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Working Paper No. 530

Changes in the U.S. Financial System and the Subprime Crisis

by

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ABSTRACT

This paper traces the evolution of housing finance in the United States from the deregulation of the financial system in the 1970s to the breakdown of the savings and loan industry and the development of GSE (government-sponsored enterprise) securitization and the private financial system. The paper provides a background to the forces that have produced the present system of residential housing finance, the reasons for the current crisis in mortgage financing, and the impact of the crisis on the overall financial system.

Keywords: Financial Instability; Mortgage Finance; Subprime Mortgages; U.S. Financial System

JEL Classifications: E12, E32, E58, E63

INTRODUCTION: MELTDOWN IN THE REAL ESTATE MARKET THREATENS THE U.S. FINANCIAL SYSTEM

Financial markets in the United States have recently been rocked by a crisis in real estate lending that has threatened the solvency of some of its largest global financial institutions. Losses to bank capital are already in the range of \$150 billion and a large number of specialized mortgage banking institutions have declared bankruptcy or been sold. Households in increasing numbers are defaulting on their mortgage contracts and foreclosures have been rising at alarming rates, rising 75 percent in 2007. The resulting decline in mortgage lending accompanied by sales of foreclosed properties has caused the price for the median existing single-family home to fall 6.5 percent in the year to December 2007, the first time in at least 40 years that median national home prices have fallen on an annual basis. In many major metropolitan areas the decline in prices has been in the 10 to 15 percent range.

This excess supply has driven sales of existing homes to their lowest level in 27 years and produced a decline in the sale of newly constructed homes of 26 percent in 2007. Forecasts are for another 15 percent decline in house prices in 2008, followed by an additional 10 percent decline in 2009. This means that market conditions are unlikely to return to normal levels before 2010.

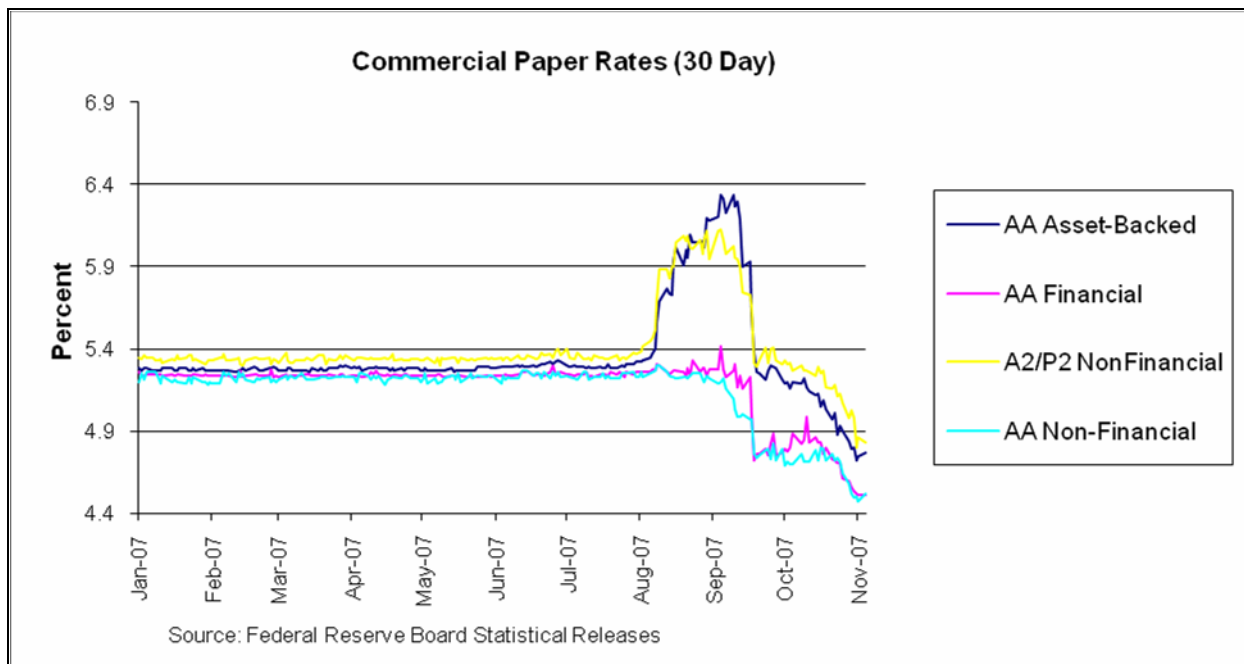
Further, there are indications that market weakness is spreading to the market for commercial real estate. Given the impact on important sectors such as construction, and on services such as realty agencies, legal offices, title and contents insurance, household removal, and do-it-yourself firms, this means that the weakness in the housing sector will have a negative impact on growth and employment for a number of years. In addition, the losses sustained by major banks have produced a sharp tightening of credit standards, meaning that finance for housing, as well as consumption spending, will further constrain recovery.

But, the United States has not been the only country affected. In the United Kingdom, Northern Rock, a major housing lender, suffered a bank run by its depositors and, after a failed search to find a buyer, has been closed. In Germany, a number of banks incurred losses from their investment in assets linked to U.S. mortgage lending. IKB bank has already received a capital injection and has subsequently reported additional losses that may lead to bankruptcy if another bailout is not arranged by the German government. In February, WestLB (a state-owned

German bank) received a capital injection of five billion euros from its owners, the state of North Rhine-Westphalia, to cover losses in subprime securities.

In both the United States and Europe the increased uncertainty over the credit worthiness of counterparties had led to a liquidity crisis in short-term money markets as banks seek to conserve liquidity and are increasingly unwilling to lend to bank counterparties. As a result, short-term credit spreads have risen to record levels. Tighter credit conditions have even spread to longer term credit markets; at the beginning of the year many banks providing market-making services in the covered bond market, which trades securities backed by the issuing bank (including the highest credit quality German Pfandbriefen), had threatened to close the secondary market because of doubts about counterparty credit quality. Indeed, many other countries that have experienced rapidly rising house prices now run the risk of following the U.S. market into decline and crisis.

Figure 1. Commercial Paper Rates (30 Day)



HOW DID THE REAL ESTATE CRISIS END THE POST-9/11 U.S. EXPANSION

Real estate has always been considered one of the least risky investments and financing home loans one of the least demanding of all financial occupations. Indeed, pundits used to describe the life of a banker at a savings and loan institution that financed residential home mortgages by the code 3-6-3. It signified “issue savings deposits at three percent, lend them out on thirty-year house mortgages at six percent, and be on the golf course by three o’clock.” With a government-guaranteed interest advantage compared to other financial institutions and the benefit of government support of the secondary market, all the banker had to do was learn to play golf to earn a safe and certain net interest margin of three percent.

The government played an important supporting role in this process by providing a secondary mortgage market through the Federal National Mortgage Association (known as Fannie Mae), which was created by the Roosevelt Administration in 1938. Fannie Mae is a government-owned corporation that buys mortgages outright from the banks that originate them. The conditions on mortgages eligible for purchase by Fannie Mae define what in the U.S. market are called “conforming” or prime mortgages. Government support of the housing market was restructured in 1968 through the introduction of the Government National Mortgage Association (Ginnie Mae), an official government agency that guarantees the timely payment of mortgages originated under special government mortgage support programs, such as loans to military veterans. Fannie Mae was transformed into a federally chartered, private corporation to support middle- and low-income housing with the same advantages (tax exemption and a special government credit line) as Ginnie Mae, but without a formal government guarantee for its liabilities. These changes were introduced in order to reduce the impact of government support for housing on the budget deficit. The Federal National Mortgage Corporation (Freddie Mac) joined Fannie Mae in 1970 and provides similar services. These institutions are now known as government-sponsored enterprises (GSEs).

The GSEs can borrow in private markets to fund their operations and after the reform they no longer had an explicit government guarantee on their liabilities, although an implicit guarantee has remained. The shift away from direct borrowing by the government required alternative sources of funding through sales to private investors. This involved the creation of bonds backed by specific mortgages, credit enhanced through overcollateralization. Since these

bonds involve no sale or conveyance of ownership of the mortgage collateral, they remain the general obligation of the issuer. Since the overcollateralization was relatively high they did not provide a definitive answer to the funding needs of either the thrifts or the GSEs. To meet these difficulties, a mortgage-backed security was created that sold (passed through) the income stream from a pool of mortgages to private market investors, such as institutions and insurance companies. These structures provided the basis for the development of the new financial instruments that have played a major role in the recent market crises.

THE END OF THE 3-6-3 WORLD

This safe and secure 3-6-3 world of real estate financing changed dramatically in the 1970s as the U.S. Congress started to deregulate the financial system, relaxing Federal Reserve Regulation Q that set the maximum interest rate that commercial banks could pay on deposits at zero, thus allowing commercial banks to compete for the deposits of the savings and loan banks. With deposit rates bid up by competition from commercial banks, but with their lending portfolios full of low, fixed interest rate, thirty-year mortgages, the safe and certain net interest margins of the 3-6-3 world quickly disappeared. As deposit rates rose above the rates on outstanding mortgages, many thrifts became technically insolvent. The remedy that was proposed allowed thrifts to invest in other, higher return financial assets, such as corporate bonds. Many failing thrift institutions bid up deposit rates (encouraged by investment bankers who brokered FDIC-insured deposits) to attract additional funds that were invested in these high risk corporate bonds, or in loans to real estate speculators that included the interest payments for the initial years of the loan and thus guaranteed profits. When the high-yield bond market revealed its true colors as “junk bonds” and the massive excess supply of housing units that had built up could not find buyers, the guaranteed profits dried up, the corporate bonds defaulted, and the thrifts had to face the inevitable and close their doors. The 3-6-3 banker of the Jimmy Stewart film “It’s a Wonderful Life” ceased to exist and the federal government set up the Resolution Trust Corporation to dispose of the housing assets of the failed mortgage banks.

But even before the collapse of the savings and loan banks, private financial institutions had been drawn to mortgage financing, driven by the belief that the thrift industry would not be capable of meeting the rapidly rising demand for housing finance. From the mid-1970s, private

investment banks sought means to complement the existing real estate financing facilities provided by the thrifts and the GSEs. As noted above, mortgage-backed bonds had a number of drawbacks that reduced their desirability as an alternative source of financing and investment bankers sought to remedy these difficulties. However, in difference from the savings and loan banks that financed and held mortgages on their balance sheets or sold them on to a GSE, investment banks and their broker-dealer desks were primarily interested in the creation of mortgage assets that could be traded. But, unlike a bond issued by IBM or General Motors, mortgages are not uniform. Each borrower has a different credit history, the collateral underlying each mortgage (that is, the house) is different, and each originator bank has its own underwriting criteria and documentation, so the problem was how to convert a group or pool of differentiated mortgages to create a security that could be traded like a bond.

According to Lewis Ranieri (2000), who pioneered the entry of investment banks into the mortgage industry:

“the goal was to create an investment vehicle to finance housing in which the investor did not have to become a home loan savant. He or she did not have to know very much, if anything, about the underlying mortgages. The structure of the deal was designed to place him or her in a position where, theoretically, the only decisions that had to be made were investment decisions. No credit decisions were necessary. The credit mechanisms were designed to be bullet-proof, almost risk-free. The only remaining questions for the investors concerned their outlook on interest rates and their preferences on maturities.”

BUILDING A MARKET FOR COLLATERALIZED RESIDENTIAL MORTGAGES

The first step in this process built on the mortgage-backed, pass-through security that provided the transfer of ownership of a pro rata share in underlying mortgages to the purchaser. Investors received certificates of ownership in a trust vehicle that held the mortgages. Issuers of pass-through instruments acted as a conduit for the investors by collecting and proportionally distributing monthly cash flows generated by homeowners making payments on their home mortgage loans. In difference from the mortgage-backed bond, the pass-through certificate represented a sale of assets to the investor, who also acquired the risk of prepayment or default. In 1977, Ranieri produced the first private mortgage-backed securities in Salomon Brothers

underwriting for Bank of America. Although it was a resounding failure (only 15 states recognized the securities as legal investments), it highlighted the legal, regulatory, and tax issues that had to be resolved to allow the full securitization of mortgages. In the short term a solution was found by using Freddie Mac since, as an authorized government agency, it was exempt from these issues. The first private pass-through securitization by Freddie Mac and Solomon Brothers was for Washington, D.C. thrift, Perpetual Savings. Since the standard pass-through structure used GSE-conforming standard thirty-year mortgages, the maturity of the securities was also notionally thirty-years. But, the prohibition of prepayment penalties for GSE-conforming mortgages meant that the maturity of the securities would generally be less than thirty years and variable, depending on the number of mortgages that were prepaid or refinanced as a result of a decline in market interest rates. Solving this problem required that the security was backed by more mortgages than the value of the securities backed by the mortgages; that is meant by what is called overcollateralization. The amount of this extra collateral could only be determined by being able to predict the prepayment rate on the mortgages. This restricted the potential sales of these securities to longer-term investors. Thus, in order to successfully securitize a mortgage, it was necessary to be able to predict the actuarial experience of defaults. Single-family homes have several elements that create an actuarial basis for evaluating mortgage assets and serve to enhance credit quality. First, unlike corporate bonds, the credit quality of mortgage pass-through securities improves over time. As the loan balance amortizes each month, the loan-to-value ratio declines, even if home prices remain stable. If there is any inflation, home prices should rise. This further improves the loan-to-value ratio. Additionally, the credit quality of mortgages of young borrowers tends to improve over time as their income rises and enhances their ability to service mortgages. On the other hand, changes in interest rates will have a direct impact on prepayment in order to refinance a mortgage. As rates decline, the incentive to repay the mortgage and refinance at a lower rate increases, while a rise in rates will reduce the prepayment and refinancing incentive.

These problems were resolved by separating the passed-through cash flows from the underlying mortgages into specific income flows of different maturity called “tranches.” In difference from simple pass-through securities, in which all investors share the risk of prepayment on a pro rata basis, these collateralized mortgage obligations (CMOs) redistributed prepayment risk among different classes or tranches with risk profiles ranging from extremely

low risk to significantly high risk. A top tranche was designed to be relatively immune to prepayment risk, while additional tranches would bear a higher share of the risk. Thus, the initial CMO structure was designed to provide more precise maturities than allowed by the standard pass-through, mortgage-backed securities. This was achieved with a sequential pay structure in which mortgage cash flows from the top or senior tranche would receive, say, a quarter of the periodic cash flows from the mortgages and have an average maturity of one to three years. The second tranche would receive the same share, but the cash flows would be distributed over an intermediate period of three to seven years. A third tranche would receive a quarter of the payments, spread over five to ten years, and a final tranche, often called the Z tranche, would receive the remaining payments, performing the function of an “accrual” bond with an average life of 15 to 20 years.

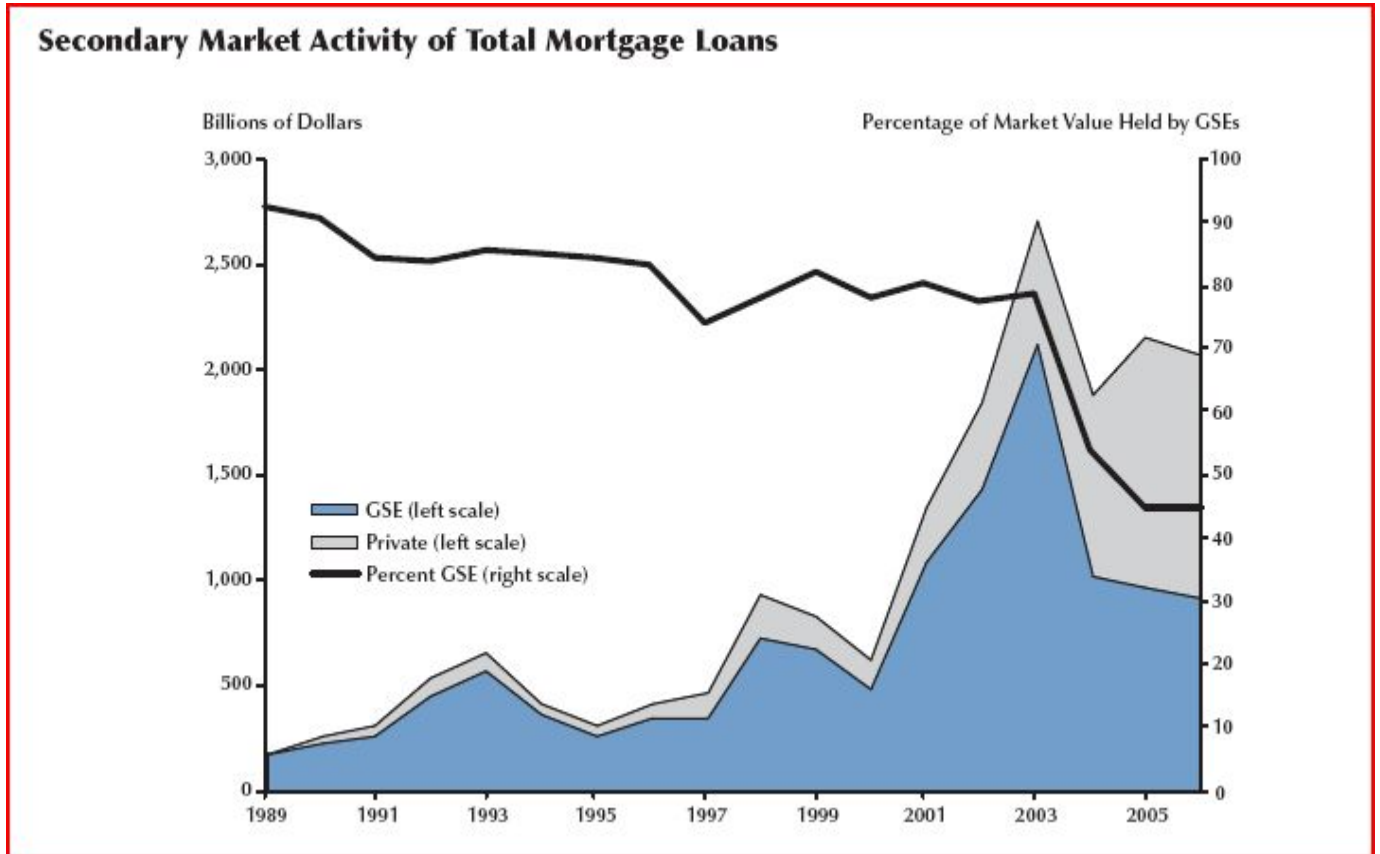
However, in this sequential pay structure, maturities were still sensitive to the departure of prepayment from the forecast rate of prepayment risks. The remedy to this problem was found in the creation of planned amortization classes, with the cash flows of each tranche protected from prepayment changes within certain limits. However, creating this “safer” set of tranches necessarily meant that other tranches, called “support” bonds, would be more volatile than the average of the underlying pass-throughs. While the planned maturity tranches were relatively easy to sell, finding buyers for the higher-yielding, less predictable support bonds has remained crucial for the success of the CMO market.

This redistribution of cash flows to specific tranches created a difficulty that required a reform of the tax code to ensure a tax-exempt structure for the securitization. This structure is called a real estate mortgage investment conduit (REMIC) and is now the dominant form of multiple-class, mortgage-backed securities. REMICs involve the creation, by the issuer, of a special-purpose entity designed to hold the mortgages as collateral and funnel payments of principal and interest from borrowers to investors. Unlike pass-through securities, however, which entail a pro rata share of ownership of all underlying mortgage cash flows, CMOs and REMICs convey ownership only of cash flows assigned to specific classes based on established principal distribution rules.

Just as the structured mortgage securities had resolved their difficulties, the thrift crisis broke out and the market for CMOs structured as REMICs quickly dominated the market. Thus, the finance of housing passed from the thrifts and the GSEs to private investment bankers. The

figure shows the increasing role of private mortgage financing through the private financial institutions relative to the GSEs.

Figure 2. Secondary Market Activity of Total Mortgage Loans



Source: McDonald and Thornton (2008)

AFTER SOME TWENTY-FIVE YEARS OF STABILITY, THE SECURITIZED MORTGAGE MARKET COLLAPSES

As already mentioned, mortgaged-backed securities were first experimented with in the 1970s by the GSEs and by the end of the end of the 1980s and the 1990s, private banks were active in the securitization of mortgages and eventually came to be a dominant force in the market without creating any major difficulties. How is it possible that after some twenty-five years of experience and stability in the financing of housing through securitized mortgages the market for securitized mortgages has brought the global financial system to the brink of collapse? Part of the answer is

to be found in the motivation behind the creation of these securitized mortgage assets. As noted above, the shift in dominance in the market from thrift institutions to private financial institutions shifted the market from one of “buy and hold” the mortgage for the income generated by the difference between deposit rates and lending rates to one of “trade” the securitized mortgage assets to generate income from the difference between buying and selling prices. While the savings and loan banker was on the golf course, he was presumably gaining information about his clients and potential borrowers. His major function was to assess the creditworthiness of his clients in order to reduce the default rate on his lending. On the other hand, the broker-dealer is only interested in turnover and trading volume. Since income is earned on the spread between the buying and the selling price and rapid turnover, credit assessment is not the major concern. Indeed, as noted by Ranieri (2000), the aim of securitization was to create an asset that could be traded without requiring credit assessment. Rather, it is the marketability of the asset that is crucial. This is why it was so important to create a bond with fixed coupon and maturity from the mass of differentiated mortgages that could be sold as a substitute for corporate bonds.

The second factor is that in the 1980s and 1990s, only investment banks and broker-dealers who were forbidden by Glass-Steagall Legislation from participating in the transactions system offering deposit accounts were involved in the creation of these assets. However, the Financial Modernization Act of 1999 that eliminated the segmentation of the U.S. financial system into commercial and investment banks and allowed the creation of bank and financial holding companies that could operate in virtually any line of business made it possible for commercial banks to operate directly in the origination and securitization of mortgages. These “bank holding companies” are generally limited to the business of banking, managing, or controlling banks, and other closely related activities. When a bank holding company’s subsidiary banks are “well capitalized” and “well managed” (as defined by U.S. banking regulations) and have satisfactory ratings under the U.S. Community Reinvestment Act, the holding may qualify a “financial holding company,” permitted to engage in a broader range of financial activities in the United States and abroad. These activities include underwriting and dealing in securities, insurance underwriting and brokerage, and making investments in nonfinancial companies for a limited period of time, as long as the company does not manage the

nonfinancial company's day-to-day activities and the company's banking subsidiaries engage only in permitted cross-marketing with the nonfinancial company.¹

Third, banks had made substantial profits during the 1990s from the underwriting and trading of dot-com companies and the associated boom in the stock market. The collapse of the dot-com bubble and the equity market caused a sharp reduction in earnings. In addition, the financial and accounting scandals surrounding Enron, World Com, Parmalat, and others, led retail investors to shift assets out of highly volatile equity markets towards what was considered the safest investment on earth—land and bricks and mortar. After the 1999 Modernization Act, financial holding companies seeking to replace their earnings from initial public offerings and brokerage in the dot-com bubble were happy to respond to the demand from investors for real estate assets.

Finally, as noted above, the mortgages funded by securitization shifted the beneficial ownership, and thus the risks, of the mortgages from the originator of the CMO to the buyers of the collateralized securities, leaving the originating bank with no risk exposure. This was important since the Basel Capital Adequacy requirements had made it more costly for banks to keep assets on their balance sheets. In a period of falling revenues after the collapse of the equity market in 2000, banks were thus seeking income that did not require additional capital. The mortgage market was ideal for this purpose, given the potential to increase income from origination of a mortgage, its securitization, servicing the securitized structure, providing insurance, etc. Thus, a financial holding company could have a special unit for the origination of mortgages, another to provide for the servicing of the mortgages (that is, the collection and transfer of interest and principal), another to provide for the creation of the mortgage-backed securities, another to set up and service the special-purpose entity that handled the securitization of the mortgages, and another to do the underwriting and sale of the mortgage-backed securities

¹ Bank and financial holding companies are regulated and supervised by the Federal Reserve Board. Their nationally chartered subsidiary banking units are regulated and supervised by the Office of the Comptroller of the Currency (OCC). Federal savings associations are regulated by the Office of Thrift Supervision and state-chartered depository institutions are regulated by state banking departments and the Federal Deposit Insurance Corporation (FDIC). The FDIC has back-up enforcement authority for banking subsidiaries whose deposits it insures. Subsidiaries of a financial holding are also subject to various securities and commodities regulations and capital adequacy requirements of the SEC and the self-regulated organizations, such as the New York Stock Exchange, in the jurisdictions in which they operate. Subsidiaries' are required to register as broker-dealer and investment advisers with the SEC and as futures commission merchants and commodity pool operators with the Commodity Futures Trading Commission (CFTC).

to final buyers, each charging fees and collecting commissions, leaving the bank with revenues that did not require regulatory capital.

The mortgages originated by the financial holding companies were pooled to create residential or commercial mortgage-backed securities. Independent financial entities and specialized mortgage banks also originated mortgages. The former sold their originations in a wholesale market to financial holdings or specialized mortgage banks for inclusion in their securitization programs. The securities originated by the bank or bought from other originators were then used as the collateral for special-purpose entities that issued the securitized capital market debt obligations. As noted above, the liabilities that were sold to investors were separated into different classes or tranches, each receiving a special claim of a portion of the principal and interest generated by the underlying mortgages.

SUBPRIME MORTGAGES AND REGULATORY ARBITRAGE

Thus, as financial holding companies and specialized mortgage banks increased their activities, their profits could only increase by increasing rates of mortgage origination. As the stock of prime borrowers who conformed to the GSE requirements were exhausted, new applicants for mortgages were sought. As in any market with a regulation, a regulatory barrier will create mispricing. The 1980s junk bond bubble was created by Michael Milken's discovery that because most fiduciary investors were limited to investment-grade assets, there was an excess demand for such assets relative to supply that also created an excess supply relative to demand for noninvestment grade bonds. Thus, investment-grade securities were overpriced and noninvestment grade securities were underpriced. Because of the investment-grade barrier the markets were not pricing risk appropriately and noninvestment grade assets were in fact less risky than their pricing suggested; buying such assets could thus produce above market returns.

The requirement for mortgages to conform to GSE conditions created a similar mispricing between prime, conforming mortgages and subprime and alternative nonprime mortgages. The primary attribute used to characterize loans as either prime or subprime is the credit score. Prime (or A-grade) conforming loans generally have FICO scores of 660 or higher, income ratios of 28% and 36%, and loan to value ratios (LTVs) less than 95%. Alt-A loans may vary in a number of important ways. Alternative A-grade loans typically have lower degrees of

documentation, are backed by a second home or investor property, or have a combination of attributes (such as large loan size and high LTV) that make the loans riskier. In particular, they will exceed the maximum size of \$417,000 for conforming loans and, in many cases, are not owner-occupied, that is they are used to finance rental property or are simply speculation on a rise in house prices. While subprime loans typically have FICO scores below 660, the loan programs and grades are highly lender-specific. Lenders will typically differ in classifying a loan with one considering a 620 FICO to be a B-rated loan, while another lender would grade the same loan higher or lower if the other attributes of the loan (such as the LTV) are higher or lower than average levels.²

The above-market return that could be made by originating or buying and securitizing such mortgages thus attracted financial institutions to this market. However, the shift in demand to this sector soon eliminated the above-market returns. However, lenders continued to seek out new mortgage borrowers in order to increase their fee and commission income. This soon led to a rapid decline in standards of the nonconforming mortgages that were included in the CMOs created by the larger financial institutions.

According to the first report of the State Foreclosure Prevention Working Group (2008),

“Weak or non-existent underwriting coupled with high levels of origination fraud combined to produce loans that had no reasonable prospect of being repaid. Rather, these loans were originated based on the assumption that housing appreciation would continue indefinitely and that when borrowers ran into trouble, they would refinance or sell. While this approach worked for a few years, when the inevitable leveling off and decline in housing prices began, the refinance option was cut off. Because many loans were originated without regard for the borrowers’ ability to pay, only in the last year have we begun to see the disastrous results of this reckless lending.”

² FICO scores are calculated and sold by the Fair Isaac Corporation. They were originally developed for applicants for credit cards and automobile loans, and they have virtually no history in assessing subprime borrowers. According to HSBC Finance Director Douglas Flint (quoted in the Wall Street Journal, February 8, 2007), “What is now clear is the FICO scores are less effective or ineffective’ when lenders are granting loans in an unusually low interest-rate environment.” According to the New York Times (Browning 2007), these scores were then used in automated underwriting programs, such as those developed by Edward N. Jones, a former NASA engineer for the Apollo and Skylab missions. Through his private software company in Austin, Texas, Jones and his son, Michael, designed a program that used the Internet to screen borrowers with weak credit histories in seconds. The old way of processing mortgages involved a loan officer or broker collecting reams of income statements and ordering credit histories, typically over several weeks. But, by retrieving real-time credit reports online and then using algorithms to gauge the risks of default, the Joneses’ software allowed subprime lenders “to grow at warp speed.”

Thus, the loans that were used as collateral on CMOs in the period starting around 2005 were increasingly of low quality, with virtually no credit assessment. Many loans were originated on the basis of the borrower's declaration of income, with no verification of income, assets, or employment.³ Such loans came to be called NINJA loans—because the borrowers had No Income, No Job, and No Assets. In order to make loans more attractive to such borrowers, originators would offer specialized repayment profiles called adjustable-rate mortgages. There were a number of varieties of these mortgages. The most common was a 2-28 or 3-27, in which the borrower was offered a low initial rate, which was within repayment capacity, but with an adjustment to the market rate after two or three years. Since this adjustment was to the market rate, plus a margin, it was possible for mortgage payments to rise even if market rates had fallen over the initial period. Other forms included adjustable-option mortgages in which the size of the mortgage could be increased rather than increase rates, or bullet mortgages that had payments determined by the amortization schedule for a thirty-year mortgage, but required full refinancing after a shorter period of ten years. Thus, fraud in documentation accompanied what were called “teaser” rates (rates below market for an initial period to induce higher mortgage underwriting volume), as well as higher fees and commissions. The table below shows the rapid increase in the share of subprime, adjustable-rate mortgage (ARM) loans after 2003, as well as the increase in loans with insufficient or absent documentation.

The impact of this effort to increase underwriting volume to borrowers who in reality had no possibility of meeting their repayments can be seen in the responses to the above-mentioned survey of mortgage servicers that reports that approximately 31% of the subprime loans that had not yet reached their initial reset date for adjustable mortgages were delinquent by thirty days or more. According to the report:

“This data shows that a significant number of homeowners with subprime loans are currently experiencing difficulty in paying their loan prior to any increase in monthly payment associated with payment shock (due to interest rate adjustment). This high delinquency rate for loans early in their loan term reflects the impact of weak underwriting and fraud in the subprime loan origination system. For example, over 21% of homeowners who will not experience their first payment reset until the third quarter of 2009 are already experiencing difficulty in making their mortgage payments.” (SFPWG 2008)

³ A full analysis of the evolution of the market can be found in Wray (2007).

Table 1. Subprime Home-Purchase Loans

	ARM Share	IO Share	Low-No-Doc Share	Debt Payments-to-Income Ratio	Average Loan-to-Value Ratio
2001	73.8%	0.0%	28.5%	39.7%	84.04%
2002	80.0%	2.3%	38.6%	40.1%	84.42%
2003	80.1%	8.6%	42.8%	40.5%	86.09%
2004	89.4%	27.2%	45.2%	41.2%	84.86%
2005	93.3%	37.8%	50.7%	41.8%	83.24%
2006	91.3%	22.8%	50.8%	42.4%	83.35%

Source: Freddie Mac, obtained from the International Monetary Fund
<http://www.imf.org/external/pubs/ft/fmu/eng/2007/charts.pdf>

If these mortgages that were increasingly the collateral for securitization after 2005 were in fact nonperforming from the time they were originated, the question then becomes how it was possible for the CMOs backed by these mortgages to be sold to final investors. Here the question of credit assessment becomes crucial. As already noted, the securitizations were created precisely in order to avoid the necessity for the buyers to be concerned about credit assessment. Nonetheless, most capital market investors who were buyers of these securitized assets were subject to the fiduciary requirements that prevented them from investing in noninvestment-grade assets.

CREDIT RATING AGENCIES AND CREDIT ENHANCEMENT—FINANCIAL ENGINEERING OR FINANCIAL ALCHEMY?

In order for such institutions to purchase these assets, an investment-grade rating from a nationally recognized statistical rating organization was required. It thus became common for financial institutions to consult with the rating agencies on the appropriate composition of the corpus collateral, as well as on the structure of the liabilities in their securitized mortgage assets. Thus, it was the credit rating agency that was called upon to provide the credit assessment of the subprime loans that were the collateral behind the CMOs. The rating was in part determined by the credit rating agencies' assessment of the statistical probability of the prepayment rate and the default rate of the underlying subprime mortgages. Although they initially relied on the models of the originating banks, the agencies eventually developed their own techniques, which were then sold to originators to structure their securitizations. However, the rating agencies had little

experience in assessing the credit-worthiness of structured assets, and the past history of the default and prepayment performance of such loans was short and limited to a period of expansion in which there were few defaults. Thus, one of the cardinal principles noted by Ranieri (2000) for the success of collateralized securitization, that is “to predict the actuarial experience of defaults,” was completely lacking. The credit ratings that were assigned were based on the design of the overcollateralization of the securitized assets, rather than on any assessment of the credit-worthiness of the borrowers of the underlying mortgages. Further, these assessments were based on insufficient data and experience in the performance of what was basically a new class of borrowers and a new asset class. As can be seen from the accompanying table, the experience of large quantities of subprime mortgages only dates from 2003, as does the expansion in the issue of subprime mortgage-backed securities.

Table 2. Mortgage Origination Statistics

	Total Mortgage Originations (billions)	Subprime Originations (billions)	Subprime Share in Total Originations (percent of dollar value)	Subprime Mortgage-Backed Securities (billions)	Percent Subprime Securitized (percent of dollar value)
2001	\$2,215	\$190	8.6	\$95	50.4
2002	\$2,885	\$231	8.0	\$121	52.7
2003	\$3,945	\$335	8.5	\$202	60.5
2004	\$2,920	\$540	18.5	\$401	74.3
2005	\$3,120	\$625	20.0	\$507	81.2
2006	\$2,980	\$600	20.1	\$483	80.5

Source: Inside Mortgage Finance (2007)

As noted above, the credit rating agencies were usually directly consulted in the design of the securitized assets and were primarily responsible for determining the appropriate overcapitalization or equity cushion that was considered to be investment grade. An issuer of a structured product would usually consult a number of rating agencies to find the agency that would grant investment grade with the lowest and least costly credit enhancement. Thus, a more conservative assessment of the risks by a rating agency would never become effective because it would not be chosen. And, as time went on without difficulties in the market, the more risk assessments by more conservative rating agencies would be revised to conform to the less conservative assessments that were being used by successful originators, in part to insure business and in part because the history of stability at these assessment levels seemed to confirm

the less conservative risk estimates as correct. This, along with the lack of statistical history on which to model the default characteristics of the assets, also contributed to the decline of the overcollateralization required of the structures (Adelson 2007).

ENSURING MARKETS FOR THE EXPANDING SUPPLY OF SUBPRIME COLLATERALIZED MORTGAGES

As the market expanded and the number of qualified borrowers declined, originators of CMOs started to experience a decline in demand for both of the top (or super-senior) tranches, as well as the intermediate tranches, of their securitized assets. Two different types of measures were taken in order to ensure sufficient demand for the growing number of collateralized subprime securitizations.

To ensure a market for the AAA-rated super-senior tranches, another set of special entities (known as structured investment vehicles or SIVs) was created to act as buyers of the senior securities of the collateralized mortgage obligations. These entities financed the purchase of structured assets (e.g., securitized credit card receivables or automobile loans, but predominantly collateralized mortgage obligations) through the issue of short-term, asset-backed commercial paper and medium-term investment notes, as well as subordinated capital. The same process of overcollateralization and subordination of tranches that was used for CMOs was used in creating these structures.

Additional credit enhancement was usually provided in the form of a guarantee from a monoline insurer or a credit-default swap written either by an insurance company or by the originating bank itself. Since the commercial paper that was issued by the SIVs was backed by investment-grade senior securities of collateralized loan instruments, it also received an investment-grade rating, and provided an attractive option for the short-term money market mutual funds that were offered to their clients by most financial institutions. For these structured vehicles, income was determined by the difference between the short-term money market borrowing rate and the higher interest rates on the senior collateralized mortgage securities. In effect, they represented borrowing short and lending long: the net interest margin income the banks had given up to concentrate on fees and commissions had now returned—but off the banks' balance sheet. Because this was old-style net interest rate spread income, the vehicles

were also highly levered. The banks that originated these vehicles benefited from the management and servicing fees, as well as the spread. These vehicles held not only credit risk, but also liquidity and interest rate risk; in particular, as the Fed tightened, the spread narrowed, and the sporadic inversion of the yield curve created the possibility of negative spreads.

In order to attract buyers for the intermediate or mezzanine tranches of the CMOs, banks started to employ credit enhancement in the form of commitments to repurchase the securities in the event of a decline in their value. These instruments, now known as “liquidity puts,” would thus bring the mortgages underlying the CMOs back to the banks in the event of a decline in market values. Banks also used monoline guarantees to provide credit enhancement, but when the supply of such instruments declined, banks were often forced to write credit default swaps themselves.

Finally, the demand for the residual tranches of the collateralized securities was generally sold to highly levered hedge funds, who had borrowed from the prime brokerage operations of the financial holding companies that originated the CMOs to finance their positions.

A MARKET BASED ON EVER-EXPANDING DEMAND MUST EVENTUALLY COLLAPSE

Thus, the subprime market was stable as long as an increasing number of new mortgages could be originated and prices of housing continued to rise in conditions of falling interest rates.⁴ However, the Federal Reserve started to reverse the accommodative monetary policy introduced after the stock market collapse and the terrorist attacks at just about the time that lenders started to loosen their lending standards. As delinquency rates started to increase in 2005, foreclosures also started to increase in 2006, placing pressure on house prices. As many of the adjustable rate mortgages written in 2005 reached their reset dates in 2007, both delinquencies and foreclosures increased and the rate of increase in house prices decelerated. Structures that were only viable in conditions of continually rising demand and prices started to have difficulties. In the summer of

⁴ This is formally what Hyman Minsky has called a “Ponzi” scheme and many commentators on the crisis have recalled the importance of Minsky’s ideas concerning financial fragility in understanding the unraveling of the mortgage market in subprime securities. However, the evolution of the crisis has a number of characteristics that distinguish it from Minsky’s explanation of the endogenous evolution of financial instability. See Kregel (2008).

2007, two hedge funds operated by a major independent investment bank reported substantially losses and eventually had to be closed despite substantial capital injections.

Mortgages that had been used to collateralize the structured mortgage obligations started to be returned to banks by buyers who had received liquidity puts. Since these obligations had not been reported on financial statements, markets were surprised by both the size of these exposures and the fact that the decline in their prices produced capital losses that drove many banks near or below the capital adequacy ratios required for their classification as well capitalized. As the market for CMOs quickly collapsed, financing institutions and mortgage banks found that they could not sell their shelf inventories of written mortgages that were waiting to be sold through collateralization, requiring them to report additional losses.

As house prices and the prices of the CMOs continued to decline, the credit rating agencies finally recognized that their investment-grade ratings for these securities had been excessively optimistic and started to downgrade the issues. As the ratings fell below investment grade, many investors who required investment grade had to sell them, further forcing down prices and reducing demand.⁵

The dramatic fall in prices and the sharp fall off in demand for the subprime-backed CMOs led to requests for the banks and the monoline insurers to meet their commitments to credit default swaps and guarantees. As it became clear that the insurers were unable to meet their commitments, credit rating agencies downgraded the monoline insurers. Since the point of getting monoline insurance on an issue was to acquire its investment-grade rating, this led to an automatic downgrading of even more CMOs, creating more selling pressure. With no demand this led to the fall in prices that eventually spread to European investors in these securities and the rapid rise in interest rate spreads, as no counterparty in the short-term money market could be considered credit worthy. In order to calm markets, major U.S. and European banks were led to borrow equity capital from sovereign wealth funds and foreign investors at above-market rates.

⁵ According to financial analyst Robert L. Rodriguez (2007), the global rating agency Fitch reported that their credit rating models were primarily determined by FICO scores and a continuation of the prior fifty-year experience of home price appreciation. Fitch admitted that if prices were to decline by 1 percent to 2 percent for an extended period of time, the model would break down completely and impair tranches as high as AA or AAA.

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