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Collapse of Fannie Mae and Freddie Mac

TESTIMONY

Before the House Committee on Oversight and Government Reform

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Executive Summary

Main Causes

I emphatically disavow the extreme partisan narratives for this crisis. To blame the Community Reinvestment Act for what happened is wrong. To blame financial deregulation for what happened is wrong. The narrative I present following this executive summary describes a combination of government failure and market failure.

I blame excessive securitization, induced by regulatory anomalies, particularly with regard to capital requirements. These anomalies were responsible for the unwarranted expansion of Fannie Mae and Freddie Mac as well as for bank participation in the phenomenon of private securitization of subprime mortgages.

I also blame mortgages with low down payments. Such mortgages encourage speculation and destabilize the mortgage market. With borrowers' equity consisting almost entirely of house price appreciation, in a rising market nearly anyone can buy a home; but when prices stop climbing almost no one can buy a home.

Finally, I blame what I call the “suits vs. geeks” divide. Financial engineers created instruments, including exotic mortgage securities and credit default swaps, that overloaded the mental circuits of industry executives and regulators.

Mortgage securitization is not inherently efficient. It owes its growth to anomalies in accounting and regulatory treatment.

When a bank originates a low-risk mortgage, why would the bank pay Freddie Mac a fee to guarantee that mortgage against default? Freddie Mac has no intrinsic comparative advantage in bearing the credit risk. However, in practice, the bank is able to reduce its capital requirements by exchanging its loans for securities. For bearing the exact same credit risk, Freddie Mac will be allowed by its regulator to hold less capital than the bank. With securitization, the credit risk goes to where the capital regulation is softest. If there were no regulatory differential, the bank might keep the loan in order to avoid the unnecessary transaction costs of securitizing it.

The regulatory anomaly is even more striking with high-risk loans. If a bank originates a high-risk loan, you would think that there is no way to avoid high capital requirements. However, it turns out that when the loan has been laundered by Wall Street, it can come back into the banking system in the form of a AA-rated security tranche. Most of the true risk is still there, but that risk is now hidden from capital requirements.

Letter-of-law Regulation is thwarted by financial innovation.

The unwarranted growth of mortgage securitization illustrates a problem known as regulatory arbitrage. Financial innovation interacts badly with what I call letter-of-the-law regulation. With letter-of-the-law regulation, we give financial institutions specific requirements, such as the precise asset weights used in risk-based capital for banks under the Basel agreement. We tell executives that as long as their institutions meet those requirements, they are fine. The problem is that with rapid financial innovation, firms are able to stay within the letter of the law while at the same time subverting the purposes of regulation and violating their responsibility to maintain safety and soundness.

I am not a lawyer, so I do not know if there is any plausible alternative to letter-of-the-law regulation. However, I wish that somehow the executives of financial institutions that rely on explicit or implicit government guarantees could be made to comply with the spirit of regulation. I wish that they took some sort of oath to protect taxpayers from risks, and I wish that violation of that oath carried with it serious penalties, including prison.

Suits vs. Geeks

In my opinion, the innovations in mortgage finance over the past twenty years have gone beyond the ability of industry executives and regulators to manage. Financial engineers and key decision-makers were not on the same page concerning the new financial instruments. This suits vs. geeks divide meant that executives were making decisions based on a distorted assessment of the risks involved.

Even now, Paul Volcker, Eugene Ludwig, Ben Bernanke, Henry Paulson, and other important public figures view the crisis through lenses that are very different from mine. To me, this is not a re-run of the bank failures of 1932, nor is it a rerun of the savings-and-loan crisis of 1980. There is a new transmission mechanism at work, particularly in the form of credit default swaps.

Implications

After the executive summary, I offer a history of mortgage securitization and the financial crisis. The implications of this history for policy are the following:

1. Mortgages with low down payments are conducive to speculation in housing. This is risky for individual homeowners and destabilizing for the market as a whole. The goal of broadening home ownership should be addressed in ways that do not encourage speculative purchases.

2. Securitization is not necessary for mortgage lending. On a level regulatory playing field, traditional mortgage lending by depository institutions probably would prevail over securitized lending. The mortgage market can function without Freddie Mac and Fannie Mae.

3. Bank capital requirements for sound mortgages are overly onerous. Reducing capital requirements for loans with reasonable down payments would help lower mortgage interest rates.

4. There were specific mistakes made in the management and regulation of Freddie Mac and Fannie Mae. When, as at Freddie Mac, the chief risk officer warns that your mortgage lending policies are ill-advised, I can think of more appropriate responses than firing the chief risk officer. Also, the regulation of Freddie Mac and Fannie Mae appears to me to have been emasculated, in large part due to the combination of heavy-handed lobbying by the two firms and Congressional meddling with the regulatory process. Certainly, performance could improve with better leadership and better regulation. However, the easiest way to prevent future problems at Freddie Mac and Fannie Mae would be to let the mortgage lending function revert to depository institutions.

5. The credit default swap is not a transaction that should be encouraged.

6. Financial innovation in general does not blend well with letter-of-the-law regulation. If financial executives cannot be punished for violating the spirit of regulations, then regulators will need to take a wary view of financial innovation. It can be difficult to distinguish innovations that provide genuine efficiency from those that serve mainly to facilitate regulatory arbitrage.

7. Policymakers appear to me to be relying too heavily on vague analogies with past crises in designing their response to the current situation. A policy that relies on rescues and bailouts strikes me as counterproductive. Such actions serve to speed up a de-leveraging process that needs to slow down, and they slow down a process of closing failed institutions that needs to speed up.

A Full Narrative of the Crisis

In a compelling fictional narrative, there are villains, victims, and heroes. One can give a compelling account of the financial crisis of 2008 containing such characters, but it would be fictional. A true villain has to know what he is doing. In the case of the financial crisis, key executives and heads of regulatory agencies were ignorant of what was happening until it was too late.

The primary candidates for the role of villain—the executives of banks, Wall Street firms, and insurance companies—did too poorly in the end to suggest willfulness. If these companies had done nothing but deliberately foist risks on others, they themselves would have survived. The fact that Bear Stearns, Lehman Brothers, and other companies took such large losses is indicative of self-deception.

My narrative of the crisis is one of a widespread gap between what people thought they knew and what was actually true. Executives had too much confidence in their risk management strategies. Regulators, too, had excessive confidence in the measures that they had in place to ensure safety and soundness of banks and other regulated institutions. The crisis was both a market failure and a government failure.

I will argue that some of the most important financial instruments implicated in the crisis, including mortgage-backed securities and credit default swaps, owed their existence to regulatory anomalies. In the way that they specified capital requirements, regulators gave their implicit blessing both to risky mortgages laundered through securitization and to treating a broad portfolio of risky assets as if it were a safe asset.

The financial structure rested on a housing bubble. A deep question is whether there are natural forces that always make an economy prone to booms and busts. If so, then had the boom and bust not occurred in housing and mortgage lending, it would have taken place elsewhere. Leaving that issue aside, the focus here will be on how the boom and bust occurred where it did.

Housing Industrial Policy

Housing and mortgage debt are heavily influenced by public policy. It might even be fair to say that housing is to the United States what manufacturing exports were to Japan in the decades following the Second World War—a sector viewed by government as critical for the health of the economy. Like manufacturing exports in Japan, housing in the United States has been the focus of industrial policy, in which government and private firms worked together to try to maintain continuous expansion. Increased home ownership and cheap, accessible mortgage finance were major policy goals, regardless of which political party held Congress or the Presidency.

This housing industrial policy can be traced back quite far. However, I will start in 1968, which was the year that mortgage securitization made its debut. In that year, Lyndon B. Johnson was an unpopular President fighting an unpopular war in Vietnam. Under the circumstances, having to ask Congress to increase the limit on the national debt always caused friction and embarrassment for the Administration. At the time, the national debt included the funds raised by government housing agencies. In 1968, the government found two ways to get this debt off its books.

The Federal National Mortgage Association, which had been created in 1938 to fill the void left by bank failures, functioned by purchasing home loans from independent originators known as mortgage bankers. Fannie Mae, as it was later called, acted like a giant national bank, financing mortgages from

all over the country. At that time, it did not issue any mortgage securities. Instead, it funded its holdings by issuing bonds, as an agency of the Federal government. To get Fannie Mae debt off its books, the government privatized Fannie Mae, by selling shares to investors. The government may have retained an implicit promise not to allow Fannie Mae to fail, but this implicit promise appeared nowhere on the government's balance sheet.

Selling Fannie Mae still left the government issuing debt to finance mortgages under loan programs of the Federal Housing Administration (FHA) and the Veterans' Administration (VA). To take these mortgage loans off the books, the Johnson Administration created the Government National Mortgage Association (GNMA), which pooled loans insured by FHA/VA into securities and sold them to investors. This meant that the government no longer had to issue its own bonds to finance these mortgages. However, the government continued to guarantee that FHA/VA mortgages would not default.

Mortgage securitization always has had two major advantages. One is that it permits accounting gimmicks, such as moving mortgages off the government books and thereby lowering the official national debt. We will see similar accounting tricks at work with every major surge in securitization.

The other major advantage of securitization is that it allows less-regulated firms to act more nimbly than depository institutions. When the regulated banking sector has been unable to satisfy mortgage demand, securitization has, for better or worse, stepped in to fill the gap. While the depository institutions (banks and savings and loan associations) have been restrained more firmly by state regulators or agencies in Washington, issuers of mortgage securities have been able to provide funds. Still, if the regulatory playing field had always been level, it is unlikely that securitization would have emerged.

Indirect Lending and Agency Costs

To understand the problems inherent with securitization, imagine that you are a bank executive faced with two alternative routes for obtaining mortgage loans—a direct route and an indirect route. In the direct route, your loans are originated by your own staff. You establish standards, policies, and procedures for loan origination. You choose the markets in which you would like to originate loans, and you will probably focus on communities where you know the local economy. You hire and train personnel to follow internal guidelines. Your compensation policies incorporate incentives for them to accept or reject applicants in accordance with company policy. Once the loan has been made, if the borrower misses a payment, your staff follows company procedures for contacting the borrower and resolving the problem.

In the indirect route, loans are originated by persons unknown to you, following guidelines established by someone else. The loans may come from communities with which you are totally unfamiliar. The originators may very well be paid on commission, which they can only receive if they close a loan—never if they reject an applicant. If the loan gets into trouble, you will have no control over how the delinquency is handled.

No sane bank executive would choose the indirect route over the direct route. In economic jargon, the “agency costs” of the indirect route are prohibitive. The originators of mortgages in the indirect route are operating under incentives that are contrary to the bank's interest. The misalignment of incentives between the bank and those acting as its agents in the indirect route will force banks to incur additional costs to monitor and review the work of the originators. Even with most diligent efforts, the bank is

likely to incur higher losses from defaults, as originators squeeze bad loans through the cracks of the bank's monitoring systems.

It is surprising, therefore, that as of 2008, nearly three-fourths of mortgage debt in the United States had been originated using the indirect method. To reach this point required a combination of Wall Street ingenuity and regulatory anomalies.

Some of the ingenuity involved finding an intermediary to bear the risk of mortgage loan defaults. For example, GNMA securities are guaranteed by the government, with the default risk on the mortgages ultimately borne by FHA. As we will see, the concept of guaranteed securities spread to other types of mortgages, although the quality of the guarantees became suspect during the crisis period in 2008. Without the guarantees—or the apparent guarantees—indirect lending would not have been possible. Even with guarantees, there was nothing cost-effective about indirect lending. The main cost advantages of securitization came from accounting and regulatory anomalies.

The Growth of Securitization

In 1970, there were many regulatory constraints hampering savings and loans (S&L's, also known as thrifts), the dominant mortgage lenders at the time. Their deposit interest rates were limited by government-set ceilings, under what was known as Regulation Q. Because of ever-rising inflation, market interest rates were much higher than Reg Q ceilings, and the thrifts were soon to be starved for funds. Nimbler, less regulated competitors—money market funds—siphoned money away from retail deposits.

Thrifts in California were particularly frustrated by a shortage of funds. At the time, depository institutions could not operate across state lines, and the relatively abundant savings in the Eastern United States could not reach the West.

To address the mismatch between savings in the East and mortgage demand in the West, Congress established Freddie Mac, with a goal of creating a national “secondary market” in mortgages. Freddie Mac was placed under the Federal Home Loan Bank Board, the agency that had oversight of the savings and loans. Unlike the thrifts themselves, Freddie Mac could move funds from one coast to the other. For example, Freddie Mac could bundle mortgage loans originated by a thrift in California into securities that Freddie Mac could sell to a thrift located in New York.

Freddie Mac was able to do what the thrifts themselves were not able to do because of regulation. Had Regulation Q not been in effect, California thrifts could have increased interest rates on deposits to attract sufficient funds to allow them to meet mortgage demand using the direct method of lending. Alternatively, if restrictions on interstate banking been lifted, a multi-state holding company could have channeled excess savings from its banks in the East to be used for mortgage loans by its banks in the West without resorting to indirect mortgage origination.

To make the secondary mortgage market efficient, Freddie Mac stepped in to guarantee security-holders against mortgage defaults. If a mortgage in a Freddie Mac security stopped making payments, Freddie Mac stepped in, pulled the mortgage out of the pool, and paid investors the full principal due on that mortgage. At that point, Freddie Mac would attempt to recover as much as it could through the foreclosure process.

My Freddie Mac Experience

Freddie Mac's role as guarantor of the mortgages that it securitized required a large and intricate operation to monitor, manage, and price mortgage credit risk. I became part of that operation, joining Freddie Mac in December of 1986. I spent much of my first few years there helping to implement a mortgage pricing model developed by Chester Foster and Robert Van Order (Foster, Chester and Robert Van Order, 1984, An option based model of mortgage default, Housing Finance Review 3, no. 4, 351-372.), two economists who joined Freddie Mac after working for the Department of Housing and Urban Development. The pricing methodology employed simulations of a variety of paths for house prices, with default probabilities depending on the house price scenario as well as characteristics of the mortgages. For example, loans for investment properties or for cash-out refinances had higher default risk than loans for owner-occupied purchases. Loans with low down payments had higher default risk than loans with higher down payments.

L*ate in 1989, I shifted to a different position at Freddie Mac, where I helped implement its quality control sample. Because loans were being originated by third parties, Freddie Mac operated a large division devoted to monitoring the performance of these loan sellers. The quality control process selected a sample of loans for re-underwriting by Freddie Mac staff. Re-underwriting was costly both to Freddie Mac and to originators, so the idea of the sample was to try to select a minimum number of loans for re-underwriting in such a way as to identify originators who were failing to properly screen loan applicants and property characteristics. This was just one of the processes that Freddie Mac needed in order to compensate for the misalignment of incentives that exists in securitized lending.*

In the early 1990s, I took on another task at Freddie Mac, which was to look into ways to automate the underwriting of loans. We came to realize that credit scoring had a number of advantages over human underwriting. It was cheaper, and the statistical methodology behind the scoring system made fewer errors—it rejected fewer good borrowers while accepting fewer bad borrowers. Finally, from the standpoint of indirect lending, switching from human underwriting to credit scoring based on data held by the large credit reporting services helped to eliminate one of the potential sources of misrepresentation on the part of loan originators, because they no longer had control over credit underwriting. Ironically, the gains in efficiency that credit scoring produced also set the stage for private securitization, in which Wall Street firms were able to make inroads into the mortgage market and threaten the dominance of Freddie Mac and Fannie Mae.

When I was at Freddie Mac, there was hardly any gap between the suits and the geeks. The Foster-Van Order model of mortgage default was ingrained in the corporate culture. The CEO, CFO, and other key executives understood this model and its implication that mortgage defaults would be much higher for mortgages with low down payments. Moreover, the suits bought into the idea of using a stress test to set capital requirements. Using a stress test methodology, in which mortgages are evaluated according to how well they would survive a downturn in house prices, the capital required to back mortgages with low down payments is prohibitively high.

When a new CEO came to Freddie Mac in 2003 (several years after I had left), a gap apparently opened up between the suits and the geeks. Warnings issued by the Chief Risk Officer and others about low down payment mortgages were ignored by the CEO.

The decade of the 1970's was not kind to the savings and loan industry. With inflation out of control, market interest rates steadily rose. Relaxation of regulation Q interest rate ceilings proved to be a mixed blessing, to say the least. Although it enabled thrifts to raise interest rates to stem the loss of deposits, it raised their cost of funds above the rates that they were earning on mortgage loans originated in prior years, when inflation and interest rates had been lower.

In the late 1970's, Lew Ranieri and Robert Dall, two executives at the bond-trading firm of Salomon Brothers, created a vision of a U.S. mortgage market dominated by securitization, which would enable investment banks to participate in the largest credit market in the world. With the thrift industry on the ropes, their timing was good. However, it took a combination of luck and intentional lobbying to shape the playing field in order to fulfill their vision.

Starting in 1980, newly appointed Federal Reserve Chairman Paul Volcker decided to break the back of inflation with contractionary monetary policy. Interest rates soared to double-digit rates, and many thrifts became insolvent. However, before they were shut down by their regulators, many thrifts made one last desperate effort to borrow money to stay in business.

The S&L's wanted to use their mortgage assets to raise cash, but they did not want to sell those mortgage assets. Under accounting rules that prevailed at the time, the thrifts were allowed to record their mortgage assets as if they had not declined in value. In fact, in an environment where new mortgages were being originated with interest rates of 12 percent, an old mortgage that carried a 6 percent interest rate and a $100,000 outstanding balance was worth approximately $50,000. Selling such loans would mean recognizing the losses, which would expose the negative net worth of the institution, which in turn would force regulators to shut it down.

(At the time, some academics were arguing that thrifts should have been shut down regardless. Their point was that under market-value accounting, they should have recognized the losses on their mortgage loans even if they held them. However, market-value accounting was novel and unpopular—only after the crisis had passed was market-value accounting widely adopted by banking regulators around the world.)

In summary, without selling mortgage loans, the thrifts could not raise cash to operate. On the other hand, if they sold the loans, they would have to recognize losses on the assets. The thrifts appeared to be in a trap.

Wall Street proposed a solution. They created a new security program at Freddie Mac, called Guarantor. Under this program, a thrift would exchange a package of its old mortgages to Freddie Mac for a security backed by those mortgages. The security could then be used as collateral for borrowing by the thrift. Freddie Mac earned a fee (as high as two percent) for engaging in this purely paper transaction. Wall Street firms earned fees finding institutional investors to lend to thrifts, with the securities as collateral. The losers, ultimately, were the taxpayers, since most of the thrifts ultimately still went bankrupt, having been bled by the fees and having made further unsound investments.

The key to the Guarantor program was a regulatory accounting ruling, much sought after by all parties, that the exchange of mortgages for a security backed by those mortgages did not require the thrift to write down the security to market value. Even though the loans that the thrifts received from institutions were based on market values, rather than book values, the thrifts were allowed to keep the securities on their books at fictional book values. Without this peculiar accounting treatment, Guarantor would not have gotten off the ground. Instead, thanks to regulators' tolerance of an

accounting fiction, Guarantor became a large program at Freddie Mac. Fannie Mae, seeing the profit opportunity, entered the mortgage security business with its own version of Guarantor, called Swap.

Up to this point, Fannie Mae and Freddie Mac operated differently from one another. Freddie Mac primarily bought loans from thrifts, packaged the mortgages into securities, and sold the securities to investors. Fannie Mae primarily bought loans from mortgage bankers and held them in its portfolio, financed by debt. Thus, Fannie Mae took interest rate risk as well as mortgage credit risk.

In 1988, Freddie Mac stock was divided among thrifts. In 1989, the stock was made available to the public on the New York Stock Exchange, thus privatizing the agency just as Fannie Mae had been privatized twenty years earlier. In its new form, Freddie Mac adopted and increasingly implemented Fannie Mae's strategy of buying loans for its portfolio, funded with debt.

Capital Requirements Advantage GSE's

By 2003, Freddie Mac and Fannie Mae together held 50 percent of the mortgage debt outstanding in the United States. Depository institutions could no longer compete effectively with the two companies, known as Government-sponsored Enterprises, or GSE's.

The key competitive advantage of the GSE's involved capital requirements. Banks are required to hold 8 percent capital against risk-weighted assets. In 1989, the United States adopted requirements developed by the Bank for International Settlements. These are known as the Basel I agreements, because the BIS is located in Basel, Switzerland. Under Basel I, mortgage loans have a risk weight of fifty percent, so that the capital requirement for a mortgage loan would be 4 percent. More refined capital requirements, known as Basel II, allow low-risk mortgages, with down payments of more than 40 percent, to receive a risk weight of 20 percent, while loans with down payments of 20 to 40 percent have a risk weight of 35 percent.

For mortgage loans with a down payment of 20 percent or more, bank capital requirements are much higher than they are for Freddie Mac and Fannie Mae. Freddie Mac and Fannie Mae are subject to different regulations. In practice, their ratio of capital to assets was less then 3 percent, which was well below that of banks.

The GSE's capital requirements were based in part on a stress test. They were supposed to hold sufficient capital to be able to withstand a decline of housing prices comparable to a severe historical recession. Whether this stress test was calculated properly for the portfolio of high-risk loans that the firms acquired starting in around 2004 is questionable. However, for loans with substantial down payments made to credit-worthy borrowers, the capital requirements for the GSE's were more accurate than the crude requirements given to banks. For an analysis of how risk weightings create regulatory arbitrage and artificially boost mortgage securitization, see the paper "Risk-Based Capital Requirements for Mortgage Loans," by Paul S. Calem and Michael Lacour-Little.[1]

As of 2003, the capital requirements were an anomaly that artificially restrained depository institutions from competing effectively with the GSE's. However, capital requirements were not yet a source of instability in the banking system. Problems in the banking system developed only when securitized sub-prime mortgage lending took off.

[1] See: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=295633.

Private Securitization

By 2004, a number of market developments caused the emergence of a significant segment of mortgage loans with low down payments, originated by mortgage brokers and securitized by Wall Street firms. These mortgage securities are called private securities, to distinguish them from securities issued by the GSE's.

Private securitization reached for a segment of the market that was considered too high-risk by the GSE's. That segment included borrowers with impaired credit or with income levels that historically would have been considered too low to qualify for the housing expenses being incurred. This so-called sub-prime market was dominated by private securitization.

One of the developments that promoted private securitization was credit scoring. In the late 1990's, credit scoring had replaced human underwriting at the GSE's. In addition to being inexpensive and reasonably accurate, credit scoring helped to reduce the agency costs associated with indirect lending. A credit score is objectively calculated by an independent specialty firm (Fair, Isaac is the most well known), which takes away the concern that a third-party underwriter could be hiding flaws in the borrower's credit history.

Another development was the concept of risk tranches. The cash flows from a pool of mortgages could be divided in such a way that all of the first, say, 5 percent, of mortgage defaults would be borne by the subordinate security, with senior securities insulated from that portion of default risk. Insulated in this way, senior securities were able to earn AA or AAA ratings from agencies, which in turn made those securities eligible to be held in institutional portfolios. For example, a bank could hold a AA security and have it receive a 20 percent risk weight.

In reality, a senior security backed by sub-prime mortgages with down payments of less than 5 percent was much more likely to suffer losses than a prime mortgage with a 20 percent down payment made by the bank. But even under Basel II, capital regulations gave a 20 percent risk weight to the security and a 35 percent risk weight to the safe mortgage loan. The regulators were telling the banks to prefer securities backed by someone else's junk loans over safe loans originated directly by the bank.

The AAA and AA ratings of mortgage securities have come under fire. Relative to those ratings, the actual performance of the securities has been dismal, and a Congressional hearing in October uncovered internal memos in the agencies warning that the ratings were inaccurate. The problems with the ratings are discussed extensively in a paper by Joshua D. Coval, Jakob W. Jurek, and Erik Stafford. They cite evidence that at least one of the rating agencies, Fitch, did not even consider the possibility of house price declines when it rates mortgage securities.[2]

Economists report that large Wall Street firms had internal models of mortgage default risk that showed that an AAA-rated mortgage security was far riskier than a AAA-rated corporate bond. These risk models were used by sophisticated investors to value mortgage-backed securities. On the other hand, the ratings made a difference to less-sophisticated investors, particularly banks, given the incentives created for the latter by capital requirements.[3]

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[2] See: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1287363

[3] See the September 15, 2008, press briefing of the Shadow Financial Regulatory Committee, http://www.aei.org/events/eventID.1790/event_detail.asp.

Innovation Feeds a Bubble

The financial innovations of credit scoring, senior-subordinated private mortgage securities, and loans with low down payments served to broaden the mortgage market. As more households became able to borrow, the demand for homes expanded and prices rose. At first, this had the effect of reducing mortgage defaults.

A homeowner's equity consists of the down payment plus any price appreciation that has taken place since the home was purchased. When that equity is positive, a borrower who finds it difficult to make the payments on a home will either sell the house or refinance it with a larger mortgage rather than default.

As long as house prices were appreciating, the performance of mortgage securities was excellent. This encouraged more lending, which encouraged more home purchases, which in turn fed into faster house price appreciation. Much of the new home buying was speculative. Over 15 percent of home loans in 2005 and 2006 went for non-owner occupants, meaning that they were bought for investment purposes. This was more than triple the rate of investor loans that were made a decade earlier.[4] Economist William Wheaton estimates that the housing stock grew by six percentage points more than the number of households, as the speculative demand for housing boosted production.

Policymakers encouraged this burst of housing speculation. Enforcement of the Community Reinvestment Act for banks and the "affordable housing goals" for the GSE's meant that these companies had to make sure that a sizable percentage of mortgage loans went to low-income borrowers, even as the run-up in house prices was increasing the ratio of median home prices to median incomes. While traditional rules of thumb suggested that a house price should be no more than three times the borrower's income, in some California counties the ratio of price to income approached ten.

Pressed to meet their "affordable housing" goals, the GSE's for the first time began to back sub-prime loans and other mortgages with low down payments. Despite internal warnings that these purchases threatened the safety and soundness of Freddie Mac and Fannie Mae, the two companies took on unprecedented exposure to credit risk. Under the stress test methodology, the mortgages that the GSE's were now guaranteeing would have required much higher levels of capital than traditional mortgage loans. However, concerned with not diluting earnings, the companies postponed raising the capital needed to restore compliance with the stress tests.

Freddie and Fannie were never the dominant high-risk lenders. Nonetheless, they took on more risk than they should have, with less capital than was prudent. Had they maintained a focus on safety and soundness and stayed out of high-risk lending, the firms would have done less to inflate the house price bubble. Freddie and Fannie would be in good shape now to pick up the pieces of the faltering private securitization market. Instead, the two firms themselves required a taxpayer bailout.

Suits vs. Geeks

The conflict between executive decisions and internal warnings at Freddie Mac and Fannie Mae was an example of what I call the "suits vs. geeks" divide. The geeks were staff who used statistical models to predict mortgage defaults under alternative scenarios and to translate those simulations into values of

[4] See "The 2006 HMDA Data," by Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner, Federal Reserve Bulletin, December 2007. http://www.federalreserve.gov/pubs/bulletin/2007/pdf/hmda06final.pdf.

various mortgage securities. The suits were executives with decision-making authority. Often, the geeks saw lower values and higher risk in the securities than the suits, but the suits were in charge of setting corporate portfolio policy.

Innovative financial instruments, such as senior-subordinated structures for private mortgage securities, were understood by financial engineers (the "geeks" as I term them). They were understood less well by executives and major policymakers (the "suits"). The geeks regarded the AA and AAA designations by the rating agencies as faulty. The suits took the ratings as reliable.

Geeks watched suits develop ever-increasing confidence in quantitative risk management, including credit scoring and bond default modeling. The latter was used to create the market for credit default swaps, which will be discussed below. Once their initial skepticism was overcome, suits became excessively confident in quantitative risk modeling. Only when the crisis came did the suits renew their skepticism about the risk models.

The geeks treated mortgage securities as having embedded put options that were very close to being in the money. That is, the security-holder has effectively sold mortgage borrowers an option to default. Borrowers are more likely to exercise that option if their equity in the home is negative, in which case the option is in the money. When initial down payments are low, it only takes a small decline in home prices to make the default option in the money. This option to default will be exercised particularly aggressively by non-own-occupants (recall that the rate of investor loans had tripled by 2005 and 2006 to over 15 percent of all mortgages).

The suits treated mortgage securities as bonds, ignoring the power of the embedded options. In August and September, when policymakers began to perceive the severity of the crisis, the suits thought that mortgage securities could not possibly have lost as much value as their market prices indicated. Federal Reserve Board Chairman Ben Bernanke insisted that if the securities were "held to maturity" that they would have higher values. Treasury Secretary Henry Paulson proposed to have the government buy and hold these securities in order to "unclog" the financial system. However, this thesis, which in effect was arguing that the geeks had mispriced mortgage securities, proved to be incorrect. The banks that had invested heavily in these securities were truly under-capitalized. The mistakes had been made by the suits, not the geeks.

A Complex Phenomenon

Overall, I would describe the housing and mortgage credit bubble as a complex phenomenon that emerged for a number of reasons. I would assign much of the blame to the growth of securitization, which in turn was affected by a number of regulatory anomalies, notably capital requirements that favored securities backed by risky mortgages over ordinary direct mortgage lending, even when the latter included loans with sizable down payments.

I would assign another large share of the blame to the emergence of a large volume of mortgage loans with low down payments. This created a situation in which housing equity consisted largely of price appreciation. That accentuated the housing cycle, because with no money down almost everyone can buy a home when prices are rising and almost no one can buy a home when prices stop rising.

Finally, I would assign some blame to the "suits vs. geeks" divide. Knowledge of mortgage credit risk and the behavior of mortgage securities was separated from power over portfolio decisions. The executives who took on mortgage credit risk at banks, insurance companies, and the GSE's did not fully

appreciate the chances they were taking. The financial engineers who were responsible for the creation and pricing of complex mortgage securities did not educate key executives or heads of regulatory agencies about the true nature of the new products. It was easier to let everyone believe that securitization reflected the "genius" of Wall Street, when in fact it was a more dubious process artificially stimulated by regulatory anomalies.

Credit Default Swaps

A number of commentators have pointed out that the loss of market value at financial institutions appears to substantially exceed the markdown in housing values. I believe that credit default swaps played a major role in causing this loss multiplier effect.

With a credit default swap, the buyer of a swap pays a regular fee equal to a percent of the bond's principal value. The seller of a swap agrees that in the event of a default, the seller will purchase the bond from the swap buyer for its full principal amount. Thus, the credit default swap acts like an insurance policy on the bond.

Credit default swaps were traded privately, with investment banks acting as dealers. That meant that there was counterparty risk. Counterparty risk is when one party to a contract could default on that contract. In particular, the buyer of a credit default swap has to worry about whether the seller will truly make good in the event that the bond default occurs. Counterparty risk is an issue, but below I will argue that it is *not* the main problem with credit default swaps.

[As the credit default swap market grew, some policy experts recommended that swaps should be traded on an organized exchange. Exchanges, such as the Chicago Mercantile Exchange (where commodity contracts are traded) or the New York Stock Exchange (where stocks are traded), eliminate counterparty risk.

For example, suppose that we are talking about corn for delivery in three months. A large food processor might contract with a specific farmer March to deliver corn in August. That would involve counterparty risk, where either the farmer or the food processor might default in August.

Instead, the food processor might buy corn futures on an organized exchange. Meanwhile, the farmer might sell corn futures on the exchange. The farmer and the food processor are no longer on opposite sides of the transaction. Instead, each is making a separate transaction with the exchange. If the farmer defaults, it is the exchange that bears the cost, not the food processor. It is up to the exchange to set up margin requirements, capital requirements, and eligibility rules to protect itself from defaults.]

In my opinion, the problem with credit default swaps is not counterparty risk. The problem is that there is no natural seller of default swaps. With corn futures, there is a natural buyer (the food processor) and a natural seller (the farmer). With credit default swaps, there is a natural buyer (the holder of a risky corporate bond), but there is no natural seller. Without a natural seller, I doubt that an organized exchange can work. The exchange has no way of ensuring that its parties can meet their obligations, except by imposing impossibly stringent requirements for capital or collateral.

In practice, the sellers of credit default swaps are relying on two strategies, neither of which is really sound. One strategy is diversification. That means that a large seller, such as an insurance company, will have many swaps outstanding, but only a few defaults will occur at a time. The analogy would be with a large life insurance company, which can presume that only a small fraction of policyholders will

die at any one time. However, the crisis of 2008 made a mockery of diversification, as the threat of defaults became widespread.

Once again, capital requirements give rise to an anomaly. One way to think about credit default swaps is that some quantitative financial engineers believe that a diversified portfolio of B-rated bonds can have lower risk and a higher reward than a lone AA bond. However, this diversification is not recognized by bank capital regulations. If the financial engineers are correct, then there is a profit opportunity for a AAA-rated insurance company to insure B-rated bonds held by banks, allowing banks to sneak B-rated bonds past regulators and allowing the insurance company to benefit from the diversification strategy.

The anomaly is that bank capital requirements make no allowance for gains from diversification, while they accept the insurance company's guarantee as legitimate. This is inconsistent. Either a portfolio of B-rated bonds truly can have lower risk than a lone AA bond, in which case bank capital requirements should say so; or else the claim is false that a portfolio of B-rated bonds has low risk because of diversification (the risks may in fact be highly correlated), in which case the capital requirements should recognize that under adverse circumstances the insurance company that sells the credit default swap may not be able to fulfill its obligation. If the seller of the credit default swap is likely to fail to perform in crisis, that in turn means that banks should not be able to lower the capital required to hold B-rated bonds by purchasing credit default swaps.

In other words, with consistent capital regulations, diversification either does or does not substantially reduce the risk of low-rated bonds. If the risk is truly diversified away, then banks can undertake the diversification themselves. If the risk is not truly diversified away, then having an insurance company undertake the diversification does not reduce the risk to banks of holding those bonds.

Apart from diversification, another strategy for selling credit default swaps is dynamic hedging. Suppose that the seller of a default swap on a bond issued by XYZ Corporation starts to suspect that the probability of a default on that bond is increasing. The seller can hedge its risk by selling short either XYZ Corporation stock or other XYZ Corporation bonds. In the event of a default, the loss that the seller will take by having to purchase the defaulted bond at par will be offset by the gains on the short-selling.

The problem with dynamic hedging is that it only works in a relatively stable market, in which few others are attempting similar strategies. When everyone is trying dynamic hedging at once, the result is a wave of short-selling that overwhelms markets.

Overall, then, if dynamic hedging is used by sellers of credit default swaps, they generate systemic risk. The individual swap sellers form contingency plans which, in the aggregate, are not compatible. When swap sellers perceive an increase in risk, they all seek to short securities simultaneously, creating the equivalent of a bank run. This run would occur just as easily if swaps were traded on an exchange as if they were traded over-the-counter.

Another systemic issue with credit default swaps is that they are subject to liquidity risk, even if the fundamental calculations of default risk are correct. Credit default swaps are like options that start out deeply out of the money. Initially, the probability of default might be thought to be much less than 1.0 percent. The seller of the swap is thus collecting a fee for selling a put option that is very unlikely to be exercised.

Because the put option is so far out of the money, its value can change even if it remains well out of the money. That is, if the probability of default goes from one in ten thousand to one in one hundred, the value of the swap goes way up (meaning that the seller's net worth goes way down), even though there is still a low likelihood that the seller will have to take a loss. This can cause the sellers of credit default swaps to suffer liquidity and solvency problems even if none of the bonds actually defaults!

A long story in the *Wall Street Journal* of October 31, 2008 explains how this affected AIG insurance, a major seller of credit default swaps. ("Behind AIG's Fall, Risk Models Failed to Pass Real-World Test."[5] The story notes,

"The buyers of the swaps -- AIG's "counterparties" or trading partners on the deals -- typically have the right to demand collateral from AIG if the securities being insured by the swaps decline in value, or if AIG's own corporate-debt rating is cut.

"...The credit crisis hammered the markets for debt securities, sparking tough negotiations between AIG and its trading partners over how much more collateral AIG should have to post."

Suppose that an insurer has sold a credit default swap on bond X. When the probability of a bond X default is really low, the option embedded in the credit default swap is far out of the money. Neither party has to be concerned that the option will be exercised. However, once the probability of default rises to some level of plausibility, say, 5 percent, the seller of the swap is going to have to demonstrate the ability to make good on the swap. In an organized exchange, the seller would have to meet a margin call. In the over-the-counter market, the seller is forced to post collateral, which acts like a margin call. Even when default is still unlikely and the option is still out of the money, the margin calls can strain the balance sheet of the seller of the swap. In addition, as the probability of a default on bond X rises, the value of the default swap changes adversely for the seller of the swap. This means that the insurer must recognize a loss, even though default remains unlikely.

Thus, even without a single default, an increase in the likelihood of defaults can undermine the seller of default swaps. The seller may lose liquidity due to margin calls or lose solvency due to the change in the value of the swaps.

There are many ways for financial institutions to get caught up in processes that amount to selling put options that are far out of the money. The GSE's, by providing guarantees of mortgages, were selling put options that were out of the money as long as house prices were not falling sharply. Holders of senior tranches in mortgage securities were in the same position. A lesson of this crisis is that sellers of out-of-the-money options can become too complacent about the risks that are being taken to earn the option premium. As the probability increases that the options will be exercised, the seller's institutional viability can be undermined long before the options actually are in the money.

I am concerned that leading policymakers do not understand how credit default swaps are creating excess demand for safe assets. The problem is that buyers of swaps demand that sellers post collateral. The only collateral that buyers will accept is short-term Treasury securities.

The demand for safe collateral has two adverse effects. First, it increases the demand for short-term Treasuries, artificially raising their price (lowering their interest rate), while driving down the prices (driving up the interest rates) on other securities. Second, it squeezes the liquidity of sellers of credit

[5] See: http://online.wsj.com/article/SB122538449722784635.html.

default swaps, threatening the viability of those firms, which in turn triggers even more demands for collateral in the system and even further flights to safety.

The problem is similar to a bank run. As institutions lost confidence in the solvency of their counterparties in transactions such as repurchase agreements or credit default swaps, they demanded more collateral as protection. This increase in the demand for collateral further weakened the institutions, causing more counterparties to demand collateral, creating a vicious cycle.

I propose a metaphor for what was happening. Imagine a a casino with several poker tables. The gamblers start to become wary and suspicious. Some of them stand up and start to shout and point fingers at one another. They say, “I do not have faith that you have the funds to cover your bets. Give me money now, before you run out.” They start grabbing and pushing and shoving. Order breaks down, and the casino degenerates into an uncontrolled riot.

What is needed in this situation, in my opinion, is a stern sheriff. The sheriff needs to clap his hands on the gamblers' shoulders and say, “Boys—sit down, and keep your hands to yourselves. We're going to get things settled here, but you need to wait. Those of you who are patient and wait until we've got things sorted out will get most of what you are entitled. But those of you who are not patient and who push and grab will get a lot less.”

With an uninsured bank, the stern sheriff approach could stop a bank run. Suppose that the bank has loans that are coming due in three months, but right now it is short of cash. The stern sheriff approach would be to charge a high fee for bank withdrawals now, with a much lower fee in three months when it expects loan repayments to give it plenty of cash on hand. Customers who participate in the run will be hit with high fees. Customers who wait three months will preserve more of their wealth.

Similarly, the government could impose penalties on firms that make extravagant demands for collateral to back repurchase agreements, credit default swaps, and similar instruments in this environment. These penalties would help deter the collateral demands. That in turn would relieve the liquidity squeeze that is taking place.

Instead of the stern sheriff, we have had Mr. Bernanke and Mr Paulson running around with huge bags of money, frantically dumping it on the tables in casino. $30 billion to cover Bear Stearns' bets, $100 billion to cover AIG's bets, $300 billion to cover Citigroup's bets, and so forth. This policy of trying to cover the gamblers' bets only serves to agitate the situation. It rewards the impatient, grab-it-while-you-can-get-it mindset that was driving the disorderly riot. The way I see it, we should have punished the impatient grabbers and instead rewarded firms that were willing to sit back and let the contracts play out.

Consider the credit default swaps sold by AIG. AIG's counterparties, such as Goldman Sachs, started demanding collateral from AIG. These counterparties are behaving like depositors during a bank run. But should government treat Goldman Sachs the way it would an individual bank depositor?

When individual depositors rush to take their money out of a bank, the FDIC provides funds to protect the depositors. That policy is based in law as well as a moral concern for the well-being of the uninformed individual depositor. The alternative of forcing depositors to hold tight until the bank's cash position improves seems unreasonable.

However, when Goldman Sachs and other institutions engage in a run on AIG, the legal and moral

situation is different. The government has made no promise to guarantee that Goldman Sachs' transaction will be safe. Goldman Sachs is not a naïve individual depositor for whom we should feel an obligation to offer relief. The alternative of ordering Goldman Sachs and other buyers of credit default swaps to hold tight, waiting for the bonds to either pay off or default, seems to me to be a perfectly reasonable way to stop the run on AIG. If government is going to intervene at all in these private contracts, instead of providing billions in guarantees I think it would be better to stop AIG's counterparties from raiding AIG in order to get collateral.

We need de-leveraging in the financial system, but the process should be gradual. It is counterproductive to have everyone try to de-leverage at once. For now, institutions involved in risky long-term agreements ought to face up to the fact that these will not be converted to risk-free short-term agreements.

While the process of de-leveraging needs to be slower, the process of weeding out failed financial firms needs to be faster. The sooner the worst banks are out of the way, the sooner that interbank credit can re-emerge.

The various bailouts and Federal Reserve lending facilities contribute to the confusion between failed firms and viable ongoing concerns. They also foster the illusion that the private sector can unload all of its long-term risky assets at once. As long as everyone believes that only the U.S. Government is capable of carrying a portfolio of risky assets, that belief will be self-fulfilling.

In voting for the Emergency Economic Stabilization Act of 2008, Congress deferred to the expertise of Treasury and Federal Reserve officials, as well as advice from prominent figures such as Paul Volcker, Eugene Ludwig, and Warren Buffet. My concern is that this expertise reflects mostly their understanding of past financial crises, without adequate knowledge of the latest financial instruments and how they affect the institutions involved.

The executives of financial firms had their mental circuits overloaded by the new financial instruments, and they made major mistakes as a result. I fear that the Treasury and the Fed are suffering from a similar overload as they deploy hundreds of billions of dollars of taxpayer money.