

The Financial Crisis: Causes and Lessons*

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The last several years have seen enormous public expenditures as losses cascaded through the financial system (and beyond) and governments shifted those losses to taxpayers in an effort to combat a severe recession or worse. There is now agreement by all that this experience should not be repeated, but the first step is to understand how such huge losses were created. Can we institute some regulatory reforms that give us confidence that it will be prevented from happening again? Are there better ways to deal with the problem of financial institutions that are “too big to fail”?

Although the events are fairly recent, much that contributed to the crisis happened well before its perceived beginning in 2007. And as part of our inquiry into the lessons to be learned, I will start by reviewing the period from 2001 to the present.

This necessarily simplified account is divided into three stages: first, a look at the key factors that led to the increasing riskiness of U.S. home mortgages; second, how those risks were transmitted as securities from U.S. housing lenders to institutional investors around the globe; and third, how those risks led to huge losses and created a credit crunch that moved the impact from the financial economy to the real economy. The goal is to lay a factual foundation for deriving the lessons that ought to be taken away from this very expensive experience.

Causation

Starting points in a historical account are somewhat arbitrary, but I will begin with the monetary policy followed by the Fed after the dot.com bust of 2000. Concerned about deflation and the Japanese stagnation of the 1990s, the Fed in 2001 abruptly lowered its target rate from 6.5% to under 2%, and then kept it at 1% until July of 2004 (as shown in Figure 1). The inflation rate over this period was around 2%, so the real rate of interest was negative. Needless to say, borrowing by both businesses and households was greatly stimulated.

For most households, the largest and most heavily debt-financed purchase they will ever make is to buy a home—and

so demand for housing, which is particularly rate-sensitive, responded strongly to the monetary stimulus. With plentiful and cheap liquidity, some of it also coming from the trade surplus investments of the Asian export economies, a steady increase in house prices was the result (as shown in Figure 2).

U.S. housing policy has for some time been to encourage home ownership, and a number of government agencies were formed from the 1930s on to support housing finance. Most notably, the Government Sponsored Enterprises (GSEs), Fannie Mae and Freddie Mac, have insured residential mortgages that met their standards for a fee. They have also bought the loans and put them into pools that have then been sold to private investors, thereby providing funds for additional purchases from banks and mortgage originators. In so doing, these GSEs led the way for the development of a securitization market for conventional mortgages.

From about 1977 on Congress embarked on a program to expand mortgage lending to minorities and low and moderate income groups (henceforth “LMIs”). It began modestly with the Community Reinvestment Act, which aimed to prevent “redlining” of certain urban areas in which a bank was allegedly refusing to lend at all, but shifted in 1995 to measuring the volume of loans to LMI borrowers by banks and then to establishing ever-growing “targets” (starting at 30% and ultimately reaching 55%) for the percentage of “affordable housing” loans among all those bought or guaranteed by the GSEs. The goal was to push home ownership rates ever higher...but it involved pushing credit standards ever lower.

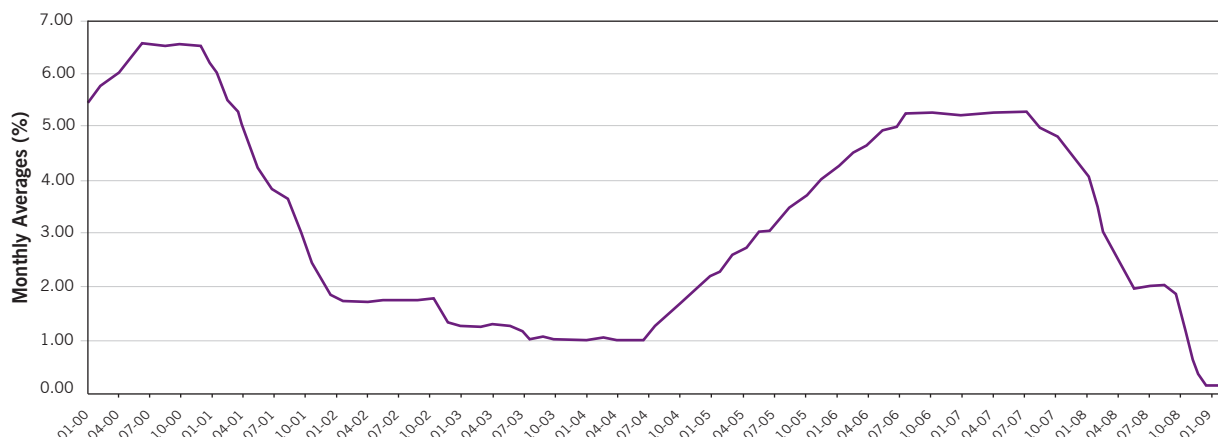
The process reached its zenith after the creation and promotion of “subprime” loans—loans to borrowers with poor credit scores (less than 660), multiple recent mortgage delinquencies or foreclosures, debt-service-to-income ratios above 50%, and the like. With a somewhat better credit score, the loans were called “Alt-A.” Conventional down payment requirements of 20% dropped to as low as 3.5% for the GSEs (and to zero for some private originators) because significant down payments were viewed as “barriers” for low-income families.

New products were invented to make mortgages more “affordable” for buyers with very limited income or resources,

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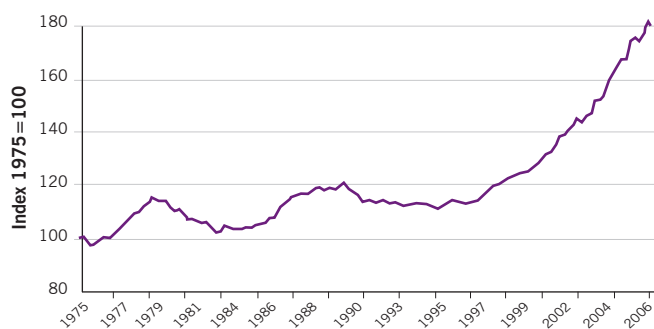
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Figure 1 **Federal Funds Effective Rate**



Source: Federal Reserve

Figure 2 **Real Housing Prices, 1975–2006**



Sources: U.S. Office of Housing Enterprise Oversight

and for owners drawing out their equity in refinancing. Adjustable rate mortgages (ARMs) evolved into “hybrid” ARMs with low initial rates that would reset to market rates after two or three years, or “option” ARMs in which the buyer could chose the monthly payment. Interest-only (IO) loans involved no amortization of principal for a period of ten or 15 years. Downpayments could be borrowed through a second mortgage. Approval processes were automated; income statements were not verified, and such “no-doc” loans became commonplace.

The private sector entered subprime lending in a big way, selling the mortgages not only to the GSEs, but into a burgeoning private securitization market. Private (non-GSE backed) issuance of subprime and Alt-A securities amounted to around \$560 billion in 2004, \$830 billion in 2005, \$840 billion in 2006, and \$470 billion in 2007 (but only \$4 billion in 2008), for a total of about \$2.7 trillion.

Was all of this based on “predatory lending” or borrower fraud? No doubt one can find an amount of misrepresentation on both sides, but that is not really the story. Both borrowers and lenders were expecting house price appreciation to create some equity and so enable a sale or refinance of the property when the resets hit—and given those expectations, both groups could be seen as acting quite rationally without any need for deception. Borrowers, with little or no down payments (or remaining equity), had nothing much to lose financially. (Indeed, in about half the states, mortgage loans are legally non-recourse; the buyer can walk away without any personal liability.) In effect, buyers were renting at the low initial rates, with an option to purchase at the reset date. And as I discuss next, mortgage originators or lenders were not keeping the credit risk, but selling it into investor pools.

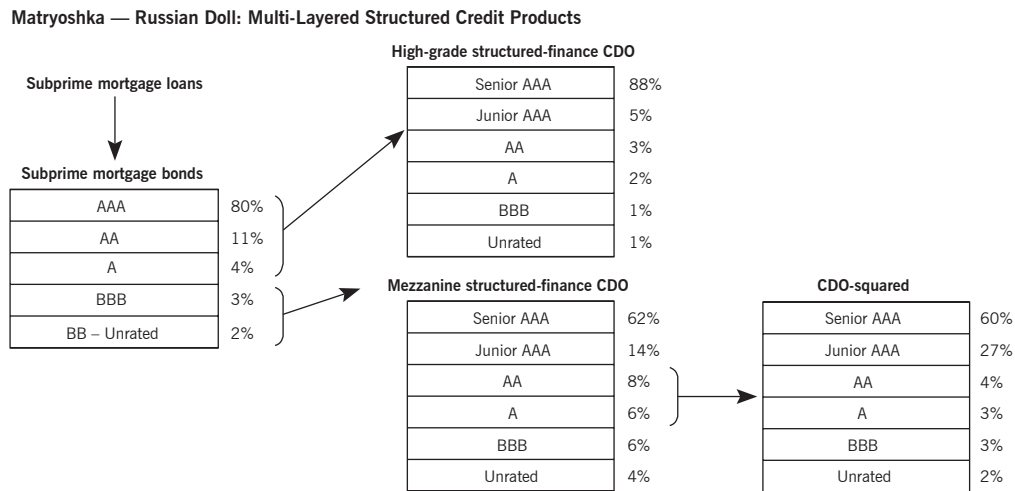
Transmission

Mortgage securitization had begun simply, with the bundling of conventional mortgages insured by a GSE into a pool. Shares of the pool were then sold to investors as reasonably safe securities in part because the borrowers were diversified across geographical regions and economies.

But with the increasing volume of subprime mortgages, things became more complicated. Investors wanted higher returns, but they also wanted safety. (A first principle of finance theory is that returns and safety move in opposite directions, but put that aside for the moment.) So, to simplify, claims on the cash flow of the residential mortgage-backed pools (RMBS) were divided into “tranches” or levels of seniority, with those at the bottom first to take losses or shortfalls in payments and those at the top holding first claims viewed as quite secure, with relatively low contractual return entitlements and AAA ratings.

It was not difficult to sell the AAA tranches, but there

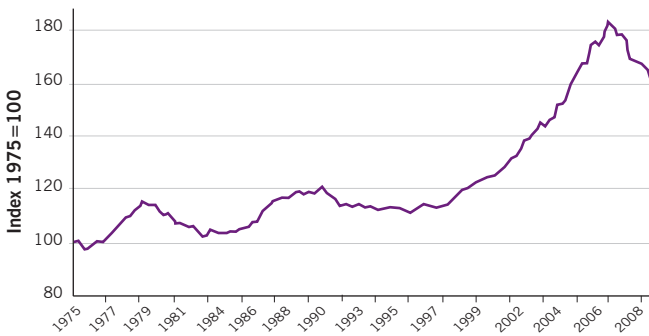
Figure 3 **Subprime Mortgages into AAA Credits**



Source: IMF staff estimates
 Note: CDO - collateralized debt obligation

Source: IMF Global Financial Stability Report (IMFGFSR), 4/08, Box 2.2., p.60

Figure 4 **Real Housing Prices, 1975–2008**

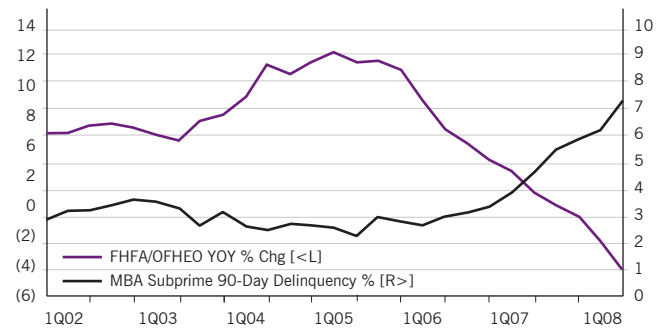


Sources: U.S. Office of Housing Enterprise Oversight

was less demand for those with lower ratings. The solution: put the lower tranches into a new pool and combine them with the tranches of a hundred other pools, and create a new hierarchy of claims on a pool of collateralized mortgage obligations (CMO). Then repeat the process, and add in some other kinds of consumer debt (auto loans, credit card loans, student loans, etc.) and perhaps some commercial loans, and form a pool of collateralized debt obligations (CDO). But the process of creating asset-backed securities (ABS) need not, and did not, stop there. It continued into CDO² pools, as illustrated in Figure 3, and on into SIVs.

As you went down this securitization chain, the actual original loans underlying it all were becoming farther and farther removed from the securities held by investors. So various forms of “credit enhancement” were used to provide

Figure 5 **Home Prices and Subprime Delinquencies**



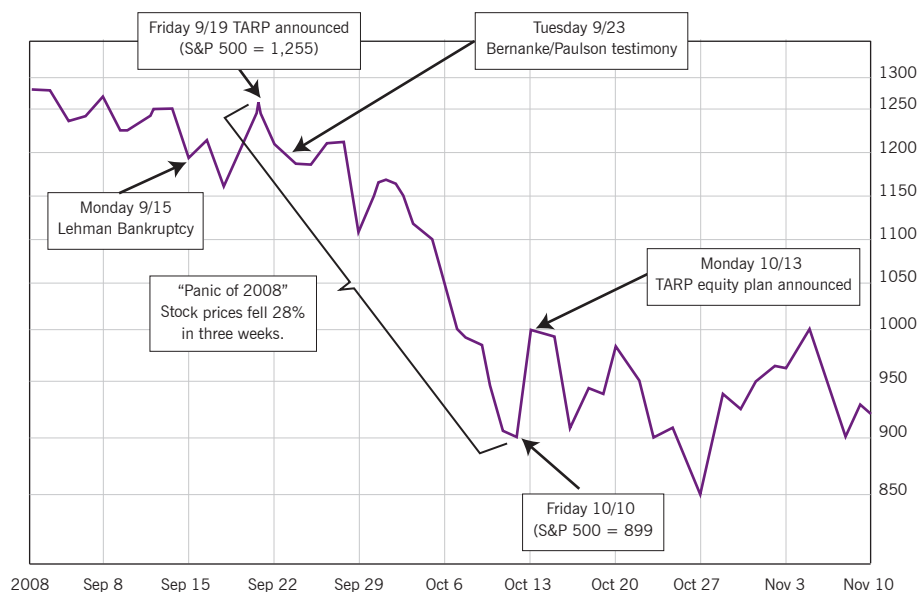
Sources: Freddie Mac

some reassurance and maintain the AAA ratings. Municipal bond insurers ventured into insuring these new kinds of bonds; and credit default swaps (CDS) were purchased to shift some of the credit risk off investors. Reliable estimates are hard to come by, but aggregate issuances (2004–2008) of MBS securitizations (agency and private) may have amounted to something on the order of \$9 trillion, purchased to their current regret by institutional investors all around the globe.

Losses

Six years or so of constantly accelerating house price appreciation could not go on forever. The exact moment when a bubble will burst seems impossible to predict, but burst it did, at the end of 2006 (see Figure 4). With house prices now falling and resets coming on line, subprime delin-

Figure 6 Stock Price Reactions to the Worsening Crisis



Source: J. Taylor & A. Weerapana, *Principles of Economics*, 486 (6th ed. 2009)

quencies began rising steeply (see Figure 5), and the whole structure simply crumbled. House values quickly fell below the amount of the mortgage debt (since there was no significant downpayment cushion) and, for those homeowners, the embedded option was clearly out of the money. Many of these “underwater” loans went into default and foreclosure, and the lower tranches of MBS pools incurred losses, while the upper tranches were obviously becoming more risky and hence declining in value.

This process inevitably affected the values of subsequent pools down the chain, but by how much? In a given MBS pool, one could observe the defaults and at least in theory use the information on thousands of borrowers to try to model future performance. But for subsequent pools, the information on the underlying original loans was lacking and the complexity made credible estimates of risks and losses nearly impossible.¹ The rating agencies saw that trouble was coming, and in 2007 they started downgrading more and more ABS issues. Their values became indeterminate and trading in them dried up, which eliminated external market prices, and their acceptability as collateral diminished accordingly.

Making the situation even worse was the poor disclosure of the positions held by the various investors in subprime loans and securities based on them—particularly commercial and investment banks, and some hedge funds. Those who had created these securities were among the largest holders. They

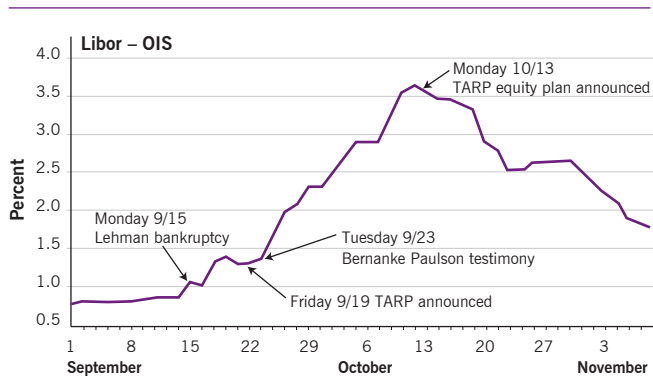
were at the heart of the credit markets in the financial system, and they were with great reluctance announcing writedowns in their positions. It was widely believed that both agency downgrades and bank writedowns were significantly lagging the actual loss of economic value, and hence there was a spreading concern about the solvency of counterparties among participants in the inter-bank and prime brokerage markets.

The growing appreciation of the seriousness of the problem throughout 2007 was followed by the dramatic failures of September 2008. The GSEs Fannie and Freddie, which owned or guaranteed \$5.4 trillion of mortgage debt, were taken over and put into conservatorships on September 7. Merrill Lynch was forced into acquisition by Bank of America on the 14th; Lehman filed for bankruptcy on the 15th; and the Fed made an \$85 billion bailout loan to AIG on the 16th. On September 19th, the Treasury Secretary announced a “bold approach” to “remove these illiquid assets that are...threatening our economy” and requested a massive appropriation to forestall a complete collapse; the effect on the equity and interbank loan markets, as can be seen in Figures 6 and 7, was immediate. Contrary to popular lore, the Lehman failure and the refusal to bail it out were not the fatal trigger, but only one in a series of signals of the mounting magnitude of losses.

On October 1, the \$700 billion TARP bill was signed into law. The initial interpretation of increasing credit stringency

1. See my article with John Taylor, “Why Toxic Assets Are So Hard to Clean Up,” *The Wall Street Journal*, July 20, 2009.

Figure 7 **Credit Spread Reactions to the Worsening Crisis (2008)**



Source: J. Taylor, *Getting Off Track 27* (2009)

throughout 2007 and 2008 was that MBS weren't trading because of a liquidity problem. The Fed constantly lowered its federal funds target rate, opened the discount window wide, and came up with a host of new lending facilities—but they still didn't trade. TARP was first conceived as a program to purchase MBS off-bank balance sheets, but immediately ran into the valuation problem. So on October 14, the Treasury converted it into a program to inject \$250 billion into bank equity in an effort to address concerns among banks about counterparty solvency.

Not surprisingly, credit cutoffs and insolvency fears spread from the financial sector into the real economy around the world, financing for business and international trade plummeted, consumers pulled back on durable purchases and businesses on investment, and a severe recession was well underway. But it is not the purpose of this paper to examine the measures taken by various governments to deal with the consequences of the financial market crisis, and the effectiveness of the different remedies attempted. My focus is on the primary causes of the crisis, and how to prevent a reoccurrence, not on all the secondary effects.

Lessons from the Crisis

What were the critical mistakes and deficiencies in the account we have just reviewed? The media, participants and politicians have put forth a host of favorite culprits, usually shifting blame to someone else: MBS securities, rating agencies, excessively compensated CEOs, CDSs, deregulation, greed, mark-to-market accounting, predatory lenders, repeal of Glass-Steagall, hybrid ARMs, short selling of bank stocks, borrower fraud, dishonest mortgage brokers, inadequate consumer protection for financial products, and so on. It would take a lot more time than I have to try to deal with each of them, and it's probably unnecessary. Some were minor factors or even irrelevant to the crisis, whatever their independent merits. But I will try to take up the more salient in three

broad categories: defects in financial products, defects in risk management, and defects in government policy.

Defects in Financial Products

CDS, and derivatives in general, have received a lot of the blame for the crisis. But CDS created none of the losses borne by subprime lenders or mortgage investors. They are an instrument for transferring, and thereby spreading, some of the risk, and they worked as designed. The CDS in the Lehman failure, the GSEs, and others were all settled and paid promptly. (In addition, the CDS served in such cases as a good measure of changes in risk perceptions.) Of course, AIG wrote far too many customized CDS on MBS for too low a price—but that was a defect in judgment, not in the derivative instrument per se.

Subprime lending often took the form of hybrid loans, with low initial rates and resets after two or three years to market rates, and borrower income was ignored or not checked. In effect, mortgage lending became collateral-based rather than borrower-based. There is nothing intrinsically unsound about lending against collateral; lending against collateral *appreciation* was the real problem. The Fed in 2008 reacted by prohibiting subprime loans without regard to ability to repay from income or net worth. Data show that the best predictors of default are the size of the downpayment and credit history—factors that are politically sensitive and not addressed by the new rule.

Given that the subprime loan problem was magnified by the securitization process, should securitization be banned—for example, by permitting banks to issue covered bonds but not form ABS pools? Pools offer wide diversification across localities and borrower characteristics, raise capital, and shift risk from the banking system to other institutional investors (as do CDS). (But since the correlation between mortgage loans and other forms of consumer credit proved much higher than anticipated during the recession, the diversification benefit was modest.)

The greater difficulty as already noted was that the complexity, created as tranches went down the line from the original RMBS pool into additional layers of pools, rendered the securities "toxic"—that is, incapable of being reliably valued or sold. In my view, the remedy for that is clear if challenging.

It is not clear that such a degree of complexity is economically warranted or will revive. But to whatever extent securitization does revive, one change seems essential: The SEC could mandate detailed disclosure of the characteristics and performance of all loans in original pools and all tranches in subsequent ones, information that could then be aggregated in a central data repository available to all. This would enable the rating agencies (and others) to model the initial risk and adjust to monthly performance information. It would also facilitate evaluation of rating agency performance and

the entry of new competitors who believe they have superior models. Various detailed proposals along these lines have been presented, but none has been implemented.

Firm Risk Management

There was clearly almost universal underestimation of the risks being incurred. Some of it seems related to agency costs and incentive problems that often arise within large organizations, but it goes beyond that. Does the answer lie in regulation or changes in corporate governance, or in a learning process that has already occurred?

Mortgage originators (brokers or bank affiliates) retained very little credit risk on the loans they made; they just took in fees and sold the loans. The agency problem is evident, and contractual arrangements tried to limit this problem with representations and warranties, holding periods, and put-back clauses. None of these approaches worked very well, however, because they were poorly drafted and many of the brokers had very thin capital in relation to their loan volume. The GSEs automated their acceptance process to meet their constantly rising “targets,” and lost the ability to monitor underwriting effectively, while the banks formed pools in “bankruptcy-remote” entities and sold on the ownership of credit risk. Or so they believed, until they found themselves with large holdings on their own balance sheets, having been pressured by reputational concerns to take back responsibility for some of their SPEs (special purpose entities).

The SPE accounting rules have since been changed, acceptable mortgage originators now have to hold loans for longer periods and have higher capital margins, and the CEOs who oversaw these operations have now mostly lost their jobs and a great deal of their net worth. So some lessons have in fact already been learned, but why were they needed?

There are several different theories. One is that the top management in these giant financial institutions didn't understand what their underlings were doing. If that was the case, the compensation incentives to look at are not just the CEOs' but those of the traders and lenders making the actual decisions. Their payouts should reflect the maturity or duration of the risks created by their decisions. To some extent that is already happening. But all the recent focus on the *level* of top management pay (as opposed to the design of the incentive structure), while pandering to the public anger, has failed to identify the important issues.

Another is that deposit insurance and other features of the government safety net for banks (including bailouts), as well as the tax code, make debt cheaper and thereby subsidized leverage and led bank management to take excessive risk quite rationally, regardless of its compensation structure. To offset these incentives for excessive leverage and risk-taking, supervisors rely on prudential regulation and capital requirements, but both have significant limitations that I will come to.

Still another is that neither the top management nor those

below understood that there was a bubble rising, though the information on house price appreciation was there for all to see. If that was the case, measures such as requiring the board to oversee a chief risk officer, as has been proposed, may be of little help. It is hard to mandate foresight. Some urge that the solution is to have a government systemic risk regulator (SRR), and we'll turn to that now.

Government Policy and Regulation

What role did government regulation and policies play in this sorry tale? There has been a lot of media talk about deregulation, or regulatory gaps or loopholes, as the cause. But what exactly were these gaps? It is necessary to distinguish between regulatory authority and regulatory performance, and I will begin with regulatory authority. My contention is that, in most instances, there was ample existing authority for U.S. regulators to have addressed these issues, provided they had perceived the need and acted on it.

Some point to the fact that derivatives were largely unregulated—but which ones, and what was the critical missing requirement? There are only two prospects that figured in my prior tale:

1. MBS/ABS? They were not derivatives but securities, and always subject to regulation as such. I believe disclosure was inadequate in critical ways, but not because authority was lacking.

2. CDS? As noted, they were not a cause of losses in subprime mortgages or securities, but rather a mechanism to spread that risk. In doing so, they did create a potential for spillovers that both buyers and sellers may have underestimated and inadequately hedged—but again those are among the secondary effects that are beyond the scope of this paper.

Some find a case for a new consolidated consumer financial protection agency, a function that is now divided in the U.S. among a number of agencies. If by “consumer” we mean household investors, it's important to recognize that MBS/ABS were bought almost entirely by large institutions, not retail investors. If we mean borrowers, the Fed and other banking agencies had extensive regulations already on the books—so extensive that probably no one would argue that they could not be made more comprehensible. But again, a lack of authority is not the issue.

Was there insufficient authority to regulate the issuers of all those subprime mortgages and securities? Most all of them were made or funded by banks that were heavily regulated by the Fed or OCC or FDIC—it is hard to find an absence of authority to have imposed higher credit standards there. The real question is, why the legal authority wasn't used more effectively?

Some believe the capital requirements for banks were too low, and so they should be increased, perhaps on a progressive scale for larger institutions. Of course, *ex post* it is clear that

capital was too low in any insolvent institution, by definition. But *ex ante*, how does one determine the proper amount to require? Under the Basel rules, a bank is “adequately capitalized” if it has a total risk-based capital ratio of at least 8%. The 8% number has no analytic foundation; it was simply the average ratio prevailing in the banking industry at the time of its adoption. Banks are not “significantly undercapitalized” unless the ratio is below 6%—and not until the ratio of tangible equity to total assets falls below 2% are they viewed as “critically undercapitalized” in the U.S. (and subject to imminent closure if more capital is not immediately raised).

When assets are “risk-adjusted” (downward) according to an elaborate schedule to determine a ratio denominator, it opens up opportunities for regulatory arbitrage. Of special relevance to this analysis is the fact that residential mortgages were awarded a risk weight of only 50%, thus lowering the capital charge. And if a bank sold a portfolio of its mortgages to an MBS pool and bought back an equivalent amount of AAA securities, the risk weight dropped to 20%. For a bank “adequately capitalized” at 8%, that meant the bank was required to carry only 1.6% of capital against the credit risk. That would not sustain much of a market downturn.

Of course, one could institute different risk weights or larger capitalization numbers. But whatever the number, it rests ultimately on the value of the assets, and this crisis has shown how questionable some of those values can be. Banks have strong incentives to overstate asset values and understate losses. Capital requirements depend on the reliability of measurements of asset values, and banks (aided by politicians in both the U.S. and the EU) have pushed successfully against the accounting rules that would require marking assets to current values, and for accounting rules that would enable certain assets to be carried at historical cost despite subsequent adverse economic developments.

That makes reported capital ratios a very flawed indicator of economic risk and potential insolvency. A study of the 123 U.S. banks that failed in 2008 and the first three quarters of 2009 found that, two quarters before the takeover, the banks had a median total risk-based capital ratio of 7% (and an average of 9.4%), and that there was no statistically significant relationship between reported capital ratios and the losses to the Insurance Fund (that FDIC estimated at the time of closure). Increased capital requirements and leverage limits might serve to reduce failures to some degree, but no one should underestimate the ability of banks to determine their own risk levels whatever the regulations say.

That leads us back to government policy and regulatory performance. This entire process began with a very loose monetary policy that, maintained for several years as the economy recovered from the dot.com bust, created the foundation for a housing boom. It was fed by a government housing policy that continually pushed for lower lending standards to turn renters into home owners, even those whose marginal

financial condition meant they could safely afford only rentals. This policy—in my view probably the most important single factor in the whole debacle—came about because Congress desired to subsidize particular groups without direct on-budget expenditures but indirectly through regulation and guarantees, thereby allowing legislators to deny the existence of any subsidization until the whole scheme collapsed.

And what was the benefit, to be weighed against the enormous cost? The percentage of household home owners in the U.S. rose from 67.5% at the beginning of 2001 to 68.4% at the beginning of 2007; it is now back down to 67.6%.

Systemic Risk Regulation

Why did bank regulators and monetary policymakers and the Congressional housing committees get it so wrong? The currently popular answer is that what we needed was a Systemic Risk Regulator (SRR) and “macro-prudential” regulation. The SRR would collect vast amounts of information—most of it now largely unspecified—from very many quite large, “systemically important” firms—also unspecified. The SRR might issue advice or warnings about perceived developing risks or concentrations to financial firms and their regulators, which seems to be the EU approach. But in the U.S. Administration version the Fed has sweeping powers to force those firms designated by a Financial Stability Oversight Council to alter their operations in various ways to prevent the occurrence of an event that might lead to systemic collapse.

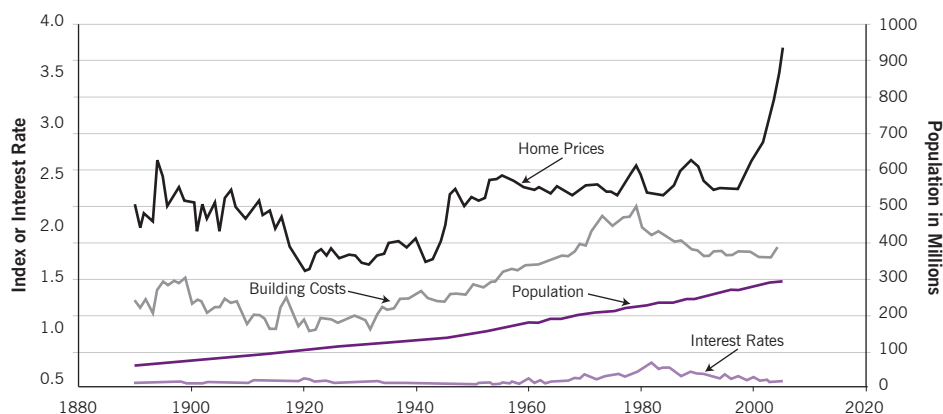
So there are two separate, and separable, parts of the concept, that we should examine. The U.S. debate was often about who or what structure would be the SRR, but that is probably not of great interest outside the Beltway, and I will put it aside. How would it work?

It is certainly feasible to impose extensive reporting requirements, if you know what you want and are indifferent to costs, on firms that you have somehow picked out as the ones that are “systemically important.” And I agree with the proposition that the individual participants in this meltdown did not have sufficient information across various products about the holdings of others to help them assess the correlations and risk of their own positions and those of potential counterparties, assuming they were given access to such detail. But there are two reservations:

1. I know of no macromodels of systemic risk that incorporate the expected behavior of financial intermediaries. When the SRR gets all that required information, how can it reliably analyze it? How can it know that it has even gotten the right information?

2. Without a tested model and a fair degree of certitude, how does the SRR (in the strong version) successfully order those large systemically important firms to change their business operations or their financial structure? It is safe to predict that they would exert political counter pressure. Regulatory agencies

Figure 8 Long-Term Trends in Single Family Homes 1890–2005



Source: R. Shiller, *Irrational Exuberance*, 13 (2d. ed. 2005)

in the past (and present) in the U.S. have not been particularly bold in going counter to Congressional desires.

At a more basic level, is the real problem just one of information? What was the essential information that was not available to the Fed and bank regulators that would have led them to attempt to forestall the present crisis? The fundamental information about house price appreciation (shown in Figure 8), declining lending standards, and the growth of opaque MBS-based securitization was no secret. In hindsight, of course, it all becomes clear. But before 2007, with the exception of a handful of short-sellers, no one understood what was impending or appreciated its magnitude—not the CEOs at the GSEs or on Wall Street, not the bank regulators, not the members of Congress in the key positions.

To my mind, lack of power and authority to regulate was not at the heart of the problem—the real problem was lack of foresight and judgment about the unexpected. Regulators, even an SRR, are no more endowed with superior foresight on taking office than others. And that is not intended as a criticism of regulators or any individuals. The state of economic theory and knowledge about the occurrence of systemic risk does not match the lofty goal of saying we are going to prevent it from happening.

Twenty years ago, in an attempt to deal with the U.S. S&L collapse, the Administration put through legislation to

pay the bill (a mere \$150 billion) and of course provide new regulation. The then Treasury Secretary testified that “Two watchwords guided us as we prepared a plan to solve the problem—NEVER AGAIN.” And naturally politicians are saying the same thing again today, while repeating some of the same errors in their control of the FHA and its exploding volume of government guarantees for mortgage loans. (Its capital is now down to 0.53%, which would be terminally undercapitalized for a private bank.) Powerful members of Congress continue to stress that the bankrupt GSEs must provide “affordable housing” to “underserved markets.”

I would suggest that we not count entirely on preventing major financial failures from happening again, in a manner no one now can exactly foresee. A good part of our thinking and efforts should be directed toward better methods of resolving such failures when they do occur. The whole exercise is how to allocate the losses, not to taxpayers but to private participants in the failed firm, in a way that maintains incentives for market discipline while minimizing spillover costs to the extent consistent with established priorities.

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