

The Causes of the Financial Crisis and the Impact of Raising Capital Requirements

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1. Introduction¹

The financial crisis that is wreaking havoc in financial markets in the U.S. and across the world has its origins in an asset price bubble that interacted with new kinds of financial innovations which masked risk, with companies which failed to follow their own risk management procedures, and with regulators and supervisors who failed to restrain excessive taking. We start by giving the factors that we judge contributed to the bubble in home prices and its interaction with financial markets.² We then turn our attention to the issue of increases in capital requirements for financial institutions. Lack of capital, or excess leverage, was only one of the culprits in the disaster; however, raising capital requirements is an important step towards a more stable financial sector.

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¹ This paper is based on a much longer version that was given at the conference. The longer version can be found on the Brookings Institution website.

² There exists much literature that also seeks to explain the events leading up to the crisis; see Ashcraft and Schuermann (2008), Calomiris (2009), Foote *et al.* (2008), Gorton (2008), and Demyanyk and Van Hemert (2008), among many others.

2. The Causes of the Crisis

2.1 Home prices were expected to keep rising

Nominal or dollar prices for residential housing had, on average, followed an almost unbroken upward path over the decades leading up to the financial crisis. Housing price declines had hit specific geographic regions, but these were local or regional events and did not overcome the rising certainty in the minds of many people that there was little or no risk of sustained price declines in a well-diversified portfolio of assets underwritten by the value of residential housing.

2.2 Long and short interest rates were low

The combination of low interest rates sustained by the Federal Reserve after the 2001 recession and the availability of large public and private pools of funds in the global capital market ensured that mortgage interest rates would be low, increasing the demand for housing. Low interest rates also fueled a desire for yield among investors, encouraging them to take on greater risks.

2.3 Housing demand built on itself to create a bubble in prices

Declining interest rates and the greater availability of mortgages were key drivers of the growth in housing demand, but demand can also build on itself. As people witness price increases year after year, and witness those around them investing in homes, a “contagion” of expectations of future price increases can (and did) form and perpetuate price increases. Buying a house, buying a bigger house, or adding on to an existing house not only provided people with more (tax-advantaged) consumption, i.e., the benefit of having more space or amenities; it also provided an investment with a great expected return. In the late 1990s, investing in stocks, especially technology stocks, became the rage and there was a bubble in equities. Once the technology bubble burst in 2000, however, the alternative investment of buying a home or a second home became even more attractive.

2.4 *Shifting types of lending and the erosion of standards*

As the economy recovered from the 2001 recession, the expansion of lending was in conformable and other prime mortgages; but as the boom proceeded, a larger fraction of the lending was for subprime, Alt-A, and home equity lending. In 2001, there was US\$2.2 trillion worth of mortgage originations, with 65% of these in the form of conventional conforming loans as well as Federal Housing Administration (FHA) and Department of Veterans Affairs (VA) loans. An additional 20% were prime jumbo mortgages, issued to those with good credit buying houses that were too expensive to be conforming, meaning that 85% of originated loans in 2001 were of prime quality. There was a huge expansion of mortgage lending over the next couple of years, and in 2003 nearly US\$4 trillion worth of loans was issued, but the share of prime mortgages remained steady at 85% as the volume of conformable mortgages soared.

The total volume of mortgage lending dropped after 2003, to around US\$3 trillion a year in 2004–2006, but the share of subprime and home equity lending expanded greatly. Prime mortgages dropped to 64% of the total in 2004, 56% in 2005, and 52% in 2006, meaning that nearly half of the mortgage originations in 2006 were subprime, Alt-A, or home equity loans. It is clear that there was a significant change in lending patterns apparent in the composition of loans going back to 2004. In addition, there was an expansion of loans to lower-income, higher-credit-risk families, including from the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, as they sought to expand home ownership for the benefits it brings in terms of sustaining neighborhoods.

Lending standards deteriorated around 2004 or 2005. Families that lacked the income and down payment to buy a house under the terms of a conforming mortgage were encouraged to take out a mortgage that had a very high loan-to-value ratio, perhaps as high as 100% (often using second or even third mortgages). This meant that they started with no initial equity, and thus no true financial stake, in the house.

As it became easier to borrow using a home as collateral and as home prices continued to rise, families started using their homes as an ATM, refinancing and taking out any equity that had built up. Americans were tapping into the rising wealth they had in their homes in order to finance consumption. Greenspan and Kennedy (2007) estimate that homeowners

extracted US\$743.7 billion in net equity from their homes at the peak of the housing boom in 2005, up from US\$229.6 billion in 2000 and US\$74.2 billion in 1991. The increase in house prices allowed a borrowing spree.

2.5 *Economic incentives in the housing and mortgage origination markets*

In many U.S. states, it is possible to repay a mortgage early without penalty. This option meant that households were encouraged to take out mortgages with terms that looked good in the short run, but were unfavorable in future years. They expected to refinance later on better terms, and without incurring a prepayment penalty.

The most perverse incentive in the mortgage origination market, though, was the ability of originators to immediately sell a completed loan off their books to another financial institution. Most mortgage loans were originated by specialists and brokers who did not provide the funding directly. One institution provided the initial funding of the mortgage but then quickly sold it off to another financial institution, where it was either held on a balance sheet or packaged with other mortgages to be securitized (see below).³ The key issue here is that the institution which originated the loan had little or no financial incentive to make sure the loan was a good one. Most brokers and specialists are paid based on the volume of loans they process; therefore, they had an incentive to keep the pace of borrowing rolling along, even if that meant making riskier and riskier loans.

2.6 *Securitization and the funding of the housing boom*

Securitization was seen as a solution to the problems with the old savings and loan (S&L) model, as it freed mortgage lenders from the liquidity constraint of their balance sheets. Under the old system, lenders could only make a limited number of loans based on the size of their balance sheet.

³ Mortgage sales contracts often allowed the buyer to “put” back the mortgage to the seller for a limited period (e.g., a year or two). But in an era of rising housing prices and thus low delinquencies, originators did not view these “puts” as a serious risk.

The new system allowed lenders to sell off loans to a third party, take it off their books, and use that money to make even more loans. The GSEs, notably Fannie Mae and Freddie Mac, were created by the federal government in 1938 and 1970, respectively, to perform precisely this function: the GSEs bought mortgage loans that met certain conditions (called “conforming loans”) from banks in order to facilitate mortgage lending and (theoretically) lower mortgage interest rates.⁴

The GSEs could then either sell the mortgage-backed securities (MBS) on the open market, or they could issue their own bonds, use the revenue to buy the MBS, and hold them on their own books. They earned a profit because they earned a higher interest return on the mortgage assets than they paid on the bonds that they had issued. This has some similarity to the S&L model, except that Fannie Mae and Freddie Mac could hold much larger pools of mortgages that were geographically dispersed. In addition, the GSEs were seen as implicitly guaranteed by the federal government (a guarantee that has since become explicit), so they paid only a few basis points above Treasury yields on their bond issuance. This implicit government backing lowered their cost of borrowing and allowed them to inflate their balance sheets enormously. The GSEs became major participants in the mortgage market; and by 2008, Fannie Mae and Freddie Mac held or guaranteed US\$5.4 trillion in mortgage debt.

The GSEs were allowed to operate with very little capital, which made them very vulnerable to an increase in defaults. In addition, their problems also came from their efforts to meet the affordable housing goals set by Congress. Congress pushed them to provide more loans to low-income borrowers to justify the capital advantage they had because of the implicit federal guarantee. They did not buy subprime whole loans directly, but they bought large amounts of subprime MBS from private issuers that they then kept on their books. Indeed, the two GSEs bought between US\$340 and US\$660 billion in private-label subprime and Alt-A MBS from 2002 to 2007.⁵

⁴ There are different estimates of the extent to which the GSEs provided lower interest rates for borrowers. Most suggest that the impact on mortgage rates was fairly small; see Passmore *et al.* (2005), for example. Presumably without the GSEs, other financial institutions would have had a bigger role.

⁵ See OFHEO (2008). The wide range is because data for Freddie Mac’s purchases of subprime and Alt-A MBS only go back to 2006, so its purchases are estimated from 2002 to 2005.

Many have pointed to the combination of the GSEs and Congressional pressures to make loans to low-income borrowers as one of the main culprits in the financial crisis (see, for example, the comments by Peter Wallison at this conference). Moreover, some critics of the GSEs argue that these institutions were not telling the truth about the extent of their purchases of bad loans. Offsetting this view, however, is data reported by the Federal Reserve that indicate that the foreclosure rates on the Fannie Mae and Freddie Mac mortgage portfolios are lower than the foreclosure rates on mortgage portfolios held by private sector banks. Getting to the bottom of this issue fully is a project that goes beyond the scope of this paper.

Securitization played an increasingly important role in financing the housing boom, especially as it created assets that could be sold to overseas buyers. The real boom in securitization since 2001 came from subprime and Alt-A loans (Alt-A mortgage loans are made to borrowers with pretty good credit ratings but who do not provide full income and asset documentation), as the share of these loans that were securitized jumped 75% after 2001. By 2006, securitization was funding most of the mortgage loans in the lower-rated categories — the loans that are now in trouble.

2.7 More securitization and more leverage — CDOs

Over time, the financing of mortgage-backed debt grew more complex and opaque. Not only did the market become riskier and less transparent, but it shifted into areas that were unregulated or weakly regulated. Banks, brokers, hedge funds, and other institutions utilized financial innovations to increase their holdings of these products; and large amounts were sold overseas, particularly to European financial institutions. Securitization has been an extremely positive innovation for credit markets; but as the securitized assets were sliced and diced and placed in off-balance-sheet entities, the increases in risk were being obscured by the complexity of the instruments.⁶

As the securitization of mortgages increasingly became an affair of the private financial sector, it spurred further innovation in products that in good times generated large profits but have also been the source of some of the biggest losses since the crisis unfolded in 2007. Collateralized debt obligations (CDOs) represented a further step into the new world of securitization

⁶ For a more technical explanation of structured finance projects, see Ashcraft and Schuermann (2008) or Gorton (2008).

that exploded after 2000. A CDO is an instrument that redistributes the underlying risks from a mortgage or other assets lying beneath it. CDO issuers purchased different tranches of MBS and pooled them together with other asset-backed securities (ABS). In fact, it became possible to build a highly rated CDO from a pool of assets, each one of which alone was quite risky. By giving first claim to the senior tranche and “overcollateralizing” the pool (so that a portion could default before any tranche was affected), the issuers were able to create AAA CDOs even when they were starting out with pools of risky assets. The issuers worked directly with rating agencies to structure the CDO tranches, so that they could optimize the size of highly rated tranches in order to lower the funding costs of the CDOs.

There is a general perception that there was “grade inflation” by the rating agencies who worked with the issuers, a perception we agree with. There were also conflicts of interest by the rating agencies who were advising the issuers and being paid for that advice, even as they were deciding what rating to give. There may also have been some collusion on the part of the groups buying the CDOs to raise the rating. Some financial managers are restricted by law to holding only investment-grade securities, and that means highly rated tranches. The fund managers were paid at the end of the year on the basis of the returns achieved in their funds, and the AAA CDOs carried attractive rates of return and made them look good — until the crash.

2.8 Structured investment vehicles and off-balance-sheet entities

One of the constraints on banks and some other institutions is that they must meet capital requirements, that is to say, they must fund a given percentage of their assets with shareholders’ capital rather than with some form of debt. Capital requirements for banks are mandated jointly by the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC), and the Federal Reserve. Capital requirements lower the profitability of banks, since they limit the extent to which banks can leverage any initial shareholder investment (plus accumulated retained earnings). Naturally, therefore, banks looked for ways to circumvent the requirements. The favored means of getting around these mandated capital requirements became what were known as structured investment vehicles (SIVs), an off-balance-sheet special purpose vehicle (SPV) set up by banks to hold MBS, CDOs, and other long-term

institutional debt as their assets.⁷ By dodging capital requirements, SIVs allowed banks to leverage their holdings of these assets more than they could on their balance sheets. SIV assets reached US\$400 billion in July 2007, according to Moody's Investors Service (2008).

2.9 Leverage and the push to short-term borrowing

The increase in leverage over the course of the subprime bubble was widespread, spanning across many financial institutions and across many forms of instruments. Adrian and Shin (2007) illustrate the perhaps counterintuitive, but extremely important, empirical insight that when financial institutions are forced to mark to market, meaning they must assign a value to an asset based on its current market valuation, rising asset prices immediately show up on banks' balance sheets, which increases the banks' net worth and directly reduces their leverage ratio.

Investment banks were not supervised like deposit-taking commercial banks and did not have the same capital requirements; thus, they were able to increase leverage to a greater extent. Investment banks were also not subject to the regulatory restrictions that accompany the capital requirements. Institutions such as Bear Stearns and Lehman Brothers borrowed at very short term and held risky longer-term assets, with low levels of capital or reserves to cover changing market conditions. Greenlaw *et al.* (2008) calculate that, while commercial banks are on average leveraged at 9.8:1, brokers/dealers and hedge funds are leveraged at nearly 32:1 (the GSEs were leveraged at 24:1 even though they were regulated).

One of the favorite instruments of short-term borrowing for investment banks became the overnight repurchase agreement or "repo loan".⁸ Overnight repos are a form of collateralized borrowing, whereby a bank pledges its assets as collateral in an overnight loan with another bank.

2.10 Credit insurance and the growth in credit default swaps

The process of securitization was further aided by the growth of credit insurers and derivatives called credit default swaps (CDS), which in

⁷ IMF (2008) cites Standard & Poor's to estimate that close to 30% of SIV assets were MBS as of October 2007, with 8.3% in subprime MBS; 15.4% were CDOs.

⁸ See Morris and Shin (2008) for an insightful discussion.

principle allowed the default risk to be taken out of MBS and CDOs before they were marketed to general investors. The first forms of credit insurance were developed by so-called monoline insurers. Having developed this line of business, the monoline companies — along with banks, hedge funds, and financial guarantors such as AIG — expanded their business model into structured products related to the housing market, selling CDS to insure holders of MBS, CDOs, and other assets against mortgage default risk. However, many of these transactions were not overseen by any regulatory body. They were done in over-the-counter (OTC) markets, so that no one other than the two parties involved knew the terms of the contract.

AIG became the biggest player in the CDS market, and its operations were carried out through an AIG subsidiary in London. After 2000, the business of insuring mortgage-related assets, along with corporate bonds and other assets, grew exponentially. The size of outstanding CDS reached US\$60 trillion in 2007. As of September 2008, AIG, a financial guarantor, had itself sold nearly US\$500 billion worth of CDS with little capital in place to protect against widespread losses.

2.11 The failure of company risk management practices

Many financial companies have lost huge amounts of money in the aftermath of the crisis, and many CEOs have lost their jobs. The crisis reflects poor internal corporate governance, poor infrastructure in and oversight of opaque financial markets, and, most of all, mistakes made by decision makers in the private sector.

There have been two important assessments made of the failures (and successes) of risk management practices at financial institutions in the wake of the crisis. On March 6, 2008, the Senior Supervisors Group (2008) issued a report based on a survey of 11 of the largest banking and securities firms (plus a roundtable meeting that included five additional firms). The report identifies risk management practices that helped some of these institutions avoid the worst of the losses as well as practices that led to failures. The failure of financial institutions to follow sound risk management practices was a major cause of the crisis. The second assessment was the report to shareholders prepared by the Swiss bank UBS (2008) at the request of regulators that described in great detail the risk management failures that took place at the bank prior to the crisis.

2.12 Regulation and supervision

Despite a general move towards deregulation in the United States, there was still an extensive regulatory apparatus in place in financial markets leading up to the crisis. As described by a senior executive at one of the large U.S. banks, there were “roomfuls of regulators” going over the books. The failure of regulators to force financial institutions to follow sound risk management practices was also one of the most important reasons for the financial crisis. The widespread belief developed over the past 20 years or so that markets can regulate themselves may have contributed to the regulatory laxity, which in turn contributed heavily to the crisis. An additional reason for regulatory failure was a significant share of subprime mortgages — those that are at the root of the current financial crisis — which were originated by independent mortgage companies, or non-depository companies unaffiliated with any bank. These independent companies were not covered by the FDIC, the Federal Reserve, or federal regulation, but rather only by state regulation.

This concludes our discussion of the causes of the crisis. We now turn to summarize the impact of raising capital requirements, which might have prevented or at least eased the crisis.

3. What Is the Impact of Increasing Capital Requirements?⁹

One of the regulatory reforms with the strongest support among policy analysts and regulators is to significantly increase the capital requirements for banks. All else equal, this should make the banks safer by providing a greater cushion to survive the mistakes and accidents from which they inevitably suffer. Higher capital requirements should also discourage transactions of lower economic value by creating a higher hurdle rate, since the extra units of capital need to be paid for by additional expected return. Some of the regrettable transactions that seemed attractive during the bubble might not have been undertaken at a higher hurdle rate.

Unfortunately, higher capital requirements are not free. At the margin, the increased hurdle rates are likely to make it harder for businesses and individuals to obtain loans, raise the cost of loans, lower the interest

⁹ The authors would like to gratefully acknowledge the support of the Financial Reform Project of The Pew Charitable Trusts for Mr. Elliott’s work related to this section of the paper.

rates offered to depositors and other suppliers of funds, and reduce the market value of the common stock of existing banks. One of the keys to determining the exact right size for an increase in minimum capital levels is to quantify these effects.

We take a pragmatic approach to answering a more specific question: what are the likely effects on loan pricing and availability of an increase in minimum capital requirements for U.S. banks over the next few years? The specificity allows us to focus on the key variables and relationships as they exist here today. Thus far, the debate and analysis surrounding bank capital increases have been heavily qualitative. There is a need to supplement these important considerations with numbers. Given space requirements, we cannot present our analysis of the numbers, but we will summarize the conclusions. It should be noted that this section of the paper is excerpted from a far more detailed analysis and, therefore, a great deal of the commentary has been left out in the interest of space. For the full-length version, please visit the Brookings Institution website.

Our analysis strongly suggested that the U.S. banking industry could adjust to higher capital requirements on loans through a combination of actions that would not wreak havoc on the system. Not surprisingly, the adjustments would need to come from a range of actions, since the rebalancing appears tough to achieve with the adjustment of any single factor. Fortunately, the banks do have a variety of levers to pull, which should allow them to make the transition. These findings imply that there would likely be relatively small changes in loan volumes by U.S. banks as a result of higher capital requirements on loans retained on the banks' balance sheets. The various actions required to restore an acceptable return on common equity appear unlikely to be large enough, even in the aggregate, to significantly discourage customers from borrowing or move them to other credit suppliers in a major way.

These findings may seem counterintuitive, given the large percentage increase in required common equity devoted to lending considered here and the strong focus of bank managers on rationing that common equity. Three points may help clarify the results. First, banks are highly levered institutions: a great bulk of the funding for a loan comes from deposits and debt. Even though common equity is expensive, it accounts for less than a fifth of the cost of a typical loan. Second, higher equity levels reduce the risk of a bank and therefore lower the returns demanded by debt and equity investors, reducing the cost of each dollar of debt or equity supporting the loans. Third, as shown in detail below, reasonable actions by

the banks can restore returns on equity to levels that are attractive to investors. Thus, there should be the ability for banks over time to raise new equity sufficient to maintain their loan volumes. It is true that large amounts of capital would need to be raised, but this appears quite feasible given a reasonable phase-in of the new rules. A four-percentage-point increase in the level of common equity as a percentage of the roughly US\$7.5 trillion of loans in the U.S. banking system would require about US\$300 billion of new equity. This would represent an approximately 20% increase in the existing US\$1.4 trillion of equity.¹⁰ Put another way, this could be obtained by retaining roughly two years' worth of the system's earnings, assuming even a 10% return on equity for the banks as a whole. In practice, a mixture of capital raising and earnings retention would likely provide the needed capital.

We side with the large majority of policy analysts who favor higher capital requirements for banks as a key step in providing greater stability to the financial system. So, we are heartened by these initial findings, which strongly suggest that a significant increase in bank capital requirements would have substantially smaller effects on lending than some have argued.

4. Conclusions

Some people have argued that the cause of the crisis was greedy banks. Others have argued that government policies, notably towards the GSEs, caused the crisis. Yet another argument is that government regulators failed to stop bad behavior by greedy banks and other institutions. Our view is that all of the above factors contributed to the crisis, and we would further add that excessive borrowing by consumers was also a factor.

It is proposed that higher capital standards would help avoid another crisis. We agree and argue that reasonable increases in capital standards would not undermine the ability of banks to provide financial intermediation.

¹⁰ The banking system in the U.S. has approximately US\$1.4 trillion of common equity, according to the FDIC, of which roughly US\$1.0 trillion is tangible common equity. For reference, a 10% return on common equity would therefore be about a 14% return on tangible common equity.

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