
# UNDERSTANDING THE BOOM AND BUST IN NONPRIME MORTGAGE LENDING

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## INTRODUCTION

The boom and bust in nonprime[2] and nontraditional[3] mortgage lending in the United States is without precedent. The factors that fueled the boom and the way it unfolded sowed the seeds for what, in hindsight, appears to be an inevitable bust. The amount of risk in the system ballooned as a result of changes in lending practices. At the same time that credit was opened up to borrowers who had been previously denied loans because of past problems repaying their debts, many other underwriting standards were loosened. In addition, products with heavy payment reset risks proliferated in both the prime and nonprime markets. This layering of risk at or near the peak of an overheated housing market was what proved so deleterious to loan performance.

Yet few predicted that performance in the nonprime mortgage market and the way that nonprime loans were converted into securities and referenced in the global capital markets,[4] would cause a loss of investor confidence so profound that it would spark a severe global financial crisis. It was not until August 2007 that the Federal Reserve decided that the rapidly eroding performance of subprime mortgage loans—and evaporating demand for the securities they backed—was enough of a threat to the broader economy to ease monetary policy. In an unusual move, the Fed lowered the discount rate for borrowing from the Federal Reserve in between regularly scheduled meetings of the Federal Open Market Committee. Although the committee held the more important federal funds rate target constant until its September meeting, lowering of the discount

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[2] "Nonprime" encompasses subprime, Alt-A, and higher-price lending. "Subprime" and "Alt-A" are, however, imprecise terms. Typically, subprime loans are made to borrowers with credit scores below a certain cutoff (commonly a 620 cutoff, although somewhat higher cutoffs may also have been used by some lenders when self-identifying loans). Alt-A mortgages are typically loans to borrowers with near-prime credit scores and/or loans requiring little or no income documentation or that allow high debt-to-income ratios. All three nonprime loan categories also include some loans with high loan-to-value ratios. When referring to federal Home Mortgage Disclosure Act data, the term "higher-price" is used because it has a very specific definition. While often used interchangeably, the terms subprime and higher-price loans are not equivalent. Definitional issues make drawing common conclusions about nonprime lending difficult.

[3] "Nontraditional" encompasses loan products that saw only limited use prior to the 2000s, such as interest-only and payment-option loans. Interest-only loans expose borrowers to payment resets when principal payments kick in after a pre-specified period. Payment-option loans can result in negative amortization. Balloon loans also fall under the nontraditional heading, as do some adjustable-rate loans such as 2/28 loans with teasers. All these loans expose borrowers to extra risk. There is some overlap between nonprime lending and nontraditional products (and a large overlap if adjustable-rate hybrid loans with teasers are included) because some nonprime borrowers were extended these loan products.

[4] Capital markets are the secondary markets where loans with terms of one year or more, and the securities backed by them, are bought and sold.

rate signaled both its concern and willingness to take action to contain the damage from the deteriorating subprime residential mortgage market.

These interventions would prove inadequate. A little more than a year later, and within the span of less than two weeks, the government helped rescue Bear Stearns and Merrill Lynch from collapse, allowed Lehman Brothers to fail, and bailed out insurance giant AIG. Credit markets froze nearly solid in the fall of 2008, the stock market went into a freefall, and job losses accelerated sharply. The interconnectedness of the global financial system became apparent as problems emanating from residential debt in the United States and in the derivatives used to hedge and trade mortgage risk prompted a global credit crisis.

Volumes will no doubt be written about what caused the boom and bust in nonprime lending and how much of the fault should be laid at the feet of borrowers, nonprime lending practices, or mortgage lending regulations on the one hand, or the financial markets that securitized, sold, rated, insured, and invested in those loans on the other. Virtually every participant in the process has come under criticism, from borrowers to mortgage brokers and lenders; from private conduits that securitized the lion's share of nonprime mortgages to Fannie Mae and Freddie Mac which bought significant shares of the highest-rated tranches of these securities; from credit default swap issuers and ratings agencies to the regulators charged with overseeing the capital and mortgage markets; and from banks that set up off-balance-sheet structured investment vehicles (SIVs) to the lenders who extended short-term credit to those SIVs.

## Roots of the Crisis

While it is difficult to know for certain what caused the boom in nonprime lending and then the particular character of the bust that followed it, there are four broad factors that likely each played essential roles. These are: 1) global liquidity which led to low interest rates, expectations of rapidly rising home prices, and greater leverage; 2) the origination of mortgage loans with unprecedented risks through relaxation of mortgage underwriting standards and the layering of risk, especially in the private-label securities market and in the portfolios of some large banks and thrifts; 3) the magnification, multiplication, and mispricing of this risk through financial engineering in the capital markets; and 4) regulatory and market failures.

These four factors did not work in isolation from each other. Historically low interest rates and tight housing markets sparked a house price bubble and motivated homebuyers to take on more mortgage debt **(Figure I-1)**.[5] The house price bubble in turn fueled strong demand for homes and gave mortgage lenders comfort that the inflating values of the collateral backing loans were sufficient to overcome lax underwriting, while the lax underwriting and nontraditional products fueled demand that helped drive prices higher. Low mortgage interest rates and strong home equity growth also spurred record levels of cash-out refinances and other forms of home equity borrowing that added to household leverage. In addition, low interest rates caused investors to use low-cost, often short-term, debt to lever up returns on low yielding underlying mortgage and other long-term interest-bearing assets. This left investors vulnerable to liquidity risk if the value of their long-term mortgage assets fell. Financial engineering on the capital markets, for its part, resulted in large amounts of nonprime securities receiving AAA ratings that increased demand for risky nonprime loans and kept credit flowing to them. And failures to adequately price and rate risk, align incentives, and monitor counterparty risk effectively also contributed. Finally, the failure of regulation to prevent over-leverage, curb the origination of risky mortgages with aggressive underwritings, or demand transparency in the capital markets also contributed to the boom and then the financial crisis.

It could be argued that the erosion of nonprime loan performance reverberated through the global financial system because of the magnification of risk through the issuance of credit default swaps (CDS) and of synthetic CDOs made up of these CDS (both of which referenced nonprime securities and exposed investors in swaps and synthetic CDOs to the risk of the underlying nonprime securities), the lack of transparency in the CDS market, the difficulty in assessing the performance of the loans underpinning CDOs, the amount of leverage financial institutions used to warehouse or purchase nonprime securities, and the lack of adequate reserves against the risk in the underlying subprime securities and the CDS referencing them.

**Liquidity and leverage.** Arguably the driving force behind the boom in nonprime lending was the excess liquidity created in the 1990s by rapid growth in the United States and other large economies, particularly China, Brazil, and India. Perhaps in tandem with expansionary monetary

[5] Low mortgage interest rates for homebuyers sparked the house price bubble but additional factors surely fuelled it, including expectations of continuing home price appreciation and increasingly lax underwriting (Glaeser, Gottlieb, and Gyourko 2010).

policy, first in the United States and then spreading to other nations, the liquidity glut led to low interest rates.[6] As a result, a remarkable amount of cash began to look for opportunities for high returns. Pulling off such a feat required not only a search for evermore places to invest cash, but also leverage to boost returns.

The nature of the global economy produced enormous US trade deficits that could only be balanced by investment dollars flowing back to the United States from nations with trade surpluses. It was perhaps inevitable that some of these investment dollars would be put to work in the market for residential debt. Around that time, residential mortgage-backed securities (MBS) represented a larger asset class than either corporate bonds or Treasuries.

In addition, those same low interest rates allowed American homebuyers to chase house prices higher and higher without adding to their monthly mortgage payments. Easy credit prolonged and extended the boom, which would otherwise have run out of steam due to affordability constraints. Moreover, the appreciating prices protected borrowers and lenders from losses. Low interest rates and strong income growth helped lift home prices not just in the United States but in many other OECD nations, with the result that prices soared ahead of incomes in a remarkable number of countries. In fact, home prices did not increase nearly as much in the United States as in several other markets.

Still, low interest rates and changes in certain underwriting standards (such as downpayment requirements) are not sufficient to explain the run up in home price appreciation. Other important factors included an expectation of continuously rising home prices and the proliferation of new and untested products with lower initial payments and large reset risks.

**Lax underwriting standards and the layering of risk**. Rapidly rising home prices in 2000–2005 masked the risks posed by nonprime loans and lax underwriting standards. Borrowers that got into trouble repaying their mortgages early in the boom could either refinance

[6] There is an active debate on how large the role of low interest rates was in sparking the crisis. Many have argued that low mortgage interest rates played a critical role in triggering the house price bubble (see for example Himmelberg, Mayer, and Sinai 2005), while others have argued that while these rates did play a role they were not central (see for example Glaeser, Gottlieb and Gyourko 2010). An additional debate has sprung up over whether it was a glut of global liquidity or monetary policy that caused the decline in long-term mortgage interest rates, with Taylor (2009) most famously arguing it was monetary policy and Greenspan (2010) most famously arguing it was not.

their loans or readily sell their homes at a profit and repay their debt. On the investment side, demand for nonprime mortgages was strong not only because the residential mortgage market was so big and offered an outlet for excess liquidity, but also because the mortgages carried higher yields than prime mortgages and the securities backed by them carried higher yields than many corporate bonds of the same rating. As a result, the number of investment companies focused solely on mortgage debt expanded.

At the peak, the lion's share of nonprime loans was sold into the secondary market and subsequently bundled into securities, with most "structured" so that a significant share of the issued classes received high credit ratings. To satisfy strong investor and borrower demand, investment banks were willing to source loans with increasingly lax underwriting, with deeper and deeper teaser rates that would reset much higher (unless interest rates fell sharply) within a year or two, and with other risky features that lowered initial monthly payments for borrowers. This led to what we call the "origination" of risk—that is, the origination of highly risky products that had heavy payment reset risks and that were underwritten in ways that often failed to require proof of income or set high caps on debt-to-income ratios. Private conduits (investment banks and other originators selling directly into private securitizations) issued nearly all the securities backed by subprime loans, although both Fannie Mae and Freddie Mac ended up purchasing significant amounts of the highly rated tranches of those securities. As of 9/30/2009, they reported owning a total of $86 billion of subprime private label securities. Private conduits also issued most of the Alt-A MBS, though Fannie Mae and Freddie Mac stepped up their issuances of securities backed by Alt-A loans 2000-2007. As of 9/30/2009, they reported guarantees outstanding on Alt-A loans in their credit books of business of $415 billion. Some portfolio lenders also loaded up on nonprime debt.

Although relaxing underwriting standards (including credit scores cutoffs, debt-to-income ratios, combined loan-to-value ratios, and income and asset documentation) and widespread adoption of mortgage products with payment reset risks may not have been the principal contributors to the run up in home prices, they may have played a part and relaxing them did cause mortgage loan performance to be much worse in the United States than elsewhere when house prices finally fell.

**Multiplication of risk on the capital markets.** The risks being taken in the primary mortgage market were multiplied on the secondary market by financial engineering and by leveraging the investments. Mortgage-backed security issuers created increasingly more complicated securities backed by mortgage loans. Credit default swap writers issued swaps that referenced these complex securities, literally multiplying the amount of capital at risk in the event that nonprime mortgage performance was worse than expected. For their part, investors hedged against their risk by purchasing these swaps. But that also leveraged their long-term mortgage investments often using short-term debt to do so.

In many regards, it was this escalation of risk, narrowing spreads despite this escalation of risk, and its fallout, that undermined confidence in the financial system, which in turn so badly disrupted the economy and led to the heavy job losses that contributed to the deep, rapid drop in home prices and the erosion of mortgage performance. In sum, the push to extend more and more credit emanating from the capital markets—as well as what was done to the credit when it was bundled and sold as securities on these markets—helped to magnify risks and increase the exposure of the financial system to deterioration in mortgage loan performance.

**Regulatory and market failures.** Properly viewed, the problem in nonprime lending stemmed from the financial institutions that established the underwriting standards, the agencies that rated the securities backed by them, the firms that wrote credit default swaps against them, and the regulators that were entrusted with policing the system. It was they—not mortgage brokers, mortgage bankers, or borrowers—that determined the products that could be offered, the underwriting standards that would be tolerated, the requirements for capital reserves against losses, and the incentive structure for mortgage brokers, mortgage bankers, and broker-dealers that rewarded volume more than long-term loan performance. In hindsight, these were significant regulatory and market failures.

Some of the biggest problems stemmed from lax regulation and the deregulation of credit and the capital markets, including the more limited and uneven regulation and supervision of financial institutions that do not take deposits. This resulted in a patchwork of federal and state regulators and regulations. Indeed, it is clear that the nonprime lending boom was strongly driven by the

demand for private-label, asset-backed securities (securities not backed by Fannie Mae, Freddie Mac, or Ginnie Mae) and the system of mortgage banking, mortgage brokers, securities broker-dealers, securities issuers, and rating agencies that fed that demand. At the height of the nonprime lending boom in 2005, about eight in ten nonprime loans (subprime and Alt-A) were securitized, and the overwhelming majority were private label securities. By 2007, the securitized share of nonprime loans had reached nine in ten. Pinto (2010) estimates that Fannie Mae and Freddie Mac accounted for just 11 percent of Alt-A securitizations in 2005 and 12 percent in 2006. Their self-identified share of subprime securitizations was zero, though as with Alt-A, they did purchase a fraction of subprime private label securities for their investment portfolios. All else equal, the probability that a loan was higher priced was much greater for loans if sold into private-label conduits and securitizations because portfolio holders and Fannie Mae and Freddie Mac were less willing to buy them.

Subprime lending was concentrated in low-income, and especially minority communities. Minorities were far more likely, all else equal, to get higher-price loans and, because housing markets result in racial/ethnic segregation of residential areas, it was minority neighborhoods that were hit hardest by risky nonprime lending. This has resulted in the concentration of foreclosures in these communities. While it is possible to blame the victim of these problems, these problems likely would not have occurred if these practices had not been tolerated by regulators and investors. In addition, though this lending was concentrated in low-income communities, the majority of it was conducted outside it albeit in a more dispersed pattern.

Unfortunately, there is a risk that the problems encountered in low-income communities will be blamed on regulations that encouraged banks, thrifts, and Fannie Mae and Freddie Mac to increase their activities in these communities. But this would be a mistake. The problem was not, as some have argued, the Community Reinvestment Act (CRA) that imposed affirmative obligations on banks and thrifts to lend in low- and moderate-income communities. CRA played a minor role at best. There is ample evidence from carefully controlled studies of loans made by CRA lenders in their assessment areas that the loans performed comparatively well (Laderman and Reid 2008). Moreover, only 4 percent of all higher-cost loans (a proxy often used for nonprime lending) at the 2005 peak were made in areas where lenders were assessed for CRA performance.

Others have claimed that it was the affordable housing goals imposed on Fannie Mae and Freddie Mac that caused nonprime lending to become such a large share of total originations. Indeed, both agencies were under considerable pressure to purchase nonprime loans or the securities they backed, especially after regulators ratcheted up their goals in 2005 and subgoals were added that forced them to meet targets through purchases of single-family rather than multifamily loans. But shareholders, analysts, and customers also urged Fannie and Freddie to step up activity in the nonprime arena after they had lost significant market share to private-label, mortgage-backed security issuers in 2004 and 2005.

The pressure on the GSEs would not have been so great if the financial institutions and rating agencies involved in the private-label market had been more tightly regulated and supervised, or if more regulatory constraints had been imposed on the nonprime products and practices of all financial institutions. It is possible that this confluence of pressures was the more potent factor in the decisions of Fannie Mae and Freddie Mac to expand their nonprime activities around that time. While the agencies bought AAA-rated subprime securities, they were not alone in doing so. Indeed, the fact that demand for these securities far outstripped supply is evidenced by the large amount of credit default swaps that referenced them. Still, their foray into nonprime lending has been responsible for a disproportionate amount of the asset impairments the GSEs have had to take and the credit losses they have incurred on their guarantees thus far.

In sum, nonprime lending and capital market problems largely arose from widespread regulatory lapses—ratings agencies and finance companies were barely subject to federal review and regulation, credit default swap markets were allowed to flourish with a striking lack of transparency, federal laws preempted state laws that might have curbed the riskiest lending practices, and efforts by states that opted out of the preemptions were stymied by federal banking regulators claiming preemptions anyway.

Moreover, it was the regulators who set the capital standards that proved inadequate throughout the financial system. It was also they who pressed Fannie Mae and Freddie Mac to take on large shares of specifically home purchase loans at the height of the nonprime market. If there is fault to be found with capital requirements and the Fannie Mae/Freddie Mac goals, it is not with the

effort to regulate capital standards or to impose low- and moderate-income lending goals, but rather the actual standards that were promulgated. By the time rule changes made by the Federal Reserve aimed at inhibiting risk layering took effect in October 2009, the damage from issuing such risky nonprime and nontraditional loans had already been done.

### What's at Stake

Uncovering the causes of the nonprime boom and bust is essential to the formulation of effective government and business responses to the crisis. At stake are not only the safety and soundness of the financial system the next time that excess global liquidity creates pressure to relax underwriting standards and raise leverage, but also the access that Americans will have to mortgage credit, on what terms, and at what cost. Access to mortgage credit is vital to asset-building through homeownership and opens up avenues to finance consumption and investment on terms that are generally more favorable than consumer credit. It is not something that government can easily back away from without risking great economic dislocations. Especially at a time when the share of US households with credit problems has soared, how credit-impaired borrowers are treated will shape asset-building opportunities during the next economic expansion for millions of Americans. And while the recent housing bust has underscored the risky nature of investing in residential real estate, it has also created the conditions—house-price-to-income ratios in some locations at or near lows not seen since the early 1990s—that could make homeownership very attractive for years to come.

The pages that follow trace the long arc from the deregulation of mortgage lending and the development of the secondary mortgage market in the 1980s, to the introduction and expansion of automated underwriting and risk-based pricing in the 1990s—and especially the related development of a dual market where low-income and minority neighborhoods were served disproportionately by subprime specialists and lenders not assessed for performance under the Community Reinvestment Act. The story continues on through the explosion of subprime lending, lax underwriting, and nontraditional mortgage products in the first half of the 2000s. Captured within this storyline are the seeds of the stunning collapse of subprime loan performance and of the securities they backed in 2007 and 2008.

It is a dramatic story, with bold efforts by the federal government to keep credit flowing and deal with a tidal wave of loan defaults and foreclosures, millions of Americans pleading with their mortgage servicers for ways to avert the loss of their homes, investors facing losses in the hundreds of billions of dollars, and residents and neighborhoods suffering the aftermath of heavy job losses and foreclosures.

But it does not and cannot end there. From the ashes of a broken mortgage finance system, a stronger one must rise. Already, rules governing a whole new regulatory category of loans—higher-priced loans newly defined to be based off Freddie Mac average prime rates—have been implemented that impose new standards intended to limit risks (including careful documentation of income and assets, and an obligation to ensure that debt payments are manageable). In addition, a law has been passed that requires national licensing and registration of mortgage brokers. Laws have also been passed and regulatory changes made that strengthen the rules governing verification of income sand assets and disclosures of interest rates, loan fees, settlement costs, and product-related interest-rate risks. Discussions are also underway to further reform the regulation of capital markets and mortgage credit transactions.

In addition, efforts to redefine the federal role in insuring mortgages and guaranteeing mortgage-backed securities are also underway, including what to do with Fannie Mae and Freddie Mac (which were placed into federal conservatorship to keep mortgage credit flowing at a moment of crisis). Businesses are rethinking the amount of risk they are willing to take and the amount of information that they will require before they take that risk and settle on its price. They are also looking for ways to improve their modeling of risk and to reach out anew to borrowers who have had past difficulty repaying their debts, including those caught up in the deep recession and other events of the last few years.

### Organization of the Report

The story is told in seven parts. The first traces the evolution of mortgage markets in the 1980s and 1990s and lays out how this evolution helps explain the nonprime lending boom and bust in the 2000s. The second part focuses on the period 2000-2007 when nonprime lending boomed, and how it boomed. It shows how excessive risks were taken in the origination of nonprime and

nontraditional loans. The third part looks in detail at three forms of risky lending at their peak in 2005 and the start of their decline in 2005—higher priced lending (a proxy for subprime lending), piggyback loans, and loans to non-occupant owners. This part of the story underscores the dual nature of the mortgage market that emerged based on income, but especially race, the spatial implications of this, metropolitan variations in risky forms of lending, and the more limited role that Fannie Mae and Freddie Mac, as well CRA lenders operating in their assessment areas, played in high-risk lending. The fourth part takes an in-depth look at the practices in the capital markets that not only allowed massive risks to be taken in primary mortgage markets, but also multiplied the risk stemming from nonprime mortgage-backed securities. The fifth section looks at the bust in nonprime lending.

The sixth and seventh parts of the story sum up the factors that contributed to nonprime boom and bust and their implications. It spells out what all this means for how to move forward. These sections lay out the critical lessons learned from the recent past and the steps necessary to creating safer, healthier nonprime and nontraditional lending markets in the future.

# PART 1: THE EVOLUTION OF MORTGAGE MARKETS AND THE EMERGENCE OF NONPRIME LENDING

The 1980s and 1990s were watershed years for housing and mortgage markets. During the 1980s, markets were reshaped by the deregulation of financial services, the aftermath of the savings and loan crisis, and the emergence of a secondary mortgage market. In the 1990s, industry consolidation, financial innovation, expansion of the mortgage banking and brokerage businesses, technological advances in the origination process, and the advent of risk-based pricing all came into play. These developments are important to understanding the practices, products, and investment behaviors that would later bring the global financial system to the brink in the 2000s.

## High-Cost Lending, Product Proliferation, and Deregulation in the 1980s

The 1980s were a tumultuous time in mortgage funding and in the regulations governing mortgage and credit markets (McCoy and Renuart 2008). The first major piece of legislation deregulating financial markets was the Depository Institutions Deregulation and Monetary Control Act of 1980. In a context of raging inflation, this act lifted interest rate ceilings (including fees) on first-lien home mortgages. It also extended coverage of a 1978 Supreme Court ruling to all deposit-taking institutions that had allowed national banks to export their home state's interest rates to others. This effectively ended state usury caps because a bank could relocate its headquarters to a state with a very high or no ceiling and export rates everywhere.

The second major piece of deregulation legislation was the Alternative Mortgage Transactions Parity Act of 1982. This act pre-empted state laws restricting the terms on adjustable-rate mortgages, balloon payments, and negative amortization. While states had a period of time to opt out (and some did), this law paved the way for interest-only and payment-option loans that would later contribute to mounting risks in the mortgage markets.

Deregulation is widely viewed as having had a powerful role in the collapse of the thrift industry. At both the state and federal levels, deregulation allowed thrift institutions to offer new and riskier loan products while also ushering in more relaxed capital requirements and accounting

procedures. This proved a volatile mix, especially when combined with souring economic conditions in the Southwest and Midwest, an unprecedented increase in the chartering of new thrifts, and a weakening of bank oversight (Curry and Shibut 2000). Lax oversight in a market when so many thrifts were investing in an overheated real estate market led to the failure of more than a thousand institutions, at a cost to taxpayers of about $124 billion (Curry and Shibut 2000).

### The Emergence of the Secondary Mortgage Market

The credit risk on mortgages borne by deposit-taking institutions proved costly when in the 1980s steep housing price corrections occurred in the oil patch states, the rust belt, and then several coastal markets. In addition, because interstate branching was restricted, local fluctuations in deposit bases led to periodic credit shortages and differences in mortgage interest rates across states. The desire to shed credit risk and tap deeper capital markets increased the pressures to find a way to create a national mortgage market.

The same bout of inflation that led to repeal of interest-rate caps on both deposit and credit products placed special strains on the traditional system for funding and delivering mortgage credit. Banks that had lent money long to homebuyers and homeowners in the 1970s found themselves with assets paying lower interest rates than on their deposits. They had to offer these lower rates in order to attract borrowers and maintain their regulatory-required capital base. Then when mortgage rates finally did fall, homeowners who had taken out mortgages when rates were high refinanced at much lower rates, returning capital to lenders in a lower interest-rate environment and diminishing a significant revenue stream. This brutal experience with taking interest-rate risk on long-term mortgages that could be freely prepaid was another factor that pushed lenders to seek alternative ways to fund mortgages.

Although Fannie Mae was chartered in 1968 and Freddie Mac in 1970, and though Ginnie Mae issued the first mortgage pass-through security (which helps manage interest-rate risk) in 1970, it was not until severe shortages of mortgage credit erupted in the late 1970s and early 1980s that a secondary market emerged. From a strategy of underwriting, originating, and holding fixed-rate mortgage loans, the system began to migrate to a model of originating for a fee, selling into loan pools, and then converting the pools into securities with an implicit federal guarantee from

Fannie Mae or Freddie Mac. A single lender often pooled originated loans and then swapped them for a security with an "agency" guarantee. With their implicit federal guarantee and lower corresponding cost of capital, Fannie Mae and Freddie Mac were able to offer a competitively priced guarantee fee.

A liquid secondary market began to emerge as volumes increased. The involvement of Fannie Mae and Freddie Mac allowed the market to develop for at least two important reasons. First, the GSEs had the implied backing of the US government, relieving investors of credit risk. The price of the guarantee fees that Fannie Mae and Freddie Mac charged was modest and felt to completely cover the risk. Second, Fannie Mae and Freddie Mac led the development of standardized documents, underwriting practices, loan products, and servicing arrangements. This greatly lowered originating and servicing costs, and further supported liquidity (Green and Schnare 2009). Liquidity matters because liquid assets attract capital at lower yields.

The development of a secondary market was also aided by passage of the Secondary Mortgage Market Enhancement Act, which made it easier and cheaper to issue agency-backed securities, permitted financial institutions otherwise banned by state law to hold them. Lenders that had originated the loans mostly retained servicing functions.

Creation of a liquid secondary market brought more advantages than just expanding the supply of mortgage credit and transferring credit and interest risk. First, securitization removed loans from balance sheets, lowering banks' capital requirements. In cases where loans were swapped for mortgage-backed securities (MBS), this lowered reserve requirements after 1988 due to risk-based capital standards that were enacted under the Basel 1 accord that gave MBS favorable treatment. Second, sales of mortgage securities provided a source of funding that was much less sensitive to fluctuations in deposit bases in each state.

Perhaps as important as the government-implied guarantee to the success of the secondary mortgage market, Fannie Mae, Freddie Mac, and Ginnie Mae "structured" these loan pools into multi-class MBS with tranches. Tranches had different maturities and privileges to cash flows, interest payments, and principal payments from underlying mortgages in the pool. By setting up

different investment classes as tranches, the GSEs could create MBS that appealed to a wider range of investors in terms of risk, payment streams, and term structures using an underlying asset that, at least notionally, was 30-year and fixed in term. Importantly, these structured securities allowed investors with less appetite for prepayment risk the opportunity to invest in less interest-rate-sensitive tranches, while those with higher tolerance could invest in the riskier levels of the security. (Part 4 of this report discusses this process in some detail.)

As a result, the third great accomplishment of the secondary market was to move from funding long-term assets with short-term deposits to a system where tranches could be sold to investors, with some relying on short-term funds to buy shorter duration tranches and some on long-term funds to buy longer duration tranches. This system evolved further in the 1990s and took increasing market share from portfolio mortgage lenders. Especially during periods when fixed-rate mortgages were a large share of total originations and lenders wanted to offload interest-rate risk, securitization rates were quite high.

### Key Developments from the 1980s

The 1980s offer key takeaways for current housing and mortgage markets. First of all, deregulation and preemption of state mortgage lending laws would later make it difficult to challenge and resist the proliferation of risky mortgage products in the 2000s. Events of the 1980s also demonstrated what can happen when short-term debt is used to fund long-term assets and when banking oversight and capital requirements are inadequate.

The second major takeaway is that the secondary market brought many benefits, including transferring credit risk to third parties, transferring interest-rate risks to nonbank investors, and providing mortgage funding that did not rely on the shrinking proportion of savings held in banks and savings and loans.[7]

The third is that migration to a secondary market business model entailed many more counterparties and elevated the importance of measuring and managing counterparty risk

[7] See Allen and Santomero (2001) for discussion of the falling share of financial assets held by depository institutions relative to nonbank financial intermediaries. According to the Federal Reserve Board Flow of Funds, the share of total financial sector credit market assets held by commercial banks dropped from 36 percent in 1980 to 28 percent by 1990.

effectively. The ultimate investors in mortgages had to rely on the representations, warranties, judgments, and creditworthiness of many financial institutions including ratings agencies, servicers, originators, and credit enhancers (guarantors and insurers) of MBS.

It is worth noting that measurement of counterparty risk was increasingly left to the ratings agencies, which assessed the credit risk of businesses and of individual MBS issues. The fact that ratings agencies themselves might represent a counterparty risk was likely not fully appreciated until 2006 or 2007, when the performance of subprime MBS eroded sharply and they began to undergo massive downgrades.

### Economic and Housing Market Conditions in the 1990s

The regulation, structure, and conduct of the capital and mortgage markets evolved rapidly in the 1990s and set the stage for much of what ensued in the 2000s. The decade had ominous beginnings. Though relatively mild by historical standards, the 1990–1991 recession was responsible for the loss of 1.6 million jobs. Unemployment a year after the recession stood at 7.5 percent, nearly 2 percentage points higher than in 1990. Economic recovery was sluggish at first and did not hit its stride until the middle of the decade.[8]

Against a backdrop of rapidly rising, then falling, interest rates early in the 1980s, the collapse of savings and loans later in the decade, unfavorable demographics for homeownership, and then a recession, it is perhaps unsurprising that the national homeownership rate stagnated during the 1980s and the early part of the 1990s. Indeed, the rate actually fell slightly from 65.5 percent in 1980 to 64.2 percent at the end of 1993 (Figure 1-1).

As much as the early 1990s were characterized by subpar economic growth, the middle part of the decade ushered in the longest and among the most robust peacetime expansions in US history. From 1993 to 2000, 18 million jobs were created and the unemployment rate dropped to an annual average of 4 percent by the end of the decade—its lowest level in 30 years. The economy expanded at a vigorous pace driven by lower interest rates that encouraged borrowing

[8] For a thoughtful discussion of economic policy during the 1990s, see Stiglitz (2003).

and investment and by deregulation in industries from telecommunications to finance that spurred a surge in corporate profits.

In no small measure, growth was fueled by increasing leverage in the household sector as more and more homeowners tapped into their equity and ran up their credit cards. Although incomes increased, the amount of household debt increased much faster (Figure 1-2). At the aggregate level, residential mortgage debt increased from $2.5 trillion in 1990 to $4.4 trillion in 1999 (constant 2008 dollars), while consumer credit climbed from $824 billion to $1.7 trillion. Together, consumer credit and mortgage debt rose from 78 percent of aggregate disposable personal income to 88 percent during the decade (Federal Reserve Board 1990–1999).

The impact of the vigorous economic expansion on housing markets was immediate and large. The net addition of 4.0 million households to the ranks of homeowners between 1994 and 1997 set a three-year record. Furthermore, households of all income levels and races/ethnicities shared in the housing boom, although the contribution of minority households was especially large. While accounting for just 17 percent of the homeowner population, minorities were responsible for an impressive 42 percent of the growth in the number of owners between 1994 and 1997 (Joint Center for Housing Studies 1998).

### The Rise of Automated Underwriting

An important development in the 1990s was the adoption of automated underwriting (AU). Until its advent, each loan was manually underwritten in a lengthy process that involved assessing the three Cs of lending—collateral, capacity, and creditworthiness. Collateral was indicated using the initial loan-to-value (LTV). Loan officers determined capacity to repay by looking at income, savings, and employment history, relying on debt-to-income (DTI) ratios and months of reserves. They determined creditworthiness through labor intensive methods drawing on credit reports.

Automated underwriting introduced the use of quantitative methods to assess and price mortgage risk. Loan assessment had always been highly dependent on the applicant's credit profile. Prior to the 1990s, however, this evaluation was done without benefit of a credit score. Loan officers instead conducted a case-by-case review of the credit history of each applicant to make a

determination of the risk of the loan. Each lending institution had its own standards, along with voluminous guidelines from Freddie Mac and Fannie Mae. In addition to the thousands of institutional underwriting standards, each loan application was subject to the personal evaluation of individual loan officers (Straka 2001).

This subjectivity raised concerns about racial discrimination in the mortgage application process. Research conducted by Freddie Mac found that automated underwriting using credit scores and other quantitative measures of risk (such as loan-to-value and debt-to-income ratios) was more successful at predicting default than the manual method. Automated underwriting also increased opportunities for applicants at the margin of the credit spectrum, increasing mortgage credit to low-income and higher-risk borrowers (Gates, Perry, and Zorn 2002).

In tandem with automated underwriting, credit scores became the industry standard for evaluating creditworthiness. Under the manual method of credit evaluation, an applicant was assessed on numerous sets of related criteria such as employment, income, job tenure, past homeownership, and rental history. Credit scores quantified the complex process of credit evaluation by executing "an exhaustive statistical analysis of actual credit experience to determine which factors should be considered in credit decisions and the weight that each factor should be accorded" (Fishelson-Holstein 2004). The mortgage industry hailed credit scores for increasing both the accuracy and speed of the underwriting process while reducing the costs of originations. In addition, credit scores did not take race, ethnicity, gender, or national origin into account, thus precluding the possibility of intentional discrimination in the underwriting process.

In keeping with their congressional mandate, the GSEs standardized industry lending practices. The implementation and use of credit scores was no exception. By the late 1990s, Freddie Mac and Fannie Mae considered scores below 660 as subprime and therefore ineligible for the same loan terms given to prime originations.

In addition, by law the GSEs could not purchase loans that exceeded 80 percent of the value of the property unless the borrower paid for private mortgage insurance (PMI). The GSEs also curbed risky behavior by lenders by requiring that sellers of mortgages to repurchase loans in

default and retain at least a 10 percent participation interest in the mortgages that had LTVs greater than 80 percent and did not have private mortgage insurance or were not sold with recourse (Freddie Mac 2004). The 10 percent rule effectively prevented lenders from conveying loans to the GSEs with LTVs over 80 percent without private mortgage insurance.

When applied in the prime conforming segment (dictated by the loan limits imposed on Fannie Mae and Freddie Mac and the loans they were willing to accept), automated underwriting was used mostly to lower costs, allow flexibility in underwriting, and more accurately discern both the probability and loss severity of default. It was not used to take on large new and unpredictable risks. Flexibility was exercised through "compensating factors" in which stretching one underwriting ratio was offset by tightening another. Larger downpayments could, for example, offset the risk of higher payment-to-income ratios. In ex-post evaluations of loan performance, the ability of automated underwriting to discern good from bad risks was striking relative to manual underwriting. This led to the expansion of mortgage credit on prime terms at a uniform interest rate to many borrowers previously denied loans, but without lowering credit score cutoffs or adding significantly to expected risk (Gates, Perry, and Zorn 2002).

### The Rise of Risk-Based Pricing and Nonprime Lending

In the subprime market, however, automated underwriting was used to set the interest rate lenders felt they needed to charge to compensate them for the higher risk of lending to borrowers with credit scores below the GSE threshold or with other nonconforming features that the GSEs would neither buy nor insure. Subprime lenders were also able to take business from FHA by offering similar products, marketing them more effectively, and in some cases undercutting the agency on price. The private market was also able to offer a quicker loan origination process.

This shift to risk-based pricing had dramatic consequences for consumers. For the first time, rather than being rationed through strict underwriting in a market with little product variation and great transparency in pricing, credit became available with wide variation, little transparency in pricing, and significant differences in terms and features. Consumers found it difficult to comparison shop because the pricing was so tailored and involved conveyance of a great deal of information and an application fee before even an initial price quote was offered.

On top of this, brokers had incentives to try to exact yield-spread premiums (fees paid back to brokers for loans delivered at an interest rate above that demanded by the lender). These premiums were settled as upfront fees. In theory, yield-spread premiums were harder for consumers to detect in the subprime market because, unlike in the prime conforming market where a narrow range of rates and points from lenders could be found in local papers, a range of subprime wholesale loan rates were not publicly posted. We could find no studies, however, that found that subprime lending in fact involved larger or more frequent yield-spread premiums. In fact, an FHA closing cost study found surprisingly high and variable yield-spread premiums on FHA loans, which are thought of as a single-price market like the prime conforming market (Woodward 2008).

Initially at least, subprime lending emerged to help people get bridge loans when buying one home before having sold another, who wanted to tap their home equity and had low loan-to-value ratios but had poor credit records, and who had experienced a disruption in income that had led to default to get credit once their income recovered (White 2006). Loans typically had fixed rates and were given to borrowers that had tightly underwritten debt payment-to-income ratios and low loan-to-value ratios. These borrowers were charged a higher interest rate with the expectation that they would refinance into prime loans once they had reestablished their credit ratings. While some lending was collateral-based without much regard for the borrower's debt-carrying capacity, this form of lending was not mainstream subprime practice. Lenders that engaged in it were faulted with being predatory because borrowers stood a good chance of defaulting, having to refinance and pay fees to do so, and eventually ending up with their homes in foreclosure. In fact, in the 1990s, subprime lending was known as B and C lending, referring to the low credit scores of borrowers.

The category "Alt-A" or "A" also emerged during the 1990s, but remained only a fraction of the volume of subprime loans during the decade. This category was largely used to signify loans to people with credit scores only slightly below prime conforming cutoffs, but more importantly, loans to people with good credit scores that wanted to not fully document their income, or to put little money down.

The impetus for the solid growth in nonprime came mostly from the strong investor and consumer demand for these loans (see Alexander et al. 2002; Ernst, Bocian, and Li 2008; and Green 2008). Nonprime loans constituted a form of credit that was previously nearly unavailable, and a market quickly formed. The consumer demand for this credit, even at higher rates, proved strong. Investor demand was high because of the higher yields available in the nonprime market. Finance companies found the yields attractive, and at first most nonprime loans were retained in portfolios (White 2006). But increasingly, nonprime loans were securitized.

From 1995-1998, subprime and Alt-A loan volumes rose but their shares of total lending held steady as measured by Inside Mortgage Finance (Figure 1-3). Then in 1999 and 2000, when conditions in the credit markets caused a flight to quality, subprime and Alt-A loan volumes fell and their share of total lending edged lowered. From 1995 to 1998, the subprime market increased from $85 billion to $178 billion (constant 2008 dollars) before the temporary 1998-2000 dip. Alt-A lending more than doubled from $14 billion in 1995 to $31 billion in 2000 (Inside Mortgage Finance 2009). While this growth was impressive, it was not until the 2000s that nonprime lending as a share of total originations exploded. It is important to note that an alternative measure of subprime lending discussed below—HUD's use of a list it created of subprime lending specialists—suggested that growth in lending by subprime specialists was dramatic and concentrated in low-income and minority census tracts.

### The Rise of the Asset-Backed Securities Market for Nonprime Mortgages

The lender standards, underwriting guidelines, and mortgage insurance requirements imposed by Fannie Mae and Freddie Mac kept the nonprime market separate and distinct from the agency market, at least during the 1990s before the two companies began to take on Alt-A loans. As lenders sought to expand credit to a riskier pool of mortgage borrowers and offer alternative products that allowed homeowners to stretch their incomes and escape making monthly private mortgage insurance payments, they had little choice but to hold these nonprime loans in their portfolios. As a result, they started to seek secondary market outlets for them other than Fannie Mae and Freddie Mac. These lenders found that ready outlet in the quickly emerging Asset Backed Securities (ABS) market where counterparty controls were weaker and lending standards less restrictive.

The development of the ABS market in the 1990s opened the door for the mass securitization of subprime home mortgages. ABS are considered private label or non-agency MBS because they are backed by assets held in a special trust and *not* backed by Fannie Mae, Freddie Mac, or Ginnie Mae (Ginnie Mae is federal guarantee of MBS backed by FHA government-insured loans). Like MBS, the securities are created by gathering assets that collect receivables over time and pooling these receivables to form a security that is sold to investors. In addition to home mortgages, the assets may include credit cards, student loans, or automobile loans.[9]

Feeding the ABS market were private conduits—financial institutions that bought and securitized receivables from a wide variety of debt-related assets that were not mortgages or did not fit within the credit standards of Freddie Mac and Fannie Mae. Loans above the limits of Fannie Mae and Freddie Mac but meeting prime underwriting standards were also issued by private conduits. These jumbo loans, however, were not considered part of the nonprime market while most of the rest of the ABS market was. Through the private label market, large Wall Street firms became active in the securitization of—and investment in—loans that fell outside of GSE credit standards.

From 1985 to 1995, the private label MBS market grew from just $3.9 billion a year to fully $69 billion in constant 2008 dollars, and continued to grow rapidly after 1995. While total MBS issuance increased more than 70 percent in real terms from $449 billion in 1995 to $769 billion in 2000, non-agency MBS issuance increased more, from a real annual level of $69 billion in 1995 to $170 billion in 2000. This lifted its share of MBS issuance from 15 percent in 1995 to 22 percent in 2000 (Inside Mortgage Finance 2009).

The growth of the ABS market also had implications for the amount of reserves lenders had to hold to guard against risk.[10] Fannie Mae and Freddie Mac charge a guarantee fee, a portion of which is held in reserve to cover expected losses. If a loan has a loan-to-value ratio over 80 percent, a mortgage insurer charges an additional premium to guard against the known and heightened risk. FHA also charges a premium and Ginnie Mae a guarantee to cover expected

[9] According to the Securities Industry and Financial Markets Association, there was $258 billion in outstanding ABS in 1995. Credit card assets comprised roughly half while auto loans made up 18 percent, and home loans (including for manufactured housing) made up 17 percent.
[10] See Guttentag (2008) for a discussion of this issue.

losses. But ABS involves issuing and selling securities to investors that, unless they have capital requirements, do not have to hold any particular sum to cover losses. This brings a higher probability that losses will not be reserved against. Structured securities, as discussed more fully in Part 4, did have various forms of credit enhancements, but the most junior had little protection.

### The Emergence of a Dual Mortgage Market

The extension of subprime credit had a particular geography.[11] Lending by subprime lending specialists was much more concentrated in low-income, minority neighborhoods than in higher-income neighborhoods (Figure 1-4). From 1993 to 2001, subprime mortgage specialist shares (as identified by the Department of Housing and Urban Development based on the specialization of lenders) in these neighborhoods increased from 2.4 percent to 13.4 percent of all home purchase originations, and from 6.8 percent to 27.5 percent of all refinances. Subprime lending specialist shares in predominantly white, low-income neighborhoods jumped as well, climbing from 1.0 percent to 11.5 percent of purchase originations and from 2.8 to 16.7 percent of refinances (Joint Center for Housing Studies 2001).

Thus, there was geographic segmentation of subprime lending activity along income and racial lines. Without careful controls, it is difficult to judge whether this pattern entailed intentional discrimination. Indeed, one might expect this pattern since minorities have lower credit scores on average than whites. But reliance on credit scores to distinguish those who would get a single-priced prime loan rather than a wide range of higher-priced subprime loans certainly had a disparate impact on minorities regardless of their incomes.

In a 2004 study, the Joint Center for Housing Studies combined HMDA and census data to look at the spatial distribution of prime and subprime specialists loans made between 1993 and 2001. The study found that, all else equal, the higher the share of African American residents in a neighborhood, the lower the odds that any borrower in that neighborhood would receive a prime loan. The analysis confirmed that many factors contributed to the disproportionately high share

[11] Several studies have looked at the geographical dispersion of subprime originations prior to 2004, when these loans grew from a niche product to a popular means of reaching potential homebuyers with below-prime credit. See, for example, Scheessele (2002), Calem, Gillen, and Wachter (2004), and Avery, Canner, and Cook (2005).

of subprime loans to black and Hispanic borrowers. Controlling for a wide range of neighborhood and borrower characteristics reduced the effect of race on the probability of receiving a subprime loan, although it remained a significant factor.

Even controlling for borrower and neighborhood income, the study found that residents of neighborhoods with relatively higher rates of mortgage denials in the past and lower shares of college-educated adults were more likely to take out subprime loans. This suggests that subprime lenders might have targeted neighborhoods where borrowers had less ability to shop prices and compare mortgages.

The study also examined the effects of competition and lender characteristics to test the emergence of a dual mortgage market. As expected, borrowers were more likely to have subprime loans in neighborhoods with fewer major banks and outside CRA assessment areas. Relative to loans held in portfolio rather than resold, subprime loans were much more likely to be sold into the ABS market than to a GSE or traditional bank.

Later studies, based on a better measure of subprime lending using information on "higher priced mortgages" and released beginning in 2004, confirmed what studies based on lender specialization found (Apgar et al. 2007).

### The Deepening of the Originate-to-Distribute Model

The originate-to-distribute model, which had begun to take off in the 1980s, expanded in the 1990s. While many lenders continued to use the traditional originate-to-hold model, especially for adjustable-rate mortgages, they increasingly sold their loans into the secondary market. The originate-to-distribute model was executed through two primary channels. In the traditional retail sector, institutions underwrote and originated loans, and then either sold them to another lender or securitized and sold them in the secondary mortgage market. In the correspondent retail channel—composed of brokers, thrifts, and community banks that acted on behalf of other lenders, originators did not fund their own loans but instead originated and sold them immediately to larger wholesale lenders on previously agreed upon terms. The wholesalers typically retained the servicing rights to the pools of loans they sold into the secondary market,

thus earning a servicing fee as well as an origination fee. For most of the 1990s, traditional retail activity made up about 40 percent of the market and the correspondent share was about 60 percent (Inside Mortgage Finance 2008).

The originate-to-distribute model had enormous appeal. For one thing, it was the path to all the considerable benefits of the secondary market—lower capital requirements if a lender swapped loans for guaranteed securities, limited need for capital for correspondents and brokers, ability to replenish capital, access to liquid markets, transfer of risks to parties best able to manage them, and scale efficiencies and economies. In addition, lenders, correspondents, and brokers could earn fees on loans they sold into the secondary market. And lastly, the model enabled a flexible, variable-cost network of brokers to serve millions of mortgage customers annually. The cost of controlling the point of sale through a fixed-cost structure of employees and branches fell increasingly out of favor.

But the originate-to-distribute model is fee-based, requiring investors to rely on third parties to underwrite, originate, and service loans on their behalf. In such a system, it is important to manage the risk that third parties will act in a way that is adverse to the interests of the ultimate investor (principal-agent risk). One important counterparty risk protection in both conforming and nonconforming markets is the tendency for sellers to retain servicing rights, thus linking payouts of fees and the costs incurred in servicing loans to long-term performance. In this and other ways, such as post-purchase or third-party audits and ratings of mortgages in pools, investors sought to protect themselves from the risks of the originate-to-distribute model.

But counterparty risk protections were not the same in the agency and private conduit markets. In the case of the agency conforming market, Fannie Mae and Freddie Mac had a more established infrastructure to identify and manage counterparty risk. The two GSEs did audits, demanded representations and warranties from approved sellers and servicers, and established significant requirements for putting capital at risk. This may have been less true in the nonconforming market, though this has not been well studied.

Still, even the conforming chain often relied heavily on brokers whose incentives were all front-loaded and did not involve retention of risk or payout based on long-term loan performance. This created opportunities for misaligned incentives, with brokers interested in consummating loans while investors and guarantors were interested in long-run performance. During the 1990s, brokers steadily increased their share of the originations from 18.8 percent in 1994, to 27.9 percent in 2000, to a peak of 31.3 percent in 2005 (Figure 1-5).

### Channel Consolidation and Concentration

Another transformation in the mortgage industry during the 1990s worth mentioning is the high and accelerating pace of consolidation among lending institutions. The removal of interstate banking requirements spurred a decade-long series of mergers and acquisitions as large lending institutions, seeking economies of scale in branding and reduction of risk through geographic diversification, expanded across state lines (Apgar and Fishbein 2005). In addition, new Internet and telecommunication technologies expanded the ways in which lenders could reach customers and reduced the need for branch offices. In the quest for increased earnings, banks also began to acquire and organically grow their own mortgage banks to earn origination and servicing fees. Automated underwriting also helped to fuel consolidation by enabling lenders to scale up or down quickly and efficiently in response to changes in mortgage demand.

Industry consolidation changed the face of mortgage finance. In 1996, the largest 25 lending institutions accounted for 40 percent of the $785 billion in home purchase and refinance originations. By 2008, their share had grown to more than 90 percent (Figure 1-6). Mortgage servicing also was consolidating (Figure 1-7). This meant that the decisions of a handful of financial institutions had profound consequences for mortgage markets and that the failure of any one could have serious impacts. It also meant that community-based organizations increasingly had to press their case around local lending practices with large institutions usually headquartered elsewhere, rather than with smaller regional and local banks with which they had long-term relationships and which tended to be more responsive to local concerns and demands.[12]

[12] See Joint Center for Housing Studies (2004) for a detailed discussion of the implications of consolidation in the mortgage industry on community-based organizations.

## The Shifting Regulatory Landscape

The regulatory landscape changed in a number of different ways in the 1990s that had an impact on the conduct of mortgage lending. There are heated debates over the extent to which each allowed, encouraged, inhibited, or had no appreciable impact on the growth in nonprime lending and excess risk taking. Some of the new regulations curbed practices in the subprime market while others stiffened pressures on banks, thrifts, and the GSEs to lend to low-income and minority borrowers and areas. Still others furthered the deregulation which began in the 1990s, including regulatory actions that gave more latitude to national banks and thrifts to pre-empt state laws, laws that reduced capital requirements, and laws that permitted financial services companies to branch into multiple business lines previously disallowed from being combined in a single entity. In addition, industry developments—particularly the expansion of the originate-to-distribute model—resulted in financial institutions outside the banking sector (and beyond the reach of tighter federal supervision) growing in importance.

### *New but Limited Restrictions on High-Cost Loans*

By the early 1990s—even before subprime lending really took off—reports of abusive and predatory practices were on the rise. This led to passage of the Home Ownership and Equity Protection Act (HOEPA) of 1994. At that time, subprime lending was largely limited to refinancing and home equity loans and lines of credit. According to HMDA data, subprime loans made up 4.5 percent of first-lien refinance activity in 1994, but just 1.0 percent of home purchase loans.[13]

Although lenders charged higher rates and fees to offset the greater risk of lending to borrowers with poor credit histories or who applied for mortgages with high payment-to-income ratios, concerns surfaced that some borrowers were being overcharged (Goldstein 1999). In addition, because most subprime loans initially were for refinances—sometimes repeated refinances with fees rolled into the mortgage balance—there was concern that some lenders were earning high fees and stripping equity from borrowers. HOEPA was aimed at limiting abusive practices by

[13] Joint Center for Housing Studies (2001).

requiring stricter disclosure requirements and prohibiting certain types of high-cost loans.[14] But the law applied to refinance loans only and set relatively high thresholds: the annual percentage rate had to exceed the yield on a comparable Treasury by eight percentage points in the case of first liens and ten percentage points in the case of second liens, or points and fees had to exceed eight percent of the total loan or $400, whichever was greater.

### *Regulatory Pressures to Meet Underserved Market Needs*

During the 1990s, the regulatory pressure on banks, thrifts, and Fannie Mae and Freddie Mac to lend to minorities and low-income borrowers and communities increased. While a 1992 law imposed affordable and underserved area lending goals on Fannie Mae and Freddie Mac, two laws passed in the 1970s—the Home Mortgage Disclosure Act (HMDA and the Community Reinvestment Act (CRA)—began to exert much more influence than they had before. CRA had imposed an affirmative obligation on banks and thrifts to lend to low and moderate income communities while HMDA had demanded the disclosure of lending patterns of mortgage loans originated in metropolitan areas.

Until the early 1990s, HMDA required most large lenders to publicly disclose the number of mortgage loans they originated by census tract. This information was combined with data on racial and income characteristics to explore the extent of lending in low-income and minority communities. Pressure in Congress mounted to expand the data released under HMDA after a series of articles appearing in the *Atlanta Journal Constitution* (Dedman 1988) exposed sharply higher mortgage denial rates among minorities in the Atlanta area.

Beginning in 1989, the Federal Reserve modified regulations governing HMDA disclosures, requiring that a larger group of mortgage lenders report not just on loans originated but also on applications received, the decision whether to accept or reject the applications, and the income and race of loan applicants. This prompted a number of studies that strongly suggested discrimination in mortgage lending. When combined with the discrimination suits brought by the

[14] In addition to alerting borrowers early in the process that they were receiving a high-cost loan, three days before closing lenders had to provide a disclosure that included the final APR, amount of monthly payment, any balloon amount, principal borrowed, any fees for credit insurance or debt cancellation and, in the case of variable-rate loans, the maximum possible payment.

US Department of Justice[15] and a highly influential study on mortgage lending conducted by the Federal Reserve Bank of Boston,[16] lenders came under greater pressure to police themselves for compliance with antidiscrimination laws and to find ways to decrease rejection rates among minority borrowers.

While during the 1980s, advocacy groups armed with HMDA data on lending patterns used CRA to pressure banks into making commitments to serve low-income communities, it was not until the 1990s that the law began to exert greater pressure on banks and thrifts. Although many agreements were signed that pledged investment in these communities (Bostic 2003; Schwarz 1998), it was not until 1989 that the teeth in the law—the authority of regulators to deny or condition a merger or acquisition application on CRA grounds—first bit. In that year, the first acquisition or merger to be denied grounds—Continental Illinois Bank—occurred. In addition, CRA regulations were tightened. CRA grades were made public so that it was easier to pressure large banks with reputation risk to strive for outstanding ratings, and grading standards were made more explicit, first in 1989 and then focused on quantitative assessments in 1995. In addition, acquisitions and mergers picked up sharply in the 1990 after restrictions on interstate branching were relaxed under the Riegle-Neal Interstate Branching Act of 1994. This made it more important to have high a CRA grade.

It is clear that HMDA and CRA, working together, pressured banks and thrifts to do more to serve low-income communities and minorities. In focus sessions conducted for a Treasury report to Congress on the impact of the Community Reinvestment Act, participant after participant underscored the important role that HMDA played in precipitating lender action.[17] As discussed more fully in Part 6 of this report, however, the role that CRA may have played in the nonprime boom and bust has become a subject of debate. The evidence of CRA having played at best a minor role is strong. First, the total share of all lending done by CRA lenders in their CRA assessment areas was a small and declining share of total mortgage lending during the 1990s

[15] In particular, United States of America v. Decatur Federal Savings and Loan Association, N.D. Ga., No. 1-92 CV2128 (1992).
[16] Munnell et al. (1992) found that minorities were about 50 percent more likely to be denied mortgages, controlling for creditworthiness and other variables. Some critics found fault with the data and methodology of the Boston Fed study (see, for example, Zandi 1993), while others re-examining the same data found evidence of discrimination (Carr and Megbolugbe 1993). Becker (1993) argued that comparing default rates was a better test for discrimination.
[17] Belsky, Lambert, and von Hoffman (2000).

(Figure 1-8). Second, only a tiny share of all higher-priced loans was made by CRA lenders in their assessment areas.

As for Fannie Mae and Freddie Mac, the Federal Housing Safety and Soundness Act of 1992 directed the Department of Housing and Urban Development (HUD) to impose affordable housing goals for the GSEs to solidify their mission to expand opportunities for low-income and minority borrowers. The goals directed the GSEs to purchase a certain percentage of loans originated to low- and moderate-income borrowers, low-income borrowers in low-income neighborhoods, and borrowers living in areas underserved by traditional lenders.[18] From 1994 to 2000, the required percentage of purchased loans increased from 30 percent to 50 percent. The effect of the HUD goals on housing markets has also been fiercely debated. While the importance of the goals in pushing the GSEs into the nonprime market relative to other forces is unclear, research indicates that the targets did at least increase the flow of conventional *prime* mortgage credit to low-income and minority households (An and Bostic 2008 and 2009).

### *Further Deregulation*

Late in the decade, banking and financial services were deregulated once again. Passage of the Financial Modernization Act of 1999 repealed a prohibition that had been in place since the Great Depression on any one financial institution combining an investment bank, a bank, or an insurance company. In fact, banks had already begun to offer investment services and the merger of Citibank and Traveler's Insurance Company was conditionally approved under the assumption that a law would be passed to allow the combination. Nonetheless, passage of the act ushered in another round of consolidation.

The Financial Modernization Act further concentrated risk in the hands of major financial conglomerates, strengthening the perception that they were too big to fail. Indeed, as later events would demonstrate, the federal government was prepared to step in with massive capital infusions to prevent several large bank holding companies from going under. That said, it was an

[18] The low- and moderate-income goal mandated that a percentage of agency purchases be targeted at loans in which borrowers made 80 percent of the area median income. The second goal targeted census tracts that had been underserved by the traditional mortgage system. Underserved areas were defined as census tracts where at least 30 percent of the population is minority and the median family income is at or below 120 percent of the median income for the area. The third goal, the special affordable goal, required the GSE to make a certain percentage of the purchases of loans from borrowers whose incomes were equal to 60 percent or less of the area median income.

insurance company (AIG) and a pure investment bank (Lehman Brothers) that precipitated the biggest problems.

In addition to this major piece of legislation, the Office of the Comptroller of the Currency (OCC) and the Office of Thrift Supervision (OTS) claimed an increasing number of preemptions of tighter state regulations of credit.[19] OTS led the way, and in 1996 issued a particularly sweeping preemption after public notice and comment periods.[20] In addition, the decline in the share of lending by CRA-regulated financial institutions and the rise of finance companies and investment banks feeding the ABS market meant that fewer regularly examined institutions were originating and securitizing loans. This shifted more and more lending to what has been described as an "unregulated fringe." (These lenders did, however, face some scrutiny by regulators, though the closeness of their supervision was less.)

### *Intensification and Growing Importance of a Dual Regulatory Structure*

Even in the 1980s, a dual regulatory system existed in which nationally chartered banks and thrifts were supervised by federal banking regulators and the rest of the financial institutions were regulated by a patchwork of state and local regulators. But during the 1990s, federal banking regulators claimed increasing preemptions of state laws that, despite many efforts through federal laws to preempt them, continued to try to regulate financial services firms and their extension of mortgage and consumer credit. These preemptions were claimed even for the mortgage bank and finance company operating subsidiaries of banks and thrifts regulated by the OCC and OTS, though not for their state-chartered affiliates. This not only intensified deregulation, but also left independent mortgage and finance companies outside the laxer regulatory environment. For their part, nationally chartered banks were subject to higher licensing and examination fees as well more stringent capital requirements than state chartered banks and nonbank financial institutions. This created a second dimension to the dual system.

In the case of nonbank financial institutions such as finance companies, mortgage bankers, and mortgage brokers, CRA regulations did not apply, while examination and supervision were generally less uniform and sometimes less stringent for independent firms.. By and large, even operating

[19] See McCoy and Renuart (2008) for a list of the preemptions eventually asserted by the OCC and OTS.
[20] 12 C.F.R. Section 560.2.

subsidiaries of bank holding companies were not examined and supervised as closely by federal regulators as the bank and thrift parts of these holding companies.[21] Moreover, it was left up to the bank holding company whether to include nonbank operating subsidiaries for CRA purposes.

### Key Takeaways from the 1990s

The mortgage industry changed in fundamental ways in the 1990s. On the one hand, automated underwriting and the use of statistical scoring methods—in combination with CRA, HMDA, and GSE goal pressures—opened up credit on prime terms to low-income and minority borrowers who had been previously been denied loans under the old system. There is some evidence to suggest that some cross-subsidization of poorer risks from better risks occurred, and that banks in a handful of markets competed for outstanding CRA ratings by offering at least some mortgages at below-market rates.[22] The system thus worked to the benefit of low-income and minority borrowers, while also maintaining prime lending standards. Although allowing higher loan-to-value ratios, Fannie Mae and Freddie Mac were protected to some degree by the requirement in their charters to have private mortgage insurance on loans with less than 20 percent down. .

On the other hand, a subprime market of specialist lenders emerged that offered borrowers higher interest-rate loans and started to sell them through private conduits into the ABS market. Borrowers that went through the subprime channel had a more difficult time comparison shopping and were vulnerable to a new form of discrimination in the mortgage lending—on interest rates, fees, and terms rather than on acceptance or denial. Subprime lending was far more concentrated in low-income than in moderate- and higher-income areas and, even after controlling for income, more heavily concentrated in predominantly minority areas than in mixed or predominantly white neighborhoods. And as we shall see, even after controlling for a variety of factors that might influence the probability of receiving a high-cost loan, race and ethnicity appear to still be significant.

[21] For example, the Financial Modernization Act limits the authority of the Federal Reserve to examinations of affiliated mortgage companies to those that could affect the safety and soundness of any bank and thrift. The late Federal Reserve Governor Edward Gramlich also noted the tendency not to closely examine nonbank affiliates (Gramlich 2007).

[22] The finding that the Community Reinvestment Act encouraged some degree of below-market lending and lending in the prime market that carried greater risk has caused concern about the CRA's market-distorting and risk-producing properties. See Pinto (2009) and Avery, Bostic and Canner (2000).

Within this subprime world, at least some operators were willing to violate laws and make predatory loans. HOEPA was passed in response, but was viewed by some as providing a safe harbor for higher interest rates and fees before its provisions kicked in. Moreover, the law did not prohibit many forms of lending and lending practices, but instead demanded heightened disclosure requirements.

The expansion of the originate-to-distribute model—especially the private conduit piece conducted in part without the same level of counterparty risk measures taken in the agency conforming market—increased risk in the housing finance system. Risk also became increasingly concentrated in the hands of fewer and fewer financial institutions—including large banks, thrifts, and Fannie Mae and Freddie Mac—even as the proliferation of MBS and ABS exposed more and more investors to credit risk in residential real estate.

Finally, the migration of mortgage lending from banks and thrifts toward investment banks, securities firms, finance companies, and mortgage brokers meant that practices in an increasingly large part of the market were subject to less intense regulation and less regular supervision. In addition, federal banking and thrift regulators claimed increasing rights to preempt state laws that were being put in place to address perceived lending abuses and the weakness of federal regulations.

# PART 2: THE RISE OF LIQUIDITY AND LEVERAGE AND THE ORIGINATION OF RISK IN THE 2000S

Deregulation and growth of the secondary market in the 1980s, followed by expansion of risk-based pricing and the ABS market in the 1990s, set the stage for the nonprime lending bust that was to follow. But it was not until the 2000s that a glut of global liquidity and low interest rates sparked a housing boom and the willingness of investors to tolerate much greater risks. It was during this period that risks were originated—including higher leverage levels, a proliferation of nontraditional mortgage products, and easy financing granted to real estate speculators—which were at the center of the collapse of mortgage loan performance. In addition, markets were deregulated even further and the 1999 Financial Modernization Act took effect. This layering of risk, late in a housing cycle and without a commensurate regulatory response, proved very damaging.

## Global Liquidity and Low Interest Rates

During the 1990s, the United States enjoyed its longest economic boom in postwar history and several large nations scaled the steep part of the industrialization growth curve (Figure 2-1). This created enormous wealth, both in the United States and abroad. The US trade balance widened and dollars paid for imports found their way back to this country in the form of investment. This caused interest rates to moderate, stimulating both consumer borrowing and spending (Caballero, Farhi, and Gourinchas 2008a, 2008b; International Monetary Fund 2009).

Then, in late 2000, in an effort to stymie the effect of the dot-com bubble and what Federal Reserve Chairman Alan Greenspan viewed as a deflationary threat, the Fed began to aggressively lower the federal funds rate. Over the next four years, the federal funds rate would drop from a high of 6.5 percent to a low of 1.0 percent.[23] The effect of lower mortgage interests and escalating house price appreciation on the housing market was extraordinary on both sides of the mortgage transaction. Homebuyers could pay more and more for homes without seeing their monthly payments go up, sparking a surge in home prices. Lenders were able to profitably

[23] It is beyond the scope of this paper, but worth noting, that there a debate over whether it was monetary policy or the global liquidity gut that drove interest rates down and whether it was long-term mortgage rates which the central banks exerts far less control over or short-term bank lending rates which it does that contributed to the house price bubble (Greenspan 2010).

expand their arsenal of mortgage products to help homeowners follow prices higher, thinking they could count on price appreciation to keep loan performance strong. This fed the boom.

As home sales soared, builders rushed to keep up with demand. Investors looking for quick returns poured into the housing market. But homeownership became increasingly unaffordable when interest rates stopped falling in late 2003 while home prices continued to climb at a 6.7 percent annual rate (Figure 2-2). As brisk as this pace was, national house prices would accelerate even further in 2004 and 2005, soaring to double-digit growth rates. Prices spiked in many metropolitan areas of the country, particularly those along the coasts. Affordability had already begun to erode in some markets as early as 2003, as house price appreciation outpaced the benefits of still-easing interest rates. Price increases and rising interest rates in 2004 then put pressure on affordability even in areas that did not experience outsized levels of appreciation.

The tendency for people to spend more when the value of their assets is appreciating led to heavy home equity borrowing and rapidly growing consumer spending, feeding the economic and housing market boom (Belsky and Prakken 2004). According to Freddie Mac, real cash-out refinancing and consolidation of second loans through refinancing increased from $75 billion in 2000 to $263 billion in 2003, peaking at $370 billion in 2006. All this borrowing also shrunk equity cushions, despite escalating home prices. The aggregate home equity-to-value ratio reached a record low of 55 percent in 2006 before house prices collapsed (Figure 2-3).

In grappling with the causes of the boom and bust in nonprime lending, it is important to recognize that global liquidity and low mortgage interest rates played a central role. They helped spark the record rates of home price appreciation that led housing markets to overheat (though they do not come close to fully explaining it – income growth, changes in construction costs, and price expectations that caused huge deviations from house price growth expected based on fundamentals also drove appreciation). This overheated market made homebuyers and investors more willing to take on risk.

The United States was not alone in seeing its house prices rise at an unusually rapid pace. In fact, this country was at the low end of the spectrum of nations that saw explosive growth in home

prices (Figure 2-4). None of these nations was spared from a subsequent drop in home prices, but most did not suffer such dramatic erosion in mortgage loan performance. What was different in the United States than in many other countries was the impact the decline had on loan performance because US lending standards were more relaxed than those in most other countries. The US experience can be contrasted with that of a country like Denmark, which also saw home prices increase sharply but which maintained an 80 percent maximum loan-to-value ratio and full income documentation requirements. Canada also maintained tighter standards and its nonperforming loan share managed to remain less than a fifth of that in the United States (Lea 2010).

### Mounting Investor and Homeowner Leverage

Liquidity and low interest rates also contributed to the nonprime lending bust by encouraging greater leverage in the housing market. Traditionally, underwriting standards limited the amount a US homeowner could leverage a downpayment. Indeed, outside FHA (which permitted downpayments as low as 3 percent but charged a steep insurance premium), downpayments of less than 5 percent were unusual until the latter half of the1990s (Jaffee and Quigley 2007).

During the 2000s, however, lenders were much more willing to allow borrowers to put down small amounts, and combined LTV ratios (including piggyback second mortgages taken out at the same time as the first lien) climbed. In 2003, roughly one-fifth of subprime and Alt-A home purchase mortgages were accompanied by a simultaneous piggyback second mortgage. By 2006 the share with piggybacks had risen to over half. Over the same time period the share of jumbo mortgages with piggybacks increased from 11 to 33 percent (Zelman et al. 2007). This critical development indicated the willingness not only of homeowners to leverage their savings but also of investors to take greater risk. It has long been recognized that the LTV ratio at the time of origination is a key factor in the decision of a borrower to default as well as the amount that can be recovered in the event of a foreclosure (LaCour Little 2004; Quercia et al. 2005).

It is worth highlighting that a similar share of home purchase originations and refinances were high-cost and subprime. Mayer and Pence (2008) find that a slim majority of subprime

originations were refinance mortgages during the nonprime lending peak.[24] The researchers also show that "almost all subprime refinances are cash-out refinances, although in some cases subprime borrowers may be extracting cash solely to pay their mortgage closing costs." Many homeowners who did not buy homes during the subprime boom but refinanced their original mortgage also ended up with riskier products. During refinance many borrowers reduced the equity in their homes by taking cash out or rolling credit card debts into a refinanced mortgage.

Making matters worse, investors also leveraged highly themselves in acquiring these riskier mortgage assets. Banks set up structured investment vehicles (SIVs) as off-balance-sheet entities to purchase MBS and ABS, and lent them money to buy the assets. Hedge funds also purchased MBS and ABS with borrowed money. In many cases, the loans extended were short term, leaving these funds and vehicles vulnerable to collateral calls and making it difficult for them to roll over their debts if poor performance eroded these long-lived assets. By the height of the subprime boom, off-balance-sheet SIVs had accumulated assets in the neighborhood of $400 billion.

SIVs were designed to operate as ongoing entities, providing sponsoring banks healthy returns without increasing their capital reserve requirements. As part of the growing shadow banking system, the SIVs operated much like banks, using funds raised by issuing short-term commercial paper to invest in long-term assets including MBS. The asset-backed commercial paper market took the place of depositors in a traditional bank, with the SIVs borrowing at short maturity to invest at long maturity. The typical gearing for a SIV's capital structure was as much as 15 to 1, although some closed-ended SIVs focusing on residential mortgage securities had much higher leverage (Felsenheimer and Gisdakis 2008).

Unlike regulated and insured banks, SIVs had weak safety nets: there was no FDIC insurance, no ability to borrow at the Fed's discount window, and limited transparency for investors. Though sponsoring banks provided liquidity backstops to the SIVs, this risk was not reflected as on the books in the banks' financial statements.

[24] For example, for the year 2005, the researchers show that 51 percent of higher-priced loans recorded in the HMDA were refinance. Comparing various data sources from 2004 to 2006, Mayer and Pence find that "refinancings represent a majority of subprime originations in all years".

Investment banks also began to leverage up and were permitted to do so by a US Securities and Exchange Commission (SEC) ruling in 2004 that dramatically changed the way the SEC measured banks' capital. Responding to a similar move by its European counterpart, the SEC instituted a voluntary program for setting capital requirements and all five major broker-dealers—Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, and Morgan Stanley—joined. The new rules allowed investment banks to use their own risk assessment systems to set their debt-to-net capital ratio. Previously, the net capital rule had required that broker dealers limit their debt-to-net capital ratio to 15-to-1. After the ruling, several investment banks exceeded that ratio, with Merrill Lynch setting a high ratio of 40-to-1 (Satow 2008).

### Easing Underwriting Standards, Product Proliferation, and Risk Layering

Nonprime mortgage growth in the first half of the 2000s was explosive as measured by dollar volume and as a share of refinance and home purchase loans (Figure 1-3). Subprime mortgage loans moved from being a niche product to being widely distributed to borrowers of all income levels beginning in 2000. Though a disproportionate share of subprime mortgages were originated to lower income and minority households, the majority of all such loans were taken out by middle-income white households. Even at the peak in 2005, Home Mortgage Disclosure Act data shows that only about a quarter of all higher-priced home purchase loans were made in low-income communities, only a third in majority-minority communities, and only a fifth in low-income majority-minority communities.

Equally important, the product mix in the subprime market shifted from mostly fixed-rate to mostly adjustable-rate loans. In 2003, fully 66 percent of subprime loans were traditional fixed-rate loans. That share fell to 31 percent in 2005 and to 26 percent in 2006 (Figure 2-5). The most common loan became 2/28 adjustables, making up fully 44 percent of subprime originations in 2005. In addition, the share requiring a balloon payment jumped from 5 percent in 2003 to 10 percent in 2005 and to 18 percent in 2006. A shift away from fixed-rate loans was even more dramatic among Alt-A mortgages, although the share of Alt-A loans with balloon payments remained in the 1-2 percent range.

As a result, a much larger share of subprime and Alt-A borrowers faced the risk that their payments would reset higher after the initial period. On top of this, lenders offered teaser rates so that borrowers' rates would rise when the discount expired even if interest rates did not increase between origination and payment reset. For a period of time, the discounts were steep (Figure 2-6). By 2006, the initial discount on a one-year adjustable-rate mortgage had reached 2.3 percentage points according to a Freddie Mac survey. This meant that a median-income buyer who could qualify for an $186,600 home loan at the fully indexed rate could qualify for a $236,600 loan based on the initial teaser rate. Moreover, when rates on adjustable loans began to reset, the increases in payments were often significant. For example, the owner of a median-priced home purchased in 2003 with 10 percent down and a 3-year adjustable loan would see his or her monthly payments jump from $797 to $1,212 in 2006.

Gorton (2008) explains the rationale behind these 2/28 and 3/27 subprime loan products and their heavy reliance on the appreciation of collateral to drive the model: "If [lenders] can lend to these households for a short period of time—two or three years—at a high but affordable interest rate, and equity is built up in their homes, then their mortgage could be refinanced with lower loan-to-value, reflecting embedded house price appreciation." By extending a short-term mortgage that could be refinanced as the homeowner acquired more equity, lenders felt they could charge a lower risk premium because borrowers' loan-to-value ratio would be lower, or their credit score higher, at the time of refinance. Thus, even though the risk-free rate to which the risk premium was added might have gone up, the lower premium charged would be offsetting, at least to some degree. Given these assumptions, originations of adjustable-rate and balloon subprime mortgages took off and the ABS market securitized the loans.

The problem was that if house prices failed to rise, homeowners would be unable to refinance. And even if they could, they would not see a reduction in their rates. Either way, the probability of default would increase as payments shot up. Clearly, this was a risky proposition and one difficult to sustain indefinitely. When prices did finally crest in most markets in 2006–2007, the risks of this lending came home to roost.

Meanwhile, issues of nontraditional loan products also skyrocketed. Interest-only (IO) and payment-option (PO) loans went from just a few percent of all loans in the first few years of the decade to a peak of about 19 percent in 2005.[25] These so-called "affordability" or "nontraditional" products allowed borrowers to leverage their incomes. Interest-only loans typically offered a five-year period in which the borrower paid only interest and the principal balance was carried. At the end of this set period, the borrower would have to repay the principal over the compressed time period remaining on the loan, which meant sharply higher monthly payments.

The payment-option mortgage was much like a credit card, giving borrowers the flexibility to make a minimum payment that could be even lower than the interest due. When a payment was less than the full amortizing amount, the rest was rolled into the mortgage balance. This would result in negative amortization, with the principal amount growing rather than shrinking. Eventually borrowers would have to increase their monthly payments to pay down this growing principal.

As sharp as the increase in the IO/PO share was nationally, it was even more dramatic in many of the largest states with the most overheated housing markets. In 2006 the highest shares of IO/PO loans were in California (43 percent) and Nevada (40 percent). Shares in other boom states did not attain quite these levels, but were still high at 24 percent in Florida and 28 percent in Arizona.

Remarkably, lenders often layered additional risks on top of these considerable payment reset risks. First, lenders began to require less and less documentation of income and assets. While low- and no-documentation loans were also available in the prime and subprime markets, they were most prevalent in the Alt-A market where full documentation shares dipped to 15 percent (Figure 2-7). Second, the average combined loan-to-value (CLTV) for securitized loans increased during the post-2000 housing boom. Compared to loans originated 1995-1999, the share of Alt-A and subprime loans originated with over 90 percent CLTV rose from 2000 to 2004, while the two categories also made up a higher share of all securitized loans. The result was that the share of all loans in private label securities originated with 90 percent CLTV or higher climbed from 6 percent in the late 1990s to over 10 percent for the first half of the 2000s (Figure 2-8).

[25] This figure is based on LoanPerformance data from First American CoreLogic.

### The Rapid Growth of the ABS Market

Most of the increase in nonprime lending—especially in the subprime market, and to a lesser extent in the Alt-A market—was securitized and sold on the ABS market. According to Inside Mortgage Finance, securitization rates for home mortgages in all categories were still on the rise when purchase originations peaked in 2005. In 2001, less than half of all subprime and Alt-A mortgages were securitized. By 2005, according to Inside Mortgage Finance, the securitization rate of subprime and Alt-A loans as measured by that organization reached 79.3 percent—well above that of prime jumbo mortgages (49.2 percent) but nearly the same as that of conforming mortgages (80.5 percent). The share of subprime and Alt-A loans securitized reached 92.8 percent in 2007.

Meanwhile, the market share of non-agency MBS conduits more than doubled from less than 20 percent of issuances in 2001 to 56 percent in 2006. At the height of the subprime market, the top issuers of private-label securities were a mix of investment banks and originators like Countrywide that sold loans directly into private securitizations (Figure 2-9).

### Growth in Investor Loans

According to Loan Performance data on home purchase loans in the prime market, both second-home and investor (non-occupant) loans increased sharply in many metropolitan areas in the early 2000s. Focusing on just the investor portion, the share of loans rose from 5.5 percent in 2000 to 9.4 percent in 2005. While this may not sound particularly dramatic, the annual number of investor loans in the US more than doubled, increasing by nearly 300,000. The increase was the equivalent of 14 percent of annual housing starts in 2005. While many probably bought homes they quickly resold, given the rapid rise in home prices and their interest in cashing in on appreciation, the magnitude of this increase relative to marginal growth in demand as represented by housing starts in 2000-2003 is significant.

While overheated markets in California and the Southwest saw high and rapidly rising shares post–2000, the largest increases in second-home and investor mortgage shares were in Florida and the coastal Southeast. Red-hot markets, combined with especially high demand for seasonal homes, lifted the second-home and investor share of originations above 40 percent. Myrtle

Beach, South Carolina, posted the largest increase in share, with loans for second homes and investment properties soaring from 29 percent of all mortgage purchase originations in 2000 to 67.6 percent in 2006 according to Loan Performance.

In terms of volume, investor shares were by far highest for Alt-A loans, followed by subprime loans, and then non-agency prime MBS. Investor shares of Alt-A loans peaked in the third quarter of 2005 at over 15 percent. Subprime investor shares fluctuated between 5 and 6 percent throughout 2005 and 2006 and the first half of 2007, peaking at 6 percent in the first quarter of 2006. Investor shares of non-agency prime MBS were lowest and remained between 1 and 2 percent through 2005 and 2006. However, during this time non-prime MBS had the highest second home loan shares, ranging between 7 and 9 percent, while Alt-A second home shares were between 4 and 6 percent, and subprime second home shares were lowest and remained between 1 and 2 percent.

### Growth in Piggyback Second Mortgages

Piggyback mortgages also took off during the 2000s and remained strong until the market went bust. In a piggyback transaction, a junior lien for a home purchase is originated at the same time as a first lien. Piggyback originations are attractive to both lenders and borrowers. First, if borrowers use the second lien as a downpayment, they can avoid paying for mortgage insurance (required when putting less than 20 percent down on the first lien mortgage). Second, borrowers can qualify for lower interest rates on their first lien if the second lien reduces the first lien below the conforming loan limit. The first-lien lender also benefits from the improved execution of selling the loan to Freddie Mac or Fannie Mae. A third rationale for piggybacks is to reduce capital requirements for the lending institution (Calhoun 2005; Avery, Brevoort, and Canner 2008). As Calhoun points out, the capital requirement on mortgages with a 90–100 percent LTV is 8 percent, while that for a loan with an 80 percent LTV is only 4 percent.

Though the benefits to borrowers and lenders were enticing, the financial crisis underscored the risk inherent in multiple lien structures. The ability to qualify for greater amounts of mortgage debt, combined with floating-rate mortgage prices (a common feature of second liens), exposed borrowers to a high degree of risk if interest rates rose and/or house prices declined. Greater

borrower risk also raised the risk of loss for the lender. Mortgage insurance typically guarantees the top loss down to 80 percent or less of the home's value. By not requiring private mortgage insurance, lenders were more at risk of losing principal if a loan went into foreclosure. In addition, second-lien products were relatively new to the market, making their risk profile in a downturn uncertain (Calhoun 2005). In addition, when first liens got into trouble, second lien holders made loan modifications of the first lien more difficult.

### Key Takeaways

The 2000s were remarkable for the amount of leverage in the financial system, the relaxation of underwriting standards and the layering of risk in the primary mortgage market, and the rampant growth of the ABS market as a source of capital for mortgage lending and as a generator of private label securities. Especially striking was the relaxation of underwriting standards and documentation intended to measure and manage the risk that borrowers would not have the capacity to repay their loans. This willingness to tolerate far less rigor in this critical step in underwriting means that mortgage investors were moving from a credit-based model of lending (in which the capacity and creditworthiness of the borrower were key to loan performance) to an asset-based model (in which the initial LTV and expectations of future house price appreciation were key to the loan performance and recovery in the event of default). Yet at the same time, loan-to-value ratios were relaxed and products with payment reset risks widely sold. Worse, these risks were often layered into loans where applicant incomes were allowed to be stretched or incomes verified. On top of this, loans were frequently offered to borrowers who had already had past problems repaying their debts.

The ABS market became a critical part of the system that allowed this risk to get originated and where much of this risk was transferred. What happened in the ABS market to these loans and in the capital markets was a critical part of the turmoil in global capital markets beginning midway through 2007. These capital market activities are detailed in Part 4 of this report, but first, a more detailed look at what was going on in terms of higher-risk lending patterns and risky products is provided. This detailed look yields several critical findings about what occurred at the height of nonprime lending and about the spatial and racial implications of this lending.

## PART 3: THE SIZE, STRUCTURE, AND SEGMENTATION OF HIGHER PRICED, PIGGYBACK, AND NON-OCCUPANT OWNER LENDING

Information reported under the Home Mortgage Disclosure Act provides a window on the mortgage market in 2005 (when nonprime markets were booming) and then in 2007 (during the early stages of the meltdown). Using information submitted by more than 7,000 organizations, it is possible to examine the concentration, segmentation, and geographic pattern of mortgage lending during those years. The HMDA database also makes it possible to look at the factors influencing the likelihood that borrowers received certain types of products—higher-price loans,[26] non-occupant owner loans,[27] and piggyback loans[28]—that carried greater risks for lenders.

The analysis reveals that even after controlling for a host of demographic, metropolitan area, lender type, and secondary marketing factors—but notably not the credit scores of the borrowers—black and Hispanic homebuyers purchasing primary residences were still far more likely to get higher priced and piggyback loans than others. It also reveals just how little higher price lending was done by CRA lenders in their assessment areas and how much more likely higher priced loans were to be sold into private label securities than held in portfolio or sold to Fannie Mae and Freddie Mac. Further, it underscores the close connection between piggy back and higher cost lending, with similar factors contributing to the odds a loan would be higher price and have a piggyback second. Lastly, it provides insights into where non-occupant owner loans were originated and the factors that contributed to the odds that a loan was to a non-occupant owner.

[26] Higher-price loans are risky because these loans are mostly to borrowers with subprime credit scores or to borrowers taking out loans with risky features (like high debt-to-income or loan-to-value ratios or limited or no documentation) that prompt lenders to demand a higher yield to compensate for the heightened risk.

[27] Non-owner occupant lending is often riskier than occupant-owner lending because some non-owner occupants purchase homes with the intention of renting them out to make ends meet or speculating on rapid home price appreciation, and because most are being given to homeowners who already own another home and for whom walking away from their investment property does not mean walking away from their primary residence. These increase the chances that borrowers will be prepared to default on their loans.

[28] Calhoun (2005) offers a detailed discussion of the risks: this form of lending allows borrowers to purchase more expensive homes with smaller downpayments, but the high combined LTV ratios and floating rate second liens typical to piggyback loans may not adequately protect borrowers as they face increases in payments and interest rates down the line, especially as compared to regular first lien mortgages. In particular, piggyback borrowers face the risk of a large unexpected increase in interest rates and payments on the HELOC component of the loan. While piggyback loans offer lenders the greater income associated with originating two mortgages instead of one, they have proven unable to hold up well under the pressure of a "one-two punch" of rising interest rates and a reversal in house price appreciation. In addition, using data from Loan Performance, Mayer and Pence (2008) found "that the share of subprime originations with an attached second rose from 7 percent in 2003 to 28 percent in 2006." See also Avery, Brevoort, and Canner (2008).

## The HMDA Database

This analysis utilizes an enhanced HMDA database that identifies piggyback second liens and codes financial institutions that are parts of the same ownership structure so they can be grouped into a single organization. This allows the aggregation of loans by subsidiaries and affiliated financial institutions under the single organization that owned them for a clearer view of market shares.[29] Mortgage companies as reported here include those having no affiliation with a depository as well as those that were affiliated with, or subsidiaries of, bank and thrift holding companies.[30]

HMDA requires that most financial institutions with offices in metropolitan areas report information about loan applicants' race, income, and sex; the census tract of the property being mortgaged; and the amount of the loan. HMDA covers approximately 89 percent of the US mortgage market and is considered to be representative of the market as a whole (Avery, Brevoort, and Canner 2008).

Beginning in 2004, lenders were also required to disclose pricing information for loans with an annual percentage rate (APR) above a certain threshold. For first-lien mortgages, the threshold was 3 percentage points above the rate charged on a Treasury security of comparable maturity. These loans are characterized as "rate-spread" or "higher-price" mortgages, which are a proxy for subprime originations.

While information on second-lien, closed-end mortgages has long been collected, the Federal Reserve recently began to use property-level information to identify second liens originated on the same property on the same day as a first-lien mortgage. This allows for the identification of piggyback loans used to purchase homes.

[29] Countrywide was a mortgage company for many years and then decided to set up a bank. While technically this made Countrywide a subsidiary of a bank, all of Countrywide (including its bank) is treated as a mortgage company in the counts of total loans made by mortgage companies. We do so because the bank had only 8 percent of Countrywide's originations in 2005. Though a much larger 42 percent of Countrywide loans in 2007 were made by its bank, even in that year only a scant 1,241 loans of its loans were made by its bank in its assessment area.

[30] It is worth noting that mortgage company subsidiaries accounted for 9 percent of all HMDA loans in 2005 and 7 percent in 2007. Affiliated mortgage companies accounted for only 3 percent of all loans in 2005 and 2 percent in 2007. In contrast, independent mortgage companies accounted for 32 percent of all loans in 2005 and 20 percent in 2007. Over nine-tenths of the loans made by affiliate and subsidiary mortgage companies were made outside of CRA assessment areas. In sum, affiliate and subsidiary loans made within CRA assessment areas amounted to less than 5 percent of all such loans in 2005 and less than 2 percent in 2007. Even had the organizations with which these lenders were associated decided to report these loans for CRA purposes (which is at the discretion of the banks and holding companies) it would not have materially affected the share of loans nationally that were assessed for CRA performance.

The year 2007 is noteworthy because a large number of lenders curtailed operations over the course of the year.[31] In addition, the yield curve (the difference in interest rates charged on shorter- and longer-term debt instruments) affects the proportion of loans in a given year that are classified as higher-price. This is important to note when comparisons are made across years and may have been an important reason that higher-priced loan shares increased.[32] But another more important factor in the sizable reduction in higher-price loans in 2007, however, was the tightening of underwriting standards and the reluctance of lenders to issue these types of mortgages.

This analysis is among the first to use HMDA to examine the incidence of piggyback lending during a period of frequent use. Researchers at the Federal Reserve matched junior liens to first liens for home purchase using the following criteria: both liens were conventional; they were originated by the same lender around the same date; and the borrower of both loans had identical owner-occupancy status, income, race, ethnicity, and gender.

This matching algorithm undercounts the number of piggyback loans because it does not identify first and second liens originated by two different lenders. The algorithm also undercounts total piggyback transactions because regulations only require that lenders report closed-end second-lien loans, not second-lien lines of credit. A limitation of this study, therefore, is that it cannot measure how frequently home equity lines of credit (HELOCs) were used as a piggyback loan to finance home purchases. This may weaken the significance of variables that are associated with the likelihood of a borrower using a piggyback second to purchase a home. Indeed, it appears that HELOCs may have dominated the secondary-lien market. By one estimate, HELOCs composed 80 percent of the total market for piggybacks originated in 2004 (Calhoun 2005; FDIC Outlook 2004).

Identification of purchase loans by non-occupant owners is based on lender reports of whether a borrower intended to live in the home. To the extent that lenders were able to judge this properly, the non-occupant owner classification encompasses second-home buyers who intended to use the home only occasionally, as well as investors purchasing homes with the intention of renting them

[31] According to the Federal Reserve, "For 2007, many more lenders than in earlier years ceased operations because of a bankruptcy or other adverse business event, and the non-reporting institutions accounted for a significant minority of the loans originated in 2006 and an even larger share of the higher-price loans made that year" (Avery, Brevoort and Canner 2008).

[32] Data on subprime originations from Inside Mortgage Finance confirm the falloff in the supply of loans considered by lenders to be subprime in 2007.For a paper that attempts to disentangle the factors that contributed to the increase in rate spread reportable loans prior to 2007, see Do and Paley (2007).

or reselling them for a profit. Unlike Loan Performance data, it is not possible to split out second-home and investor loans in the HMDA data.

### Overview of Home Mortgage Lending in 2005 and 2007

Between 2005 and 2007, the number of mortgage loans to owner-occupants dropped from 9.5 million to 6.1 million (Figure 3-1). Loans for refinance were 54 percent of the 2005 loans and 51 percent of 2007 loans. Home purchase loans were 32 percent lower in 2007 than in 2005 and refinance loans were 38 percent lower.

Nearly all mortgages originated in 2005 and 2007 to purchase or refinance one- to four-unit properties (henceforth referred to as single-family) were conventional loans. About 90 percent of first liens for owner occupants were conventional, as were all of the piggyback second liens and 99 percent of first liens for non-occupant owners.

Loans for home purchase by non-occupant owners in 2005 totaled 858,860. By 2007, these loans fell off even more sharply in percentage terms than loans to owner-occupants. Loans to non-occupant owners for home purchases contracted 45 percent.

Refinance loans to both owner occupants and non occupants also made up a sizable share of higher cost loans reported in HMDA. The share of home purchase originations that were higher priced decreased 10 percentage points from 2005 to 2007. In contrast the higher priced share of refinance originations fell only 5 percentage points over the same time period (Figure 3-2). Homeowners were motivated to refinance their mortgages during the boom in house prices in order to cash out home equity and pay off high balanced credit cards and other debts. (Figure 3-3).

Nearly 1 million first-lien home purchase loans—or 19 percent—were originated with a piggyback second lien in 2005 according to HMDA. Of these, only about 1 in 10 piggybacks were to purchase of homes not intended for owner occupancy, compared with about 1 in 5 first-lien loans that went to non-occupant owners. By 2007, piggybacks dropped by fully 63 percent.

## Descriptive Analysis of Riskier Lending

Riskier lending exhibited variations by metropolitan area and higher price and piggy back lending exhibited variation by neighborhoods sorted by minority shares and income. In addition, secondary market sales patterns, CRA lending shares, and extent of consolidation and specialization also varied by type of lending. These variations are analyzed below.

### *Riskier Lending by Neighborhood Type*

The incidence of higher-price loans varies greatly by race and income. In large measure, these variations reflect the fact that higher-price lending decreases with income and is more common among blacks and Hispanics than Asians and whites. But econometric analysis using 2004 HMDA revealed that even after controlling for the racial composition and income level of a neighborhood, minorities were more likely to receive a higher-price home purchase loan than whites living in the same neighborhood (Apgar et al. 2004).

During the heyday of subprime lending in 2005, the share of higher-price conventional home purchase loans made to owner-occupants was 25 percent nationally but fully 47 percent in predominantly minority, low-income census tracts; 34 percent in low-income, mixed-race tracts; and 30 percent in low-income, predominantly white tracts (Figure 3-4). In middle-income tracts, the higher-price share ranged from 43 percent in predominantly minority areas to 20 percent in predominantly white areas. Even after the market began to implode in 2007, the racial disparity in higher-price shares narrowed but still persisted.

While higher-price loans accounted for a disproportionately large share of lending in minority, low-income census tracts, only 17 percent of all such loans to owner-occupants in 2005 and 16 percent in 2007 were in these tracts (Figure 3-5). The share in predominantly white, middle-income census tracts was nearly as large (12 percent in 2005 and 14 percent in 2007), while fully 26 percent were in mixed-race, middle-income tracts. Higher-price lending outside of low-income tracts and predominantly minority, middle- and high-income census tracts was much more dispersed, however, leaving these tracts less exposed to the risk of concentrated foreclosures when default rates started to climb.

Race- and ethnic-based neighborhood disparities were not evident in first-lien home purchase loans to non-occupant owners or piggyback loans to non-occupant owners, but lower-income areas were more likely to have larger shares of both of these loan types. In the case of loans to non-occupant owners, the share ranged from the mid-to-high 20s in low-income areas, to the mid–to-high teens in middle-income areas, to the low teens in high-income areas in 2005. For piggyback loans on non-occupant owner purchases, the shares varied from the low double digits in low-income neighborhoods to the mid-single digits in higher-income neighborhoods.

In the case of piggyback loans for owner-occupied homes, however, there were strong disparities by racial/ethnic mix of the neighborhood, but not by income level. Indeed, in 2005, the share of piggyback owner-occupant home purchase loans in minority low-income tracts was 34 percent—twice that in low-income white neighborhoods. But even in middle-income tracts, the shares were 35 percent in predominantly minority tracts and only 16 percent in predominantly white tracts. These loans were also distributed across census tracts in a way similar to higher-price loans.

### *CRA Assessment Area Lending*

In 2005, CRA lenders operating inside their assessment areas accounted for only 29.5 percent of lower-priced loan originations for home purchases by owner-occupants, and a significantly smaller 4.5 percent share of higher-price loan originations (Figure 3-6). In 2007 when the ABS markets for nonprime mortgage loans shut down and nonprime specialist originators were failing, the CRA assessment area shares jumped to 37 percent of lower-priced loans and 19 percent of higher-price loans. But with overall lending dropping sharply, this increase reflected more a gain in market share than rising volume.

Additionally, loans made by CRA lenders operating in their assessment areas were an even lower share of higher price loans originated in low-income, predominantly minority census tracts. CRA assessment area shares of higher-price loans were actually lower in low-income, predominantly minority census tracts than in low-income predominantly white census tracts (at 4 percent versus 7 percent in 2005 and 19 percent versus 22 percent in 2007) (Figure 3-7). In contrast, CRA assessment shares of lower-priced home purchase originations to owner-occupants across nine categories of census tracts grouped by income and race were very similar. The shares ranged in a

narrow band from 28 percent to 32 percent in 2005 and from 36 percent to 44 percent in 2007, with the biggest share in low-income minority areas in 2007 as nonprime lending lost share.

Among non-occupant owners, the proportions of home purchase loans originated by CRA lenders operating in their assessment areas—27 percent in 2005 and 39 percent in 2007—were similar to their shares of the lower-priced owner-occupied home purchase loan market. CRA assessment area shares of piggyback loans were even less than of lower-priced owner-occupied home purchase loans and were lowest in predominantly minority areas when sorted by income, but increased with the income of tracts.

### *Secondary Market Sales of Loans*

It must be noted that HMDA data on secondary market sales of loans imperfectly represent actual activity in any given year for two main reasons. First, only loans sold in the same year as they were closed are reported as sales for that year. The data thus exclude loans originated at the end of the year and seasoned loans not originated in that year. Second, many loans are sold more than once in a year, including purchases by aggregators who then sell them into conduits or private securitizations. Not all these additional sales and subsequent securitizations are captured.[33] Still, the share of reported sales under HMDA gives a reasonable indication of the first-line purchasers of loans originated in a year. Most of the loans that are missed because they are resold and securitized show up in the "other buyer" category (which includes finance companies, affiliated organizations, and mortgage brokers, among others).

In 2005, nearly 1 million higher-price conventional loans were made to owner-occupants to buy homes. By 2007, that number had plunged to about 350,000. Lower-priced loans to such buyers totaled 3 million in 2005 and then dropped to only about 2.2 million in 2007. Sales to Fannie Mae and Freddie Mac accounted for a tiny 3 percent of all the higher-price home purchase loans originated in 2005, while private securitizations and other conduits accounted for as much as 48 percent. By contrast, Fannie Mae and Freddie Mac accounted for 30 percent of sales of lower-priced home purchase loans originated in 2005, while private conduits accounted for only 23

[33] A simple illustration of this deficiency is that in 2005, the HMDA data suggest that 51 percent of high-cost home purchase loans were sold to private securitizations (15 percent), private conduits (33 percent), or Fannie Mae and Freddie Mac (3 percent). Industry sources show a much higher share of subprime loans and a similar share of Alt-A loans were securitized.

percent. By 2007, however, Fannie and Freddie's share of higher-price loans had surged to 22 percent, up from about 30,000 in 2005 to about 77,000. This increase is consistent with the more aggressive moves the GSEs made into higher-price lending after the 2005 change in their goals and as market pressures on them mounted. When the ABS market ground to a halt in mid-2007 the shares of private securitizations and other private conduits fell to 15 percent of the higher-price market and 14 percent of the lower-priced market.

In 2005, Fannie Mae and Freddie Mac also had a smaller share of non-occupant owner home purchase secondary sales than did private securitizations and other private conduits, but the difference was far narrower than in the higher-price loan market (Figure 3-8). By 2007, with purchase loans to non-occupant owners down by 45 percent, Fannie and Freddie's market share increased from 20 percent to 29 percent, while that of the other private conduits fell from 27 percent to 11 percent. But the absolute number of such loans bought by Fannie Mae and Freddie Mac in 2007 was only about 40,000 higher than in 2005.

As for piggyback seconds used by owner-occupants to buy homes, Fannie Mae and Freddie Mac purchased or guaranteed only 8 percent in 2005, while private securitizations and other private conduits handled a hefty 46 percent. By 2007, the GSEs' share surged to 31 percent, while that of private conduits dropped to 18 percent. Similar trends could be seen in piggybacks used by non-occupant owners.

The share of higher-price loans for home purchase by owner-occupants that were sold to private securitizations and other private conduits was higher in predominantly minority than predominantly white census tracts across all three tract income categories. Moreover, it was somewhat higher in higher-income tracts than in lower-income tracts (Figure 3-9). In 2005, for example, the share sold through private channels ranged from 44 percent in low-income white tracts, to 49 percent in low-income minority tracts, to 52 percent in high-income predominantly minority tracts**.**

The share of piggy-back loans for owners buying primary residences sold through private labels was sharply higher in predominantly minority areas after controlling for the income of the areas. In 2005, for example, shares in the piggyback owner-occupant owner market ranged significantly

from 37 percent in high-income, predominantly white neighborhoods to 52 percent in high-income predominantly minority neighborhoods. Among low-income tracts that year, the spread was a narrower 45 percent in predominantly white areas to 51 percent in predominantly minority areas.

The share of non-occupant owner loans sold through private securitizations and other conduits was higher in low-income and minority tracts. Only 19 percent of non-occupant owner loans in 2005 in low-income, predominantly white neighborhoods were sold to private securitizations and other conduits, compared with 31 percent in low-income, predominantly minority neighborhoods.

Until the private conduit channels shut down, mortgage companies originated fully 69 percent of first-lien home purchase loans to owner-occupants. In 2007, with ABS markets in turmoil, this share plunged to 36 percent. At only 36 percent in 2005 and 31 percent in 2007, mortgage company shares of lower-priced home purchase loans were significantly lower. The mortgage company share of home purchase loans to non-occupant owners was in line with their share of lower-priced home purchase loans to owner-occupants. Meanwhile, their shares of piggyback loans were similar to their shares of higher-price home purchase origination loans.

### *Consolidation and Specialization*

Concentration of originations in the hands of a few large lenders is a hallmark of the higher- and lower-priced home purchase markets as well as the piggyback market (Figure 3-10). With the failure of some large lenders in 2007, the market share commanded by the top ten lenders increased across all these loan types. For example, the top ten higher-price lenders went from 30 percent to 36 percent of higher-price purchase originations to owner-occupants between 2005 and 2007, and the top ten lower-priced lenders from 36 percent to 47 percent in the lower-price market.

Looking back to 2004 loans, there was a high degree of specialization based on loan price and secondary market outlet. According to analysis of HMDA data, just 13 percent of lenders made 46 percent of higher-price loans in 2004 (Apgar, Bendimerad and Essene 2007). Half or more of the loans issued by these subprime specialists were high priced. Mortgage companies dominated the market, originating fully 83 percent of the loans from higher-price specialists. In contrast, most lending organizations made few higher-price loans. For example, 59 percent of lenders

were responsible for only 2 percent of higher-price loans. For this large group of lenders, 97 percent or more of their originated loans were lower price. The remaining 27 percent of lenders had higher-price loan shares varying from 3 percent to 50 percent, and were responsible for just over half of higher-price loan originations. It is especially noteworthy that CRA-regulated lenders operating in their assessment areas made only 6 percent of higher-price loans.

This channel specialization extends to secondary market outlets. For example, HMDA data suggests that the GSEs directly purchased only 1.7 percent of the 1.3 million higher-price loans issued in 2004. Higher-price loan specialists sold only one-tenth of a percent of their loans directly to the GSEs, but 64 percent of their loans to private conduits. In contrast, lower-price specialists sold 29 percent of their loans to the GSEs and just 19 percent to private conduits. In both cases, the remaining loans were either sold to other financial organizations or not sold.

This specialization is confirmed in the econometric analysis of HMDA data discussed below. In the higher-price equation, coefficients on some of the higher-price lenders are higher than for the key neighborhood, borrower, and secondary market sales variables included in the model.

### *Metropolitan Variations in Lending Products*

Higher-price, piggyback, and non-occupant owner loan shares vary widely by location. Higher-price home purchase loan shares in 2006 ranged from 30–46 percent in the 50 metro areas with the largest shares, to 7–15 percent in the 50 metro areas with the lowest shares (Figures 3-11 and 3-12). Unsurprisingly, metropolitan areas in California had a large share of higher-price loans. What is surprising is that so did areas in rust belt states such as Indiana, Ohio, and Michigan, where houses prices did not appreciate much during the boom.

Higher-price loans were also common in the South and Southeast (especially Texas). It is difficult to discern clear patterns in a map of high- and low-share metro areas. Some metropolitan areas with large minority shares had low shares of lower-price loans and some had high shares. Metropolitan variations in housing affordability (Figures 3-13 and 3-14) do not seem to have had much influence on which places had large shares of higher-price loans and which did not.

Piggyback shares of home purchase loans in 2006 ranged from 31–56 percent in the 50 metro areas with the largest shares to 4–11 percent in the 50 metro areas with the smallest shares (Figures 3-15 and 3-16). Although higher-price loan originations made up large shares of home purchase loans in the industrial Midwest and the South, very few piggyback loans were originated in these locations. Rather, originations of second liens for home purchase were more widespread in California and Texas (which also had high shares of higher-price loans) and in the upper Northwest and Mountain States (which did not have especially high shares of higher-price loans).

Again, the reasons for these results are unclear and may well have to do with the particular lenders operating in different metropolitan areas and their use of piggyback loans, since piggyback lending (like higher-price lending) was concentrated among some lenders. That said, when controlling roughly for metropolitan affordability, it is clear that less affordable areas (with median house price-to-income ratios of 6 or greater) had larger shares of piggyback loans, and that differences by income and racial/ethnic mix of census tracts were far more pronounced in the least affordable than in the most affordable metro areas (with median house price-to-income ratios of less than 3) **(Figures 3-17 and 3-18)**.

Non-occupant owner home purchase loan shares in 2006 ranged from 23–70 percent in the 50 metro areas with the largest shares to 6–10 percent in the 50 metros with the lowest shares **(Figures 3-19 and 3-20)**. Here the pattern is clearer, with places that are traditionally second-home destinations having the highest shares, along with the Gulf Coast (post-Katrina). That said, even after controlling for the share of seasonal or occasional use units in a census tract, the metropolitan dummy variables in the non-occupant owner models discussed below had an enormous impact on the odds of a loan being made to non-occupant owner. All else equal, the specific metropolitan area often quintupled or more the baseline 3 percent chance of a loan being made to a non-occupant owner at the means of the sample and compared to the New York metropolitan area as a metro base case.[34]

[34] Doms, Furlong and Krainer (2007), however, found an economically and statistically significant relationship between the investor shares and subprime delinquency rates.

## Multivariate Analysis of Market Segmentation

This section describes a multivariate analysis used to investigate the likelihood that a mortgage applicant receives a higher-risk loan for a home purchase. A logistic regression estimates the probability that a borrower (denoted by subscript *i*) obtains a higher-price, non-occupant owner, or piggyback loan as a function of vectors corresponding to borrower (B), neighborhood (N), secondary market sales (S), lender type (L), and metropolitan (M) characteristics. In this way, the analysis follows previous literature by constructing a statistical approach that relies on the explanatory power of four or five sets of independent variables.[35] Unlike in these papers, however, separate models are estimated for each type of riskier loan.

The model takes the general form:

$$\textbf{Prob (Higher risk loan)}_i = F(B_i, N_i, S_i L_i, M_i) + ei$$

where F is the logistic distribution function and e is the error term.

The regressions are run separately for 2005 and 2007 to examine the results before and after the peak in nonprime lending.

***Borrower characteristics.*** Dummy variables are used to test for the impact of the borrower's race and ethnicity on the probabilities of receiving particular types of loans. Research has shown that, all else equal, subprime originations to black and Hispanic households are higher. Studies have also found that Asian households are less likely to receive subprime mortgages than others.

Income of the borrower is also entered into the model as a dummy variable. The low-income dummy variable assigns a 1 if the borrower's household income is less than 80 percent of the area median. The dummy for high income captures borrowers making over 120 percent of the area median. Whether the borrower is female and whether borrower income was missing (as a

[35] See, for example, Farris and Richardson (2004); Calem, Gillen, and Wachter (2004); Firestone, Van Order, and Zorn (2007); and Apgar, Bendimerad. and Essene (2007).

proxy for no-documentation loans) is also included. The most critical piece of information on the borrower that is missing is the credit score.

***Neighborhood characteristics.*** Calem, Gillen and Wachter (2004) identified neighborhood characteristics that were significantly correlated with subprime originations. Following Apgar et al. (2007), the analysis includes dummy variables on the racial and ethnic mix, as well as the income mix, of the census tract. Median incomes in low-income tracts were less than 80 percent of metro-wide medians in 2000, those in middle-income tracts were 80–120 percent of metro-wide medians, and those in high-income tracts were greater than 120 percent of metro-wide medians.

Predominantly minority neighborhoods were tracts with more than 50 percent minority households, mixed-race neighborhoods were tracts with 50–90 percent white households, and predominantly white neighborhoods were with more than 90 percent white households. Racial composition is combined with income composition to create nine neighborhood type variables. The share of housing for recreational or seasonal use is also included to capture demand by non-occupant owners for second homes in the tract.

The capitalization rate represents how attractive a property is for investment purposes and is calculated by dividing median rents by median housing values, using the 2000 Census. Also, as Calem et al. (2004) note, a larger value for this measure is consistent with lower expected price appreciation or more uncertain future house prices, indicating increased credit risk. Another risk indicator is the denial variable, calculated as a two- year lag of the five-year average denial rate for conventional loans. The turnover rate is calculated as the number of home purchase loans from HMDA divided by the number of owner occupied housing units in 2000 and is included because Calem et al. (2004) found neighborhoods with little turnover tend to have more uncertain housing values and, hence, may involve greater credit risk. The analysis also includes the share of owners in the census tract.

***Secondary market sales channel.*** To examine the influence of the channel through which the loan is ultimately sold (if at all) on the probabilities of receiving a high-risk product,

the regression equation includes whether the lien was sold to Fannie Mae or Freddie Mac, in a private securitization, to a private conduit, to a bank or thrift, or to another financial institution.

***Lender type.*** Of interest to this study is the role that lender type plays in the frequency of subprime origination. Apgar et al. (2007) argue that two mortgage channels exist in US housing markets. The first is the more regulated channel in which traditional banks and thrifts are assessed for compliance with Community Reinvestment Act regulations in areas where they have branch offices. The second channel grew robustly in market share during the nonprime boom and was fed by other lenders, including mortgage brokers and traditional lenders operating outside their CRA assessment areas through mortgage company affiliates and subsidiaries.

The regression equation includes dummy variables identifying the lender as a CRA-regulated bank or thrift operating inside of its assessment area, or as some other lender type such as CRA-regulated institutions operating outside their assessment areas, credit unions, mortgage companies, affiliated mortgage companies, and mortgage company subsidiaries of holding corporations. Dummy variables are also incorporated for the top organizations that contributed half of the year's lending.

***Metropolitan area.*** As noted previously, the shares of higher-price, non-occupant owner, and piggyback home purchase loans vary considerably by metropolitan area. Several factors could underpin these variations, including the influence of state and local regulations, historical evolution of the mortgage market, how engaged specific firms are in lending or purchasing loans from different areas, and unobserved risk factors that are correlated with metropolitan areas. To control for these possible influences, the model includes dummy variables for metropolitan areas. Like the individual lender variables, however, they are not included in the results reported in the tables below.

Lastly, to evaluate the impact of affordability on originations of different types, the model includes the ratio of county house price to income—the only non-tract variable in the regression due to data availability. Summary statistics for each of the variables in the models, regression coefficients in each model, and test statistics are presented in Appendix A.

In addition to showing the logit coefficients for each variable, the following tables show the change in probability relative to a baseline for each of the variables, created by holding the other variables constant. Again, we do not show results for the lender and metropolitan area dummy variables. The baseline is calculated at the sample means for all ratio-scale variables and at the sample proportions for dummy variables.[36] To represent the impact of a particular ratio-scaled variable on the probability of receiving a certain type of loan, the impact of a one standard deviation increase in that variable from its mean on the base probability is modeled. To represent the impact of a particular dummy variable on the probability of receiving a certain type of loan, that variable is set to 1 and all other dummy variables in the class are set to 0.[37] Thus, increases or decreases in probabilities relative to the baseline are with reference to the missing dummy variable case.[38] This is a useful and more intuitive way for conveying the impact of the independent variables on the dependent variable in question  It also means that the base probability in the case of each class of dummy variable is the probability of receiving a particular type of loan, all else equal, of the missing dummy category. For this reason, base probabilities vary depending on which dummy variable is being examined.

### *Higher-Price Loan Model Results*

The variables that had the strongest direct influence on the baseline probability of receiving a higher-price loan were the race and ethnicity of the borrowers and the secondary market channel the loan was sold in. Indeed, being sold into a private securitization increased the chances of being a higher-price home purchase loan by a full 17 percentage points, doubling the baseline probability for loans not sold into the secondary markets **(Figure 3-21)**. Being Hispanic increased the probability of receiving a higher-price loan by a full 10 percentage points over the white base probability of 11 percentage points. Being black increased the odds even more, to 13 percentage points (more than doubling the white base case probability).

[36] The treatment of dummy variables is complicated and worthy of illustration. For example, the base case proportions for the race/ethnicity class of dummy variables in the higher-price home purchase model is set to 13 percent Hispanic, 6 percent Asian, and 8 percent black because that is the share of all home purchase loans each of these groups accounted for in the national sample.

[37] For example, in the case of the race/ethnicity dummy, when looking at the influence of being Hispanic, the Asian and black dummies are set to 0 and the Hispanic variable to 1.

[38] In this example, the missing dummy variable is white, so the measured change in the probability of receiving a higher-price loan from being Hispanic, all else equal, is relative to the probability if one were white.

The impacts of minority status on receiving a higher-price refinance loan were not as great, with the increased probability 3 percentage points higher for Hispanics and 6 percentage points higher for blacks than the 11 percentage point baseline for whites **(Figure 3-22)**. But in the case of the private securitization channel, the impact on the odds of receiving a higher-price product was even larger for refinance than home purchase loans. Indeed, private securitization increased the probability by 21 percentage points over and above the 17 percentage point baseline "not sold" case.

The next strongest direct influence was the two-year lag of the census tract's five-year denial rate. A standard deviation increase in this variable from the mean lifted the odds that a loan was higher priced by 5 percentage points over the 13 percentage point baseline for home purchases, and by 3 percentage points over the 12 percentage point baseline for refinances.

The strongest inverse influences on the baseline probability of receiving a higher-price loan in 2005 were (1) being sold to Fannie Mae or Freddie Mac, which reduced the odds by fully 14 percentage points for home purchase loans, and 15 percentage points for refinance loans, from baseline probabilities of 17 percentage points in both cases; and (2) being originated by a CRA lender in their assessment areas, which reduced the odds by 15 percentage points for home purchase loans from a baseline of 19 percentage points, and by 12 percentage points for refinance loans from a baseline of 16 percentage points. In both cases, the likelihood of a loan being high cost, all else equal, was only about four-fifths as great as if made by other lenders or if not sold into the secondary market. This is because Fannie Mae and Freddie Mac purchased very few of these loans because they did not conform to their underwriting standards

Other strong influences that lessened the likelihood of receiving a higher-price home purchase loan were "missing borrower income" (shaving 5 percentage points from a 15 percentage point baseline), and buying a property in a higher-income neighborhood (taking 6 percentage points in predominantly white areas and 4 percentage points in mixed-race areas off a 15 percentage point probability in low-income, predominantly minority tracts). The effects were similar for refinance loans. The neighborhood results may either reflect channel structure (these loans were less likely to be marketed in these communities) or differences in borrower behaviors in these communities.

It is worth noting that the individual lender or originator variables also had strong independent influences on the probability of receiving a higher-price loan. This is consistent with the finding that higher-price lending activity was highly specialized and that unobserved factors correlated with metropolitan areas had an impact. For example, the odds of receiving a higher-price home purchase loan in Stockton, California were 1.4 times higher than in the base case of New York, all else equal. Generally, after controlling for other variables in the model, the probabilities in many metropolitan areas in California and Texas, along with several in Alabama, Mississippi, Arkansas and a few in the Midwest, were also much higher.

In addition, the likelihood of receiving a higher-price home purchase loan relative to the baseline case of Indy Mac was 38 percentage points higher for Lehman Brothers Federal Savings Bank and 10 percentage points lower for Bank of America. The fact that the CRA lender variables and secondary market sales variables stand out as significant even after controlling for the largest lenders is striking because these institutions accounted for more than half of all lending, and because their secondary market sales channels were so distinct.

By 2007, the variables driving the model had less explanatory power as the subprime market began to contract dramatically and subprime lenders failed. The pseudo R-squared (amount of variation captured by the independent variables) fell from 38 percent for the home purchase regression in 2005 to 19 percent in 2007, and from 36 percent to 21 percent for refinance loans. The direction and power of the influences on receiving a higher-price loan were generally similar among the variables of interest in 2005 and 2007, but the CRA assessment area effect was weaker in the home purchase regression in 2007. In addition, the missing borrower income effect reversed direction while the higher-income neighborhood effect became negligible.
In the refinance equation, the influence of being sold through a private securitization jacked up the probability of getting a higher-price loan by a much larger 34 percentage points in 2007 (over and above a 19 percentage point not-sold baseline). This compares with a 21 percentage point increase in probability (over and above a 17 percentage point not-sold baseline) in 2005.

### *Non-Occupant Owner Loan Model Results*

Unlike the subprime and higher-price markets, lending to non-occupant owners has received relatively little attention. The factors likely to influence the probability of getting a loan to buy a home with no intention of occupying it may be quite different from those influencing the probability of receiving a higher-price loan.

The variables with the largest direct relationship to the likelihood of receiving a non-occupant owner loan are the income of the borrower and whether income was reported **(Figure 3-23)**. Not surprisingly, being a higher-income borrower increased the probability of taking out a non-occupant owner loan. The size of the effect is dramatic: 16 percentage points over and above the 7 percentage point baseline probability for a middle-income borrower in 2005. Interestingly, missing borrower income increased this probability by some 20 percentage points in 2005, and even more so in 2007. This suggests that no income documentation was a strong predictor of taking out a home purchase loan as a non-occupant owner, but only five percent of these loans were missing income of the borrower.

Loans sold into the secondary market and made for properties located in middle- and higher-income neighborhoods, as well as neighborhoods with lower homeownership rates, slightly decreased the baseline probability of a non-occupant loan. Buying in an area with high denial rates increased the probability. Thus, low-income neighborhoods with higher rates of renting and poorer past mortgage performance were more likely to attract interest from non-occupant owners after controlling for other factors. Overall, though, apart from the income variables and the Hispanic variable (which decreased the odds by more than a third); none of the others increased or decreased the odds of a loan being made to a non-occupant owner by more than a third.

The non-occupant owner loan model did not fit as well as the higher-price loan model. The pseudo R-square was just 19 percent in both 2005 and 2007. In addition, the baseline probability of receiving a non-occupant owner loan did not fall as much over the two years as the probability of receiving a higher-price loan.

### *Piggyback Loan Model Results*

The piggyback loan model adds a higher-price loan dummy variable to determine how much taking out a first-lien higher-price loan influenced the likelihood of taking out a piggyback second. In the 2005 model of piggybacks to owner-occupants, the higher-price loan variable had the most significant influence of all **(Figure 3-24)**. Indeed, it increased the likelihood of taking out a piggyback loan by 19 percentage points over and above a 12 percentage point baseline for lower-priced loans, raising the odds fully 1.5 times. The impact in 2007 was much smaller at 1 percentage point over and above a 10 percentage point baseline.

Apparently, the intervening years considerably reduced the likelihood that a recipient of a high-cost first loan would finance a home purchase in part with a second loan. This could reflect either an increase in HELOC lending between 2005 and 2007 or a reticence of lenders to offer piggybacks on higher-price loans, perhaps because investors had grown more leery of them. The explanatory power of the owner-occupant piggyback loan model drops from a pseudo R-squared of 21 in 2005 percent to only 7 percent in 2007, suggesting that the overall explanatory power of the variables had diminished substantially.

Other variables that increased the probability of receiving a piggyback home purchase loan in 2005 by 30 percent or more include if the first lien was sold through a private securitization or private conduit (increasing the odds relative to the baseline of not being sold by 85 percent and 63 percent) and if the loan was made to a Hispanic borrower (increasing the odds relative to a white baseline by 44 percent). Black borrowers also were more likely to get a piggyback loan, all else equal, increasing the odds by 25 percent (or 4 percentage points rounded) over a baseline white probability of 15 percentage points).

The variables with the greatest impact on reducing the chances of taking out a piggyback loan were if the first-lien loan was in a CRA assessment area (an 8 percentage point reduction relative to an 18 percentage point baseline for other loans); if the first lien was sold to Fannie Mae and Freddie Mac (a 4 percentage point reduction relative to a baseline probability for loans not sold of 14 percentage points); and if the borrower had a low income (a 5 percentage point reduction relative to a baseline probability of 17 percentage points for middle-income borrowers). It is also

worth noting that in 2005 being sold to any purchaser other than Fannie Mae and Freddie Mac increased the chances of receiving a piggyback loan while in 2007 even being sold to Fannie Mae and Freddie Mac increased the odds but only modestly. Clearly, then, first liens on piggyback loans were often sold into the secondary market. Again, this reflects the fact the CRA lenders were less likely to originate loans with piggybacks in CRA assessment areas and Fannie Mae and Freddie Mac less willing to purchase them.

Piggyback loans to non-occupant owners were relatively rare. The share of non-occupant owners receiving piggyback loans to purchase homes was only 11 percent in 2005 and 6 percent in 2007. The explanatory power of the models was comparable to that of the owner-occupant piggyback model, with pseudo R-squares of 22 percent in 2005 and 10 percent in 2007.

In 2005, getting a higher-price loan increased the chances of receiving a piggyback loan as a non-occupant owner by 1 percentage point over the baseline probability for lower-priced loans of 3 percentage points **(Figure 3-25)**. Once again, being sold to another private conduit significantly increased the odds (3 percentage points over and above a 2 percentage point baseline of not being sold at all). But the impact of private securitization, while directly related, was much smaller (at a mere 1 percentage point increase over baseline). In this case, being sold to a life insurance, credit union, mortgage bank, finance company, affiliated institution, or Farmers Home increased the probability of receiving a piggyback loan on the same order as selling to a private conduit.

Other variables that increased the odds of a piggyback loan by more than 30 percent were unreported borrower income and being black (relative to a baseline case of being white). A variable that decreased the odds of a piggyback loan by 30 percent or more was being low-income relative to a baseline of being middle-income. In 2007, the influence of the variables was similar, although the impact of a higher-price loan changed from increasing the odds to decreasing them. In addition, being sold into the secondary market increased the probability of a piggyback loan even more. Individual metropolitan area influences were generally modest in the piggyback models, possibly because inclusion of the higher-price loan variable in the equations reduced these fixed effects.

### Key Takeaways from Analysis of HMDA Lending Patterns

The foregoing analysis reveals several things about the way high risk lending was conducted at the peak of nonprime lending and as it started to wane.[39] First, while higher-priced lending mostly occurred *outside* of low-income and predominantly minority areas, it was a much larger share of lending in such areas than in predominantly white and middle and high-income areas. Second, after controlling for a variety of pertinent factors—though importantly not credit scores—blacks and Hispanics were still far more likely to end up with a higher priced home purchase loan than whites. Third, lower income homebuyers after controls were also more apt to get higher priced loans, but income was less central than race. Fourth, CRA assessment area lending accounted for only a sliver of higher priced lending in 2005 but a larger share in 2007 after other lenders exited markets. Fifth, a loan having been made in a CRA assessment areas, all else equal, greatly reduced the odds it would be high cost. Sixth, only a tiny share of higher priced loans were sold to Fannie Mae and Freddie Mac in 2005, though the share increased in 2007 when the ABS market for nonprime loans started to shut down. The odds of a loan being higher price being sold to Fannie Mae and Freddie Mac were much lower because they were much less willing to guarantee or purchase them. Seventh, there were wide variations in higher priced loans shares by metropolitan areas, which remained even after controlling for various characteristics of tracts and borrowers, some of which were likely attributable to the lender specialization of the firms most active in these areas.

With respect to piggyback lending, having a higher price first lien greatly increased the chance of having a piggyback second, as did the race and ethnicity of the borrower and if it was sold into a private label security. The odds were sharply reduced if made by a CRA lender in its assessment area or if sold to Fannie Mae or Freddie Mac. Like higher-priced lending, piggyback lending exhibited significant metropolitan variation, even after controlling for many factors varying across metro areas.

Non-occupant owner lending followed different patterns than higher price and piggyback loans. First, higher income borrowers were much more (rather than less) likely to get a non-occupant owner loan than were lower income borrowers. Second, the impact of being sold into the secondary market

[39] The value of the "higher price" loan definition is that it is clearly defined and not based, like subprime and Alt-A, on self identification by firms potentially using different definitions.

was much slighter and negative. Lastly, even after controlling for borrower and neighborhood characteristics, metropolitan dummy variables played a very large role in the models.

## PART 4: THE MECHANICS OF SECURITIZATION AND THE MAGNIFICATION OF RISK

For decades, the mortgage securitization process worked successfully to place long-term, fixed-rate, pre-payable mortgage loans with a variety of institutional investors, pooling and repackaging the loans into securities with a broad range of maturities, coupons, and credit risk protection. A large, liquid secondary market provided increasing access to mortgage credit on more favorable terms than would otherwise have been possible. Structured bonds that either simply pass through principal and interest payments or create a spectrum of multi-class securities with different exposure to prepayment risk undoubtedly had an important impact on the capacity of mortgage markets to attract deep pools of capital under normal circumstances. Within the confines of the agency (Fannie Mae, Freddie Mac, and Ginnie Mae) MBS market, the structure worked well for nearly two decades. Investors could mostly look beyond the risk of outright loss of principal and focus on prepayment and interest risk. The duration risk of the traditional 30-year fixed-rate mortgage could be managed in complex ways, and securities backed by these mortgages could be easily traded in highly liquid markets. The value of mortgages to investors was in turn enhanced by standardized, liquid markets and by their ability to meet precise preferences for different coupons tied to different maturities and interest-rate risk sensitivities.

But the secondary market became dysfunctional when it permitted mass originations of highly risky loans that, through financial engineering, were repackaged as mostly AAA-rated securities. At the peak, the lion's share of subprime and Alt-A mortgages were issued as private-label securities and resold to other investors. While Freddie Mac did not wrap any private-label subprime securities and Fannie Mae wrapped only $12.8 billion, from 2004 to 2007 the two GSEs together purchased approximately 32 percent of all private-label subprime and 11 percent of private-label Alt-A issues for a total share of 23 percent of the combined markets during this period (Inside Mortgage Finance & Federal Housing Finance Agency, via Pinto 2010). As detailed below, the GSEs also have billions of dollars of self-indentified Alt-A whole loans in their credit books of business, and some analysts have used various definitions to identify additional loans in the GSE books felt to be high risk that were not self-identified as subprime or Alt-A (Jaffee 2010; Pinto 2008, 2010).

With so much nonprime debt securitized, it is clear that the capital markets allowed great risks to be taken in the primary mortgage market. Less obvious is how financial engineering in the capital markets then further shrouded risks through the creation of Collateralized Debt Obligations (CDOs). By dividing up mortgage cash flows from different pools of mortgages backing different securities in ever more complicated ways and combining them with other assets, CDOs appeared to help diversify risk. The way in which expected defaults of CDOs were modeled, however, turned out to exacerbate the risks. This is because CDOs required making additional assumptions about the correlation of assets within the CDO that made models of default probabilities highly sensitive to the assumptions made. Unfortunately, the assumptions used often discounted these risks because they were drawn from pricing differences in credit default swap markets over a period in which home prices were appreciating.

What literally multiplied the exposure to underlying nonprime mortgage risk, however, was the issuance of credit default swaps (CDS) and synthetic CDOs. A CDS is an agreement between a buyer and seller of protection against the default of an underlying security. The protection seller agrees to pay the protection buyer in the event of pre-specified credit events in return for a periodic premium payment from the protection buyer. A synthetic CDO is a portfolio of CDS. Synthetic CDOs bundle CDS together and are issued as securities with different tranches constituting different exposures to credit risk. By referencing actual subprime MBS and CDOs, CDS and synthetic-CDOs created exposure to the risks in these underlying securities over and above the face value of the actual subprime MBS and CDOs themselves. This referencing meant that in addition to the investors in the actual underlying nonprime MBS and CDOs, the CDS issuers and the buyers of synthetic CDOs also bore the risk of subprime loans not performing well. CDS were issued mostly by a handful of very large firms that were not regulated or supervised for the capital adequacy of their reserves against CDS losses.

To understand the boom and bust in nonprime mortgage lending, it is therefore important to grasp how risks in the primary mortgage market were magnified by practices in the capital market. As with loans in the primary mortgage market, MBS flowed through separate channels based on the underlying credit characteristics of the loan. Thus, it is also important to contrast the prime, conforming agency market and the market for nonprime and high-risk securities.

### Securitization in the Agency Market and the Emergence of REMICs

When secondary markets first got off the ground, mortgages were pooled and issued as simple "pass-through" securities. A special purpose vehicle (SPV) was established that held the loans backing the securities in a trust and passed through principal and interest payments to investors (net of a fee to guarantee timely payments as well as a fee to service the loans). Mortgages with similar characteristics (e.g., coupon maturity) were pooled together. Each investor received a pro rata share of the principal and interest paid by the mortgage borrower. These pass-through securities were valuable to investors because they carried an explicit (in the case of Ginnie Mae) or implicit (in the case of Fannie Mae and Freddie Mac) government guarantee against loss of principal, and because they allowed investors to buy and sell standard securities originated using standard procedures and documents in a liquid secondary market with increasing volume and scale. These pass-through securities are still the most common of MBS issued in the agency MBS market.

But these simple securities did not do much to address interest-rate risk. In particular, investors in agency securities were not protected from the timing of mortgage prepayment. As a result, if a homeowner prepaid after refinancing or selling a home, investors could receive an unscheduled repayment. To address these risks, MBS began to be issued as multi-class securities, with each class assigned to a different tranche. Issues were structured (hence the term "structured finance") so that the tranches had different coupons, maturities, and payment privileges. By slicing and dicing the cash flows from the underlying pool, a single bond issue could contain a range of tranches.

The first of these structured securities, often called collateralized mortgage obligations (CMOs), was introduced in 1983. They later came to be known as real estate mortgage investment conduits (REMICs) after the Tax Reform Act of 1986 allowed greater flexibility and favorable tax treatment for such structuring. REMICs took off during the 1990s and expanded to include securities issued by Ginnie Mae in 1994 and securities issued by so-called "private labels"—private securitizations made by finance companies, banks, thrifts, and investment banks. These are also prevalent today and were common in the MBS market from about 1985 to 2005, and again in 2008.

The simplest form of REMIC is a "sequential pay" structure. As described by Fannie Mae on its website:

> The principal on these classes is retired sequentially; that is, one class begins to receive principal payments from the underlying securities only after the principal on any previous class has been completely paid off. The principal payments, including prepayments, are directed to the first sequential class (A) until it is retired, then the payments are directed to the next sequential class (B) until it is retired. The process continues until the last sequential pay class (C) is retired. While the class A principal is paying down, B and C class holders receive monthly interest payments at the coupon rate on their principal.

Sequential pay securities reduce prepayment risk for some classes while assigning more to others. Investors may end up with more or less prepayment risk, and with prepayments that occur sooner or later than expected. Thus, a yield curve tied to different maturities is created within a single pool of bonds with very similar coupons and maturities. In addition, investors interested in betting on faster or slower prepayment speeds, or investors with other investments they could hedge with differing prepayment speeds, could purchase securities that assume more of the prepayment risk. This process typically makes the parts more valuable than an undivided whole and provides a powerful incentive for issuers to structure their securities. A host of other REMIC structures have been created to further reduce repayment uncertainty for investors interested in more certain cash flow timing.[40]

Despite all these efforts to bring greater certainty to cash flows for investors in some tranches, while allowing others to make bets on prepayment speeds or hedge other positions, structured securities do not provide complete certainty. As a result, investors on either side of the bet may win or lose if prepayment speeds vary from predicted levels. Changes in interest rates, and (if not guaranteed by the issuer) credit losses can influence both the timing of principal and interest payments and the amount of principal recovered.

A few features of REMICs are worth noting. First, investors in different tranches have different interests. Thus, if the servicer has discretion over how it handles refinances (such as alerting borrowers to refinancing opportunities so they can earn a fee by refinancing the loan) or

[40] Among the most common of these are stripped structures in which an interest-only (IO) strip pays interest only and the principal-only (PO) strip pays principal only. The PO strip is purchased at a discount because principal payments start slow and gain speed. PO strip investors come out ahead if the issue prepays faster than expected. Another common structure is the planned or targeted amortization class (PAC or TAC). These pay principal according to a schedule that may differ from the amortization schedule of the loans in the pool, so that principal is paid over a range of prepayment scenarios (prepayment band) within a specified time period. In these sorts of structures, there are support bonds that get the excess or shortfall of principal outside the prepayment band. Another common form of structure involves floater and inverse floater tranches that have interest payments tied to an index.

prepayments due to loan defaults (such as accelerating them or modifying mortgages to avoid them), investors may want the servicer to apply that discretion differently. Second, the various ways that securities can be structured vastly increase the range of underlying mortgage types that can be used to back REMICs, given that cash flows and tranches can be created that bear little resemblance to the payout and amortization schedules of the underlying loans. This feature clearly helped the market for mortgage products such as interest-only, payment-option, and hybrid adjustable-rate loans to thrive. Third, REMICs often create a tranche in which a support bondholder benefits from early prepayments and will pay for early prepayments. Fourth, the sensitivity of returns to prepayment assumptions in many tranches can be quite high.

### Structuring Non-Agency Private Conduit Securities

The biggest distinctions between private-label (non-agency) MBS markets and agency MBS markets are the lesser degree of standardization in underwriting, the greater tolerance for risk, the higher coupon, and the lack of an implicit or explicit federal guarantee against credit risk.[41] Because the price of private-label ABS backed by mortgages is more sensitive to the credit quality of the underlying loans because timely payment of principal and interest is not guaranteed by a GSE or the federal government, they are structured to provide some protection to investors from both prepayment risk and credit risk.

Indeed, Coval, Jurek and Stafford (2008) argue that the essence of structured finance is to "repackage risks and create 'safe' assets from otherwise risky collateral" by creating tranches that are "viewed by investors to be virtually risk-free and certified as such by ratings agencies." Supporting this argument is a Fitch Ratings study from 2007 that estimated that 60 percent of all global structured products (not just those backed by subprime mortgages) were AAA-rated compared to less than 1 percent of all corporate issues. Ashcraft and Shuermann (2008) present a Bear Sterns chart suggesting that a typical subprime MBS structure had 79.3 percent AAA-rated debt and a typical Alt-A MBS 92.9 percent AAA-rated debt. It was the ability to manufacture

[41] Another difference is the existence of the to-be-announced (TBA) market in the agency market. Since the default risk of each mortgage loan is guaranteed by the agencies, these securities are able to trade on the TBA market where buyers and sellers trade MBS without specifying the specific pool of loans that will be traded. Market participants do not know which mortgage pool they will receive until two days before settlement. The lack of specificity of mortgage details until right before settlement is due to the insurance provided by the agency and promotes the liquidity of the agency market. It also allows borrowers to lock in mortgage rates well ahead of the closing date.

such large shares of AAA-rated product from loans with underlying risks that caused these securities to grow so rapidly.

For the most part, non-agency securitization falls into two types of structures. The six-pack structure is the one most often used in the securitization of prime jumbo and Alt-A loans. Subprime loans are securitized using a structure of excess spread and overcollateralization. Both structures are normally devised so that credit risk is segmented into three major classes or tranches: a senior tranche, a mezzanine tranche, and equity, residual, or junior tranche. The equity tranche is the first to incur losses and is typically unrated, while the senior tranche has an AAA rating and the mezzanine class has a rating from AA to BBB.

In a six-pack structure, the senior tranches receive principal payments first, followed by mezzanine investors, and finally by the equity tranche investors (Fabozzi 2005). This payment process is referred to as subordination (with junior tranches subordinate to senior tranches). The process is reversed on the loss side, with equity investors incurring the first loss, followed by mezzanine investors and senior tranche buyers. Lower tranches receive higher coupon rates to compensate for the additional risk. In this manner, investors are able to choose their level of prepayment and credit risk by investing in tranches commensurate with their risk tolerance and desired yield.

Subprime securities are enhanced not only by subordination of the various tranches but also by overcollateralization and excess spread. Subprime securities are over collateralized in the sense that the principal amount of the issued security is less than the principal amount in the mortgage pool. For instance, a $500 million subprime security could be issued that is backed by a pool of mortgage assets totaling $550 million in principal, representing a 10 percent overcollateralization. Excess spread is the third type of credit enhancement common to subprime securities. It is the difference between the weighted average coupon paid by borrowers and the weighted average coupon paid to security holders net of servicing fees. The excess interest is deposited into a reserve account and serves as the first line of defense against losses to security holders. Excess spread is paid to senior-level investors when defaults in the underlying mortgage

pool reach a certain predetermined level. Overcollateralization and excess spread are also frequently used in second-lien structured securities.[42]

Practices such as overcollateralization and excess spread seem attractive in theory. Indeed, as noted, ratings agencies assigned AAA ratings to large parts of subprime REMIC issues, based on the appeal of these practices as well as on overly optimistic assumptions about the probability of nationwide home price declines. In the agency debt market, issuers are charged a guarantee fee to cover the expected losses on a security issue, plus a risk-adjusted rate of return to Fannie Mae, Freddie Mac, or Ginnie Mae. Reserves are kept against the risk of loss. Although excess spread and overcollateralization play the role of reserves in the case of private-label securities, many of the tranches receive no protection from these practices because they protect only the senior and perhaps, to a more limited degree, the mezzanine tranches. Instead, investors in the equity and mezzanine tranches take greater risks for a potentially higher return, assuming the underlying loans support payments at the higher coupons for the expected duration of the tranche. This leaves many investors unprotected against losses unless they choose to—or are required to—reserve against them.

In addition, the degree of overcollateralization and excess spread is only sufficient to protect the senior tranches or a portion of the mezzanine tranches, but only if the default probabilities that undergird the ratings are estimated properly. Ratings agencies make assumptions about the expected probability of default or (in the case of Moody's) expected losses. If losses turn out to be higher than expected, then equity, mezzanine, and even senior tranches can experience lower-than-expected returns.

If expected probabilities of default increase after a REMIC is issued, the bonds are downgraded. In the end, rating private label securities involved making assumptions about default probabilities or expected losses that turned out to be overly optimistic. As an example, in 2007, even before the larger meltdown, the Bank of International Settlements reported that Moody's

[42] According to Calhoun (2005), the key difference in a closed-end second loan and a home equity line of credit securitization is that "they are structured to maintain investor financial interest in the pool at more or less a constant level for some initial period of time corresponding to the draw period on the underlying loans, and payoffs by some borrowers are used to purchase investor interest in new loans or new credit draws by other borrowers." This extends the lifespan of a HELOC security past the average duration of agency and non-agency MBS, which is paid out over time. Closed-end junior liens are sometimes packaged with other subprime and non-agency collateral.

downgraded 31 percent of all tranches it had rated and 14 percent of its AAA-rated ABS tranches. In June 2009, Standard and Poor's reported that only about one-tenth of its AAA-rated ABS collateralized debt obligations remained AAA while nearly six-tenths had fallen to B.

Thus, non-agency securities carry prepayment, interest rate, and credit risk. Although agency securities also carry these risks, investors believed that the federal government would make good on its explicit and implicit guarantees and discounted the risk of loss of principal, focusing instead only on prepayment speeds. And these investors were correct: Ginnie Mae continues to make good on its guarantee, and Fannie Mae and Freddie Mac were important enough for the federal government to step in and provide additional resources so that they could pay on the guarantees. This was not the case with non-agency securities, and investors suffered heavy losses.

### The Rise of CDOs and CDO-Squared

In no small part, the remarkably high share of structured bonds that received AAA ratings during the nonprime boom was achieved not just through the subordination, excess spread, and overcollateralization in structured securities, but also in the re-securitization of some of these obligations into CDOs and CDO-squared. Collateralized debt obligations proliferated in international capital markets and rocked global finance from China to Iceland when nonprime mortgage performance began to erode. In addition, in an effort to monetize the risk in these structures, some investors tried to insure against the collateral underlying the securities by taking bets against the trusts and institutions that issued them in the form of CDS. Unfortunately, CDS only insure investors by exposing them to the uncertain capital cushion—which turned out to be all too thin—of a complex combination of largely unknown counterparties.

The main challenge of structuring subprime mortgage securities and other subprime credits was marketing the mezzanine tranche to investors. "A" or higher-rated securities receive favorable capital treatment under risk-based capital reserve requirements established by the Basel Accord in 1988 in the wake of the Latin American debt crisis. While the senior tranche and equity tranches could be placed, it was the B class that often lacked a market. One way the secondary market found to get around the lack of demand for mezzanine classes was to pool B tranches

from different securities into CDOs. CDOs thus supported subprime mortgage securitization by providing a venue for selling the illiquid tranches of the security.[43]

CDOs are special purpose vehicles that purchase bonds, loans, and other assets and further restructure them into risk-based tranches to sell to investors. In some, even MBS are a form of CDO because the loans backing them are made to individual. Because the underwriting process had become standardized, MBS were not thought of as CDOs even though it would turn out that they were similarly sensitive to joint probability of default assumptions.

Increasingly, tranches of subprime and Alt-A MBS became a significant component of CDOs' underlying asset base. Indeed, over the period 2005–2007, Economy.com estimates that the typical CDO issued on the ABS market invested about 70 percent of its portfolio in subprime MBS.

The CDO structure is similar to private-label MBS securities in that they are divided into tranches by risk level and include senior, mezzanine, and equity tranches. The CDO has additional structural components that include performance triggers that, if delinquency and losses exceed certain predetermined levels, preclude payment to all but the most senior tranches. Also unlike MBS, which are static and fixed to the initial underlying pool, CDOs can in theory be actively managed to swap in and out of different tranches as a way to manage risk. Through CDO securitization, financial markets were able to pool the riskiest and least liquid tranches of subprime MBS and restructure them into securities in which formerly risky mezzanine and equity tranches could be reclassified and sold in part as senior-level tranches.

Rating CDOs involves making assumptions not just about the default probabilities or expected losses of the individual asset types in a pool, but also about the joint probability of defaults of tranches drawn from different security issues. As it turns out, CDO ratings are highly sensitive to even small variations in the estimated joint probabilities of default. As early as 2004, a working paper released by the Bank for International Settlements noted that "it has been argued that the high numbers of downgrades of high-yield CDO tranches over recent years are at least partially the result of the under-modeling of both default and recovery rates, and hence, a manifestation of

[43] According to Deng et al. (2009), "CDOs may have served to enhance efficiency in the asset-backed securities markets, via the pooling and re-tranching of less liquid and lower-rated subprime MBS into derivative securities that were more tradable."

model risk" (Fender and Kiff 2004, p.9). The authors also cited Adelson (2003) who argued that ratings agencies discount negative default probabilities across classes. Coval, Jurek, and Stafford (2008) provided simple illustrations and simulations of how sensitive ratings are to joint default probability assumptions. Indeed, the assumptions used discounted the risk of nominal house price declines occurring nationally and, in the case of CDOs, relied on historical prices of CDS over a period in the 1990s to early 2000s when house prices were appreciating (Salmon 2009).

More sensitive still are CDO-squared securities, which draw from an underlying pool of CDO tranches that have been combined and repackaged. CDO-cubed securities take the process a step further and are structured from the tranches of CDO-squared securities. In fact, there are multiplicative CDO derivatives in existence in the market, coined generally as $CDO^n$. Coval and his colleagues show how even a CDO-squared security made up entirely of mezzanine tranches could have large senior tranches with AAA ratings.

The market for these CDOs (including synthetics using credit default swaps which are discussed in more detail below) was enormous. The Securities Industry and Financial Market Association (SIFMA) reported total global CDO issuance stood at approximately $157.5 billion in 2004, then more than tripled to $520.6 billion just two years later. But as quickly as CDO issuances rose, they fell at the first signs of trouble. Quarterly issuance peaked at $178.6 billion in the second quarter of 2007, and plummeted 87 percent to $23.6 billion a year later (Figure 4-1). CDOs denominated in US currency made up the lion's share, averaging 76 percent of global issuance from 2005 to 2007. In 2008, however, US-issued CDOs were just 37 percent of the total. For the first time, CDOs issued in European currency exceeded the share of dollar-denominated CDOs, at 50 percent of a much smaller total.

The composition of CDO issuance also changed dramatically from the height of the subprime boom to the present bust. SIFMA offers eight categories of underlying collateral, including investment-grade loans, high-yield loans, investment-grade bonds, high-yield bonds, structured finance, swaps, and a separate category for funds that do not fall into the previous groups. Notably, the quarterly SIFMA data indicate that only a silver of CDOs were backed by investment-grade bonds in 2006 (Figure 4-2). In 2005, structured finance (including mortgage-

backed securities, commercial mortgage-backed securities, collateralized mortgage obligations, asset-backed securities, other collateralized debt obligations, and credit default swaps) made up a full 65 percent of total CDO securities issuance. By 2008, however, structured finance was only 30 percent of issuances—a distant second to high-yield loans, which made up 42 percent.

### Credit Default Swaps and Synthetic CDOs Further Multiply Risks

An explosion of CDS issuance referencing subprime MBS multiplied the exposure to subprime mortgage risk in the financial system. CDS are bilateral agreements between two counterparties to trade risk with reference to a third-party entity. The buyer pays a fee to the seller in return for a contingent claim on the seller should the reference security fail to make a payment or default. The seller either takes delivery of the defaulted bonds at par or pays the buyer the difference between the par value and the recovery value. CDS bear a resemblance to insurance policies, but in most cases there is no requirement to hold any asset or prove adequate reserves against the total exposure to losses. CDS can also be traded to speculate on changes in credit spreads.

Estimates of the size of the CDS market vary, but even lower-range estimates place it at over $40 trillion at the end of 2007. The emergence of this mammoth market multiplied risks in at least four ways. First, it introduced an additional layer of counterparty risk because settlements of CDS require that those writing protection are able to make good on protection, yet they are not required to reserve against losses in the same way as an insurance company or deposit-taking financial institution. Second, it introduced more systematic risk because a few enormous issuers dominated the market and the default of a single issuer could have serious ramifications. The failure of Lehman Brothers and the potential failures of Bear Stearns and AIG underscored how serious this risk had become. The bailout of AIG and the arranged sale of Bear Stearns to JP Morgan Chase further demonstrated just how fearful the government was of a meltdown in the CDS market. Third, the CDS market is not transparent, lacking both a central clearinghouse and price discovery mechanism. This made it unclear who bore which risks in the system, and who stood to lose if subprime performance was worse than anticipated. Indeed, not until the government stepped in to avert the failure of Bear Stearns and AIG and in the aftermath of the Lehman Brothers failure did it become aware of just how many counterparties stood to lose from the failure of any one of these entities. Finally, the CDS market vastly expanded the exposure of

investors to subprime credit because the supply of CDS is not limited by the face amount of subprime debt but rather by the number of agreements that financial firms enter into that reference the face debt. Multiple contracts can and were written against the same issue.

Unlike subprime mortgages, the supply of CDS was unlimited and provided ample fodder for CDO securitization. So insatiable was the global demand for exposure to subprime mortgages that this market soared. The Federal Reserve estimates that exposure to CDOs referencing BBB-rated subprime MBS was 60 percent greater than the BBB-rated subprime MBS issuance itself in 2005. In 2006, it was 93 percent greater (Pozsar 2008).

As Gorton (2008) explains, "The demand for exposure to riskier tranches of subprime RMBS exceeded supply by a wide margin. The additional risk exposure was created synthetically." A synthetic CDO is composed of CDS. The seller of the synthetic CDO receives credit protection from the buyer of the security. Purchasing of CDOs exposes the buyers to subprime risk.

The investors/buyers of synthetic CDOs receive premiums from the sellers in return for a promise to pay the sellers in the event of certain credit events. Many sellers of synthetic CDOs and CDS did not own the underlying reference securities. By buying protection for referenced securities they did not own, sellers of synthetic CDO were betting that the performance of the referenced securities would be poor. If the referenced securities defaulted early and in large numbers, they stood to and did receive enormous payouts relative to the premiums advanced. It was not uncommon for premiums to take the form of semiannual payments that were somewhere between 50 to 200 basis points of the face amount in the event of default or bankruptcy. An estimated 85 percent of synthetic CDOs were not backed by collateral (Pozsar 2008).

### Leverage, Duration Risk, and Special Investment Vehicles

Risk was further aggravated by the heavy use of short-term loans to finance investment in longer-term subprime-related securities. While the equity tranches were purchased by thousands of hedge funds, private equity funds, and other institutional buyers, the senior tranches ended up becoming quite concentrated within about a dozen banks and insured by a small number of monoline insurers (Pozsar 2008). Bank exposure was not transparent because most of their

investments were spun off into SIVs. According to Standard & Poor's, about half of the assets of these SIVs were some form of MBS and about a fifth CDOs, and the SIVs typically borrowed fully $15 for every $1 of equity. The first-loss position usually took the form of capital notes and the rest of the financing came from medium-term notes and asset-backed commercial paper. The banks that set them up charged fees for guaranteeing a portion of the SIV's liquidity.

It is not known how much leverage hedge funds and private equity funds used to purchase subprime MBS and CDOs, CDO-squared, and synthetic CDOs, or how much exposure these funds had relative to their asset bases because they are not required to disclose this information. But with the cheap cost of credit and the impression that these funds were well hedged against risk, it is likely that heavy leverage was used to boost returns among these entities as well.

As a result, risk on senior tranches was more concentrated than many had thought and investments in all tranches were heavily leveraged with short-term debt that required frequent access to short-term debt markets to sustain. In addition, risk was concentrated in the hands of a few monoline insurers and large issuers of CDS. Though intended to distribute risk, the structured finance system in fact concentrated senior tranche, insurance, and CDS risk. It is also worth noting that the resecuritization of AA-, A-, and BBB-rated mezzanine tranches in CDOs created a significant amount of senior debt that was backed by these riskier pieces of subprime securities. When conduits and SIVs could not roll over their short-term debts, many failed or had to be taken over by the banks and investment banks that sponsored them.

### Key Takeaways

The capital markets both enabled greater risks to be taken in the primary mortgage market than ever before (by transforming risky assets into mostly AAA-tranches of securities and sopping up so much loosely underwritten product) and multiplied it (by writing CDS as well as creating synthetic CDOs of CDS that referenced ABS backed by nonprime mortgages, creating CDOs and CDO-squared that were hard to trace back to underlying mortgages, and allowing so much leverage in the purchase of assets, much of it off balance sheet). Structured securities morphed from instruments to manage interest-rate risk in the agency market where credit risk was convincingly covered by government agencies with explicit federal guarantees or by Fannie Mae

and Freddie Mac with implicit federal guarantees. They became instruments for attempting to manage credit rate risk in the ABS market.

In the process, risks were taken with not enough attention paid to whether capital reserves were nearly adequate to cover the risks being taken. Issuers made higher profits with ABS than agency issues and were motivated to use the ABS channel. The exposure of many firms to the risks was unclear due to the lack of transparency in the CDS and SIV markets. In addition duration risk was tolerated as investors were able to finance long-term assets with short-term debts. Investors in different tranches often were affected in different ways by defaults and modifications, placing strains on servicers charged with taking steps to protect investors. Despite all the additional risk being taken, eventually things reached the point where, as Greenspan (2010, p. 8) so directly put it, "there was little room for further underpricing of risk." All these developments contributed in fundamentally important ways to both the boom and the bust in nonprime lending and their consequences for credit markets and economies across the globe.

# PART 5: THE BURSTING OF THE HOUSING BUBBLE AND THE EROSION OF NONPRIME LOAN

An accounting of how the housing bubble burst rightfully begins with how it started. The evolution of the mortgage market, combined with strong economic growth from 1993 through 2000, helped to fuel a boom in homeownership. At that point, the gains in homeownership came from strong fundamentals and appeared on solid footings. Around 2001, sharp reductions in mortgage interest rates, the rapid expansion of nonprime mortgage credit, and the explosion of products that lowered initial payments at the expense of heightened repayment risks, together with initially tight markets that drove home prices higher and fuelled expectations of continued sharp increase in home prices, pushed home sales and house price appreciation to record heights.

Beginning in mid-2006, however, house prices across the country plunged and home sales fell sharply as potential buyers held back because of the uncertain direction of house prices as well as an increase in mortgage interest rates. New construction crashed, turning its contribution to the economy from a one percentage point increase in GDP during the boom to a one percentage point decrease in 2007. Moreover, the entire gain in the homeownership rate from 1999 to 2004 was reversed by the third quarter of 2009. Meanwhile, foreclosures became an incessant and destructive force in the housing market, dragging down house prices, boosting the inventory of homes for sale, and destroying home equity for millions of American households.

The precipitating events of the crisis were the sharp declines in home prices and the eroding mortgage loan performance that followed. The proliferation of nonprime and nontraditional mortgage products in the 2000s played an important part in how badly and quickly loan performance eroded. These loans included subprime, Alt-A, no-documentation, payment-option, hybrids (like 2/28 adjustables), and piggyback loans. The most risky of these loans were securitized through private conduits. Indeed, at the end of 2008, 15 percent of mortgage loans backing private-label MBS—nearly all of it nonprime—contributed fully half of all seriously delinquent (90+ days) home loans (Figure 5-1).

## The Unraveling of the Housing Boom

Eventually, even creative finance could not overcome rising interest rates and decreasing affordability. Home prices stalled and then fell. According to the S&P/Case-Shiller National Home Price Index, home price appreciation peaked in the first quarter of 2005 and home prices in the first quarter of 2006. Home prices nationally were down 2 percent from the peak by the first quarter of 2007, 15 percent by the first quarter of 2008 and fully 31 percent by the first quarter of 2009.

Without the lure of rising prices, investors exited the home purchase market. After increasing from 7 percent of originations in 2003 to 8.4 percent in 2004, the investor share of mortgage loans peaked at 9.4 percent in 2005. The combined share of investor loans and second-home loans reached a peak of 16.6 percent of originations in 2005, and still made up 15 percent of originations in 2006 as home prices topped out. While the pullback in 2006 was slow on a national level, investor and second home shares were already dropping more sharply in previously hot markets like Las Vegas (from 15 percent in 2005 to 11 percent in 2006), Phoenix (from 16 percent to 10.5 percent), Ft. Lauderdale (from 18 percent to 14 percent) and Riverside (from 12 percent to 8 percent).[44]

The exit of investors accelerated the retreat in housing demand in some of the most overheated markets and widened the mismatch between housing supply and demand, causing prices to drop sharply. While home price declines were widespread, the low price tier—where prices had run up the most and investors were concentrated—posted the largest drops. In each of the 17 metro areas where the S&P/Case-Shiller index reported information by price tier, the sharpest declines occurred in the bottom third of the market. Bottom tier price declines averaged 53 percent peak to trough, or 1.25 times the 44 percent average decline in the middle tier and 1.4 times the 40 percent average decline in the top tier. In all but two metros, however, the appreciation leading up to the peak was also greater in the bottom tier. From January 2000 to the peak, bottom-tier prices doubled in 11 metros, with an average 134 percent increase. By comparison, middle-tier prices doubled in 9 metros and total appreciation averaged 109 percent. Top-tier prices doubled in just 7 metros, while appreciation averaged 93 percent.

[44] Investor shares data were provided to JCHS in 2007 by First American CoreLogic.

In 2007, a wave of loan resets hit, driving up payments on an increasing number of adjustable-rate subprime mortgages. The wave did not crest until 2008. Although the surge subsided by late 2009, another wave of resets is set to peak in 2011, led by Alt-A and payment option mortgages (Uhlfelder 2009).

Because adjustable mortgages often reset to higher interest rates (due to either or both increases in the indexes or the expiration of teaser rates), they generally lead to higher default rates. The impact of the initial wave of resets was so damaging because of the sheer volume of resets, but also because many borrowers were underwater so lenders would not refinance the loans and because many borrowers were already stretching to meet their mortgage payments at even the lower interest rates due to lax underwriting.

The subsequent jump in delinquencies and defaults on subprime adjustable-rate mortgages was dramatic. After years of remaining on par with the delinquency rates of fixed-rate subprime loans, according to the Mortgage Bankers Association's National Delinquency Survey the share of subprime adjustable-rate loans that were seriously delinquent or in foreclosure climbed from 6 percent in the fourth quarter of 2005 to 9 percent in the fourth quarter of 2006, and then shot up to 20 percent in the fourth quarter of 2007.

Without question, the dismal performance of nonprime loans was driven by the bust in house prices. LaCour-Little (2004) summarized many studies focusing on mortgage defaults, all of which conclude that homeowner equity levels and loan-to-value ratios are critical determinants of defaults. Falling home prices, thin equity cushions, and increases in LTV ratios pushed millions of homeowners into negative equity, with the heaviest concentrations in lower price tiers and in metropolitan areas that experienced the sharpest drop in prices.

Still, Foote, Gerardi, and Willen (2008) pointed out that even though most owners who lose their homes to foreclosure have negative equity, most owners with negative equity do not lose their homes because they keep making payments if they can. Thus, while negative net equity is necessary condition, it is often not sufficient to drive defaults. It was the double whammy of the necessary and then the sufficient condition of not being able to make payments that created the

meltdown. The number of borrowers having difficulty making payments had reached record levels, both because of poor initial underwriting and resets, as well as heavy job losses that made it tough even for those with fixed-rate mortgages to remain current.[45]

### The Collapse of Loan Performance

Trapped with no way to refinance or sell their way out of trouble and saddled with loans larger that the value of their homes, default rates soared among nonprime borrowers. As nonprime loan performance eroded, confidence in the financial system was shaken by the realization that subprime exposure was concentrated in many large financial institutions teetering on the brink of failure. As a result, the prices of nonprime securities plummeted and the flow of nonprime mortgage credit was reduced to a trickle.

Delinquency rates reported by the Mortgage Bankers Association for the third quarter of 2009 translate into approximately 4 million loans that were seriously delinquent (90+ days past due). This represents a four-fold increase from the third-quarter 2005 level of approximately 741,000. Serious delinquencies accelerated across all loan types, beginning with subprime, followed by FHA loans and then prime loans.

Subprime delinquency rates posted not only the earliest but also the sharpest increase. After rising modestly from 5.7 percent to 6.8 percent between the third quarters of 2005 to 2006, the rate climbed steadily to 11.4 percent in the third quarter of 2007, 19.6 percent in the third quarter of 2008, and 28.7 percent in the third quarter of 2009.

Within each loan type, serious delinquency rates were significantly higher for adjustable loans. In the subprime market, 40.8 percent of ARMs were seriously delinquent as of the third quarter of 2009, double the 19.7 percent rate for fixed loans (using non-seasonally adjusted numbers). Among prime mortgages, the serious delinquency rate for ARMs (16.7 percent) was three times higher than for fixed-rate loans (4.3 percent). FHA loans also follow this pattern, though the

[45] Nevertheless, some—and perhaps an increasing number—of borrowers are abandoning the effort to pay off loans in areas where home prices have fallen sharply. Cohen-Cole and Morse (2009), studying the specific impact of falling house prices on mortgage and credit card default rates in California, found that falling home prices contributed to the decision of financially stressed individuals to protect their credit card lines rather than keep their mortgage payments current. Such strategic defaults cause great alarm among lenders. However, even in the terrible meltdown in Massachusetts in the early 1990s, only about a fifth of those with negative net equity defaulted (Foote, Gerardi, and 2008).

difference between the delinquency rate for ARMs (11.8 percent) and fixed-rate loans (8.4 percent) was much smaller. Although their delinquency rates remain much lower than for subprime loans, the number of seriously delinquent prime fixed-rate loans overtook the number of seriously delinquent adjustable-rate subprime loans in the second quarter of 2009.

With delinquencies on the rise, the number of loans in foreclosure steadily increased by an average of 114,000 each quarter from the second quarter of 2006 through the second quarter of 2009, but accelerated to about a 150,000 annual pace from the third quarter of 2008 to the third quarter of 2009, according to Mortgage Bankers Association delinquency figures. The crisis began in subprime adjustable-rate mortgages, which increased from 22.6 percent of all loans in foreclosure in the second quarter of 2004 to a peak of 43.5 percent in the second quarter of 2007. Turning from rates to absolute numbers of homes in foreclosure, by mid-2008 annual growth of the number of subprime loans in foreclosure appeared to have peaked, but the number of prime loan foreclosures began to accelerate. Closer to a third of loans in foreclosure in the early 2000s, the share of prime loans has remained above half since early 2009 as job loss and the effects of underwater borrowers took their toll.

### Investor Losses

As long as home prices kept going up, subprime securities performed well because borrowers could refinance or sell their way out of trouble. But when home prices finally began to fall and subprime loan performance eroded, the risk within subprime REMICs and CDOs became apparent.

Two quantitative indicators charted the implosion in the subprime market. The first was the ABX index, which equally weighted 20 subprime MBS. This index plummeted in 2007 as demand for subprime mortgages evaporated. Another indicator of the deterioration in subprime mortgages was an increase in early payment defaults—more and more borrowers began to default within the first six months of their mortgage, indicating that the loans were poorly underwritten or offered to speculators prepared to walk away from their loan commitment.

The downward movement in both indicators triggered a dramatic loss of confidence in subprime securities. Investors demanded that originating lenders buy back millions of dollars of subprime

loans, leading to the unprecedented failure of more than 100 institutions. The price of subprime MBS plunged. Investment banks that had purchased a large amount of subprime MBS, such as Bear Stearns and Lehman Brothers, were crushed by such overwhelming losses. Banks began to doubt each other's viability. The commercial paper market—the $28 trillion credit market used by banks and corporations to meet short-term obligations like payroll—froze up, prompting the most extensive federal government intervention in the financial market since the Great Depression.

In this environment, Wall Street was redrawn as venerable institutions like Lehman Brothers imploded, lenders such as New Century went bankrupt and survivors like JP Morgan, Bank of America, and Wells Fargo gobbled up institutions weakened to the point of dependency by their subprime investments. These included Bear Sterns, Wachovia, Washington Mutual, Countrywide, and Merrill Lynch. According to the International Monetary Fund's October 2009 Global Financial Stability Report, potential global writedowns on credit over 2007–2010 could exceed $3 trillion, including nearly $500 billion in bank writedowns of residential loans and securities.

### The Impact of Tighter Underwriting

As the subprime market began to falter, lenders first tightened lending standards on subprime mortgages and then exited the market. According to the Federal Reserve Board's Senior Loan Officer Opinion Survey on Bank Lending Practices, the percent of banks reporting stricter lending standards on subprime mortgages rose from 56 percent in early 2007 to 100 percent by the end of 2008. Standards in the prime mortgage market were eventually tightened as well. While the share of banks reporting tighter prime mortgage lending standards did not exceed 50 percent until early 2008, the share had risen to 70 percent by the second half of the year.

With tighter underwriting and restricted availability, credit for nonprime and nontraditional mortgage products rapidly dried up. Inside Mortgage Finance (2009) reported that the volume of subprime mortgage originations dropped by an inflation-adjusted 69 percent in 2007 and by another 88 percent in 2008. Meanwhile, Alt-A loan originations fell by 33 percent and then by 85 percent in those same two years, down to less than a tenth of their 2006 volume. Jumbo loan volumes were off by 30 percent in 2007 and by another 73 percent in 2008. Even in the prime

markets, there was a clampdown in liberal underwriting. The credit risk profile of the GSEs shifted dramatically towards higher quality credits (Figure 5-2).

The credit crisis in the last quarter of 2008 also led to a widening of the spreads between 10-year Treasury yields and mortgage rates. After holding near 150 basis points since 2003, the spreads on conventional, conforming 30-year mortgages began to rise in the second half of 2007 and then spiked to 291 basis points by December 2008.

### Federal Responses

The shutdown of the ABS markets and the retreat of even prime jumbo lenders left FHA and Fannie Mae and Freddie Mac (which the US Treasury took into conservatorship in late 2008) as the primary providers of liquidity to the mortgage markets. After retreating to just 40 percent of all MBS securitizations in 2006, Freddie and Fannie's share grew to more than 75 percent in 2008 (Figure 5-3). In addition, the resurgence of FHA mortgage loans brought Ginnie Mae's share of MBS issuance from less than 5 percent of the market in 2006 to nearly 23 percent in 2008 (Figure 5-4). In combination, government agencies and GSEs were responsible for more than 95 percent of MBS issuance in 2008. Such concentration meant that the federal takeover of Fannie Mae and Freddie Mac not only made government support of their MBS explicit but led to a de facto nationalization of mortgage guarantees.

To keep the flow of capital into the mortgage markets via Freddie Mac and Fannie Mae, in early 2009 the Federal Reserve began purchasing agency MBS securities guaranteed by the two GSEs. Purchases of up to $1.25 trillion were planned to continue until the end of the first quarter of 2010, in hopes that private capital would return to the mortgage markets by then. As of November 11, 2009, the Fed held $775 billion in agency MBS on its balance sheet.

After the Fed announced expansion of the MBS purchase program in March 2009, spreads on conventional, conforming 30-year mortgages and 10-year Treasuries dropped 63 basis points within the next two months. While purchases of more than $1 trillion of Fannie Mae and Freddie Mac MBS in 2009 were able to drive the spreads on conforming loans back down to and then

below the trend line, spreads on prime jumbo loans remained high and lending standards especially tight.

Although federal intervention propped up the agency market, the market for nonprime loans collapsed and the market for jumbo loans remained under severe stress. Starting in late 2007, interest rates on nonconforming jumbo mortgages rose relative to those of conforming loans, widening the spread from approximately 20 basis points to well over 100 basis points in early 2008. This indicates the increase in the risk premium investors attached to mortgage loan assets without agency guarantees. The retreat of private capital from the secondary mortgage market was especially apparent in the collapse of nonconforming, non-agency MBS products such as jumbo loans. Non-agency jumbo MBS issuance dropped 97.8 percent in 2007–2008 after adjusting for inflation, from $349 billion to $7.6 billion, including no reported jumbo MBS issuance in the fourth quarter of 2008.

While the federal government propped up and expanded the conforming mortgage markets by raising loan limits, private financial institutions were trying to rid their balance sheets of billions of toxic residential mortgage assets. On September 30, 2009, the IMF estimated worldwide exposure to toxic assets at $3.4 trillion, including $2.8 trillion in bank writedowns of assets ($1 trillion of which was originated in the US, $814 billion in the euro zone, and $604 billion in the UK). To address this challenge, stabilize banks, catalyze the secondary markets, and free up assets for productive use, the federal government proposed a number of programs under the Financial Stability Plan. One such program, the Term Asset-Backed Loan Facility (TALF), offers financing to investors to support purchases of certain AAA-rated asset-backed securities. The program has been promoted as having the potential to generate up to $1 trillion of lending for businesses and households. The Public Private Investment Program (PPIP), in contrast, is an incentive program by the Federal Reserve, Treasury, and FDIC to encourage private-sector purchases of toxic, or legacy, assets in an effort to restart the market. Using $75–100 billion in Troubled Asset Relief Program capital, the program offers FDIC guarantees on financing of up to 86 percent of the purchase price of the assets, and then would contribute 50 percent of the remaining equity portion as a partner in the deal. The PPIP, however, has received very little use.

In parallel with the massive government support of housing markets through secondary mortgage market funding, the federal government allocated up to $75 billion to stem foreclosures. The hope was that the Home Affordable Mortgage Program (HAMP) would serve about 3-4 million qualifying homeowners, but the program got off to a slow and unpromising start. Through November 2009, HAMP had started a total of 759,048 trial modifications.

From August through November of 2009, 126,346 loan modification trials were started per month on average. But over that same period, the number of eligible 60+ day delinquent homeowner loans was growing by an even greater 148,620 per month on average. In October, however, modification trial starts (163,913) exceeded growth in delinquencies (118,887) for the first time, before dropping back to 108,064 new modification starts in November. If the program can maintain the average monthly level of modification starts to date, it would take 20 months to address the 2.5 million remaining eligible loans, even if no new mortgages become eligible in the meantime.

However, many of the loans that had initial trial modifications became delinquent after a short period. According to written testimony by the Assistant Secretary of the Treasury to the Congressional Oversight Panel in October 2009, a Treasury Department survey of major servicers found that the share of borrowers with trial modification plans current on their modified mortgages could only be stated as being over 73 percent, suggesting that delinquency rates at the time were as high as 27 percent.[46] In addition, only about 31,382, or 4 percent, of the temporary trial modifications started had been made permanent by November 2009.

Although the federal government ramped up pressure on servicers to move from temporary to permanent modifications, it was unclear that the pressure would be effective or that even permanent modifications would successfully avert redefaults. Overall, foreclosures remained at elevated levels through the end of 2009.

### Averting All-Out Catastrophe

When the risks in the system finally came home to roost, active federal intervention kept credit flowing to mortgage markets. But federal intervention did not draw credit back to nonprime

[46] This is from questions for the record for US Department of the Treasury Assistant Secretary Herbert M. Allison, Jr., Congressional Oversight Panel, October 22, 2009. Accessed 12/16/2009 at http://cop.senate.gov/documents/testimony-102209-allison-qfr.pdf.

borrowers or have a material impact on reviving jumbo loan markets. Federal efforts to stem the tide of foreclosures and their negative impact on home prices also did little to prevent foreclosures and other forms of distressed sales (such as short sales) from reaching and remaining at record levels. Instead, it took a combination of government support of conforming credit flows and artificially low mortgage interest rates, a federal tax credit for first-time buyers (and later a more limited one for trade-up buyers), steep declines in home prices, foreclosure fire sales, and a painful inventory correction on the part of home builders to bring some life back into housing markets at the end of 2009.

But the damage of the housing boom and bust, fueled as significantly as it was by nonprime lending, was already done. In its wake came not only heavy investor losses and a severe loss of confidence in mortgage markets and the financial system, but the shuttering of credit for all but prime borrowers able to qualify for loans guaranteed by Fannie Mae, Freddie Mac, FHA, and Ginnie Mae. The path toward a reduced federal role in the market entering 2010 was unclear, and the future of all these agencies and companies hung in the balance.

## PART 6: SUMMARY OF FACTORS CONTRIBUTING TO THE BOOM AND BUST

It is remarkable that a housing finance system which delivered trillions of dollars to mortgage borrowers by sourcing capital from around the world reached the brink of collapse in the fall of 2008. Prior to its meltdown, the system was lauded for being able to deliver massive amounts of capital in an efficient and liquid way for what otherwise would have been illiquid underlying long-term assets with a very narrow investor base.

The immediate event that precipitated the housing finance crisis was the rapid and dramatic erosion of nonprime mortgage performance in the middle of 2007. But the damage stemmed not only from the more than $2.7 trillion of subprime mortgages and $1.5 trillion of Alt-A mortgages that were originated from 2000 to 2007 (Inside Mortgage Finance 2009). It arose also from the credit default swaps that referenced nonprime mortgage securities in multiplies of their original face amount and from the recombination of nonprime tranches into complicated CDOs.

While the collapse of subprime loan performance triggered the financial crisis, it is equally important to recognize that the surge in nonprime lending and all the financial engineering and risk-taking in the capital markets were set against the backdrop of a housing boom fueled by liquidity, leverage, and increasingly lax underwriting tolerated widely in the private-label ABS market as well as by a handful of large portfolio lenders.[47] Indeed, nonprime lending performance did not erode rapidly until home prices began to drop.

While the United States was not alone in seeing an asset bubble form in house prices only to burst it was alone in how badly its mortgage loans performed. The major reason for the subpar US performance is that no other nation had such high proportions of nonprime loans originated at or near the peak of a house price bubble. Although mortgage product innovations were widespread among nations during the boom, the extent to which standards were loosened was far greater in the US than elsewhere (Lea 2010). How much these developments contributed to overheated housing

[47] According to 2005 HMDA data, the lenders with the largest number of unsold higher price loans were Washington Mutual (36 percent of its nearly 200,000 loans), Wells Fargo (39 percent of its roughly 178,000 higher cost loans), Ameriquest (90 percent of its 63,000 loans), Citigroup (47 percent of its 88,000 loans), HSBC Holdings (55 percent of its 63,000 loans), and Lehman Brothers Bank (88 percent of its 24,000 loans).

markets is difficult to quantify, but the fact that home prices rose most in the bottom price tier of metropolitan markets and in locations where investor loans were concentrated suggests that easy access to credit, often on stretched terms, did play a role. In addition, the surprising jump in early defaults on subprime mortgages—well before even payment resets hit—indicates that the early downturn in loan performance may have been due in part to speculators defaulting as soon as it became clear that home prices would not continue their ascent.

The erosion of nonprime loan performance then reverberated through the global financial system for at least four reasons: 1) the sheer size of the US mortgage market and the heavy amounts of foreign capital invested in it, especially from nations with which the United States had large trade deficits; 2) the magnification of risk through the issuance of credit default swaps referencing nonprime securities; 3) the lack of transparency in the CDS market and the difficulty in assessing the performance of the loans underpinning collateralized debt obligations, and 4) the amount of leverage financial institutions used to warehouse or purchase nonprime securities with short-term liabilities, together with and the lack of adequate reserves against the risk in the underlying subprime securities and the CDS referencing them.

The devastation in many communities where nonprime loans were concentrated was immense. Foreclosure rates as estimated by HUD were highest in low income minority neighborhoods, where the median 18-month foreclosure rate was estimated at over eight percent for the period January 2007 through June 2008, and in all likelihood climbed still higher as the recession deepened. Even in high income minority areas, the rate was still well over four percent for this period (Figure 6-1). Minorities were disproportionately the recipients of higher priced loans even after controlling for income, lender types, the largest individual lenders serving the markets, neighborhood racial and income composition, the channel the loan was sold through (if not unsold), the denial rates in the neighborhood, and unobservable conditions that varied by metropolitan area. By extension, the havoc on housing markets has been worst in low-income communities where minorities make up more than half the households. There is some evidence that some who were sorted into subprime products would have qualified for lower cost prime products (Brooks and Simon, 2007) and that even after controlling for relevant factors influencing costs, the gap between what minorities and whites were charged in the subprime

market remained about 10 percent (Courchane et al. 2004). This too is a consequence of the nonprime boom and bust.

Beyond these top line findings are several others important to understanding what happened, the lessons that can be learned, and charting a path forward. These follow.

### Lending Practices Created Excess Risk

There are three basic and time-tested elements of underwriting a mortgage loan. These are: 1) assessing the capacity of the borrower to manage mortgage payments, 2) assessing the creditworthiness of the borrower, and 3) assessing the strength of the collateral backing the loan. For decades, the standards that were applied to each of these criteria to contain credit risk were little changed and were applied manually. Although these standards started to get relaxed in the 1990s as the subprime market emerged and lenders began to use automated underwriting and risk-based, it was still uncommon to relax all three underwriting standards at once.

During the height of the nonprime boom, however, it was common for lenders to relax constraints in all three areas simultaneously and aggressively.[48] The following loan features became common and were often combined in one loan: 1) low- or no-downpayment loans (often in the form of piggyback loans that lifted combined LTV to high levels); 2) loans with balloon or negative amortization features; 3) loans to borrowers with credit scores below 620, and 4) loans with little or no income verification or documentation, or payments calculated at low initial teaser rates and/or with interest only, or very high mortgage-payment-to income ratios.

[48] In the subprime market, at its peak in 2005, 44 percent of loans were 2/28 mortgages and 13 percent were hybrid adjustables with other reset schedules. Another 10 percent were balloon loans and 2 percent were interest-only loans. In the subprime market, therefore, not only were loans being made to people with low credit scores but they were being extended riskier loans. On top of that, they were allowed to qualify on the basis of their lower initial payments and some were not asked to provide full documentation. And 11 percent of the subprime loans in that year had loan-to-value ratios of over 90 percent. The situation in the Alt-A market was not much better. There, 54 percent of loans were adjustable rate mortgages (34 percent of them hybrids) and 14 percent were interest-only loans. Documentation standards were far lower in the Alt-A than the subprime market, bottoming out at just 15 percent of loans fully documented in the first quarter of 2007. All these figures are based on Loan Performance data.

As underwriting standards were eased, the usual constraints on consumer borrowing were lifted. This permitted borrowers to stretch their incomes and assets to unprecedented lengths and to take on loans with heavy payment reset risks. Many were willing to take these risks because they wanted to own a home, or wanted to speculate in real estate, or saw opportunities to buy a better home in a more desirable location than if they limited themselves to more traditional products. Meanwhile, investors in ABS and even several large portfolio lenders tolerated the heightened default risks of borrowers who purchased homes at or near the top of the market with thin or no equity cushions and with heightened risk that payments would reset to much higher levels. Never before had such large gambles been placed on the bet that house prices would continue to appreciate enough to provide meaningful collateral protection for home loans that had relaxed every constraint.

In many respects, the credit-based lending (the creditworthiness and capacity of the borrower) of the past was replaced with asset-based lending (collateral value)—yet at often high-to-value ratios. When interest rates increased and prices fell, a bust of some magnitude was bound to follow.

### Lending Practices Helped Fuel an Unsustainable House Price Bubble

These same lending practices helped fuel the house price bubble. Lending practices that lowered downpayment constraints, relaxed or effectively removed payment-to-income constraints, or lowered initial payments, all helped homebuyers chase home prices higher. They pulled demand into the market so rapidly that at first builders had a hard time keeping up. Markets remained tight for a time as demand soared, further sparking home price appreciation. Easy credit for speculators added even further to demand. These speculators contributed to an eventual overhang of vacant properties. When investors started canceling orders for new and existing homes, they left builders stuck with bloated inventories and other home sellers without buyers. This inventory was a drag on the market that further depressed prices.

This set up a dangerous cycle in which rising home prices were fuelled by lax lending practices, escalating prices in turn encouraged risk taking on the part of homebuyers and mortgage lenders, which in turn helped support an unsustainable bubble. When home prices finally fell, the

systemic risks mounting in the system from excess risk-taking in the mortgage finance system became plain, and the fall was worsened by the sale of foreclosures.

### Relatively Inelastic Demand for Mortgage Credit Created Large Spreads

Investor demand for nonprime market loans was fuelled by the higher interest rates that borrowers were willing to accept. In the heat of a housing market with rapidly rising prices, even quite high nonprime rates relative to Treasuries of comparable maturities proved salable—especially to people with low credit scores or irregular incomes that had previously been denied access to mortgage credit. Even with the specter of expiring teaser discounts and rising interest rates, homebuyers, real estate speculators, and mortgage investors were all willing to take the gamble that rising prices would handily permit refinances or sales without defaults when payments reset.

The same wide spreads that subprime borrowers were willing to accept is what made subprime debt so attractive to investors. Financial intermediaries saw in these spreads the ability to structure loans for a fee that would win AAA ratings for as much as 80 percent of a subprime REMIC issue, and for 60 percent of a subprime CDO made up of 100 percent of BBB-rated mezzanine tranches of subprime REMICs (Pozsar 2008). Even more appealing, AAA-rated nonprime structured securities had higher yields than debt obligations of identically rated corporate issuers.

### The Emergence of a Lowest Common Denominator Problem

As risky loan products and lax underwriting treatment proliferated, lenders that did not follow the riskiest practices rapidly lost market share to those who did, creating a "lowest common denominator" problem. For example, when some broker-dealers began to accept 2/28 subprime mortgages with deep teaser discounts, other lenders had to follow suit because the loans were extremely attractive to subprime borrowers. Securities broker-dealers liked these mortgages—which let borrowers qualify based on a low initial teaser rate for 2 years that then reset to an adjustable rate for 28 years—because yields were still so high that they could structure securities in ways that were marketable to investors and generated fees for themselves.

Similarly, lenders that wanted to adhere to traditional, tighter underwriting standards quickly lost market share to those willing to offer low- or no-downpayment loans, low documentation

requirements, and high payment-to-income ratios. Lenders that wanted to follow the spirit of consumer disclosure laws also easily lost share to others willing to adhere just to the letter of the laws (e.g., by advertising the best available rate without indicating that an applicant might not qualify for this rate) (McCoy and Renuart 2008). Even if some lenders resisted—and there is evidence that even some very large players like Bank of America did—there were scores of others to take their place.

### Consumer Behaviors and Confusion When Faced with Multiple, Complex Credit Choices

The world of mortgage finance changed dramatically during the 2000s. Rather than being approved or denied for loans with narrow terms and a nearly uniform price, borrowers were suddenly offered a dizzying array of products and features in a wide price range. For subprime borrowers, market pricing was especially opaque because the price depended not only on the applicant's credit score but also the specific terms of ever more complicated products.

To get to the point where a price was even quoted, borrowers had to provide information about their credit and usually pay an application fee. Together with the complex features of the loan (the individual costs of which were not disclosed), this made comparison shopping difficult. It also created the possibility of being discriminated against in pricing, and led to potential confusion about how the loans might affect them given their personal circumstances. On top of this, borrowers with past credit problems were often susceptible to sales pitches that assured them that they would be approved for a loan. Eagerness to get a yes and concerns that they might not get another opportunity for approval may thus have further discouraged borrowers from comparison shopping (Yin 2003).

Mounting evidence from the field of behavioral economics suggests that consumers faced with making credit choices are prone to certain cognitive biases that are compounded when they must assign probabilities to the likelihood of multiple future events occurring (Laibson and Zeckhauser 1998). Furthermore, consumers tend to assign relatively more weight to the present and discount the future in making decisions. Combined with a tendency to believe that their individual chance of experiencing a bad event was lower than the average probability, this

hyperbolic discounting may have led many borrowers to minimize the threat posed by taking on risky mortgages (Jolls 1998).

The mortgage market also evolved in ways that amplified these cognitive biases. For example, Woodward (2003) found that consumers made more optimal choices when presented with simple mortgage products, at least in part because they found it difficult to value individual components of complex products. As a result, they ended up paying more for the complex instruments.

While people who have difficulty with numbers or inaccurately estimate their credit scores are especially prone to errors when making credit decisions, even numerate people find these decisions difficult to make (Peters et al. 2006; Courchane et al. 2004). In a seminal study, it was found that business school students disagreed on the best of several credit options even though only one of them minimized the discounted present value of the loan (Shu 2003). Instead of solving to find the solution mathematically, many students reverted to simpler rules of thumb like picking the loan with shortest maturity or the loan with the smallest sum of undiscounted payments. The shortcut that mortgage borrowers tend to fall back on most often is to compare monthly payments and make decisions based on whether they think they can swing these payments (Campbell 2006). This is a problematic rule of thumb because monthly payments are quite different from annual percentage rates (the preferred summary measure of loan costs) and because there is ample evidence that most people underestimate annual percentage rates based on monthly payments (Stango and Zimmerman 2006).

Further complicating matters for consumers, mortgage terms and transactions are highly complex and only became more so, and are and were often communicated in ways that are difficult to understand. Pages of documents that are difficult to follow are involved even in a mortgage refinance. It is easy for people to be confused about the mortgage they are signing up for even when lenders have the best intentions of clearly communicating the terms to the borrower. The complexity of the terms and documents also leaves consumers vulnerable to those who might wish to intentionally confuse or mislead them.

### The Appearance (But Not Reality) of Effective Credit Risk Management

In addition to weaknesses in the regulation of credit markets, another factor contributing to the origination of risk and its magnification in the capital markets was the perception that the mechanisms in place to manage and mitigate subprime mortgage risk were effective. Indeed, the system appeared to have myriad ways to manage these risks well.

In the first instance, the risks being taken and priced were being modeled and simulated by several separate firms, including portfolio lenders, those guaranteeing securities like the GSEs and FHA, and, perhaps in some cases, third-party investors. Mortgage scoring models had evolved rapidly in the 1990s and revealed that credit scores were strongly predictive of default probabilities and severity of losses, at least in the prime market (Gates et al. 2002). For the first time, the models were based on vast amounts of detailed loan information collected over relatively long periods and with cross-sectional variations in housing market and economic conditions. This gave investors and guarantors greater confidence in their ability to manage and price mortgage risk and to relax underwriting standards in ways that added little risk (Raiter and Parisi 2004).

Second, in the case of structured nonprime securities, ratings agencies applied their own models to both MBS and CDOs, and judged these loans safe enough to assign AAA-ratings to a large share of the tranches in an issue. Like others sizing up risk, ratings agencies stress-tested the loans in nonprime MBS using assumptions drawn from past periods of stress in housing markets. In hindsight, and with greater disclosure, it is now clear these tests were insufficient and that fitting models of new products and practices to valid historical precedents was difficult because of the lack of history with the products and practices (Rossi 2010; An, Yao, et. al. 2009). At the time this was far less clear.

Third, it was not just the ratings but the structure of investments that prompted confidence in agency ratings. The issues were over collateralized, had excess spread siphoned into reserves, and investment grade tranches were senior in priority. Equity pieces were often held at least in part by the underwriters of the securities, and in any event enjoyed strong demand, suggesting to senior note holders that the yields in the equity pieces were rich enough to justify the risk. Risk

diversification into other assets provided by CDOs also appeared to offer another level of protection against systemic risk. In addition, investment banks and issuers pressured rating agencies to lower subordination levels so as to increase proceeds. Thus, competition among rating agencies may have resulted in overly optimistic assumptions about risk.

On top of all this, those who wanted to hedge their risks had ample opportunities to do so. Monoline insurers offered protection on whole loans as well as tranches of nonprime securities. Purchasers of nonprime securities could buy protection through bilateral credit default swaps with large AAA protection writers or by trading in CDS. All of these actions created the appearance that subprime risks were being managed well, hedged and diversified against, and distributed widely to those most able to bear or manage them.

### Insufficient Attention to Systemic Risk

Major financial institutions, rating agencies, investors, and regulators did not take enough account of mounting systemic risk. Systemic risk was exacerbated by moving from a secondary market system dominated by financial institutions that charged guarantee fees and insurance premiums to cover credit risk to a system where those holding the most concentrated exposure to credit risk—the equity tranche holders and CDS protection writers—did not collect funds to cover credit risk.

Investors and rating agencies did not fully appreciate the systemic risk of securitizing nonprime mortgage loans that were themselves risky and had strongly correlated joint probabilities of default. With respect to CDOs and CDO-squared (which were increasingly backed by subprime mortgage loans when the housing market peaked in 2005-2006), the potential for small variations in expected losses to drive wide variations in loss estimates was underappreciated. Similarly, there was a failure to recognize the fact that securities were being structured so that AAA-rated tranches were bearing systemic risk in a way that most traditional AAA ratings of company credits did not (Ashcraft and Schuermann 2008).

Certainly there were those who cautioned that nonprime lending practices were exposing consumers to significant risk and fretted over the impact this could have on the safety and

soundness of the financial system. Some of these voices came from the ranks of the financial regulators themselves. FDIC Chair Sheila Bair and Federal Reserve Governor Edward Gramlich were among the most vocal of them. But their warnings were largely unheeded and the regulatory responses to these risks were in hindsight rather tentative and ultimately insufficient. It was not until risks were triggered by falling home prices and payment resets that serious notice was taken and investors shut down nonprime lending with their unwillingness to purchase any more nonprime loans or the securities backed by them.

In addition, no single regulator was charged with attempting to measure and detect when investments and practices in the financial markets were adding to systemic risk. Nor was a single regulator charged with stemming rising systemic risks by issuing regulations to contain them. Meanwhile, leverage ratios of investment banks were allowed after 2004 to be set by the banks themselves. Off-balance-sheet SIVs and piggyback seconds allowed banks to take on more leverage. Massive volumes of CDS were issued that were not regulated by banks or insurance commissioners. Securities with performance systematically related to the performance of the broader market were given AAA ratings. Fannie Mae and Freddie Mac had high leverage ratios. Making matters even worse, the systemic risk being created by concentrating risk in the hands of a few "too-big-to fail" financial institutions was difficult to detect because the market for CDS was opaque.

With SIVs and other funds depending on constant access to the commercial paper markets to finance long-term assets, duration risk was also allowed to flourish and went unregulated. This maturity mismatching caused many financial institutions to fail when they could no longer access the short term debt markets. This in turn forced them to sell assets into an illiquid market, further depressing prices.

### Financial Engineering Flaws

The models used to price risk and structure securities turned out to have fatal flaws. Indeed, the collapse of the subprime structured finance market can be attributed in part to the market's failure to properly model risk, and especially to measure and manage systemic risk.

Unlike other fixed-income instruments, mortgage bonds are notoriously hard to value because of the prepayment and default risk inherent in each loan. As a result, investors in mortgage securities are unsure of the timing of payments and the ultimate interest payments they will get. While valuation becomes crucial in this case, CDO models had to contain simplifying assumptions to support mass securitization of subprime mortgages.[49] As a result, the models ignored the potential impact of systemic events, i.e., the likelihood that an exogenous event would affect every loan in the MBS portfolio. Unfortunately, declining prices in nearly all housing markets was just such an event.

Another failure of valuation models, as noted above, is that they used as inputs past periods when house prices had increased nationally in nominal terms and had seldom declined much in real terms. In fact, most models used in the private conduit market to rate CDO used data for a period of less than a decade from 1996 onward, when house prices were soaring (Salmon 2009). In addition, there was a tendency to rely heavily on the credit scores of borrowers. But applicants with relatively solid credit scores were allowed to provide limited documentation and to leverage their income in new ways. The models thus did not consider how these developments might affect the predictive power of credit scores. Models in use by Fannie Mae and Freddie Mac in the 1990s were based on years of historical data under particular underwriting standards spanning periods of home price declines.

In addition, rating agencies applied corporate techniques to structured finance despite the big differences between corporate bonds and mortgage securities (Ashcraft and Shuermann 2008). Firms are dynamic enterprises run by management that makes investment decisions and can deploy and redeploy capital as the economic environment warrants. In contrast, MBS, CDOs and their derivatives are static. Capital cannot be redeployed, and defaults cannot be remedied by purchasing other assets (except in the case of CDOs). Instead, credit enhancement substitutes for the dynamic structure of management decision making. But when mortgages perform much worse than expected, credit enhancement is not enough. Moreover, senior tranches concentrate

[49] In the case of CDOs, an approach that relied on the pricing changes in CDS over the 1990s and early 2000s was used in lieu of actual loan performance information to rate CDOs. This was a period of decent price appreciation in housing markets and careful underwriting in the mortgage markets, rendering price changes on CDS on mortgages a weak predictor of performance of loans originated under the types of conditions prevailing from 2004-2007. See Salmon (2009).

systemic risk. In the case of nonprime MBS and the CDOs they backed, the failure to appreciate how highly correlated the underlying assets were and to factor this into the joint default assumptions proved to be a fatal error. The lower yields that AAA-rated subprime securities carried relative to lower investment grades of such securities were at odds with the dictates of capital asset pricing models that suggest higher yields should be demanded for securities strongly correlated with the broader market (Coval, Jurek, and Stafford 2009).

It is very important to understand the role that the inattention to systemic risk and the weak historical precedents for modeling played in the nonprime market (Rossi 2010). Without the appearance of risks that were well enough understood and priced, the lax lending practices—which both disparately impacted low-income and minority borrowers and communities and elevated systemic risk so much—would not have been tolerated.

### Weak Counterparty Risk Management and Misaligned Principal-Agent Incentives

The nonprime mortgage lending system relied on an originate-to-distribute model, as well as financial engineering on the capital markets, that increased the number of counterparties in the housing finance system. Although the ratings agencies were relied upon to appraise the creditworthiness of counterparties large enough to get rated and had a long track record of success in corporate ratings, plenty of unrated entities like brokers and small finance companies also fed loans to the system, and some of the financial institutions with strong credit ratings saw major downgrades when the credit markets froze. In addition, lack of transparency in the CDS markets and among hedge and private equity funds and SIVs made it difficult to know the extent of exposure of counterparties to nonprime risk. All this added to the importance and cost of counterparty risk assessment.

Yet the mechanisms in place to manage counterparty risk were also lacking. Fannie Mae and Freddie Mac had for decades relied successfully on approved seller standards and audits as well as representations and warranties to guard against counterparty risk. But these protections broke down at the height of the nonprime lending boom in ways that did not become apparent until after the fact. Safeguards in the private label market were no better. In addition, loan originators were often brokers or small mortgage banks that had little or no capital at risk. But it is important

to note that even those that did have substantial amounts of capital at risk often did not have adequate capital reserves to cover losses. Thus, skin in the game did not appear to have prevented excessive risk taking.

Furthermore, investment banks, Fannie Mae and Freddie Mac were allowed high leverage ratios, while leverage ratios of SIVs and finance companies were not federally regulated, and CDS issuers were allowed to write insurance-like protection with an implicit premium on swap rate. While no reserves were required, these instruments were marked to market with a capital requirement. When the tide went out, many counterparties could not make good on their claims, causing a collapse in investor confidence and a liquidity crisis. The posting of collateral created liquidity problems. It was the reliance on a thin market that caused disputes on collateral posting and the inability to limit losses by getting out of trades.

Incentives in the originate-to-distribute model between financial intermediaries serving as agents for the ultimate loan investors were not necessarily aligned. Brokers are paid an upfront fee for originations and broker-dealers an upfront fee for pooling and structuring securities. In essence, the financial intermediaries were primarily rewarded through volume, while investors are rewarded through the long-term performance of the loans. The compensation of rating agencies may have also created conflicts of interest because issuers pay for the ratings, not the investors that rely on the ratings to make investment decisions (Fender and Kiff 2004).

The compensation structure for mortgage brokers and loan officers also created opportunities to pass along their upfront fees to borrowers in the somewhat shrouded form of yield-spread premiums built into interest rates. This may have provided brokers and loan officers an incentive to originate loans in the nonprime market where pricing was more opaque, although no studies have confirmed that this was the case. In fact, even in the FHA channel with simpler mortgages and easier price discovery, yield-spread premiums show a wide dispersion (Woodward 2008). Also brokers do have offsetting incentives to treat customers fairly and transmit quality loans to aggregators. The mortgage lending business is highly competitive. Customer service and referrals matter to brokers, and so act as a check on their rent-seeking behavior. In addition,

many lenders monitor the relative performance of loans originated by brokers and loan officers and will cease doing business with those with poor track records.

As for seller-servicers, they are compensated in part through servicing income, which is tied to the long-term performance and longevity of loans. These originators have significant incentives to originate quality loans because the efficiency and returns of their servicing portfolios depend on it. The fact that servicing is highly concentrated and has thin margins puts strong pressure on sellers and servicers to attend to quality. This was less so in the nonprime market where more spread was retained by sellers and servicers.

### Opacity, Externalities, and the Skein of Risk

The operation of capital markets and the derivative products they spawned created a skein of risk that had a contagion effect when nonprime loan performance deteriorated. Nonprime mortgage cash flows found their way into ever more complicated securities. Swap contracts written by third parties to allow investors to hedge their risks were actively issued for trading purposes. The reliance on short-term debt by private conduits and SIVs and the use of monoline credit insurers to hedge risk further increased the number of parties exposed to nonprime risk. Together, these factors propagated an enormous amount of risk that was opaque in its distribution and profound in its capacity to cause negative externalities for the whole financial system.

Appearances to the contrary, all the financial engineering performed on nonprime mortgages did not reduce their risk. At best, it shifted the entities exposed to the risks, increased the number of entities exposed to it, and increased the overall exposure to the underlying risk through credit default swaps referencing the securities. In fact, as we have argued, it may have escalated the origination of more risk by converting a large portion of the securities backed by increasingly risky loans into AAA-rated tranches.

### Regulatory Failures

Regulatory lapses figure prominently in many of the findings and lessons learned from the meltdown. Here, these failures are more explicitly discussed and grouped together. Regulatory problems are at the heart of what went wrong. The stunning failure of so many large financial

institutions and the rescue of several others with taxpayer dollars give weight to those who fault the regulatory system.

Most of the problems with the regulatory system relate to lax and inadequate financial regulation, including limited federal oversight of key aspects and players in the housing finance system and capital markets, deregulation, weak enforcement, and weak regulatory responses to risk layering. But there are some who fault regulations that put pressure on banks, thrifts, and the GSEs to relax lending standards and to aggressively pursue risky borrowers. As discussed below, the evidence that CRA played a significant role in nonprime lending is very weak while the evidence that the goals imposed on the GSEs played a significant role is mixed and hard to disentangle from the market pressures on the GSEs that could have equally or even more significantly driven their unfortunate investment in Alt-A loans and guarantees, nontraditional loans, and triple-A rated tranches of subprime securities (Jaffee 2010). In any event, the pressures the GSEs may have been under to lean on Alt-A and subprime lending to meet their goals would likely not have existed absent weak regulations of the primary market and the ABS markets that led to such rapid growth in nonprime and nontraditional lending in the 2000s. In addition, if the GSE goals did play a role, it is noteworthy that the goals did not produce problems during the 1990s, suggesting that if these goals had an impact at all it was likely based on how they were imposed at some point in the 2000s that mattered. And there is evidence that these goals did result in an increase in lending to low and moderate-income borrowers and underserved areas in the 1990s (Bostic and Robinson 2003).

Despite growing agreement that regulations need to be tougher, and strides already made in that direction, even among those who now find fault with the regulatory system there is little agreement about the principal flaws that most need fixing. For some, it is too little oversight outside the banking sector or too weak consumer protections or insufficient attention to practices that propagate systemic risk. For others, it is a matter of strengthening capital requirements and closing loopholes that allow banks and others to avoid appropriately reserving against risk. In all cases, there is a broad range of views of what are the right ways to fix the problems.

***Deregulation, regulatory shopping, and state preemptions.*** Deregulation from the 1980s has been faulted for ushering in higher priced lending and anything-goes underwriting standards and mortgage product offerings. The existence of multiple banking regulators has been faulted for allowing further de facto deregulation as a result of the more reaching preemptions of state law claimed by banking regulators competing for deposit-taking institutions that can shop for a preferred regulator (McCoy and Renuart 2008). This process, it is asserted, allowed thrifts and nationally chartered banks and their affiliates to avoid state laws aimed at restricting permissible lending practices and thus allowed high-risk lending to thrive.

***Weak federal regulation and supervision of the shadow banking system, including lax oversight of the capital markets.*** Most criticisms of the nation's regulatory structure in relation to the nonprime crisis focus on the part of the system beyond the reach of banking regulators. This so-called "shadow banking system" or "unregulated fringe" includes state-chartered insurance and finance companies, investment banks, hedge funds, ratings agencies, private equity firms, special investment vehicles, and the brokers that delivered a substantial portion of loans from the retail level.[50]

Giving credence to this argument is the fact that the shadow banking system originated most of the nonprime loans. In addition, these loans increasingly ended up in private-label securities. When home prices began to fall these were the source of the heaviest and earliest mortgage losses. Virtually all of the subprime securities were private label issues and many of them were Alt-A issues. With subprime and Alt-A reaching securitization rates over 90 percent in 2007, the private label market played a pivotal role.

It is clear ratings agencies, investment banks, hedge funds, private equity funds, and state-chartered finance companies were not as closely supervised as deposit-taking institutions, nor were they generally subject to as tight or uniform regulation. Opacity in these markets was permitted, and rating agency practices and models were not subjected to the scrutiny of federal

[50] The term "unregulated" fringe is really a misnomer. It would be more accurate to call the financial institutions in the shadow banking system less regulated or less closely supervised, or the state-regulated fringe.

regulators. Finance companies were regulated and supervised unevenly by state regulators, and mortgage brokers were subject to an uneven patchwork of state laws and licensing.

Moreover, the system also made it more difficult to detect noncompliance with federal credit regulations and consumer protections among state-chartered finance companies. Instead of examining for compliance, detection relied more on suits being brought and complaints being made to the Federal Trade Commission (FTC). The FTC had enforcement but not examination authority over the activity of these non-deposit-taking financial firms.

Meanwhile, some banks and thrifts gambled on nonprime loans and held many such whole loans in their portfolio or set up SIVs that invested in the highly rated tranches of nonprime securities. Despite federal oversight, these banks and thrifts or their affiliates took on this risk and were allowed to carry mortgage assets off balance sheet.

There were several specific problems with regulation and oversight of the shadow banking system and the capital markets. These include the adequacy of (1) capital requirements for investment banks, CDS issuers, and the GSEs; (2) measures to ensure transparency; (3) oversight of rating agencies; (4) oversight and regulation of CDS markets and capital standards for CDS protection writers; (5) assignment of liability for defects in loan originations; (6) underwriting standards, and (7) oversight of compensation.

The credit rating agencies played a central role in determining the feasibility of nonprime lending in general, and of certain terms in particular, through their ratings of structured nonprime securities. Yet this crucial function was essentially unregulated until the Credit Rating Agency Reform Act of 2006, which gave the SEC authority over the agencies. In addition, the lack of a central clearinghouse and minimal regulation of the CDS market has been criticized for allowing both opacity and systemic risk to build in the capital markets. Furthermore, assignees' lack of liability for the practices of nonprime loan originators (many of which were small and thinly capitalized) has been faulted for letting large, well-capitalized financial institutions off the hook for policing their origination channels.

***Insufficient consumer protections.*** Credit regulations did not adequately protect consumers, especially when the nation's credit allocation system shifted from offering nearly uniform pricing only to borrowers who met prime standards to offering credit at a risk-adjusted price to borrowers with subprime credit scores who were taking out loans with nonconforming underwriting standards and features. Consumer disclosures have been faulted for being insufficient and confusing. Except for high-cost refinance loans as defined under HOEPA, for example, the Truth in Lending Act (TILA) did not require lenders to disclose binding prices until closing. In addition, subprime lenders were permitted to advertise their best rates without disclosing to consumers that they might not qualify for them. Furthermore, variable-rate disclosures were viewed as weak and as calling insufficient attention to the risks associated with a floating interest rate.

In general, disclosures designed back in the 1960s did not anticipate the complex risks (including a range of payment reset risks) that consumers would take on. Therefore they did not effectively disclose and underscore these risks. Even the APR, which is at the heart of both the prime and subprime disclosure regimes, is not easily grasped (Durkin 2008). New changes to the Real Estate Settlements and Procedures Act (RESPA)[51] and Truth-in-Lending Act (TILA)[52] in place by 2010 have gone a long way towards improving disclosures and good faith estimates.

Beyond complaints about the efficacy of consumer disclosures, many have faulted the system for not prohibiting or curtailing lending practices and terms thought to be unfair to or too risky for consumers. Recall that as early as the 1980s, the federal government preempted state laws that restricted the types and terms of mortgages (McCoy and Renuart 2008). When federal banking regulators issued guidance late in the nonprime boom, warning against certain loan terms and practices, this may have driven even more volume outside the traditional banking sector. While HOEPA was intended to deal with potentially unsafe, unfair, or usurious rates and fees as reports

[51] Changes to RESPA took effect in January 2010 and included a thorough revamping of the disclosure forms for Good Faith Estimates (GFE) and HUD-1 settlement charges that made it easier to compare loans. The new GFE more clearly describes potential changes to interest rates, loan balances, and payments, and lumps all lender charges into a single origination charge. RESPA reforms also include restrictions on how much settlement charges can change between issuance of the GFE and closing. Lender-related fees must be identical from application to closing and there is a 10% tolerance for estimates in other areas.

[52] Changes to TILA, which govern disclosure of the costs and terms of mortgage credit, took effect in July 2009 and applied to all non-investor mortgages. Under the changes, lenders are required to provide Good Faith Estimates to borrowers within three days of loan application, with a seven-day waiting period between GFE and closing. No fees can be collected from a borrower before a disclosure is issued except for the cost of obtaining a credit report. If the annual percentage rate changes by more than 0.125%, the lender must provide a corrected disclosure and wait an additional three days before closing the loan.

of predatory lending increased, it applied only to closed-end mortgages for refinance, had very high APR triggers, and imposed only some lending restrictions.[53]

***Inadequate Regulatory Responses to Warning Signs.*** Despite mounting concern over the kinds of risks being taken in the nonprime market, the response of federal regulators came late or failed to prevent excessive risk building in the housing finance system. After HOEPA rules issued in 1994, the next response to practices occurring in subprime markets and the increase in financial institution exposure to subprime loans was the Interagency Guidance on Subprime Lending issued in 1999 and extended guidance in 2001. This guidance was mostly advisory in nature, though the 2001 extension did state that the portion of an institution's allowance for loan losses allocated to the subprime portfolio be sufficient to absorb estimated credit losses. The guidance also only applied to federally-regulated deposit-taking institutions. Despite this guidance some banks and thrifts continued to put subprime loans on their books. And to the extent it discouraged bank and thrifts from originating subprime loans it did not do so in the ABS market, which exploded in mortgage lending volume during the first half of the 2000s. The next actions were guidance on home equity lending, also aimed at deposit-taking institutions only, issued in 2005 and 2006. Guidance on nontraditional loan products came in the fall of 2006.

It was not until HOEPA changes went into effect on October 1, 2009 that really meaningful and enforceable steps were taken.[54] Though late in coming and not strong enough by some lights and too strong by others, the HOEPA changes were substantial. Additional changes in the form of strengthened TILA disclosures took effect in July 2009 and revised RESPA good faith estimates took effect in January 2010. Thus, while there eventually was a meaningful response, it did not take effect until some two years or more after the market had largely shut down nonprime lending anyway.

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[53] Lenders were prohibited from offering such high-cost loans with a balloon payment due within 5 years or with negative amortization, imposing a prepayment penalty for longer than 5 years, or refinancing the loan within a year unless assignees that pooled and securitized loans were subject to liability. Further, lenders were required to disclose a final APR, the amount of monthly payments, any balloon payments due, principal borrowed, and fees for credit insurance and debt cancellation three days before closing.

[54] HOEPA reforms included a new definition of higher priced lending. First-lien mortgages are now considered higher priced if they are 1.5 percentage points or more above an "average prime offer rate" index based on Freddie Mac's mortgage survey. Subordinate mortgages are higher priced if they are 3.5 percentage points or more above this index. For these higher priced loans, lenders are prohibited from making a loan without regard to the borrowers' ability to repay the loan from income and assets other than the home's value, based on the highest scheduled payment in the first seven years. Lenders must verify income and assets and establish escrows for taxes and insurance, and prepayment penalties are severely restricted. The reforms also introduced new rules for all mortgages which included prohibiting misrepresentation of home value, prohibiting pyramiding late fees, changing advertising rules, and expanding early disclosure requirements.

***On CRA and GSE Goals.*** CRA has been criticized for contributing to the pressure to relax underwriting standards. Yet there is considerable evidence that CRA did not contribute in any meaningful way to the massive expansion in nonprime lending and its disastrous aftermath. While there is evidence that at least some banks and thrifts did engage in lending practices that exposed them to greater risk (Pinto 2009), only a tiny fraction of higher price lending during its heyday was done by lenders in areas where they were being assessed for CRA performance. Indeed, less than 5 percent of higher price loans at their peak in 2005 were made by CRA lenders in areas where they were being assessed for compliance. Nonprime loans were overwhelmingly made by affiliates of CRA lenders lending outside assessment areas and by other non-CRA lenders. In addition, the more complex econometric analysis presented in this report shows that, after holding many other factors constant, a loan having been made by a CRA lender in their assessment area lowered the probability of it being a higher price loan. Furthermore, a study aimed at exploring the performance of loans made by CRA lenders in their CRA assessment areas at the height of nonprime in lending California found CRA loans were half as likely to go to foreclosure compared to loans made by independent mortgage companies, even after controlling for a host of relevant factors including borrower credit scores (Laderman and Reid 2008). As a result of this and other evidence, governors of the Federal Reserve and chairs of the Federal Deposit Insurance Corporation and the Office of the Comptroller alike have all plainly stated that they do not find the evidence offered to suggest CRA played a role in fueling nonprime lending is compelling.

The influence of the GSE goals imposed on Fannie Mae and Freddie Mac by Congress beginning in 1992 and administered by HUD on the extent to which these companies participated in nonprime and nontraditional lending is less clear. Initially, the primary GSE response to the imposition of goals was to set up community lending programs that eased downpayment and sometimes other underwriting requirements. It was not until around 2000 that Fannie Mae and Freddie Mac began to wade deeper into nonprime lending. It was at this time that HUD sharply increased the affordable housing and underserved area goals imposed on Fannie Mae and Freddie Mac but it is also around the time when market pressures to guarantee securities backed by nonprime mortgages intensified. The mortgage lending customer base of the two companies

pressed the companies to provide a channel for selling nonprime mortgages so that the lenders had an alternative to a private label execution.

Both agencies were under considerable market pressures to purchase nonprime loans in the first half of the 2000s. As shareholder-owned companies, they were under intense pressure to regain market share they were losing to private label issuers of Alt-A and subprime securities during the early and mid-2000s, to serve their large customers better, and to go after the higher yields offered in the nonprime market. As regulated entities, they were more intense regulatory pressures after 2004 when regulators ratcheted up their affordable lending and underserved area goals and established subgoals that forced them to meet targets through purchases of single-family rather than multifamily loans.

While the goals certainly may have played a role, it is worth noting that Alt-A loans, which made up 11 percent of Fannie Mae's single family credit book but fully 43 percent of its credit losses in the first quarter of 2008, were the largest contributor to their woes. Yet Alt-A loans were not particularly goal rich—they tended to be higher balance loans, suggesting they were not that helpful in meeting affordable lending goals. And the second largest contributor to Fannie Mae's credit losses were interest-only loans, but these were goal thin since they were primarily used by borrowers of all incomes in areas with expensive housing markets. Equally plausible explanations for their behavior are the pressures they were under as shareholder-owned companies. Weighing the evidence and arguments Jaffee (2010) concludes that market pressures probably played the larger role.

Whatever the reasons, it is the case that nearly all industry-identified subprime loans were nonconforming loans and that Fannie Mae and Freddie Mac participated in these subprime markets almost entirely through purchases of AAA-rated tranches of private label securities.[55] While this added to the demand for subprime loans, the demand for exposure to these loans exceeded the total supply of them so it is hard to conclude that the market would not have flourished without them. Indeed, synthetic CDOs and CDS were issued that involved protection on amounts in addition to

[55] In 9/31/09, Fannie Mae reported 0.3% of its credit book of business was industry-identified subprime, but that loans with credit scores under 620 accounted for 4%of its book. Loans with such low credit scores would typically be considered subprime. Freddie Mac has not disclosed it had any subprime loans, but reported 4% of loans in its credit book had credit scores under 620. However, only Fannie Mae wrapped a guarantee around known subprime securities—but only about $12.8 billion worth.

the face amount of the subprime securities they referenced, so great was the demand and appetite for subprime risk that had to be sated. It is also the case that private-label Alt-A securities outstripped the issuance of Fannie Mae and Freddie Mac MBS Alt-A securities and GSE portfolio purchases of private-label Alt-A securities combined. Indeed, Pinto (2010) estimated that in the peak years for Alt-A originations, 2005 and 2006, the GSE share of the Alt-A market was 25 and 36 percent, respectively[56]. Furthermore, looking just at private label Alt-A securitizations, the GSE share was an even lesser 11 percent in 2005 and 12 percent in 2006.

Understanding and sizing the GSE contribution to the expansion of risk in the financial system, however, is difficult. Subprime and Alt-A loans are typically based on industry self-identifications. As a result, both Pinto (2008, 2010) and Jaffee (2010) each attempted to estimate GSE exposure to high risk loans other than just those self-identified as subprime and Alt-A. Using information Fannie Mae and Freddie Mac themselves disclosed on the credit profiles of their guarantee business and portfolios, Jaffee creates an "other" high risk category that includes all loans and securities that are not identified as Alt-A or as subprime but that had credit scores under 660, or a loan-to-value ratio over 90 percent, or were interest-only or payment option. Together with self-identified subprime and Alt-A, this is the book of business that has generated the lion's share of losses at the GSEs. At $1.0 trillion on the guaranty books on 9/30/09, this "other high risk loan" is a large category—larger in fact than the under half billion dollars of self-indentified subprime and Alt-A in their guaranty book. Jaffee estimates that about 30 percent of the guaranty book and 10 percent of the investment portfolios of the GSEs on 9/30/09 were "other high risk", subprime, and Alt-A combined. He did not, however, attempt to estimate the GSE share of the total mortgage debt outstanding that was high risk as of that date. Pinto 2008, on the other hand, considered any loan with a credit score of less than 660 in the credit books of the GSEs to be subprime and added these directly into the self-reported subprime numbers. Unlike Jaffee, he did try to estimate the GSE share of total subprime market as he construes subprime loans (all loans with credit scores of under 660 included). By this definition, he concluded that the GSEs were responsible for 34 percent of the subprime loans outstanding in 2008.

[56] Pinto (2009) concludes that Alt-A originations reported by Inside Mortgage Finance (IMF) do not include GSE purchased Alt-A whole loans, therefore adds on reported GSE Alt-A purchases to the total Alt-A originations reported by IMF to obtain the GSE share.

Meanwhile, according to HMDA, sales to Fannie Mae and Freddie Mac accounted for a tiny 3 percent of all the higher-price home purchase loans originated in 2005, while private securitizations and other conduits accounted for as much as 48 percent. By contrast, Fannie Mae and Freddie Mac accounted for 30 percent of the sales of lower-priced home purchase loans originated in 2005, while private conduits accounted for only 23 percent.

Though the exact numbers and market shares are tough to settle on and depend on definition, the foray of the GSEs into "higher-price," "subprime," "Alt-A," "other high risk," and "nontraditional loans" has been responsible for a disproportionate amount of the asset impairments and credit losses taken by the GSEs on their guarantees and portfolios. But it is important to recognize that the pressure on the GSEs would not have been as great if the financial institutions and rating agencies involved in the private-label market had been more tightly regulated and supervised, or if more regulatory constraints had been imposed on the nonprime products and practices of all financial institutions. Also, if the goals did play a role, it was equally the way they were imposed that was at fault—requiring the GSEs to take a 58 percent share of a primary market they did not directly control and that had gravitated towards nontraditional products and nonprime loans was bound to pressure the agencies to enter these markets.

## Multiple Factors and Failures Combined and Converged to Produce the Crisis

It is said that success has many mothers and failures few, but the nonprime crisis is an exception. As a result, the financial crisis has prompted a wide range of reform proposals. The Administration and Congress both intend to pursue regulatory changes and major financial reform legislation was passed in July 2010. Business groups have banded together to propose reforms they can implement through their own trade associations and have petitioned lawmakers to implement others. Proposals now being considered address the wide range of issues identified here, including improving systemic risk management, strengthening consumer protections and disclosures, improving market transparency, better aligning incentive structures to manage counterparty risk, strengthening the regulation and supervision of the shadow banking system (and the financial institutions that comprise it), breaking up or reforming Fannie Mae and Freddie Mac, and revisiting affirmative lending obligations like CRA.

# PART 7: MOVING FORWARD: CREATING SAFER AND HEALTHIER NONPRIME AND NONTRADITIONAL MORTGAGE MARKETS

With so many people now facing credit problems and foreclosures in the wake of the recession, reestablishing a functional nonprime housing finance system is increasingly important to the future of homeownership and asset building. The in-depth analysis of the boom and bust in nonprime lending presented in this report points to a number of important steps that government and the private sector should take to restore mortgage markets to health. Many of the steps that will move the nation decisively in this direction have already been taken in new rules under existing regulations and newly passed laws. These include new TILA, HMDA, RESPA and HOEPA rules, the Dodd-Frank Wall Street Reform and Consumer Protection Act (the Financial Reform Act), and the Secure and Fair Enforcement for Mortgage Licensing Act (SAFE Act). Though the details of many of the steps have yet to be hammered out, they will be pounded out in the process of promulgating new regulations and setting up the Consumer Financial Protection Bureau. Still others have not yet begun, including reforming the federal role in regulating secondary mortgage markets and supporting mortgage markets with guarantees and insurances at the loan and MBS level.

## Put Prudent Nonprime Lending With Traditional Products to a Fair Test

The evolution of nonprime lending in the mid-2000s was unfortunate not only for the damage it did, but also because it provided an unfair test of lending to borrowers with past credit problems. The wholesale relaxation of lending standards, when combined with marketing of riskier nontraditional products near the peak of an overheated housing market, was a recipe for heavy defaults and severe losses. Had the financial system itself contained the risk better—through effective self-policing or through stronger regulation—the performance of nonprime loans (and prime loans for that matter) might well have been much better.

At least one test of nonprime loan performance—set up by Self Help, the Ford Foundation, and Fannie Mae under carefully controlled conditions—suggests that nonprime lending can be sustainable even under difficult market conditions. In 2000, Self Help began purchasing loans under the Community Advantage Program (CAP) that were originated by CRA lenders but that

did not conform to Fannie Mae's underwriting standards. Although tame by the nonprime lending standards and products offered in the mid-2000s (most CAP loans were 30-year fixed rate mortgages with no prepayment penalties and complete income documentation), at the time the experiment was designed the underwriting standards used were considered so risky that Fannie Mae agreed to participate only in a second-loss position with a large first-loss reserve funded by a grant from the Ford Foundation.

Ding and Quercia (2008) compared the performance of subprime mortgages originated outside CAP to CAP loans. They found that subprime loans carried a significantly higher risk of default and prepayment than CAP loans, even for comparable borrowers. For subprime loans with specific characteristics such as adjustable rates or prepayment penalties, the relative risk of default over CAP loans (which prohibited these practices) was even higher. Origination channel also appeared to make a difference, with default risk three to five times higher for borrowers who had obtained their mortgages through brokers, all else equal. The study also showed that in combination risky loan features magnified risk. Borrowers were four to five times more likely to default on subprime loans that combined broker origination, adjustable rates, and prepayment penalties than on CAP loans. These findings demonstrated that borrower characteristics were not solely responsible for the higher risk of subprime loans, and that features of the loans and of their origination channels contributed significantly to risk.

Ding and Quercia concluded that, when done correctly, lending to low-income and risky borrowers can be viable. And there is other evidence that loan type matters. Indeed, the difference between serious delinquency rates on subprime fixed versus adjustable-rate loans indicates that product type matters a great deal (Figure 7-1). For example, serious delinquency rates in the third quarter of 2009 stood at a remarkable 40.8 percent for subprime adjustable-rate mortgages but a much lower 19.7 percent for fixed-rate subprime loans. In part, this difference reflects the fact that a larger share of adjustable-rate than fixed-rate mortgages were originated in 2004–2006 when home prices peaked. But even after controlling for vintage of loans, fixed-rate subprime mortgages performed far better (Figure 7-2).

It is now time to put prudent nonprime lending to a broad and fair test. The ingredients of such a test should include more careful licensing of brokers, a return to more traditional lending products, verifying incomes and ensuring the borrowers have the capacity to handle mortgage payments at a fully-indexed rate, and requiring escrows. This would restore common sense underwriting. And important strides in this direction have already been taken through the regulation of higher-priced loans as defined by new HOPEA regulations, newly mandated national licensing of brokers, and changes to Good Faith Estimates under the Truth in Lending Act. Provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Reform Act") go further by establishing minimum underwriting standards, enhanced disclosures on adjustable and interest-only loans, a prohibition on prepayment penalties for all but certain fixed-rate qualified loans, and a prohibition on payments to the originator (broker) for all loans types that are based on loan terms such as loan type or interest rate (though the bill does allow the ability to pay a broker more points based on loan size).

**Recognize that Properly Underwritten, Nontraditional Loans Have Their Place**

When prudently underwritten—and when systemic risk was not ballooning—many nontraditional loan products performed well. It would therefore be wrong to conclude from the poor overall performance of nontraditional prime loans that the products themselves should be prohibited.

Indeed, there are good reasons to offer nontraditional products like payment-option loans that allow for flexibility in deciding on monthly payments; or hybrid adjustable-rate mortgages that allow people to amortize loans over 30 years but lock in lower rates for a shorter period matching their expected stay; or products that bank on future income gains. For example, a 5/25 loan affords borrowers that intend to move within 5 years a lower interest rate, with the only risk being that the rate will reset if the borrower remains in the home longer than expected. This ought to be viewed as a useful and workable loan option rather than one to be avoided.

It should be noted that the housing market crisis exposed nonprime lending to exceptional stresses that even prime loans were unable to withstand. The steep decline in home prices experienced in many areas, when combined with high unemployment, took a toll on the performance of prime mortgages as well. Indeed, serious delinquency rates on prime loans

reached 6.3 percent in the third quarter of 2009 and were still rising. By comparison, during the previous three recessions (none of which featured as steep a drop in home prices), serious delinquency rates for all loans peaked at less than 2 percent.

### Build Models that Can Serve as a Foundation for Sustainable Nonprime Lending

The failure to properly model nonprime default probabilities and loss severities could be interpreted as a sign that modeling cannot be used to assess nonprime and nontraditional product risk. But the history of these models in the prime mortgage market suggests otherwise. Credit scores and mortgage scoring models were first used in the prime market to test whether the received underwriting standards could be adjusted to allow more borrowers to qualify without adding significantly to the expected risk profile of a pool of loans. As it turned out, a lender could ease one underwriting standard if it tightened another, allowing a larger proportion of low-income and minority borrowers to qualify for agency-guaranteed loans without adding much to expected risk (Gates, Perry, and Zorn 2002). Importantly, these positive developments occurred against a backdrop of standardized mortgage documents, underwriting, and mortgage products.

This orderly process of expanding the pool of eligible borrowers in the prime conforming market was extended by the GSEs into the nonprime market gradually at first. Fannie Mae created the Expanded Approval program in 2000 to provide credit to borrowers with lower credit scores and other underwriting variances that constituted higher expected risks. This was separate from its community lending programs that reached out to underserved markets. Expanded Approval was a risk-based pricing system, but its use was limited to select lenders, volumes were kept low, loan products were typically fixed, and at least initially a hard 620 credit score cutoff was used.

But the private conduits relaxed underwriting dramatically, relying heavily on simulations based on borrower credit scores and loan-to-value ratios that included overly optimistic home price appreciation assumptions or drew conclusions from past performance of similar products that were more strictly underwritten (Rossi 2010; Lang and Jagitiani 2010). These models relied far less on past precedent than the models in the prime market, where there was much more relevant historical data to examine.

Moving forward, it should be possible to build a sustainable nonprime lending system that is based on careful modeling of and experimentation with different underwriting standards and products. The goal must be to manage nonprime risk better through sounder underwriting and by requiring greater reserves to buffer losses. Business has already begun to look for ways to lend more safely to borrowers with nonprime credit scores and, in particular, to better understand the risk of lending to those negatively affected by the recession and the housing market collapse.

### Engage in a Serious Public Debate about Acceptable Levels of Risk

Even before subprime foreclosures skyrocketed, there was already a question of what level of expected default was reasonable for lenders to accept. From a public policy perspective, the question is about the fairness of offering a borrower a loan that a lender has good reason to believe has, say, a 1-in-2 or a 1-in-5 or a 1-in-10 chance of defaulting. Until the second half of 2007, subprime defaults were under 10 percent. As a result, about 9 in 10 subprime borrowers that would otherwise have been denied credit were able to either refinance their mortgages or buy homes and benefit from the potential to earn a leveraged return on an investment in housing, pay down principal, and enjoy the pride of ownership.

A serious public debate over what level of expected risk is reasonable for individuals to assume, from a safety and soundness perspective, has never been initiated. An argument can be made in favor of lending under standards that produce higher expected default rates than in the prime market as long as three conditions are met. First, estimates of expected defaults should be considered reliable and based on actual performance history before pilot programs are expanded. Second, yields should be high enough to cover and reserve against expected losses, though this is much easier said than done because there is no consensus on how to get the expected loss calculations right. Third, borrowers must understand the risks they are taking on. Under these circumstances, borrowers can make informed choices and lenders cover themselves for the added risk of lending to borrowers who have failed to repay previous debts on schedule.

Of course, the debate over what constitutes an acceptable level of risk would not be simple and would take place against a backdrop of lost faith in the models used to form default and loss expectations. However, lenders will almost certainly continue to rely on modeling past data and

simulating performance in making underwriting decisions. These models will come under closer scrutiny—whether or not regulations demand it—because investors will be less likely to go along with modeling assumptions and approaches used in the past. In addition, information will now be available on how different loan types performed under a truly disastrous set of circumstances. As time passes, credit-scoring models will also be improved by modeling the ability of those who defaulted on their mortgages to repay other debts, providing an even stronger basis for underwriting decisions.

### Take Steps to Limit Systemic Risk

Scanning the wreckage caused by the financial crisis in September 2008, as well as six other episodes since the 1980s,[57] head of National Economic Council Larry Summers (2008) concluded that "regulation will have to shift from its traditional focus on regulating individual institutions to focus on the stability of the entire system." While it is likely that policymakers will move in this direction, it is instructive to note that during the height of the housing bubble and nonprime lending boom, many serious and thoughtful observers failed to appreciate the depth and magnitude of the systemic risk being taken, and regulators failed to heed the warnings of those who did. This underscores how difficult it is to decide that a bubble is forming and take steps to stop it, especially ones that restrict credit practices and products.

Limiting systemic risk is politically unpopular because it can constrain economic growth and inhibit financial innovation. Measures that could be taken include imposing stiffer capital requirements on more financial institutions so that they can lend less from a given asset base; subjecting financial institutions that are not federally chartered to more rigorous federal safety and soundness examinations and examinations for compliance with consumer protection rules; creating an agency to prohibit credit products viewed as unsafe for consumers (and by extension the financial system); or, as Pollock (2009) has suggested, raising capital requirements when asset prices deviate from long-term trends.

[57] These other crises are the 1987 stock market crash, the savings and loan crisis of the mid- to late 1980s, the commercial real estate crash of the late 1980s and early 1990s, the peso crisis in Mexico in 1994–1995, the Asian financial crisis of 1998, and the Long Term Capital Management collapse scare in 1998.

Though unpopular, one or more of these actions may be preferable to leaving the current set of regulations unchanged. The downside of that decision is obvious: the world would remain exposed to periodic financial crises stemming from permissible practices in the financial system that may cost taxpayers a great deal of money and have disastrous consequences for the economy. In the end, some combination of stiffer capital reserve requirements, paying into federal insurance funds, and limiting the risks lenders by enforcing basic underwriting standards—especially on riskier loan products or higher-priced loans to risky borrowers—will be important. It remains to be seen whether the new HOEPA higher priced lending requirements and provisions of the Reform Act for minimum mortgage lending standards go far enough in constraining risky mortgage lending and if the broader oversight and stronger capital and risk-retaining requirements on banks and nonbank financial institutions within the Reform Act will be enough to contain systemic risk. But containing systemic risk through proper management of risk is a critical adjunct to stronger capital reserve requirements that limit the supply of credit.

In short, containing and managing risk through underwriting, not just through its pricing, must be restored to nonprime markets while still allowing a market for serving borrowers with subprime credit records to thrive. In addition, if lenders continue to have wide latitude to offer products and apply underwriting standards of their choosing, there should be some way for regulators to step in if there is a sense that the collective action of lenders is contributing dangerously to systemic risk.

### Improve Consumer Protections and Disclosures

The admonishment "buyer beware" as a predicate of consumer protection works best when buyers can easily comparison shop, prices are transparent (and borrowers do not incur costs for price discovery), product features being compared are nearly identical, buyers and sellers have equal information and power in the negotiation, the risks of purchasing a product are clear, and buyers have a clear and well-informed perspective on the product that is best for them (Laibson and Zeckhauser 1998). All of these conditions were lacking in the nonprime mortgage market.

As discussed, steps to protect consumers have already been taken in the form of HOEPA reforms that curb underwriting excesses around capacity to pay for the newly created category of "higher priced loans" and to better inform consumers through TILA and RESPA disclosures that make

interest rate, interest fee, and settlement cost estimates more binding for all loans secured by homes. Additional steps aimed at underwriting are in the Reform Act, such as mandatory verification of income and minimum underwriting standards to ensure a borrower's ability to pay (which include use of a fully-indexed interest rate on hybrid adjustable rate mortgages to ensure the ability of a borrower to absorb reset shock should it occur).

An important step that the government could also take is to help nonprime borrowers to comparison shop by demanding greater pricing transparency. Government could explore the feasibility of requiring that lenders publicly post prices for comparable loan products to a public website. The disclosure could take the form of grids that show interest rates that borrowers with particular credit scores would be charged if they took out a particular product with a particular set of terms. Alternatively, when an automated scoring model is used, the borrowers could be granted access to the wholesale loan interest rate (net of broker commissions) and also told the wholesale cost of running their information through an automated system to get another price quote when working with brokers who work with multiple lenders.

As it stands now, buyers and sellers do not have equal information or bargaining power. Sellers of mortgages have much more information on the rates and terms being offered on nonprime mortgages than borrowers. Brokers are faxed—or otherwise have access to—rate sheets along a number of dimensions from multiple lenders and are under no obligation to share that complete information with borrowers. Correspondent and retail branch lenders know the minimum interest rate that wholesale aggregators are looking for, but they too are not required to make those prices known to the borrower.

By prohibiting yield-spread premiums on all residential mortgages, amending TILA to require that lenders disclose the aggregate fees paid to brokers related to each loan, and the additional prohibition of any other person from paying compensation to the loan originator for a transaction if the consumer pays the loan originator's compensation directly, provisions of the Reform Act quickly put into rule by the Federal Reserve, will also enable borrowers to more easily see all the compensation they cede to their lenders and the amount of interest they will be paying on their loan.

Beyond the challenges posed by the specific features of the nonprime market are the cognitive biases of consumers in making mortgage decisions, which leave borrowers vulnerable to taking on risks and failing to pick the lowest cost loan. As discussed previously, these biases include discounting future risks and assuming that their own level of risk of an adverse event is lower than average. There are also cognitive biases that result from innumeracy, which is widespread, and the use of rules of thumb to solve complex problems with future uncertainties, such as focusing on the monthly payment rather than the annual percentage rate in sizing up the true cost of the loan.

While all these biases apply in a more extreme way in the nonprime market, they exist to some degree in the prime market as well. The challenges in relying entirely on educated consumers to protect themselves in mortgage transactions are apparent. The RESPA and TILA reforms in effect in 2010 go a long way toward greater clarity about payment reset risks on products that contain them and in giving firmer fee and rate quotes to borrowers, but they are as yet untested in terms of influence on consumer behavior. The Reform Act calls for other amendments to the TILA, requiring that lenders give borrowers six month notice prior to the reset of any hybrid mortgage, along with an explanation of the change, good faith estimate of the new amount, and a list of alternatives the borrower may pursue before the reset.

The sense that disclosures are not enough has also added to the pressure on lawmakers to strengthen consumer protections further. In considering new regulations, lawmakers are faced with the challenge of protecting consumers without inhibiting financial innovations that might in fact serve borrowers well, or without prohibiting mortgage products and underwriting standards that lenders want to offer and that consumers can use to finance consumption or investment. The Bureau of Consumer Financial Protection, for example, will have to walk a fine line between protecting consumers and not stifling innovation.

### Review Affirmative Obligations/Duties to Serve Low-Income Markets

With pockets of concentrated foreclosures dotting low and moderate-income communities, especially where minorities make up half or more of the population, there is a significant risk of a return to a time when it was especially difficult to get mortgage loans in these communities. A strong economic argument can be made that absent collective action, lenders will pull back from low-income lending in ways that will have disparate impacts on minorities, low-income neighborhoods in general and low-income minority neighborhoods in particular (Litan et al. 2000).

As argued above, it is easy to confuse the reasons for the poor performance of loans to these borrowers and in these communities, and blame the victim. But these low-income, especially minority communities, were "reverse redlined," with unfettered lending practices permitting borrowers to take excessive risks they sometimes did not understand, including some degree of predatory lending and the use of products and underwriting standards that allowed buyers in low-income communities to drive prices to unsustainable levels. Lenders fitting models to recent history might deny credit in the future on the basis of the abysmal performance generated by the recent reckless practices that thrived at the top of an overheated housing market.

Just as when CRA and HMDA were initially passed, it may take collective action that only regulation can bring about to keep lenders looking for ways to reach out to low-income communities and working together to restart lending under a more sustainable model in these places. It is now costly to gather information on risk in these areas and extract lessons from the meltdown that may offer clues about how to take more manageable risks in the future. With credit now hard to get due to much tighter underwriting standards, it will take many lenders easing standards in these communities at once to cause enough credit to flow and create enough sales transactions to mend broken markets.

But there is also ample reason to want to review and reconsider how CRA is implemented and how widely it should apply (Willis 2010). This review is already well underway—with many opposing views—but it is important that the review lead to concrete steps to improve how CRA grades are assessed and potentially expand its reach (Chakrabarti et al., eds., 2009). As it stands now only loans made by banks and thrifts in areas where they have branch offices count, reducing the laws

relevance since only a fraction of all mortgage loans fit this bill. Its critics have pointed out that at least in some cases large banks responded to regulatory pressures by extending below market interest rate loans to borrowers that already had a higher than typical risk profile. While some cross-subsidization has long been a part of the broad prime market—so that the same price has been charged on loans and to borrowers that constitute even though they constitute different risks—this sort of treatment has struck some observers as evidence of an act implemented in an overreaching way or interpreted unwisely by the regulated. Although the extent to which such market distorting behavior was practiced is unclear, most observers believe it was mostly done by a handful of lenders in large metropolitan areas that were competing for outstanding ratings.

Like CRA, the notion of the duty for secondary market firms to serve certain markets where the risk of being underserved either remains or could reemerge is sensible. It should not be abandoned, even if it is viewed as having contributed to the unwise embrace of Alt-A lending by the GSEs in the mid-2000s, without first diagnosing if it was how the goals were set that created a problem. Fannie Mae and Freddie Mac from 1999 onward complained about the increase in the goals and even more vocally about the inflexibility of the goals. They argued that the goals should be modified for years in which refinance volumes were especially heavy or adjustable rate shares especially high and in 2004 the industry challenged HUD's calculations and estimates of the market. Then in 2005, they complained that forcing them to meet specific single-family home purchase subgoals was ill-advised and limited their ability to meet goals in a more prudent and safe fashion.

### Improve Transparency in the Capital Markets

As Federal Reserve Chairman Bernanke (2008) pointed out, "Because mortgage-backed securities are complex amalgamations of underlying mortgages that may themselves be complex to price, transparency about the underlying assets and the mortgage-backed security itself is essential." Similarly, Baily, Elmendorf and Litan (2008) stated that "unconventional credit-market instruments—such as derivatives on asset-backed securities—were intrinsically complicated and unfamiliar even to sophisticated investors, and they had a very short track record that was exclusively from a period of rapidly rising house prices." Yet transparency in the ABS market was lacking because only a limited amount of detailed information on the underlying assets was passed along when the assets were placed into securities. In addition,

investors had an even more difficult time following the characteristics of underlying loans and predicting how their performance would affect payouts when tranches were recombined to manufacture even more tranches in CDOs. When CDO tranches were recombined again to form CDO-squared, transparency suffered even more.

CDS and synthetic CDOs (CDOs made up of CDS) did not trade on public markets and did not have a central clearinghouse or repository of record. Indeed, the Commodity Futures Modernization Act of 2000 ensured that the derivatives market would remain largely unregulated. A dispute between the SEC and the Commodity Futures Trading Commission over which had jurisdiction over derivatives like CDS had inhibited the market for them in the United States while the market was developing rapidly in Europe. As a result, regulators, let alone investors, could not gauge total exposure to nonprime credit risk, which entities held it, and who the counterparties to CDS were.

This lack of transparency proved a major failing, turning a useful method for managing and hedging risk into a means for propagating it. In the aftermath of the financial crisis, efforts have been made to have credit default swaps and other derivatives traded on public exchanges or clearinghouses, backed by capital reserves, such as is written into the Reform Act through the requirement that several classes of derivatives be traded on an exchange and routed through derivatives clearing organizations registered with the CFTC. The opacity of capital markets may also lead investors to demand, or regulators to require, greater disclosure of pertinent information on the loans backing mortgage securities. The lesson here is that these efforts are important and worthwhile. As part of the Reform Act, the SEC is required to adopt rules requiring the issuers of ABS to disclose information regarding the underlying assets within each tranche or class, including disclosures of loan-level data. These are all important steps in addressing transparency.

### Improve Measurement, Monitoring, and Management of Counterparty Risk

The lack of transparency in the capital markets and the reliance on ratings agencies to judge the creditworthiness and business practices of counterparties resulted in counterparty risk that was undetected and poorly managed. In addressing this problem, there is a tendency to prescribe retention of more credit risk by the mortgage originators to better align counterparty interests

while also creating cushions against losses. While this makes sense, there are limits to how far down the supply chain such demands can reasonably reach, and it is likely that putting more capital at risk is not sufficient in and of itself to properly manage counterparty risk.

Imposing stiff capital requirements on brokers and small mortgage companies on all products is impractical and doing so could drive them out of business. Yet the originate-to-distribute model has relied—and will likely continue to rely—on mortgage brokers. The reason the broker network has been so durable is that it allows larger lenders to avoid the fixed costs of operating a large retail mortgage origination system. Consumers can also benefit from brokers who are able to offer products, pricing, and underwriting from a wide array of lenders. Given their scale and business model, brokers are often not in a position to retain much credit risk. Thus, the carve out for "qualified loans" in the Financial Reform Law is essential to supporting a competitive market for loan origination that allows smaller community banks and mortgage brokers to continue to originate loans. While "qualified loans" is of the release of this report had yet to be defined, the intention is to waive risk retention for well established traditional loan products like 30-year fixed rate mortgages that are prudently underwritten.

While larger mortgage banks, finance companies, banks, thrifts, and investment banks are in a better position to retain more of the risk—and there are good reasons to want them to do so—it does not guarantee reduction in the risks taken, especially if origination and brokerage fees remain upfront and substantial. In fact, many banks did have capital at risk, which is why their losses related to nonprime mortgages have been so large, such as Bear Stearns and Lehman Brothers.

In addition to requiring that counterparties to put capital at risk, there are other ways that counterparties can and should monitor, manage, and contain risk. Instead of relying on the ratings of rating agencies, entities that aggregate loans—or insure or guarantee loans or the securities they back—can impose their own strict requirements for sellers and servicers. Fannie Mae, Freddie Mac, and others have long operated with such rules. In addition, these aggregators can constantly monitor the performance of sellers and brokers to detect those with loans that perform significantly worse than their peers. Regulations could require that all aggregators impose certain requirements on sellers and servicers and that all aggregators have counterparty risk monitoring systems in

place. These systems would look for statistical outliers in the performance of their sellers and servicers and prescribe methods for investigating whether they warrant breaking off business with these seller-servicers. The Reform Act calls for new regulations on ratings procedures and further disclosures of credit rating methodologies by the credit ratings agencies, with emphasis on qualitative detail on the data used and assumptions made, as well as some quantitative reporting of the impact of various changes to market conditions.

A recent step in the direction of both greater counterparty strength and ability to monitor performance is the requirement that mortgage brokers meet national licensing standards and be listed in a national registry. Licensing standards help ensure the professionalism of brokers and registration allows the performance of brokers to be more closely monitored. Interestingly, employees of regulated financial institutions must be federally registered but do not need state licenses, diminishing the reach of the law.

The extent to which counterparty rules as strong as those in the conforming market were in place in the private conduit channels is less clear. The incentives to police distribution channels were weaker because the broker-dealers that structured the securities were not guarantors and were insulated from assignee liability. One way to help ensure that broker-dealers police their distribution channels, therefore, would be to hold assignees liable for certain conditions under which loans were originated, though efforts to impose assignee liability in the 1990s strongly suggest that conditions would have to be limited, clear, compelling, and liability capped so securities backed by loans in private conduits could be effectively rated. Even so, such a move could have a chilling effect on market participants.

Lastly, counterparty risks can be reduced by better aligning the incentives of agents to avoid principal-agent problems. This could be done by tying some portion of mortgage broker and MBS broker-dealer compensation to the long-run performance of loans, such as the requirement in the Reform Act that issuers retain a minimum of 5 percent of all securitized assets unless the ABS is backed entirely by qualified mortgages as defined by the bill. Rather than front loading all the incentives, some portion could come out of the payment streams from the mortgages the brokers originate or securities they issue. This is how servicers are compensated. But it would be

difficult to achieve this without a transition period because upfront fees are more immediate. It would also likely take regulation because brokers prefer upfront fees. Thus, any firm that offered them would likely gain market share from those paying a portion from recurring monthly payments tied to loan performance and prepayment characteristics.

### Improve Regulation and Supervision of the Shadow Banking System

Whether or not one subscribes to the view that the way affordable and underserved lending goals were imposed on Fannie Mae and Freddie Mac was a principal contributor to the weak lending practices that flourished in the nonprime and nontraditional market, it is clear that the private-label securities gravitated towards these weakened standards without any pressure to meet such. Furthermore, it is clear that participants in both the primary mortgage markets and the capital markets (where mortgage loans were sold, securitized, made into CDOs, referenced by CDS or synthetic CDOs made up of them), were less tightly supervised and regulated than nationally chartered banks and thrifts.

This lack of oversight by federal authorities meant that many important practices occurred out of sight and reach of federal regulators (except for practices already prohibited by federal credit laws like TILA, RESPA, HOEPA, and the Equal Credit Opportunity Act). Finance companies, mortgage brokers, ratings agencies, CDS issuers and markets, investment banks, and investment funds would benefit from more federal oversight and regulation.

While many of those that might be subjected to such regulation and oversight are resisting it, at least one major trade association representing firms in the so-called shadow banking system has acknowledged the value of subjecting firms it represents to federal oversight. The Mortgage Bankers Association has called for establishing a federal regulator to develop uniform national mortgage standards and regulate independent mortgage banks and brokers.[58]

[58] The MBA proposal calls for legislation that incorporates and extends borrower protections in HOEPA, including taking into account a borrower's ability to pay using fully indexed rates and fully amortized payments. It also improves appraisal and servicing rules. The proposal establishes a duty of care for loan originators which requires them to present a choice of appropriate loan products to borrowers, fully disclose their cost, and disclose all forms of compensation received by the broker or loan officer in connection with the loan. Under the proposal, borrowers would have to agree in writing to the terms of a nontraditional loan product before closing.

It does appear likely that at least some players in the shadow banking system will come under closer federal scrutiny and regulation. As noted, the federal government has already taken that step with mortgage brokers through licensing and registration, but it is likely that efforts will be made to improve federal oversight and regulation of the rating agencies, issuers of CDS, and investment banks acting as broker-dealers. The Consumer Financial Protection Bureau goes a long way towards doing this by granting a single bureau within the Federal Reserve the authority to examine and enforce regulations for all mortgage-related businesses, including all lenders, servicers, mortgage brokers, and bank and nonbank financial companies. Included in this is the requirement that the Federal Reserve must regularly examine financial activities of nonbank subsidiaries of bank and nonbank financial companies in order to increase oversight and reduce so-called "regulatory arbitrage" among these entities.

### Retool Federal Role in Guaranteeing Mortgage Debt

No matter what the reasons for Fannie Mae and Freddie Mac's deep dive into the Alt-A market and much smaller foray into purchasing AAA-rated subprime tranches and guaranteeing low credit score loans, the fact that they required enormous bailouts (although shareholders were largely wiped out and top management departed) and were taken into conservatorship underscores the need to reevaluate the federal role in insuring mortgages and providing implicit or explicit guarantees of MBS. Furthermore, the failure of FHA in 2008 to sustain minimum required capital reserves led some to question the financial strength of that government agency during a crisis as well.

For decades, the markets perceived that Fannie Mae and Freddie Mac had the implicit backing of the federal government because they were chartered by Congress, enjoyed special privileges, and had modest but symbolic lines of credit with Treasury. When the federal government stepped in and placed Fannie Mae and Freddie Mac into conservatorship, this perception was borne out for its debtors and purchasers of its MBS (though not for its shareholders). It is important to point out, however, that other large financial institutions, notably AIG and the several of the nation's largest banks, received significant federal backing for their obligations as well, and in some cases on terms less onerous than those imposed on the GSEs. Thus, the expectation has been raised that the federal government will step into to prop up any institution deemed too large to fail and

to honor their debts. But, be that as it may, the experience with Fannie Mae and Freddie Mac must cause a rethinking of the how the government should support mortgage liquidity and the stability of the financial system through insurance and guarantees of mortgages and MBS.

In rethinking this role, several important lessons outlined in this report should be kept in mind. First and foremost, absent FHA and the federal government stepping in to honor the debt and guarantee commitments of Fannie Mae and Freddie Mac, the mortgage market would have utterly collapsed. The prospect of such a collapse is terrifying. Had it occurred, for some period of time no one could have bought or sold a home without cash or accepting onerous terms, no one could have refinanced to take advantage of lower rates, and no one could have borrowed against home equity. Homes would have been as devalued and untradeable as subprime securities were in the fall of 2008. Thus, it is clear that federal insurances and guarantees are vital to the stability of the mortgage finance system and the broader finance system, as well as the national economy. It would therefore be ill-advised for the federal government not to have mechanisms in place to provide these insurances and guarantees and be able to activate them immediately on a massive scale should conditions demand it. Indeed, the ability of the federal government to go in over a weekend and seize control of the two companies was vital to keeping the financial system from collapsing and credit flowing through a network of thousands of *private firms* that originate and service loans. In addition, Fannie Mae and Freddie Mac were tasked for running large-scale federal loan modification programs and had the scale to do so. Lastly, their large presence in the market place allowed the Federal Reserve to operate an agency MBS purchase program that lowered mortgage interest rates and successfully kept credit flowing to conforming borrowers.

Second, even if the federal government provides only an implicit guarantee (and it is doubtful whether such an implicit guarantee makes sense moving forward or if only explicit guarantees should be offered), it has a compelling interest in charging fees for these guarantees, as it does with FHA, to protect against losses. It must also sort out ways to make sure it has the proper counterparty risk management measures in place, including adequate reserve requirements against losses and other risk-sharing arrangements that limit moral hazard and principal-agent problems.

Third, the need for federal guarantees goes beyond the need to insure whole loans and extends to guarantees of MBS, especially of securities structured to allow interest rate risk to be parsed and better managed. As discussed in this report, the secondary market—and one driven by large players that can enforce standardization—has enormous benefits, including liquidity that lowers mortgage interest rates, the capacity to tap into deeper pools of capital which also lowers costs, and better matching asset and liability duration through the issuance of securities with a range of maturities, coupons, and privileges to cash flows from otherwise long-term, illiquid mortgage assets. Absent structured securities aimed at managing interest rate and related prepayment and asset-liability matching risks, it would be difficult to source so much capital for 30-year fixed rate products. Even pension funds and insurance companies focused their purchases on REMIC tranches with short-term maturities. Absent federal guarantees on those structured securities, they may not be issued at all times and will have to revert to the tricks of structuring credit risk that backfired so badly in the private label ABS and CDO market for subprime mortgage securities.

Fourth, if lowest common denominator lenders are allowed to thrive anywhere in mortgage credit markets because regulatory oversight is weak, any shareholder-owned company like Fannie Mae and Freddie Mac that offers an implicit (or explicit) mortgage guarantee will come under pressure to move towards that lowest denominator to retain market share and possibly boost short-term earnings if yields are attractive. Thus, the federal government has a compelling interest not only in managing counterparty risk through capital requirements and risk-sharing arrangements but also through care in the loan products and underwriting standards it will allow these enterprises to insure or purchase (perhaps above and beyond regulations already in place to limit products and provide basic standards for all mortgage loans, as is starting to occur as a result of the Reform Act, new TILA rules, and the new HOEPA rules governing higher-priced lending).

Lastly, FHA has been criticized over the years for being too rule bound by law to act decisively to manage the risks in its own portfolio and innovate in ways that might better serve the consuming public. It has also been faulted for being too sensitive to political pressure to police its private partners as effectively as a private company can. And it has long been viewed by experts as having antiquated information technology systems, salary structures that make it difficult to attract the necessary talent, and other problems that stem from being a government

agency subject to annual appropriations. While many strides have been made to improve and reform FHA, few would say that these reforms have solved many of the agency's structural challenges. Moving forward, old reform proposals should be dusted off and revisited in light of recent events and FHA's evolution (Vandell 1995; Wartell 2002). As for Ginnie Mae, which guarantees timely payment of principal and interest on securities backed by FHA insured loans, it provides a model that is now being looked at as a way for the federal government to provide wraps around securities issued by firms that would become chartered entities for the purposes of issuing MBS explicitly backed by the federal government.

Beyond the loans and MBS its guarantees, the federal government of course also has its role to play in regulating originators, issuers, rating agencies, mortgage loan products, mortgage derivative products, consumer disclosures, and public disclosures of lending information like HMDA to protect consumers and investors and promote fair lending. It has long exercised this role and is in the process of rethinking and reforming it.

### Improve Loan-Level Disclosures

The lack of disclosure and lack of uniformity in disclosure has made it extremely difficult to reach common conclusions about the basic facts of the boom and bust in nonprime lending.[59] Subprime and Alt-A loans were self-defined by lenders. There was no statutory definition—even credit score cutoffs varied widely in defining subprime. While proprietary databases often contained sufficient information to parse data based on the underlying loan product features, underwriting standards, and credit scores of borrowers, these data were not widely available to the public at a detailed level.[60] This has inhibited meaningful analysis. To gauge the nature and extent of nonprime lending it would be helpful to get away from such umbrella terms as Alt-A, prime and subprime and substitute much more specific categories that are reported in common ways. For example, it would be useful to cross classify loans into common categories of combined loan-to-value ratios, debt-to-income ratios, credit scores, the degree of documentation

[59] See Edward Pinto's (2008) detailed testimony on the subject to the Committee on Oversight and Government Reform of the US House of Representatives, December 9, 2008.

[60] It is worth noting that Wall Street analysts often released reports that drew on such detailed information and that some of the vendors were quite forthcoming in recent years to researchers and policy makers on a case-by-case basis. But these vendors are businesses and there are both limits to the amount of time they can spend on formatting tables for outside parties to help inform public debates and inefficiencies in doing so in ways that are thought out in advance as the most fundamental to policy formulation. Coming up with required national level disclosures as described in the text would bring efficiency and consistency to the process and could be developed based on a process facilitated by regulators.

of income, whether loans required escrowing of taxes and insurances, if the applicants intended to occupy the home as a primary residence or not, and type of product (such as interest-only loans with reset dates of five years or more or less than five years; payment-option loans; fixed-rate loans of 15 years or less or more than 15 years; and adjustable rates with reset dates of one year or less, 2-4 years, and 5 years or more). Common combined LTV categories might be 80 percent or less, 80-90 percent, 91-95 percent, 96-97 percent, greater than 98 percent, and so forth. Information on numbers as well as performance of loans cross-classified in this way if a certain threshold number of loans were reached within a cell could be required of private vendors. This could be done at the national level and only for pre-agreed categories and threshold loan numbers so that the vendors would still be able to sell more detailed geographic and loan-level data.

There are many loan-level disclosure reforms proposals now circulating that would demand much greater disclosure than this, especially on loans in private label securities. These may gain traction. The approach described here is an effort aimed specifically at gauging the national patterns of the kinds of loans being originated and under what sorts of underwriting standards, how much risk layering, and how these loans are performing. These other reforms, such as is included in the Reform Act, are mostly aimed at improving the ability of investors to access information regarding the underlying assets behind ABS and CDOs they invest in, such as the identity of the broker or originator of each loan, the compensation received, the amount of risk retained by the originator and securitizer, and the ongoing performance of the security.[61] Others seek to link loan information to borrower characteristics by forming a common identifier between HMDA data and loan level data reported to and aggregated by third party data vendors.[62] Additional HMDA disclosures required by the Reform Act include a universal identifier as well as the age of the borrower or applicant, credit score, total points and fees payable at origination, the difference between the loan APR and a benchmark rate for all loans, the months of a prepayment penalty, the value of collateral property, the proposed terms of the loan in months, terms that would allow the payments to be not fully amortizing, the channel through which the application was made, a unique identifier for the loan originator, parcel identifier for the property, and other information that the Bureau may see fit to acquire.

[61] For an excellent review of these proposals as well as the issues they pose, see Jackson (2010).
[62] See both Jackson (2010) and Fishbein and Essene (2010).

### Revisit Servicing Arrangements in Securitizations

The jury is still out on whether the differing interests of tranche holders and the Pooling and Servicing Agreements that governed servicing arrangements for loans held in trust by special purpose entities inhibited servicers in their response to massive subprime loan defaults. As a result, the legal agreements governing trusts and the conduct of servicers are worthy of closer attention, and efforts to strengthen them are worth making.

### Moving Forward

The severe global recession sparked by the meltdown in credit markets poses important questions to business leaders and policymakers about the best ways to reform the US capital markets and housing finance system. The answers are difficult because they involve the perennial tradeoff between, on the one hand, limiting access to credit by imposing harsher capital standards, restrictions, and prohibitions on products and underwriting practices and, on the other hand, ensuring credit is as available as possible, consistent with sound underwriting, for businesses and households to borrow to pursue consumption and investment.

Even those who have faulted many nonprime lending practices express a strong interest in seeing the market succeed because, by definition, it opens up access for borrowers and allows the use of loan products and terms otherwise unavailable in the prime market. Whatever solutions are worked out, it is now more important than ever to strike a fruitful balance in this perennial tradeoff. The hope is that market corrections and regulatory reforms in the nonprime market will allow a broad range of households to have access to mortgage credit, but in ways that are more sustainable, involve fewer risks, and do not become fodder for excessive financial risk-taking in the capital markets.

By 2010, regulatory reform proposals were proliferating and on July 21, 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act was passed into law. Other proposals have been made by a wide range of sponsors, including trade organizations, investment banks, think tanks, academics, lawmakers, and the administration. It is uncertain how these proposals will be received and which will ultimately be acted upon. But what emerges from these actions over the

coming years will govern the safety and soundness of the financial system, access to and the cost of mortgage credit, and the fairness and clarity of mortgage lending for years to come.

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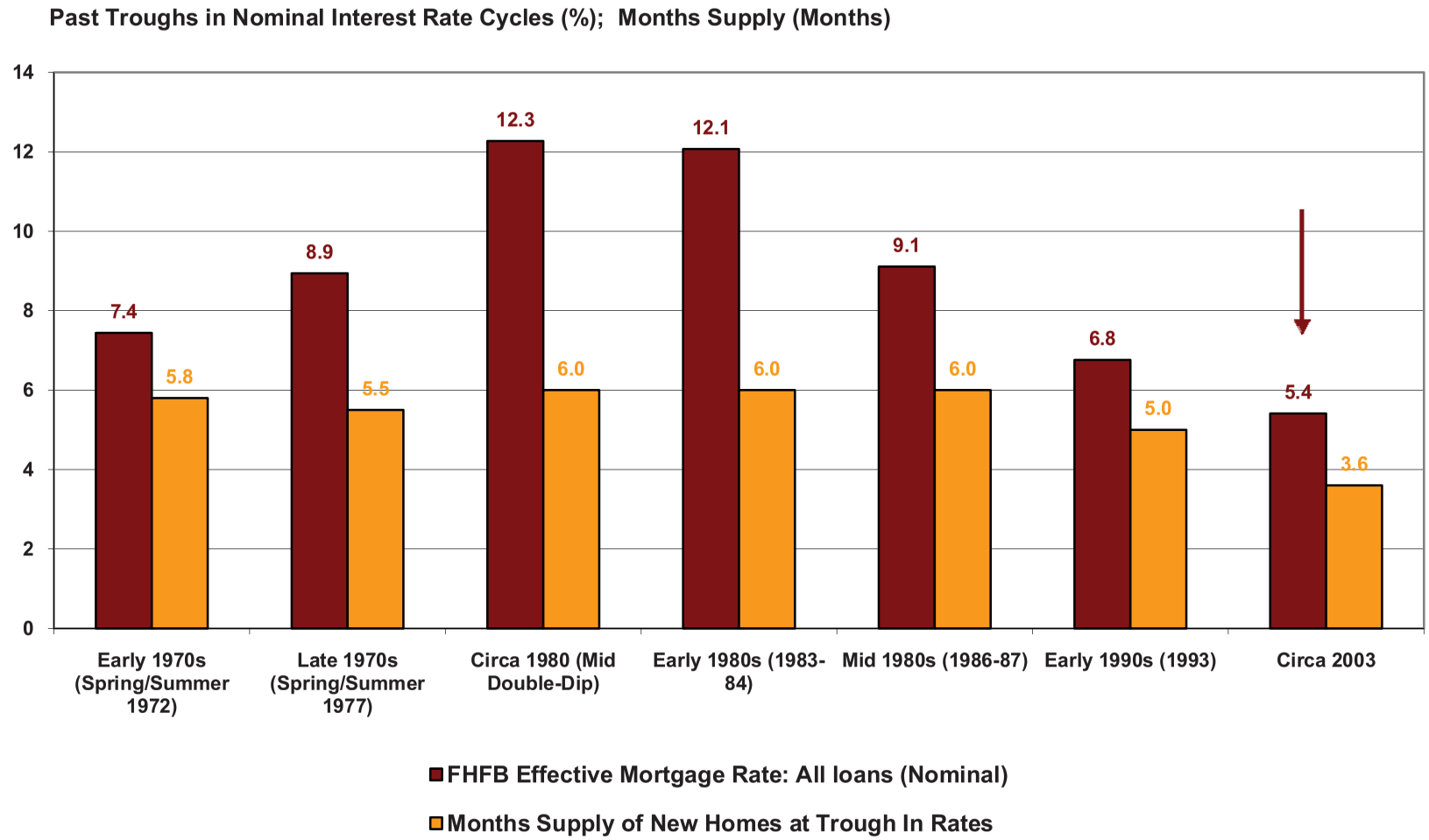
## LIST OF ACRONYMS

| | |
|---|---|
| **ABS** | Asset-backed security |
| **APR** | Annual percentage rate |
| **AU** | Automated underwriting |
| **CDO** | Collateralized debt obligation |
| **CDS** | Credit default swap |
| **CRA** | Community Reinvestment Act of 1977 |
| **FHA** | Federal Housing Administration |
| **FTC** | Federal Trade Commission |
| **GFE** | Good Faith Estimate |
| **GSE** | Government-sponsored enterprise |
| **HAMP** | Homes Affordable Mortgage Program |
| **HELOC** | Home equity line of credit |
| **HERA** | Housing and Economy Recovery Act |
| **HMDA** | Home Mortgage Disclosure Act of 1975 |
| **HOEPA** | Home Ownership and Equity Protection Act of 1994 |
| **HUD** | US Department of Housing and Urban Development |
| **IO** | Interest-only (loans) |
| **LTV** | Loan-to-value (ratio) |
| **MBS** | Mortgage-backed security |
| **NMLS** | Nationwide Mortgage Licensing System |
| **NPV** | Net present value |
| **OCC** | Office of the Comptroller of the Currency |
| **OTS** | Office of Thrift Supervision |
| **PAC** | Planned Amortization Class |
| **PMI** | Primary mortgage insurance |
| **PO** | Payment option (loans) |

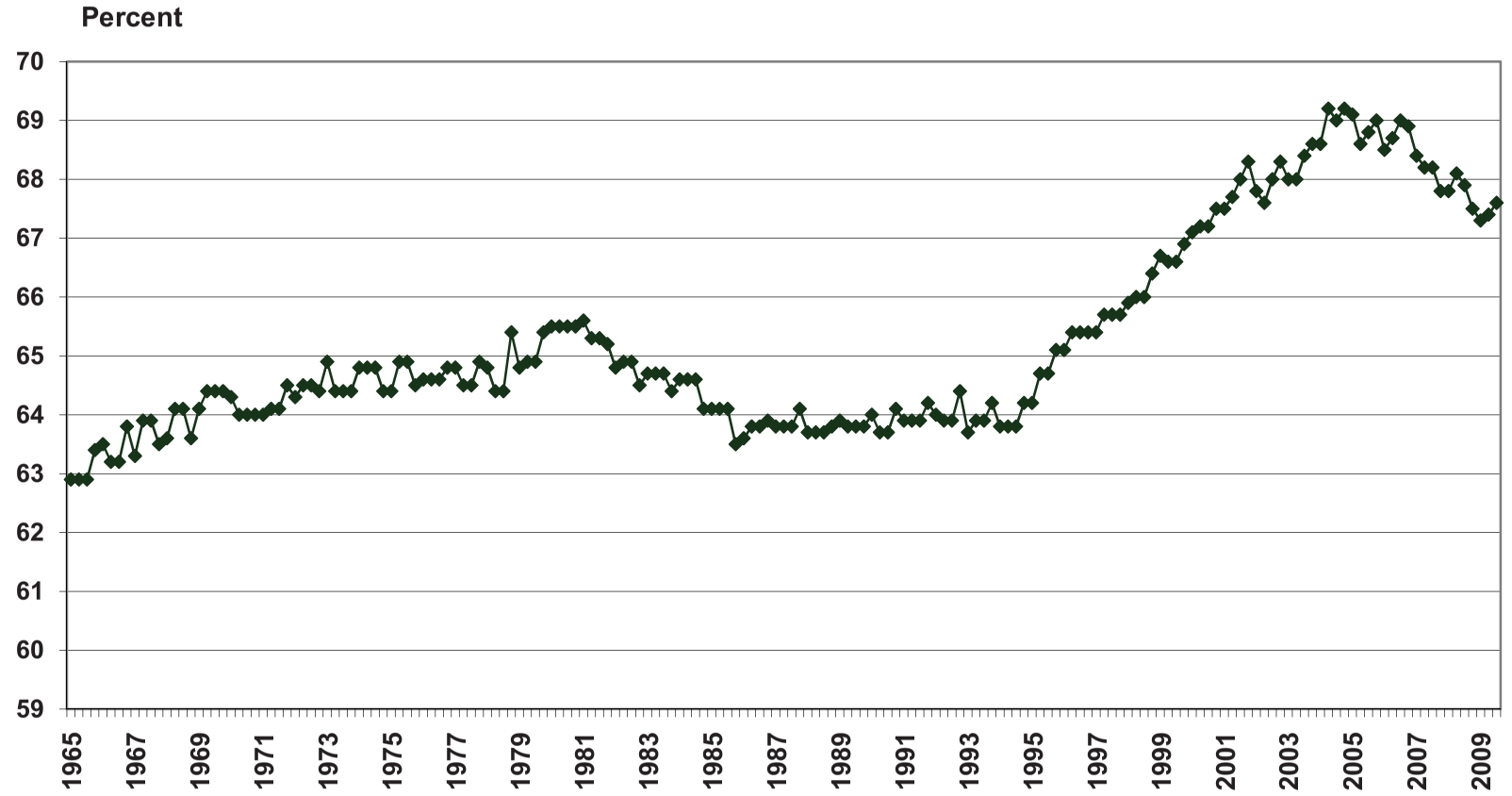
| | |
|---|---|
| **PPIP** | Public Private Investment Program |
| **PSA** | Pooling and Servicing Agreement |
| **REMIC** | Real Estate Mortgage Investment Conduit |
| **RESPA** | Real Estate Settlement and Procedures Act |
| **RHS** | Rural Housing Service |
| **SAFE** | Secure and Fair Enforcement for Mortgage Licensing Act of 2008 |
| **SEC** | US Securities and Exchange Commission |
| **SIV** | Structured investment vehicle |
| **TAC** | Targeted Amortization Class |
| **TALF** | Term Asset-Backed Loan Facility |
| **TBA** | To-Be-Announced (market) |
| **TILA** | Truth in Lending Act |
| **VA** | US Department of Veterans Affairs |

**Figure I-1: Historically Tight Supplies and Low Interest Rates in the Early 2000s Sparked Record Price Appreciation**



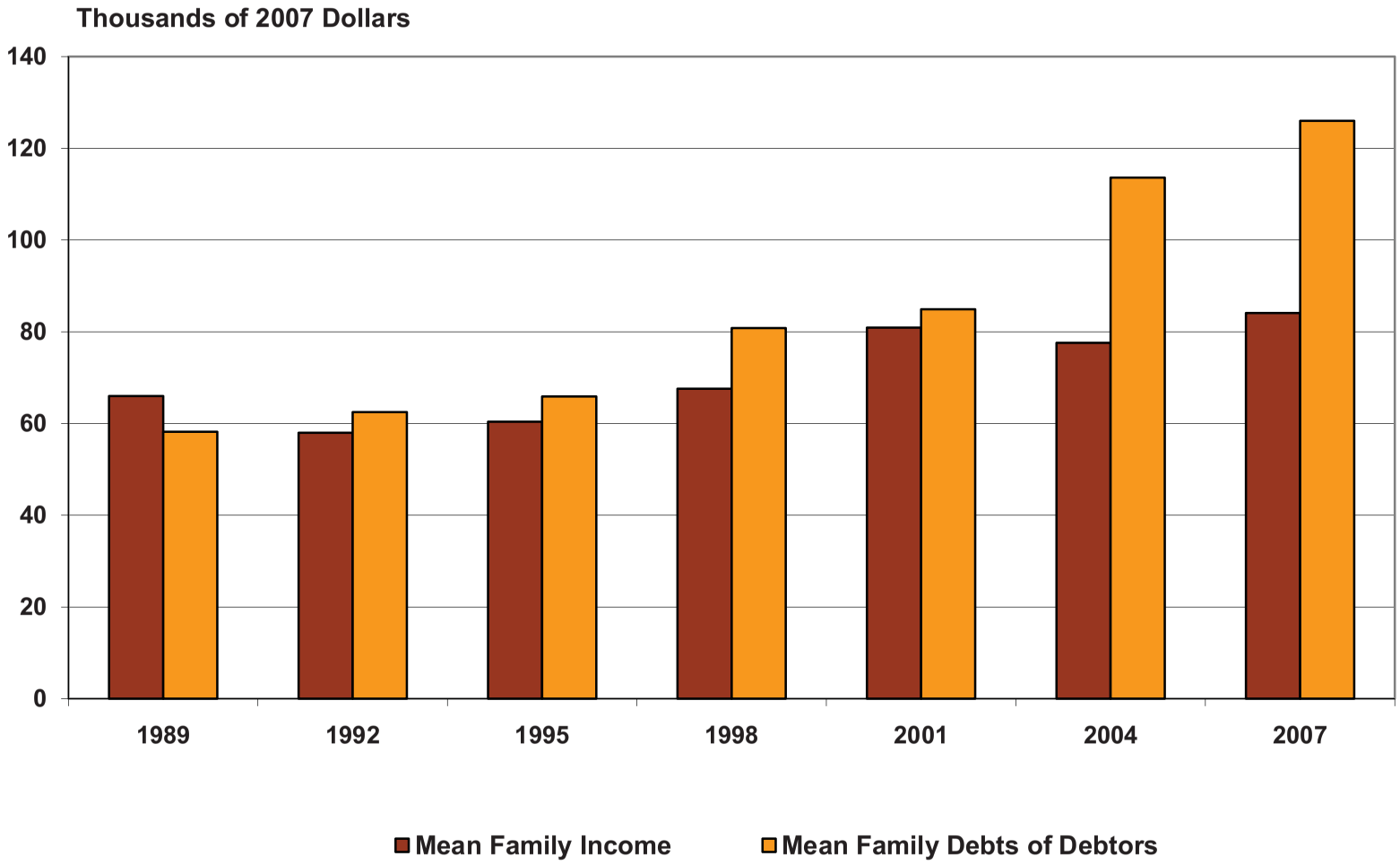

Sources: Federal Housing Finance Board, MIRS; US Census Bureau, New Residential Sales.

**Figure 1-1. The Homeownership Rate Troughed in the 1980s But Increased Sharply in the Latter Half of the 1990s**



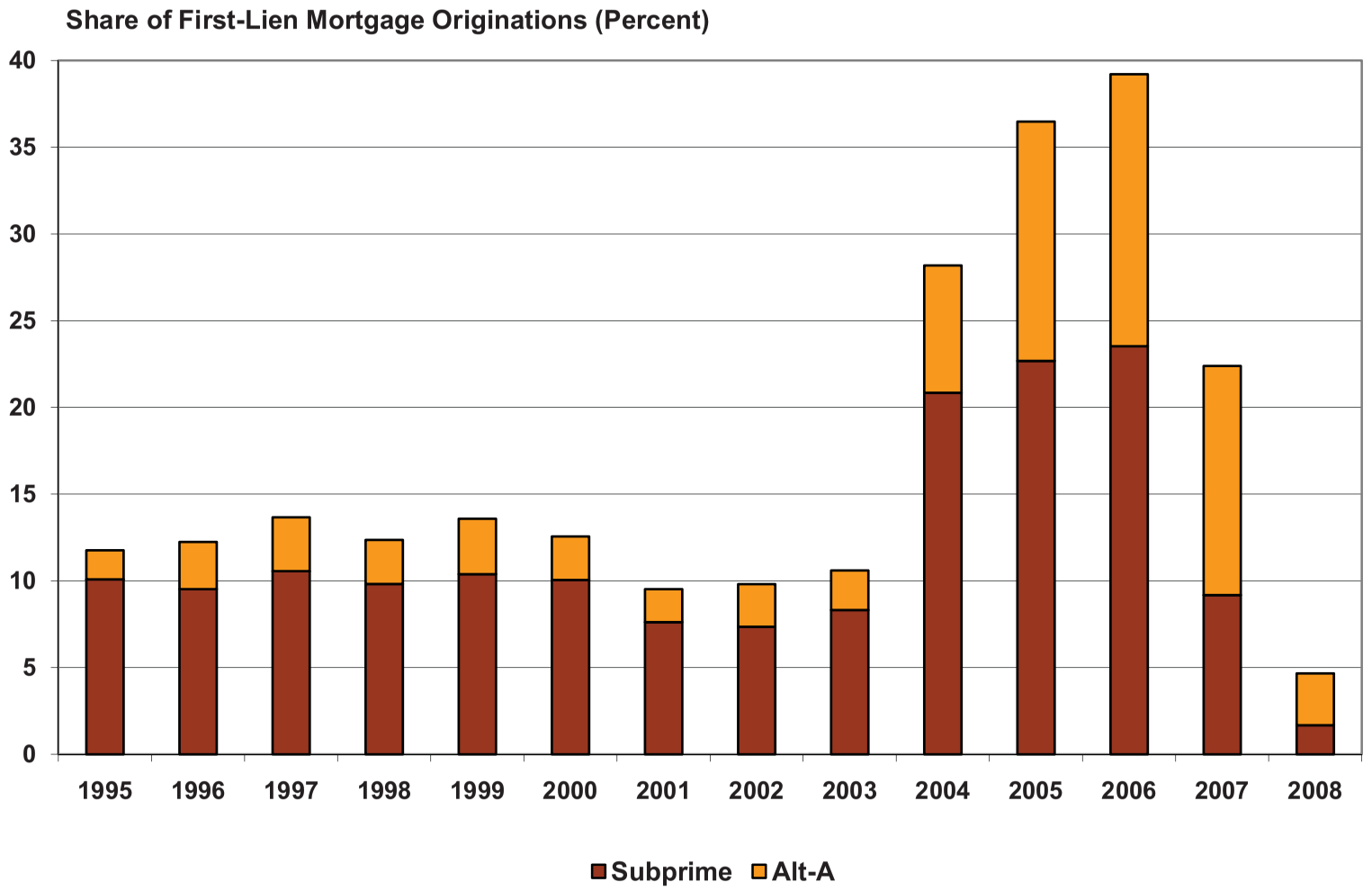

Source: US Census Bureau, Housing Vacancy Survey.

**Figure 1-2. Average Debt Has Increased Far More Than Incomes**



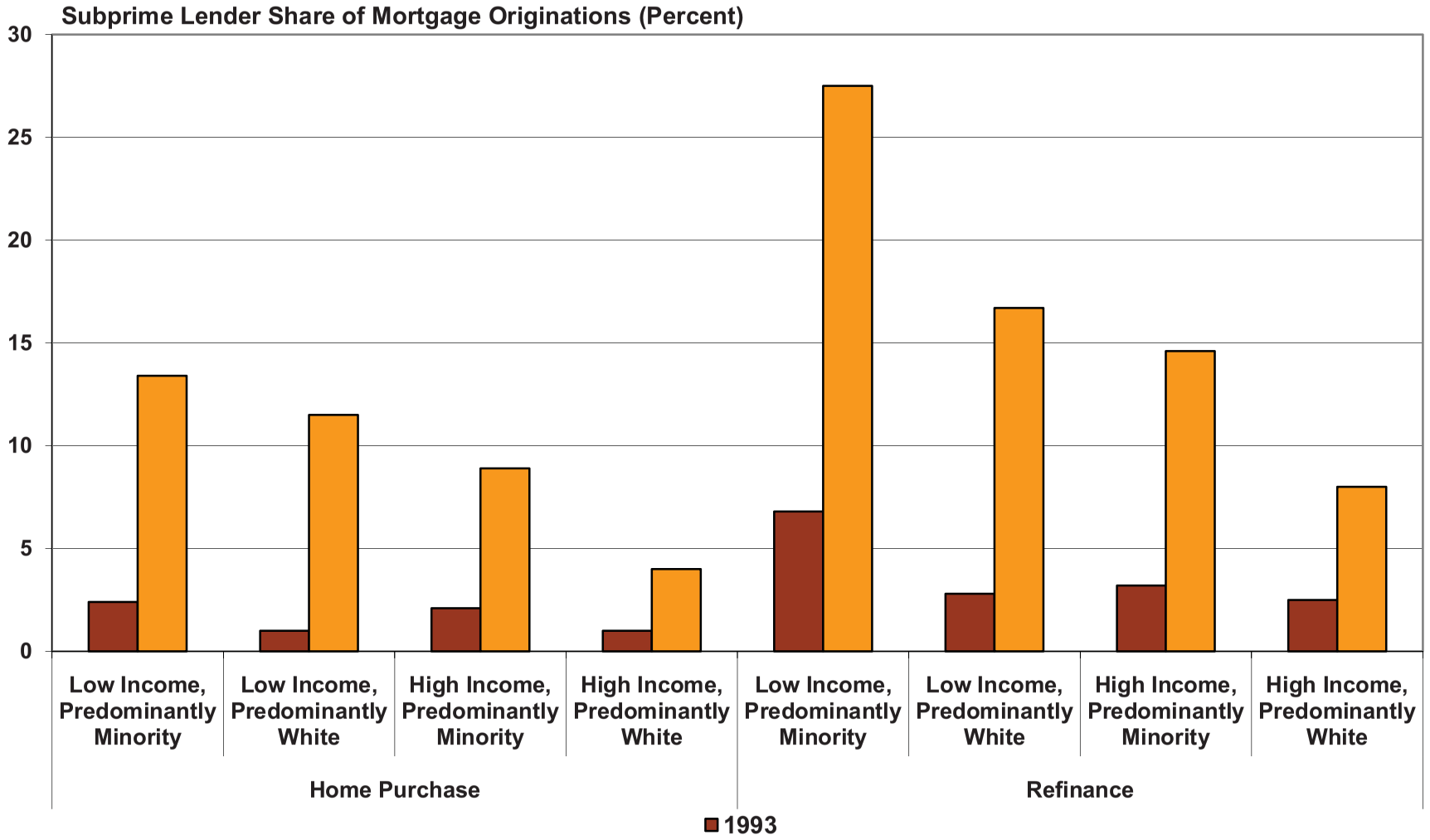

Source: Federal Reserve Board, Survey of Consumer Finances.

**Figure 1-3. Nonprime Lending Soared in the 2000s**




Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

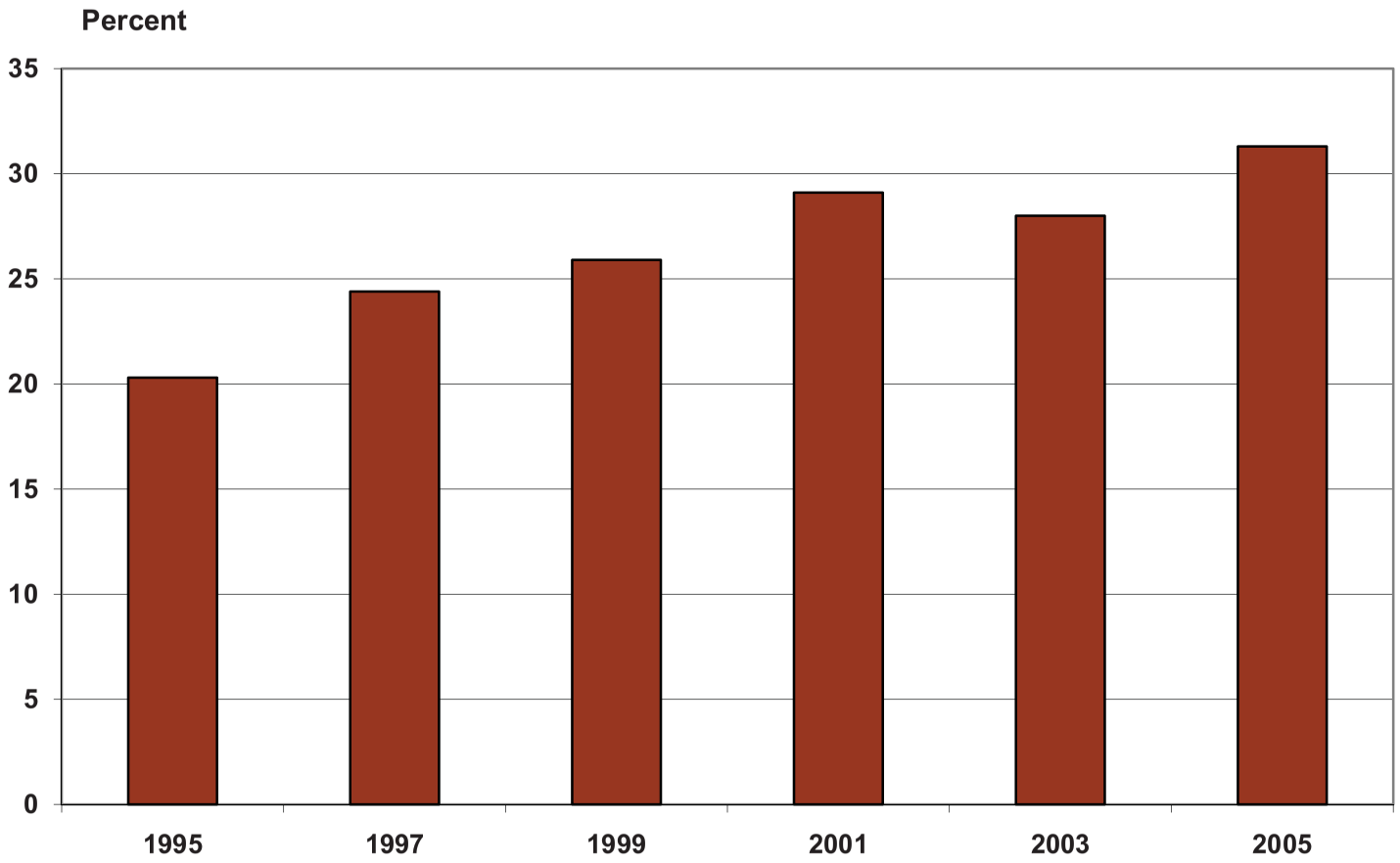
**Figure 1-4. Subprime Loans Were Concentrated in Low Income and Minority Neighborhoods**




Notes: Includes only loans made in metropolitan areas. Predominantly white neighborhoods were less than 10% minority in 1990, while predominantly minority neighborhoods were 50% or more minority in 1990. Low-income neighborhoods had median income 80% of metro area median or lower in 1990, and high-income neighborhoods had median income 120% of metro area median or higher in 1990. Subprime loans are defined as all loans originated by lenders which were identified by HUD as subprime lending specialists.

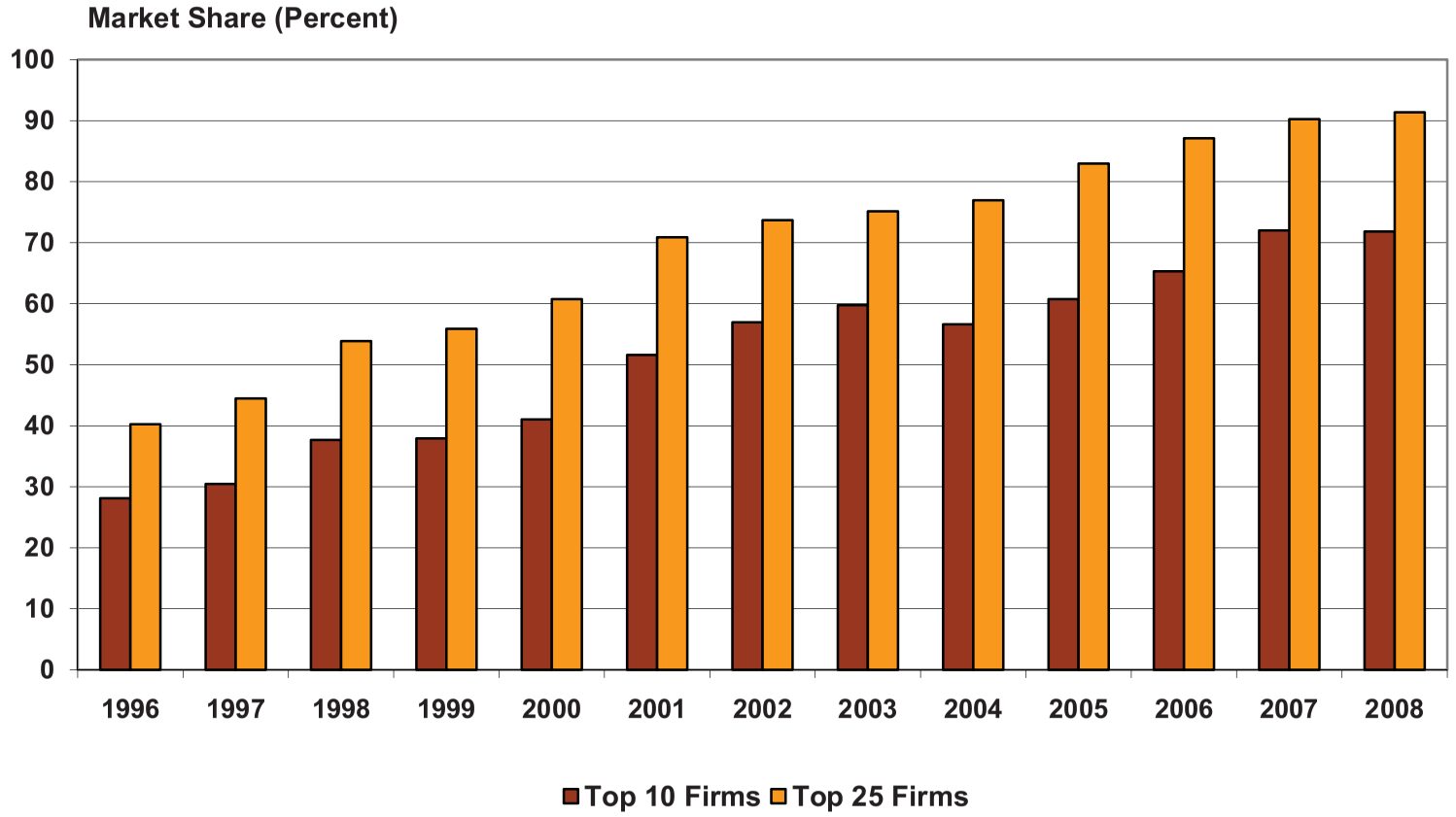
Source: JCHS tabulations of enhanced HMDA database.

**Figure 1-5. The Broker Share of Originations Climbed from 1995-2005**




Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

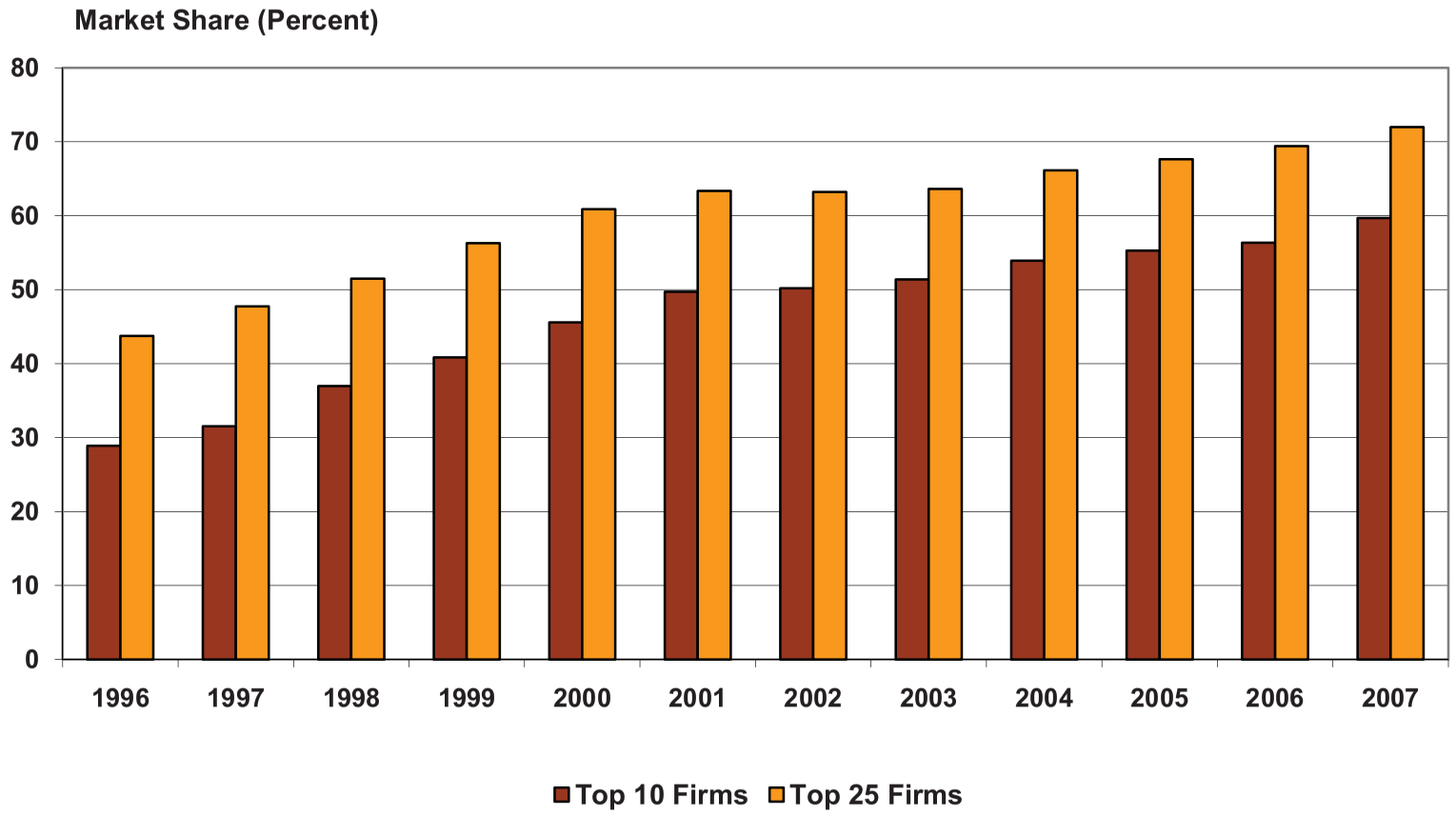
**Figure 1-6. Market Consolidation Among Mortgage Originators Has Been Significant**




Note: Market share is measured by dollar volume of loans.

Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

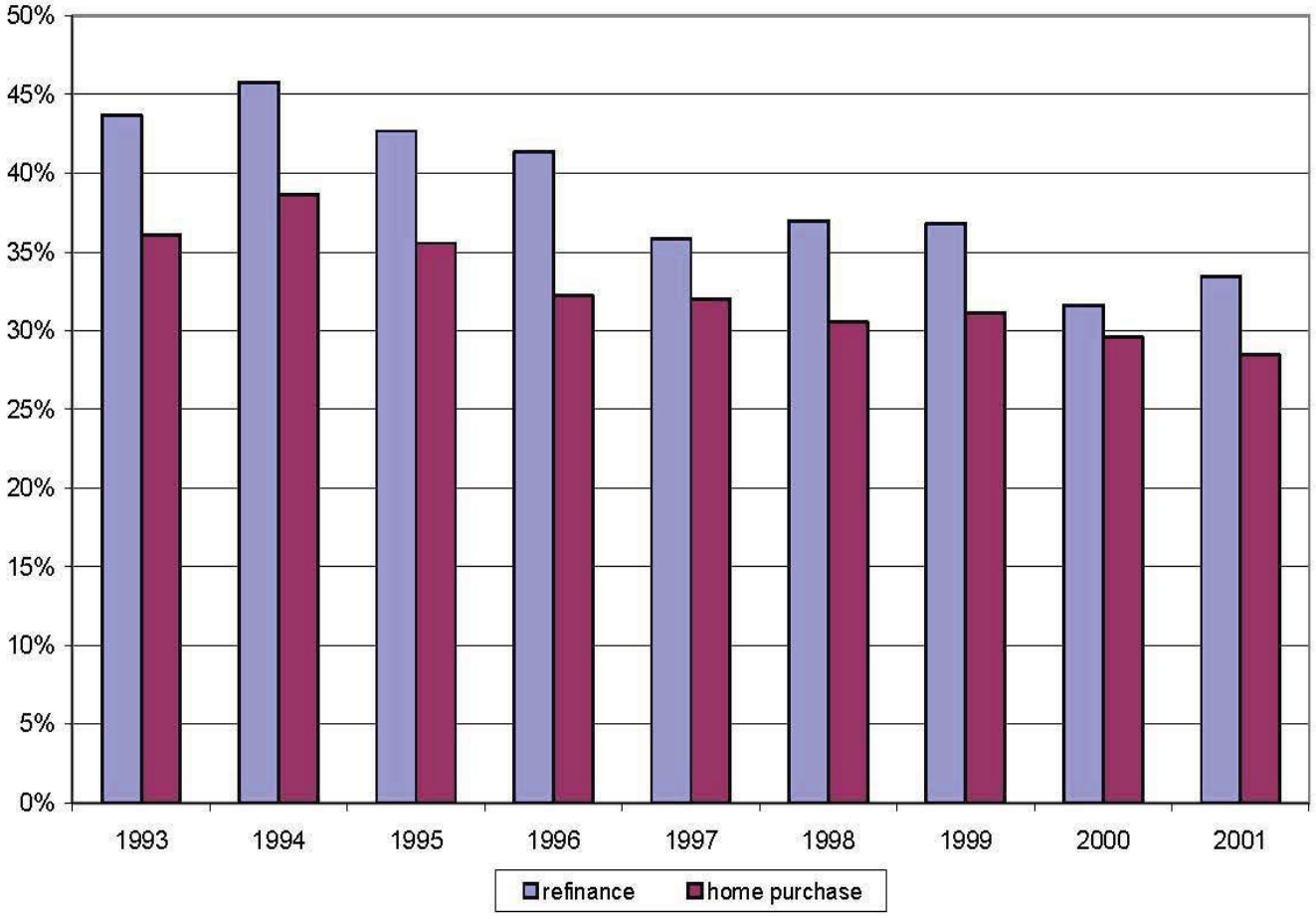
**Figure 1-7. The Servicing Industry Also Consolidated**




Note: Market share is measured by dollar volume of loans.

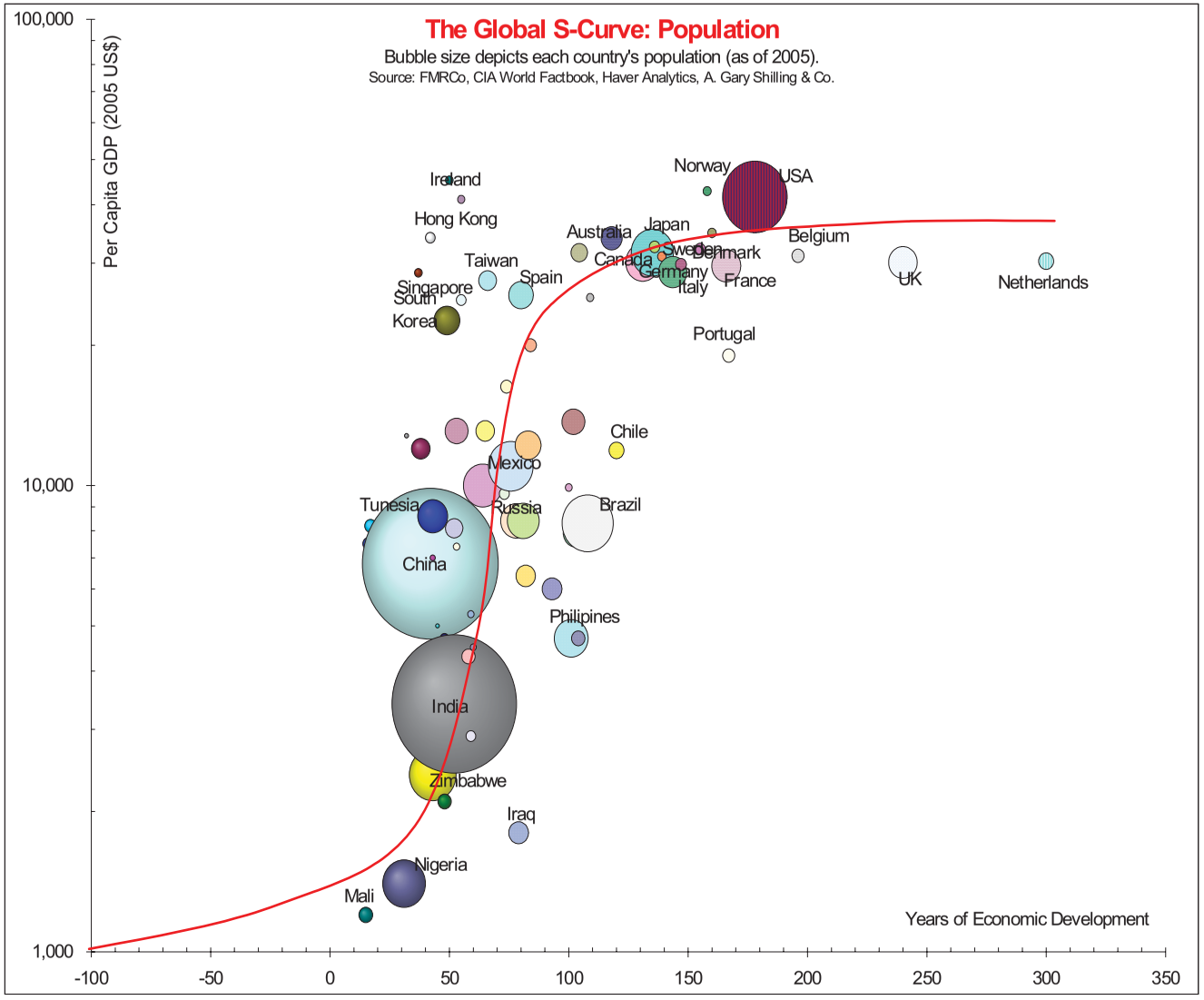
Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

**Figure 1-8. CRA Assessment Area Lending Fell Steadily in the 1990s**



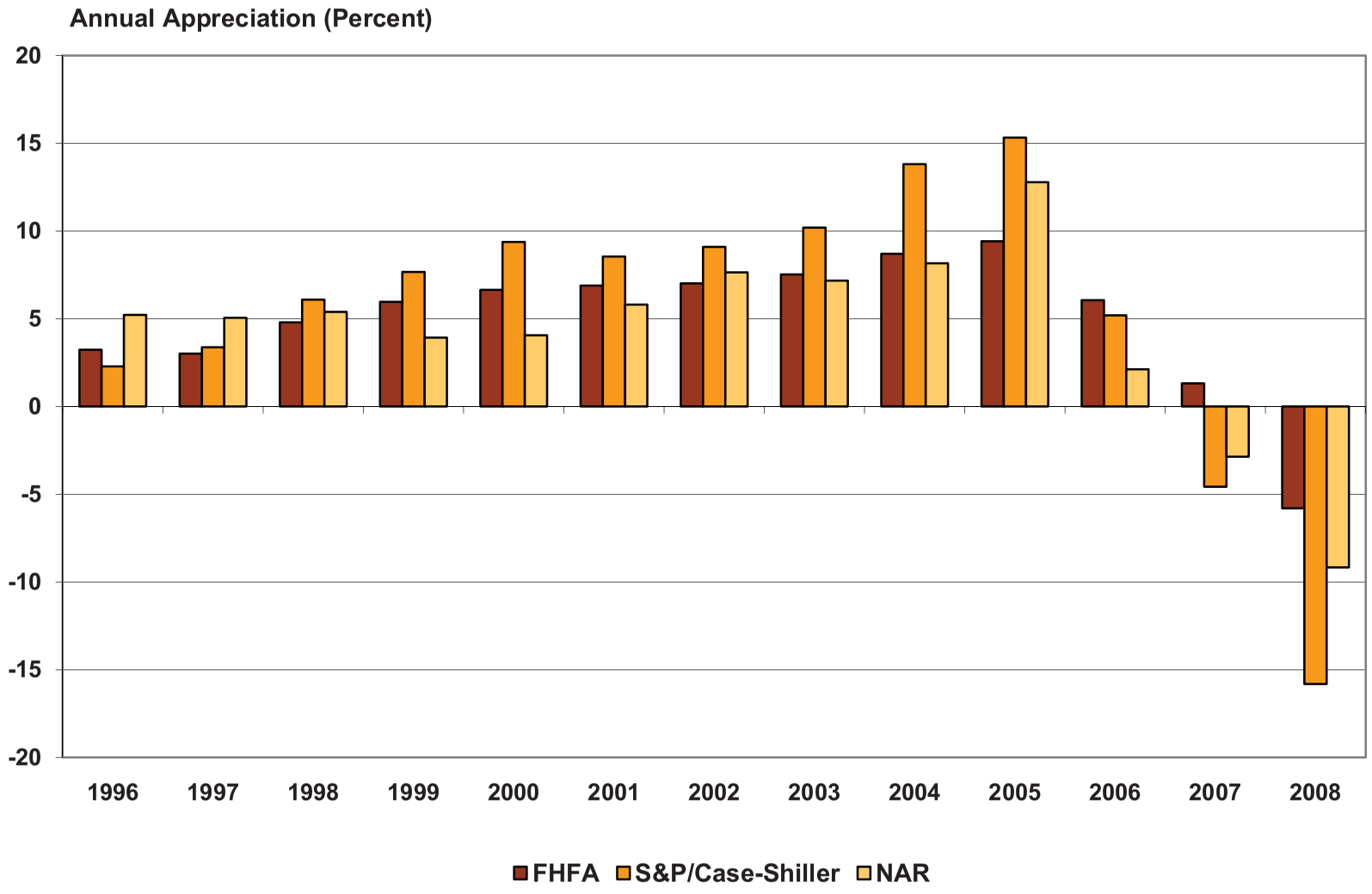

Source: Joint Center for Housing Studies, "Credit, Capital and Communities: The Implications of the Changing Mortgage Banking Industry for Community Based Organizations," 2004.

**Figure 2-1. Several Large Nations Climbed the Steep Part of the Industrialization Curve in the 1990s**



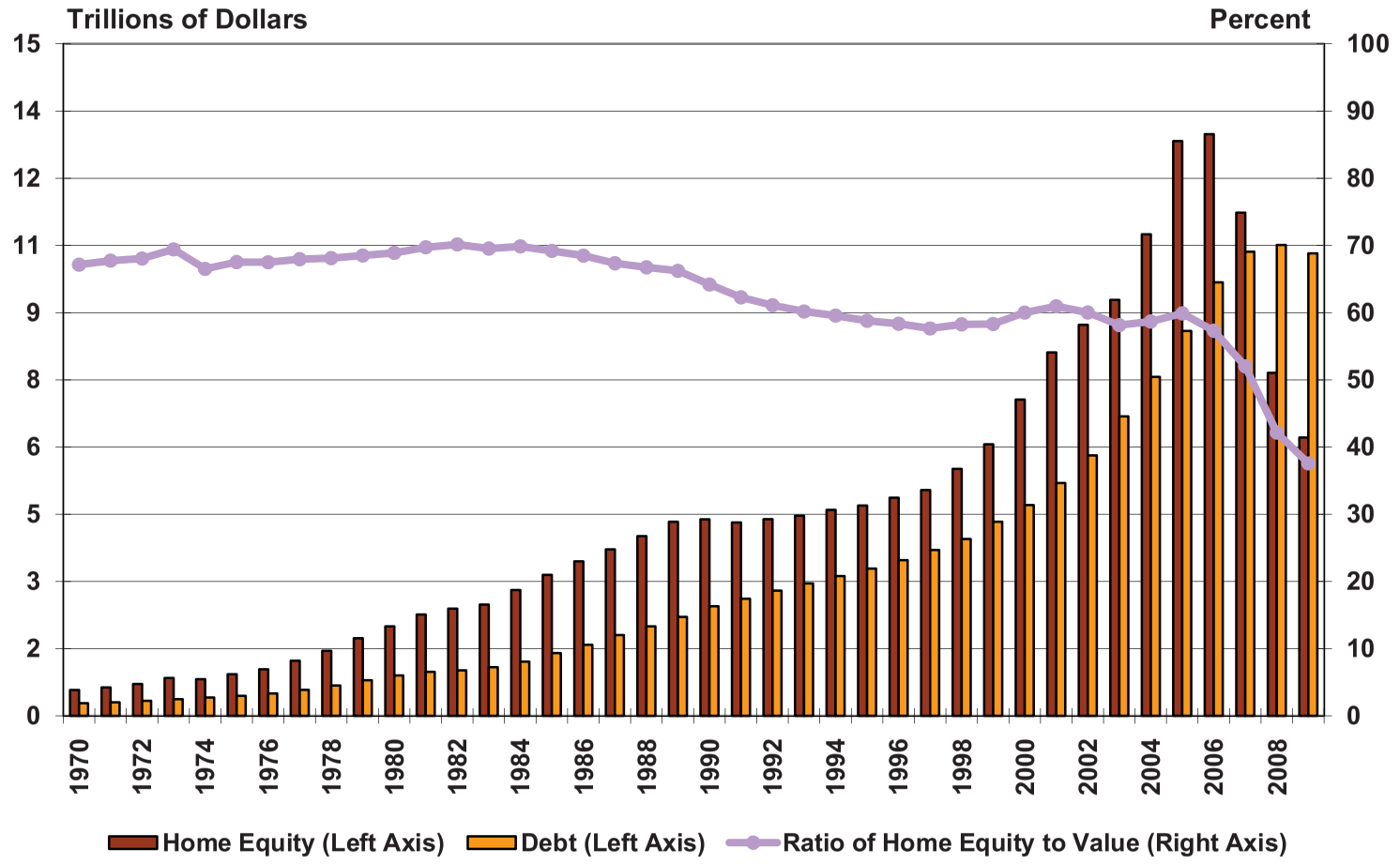

Source: Jurrien Timmer, Director of Investment Research at Fidelity Investments.

**Figure 2-2. By Various Measures, US House Prices Soared From 1995-2005**



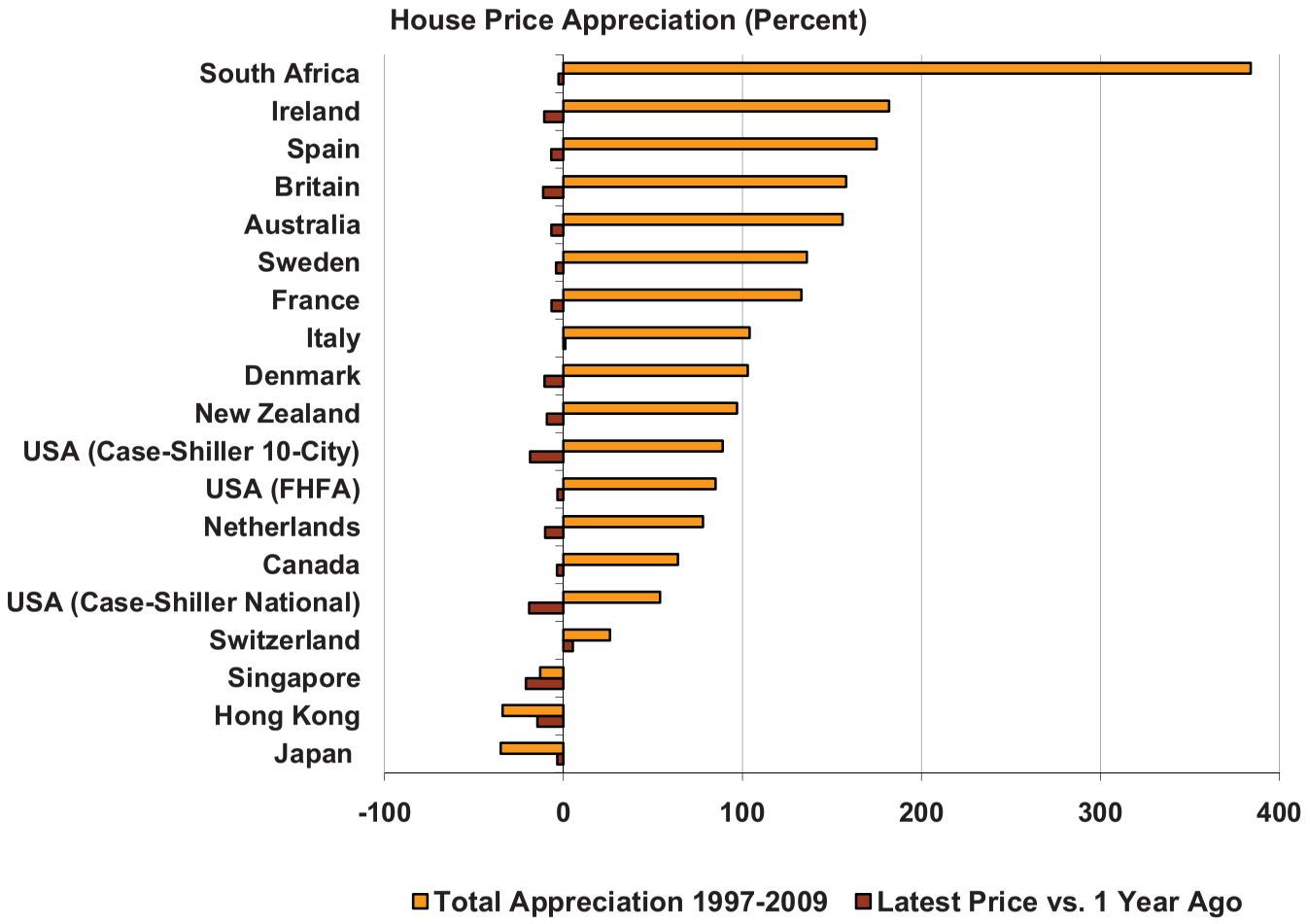

Sources: Federal Housing Finance Agency Purchase Only House Price Index; S& P/Case-Shiller National US Home Price Index; National Association of Realtors® Median Existing Single-Family Home Price.

**Figure 2-3. The Home Equity to Value Ratio Plummeted when Prices Declined after 2006**




Source: Federal Reserve Board Flow of Funds, Balance Sheet of Households and Nonprofit Organizations.

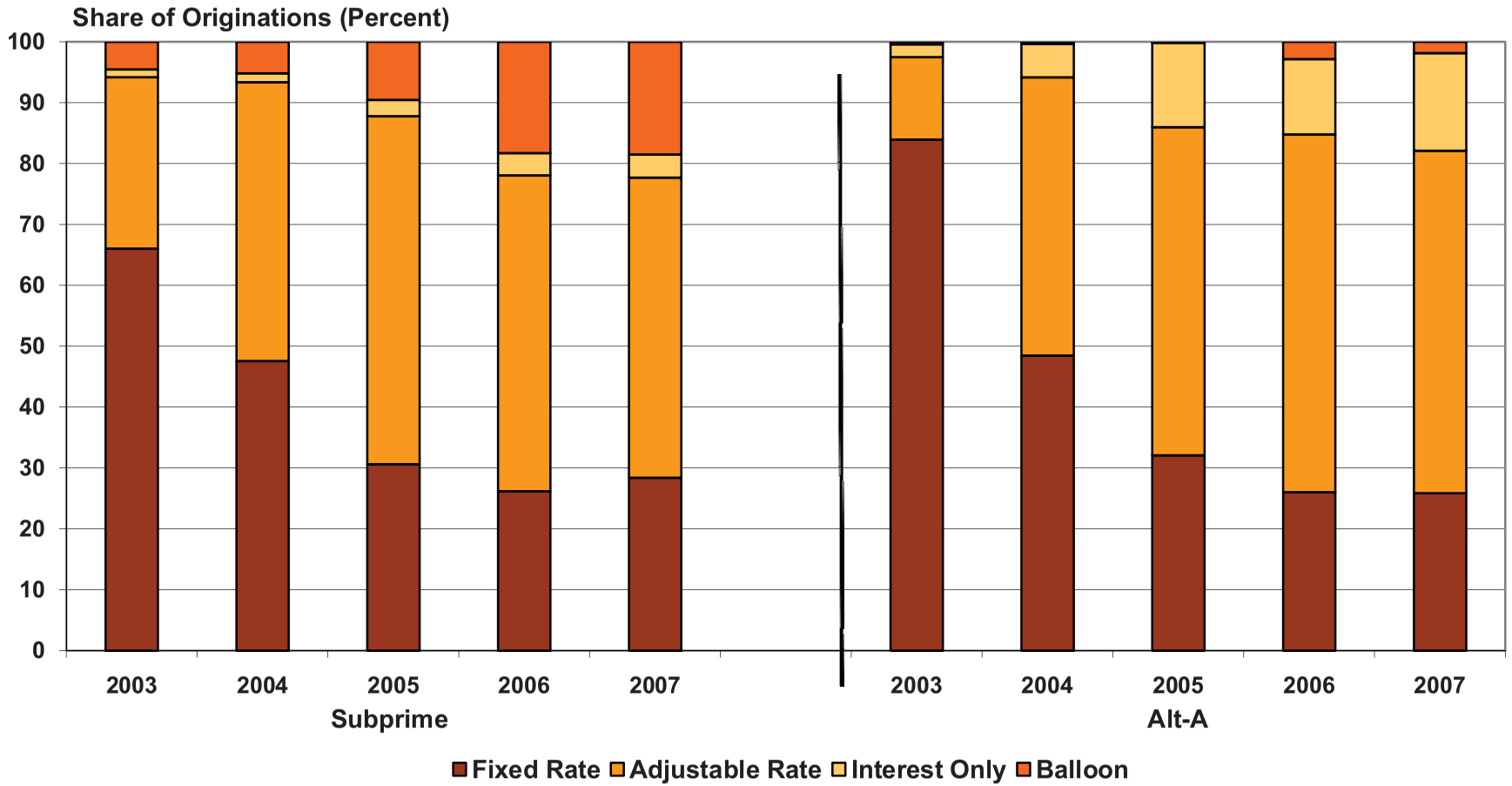
**Figure 2-4. The Explosive Growth in Home Prices Was Not Limited to the US**




Note: Data are as of the first quarter of 2009 or the latest available.

Source: *The Economist,* "Global House Prices," June 4, 2009.

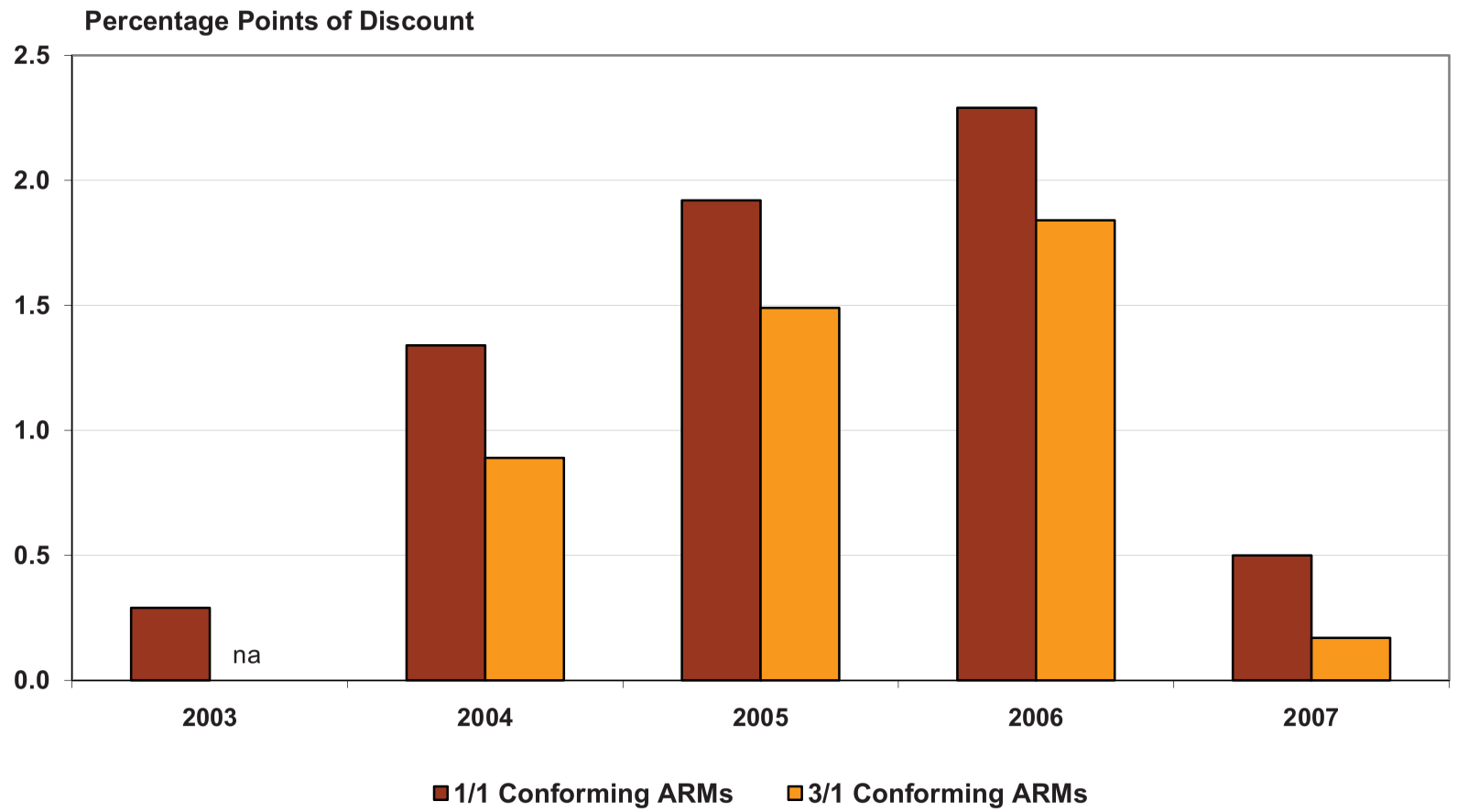
**Figure 2-5. Adjustable Mortgages Made Up a Growing Share of Nonprime Loans**




Note: Adjustable rate mortgages include hybrid loans with initial fixed rates.

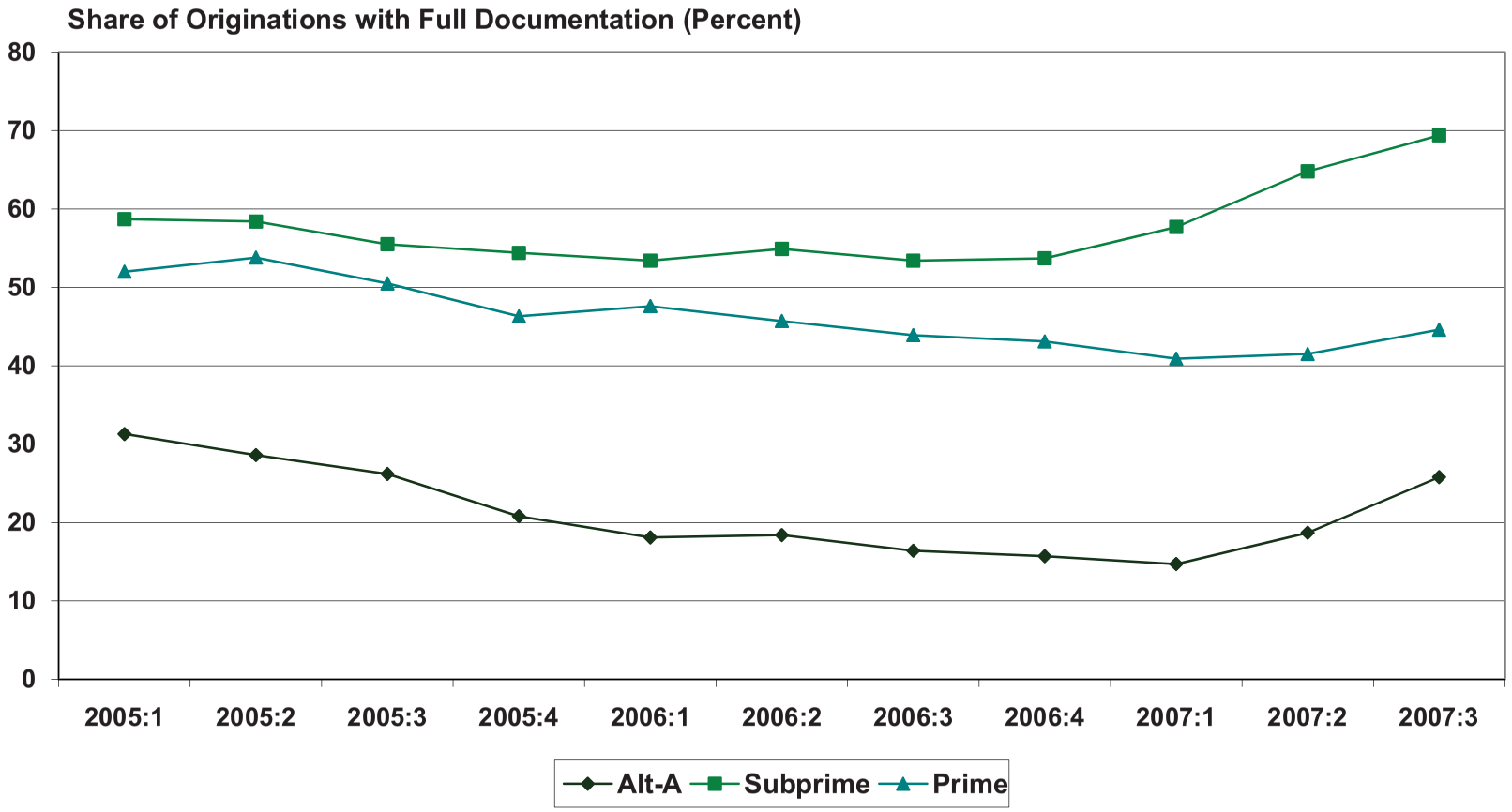
Source: First American CoreLogic, LoanPerformance data.

**Figure 2-6. Initial ARM Discounts Were Steep for a Period of Time**




Source: Freddie Mac, ARM Annual Survey.

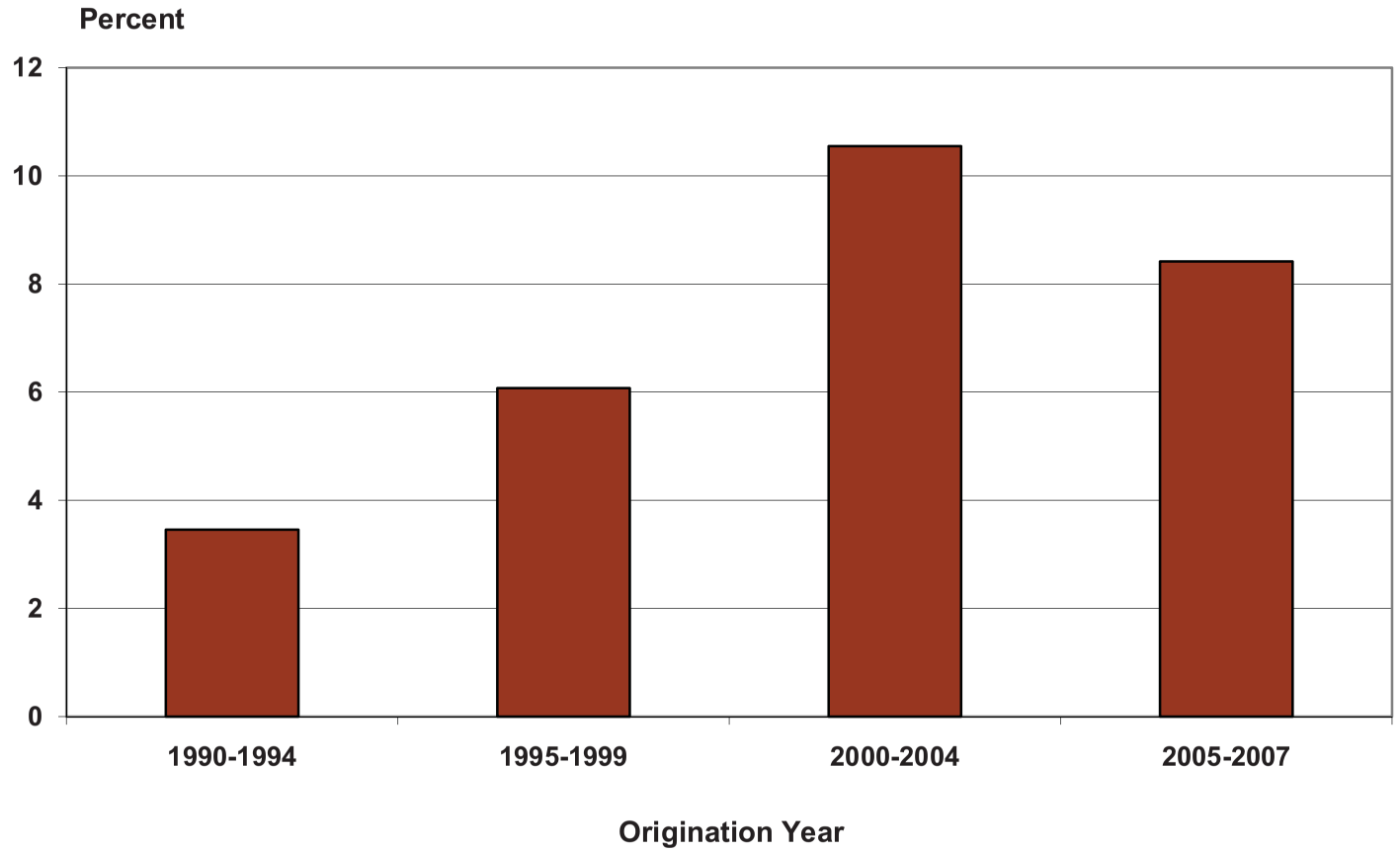
**Figure 2-7. Few Alt-A Loans Had Full Documentation**




Note: Origination share is based on loan volume.

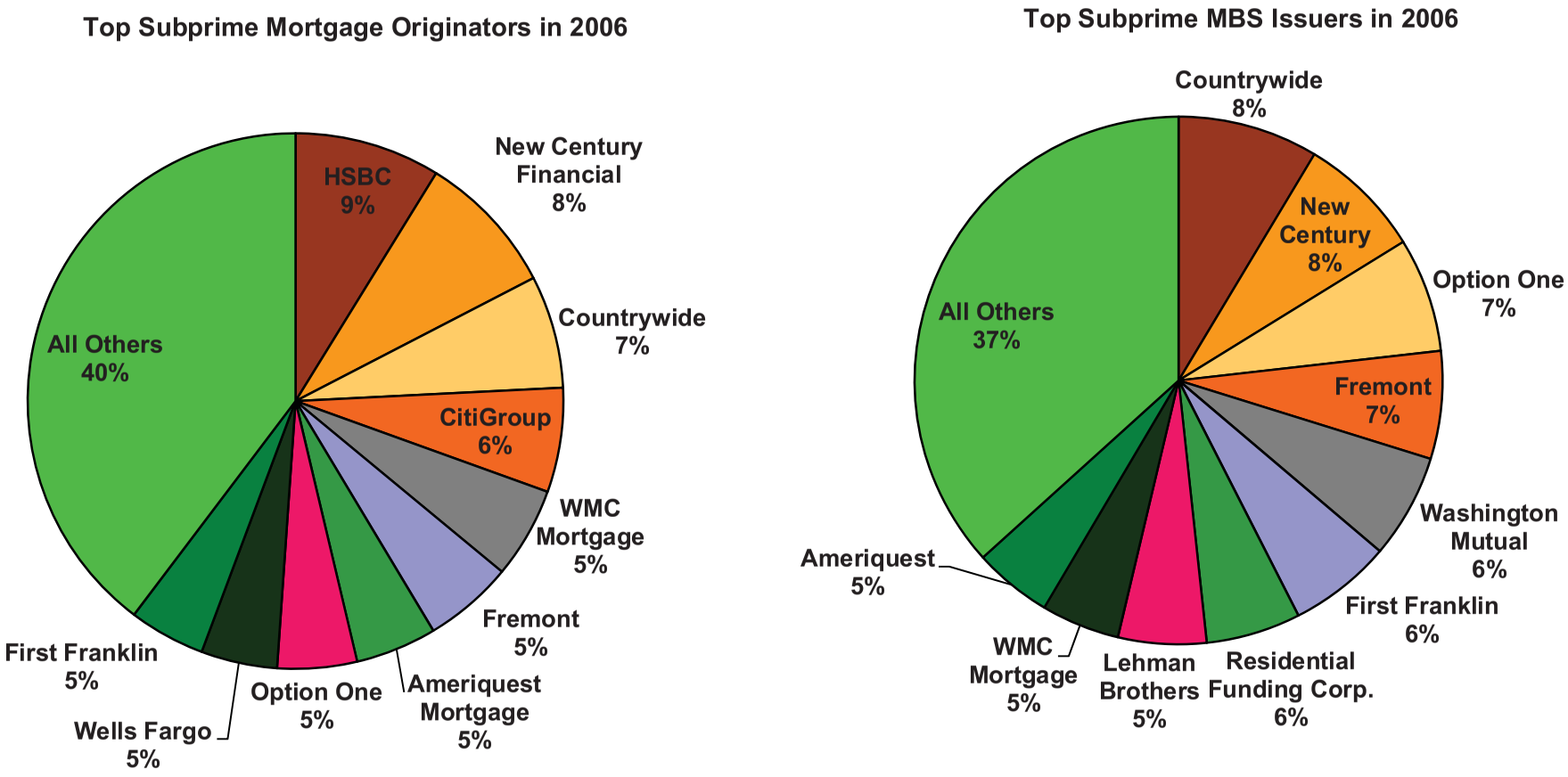
Source: First American CoreLogic, LoanPerformance data.

**Figure 2-8. The Share of Loans in Private Label Securities with CLTV of 90 Percent or Higher Rose Sharply**




Source: First American CoreLogic, LoanPerformance data.

**Figure 2-9. The Top Ten Subprime Originators and Securitizers Captured More than 60 Percent of Each Market**




Note: Market share is measured by loan volume.

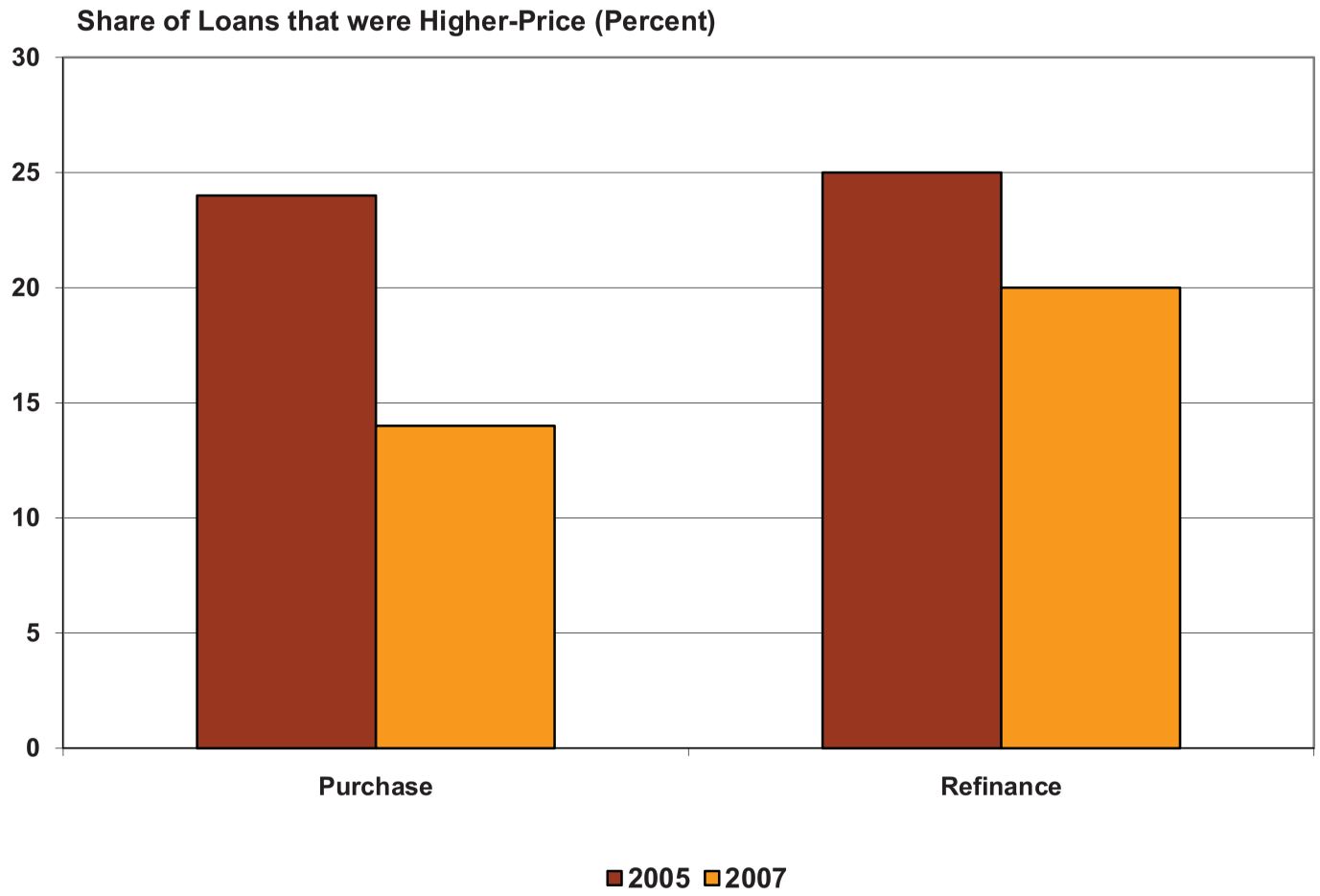
Source: Inside Mortgage Finance, *2007 Mortgage Market Statistical Annual*.

**Figure 3-1. The Composition of HMDA Loan Originations**

| | First Liens | | | | | | | | First Liens with Piggyback Seconds | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Owner Occupied | | | | Non-Owner Occupied | | | | Owner Occupied | | Non-Owner Occupied | |
| | Home Purchase | | Refinance | | Home Purchase | | Refinance | | Home Purchase | | | |
| | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 |
| - - | | | | | | | | | | | | |
| Number of Loans | 4,399,570 | 2,996,552 | 5,117,160 | 3,149,792 | 868,860 | 481,545 | 475,441 | 388,185 | 895,505 | 334,876 | 93,124 | 27,413 |
| Share of Loans (Percent) | | | | | | | | | | | | |
| Conventional 1-4 Family Site Built | 90.3 | 86.8 | 96.5 | 93.8 | 98.9 | 98.5 | 98.9 | 99.1 | 99.9 | 99.9 | 99.9 | 100.0 |
| Government Insured 1-4 Family Site Built | 7.9 | 10.9 | 2.7 | 4.9 | 0.0 | 0.0 | 0.4 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| Manufactured Homes (Conv. and Gov.) | 1.8 | 2.4 | 0.9 | 1.3 | 1.1 | 1.5 | 0.6 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

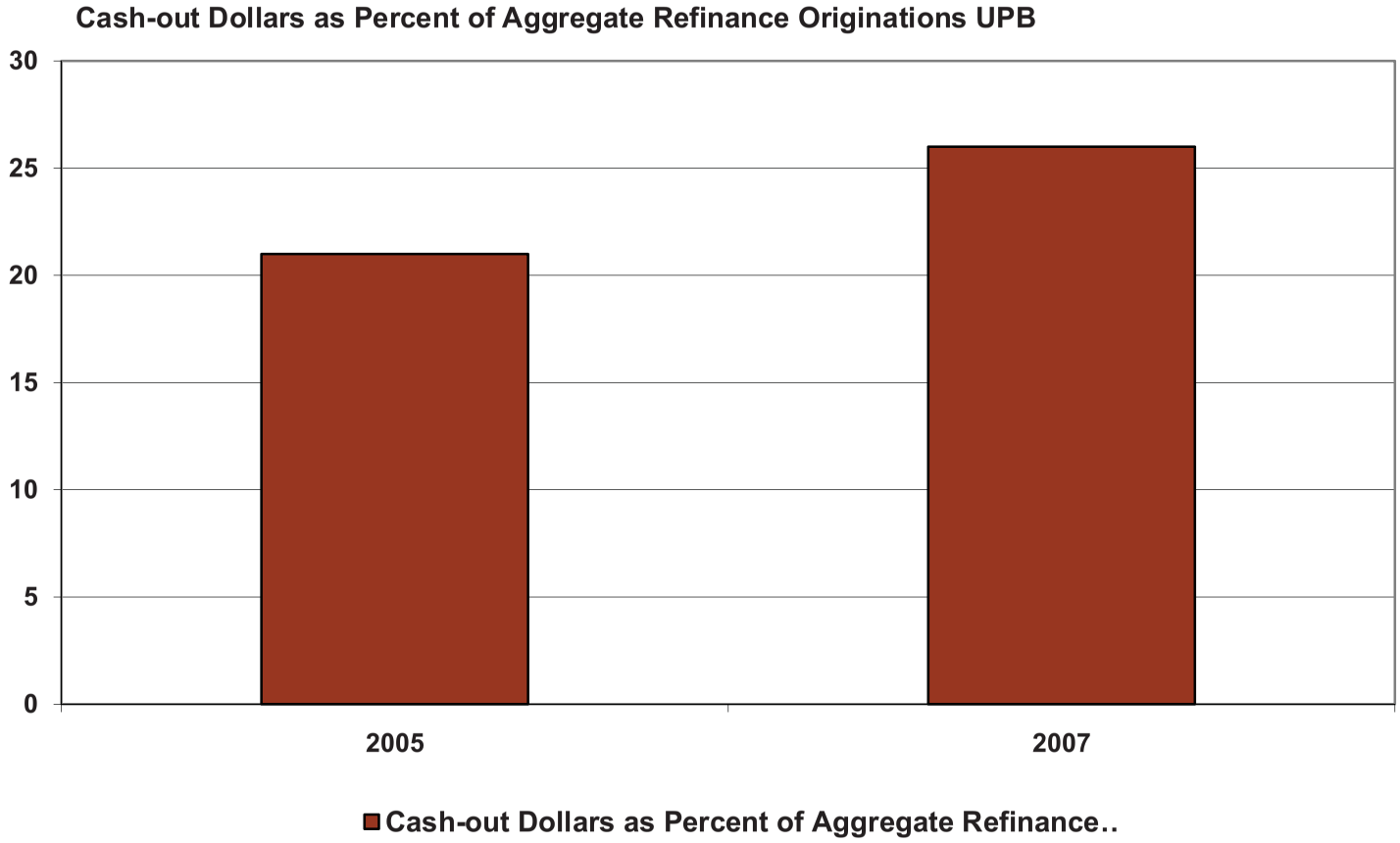
Source: JCHS Enhanced HMDA Database.

**Figure 3-2. Higher-Price Share of Purchase and Refinance Loans**




Source: JCHS Enhanced HMDA Database.

**Figure 3-3. Estimated Total Cash-Out Dollars as a Percentage of Aggregate Refinanced Originations UPB**




Source: Freddie Mac, Estimate excludes FHA/VA and subprime refinance originations.

## Figure 3-4. Risky Lending by Neighborhood Type

| | Owner Occupied First Liens | | All First Liens | | Owner Occupied First Liens | | Non-Owner Occupied First Liens | |
|---|---|---|---|---|---|---|---|---|
| | Higher Price Loan Share | | Non-Owner Occupied Share | | Piggyback Loan Share | | | |
| Percent | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 |
| Low Income | | | | | | | | |
| Predominantly White | 29.7 | 20.1 | 23.6 | 21.8 | 16.9 | 7.9 | 7.7 | 3.4 |
| Mixed race | 34.1 | 18.4 | 27.7 | 24.9 | 25.7 | 12.1 | 10.4 | 5.2 |
| Predominantly Minority | 47.5 | 27.0 | 26.6 | 24.3 | 34.4 | 15.3 | 12.5 | 5.3 |
| Middle Income | | | | | | | | |
| Predominantly White | 19.8 | 11.9 | 16.1 | 14.6 | 16.5 | 9.8 | 7.7 | 5.0 |
| Mixed race | 25.9 | 14.1 | 19.0 | 16.2 | 24.5 | 13.4 | 11.8 | 6.4 |
| Predominantly Minority | 43.0 | 23.8 | 15.4 | 15.0 | 34.7 | 17.0 | 12.9 | 6.2 |
| High Income | | | | | | | | |
| Predominantly White | 10.8 | 6.7 | 13.6 | 11.1 | 14.1 | 11.2 | 8.4 | 5.4 |
| Mixed race | 16.2 | 8.9 | 13.6 | 11.4 | 20.0 | 13.9 | 11.7 | 6.8 |
| Predominantly Minority | 32.5 | 19.2 | 12.5 | 11.2 | 28.0 | 16.9 | 9.9 | 6.2 |

Notes: Includes originations of conventional 1-4 unit home purchase loans. Low income neighborhoods are census tracts with median family income in 2000 that is less than 80% of the 2000 area median family income; while moderate income neighborhoods are census tracts with median family incomes 80-120% of area median and high income neighborhoods are census tracts with median family incomes greater than 120% of area median. Minority neighborhoods are tracts with a minority population share of population greater than 50% in 2000, while mixed neighborhoods are tracts with a 10-50% minority share and white neighborhoods are census tracts with a minority share less than 10%.

Source: JCHS Enhanced HMDA Database.

**Figure 3-5. Distribution of Loan Types by Neighborhood Type (Percent)**

| | First Liens | | | | | | First Liens with Piggyback Seconds | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Owner Occupied | | | | Non-Owner Occupied | | Owner Occupied | | Non-Owner Occupied | |
| | High Cost | | Low Cost | | All Loans | | All Loans | | All Loans | |
| Share of Loans (Percent) | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 |
| Low Income | | | | | | | | | | |
| Predominantly White | 1.6 | 2.0 | 1.2 | 1.2 | 1.9 | 2.1 | 1.0 | 0.8 | 1.3 | 1.2 |
| Mixed race | 7.9 | 7.8 | 5.0 | 5.4 | 10.1 | 10.4 | 6.5 | 5.4 | 9.7 | 9.4 |
| Predominantly Minority | 17.2 | 15.9 | 6.2 | 6.7 | 14.9 | 14.0 | 13.6 | 9.5 | 17.2 | 12.9 |
| Middle Income | | | | | | | | | | |
| Predominantly White | 12.2 | 14.4 | 16.1 | 16.7 | 13.4 | 15.3 | 11.1 | 12.5 | 9.6 | 13.2 |
| Mixed race | 26.4 | 25.6 | 24.6 | 24.3 | 27.1 | 26.0 | 27.3 | 25.5 | 29.6 | 28.6 |
| Predominantly Minority | 11.8 | 9.9 | 5.1 | 4.9 | 5.7 | 5.4 | 10.4 | 7.4 | 6.8 | 5.8 |
| High Income | | | | | | | | | | |
| Predominantly White | 5.9 | 7.3 | 15.9 | 15.8 | 9.8 | 10.0 | 8.4 | 12.7 | 7.6 | 9.3 |
| Mixed race | 14.1 | 14.3 | 23.9 | 23.1 | 15.7 | 15.4 | 19.1 | 23.6 | 17.0 | 18.1 |
| Predominantly Minority | 2.9 | 2.7 | 2.0 | 1.8 | 1.5 | 1.3 | 2.8 | 2.5 | 1.3 | 1.4 |
| | | | | | | | | | | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Notes: Includes originations of conventional 1-4 unit home purchase loans. Low income neighborhoods are census tracts with median family income in 2000 that is less than 80% of the 2000 area median family income; while moderate income neighborhoods are census tracts with median family incomes 80-120% of area median and high income neighborhoods are census tracts with median family incomes greater than 120% of area median. Minority neighborhoods are tracts with a minority population share of population greater than 50% in 2000, while mixed neighborhoods are tracts with a 10-50% minority share and white neighborhoods are census tracts with a minority share less than 10%.

Source: JCHS Enhanced HMDA Database.

**Figure 3-6. Distribution of Loan Types by Lender Type (Percent)**

| | First Liens | | | | | | First Liens with Piggyback Seconds | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Owner-Occupied | | | | Non-Owner Occupied | | Owner Occupied | | Non-Owner Occupied | |
| | High Cost | | Low Cost | | All Loans | | All Loans | | All Loans | |
| **Share of Loans (Percent)** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** |
| **Independent Mortgage Companies** | 68.7 | 36.0 | 39.0 | 31.1 | 42.7 | 26.9 | 62.7 | 37.0 | 58.1 | 46.4 |
| **CRA Lenders Outside Assessment Areas** | 26.6 | 44.1 | 28.6 | 27.8 | 29.7 | 32.7 | 26.8 | 32.8 | 31.5 | 29.5 |
| **CRA Lenders in Assessment Areas** | 4.5 | 19.4 | 29.5 | 37.2 | 6.8 | 39.1 | 10.2 | 29.2 | 10.0 | 23.8 |
| **Credit Unions** | 0.2 | 0.5 | 2.8 | 3.8 | 0.8 | 1.3 | 0.3 | 1.0 | 0.5 | 0.3 |
| **Total** | 100.0 | 100.0 | 100.0 | 100.0 | 00.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Notes: Includes originations of 1-4 unit conventional home purchase loans.

Source: JCHS Enhanced HMDA Database.

**Figure 3-7. Market Share of In-Assessment-Area Lending by CRA Lenders Within CRA Assessment Areas, by Loan and Neighborhood Type (Percent of Loans Originated)**

| | Owner-Occupied | | | | Non-Owner Occupied | | Owner Occupied | | Non-Owner Occupied | |
|---|---|---|---|---|---|---|---|---|---|---|
| | High Cost | | Low Cost | | All Loans | | Loans with Piggybacks | | | |
| **Percent** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** |
| **Low Income** | | | | | | | | | | |
| **Predominantly White** | 7.3 | 21.8 | 31.6 | 37.7 | 32.9 | 43.2 | 9.0 | 29.2 | 9.3 | 19.5 |
| **Mixed race** | 4.1 | 17.8 | 28.7 | 38.1 | 27.1 | 39.3 | 7.7 | 30.0 | 7.9 | 20.8 |
| **Predominantly Minority** | 3.7 | 18.9 | 29.4 | 44.2 | 21.6 | 38.0 | 7.7 | 30.0 | 7.9 | 20.8 |
| **Middle Income** | | | | | | | | | | |
| **Predominantly White** | 6.3 | 20.2 | 32.2 | 37.1 | 32.0 | 40.5 | 13.4 | 29.4 | 11.2 | 26.8 |
| **Mixed race** | 4.1 | 18.1 | 27.3 | 35.1 | 25.8 | 37.5 | 9.5 | 27.4 | 10.0 | 22.6 |
| **Predominantly Minority** | 3.7 | 19.4 | 27.6 | 39.6 | 23.3 | 38.8 | 5.7 | 26.2 | 9.7 | 20.8 |
| **High Income** | | | | | | | | | | |
| **Predominantly White** | 6.0 | 21.0 | 31.2 | 36.5 | 30.4 | 40.0 | 17.7 | 31.1 | 13.6 | 26.7 |
| **Mixed race** | 4.5 | 21.0 | 29.4 | 37.1 | 26.8 | 39.8 | 12.9 | 29.9 | 10.1 | 26.6 |
| **Predominantly Minority** | 3.9 | 20.8 | 29.6 | 39.1 | 30.9 | 45.2 | 6.2 | 25.2 | 13.2 | 24.2 |
| **Total Market Share of CRA Lenders in Assessment Areas** | **4.5** | **19.4** | **29.5** | **37.2** | **26.8** | **39.1** | **10.2** | **29.2** | **10.0** | **23.8** |

Notes: Includes originations of conventional 1-4 unit home purchase loans. Low income neighborhoods are census tracts with median family income in 2000 that is less than 80% of the 2000 area median family income; while moderate income neighborhoods are census tracts with median family incomes 80-120% of area median and high income neighborhoods are census tracts with median family incomes greater than 120% of area median. Minority neighborhoods are tracts with a minority population share of population greater than 50% in 2000, while mixed neighborhoods are tracts with a 10-50% minority share and white neighborhoods are census tracts with a minority share less than 10%. Numbers in the table should be read, for example, as: 'In-assessment-area lending by CRA lenders accounted for 7.3 percent of all high-cost, owner occupied loans originated in predominantly white neighborhoods in 2005, increasing to 21.8 percent in 2007.'

Source: JCHS Enhanced HMDA Database.

**Figure 3-8. Distribution of Secondary Market Sales by Purchaser (Percent)**

| | First Liens | | | | | | First Liens with Piggyback Seconds | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Owner-Occupied | | | | Non-Owner Occupied | | Owner Occupied | | Non-Owner Occupied | |
| | High Cost | | Low Cost | | All Loans | | All Loans | | All Loans | |
| **Share of Loans (Percent)** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** | **2005** | **2007** |
| **Loan Not Sold Year Closed** | **17.6** | **21.6** | **21.2** | **23.6** | **28.2** | **34.9** | **15.9** | **14.4** | **13.9** | **13.7** |
| **Fannie Mae or Freddie Mac** | 3.1 | 22.3 | 30.0 | 36.7 | 19.7 | 29.3 | 7.7 | 31.5 | 8.1 | 31.2 |
| **Private Securitization** | 15.4 | 5.1 | 4.3 | 1.4 | 6.5 | 2.0 | 12.4 | 3.3 | 6.3 | 3.4 |
| **Other Private Conduit** | 33.0 | 10.2 | 18.6 | 12.7 | 19.8 | 9.4 | 33.7 | 15.3 | 35.6 | 17.0 |
| **Commercial Bank or Savings Bank/Association** | 5.7 | 4.3 | 5.2 | 5.3 | 4.8 | 4.0 | 6.0 | 6.2 | 4.3 | 4.7 |
| **Other Purchasers** | 25.3 | 36.4 | 20.7 | 20.2 | 21.0 | 20.5 | 24.3 | 29.3 | 31.8 | 30.0 |
| **Total** | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Notes: Includes originations of 1-4 unit conventional home purchase loans. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

Source: JCHS Enhanced HMDA Database.

**Figure 3-9. Share of Loans Sold to Private Securitizations and Other Private Conduits, by Loan and Neighborhood Type (Percent)**

| | Owner-Occupied First Liens | | | | Non-Owner Occupied First Liens | | Owner Occupied First Liens | | Non-Owner Occupied First Liens | |
|---|---|---|---|---|---|---|---|---|---|---|
| | High Cost Loans | | Low Cost Loans | | All Loans | | Loans with Piggybacks | | | |
| Percent | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 |
| Low Income | | | | | | | | | | |
| Predominantly White | 44.4 | 11.8 | 17.3 | 13.6 | 18.6 | 8.7 | 44.6 | 16.2 | 38.6 | 20.1 |
| Mixed race | 47.0 | 14.4 | 22.5 | 14.4 | 25.2 | 10.7 | 47.9 | 18.6 | 40.9 | 21.6 |
| Predominantly Minority | 48.5 | 15.7 | 26.3 | 12.5 | 30.8 | 12.3 | 50.5 | 18.9 | 46.3 | 25.2 |
| Middle Income | | | | | | | | | | |
| Predominantly White | 44.7 | 12.4 | 17.9 | 13.8 | 19.6 | 9.4 | 40.3 | 15.7 | 35.8 | 15.6 |
| Mixed race | 48.5 | 15.8 | 24.1 | 14.7 | 27.0 | 11.9 | 46.8 | 19.5 | 41.6 | 21.3 |
| Predominantly Minority | 50.8 | 17.2 | 29.5 | 14.1 | 32.6 | 12.6 | 52.2 | 21.1 | 47.0 | 25.5 |
| High Income | | | | | | | | | | |
| Predominantly White | 45.6 | 14.6 | 19.5 | 13.8 | 22.1 | 10.8 | 36.6 | 16.8 | 37.0 | 16.5 |
| Mixed race | 50.5 | 17.1 | 24.9 | 14.5 | 28.6 | 12.3 | 44.6 | 19.3 | 42.5 | 18.9 |
| Predominantly Minority | 52.4 | 17.2 | 28.0 | 14.1 | 28.2 | 11.3 | 51.9 | 20.1 | 40.8 | 18.7 |

Notes: Includes originations of conventional 1-4 unit home purchase loans. Low income neighborhoods are census tracts with median family income in 2000 that is less than 80% of the 2000 area median family income; while moderate income neighborhoods are census tracts with median family incomes 80-120% of area median and high income neighborhoods are census tracts with median family incomes greater than 120% of area median. Minority neighborhoods are tracts with a minority population share of population greater than 50% in 2000, while mixed neighborhoods are tracts with a 10-50% minority share and white neighborhoods are census tracts with a minority share less than 10%.

Source: JCHS Enhanced HMDA Database.

## Figure 3-10. Concentration of Lending by Type of Loan

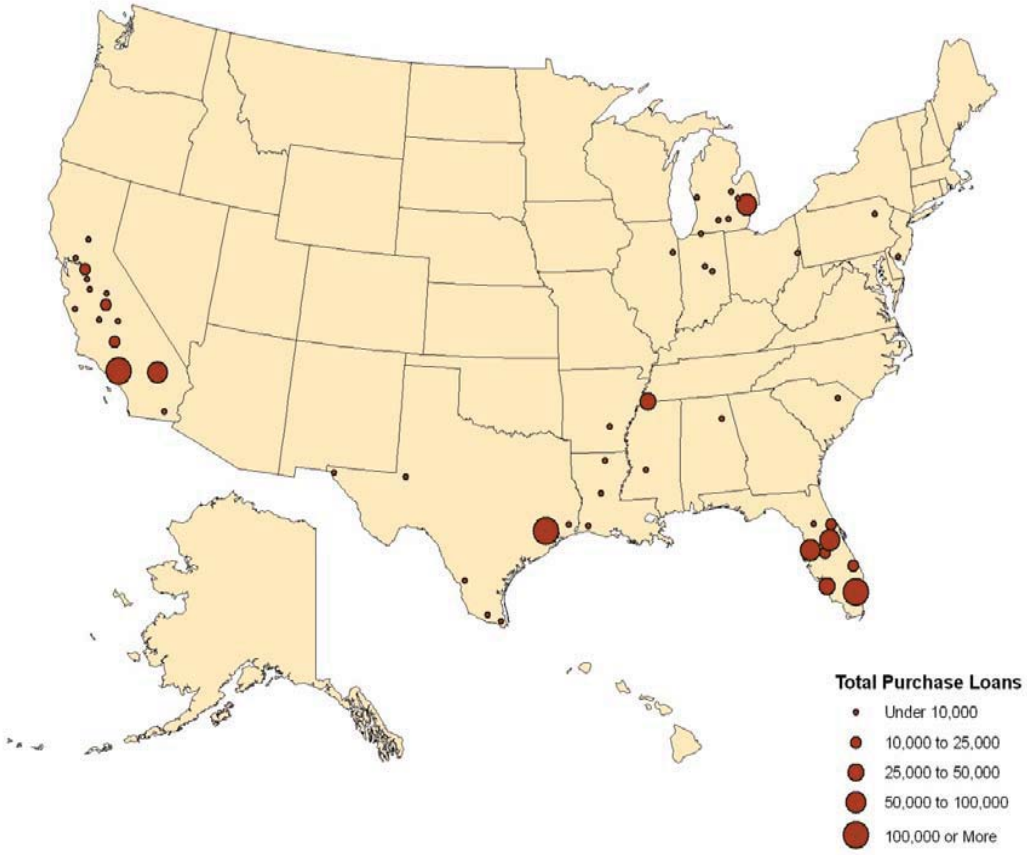
| | First Liens | | | | | | First Liens with Piggyback Seconds | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Owner-Occupied | | | | Non-Owner Occupied | | Owner Occupied | | Non-Owner Occupied | |
| | High Cost | | Low Cost | | All Loans | | All Loans | | All Loans | |
| | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 | 2005 | 2007 |
| **Number of Loans** | 976,645 | 351,373 | 2,995,278 | 2,248,679 | 858,989 | 474,276 | 894,925 | 334,465 | 93,074 | 27,407 |
| **Share of Loans (Percent)** | | | | | | | | | | |
| **Top 10 Lenders** | 29.7 | 36.1 | 36.5 | 47.1 | 34.5 | 43.8 | 24.6 | 44.9 | 6.6 | 48.8 |
| **Next 40 Lenders** | 48.0 | 38.9 | 26.1 | 22.1 | 28.7 | 20.9 | 43.1 | 27.5 | 46.9 | 23.6 |
| **Rest of Lenders** | 22.3 | 24.9 | 37.5 | 30.8 | 36.8 | 35.3 | 32.3 | 27.6 | 46.5 | 27.6 |
| **Total** | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Notes: Includes originations of 1-4 unit conventional home purchase loans.

Source: JCHS Enhanced HMDA Database.

**Figure 3-11. Places with the Highest Share of Higher-Price Loans Were in California, the South and Southeast, and the Rustbelt**

**Top 50 Metros Ranked by Higher-Price Loan Share of Originations in 2006 (Ranging From 30% to 46%)**

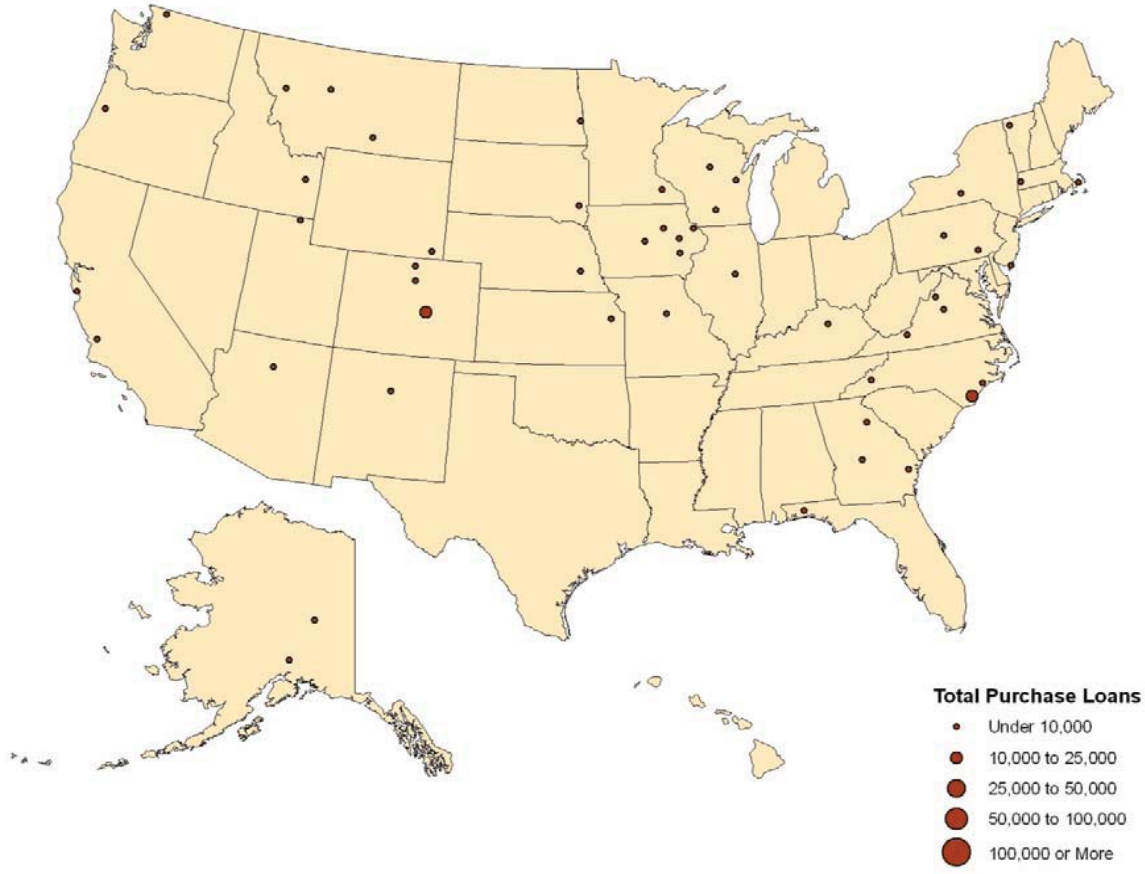



Notes: Includes first lien home purchase loans originated in 2006. Map shows the 50 metropolitan areas, out of 361 total, with the highest shares of loans with an APR at least 3 percentage points above a Treasury security of comparable maturity.

Source: JCHS Enhanced HMDA Database, 2006.

## Figure 3-12. Higher Price Loans Were Less Common in the North

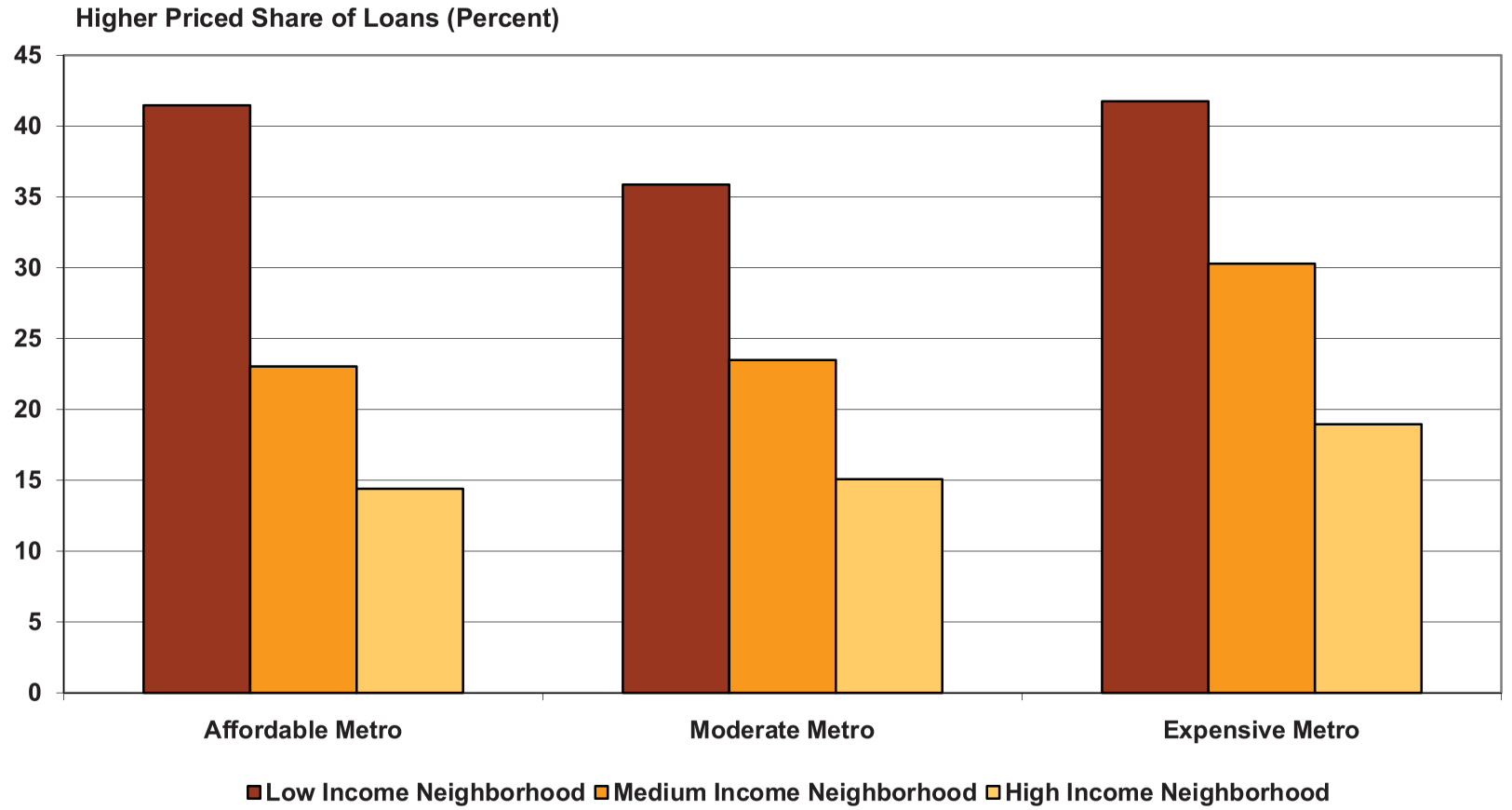
**50 Metros with the Lowest Higher-Priced Loan Shares of Originations in 2006 (Ranging from 7% to 15%)**




Notes: Includes first lien home purchase loans originated in 2006. Map shows the 50 metropolitan areas, out of 361 total, with the lowest shares of loans with an APR at least 3 percentage points above a Treasury security of comparable maturity.

Source: JCHS Enhanced HMDA Database, 2006.

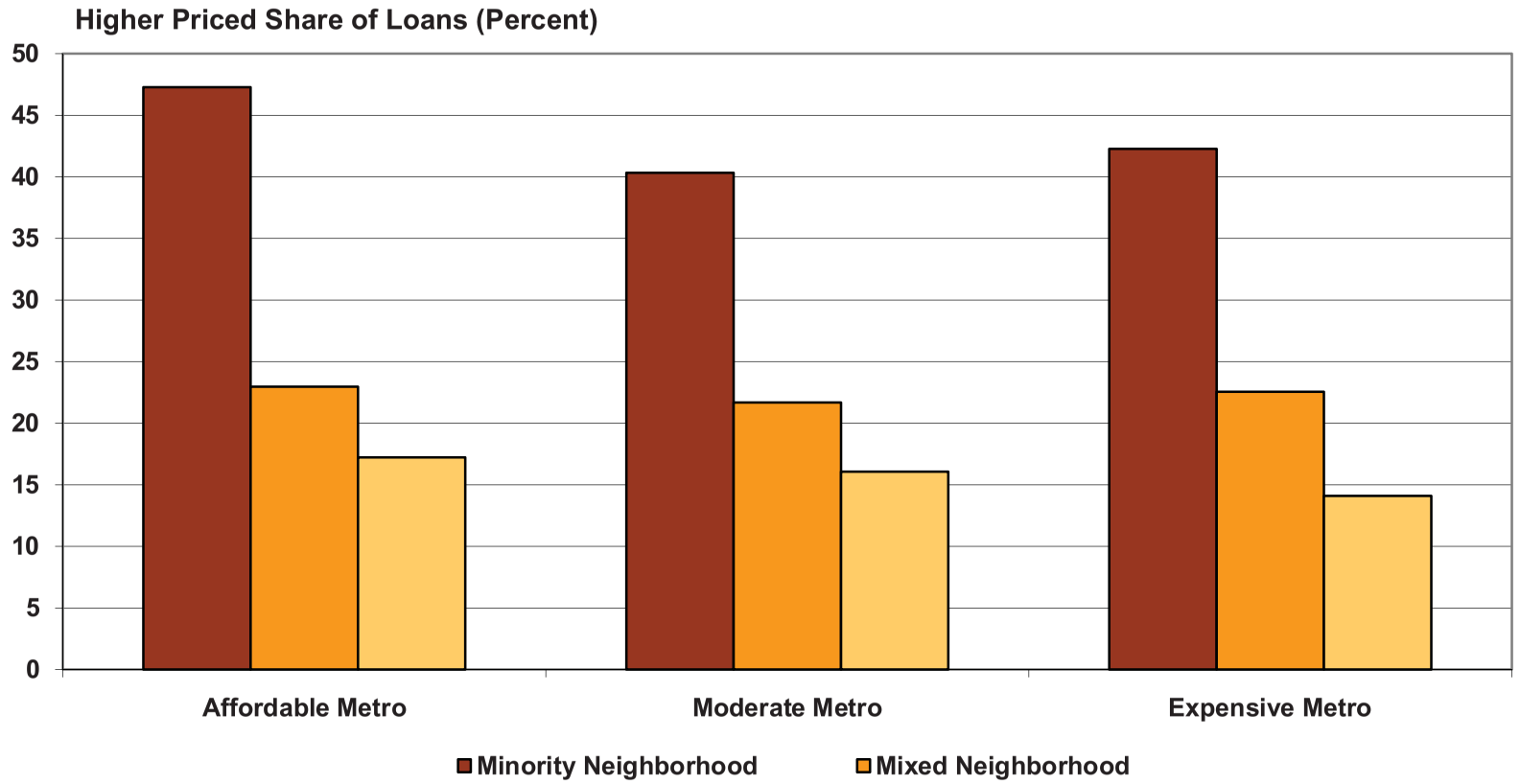
**Figure 3-13. Higher Priced Loans Were Common in Low Income Areas Independent of Housing Affordability**




Note: Includes first lien home purchase loans originated in 2006, and excludes manufactured homes. Affordable metro areas are those where median house sales prices were less than 3 times median household incomes. House prices in moderate metro areas were 3-6 times incomes, and house prices in expensive metros were more than 6 times incomes.

Sources: JCHS Enhanced HMDA Database, 2006, and Moody's Economy.com estimates of median house price and household income.

**Figure 3-14. Higher Priced Loans Were Also More Common in Minority Neighborhoods Regardless of Affordability**

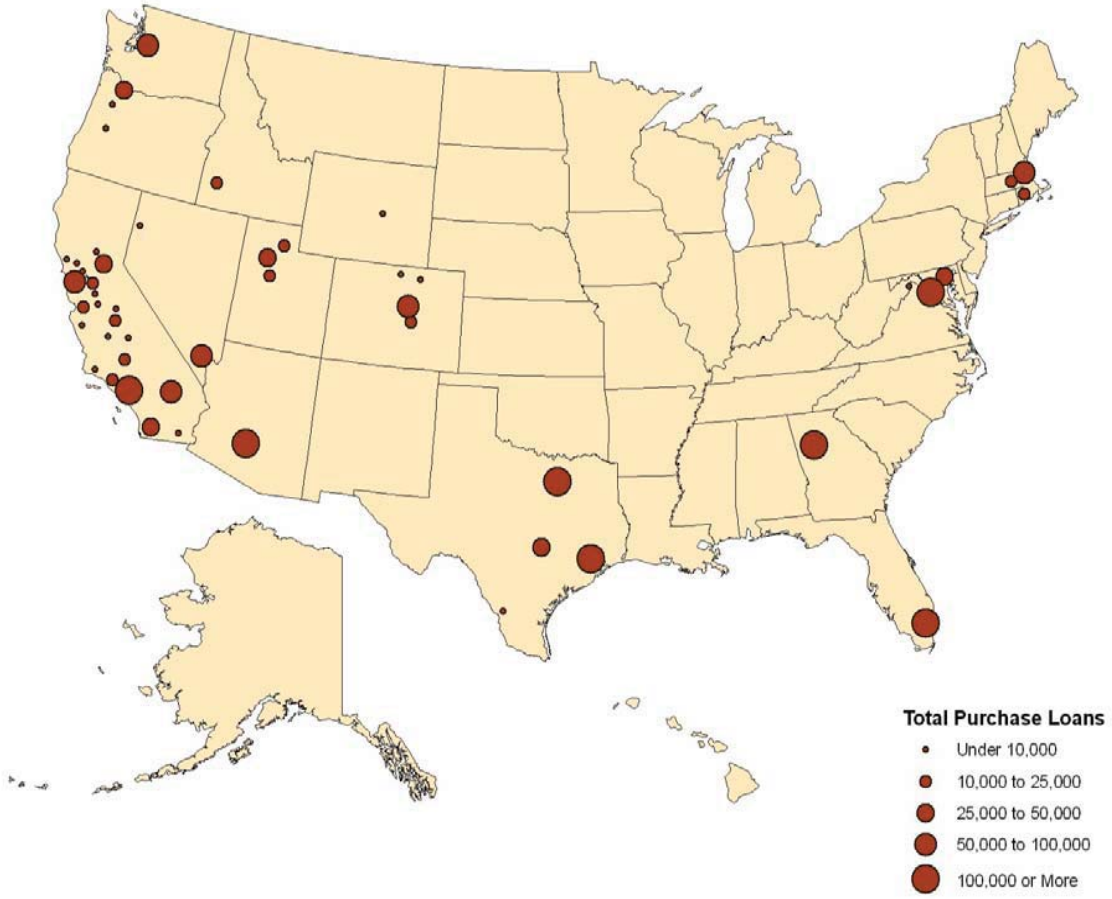



Note: Includes first lien home purchase loans originated in 2006, and excludes manufactured homes. Affordable metro areas are those where median house sales prices were less than 3 times median household incomes. House prices in moderate metro areas were 3-6 times incomes, and house prices in expensive metros were more than 6 times incomes. Minority neighborhoods are defined as census tracts with a minority share of the population greater than 50%. Mixed neighborhoods are 10-50% minority, and white neighborhoods are less than 10% minority.

Sources: JCHS Enhanced HMDA Database, 2006, and Moody's Economy.com estimates of median house price and household income.

**Figure 3-15. Not All Areas with Substantial Higher Priced Lending Also Had High Piggyback Loan Shares**

**Top 50 Metros Ranked by Share of Originations with Piggyback Loans in 2006 (Ranging from 31% to 56%)**

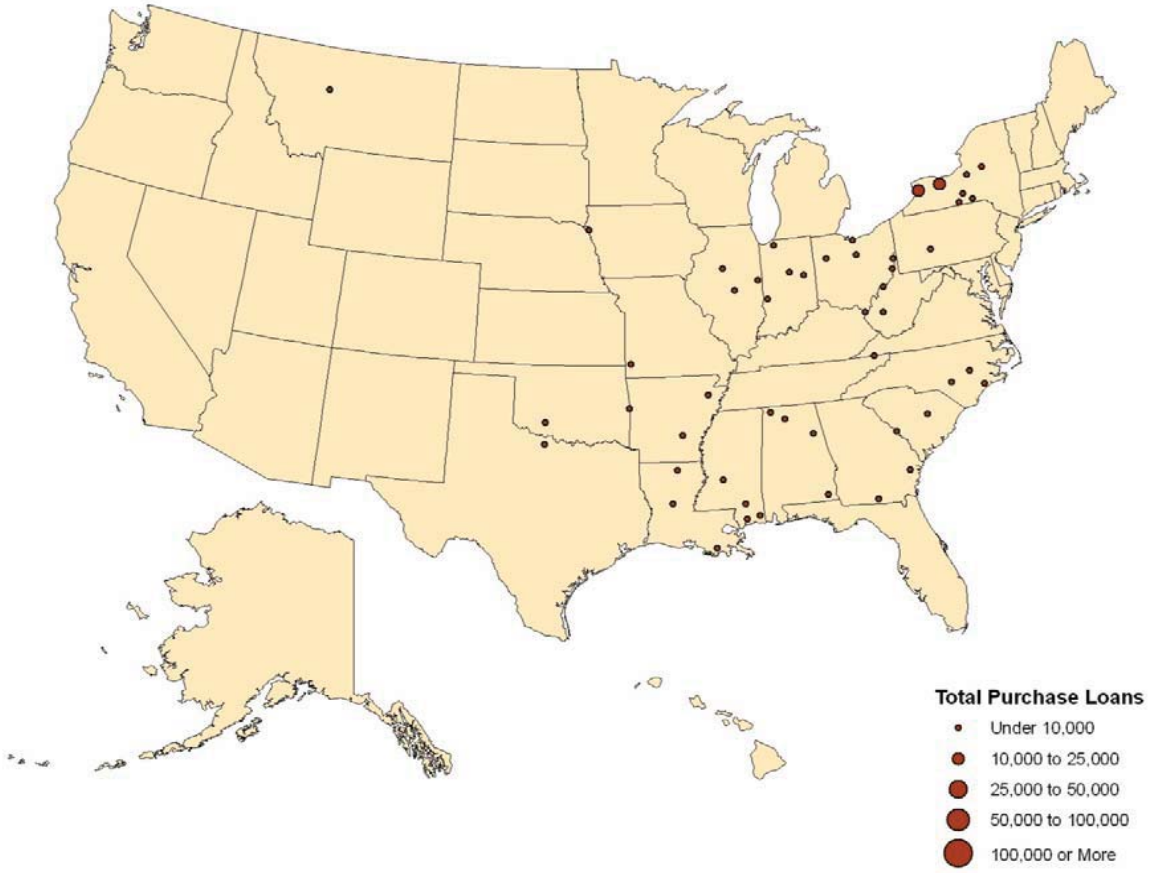



Note: Includes home purchase loans originated in 2006. Map shows the 50 metropolitan areas, out of 361 total, with the highest share of subordinate liens relative to first liens.

Source: JCHS Enhanced HMDA Database, 2006.

**Figure 3-16. Piggyback Lending Shares Were Lowest Away from the West and Expensive Coastal Metros**

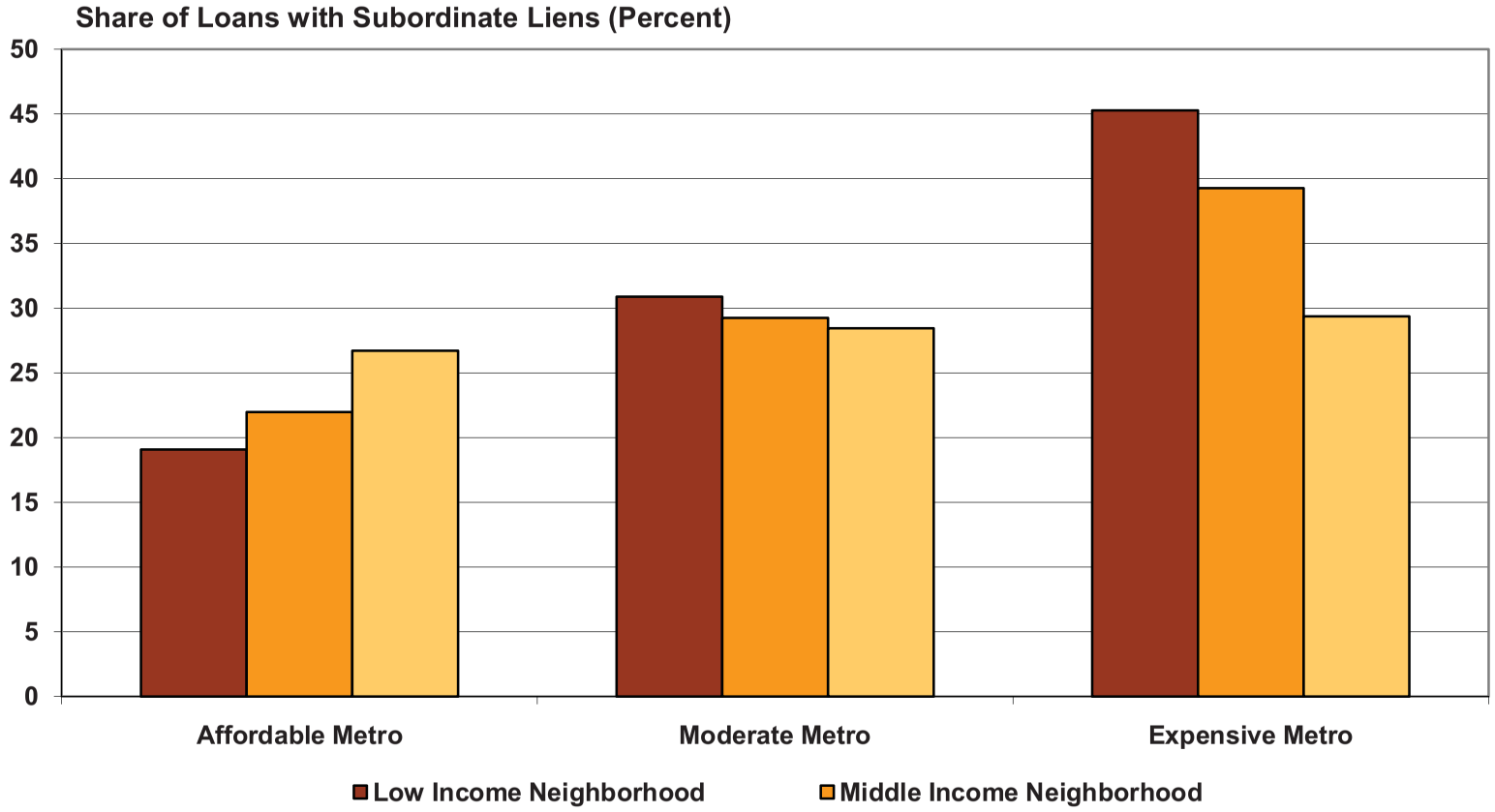
**50 Metros with Lowest Piggyback Loan Shares of Originations in 2006 (Ranging from 4% to 11%)**




Note: Includes home purchase loans originated in 2006. Map shows the 50 metropolitan areas, out of 361 total, with the lowest share of subordinate liens relative to first liens.

Source: JCHS Enhanced HMDA Database, 2006.

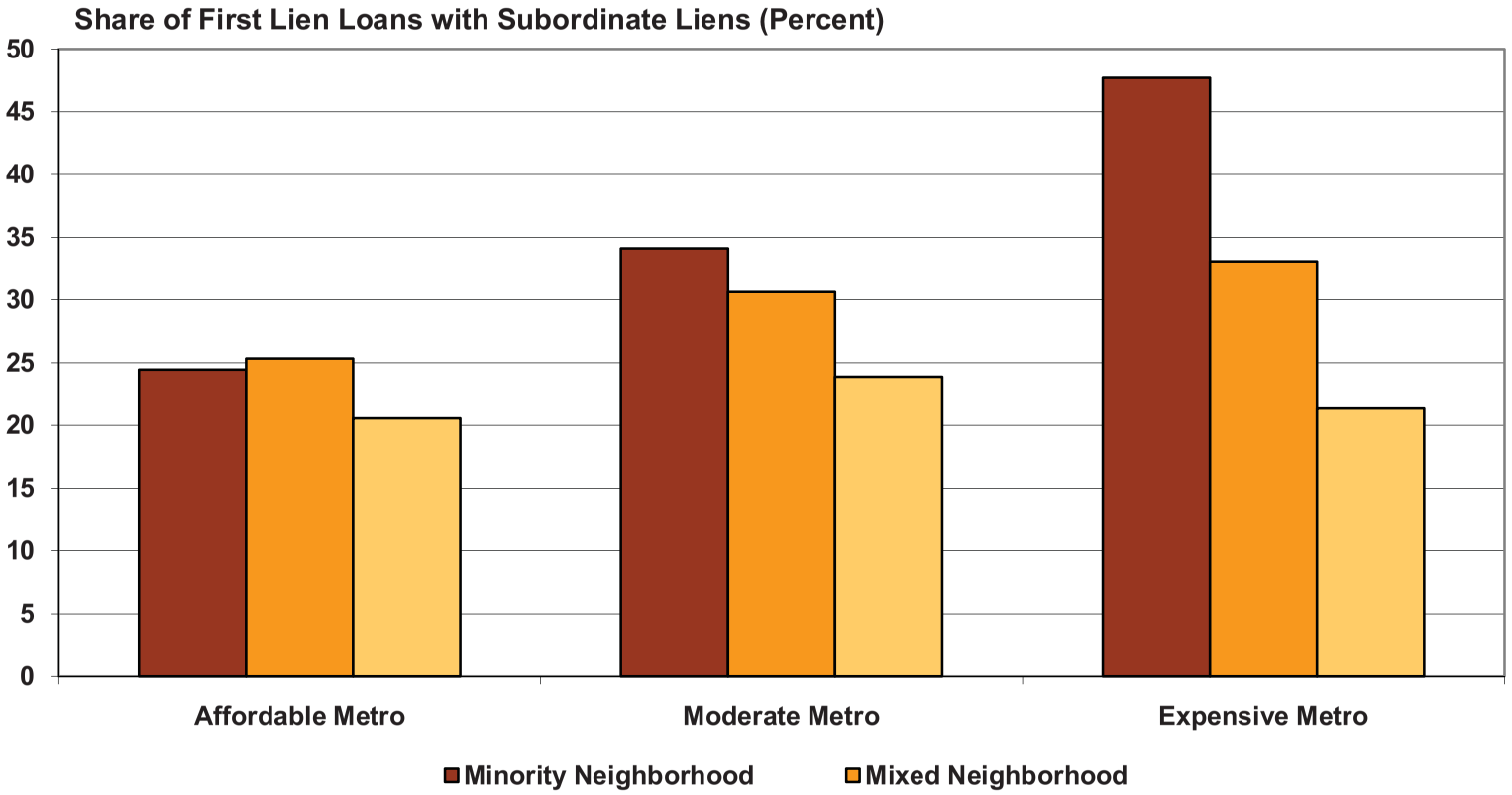
**Figure 3-17. Piggyback Home Purchase Loans Were Especially Common in the Lowest Income Neighborhoods in the Most Expensive Metropolitan Areas**




Notes: Includes home purchase loans originated in 2006 and excludes manufactured homes. Low income neighborhoods are defined as census tracts with a median family income less than 80% of the area median. Moderate income neighborhoods have median family incomes that are 80-120%, and high income neighborhoods greater than 120%, of the area median.

Source: JCHS Enhanced HMDA Database, 2006.

**Figure 3-18. Piggyback Loans Were Also Common in Minority Neighborhoods in Expensive Metros**

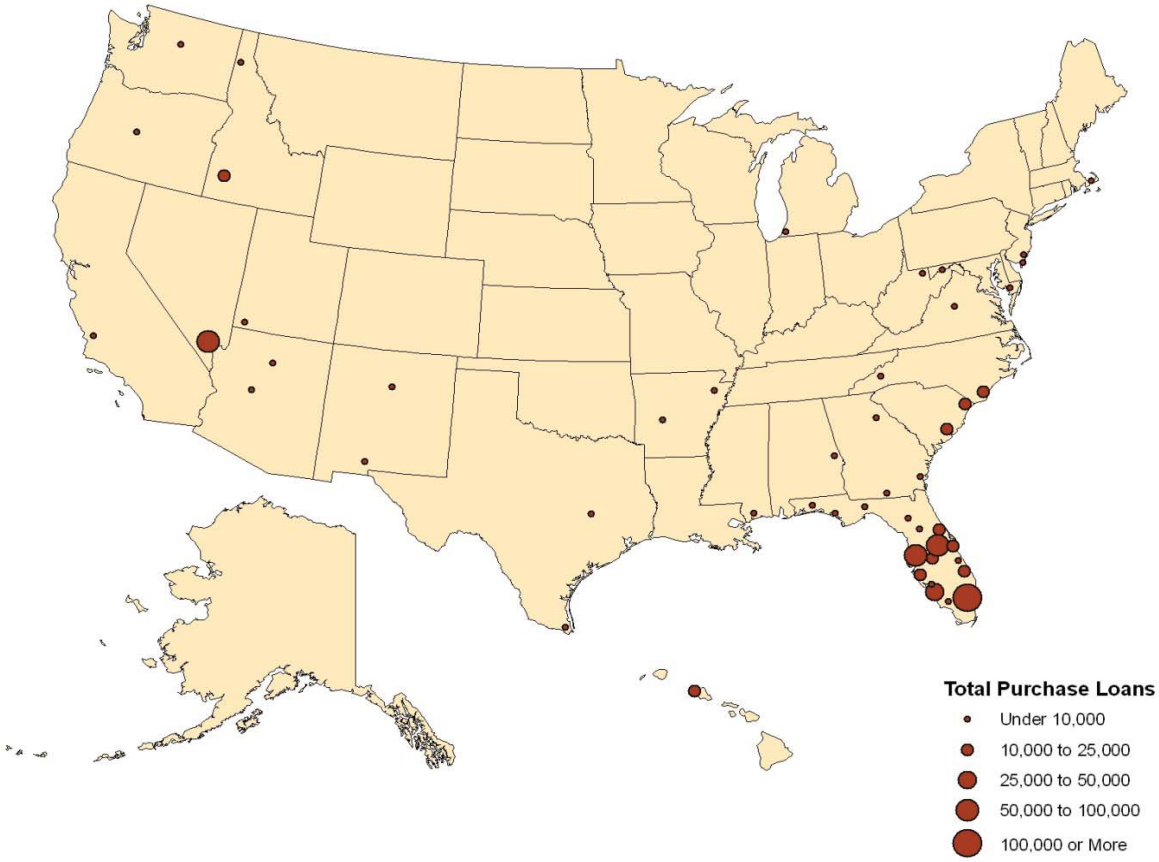



Notes: Includes home purchase loans originated in 2006 and excludes manufactured homes. Low income neighborhoods are defined as census tracts with a median family income less than 80% of the area median. Moderate income neighborhoods have median family incomes that are 80-120%, and high income neighborhoods greater than 120%, of the area median. Minority neighborhoods are defined as census tracts with a minority share of the population greater than 50%. Mixed neighborhoods are 10-50% minority, and white neighborhoods are less than 10% minority.

Source: JCHS Enhanced HMDA Database, 2006.

**Figure 3-19. Non-Owner Occupant Loans Are Concentrated in Florida and Other Traditional Second Home Destinations**

**Top 50 Metros Ranked by Share of Non-Owner Occupant Loan Originations in 2006 (Ranging from 23% to 70%)**

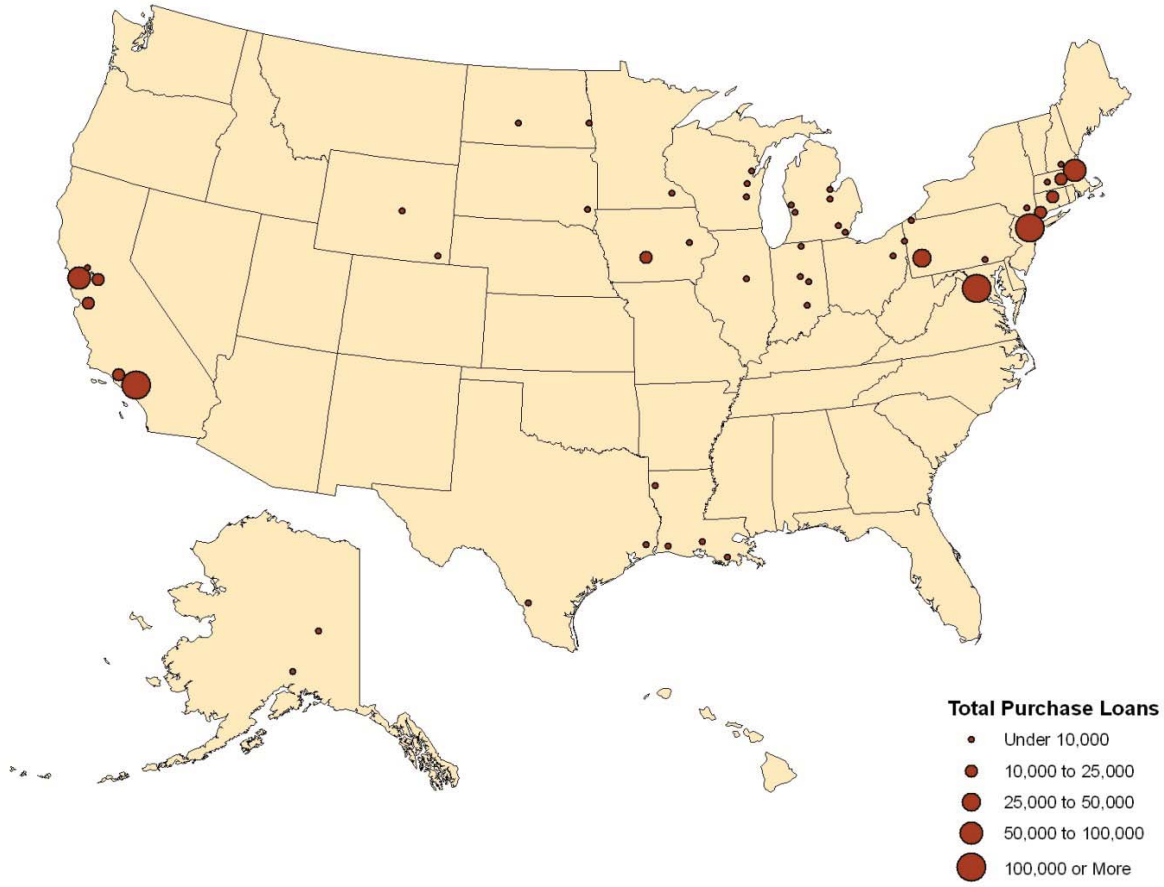



Notes: Includes first lien home purchase loans originated in 2006. Map shows the 50 metropolitan areas, out of 361 total, with the highest shares of non-owner occupied loans.

Source: JCHS Enhanced HMDA Database, 2006.

**Figure 3-20. Non-Owner Occupied Loan Shares Were Lowest in the Northeast, Midwest, and West**

**50 Metros with the Lowest Shares of Non-Owner-Occupant Loan Originations in 2006 (Ranging from 6% to 10%)**




Notes: Includes originated first lien home purchase loans only. Map shows the 50 metropolitan areas, out of 361 metropolitan areas total, with the lowest shares of non-owner occupied loans.

Source: JCHS Enhanced HMDA Database, 2006.

## Figure 3-21. Baseline Probability and Marginal Effects Estimates for Higher Price Home Purchase Loan Model

| | Higher Price Home Purchase Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Baseline Probability | Impact of Variable on Probability of Higher Price Loan | | Baseline Probability | Impact of Variable on Probability of Higher Price Loan | |
| | Percent | Percentage Points | Percent | Percent | Percentage Points | Percent |
| **Borrower Characteristics** | | | | | | |
| Hispanic | 11.4 | 10.0 | 87.2 | 7.7 | 9.0 | 116.7 |
| Asian | 11.4 | (1.6) | (13.9) | 7.7 | (1.3) | (16.3) |
| Black | 11.4 | 12.7 | 110.8 | 7.7 | 10.9 | 142.4 |
| Female | 12.7 | 1.3 | 10.1 | 8.7 | 0.5 | 5.3 |
| Low Income | 14.8 | 2.1 | 14.0 | 9.0 | (0.1) | (0.9) |
| High Income | 14.8 | (3.7) | (25.0) | 9.0 | (0.7) | (7.9) |
| Missing Income | 14.8 | (5.0) | (34.0) | 9.0 | 11.0 | 122.0 |
| | | | | | | |
| **Neighborhood Characteristics** | | | | | | |
| Low Income, Predominantly White | 15.5 | 1.5 | 9.7 | 9.4 | 3.1 | 32.6 |
| Low Income, Mixed Race | 15.5 | 0.9 | 5.6 | 9.4 | 1.1 | 12.0 |
| Moderate Income, Predominantly White | 15.5 | (1.7) | (11.3) | 9.4 | 0.2 | 2.2 |
| Moderate Income, Mixed Race | 15.5 | (1.1) | (6.8) | 9.4 | 0.1 | 1.4 |
| Moderate Income, Predominantly Minority | 15.5 | (0.2) | (1.1) | 9.4 | (0.5) | (4.9) |
| High Income, Predominantly White | 15.5 | (5.6) | (36.1) | 9.4 | (2.0) | (21.0) |
| High Income, Mixed Race | 15.5 | (4.3) | (27.9) | 9.4 | (1.5) | (15.4) |
| High Income, Predominantly Minority | 15.5 | (2.3) | (14.6) | 9.4 | (1.2) | (12.4) |
| Share of Units for Seasonal, Recreational or Other Use | 13.1 | (0.5) | (3.4) | 8.9 | 0.1 | 0.7 |
| Capitalization Rate | 13.1 | 0.8 | 6.2 | 8.9 | 0.3 | 3.2 |
| Turnover Rate | 13.1 | (0.4) | (2.9) | 8.9 | (0.2) | (2.8) |
| Denial Rate | 13.1 | 4.9 | 37.5 | 8.9 | 4.0 | 45.6 |
| Share Owner Occupied | 13.1 | 0.6 | 4.7 | 8.9 | 0.4 | 4.6 |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 17.5 | (14.4) | (82.5) | 10.1 | (4.1) | (40.7) |
| **Private Securitization** | 17.5 | 17.0 | 97.0 | 10.1 | 16.5 | 163.5 |
| **Other Private Conduit** | 17.5 | 6.6 | 37.5 | 10.1 | (3.7) | (36.9) |
| **Commercial Bank, Savings Bank or Savings Association** | 17.5 | (3.9) | (22.0) | 10.1 | (3.4) | (33.4) |
| **Other Purchasers** | 17.5 | (2.0) | (11.2) | 10.1 | 6.0 | 59.1 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 18.6 | (14.8) | (79.8) | 11.4 | (5.9) | (51.9) |
| | | | | | | |
| **County House Price to Income Ratio** | 13.1 | (3.4) | (26.2) | 8.9 | (1.9) | (21.2) |

Notes: See Figure A-1 for descriptive statistics and model fit statistics. Dummy variables for major lenders and for metropolitan areas are not shown. Baseline probabilities are estimated at the mean for continuous variables and are estimated using sample proportions for dummy variables. Variable change used to estimate impact is one standard deviation for continuous variables, and from 0 to 1 (with other variables of the same type set to 0) for dummy variables. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure 3-22. Baseline Probability and Marginal Effects Estimates for Higher Price Refinance Loan Model

| | Higher Price Refinance Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Baseline Probability | Impact of Variable on Probability of Higher Price Loan | | Baseline Probability | Impact of Variable on Probability of Higher Price Loan | |
| | Percent | Percentage Points | Percent | Percent | Percentage Points | Percent |
| **Borrower Characteristics** | | | | | | |
| Hispanic | 10.9 | 3.3 | 30.4 | 13.3 | 4.1 | 30.8 |
| Asian | 10.9 | (1.0) | (9.0) | 13.3 | (2.0) | (15.0) |
| Black | 10.9 | 6.0 | 55.0 | 13.3 | 6.7 | 50.4 |
| Female | 11.1 | 2.0 | 18.2 | 13.5 | 2.3 | 17.3 |
| Low Income | 13.4 | 1.0 | 7.1 | 14.8 | 0.1 | 0.8 |
| High Income | 13.4 | (2.9) | (21.4) | 14.8 | (1.3) | (8.9) |
| Missing Income | 13.4 | (8.9) | (66.5) | 14.8 | (1.5) | (10.0) |
| | | | | | | |
| **Neighborhood Characteristics** | | | | | | |
| Low Income, Predominantly White | 13.6 | 0.5 | 4.0 | 15.8 | 1.5 | 9.4 |
| Low Income, Mixed Race | 13.6 | 0.4 | 2.6 | 15.8 | 0.8 | 4.9 |
| Moderate Income, Predominantly White | 13.6 | (1.6) | (11.6) | 15.8 | (1.2) | (7.4) |
| Moderate Income, Mixed Race | 13.6 | (1.0) | (7.6) | 15.8 | (0.7) | (4.7) |
| Moderate Income, Predominantly Minority | 13.6 | (0.7) | (5.4) | 15.8 | (1.0) | (6.4) |
| High Income, Predominantly White | 13.6 | (4.4) | (32.5) | 15.8 | (3.8) | (24.4) |
| High Income, Mixed Race | 13.6 | (3.7) | (27.4) | 15.8 | (3.2) | (20.5) |
| High Income, Predominantly Minority | 13.6 | (2.1) | (15.4) | 15.8 | (2.6) | (16.3) |
| Share of Units for Seasonal, Recreational or Other Use | 11.7 | (0.2) | (2.0) | 14.2 | (0.2) | (1.5) |
| Capitalization Rate | 11.7 | 1.0 | 8.5 | 14.2 | 0.8 | 5.7 |
| Turnover Rate | 11.7 | 0.1 | 0.7 | 14.2 | (0.0) | (0.2) |
| Denial Rate | 11.7 | 3.2 | 27.8 | 14.2 | 4.3 | 30.5 |
| Share Owner Occupied | 11.7 | 0.3 | 2.4 | 14.2 | 0.2 | 1.7 |
| | | | | | | |
| **Secondary Market Sales Channel** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Fannie Mae or Freddie Mac** | 16.8 | (15.2) | (90.8) | 18.6 | (15.0) | (80.6) |
| **Private Securitization** | 16.8 | 21.0 | 125.2 | 18.6 | 34.4 | 184.7 |
| **Other Private Conduit** | 16.8 | 10.7 | 63.9 | 18.6 | (2.5) | (13.3) |
| **Commercial Bank, Savings Bank or Savings Association** | 16.8 | (2.5) | (14.7) | 18.6 | (2.0) | (10.8) |
| **Other Purchasers** | 16.8 | (2.5) | (14.7) | 18.6 | 7.7 | 41.6 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 16.0 | (12.2) | (76.0) | 17.9 | (10.0) | (56.0) |
| | | | | | | |
| **County House Price to Income Ratio** | 11.7 | (3.0) | (26.0) | 14.2 | (2.1) | (15.0) |

Notes: See Figure A-2 for descriptive statistics and model fit statistics. Dummy variables for major lenders and for metropolitan areas are not shown. Baseline probabilities are estimated at the mean for continuous variables and are estimated based on sample proportions for dummy variables. Variable change used to estimate impact is one standard deviation for continuous variables, and from 0 to 1 (with other variables of the same type set to 0) for dummy variables. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure 3-23. Baseline Probability and Marginal Effects Estimates for Non-Owner Occupant Home Purchase Loan Model

| | Non-Occupant Owner Home Purchase Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Baseline Probability | Impact of Variable on Probability of Non-Occupant Owner Loan | | Baseline Probability | Impact of Variable on Probability of Non-Occupant Owner Loan | |
| | Percent | Percentage Points | Percent | Percent | Percentage Points | Percent |
| Borrower Characteristics | | | | | | |
| Hispanic | 13.1 | (4.6) | (35.5) | 10.7 | (3.2) | (29.6) |
| Asian | 13.1 | 2.3 | 17.9 | 10.7 | 1.0 | 9.8 |
| Black | 13.1 | (0.4) | (3.3) | 10.7 | (1.3) | (12.0) |
| Female | 13.3 | (2.7) | (20.1) | 11.1 | (2.5) | (22.8) |
| Low Income | 7.0 | (3.6) | (51.1) | 5.6 | (3.2) | (56.8) |
| High Income | 7.0 | 15.7 | 226.1 | 5.6 | 14.0 | 249.2 |
| Missing Income | 7.0 | 19.7 | 282.7 | 5.6 | 26.9 | 478.2 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 13.9 | 1.6 | 11.4 | 10.4 | 2.9 | 27.4 |
| Low Income, Mixed Race | 13.9 | 2.2 | 15.6 | 10.4 | 2.2 | 21.2 |
| Moderate Income, Predominantly White | 13.9 | (1.7) | (12.3) | 10.4 | 0.1 | 0.6 |
| Moderate Income, Mixed Race | 13.9 | (0.8) | (5.8) | 10.4 | 0.2 | 2.1 |
| Moderate Income, Predominantly Minority | 13.9 | (1.6) | (11.4) | 10.4 | (0.3) | (3.0) |
| High Income, Predominantly White | 13.9 | (3.6) | (26.0) | 10.4 | (1.5) | (14.6) |
| High Income, Mixed Race | 13.9 | (2.2) | (15.5) | 10.4 | (0.7) | (6.4) |
| High Income, Predominantly Minority | 13.9 | (2.5) | (18.2) | 10.4 | (0.9) | (8.7) |
| Share of Units for Seasonal, Recreational or Other Use | 12.5 | 2.6 | 20.9 | 10.3 | 2.3 | 22.7 |
| Capitalization Rate | 12.5 | 1.7 | 13.7 | 10.3 | 1.4 | 13.3 |
| Turnover Rate | 12.5 | (0.4) | (3.1) | 10.3 | (0.1) | (1.4) |
| Denial Rate | 12.5 | 3.5 | 28.1 | 10.3 | 3.7 | 36.0 |
| Share Owner Occupied | 12.5 | (3.1) | (24.6) | 10.3 | (2.8) | (27.3) |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 15.5 | (4.5) | (29.2) | 13.8 | (4.0) | (28.8) |
| **Private Securitization** | 15.5 | (4.3) | (27.5) | 13.8 | (4.3) | (31.3) |
| **Other Private Conduit** | 15.5 | (3.3) | (21.1) | 13.8 | (5.5) | (39.8) |
| **Commercial Bank, Savings Bank or Savings Association** | 15.5 | (4.1) | (26.7) | 13.8 | (5.2) | (37.9) |
| **Other Purchasers** | 15.5 | (3.3) | (20.9) | 13.8 | (4.5) | (32.8) |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 11.9 | 2.8 | 24.0 | 9.7 | .7 | 17.5 |
| | | | | | | |
| **County House Price to Income Ratio** | 12.5 | (0.1) | (0.6) | 10.3 | 0.4 | 3.8 |

Notes: See Figure A-3 for descriptive statistics and model fit statistics. Dummy variables for major lenders and for metropolitan areas are not shown. Baseline probabilities are estimated at the mean for continuous variables and are estimated based on sample proportions for dummy variables. Variable change used to estimate impact is one standard deviation for continuous variables, and from 0 to 1 (with other variables of the same type set to 0) for dummy variables. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure 3-24. Baseline Probability and Marginal Effects Estimates for Owner Occupied Piggyback Lending Model

| | Owner Occupant Piggyback Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Baseline Probability | Impact of Variable on Probability of Piggyback Loan | | Baseline Probability | Impact of Variable on Probability of Piggyback Loan | |
| | Percent | Percentage Points | Percent | Percent | Percentage Points | Percent |
| **Borrower Characteristics** | | | | | | |
| Hispanic | 14.8 | 6.5 | 43.8 | 10.2 | 3.5 | 33.9 |
| Asian | 14.8 | (0.6) | (3.9) | 10.2 | (1.4) | (13.5) |
| Black | 14.8 | 3.7 | 25.0 | 10.2 | 1.4 | 13.7 |
| Female | 15.4 | 1.1 | 6.9 | 10.6 | 0.1 | 1.0 |
| Low Income | 17.2 | (5.4) | (31.6) | 10.1 | (4.2) | (41.2) |
| High Income | 17.2 | 0.2 | 1.3 | 10.1 | 3.8 | 38.0 |
| Missing Income | 17.2 | (3.3) | (19.0) | 10.1 | 2.5 | 24.9 |
| | | | | | | |
| **Neighborhood Characteristics** | | | | | | |
| Low Income, Predominantly White | 17.6 | (2.5) | (14.2) | 12.5 | (3.0) | (24.3) |
| Low Income, Mixed Race | 17.6 | (0.7) | (4.1) | 12.5 | (1.2) | (9.7) |
| Moderate Income, Predominantly White | 17.6 | (1.7) | (9.8) | 12.5 | (2.3) | (18.0) |
| Moderate Income, Mixed Race | 17.6 | (0.9) | (5.2) | 12.5 | (1.5) | (11.9) |
| Moderate Income, Predominantly Minority | 17.6 | 0.3 | 1.5 | 12.5 | (0.1) | (0.5) |
| High Income, Predominantly White | 17.6 | (3.9) | (22.0) | 12.5 | (3.0) | (24.2) |
| High Income, Mixed Race | 17.6 | (3.4) | (19.3) | 12.5 | (2.6) | (21.1) |
| High Income, Predominantly Minority | 17.6 | (1.8) | (10.3) | 12.5 | (0.9) | (7.6) |
| Share of Units for Seasonal, Recreational or Other Use | 15.8 | (1.1) | (6.8) | 10.6 | (0.6) | (6.0) |
| Capitalization Rate | 15.8 | 0.4 | 2.3 | 10.6 | 0.2 | 2.0 |
| Turnover Rate | 15.8 | 0.4 | 2.4 | 10.6 | 0.1 | 1.2 |
| Denial Rate | 15.8 | (0.7) | (4.5) | 10.6 | (0.5) | (4.8) |
| Share Owner Occupied | 15.8 | (0.3) | (2.1) | 10.6 | (0.1) | (1.3) |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 13.7 | (4.3) | (31.5) | 6.2 | 3.3 | 53.2 |
| **Private Securitization** | 13.7 | 11.6 | 84.8 | 6.2 | 9.6 | 154.2 |
| **Other Private Conduit** | 13.7 | 8.7 | 63.3 | 6.2 | 7.2 | 115.9 |
| **Commercial Bank, Savings Bank or Savings Association** | 13.7 | 3.8 | 28.0 | 6.2 | 7.1 | 113.2 |
| **Other Purchasers** | 13.7 | 3.9 | 28.6 | 6.2 | 10.4 | 165.7 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 18.1 | (8.3) | (45.7) | 11.2 | (1.6) | (14.5) |
| | | | | | | |
| **Higher Price Loan** | 12.3 | 18.9 | 154.3 | 10.4 | 1.3 | 12.5 |
| | | | | | | |
| **County House Price to Income Ratio** | 15.8 | (0.9) | (5.6) | 10.6 | (1.2) | (11.8) |

Notes: See Figure A-4 for descriptive statistics and model fit statistics. Dummy variables for major lenders and for metropolitan areas are not shown. Baseline probabilities are estimated at the mean for continuous variables and are estimated based on sample proportions for dummy variables. Variable change used to estimate impact is one standard deviation for continuous variables, and from 0 to 1 (with other variables of the same type set to 0) for dummy variables. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

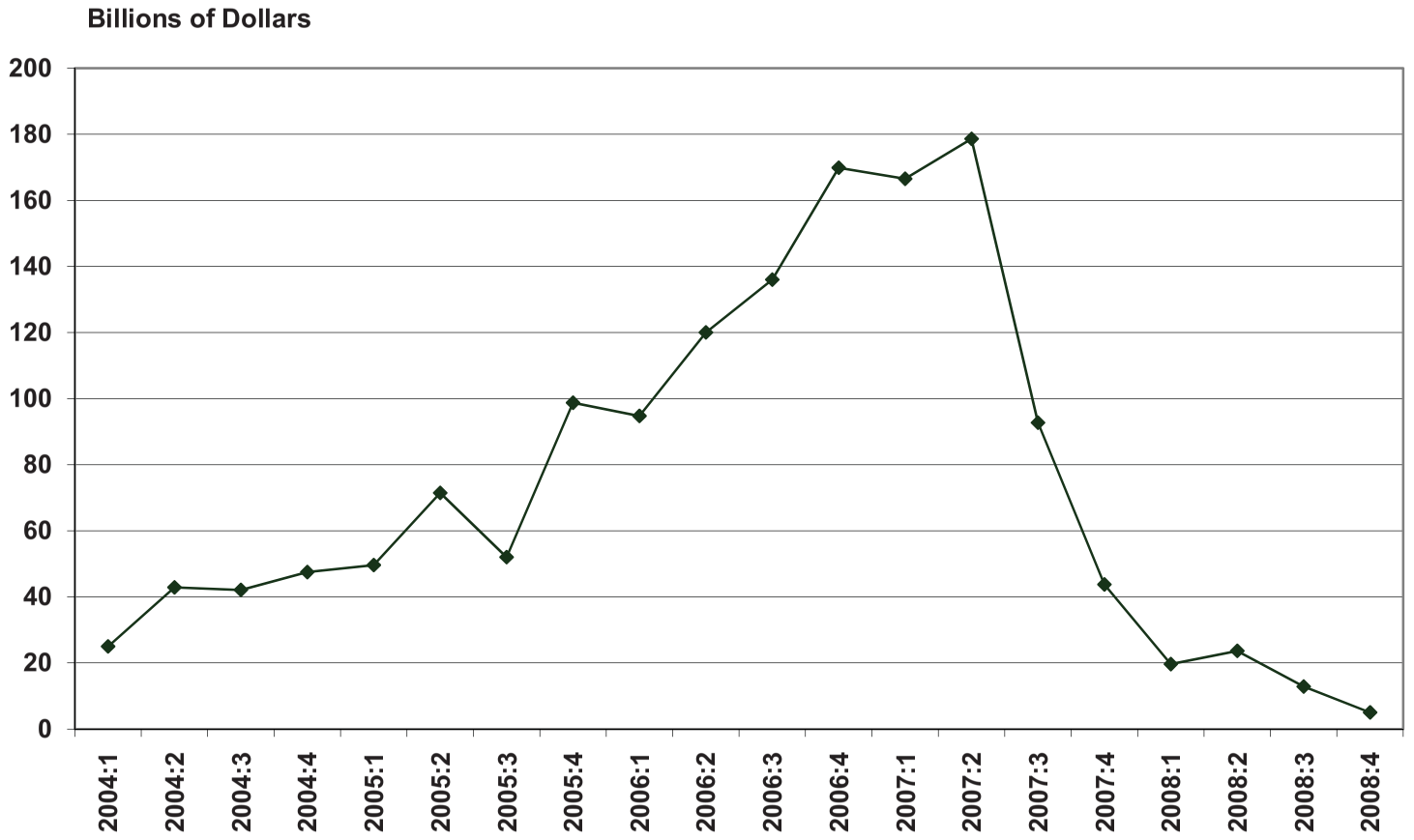
## Figure 3-25. Baseline Probability and Marginal Effects Estimates for Non-Owner Occupied Piggyback Lending Model

| | Non-Owner Occupant Piggyback Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Baseline Probability | Impact of Variable on Probability of Piggyback Loan | | Baseline Probability | Impact of Variable on Probability of Piggyback Loan | |
| | Percent | Percentage Points | Percent | Percent | Percentage Points | Percent |
| **Borrower Characteristics** | | | | | | |
| Hispanic | 3.1 | 0.7 | 21.9 | 3.2 | 1.0 | 30.5 |
| Asian | 3.1 | (0.5) | (16.0) | 3.2 | (0.3) | (8.6) |
| Black | 3.1 | 1.2 | 39.7 | 3.2 | 1.1 | 34.3 |
| Female | 3.1 | 0.3 | 9.1 | 3.2 | 0.4 | 13.4 |
| Low Income | 2.6 | (1.0) | (37.4) | 2.4 | (0.9) | (35.6) |
| High Income | 2.6 | 0.8 | 30.3 | 2.4 | 1.2 | 50.7 |
| Missing Income | 2.6 | 1.6 | 62.5 | 2.4 | 1.2 | 49.5 |
| | | | | | | |
| **Neighborhood Characteristics** | | | | | | |
| Low Income, Predominantly White | 3.3 | (0.2) | (6.1) | 3.5 | (0.9) | (24.3) |
| Low Income, Mixed Race | 3.3 | 0.0 | 0.6 | 3.5 | (0.2) | (5.2) |
| Moderate Income, Predominantly White | 3.3 | (0.2) | (7.0) | 3.5 | (0.2) | (7.0) |
| Moderate Income, Mixed Race | 3.3 | (0.0) | (1.2) | 3.5 | (0.2) | (4.8) |
| Moderate Income, Predominantly Minority | 3.3 | 0.1 | 4.3 | 3.5 | 0.0 | 0.7 |
| High Income, Predominantly White | 3.3 | (0.5) | (16.1) | 3.5 | (0.5) | (15.5) |
| High Income, Mixed Race | 3.3 | (0.3) | (8.4) | 3.5 | (0.2) | (6.5) |
| High Income, Predominantly Minority | 3.3 | 0.1 | 2.8 | 3.5 | (0.0) | (0.4) |
| Share of Units for Seasonal, Recreational or Other Use | 3.2 | (0.3) | (9.3) | 3.3 | (0.1) | (4.0) |
| Capitalization Rate | 3.2 | (0.0) | (0.9) | 3.3 | 0.0 | 0.2 |
| Turnover Rate | 3.2 | 0.1 | 2.5 | 3.3 | 0.0 | 0.2 |
| Denial Rate | 3.2 | 0.1 | 3.7 | 3.3 | (0.2) | (5.6) |
| Share Owner Occupied | 3.2 | 0.2 | 5.4 | 3.3 | 0.1 | 3.2 |
| | | | | | | |
| **Secondary Market Sales Channel** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Fannie Mae or Freddie Mac** | 2.3 | (0.3) | (13.9) | 1.8 | 1.7 | 92.3 |
| **Private Securitization** | 2.3 | 0.8 | 33.4 | 1.8 | 4.2 | 236.2 |
| **Other Private Conduit** | 2.3 | 2.9 | 128.1 | 1.8 | 4.5 | 249.4 |
| **Commercial Bank, Savings Bank or Savings Association** | 2.3 | 0.0 | 0.1 | 1.8 | 3.0 | 164.6 |
| **Other Purchasers** | 2.3 | 3.2 | 143.2 | 1.8 | 3.9 | 215.2 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 4.2 | (2.6) | (63.4) | 4.0 | (1.6) | (40.3) |
| | | | | | | |
| **Higher Price Loan** | 3.0 | 1.2 | 41.7 | 3.5 | (0.9) | (25.4) |
| | | | | | | |
| **County House Price to Income Ratio** | 3.2 | (0.1) | (2.8) | 3.3 | (0.2) | (4.8) |

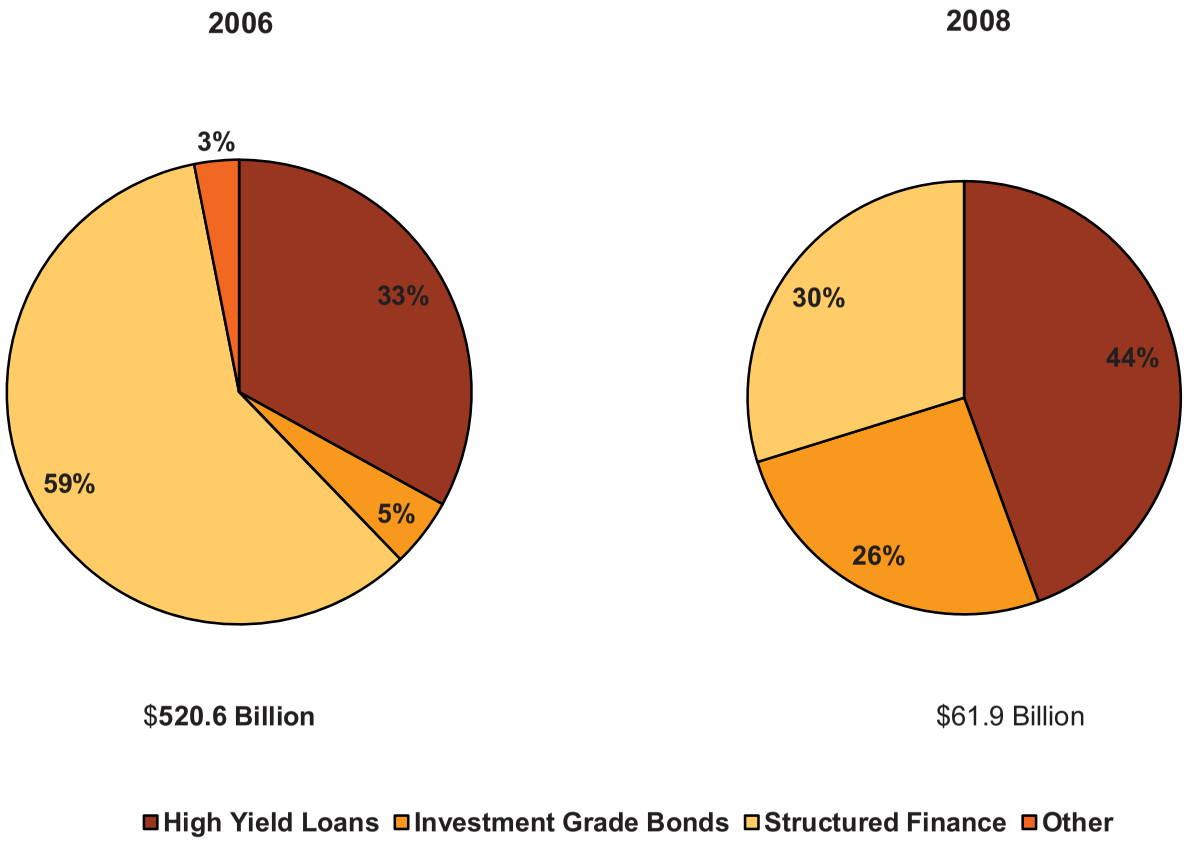
Notes: See Figure A-5 for descriptive statistics and model fit statistics. Dummy variables for major lenders and for metropolitan areas are not shown. Baseline probabilities are estimated at the mean for continuous variables and are estimated based on sample proportions for dummy variables. Variable change used to estimate impact is one standard deviation for continuous variables, and from 0 to 1 (with other variables of the same type set to 0) for dummy variables. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

**Figure 4-1. Global CDO Issuance Peaked in the Second Quarter of 2007**



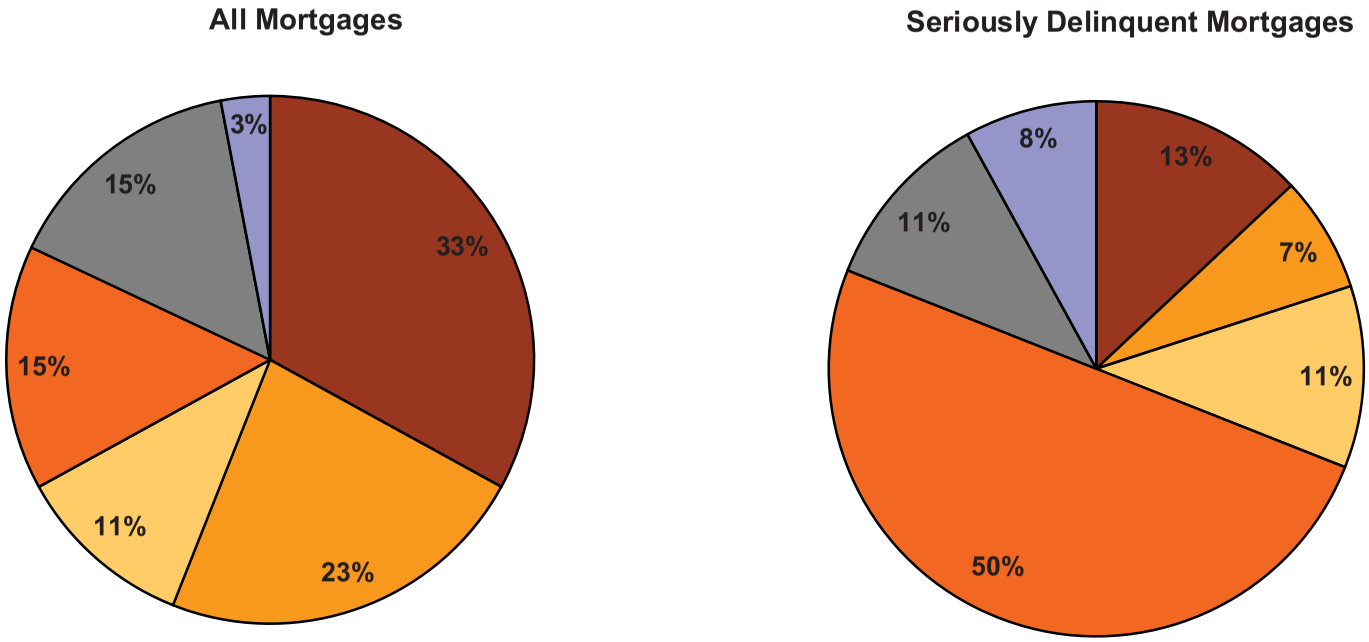

Source: Securities Industry and Financial Markets Association, Global CDO Issuance.

**Figure 4-2. Collateral Backing CDOs Shifted Sharply and Volume Plummeted**




Source: Securities Industry and Financial Markets Association, Global CDO Issuance.

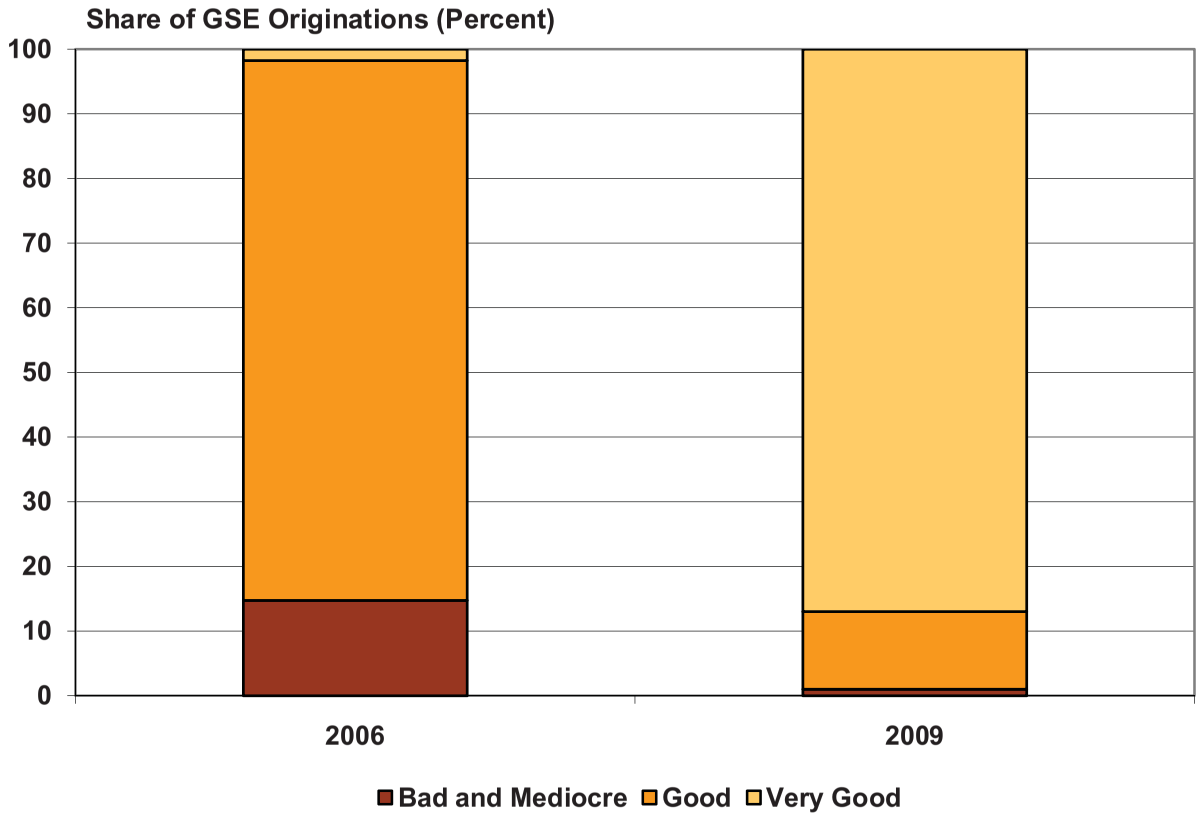
**Figure 5-1. Seriously Delinquent Mortgages Were Concentrated Among Private Label Securities**




Notes: Data are as of December 2008. Seriously delinquent loans are 90+ days delinquent or in foreclosure.

Source: Freddie Mac, Office of the Chief Economist.

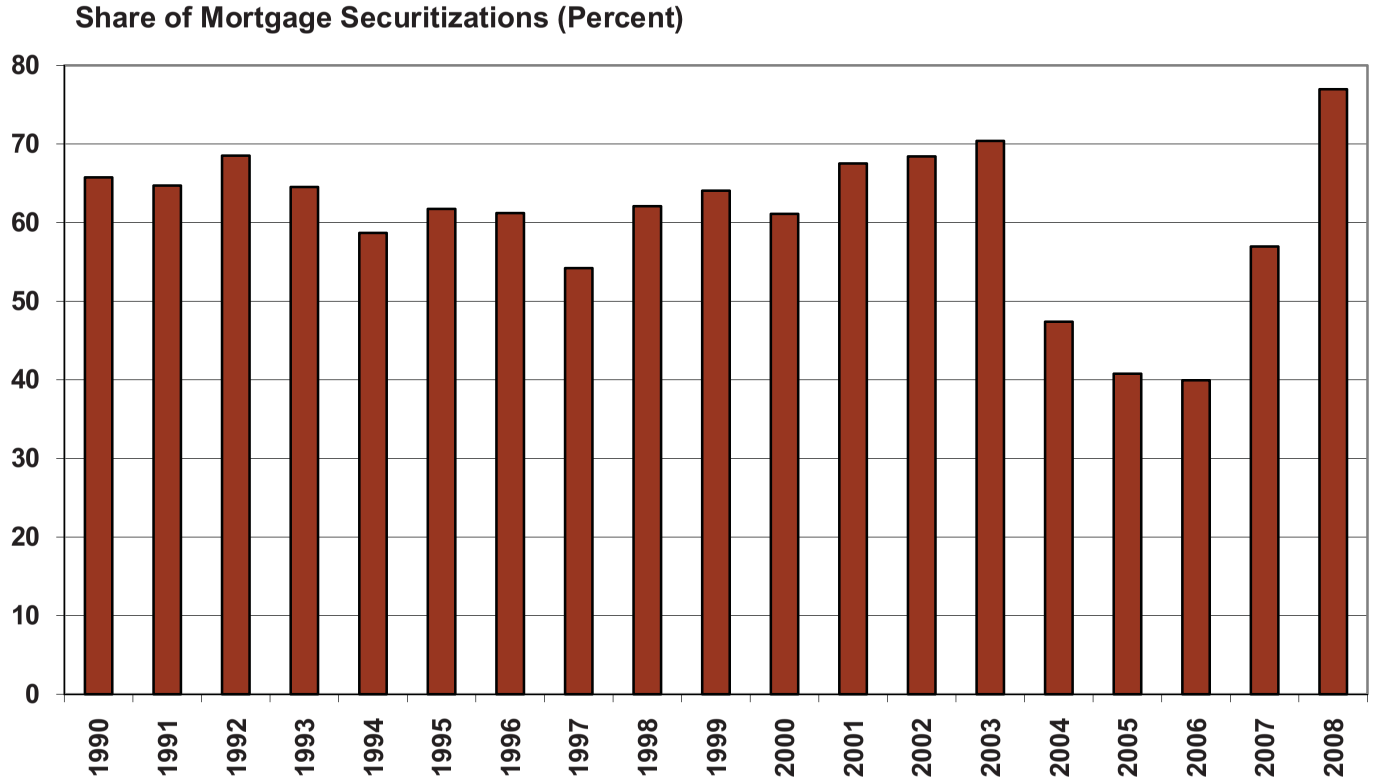
**Figure 5-2. Lending Standards Have Tightened Dramatically Even in the Prime Market**




Notes: Very good loans are loans with FICO scores over 750 and original LTVs less than 75. Bad or mediocre loans have FICO scores under 690 and original LTVs greater than 85. All other loans are classified as good.

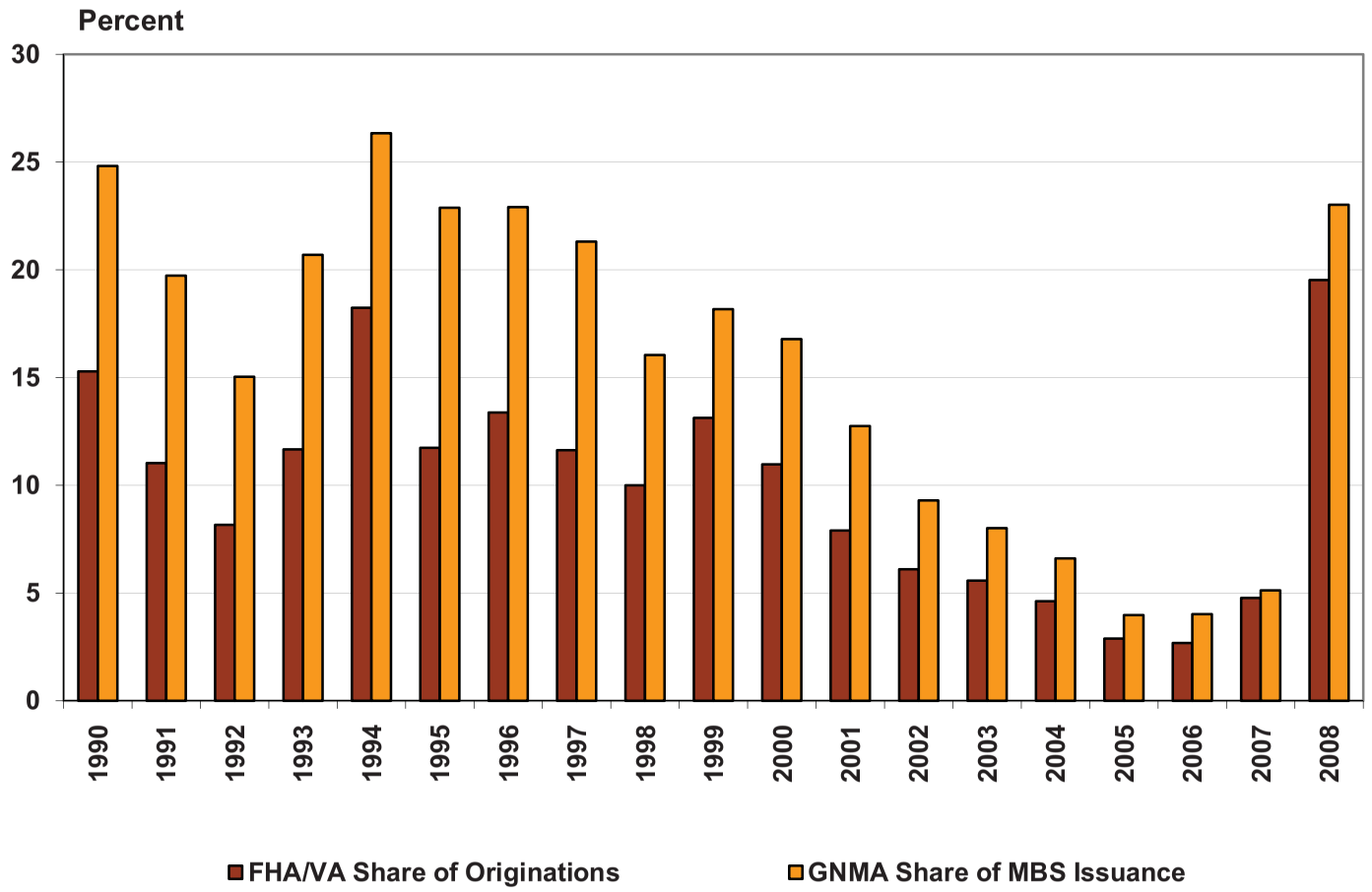
Source: Barclays Capital, "GSEs: Back to the Future," December 2009.

**Figure 5-3. Fannie Mae and Freddie Mac Lost Market Share at the Nonprime Lending Peak But Regained it When Nonprime Lending Collapsed**



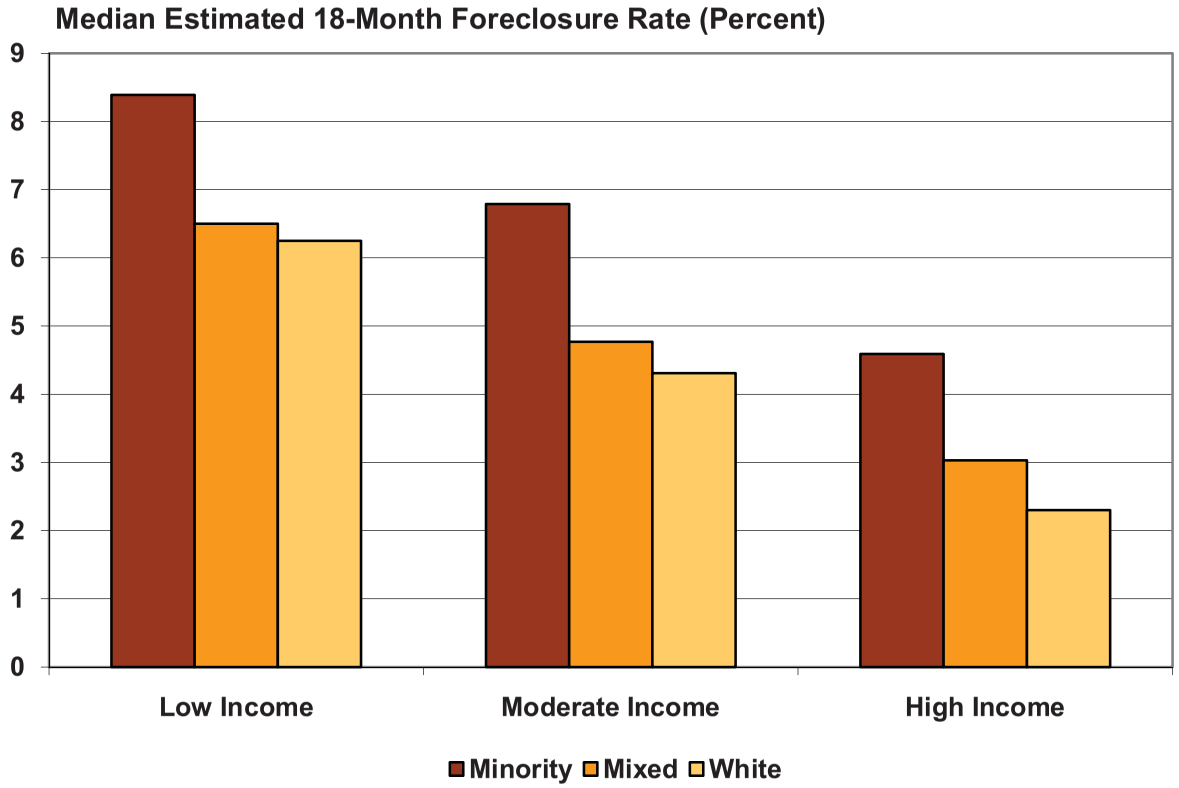

Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

**Figure 5-4. FHA Market Share Soared After ABS Markets Collapsed**




Source: Inside Mortgage Finance, *2009 Mortgage Market Statistical Annual*.

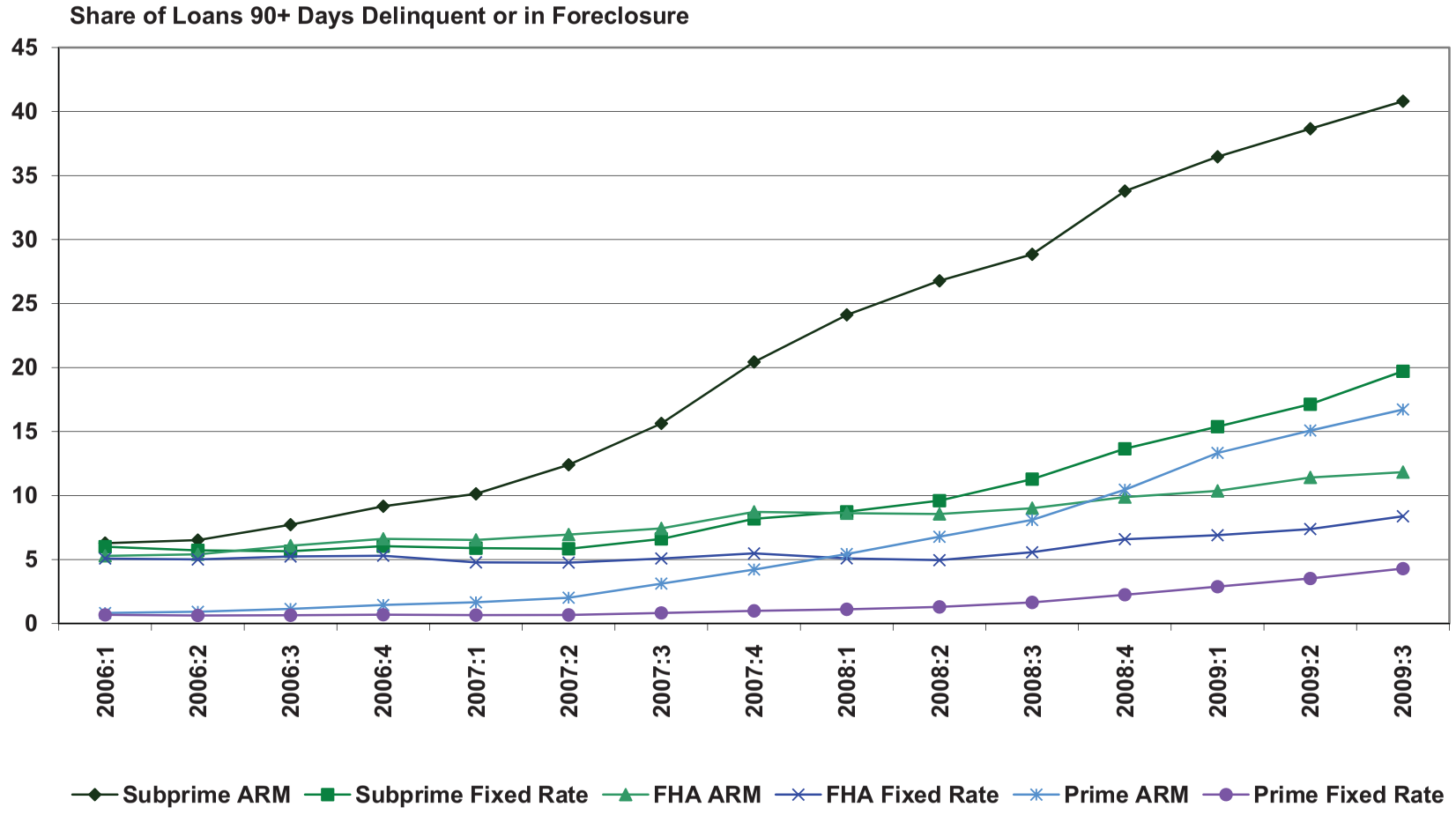
**Figure 6-1. Even Controlling for Income, Foreclosures Are Markedly Higher in Minority Neighborhoods**




Notes: Minority neighborhoods are census tracts that were more than 50% minority in 2000; mixed neighborhoods were 10–50% minority; white neighborhoods were less than 10% minority. Low-/moderate-/high-income neighborhoods had median family incomes less than 80%/80–120%/more than 120% of the metropolitan area median in 2000. Estimates are based on a HUD model of the share of loans foreclosed from January 2007 to June 2008.

Source: Joint Center for Housing Studies, State of the Nation's Housing 2009.

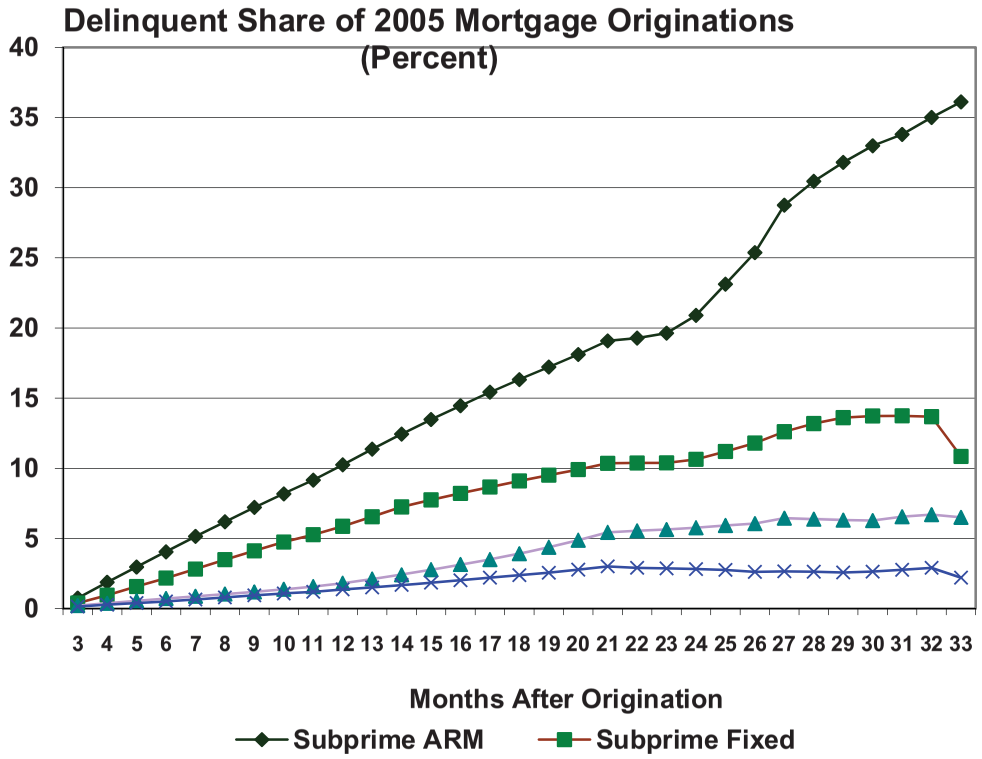
**Figure 7-1. Delinquencies Are Much Higher for Subprime Adjustable Mortgages than Subprime Fixed Mortgages**

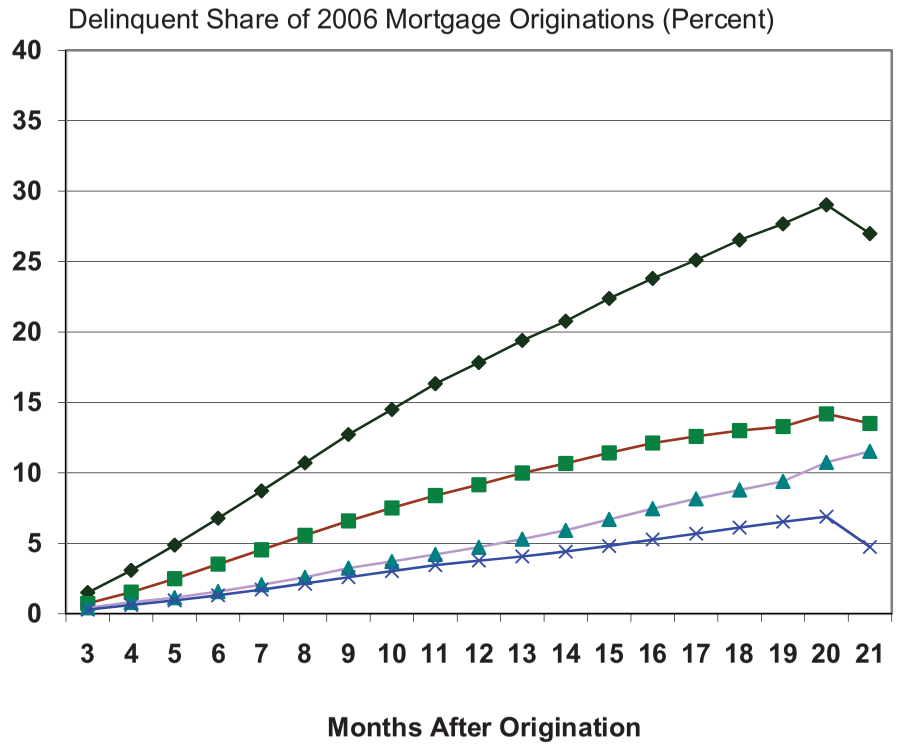



Notes: Serious delinquencies include loans 90+ days delinquent or in foreclosure. Delinquent loan shares are not seasonally adjusted.

Source: Mortgage Bankers Association, National Delinquency Survey.

**Figure 7-2. Adjustable Subprime Mortgages Fared Worse Than Other Types of Nonprime Loans**




Note: Delinquent loans are 60+ days delinquent or in foreclosure.

Source: First American Core Logic, Loan Performance data.

## Figure A-1. Descriptive Statistics, Logit Coefficients, and Model Fit Statistics for Higher Price Home Purchase Loan Model

| | Higher Price Home Purchase Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Mean | SD | Coefficient | Mean | SD | Coefficient |
| Higher Price Loan | 0.246 | | | 0.135 | | |
| Intercept: High Cost = 1 | | | -1.623 | | | -2.478 |
| | | | | | | |
| Borrower Characteristics | | | | | | |
| Hispanic | 0.133 | 0.340 | 0.746 | 0.108 | 0.311 | 0.876 |
| Asian | 0.061 | 0.238 | -0.167 | 0.057 | 0.232 | -0.191 |
| Black | 0.076 | 0.265 | 0.900 | 0.073 | 0.260 | 1.011 |
| Female | 0.309 | 0.462 | 0.111 | 0.306 | 0.461 | 0.057 |
| Low Income | 0.228 | 0.419 | 0.155 | 0.238 | 0.426 | -0.010 |
| High Income | 0.478 | 0.500 | -0.330 | 0.494 | 0.500 | -0.090 |
| Missing Income | 0.043 | 0.202 | -0.473 | 0.029 | 0.169 | 0.926 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 0.013 | 0.114 | 0.111 | 0.013 | 0.115 | 0.316 |
| Low Income, Mixed Race | 0.057 | 0.232 | 0.065 | 0.057 | 0.233 | 0.125 |
| Moderate Income, Predominantly White | 0.151 | 0.358 | -0.140 | 0.164 | 0.370 | 0.024 |
| Moderate Income, Mixed Race | 0.250 | 0.433 | -0.083 | 0.245 | 0.430 | 0.015 |
| Moderate Income, Predominantly Minority | 0.067 | 0.251 | -0.013 | 0.056 | 0.230 | -0.055 |
| High Income, Predominantly White | 0.134 | 0.341 | -0.512 | 0.147 | 0.354 | -0.257 |
| High Income, Mixed Race | 0.215 | 0.411 | -0.377 | 0.219 | 0.413 | -0.184 |
| High Income, Predominantly Minority | 0.022 | 0.148 | -0.184 | 0.019 | 0.137 | -0.146 |
| Share of Units for Seasonal, Recreational or Other Use | 0.025 | 0.051 | -0.784 | 0.024 | 0.048 | 0.147 |
| Capitalization Rate | 0.067 | 0.028 | 2.510 | 0.067 | 0.029 | 1.225 |
| Turnover Rate | 0.169 | 0.076 | -0.448 | 0.166 | 0.075 | -0.410 |
| Denial Rate | 0.150 | 0.075 | 5.006 | 0.191 | 0.087 | 4.825 |
| Share Owner Occupied | 0.696 | 0.198 | 0.266 | 0.694 | 0.201 | 0.247 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 0.234 | 0.423 | -1.907 | 0.348 | 0.476 | -0.568 |
| **Private Securitization** | 0.070 | 0.256 | 0.908 | 0.019 | 0.138 | 1.171 |
| **Other Private Conduit** | 0.221 | 0.415 | 0.402 | 0.124 | 0.329 | -0.502 |
| **Commercial Bank, Savings Bank or Savings Association** | 0.053 | 0.225 | -0.294 | 0.052 | 0.221 | -0.443 |
| **Other Purchasers** | 0.218 | 0.413 | -0.142 | 0.224 | 0.417 | 0.533 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 0.234 | 0.423 | -1.767 | 0.348 | 0.476 | -0.796 |
| | | | | | | |
| **County House Price to Income Ratio** | 0.043 | 0.022 | -15.428 | 0.039 | 0.022 | -11.731 |
| | | | | | | |
| | **Intercept Only** | **Intercept and Covariates** | | **Intercept Only** | **Intercept and Covariates** | |
| **AIC** | 4,430,853 | 2,743,974 | | 2,059,467 | 1,677,794 | |
| **SC** | 4,430,866 | 2,749,595 | | 2,059,480 | 1,683,132 | |
| **-2 Log L** | 4,430,851 | 2,743,122 | | 2,059,465 | 1,676,958 | |
| **Pseudo R Squared** | 0.381 | | | 0.186 | | |

Notes: Most coefficients are significant at the .0001 level. Dummy variables for major lenders and for metropolitan areas are not shown. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure A-2. Descriptive Statistics, Logit Coefficients, and Model Fit Statistics for Higher Price Refinance Loan Model

| | Higher Price Refinance Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Mean | SD | Coefficient | Mean | SD | Coefficient |
| Higher Price Loan | 0.253 | | | 0.135 | | |
| Intercept: High Cost = 1 | | | -1.301 | | | -2.478 |
| | | | | | | |
| Borrower Characteristics | | | | | | |
| Hispanic | 0.116 | 0.320 | 0.303 | 0.108 | 0.311 | 0.876 |
| Asian | 0.034 | 0.182 | -0.106 | 0.057 | 0.232 | -0.191 |
| Black | 0.086 | 0.281 | 0.508 | 0.073 | 0.260 | 1.011 |
| Female | 0.311 | 0.463 | 0.190 | 0.306 | 0.461 | 0.057 |
| Low Income | 0.260 | 0.439 | 0.080 | 0.238 | 0.426 | -0.010 |
| High Income | 0.414 | 0.493 | -0.273 | 0.494 | 0.500 | -0.090 |
| Missing Income | 0.052 | 0.222 | -1.193 | 0.029 | 0.169 | 0.926 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 0.015 | 0.122 | 0.046 | 0.013 | 0.115 | 0.316 |
| Low Income, Mixed Race | 0.055 | 0.227 | 0.030 | 0.057 | 0.233 | 0.125 |
| Moderate Income, Predominantly White | 0.162 | 0.369 | -0.141 | 0.164 | 0.370 | 0.024 |
| Moderate Income, Mixed Race | 0.240 | 0.427 | -0.090 | 0.245 | 0.430 | 0.015 |
| Moderate Income, Predominantly Minority | 0.091 | 0.287 | -0.064 | 0.056 | 0.230 | -0.055 |
| High Income, Predominantly White | 0.117 | 0.321 | -0.443 | 0.147 | 0.354 | -0.257 |
| High Income, Mixed Race | 0.189 | 0.391 | -0.362 | 0.219 | 0.413 | -0.184 |
| High Income, Predominantly Minority | 0.026 | 0.161 | -0.192 | 0.019 | 0.137 | -0.146 |
| Share of Units for Seasonal, Recreational or Other Use | 0.024 | 0.053 | -0.435 | 0.024 | 0.048 | 0.147 |
| Capitalization Rate | 0.066 | 0.026 | 3.561 | 0.067 | 0.029 | 1.225 |
| Turnover Rate | 0.158 | 0.069 | 0.113 | 0.166 | 0.075 | -0.410 |
| Denial Rate | 0.158 | 0.078 | 3.604 | 0.191 | 0.087 | 4.825 |
| Share Owner Occupied | 0.700 | 0.188 | 0.144 | 0.694 | 0.201 | 0.247 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 0.221 | 0.415 | -2.554 | 0.348 | 0.476 | -0.568 |
| **Private Securitization** | 0.076 | 0.266 | 1.102 | 0.019 | 0.138 | 1.171 |
| **Other Private Conduit** | 0.180 | 0.385 | 0.632 | 0.124 | 0.329 | -0.502 |
| **Commercial Bank, Savings Bank or Savings Association** | 0.049 | 0.216 | -0.188 | 0.052 | 0.221 | -0.443 |
| **Other Purchasers** | 0.224 | 0.417 | -0.188 | 0.224 | 0.417 | 0.533 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 0.235 | 0.424 | -1.563 | 0.348 | 0.476 | -0.796 |
| | | | | | | |
| **County House Price to Income Ratio** | 0.047 | 0.023 | -14.553 | 0.039 | 0.022 | -11.731 |
| | | | | | | |
| | **Intercept Only** | **Intercept and Covariates** | | **Intercept Only** | **Intercept and Covariates** | |
| **AIC** | 5,583,860 | 3,578,594 | | 3,031,229 | 2,393,281 | |
| **SC** | 5,583,873 | 3,584,307 | | 3,031,242 | 2,398,673 | |
| **-2 Log L** | 5,583,858 | 3,577,742 | | 3,031,227 | 2,392,445 | |
| **Pseudo R Squared** | 0.359 | | | 0.211 | | |

Notes: Most coefficients are significant at the .0001 level. Dummy variables for major lenders and for metropolitan areas are not shown. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure A-3. Descriptive Statistics, Logit Coefficients, and Model Fit Statistics for Non-Owner Occupied Home Purchase Loan Model

| | Non-Owner Occupied Home Purchase Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Mean | SD | Coefficient | Mean | SD | Coefficient |
| Non-Owner Occupied | 0.178 | | | 0.154 | | |
| Intercept: Non-Owner Occupied = 1 | | | -3.528 | | | -4.092 |
| | | | | | | |
| Borrower Characteristics | | | | | | |
| Hispanic | 0.126 | 0.332 | -0.491 | 0.104 | 0.306 | -0.386 |
| Asian | 0.061 | 0.240 | 0.192 | 0.057 | 0.231 | 0.105 |
| Black | 0.076 | 0.266 | -0.039 | 0.073 | 0.259 | -0.142 |
| Female | 0.295 | 0.456 | -0.255 | 0.291 | 0.454 | -0.287 |
| Low Income | 0.198 | 0.399 | -0.753 | 0.210 | 0.407 | -0.872 |
| High Income | 0.521 | 0.500 | 1.367 | 0.531 | 0.499 | 1.411 |
| Missing Income | 0.053 | 0.223 | 1.580 | 0.041 | 0.199 | 2.090 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 0.014 | 0.118 | 0.126 | 0.015 | 0.120 | 0.274 |
| Low Income, Mixed Race | 0.065 | 0.246 | 0.170 | 0.065 | 0.246 | 0.217 |
| Moderate Income, Predominantly White | 0.148 | 0.355 | -0.151 | 0.162 | 0.369 | 0.007 |
| Moderate Income, Mixed Race | 0.254 | 0.435 | -0.070 | 0.247 | 0.432 | 0.024 |
| Moderate Income, Predominantly Minority | 0.066 | 0.248 | -0.140 | 0.056 | 0.229 | -0.034 |
| High Income, Predominantly White | 0.128 | 0.334 | -0.342 | 0.140 | 0.347 | -0.175 |
| High Income, Mixed Race | 0.205 | 0.404 | -0.193 | 0.209 | 0.406 | -0.073 |
| High Income, Predominantly Minority | 0.021 | 0.143 | -0.230 | 0.018 | 0.133 | -0.101 |
| Share of Units for Seasonal, Recreational or Other Use | 0.031 | 0.069 | 3.207 | 0.029 | 0.065 | 3.539 |
| Capitalization Rate | 0.069 | 0.029 | 5.204 | 0.068 | 0.029 | 4.780 |
| Turnover Rate | 0.172 | 0.078 | -0.468 | 0.167 | 0.076 | -0.213 |
| Denial Rate | 0.155 | 0.078 | 3.684 | 0.195 | 0.091 | 3.862 |
| Share Owner Occupied | 0.680 | 0.204 | -1.553 | 0.680 | 0.208 | -1.683 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 0.227 | 0.419 | -0.398 | 0.339 | 0.473 | -0.384 |
| **Private Securitization** | 0.070 | 0.254 | -0.371 | 0.019 | 0.138 | -0.423 |
| **Other Private Conduit** | 0.217 | 0.412 | -0.275 | 0.119 | 0.324 | -0.569 |
| **Commercial Bank, Savings Bank or Savings Association** | 0.052 | 0.223 | -0.358 | 0.050 | 0.218 | -0.535 |
| **Other Purchasers** | 0.217 | 0.412 | -0.273 | 0.221 | 0.415 | -0.449 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 0.240 | 0.427 | 0.248 | 0.355 | 0.478 | 0.180 |
| | | | | | | |
| **County House Price to Income Ratio** | 0.043 | 0.022 | -0.321 | 0.039 | 0.022 | 1.925 |
| | | | | | | |
| | **Intercept Only** | **Intercept and Covariates** | | **Intercept Only** | **Intercept and Covariates** | |
| **AIC** | 4,522,294 | 3,679,206 | | 2,644,195 | 2,140,192 | |
| **SC** | 4,522,308 | 3,684,910 | | 2,644,208 | 2,145,600 | |
| **-2 Log L** | 4,522,292 | 3,678,354 | | 2,644,193 | 2,139,356 | |
| **Pseudo R Squared** | | 0.187 | | | 0.191 | |

Notes: Most coefficients are significant at the .0001 level. Dummy variables for major lenders and for metropolitan areas are not shown. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure A-4. Descriptive Statistics, Logit Coefficients, and Model Fit Statistics for Owner Occupied Piggyback Lending Model

| | Owner Occupied Piggyback Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Mean | SD | Coefficient | Mean | SD | Coefficient |
| Piggyback Loan Present | 0.225 | | | 0.129 | | |
| Intercept: Piggyback = 1 | | | -1.637 | | | -2.177 |
| | | | | | | |
| Borrower Characteristics | | | | | | |
| Hispanic | 0.133 | 0.340 | 0.442 | 0.108 | 0.311 | 0.331 |
| Asian | 0.061 | 0.238 | -0.046 | 0.057 | 0.232 | -0.161 |
| Black | 0.076 | 0.265 | 0.267 | 0.073 | 0.260 | 0.144 |
| Female | 0.309 | 0.462 | 0.079 | 0.306 | 0.461 | 0.011 |
| Low Income | 0.228 | 0.419 | -0.443 | 0.238 | 0.426 | -0.577 |
| High Income | 0.478 | 0.500 | 0.016 | 0.494 | 0.500 | 0.366 |
| Missing Income | 0.043 | 0.202 | -0.249 | 0.029 | 0.169 | 0.251 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 0.013 | 0.114 | -0.183 | 0.013 | 0.115 | -0.313 |
| Low Income, Mixed Race | 0.057 | 0.232 | -0.051 | 0.057 | 0.233 | -0.116 |
| Moderate Income, Predominantly White | 0.151 | 0.358 | -0.124 | 0.164 | 0.370 | -0.224 |
| Moderate Income, Mixed Race | 0.250 | 0.433 | -0.064 | 0.245 | 0.430 | -0.144 |
| Moderate Income, Predominantly Minority | 0.067 | 0.251 | 0.018 | 0.056 | 0.230 | -0.005 |
| High Income, Predominantly White | 0.134 | 0.341 | -0.295 | 0.147 | 0.354 | -0.311 |
| High Income, Mixed Race | 0.215 | 0.411 | -0.255 | 0.219 | 0.413 | -0.267 |
| High Income, Predominantly Minority | 0.022 | 0.148 | -0.131 | 0.019 | 0.137 | -0.090 |
| Share of Units for Seasonal, Recreational or Other Use | 0.025 | 0.051 | -1.605 | 0.024 | 0.048 | -1.419 |
| Capitalization Rate | 0.067 | 0.028 | 0.991 | 0.067 | 0.029 | 0.776 |
| Turnover Rate | 0.169 | 0.076 | 0.372 | 0.166 | 0.075 | 0.170 |
| Denial Rate | 0.150 | 0.075 | -0.728 | 0.191 | 0.087 | -0.624 |
| Share Owner Occupied | 0.696 | 0.198 | -0.130 | 0.694 | 0.201 | -0.075 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 0.234 | 0.423 | -0.427 | 0.348 | 0.476 | 0.463 |
| **Private Securitization** | 0.070 | 0.256 | 0.758 | 0.019 | 0.138 | 1.041 |
| **Other Private Conduit** | 0.221 | 0.415 | 0.596 | 0.124 | 0.329 | 0.850 |
| **Commercial Bank, Savings Bank or Savings Association** | 0.053 | 0.225 | 0.293 | 0.052 | 0.221 | 0.835 |
| **Other Purchasers** | 0.218 | 0.413 | 0.298 | 0.224 | 0.417 | 1.094 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 0.234 | 0.423 | -0.706 | 0.348 | 0.476 | -0.175 |
| | | | | | | |
| **Higher Price Loan** | 0.246 | 0.431 | 1.177 | 0.135 | 0.342 | 0.132 |
| | | | | | | |
| **County House Price to Income Ratio** | 0.043 | 0.022 | -3.061 | 0.039 | 0.022 | -6.312 |
| | | | | | | |
| | **Intercept Only** | **Intercept and Covariates** | | **Intercept Only** | **Intercept and Covariates** | |
| **AIC** | 4,238,444.10 | 3,349,174.40 | | 1995742.3 | 1,843,175.70 | |
| **SC** | 4,238,457.30 | 3,354,808.60 | | 1995755.1 | 1,848,526.70 | |
| **-2 Log L** | 4,238,442.10 | 3,348,320.40 | | 1995740.3 | 1,842,337.70 | |
| **Pseudo R Squared** | | 0.210 | | | 0.077 | |

Notes: Most coefficients are significant at the .0001 level. Dummy variables for major lenders and for metropolitan areas are not shown. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.

## Figure A-5. Descriptive Statistics, Logit Coefficients, and Model Fit Statistics for Non-Owner Occupied Piggyback Lending Model

| | Non-Owner Occupied Piggyback Loan | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | | | 2007 | | |
| | Mean | SD | Coefficient | Mean | SD | Coefficient |
| Piggyback Loan Present | 0.108 | | | 0.058 | | |
| Intercept: Piggyback = 1 | | | -3.154 | | | -4.033 |
| | | | | | | |
| Borrower Characteristics | | | | | | |
| Hispanic | 0.094 | 0.292 | 0.205 | 0.083 | 0.276 | 0.276 |
| Asian | 0.065 | 0.246 | -0.179 | 0.052 | 0.223 | -0.093 |
| Black | 0.077 | 0.267 | 0.347 | 0.071 | 0.257 | 0.306 |
| Female | 0.231 | 0.421 | 0.090 | 0.211 | 0.408 | 0.130 |
| Low Income | 0.062 | 0.242 | -0.478 | 0.056 | 0.231 | -0.449 |
| High Income | 0.721 | 0.448 | 0.272 | 0.732 | 0.443 | 0.423 |
| Missing Income | 0.098 | 0.298 | 0.502 | 0.107 | 0.309 | 0.415 |
| | | | | | | |
| Neighborhood Characteristics | | | | | | |
| Low Income, Predominantly White | 0.019 | 0.136 | -0.065 | 0.021 | 0.142 | -0.287 |
| Low Income, Mixed Race | 0.101 | 0.301 | 0.007 | 0.104 | 0.306 | -0.055 |
| Moderate Income, Predominantly White | 0.134 | 0.341 | -0.075 | 0.153 | 0.360 | -0.075 |
| Moderate Income, Mixed Race | 0.271 | 0.445 | -0.013 | 0.260 | 0.439 | -0.051 |
| Moderate Income, Predominantly Minority | 0.057 | 0.232 | 0.044 | 0.054 | 0.226 | 0.007 |
| High Income, Predominantly White | 0.098 | 0.298 | -0.182 | 0.100 | 0.300 | -0.174 |
| High Income, Mixed Race | 0.157 | 0.364 | -0.090 | 0.154 | 0.361 | -0.069 |
| High Income, Predominantly Minority | 0.015 | 0.120 | 0.029 | 0.013 | 0.114 | -0.005 |
| Share of Units for Seasonal, Recreational or Other Use | 0.063 | 0.114 | -0.884 | 0.060 | 0.117 | -0.360 |
| Capitalization Rate | 0.075 | 0.032 | -0.287 | 0.074 | 0.033 | 0.065 |
| Turnover Rate | 0.185 | 0.082 | 0.307 | 0.175 | 0.078 | 0.032 |
| Denial Rate | 0.174 | 0.088 | 0.423 | 0.219 | 0.104 | -0.574 |
| Share Owner Occupied | 0.609 | 0.215 | 0.251 | 0.601 | 0.222 | 0.147 |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Secondary Market Sales Channel** | | | | | | |
| **Fannie Mae or Freddie Mac** | 0.197 | 0.397 | -0.152 | 0.293 | 0.455 | 0.671 |
| **Private Securitization** | 0.065 | 0.247 | 0.296 | 0.020 | 0.139 | 1.257 |
| **Other Private Conduit** | 0.198 | 0.399 | 0.855 | 0.094 | 0.292 | 1.298 |
| **Commercial Bank, Savings Bank or Savings Association** | 0.048 | 0.214 | 0.001 | 0.040 | 0.197 | 1.004 |
| **Other Purchasers** | 0.210 | 0.407 | 0.922 | 0.205 | 0.403 | 1.188 |
| | | | | | | |
| **Lender Type** | | | | | | |
| **CRA Institution Inside Assessment Area** | 0.268 | 0.443 | -1.031 | 0.391 | 0.488 | -0.533 |
| | | | | | | |
| **Higher Price Loan** | 0.209 | 0.407 | 0.361 | 0.200 | 0.400 | -0.302 |
| | | | | | | |
| **County House Price to Income Ratio** | 0.043 | 0.020 | -1.456 | 0.038 | 0.021 | -2.442 |
| | | | | | | |

| | **Intercept Only** | **Intercept and Covariates** | **Intercept Only** | **Intercept and Covariates** |
|---|---|---|---|---|
| **AIC** | 589,367.90 | 461,944.42 | 209475.0 | 188,901.09 |
| **SC** | 589,379.56 | 466,924.74 | 209486.1 | 193,539.22 |
| **-2 Log L** | 589,365.90 | 461,090.42 | 209473.0 | 188,063.09 |
| **Pseudo R Squared** | | 0.218 | | 0.102 |

Notes: Most coefficients are significant at the .0001 level. Dummy variables for major lenders and for metropolitan areas are not shown. Other purchasers include life insurance companies, credit unions, mortgage bankers, finance companies, bank affiliates, and the Farmers Home Administration.