

Not (Yet) a ‘Minsky Moment’

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I. The Current Liquidity Shock

We are currently experiencing a liquidity shock to the financial system, initiated by problems in the subprime mortgage market, which spread to securitization products more generally – that is, mortgage-backed securities, asset-backed securities, and asset-backed commercial paper (MBS, ABS, and ABCP). Banks are being asked to increase the amount of risk that they absorb (by moving off-balance sheet assets onto the balance sheet), but the related losses that the banks have suffered are limiting somewhat the capacity of banks to absorb those risky assets. The result is a reduction in aggregate risk capacity in the financial system as losses force those who are used to absorbing risk to have to sell off or close out their positions.

During the Russian crisis in 1998 emerging market hedge funds facing reduced leverage capacity had to dump their other securities, for example Brazilian bonds, producing large reductions in Brazilian and other sovereign bond prices. Similarly, during the recent turmoil banks have withdrawn funding from equity hedge funds investing in quantitative trading of equity, and cancelled or reduced some lines of credit. The limited risk absorbing capacity of intermediaries causes shocks that originate in one sector to spread more broadly. The financing of many risky activities unrelated to the core mortgage market shock has been reduced relative to their pre-shock levels. There are, at least temporarily, lots of “innocent bystanders” that are affected due to the aggregate scarcity of equity capital in financial intermediaries relative to the risk that needs reallocating.

Is this the beginning of a financial or economic “crisis”? Said differently, is it (as many journalists and bloggers have labeled it) a “Minsky moment” – that is, the beginning of a recession induced by the realization that asset prices and leverage are too high, and that we are about to suffer a broad-based decline in credit availability?

The current liquidity shock reflects the failure of a financing mechanism (the intermediation process of securitization) that entails significant reallocation of risk. The magnitude of the repercussions in global markets indicates how important securitization

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has become. Over the last two decades securitization had produced great progress in the sharing of risk and the reduction of the amount of financial system equity capital needed to absorb risk, by establishing mechanisms for transferring risk from banks' and finance companies' balance sheets to the market, and by establishing those mechanisms in creative ways that reduced adverse selection and moral hazard costs associated with more traditional securities markets.

That progress was real and these technological innovations will persist. Mistakes were made as part of what could be called a process of learning by doing, or perhaps better phrased as learning by losing (the history of the last two decades has seen many temporary disruptions to the process of financial innovation in securitization, as discussed in Calomiris and Mason 2004, of which the current liquidity shock is clearly the most severe). Securitizations have had a bumpy ride for two decades, which is inherent in innovation, but overall the gains from reshaping risk, sharing risk, and creating mechanisms that reduce the amount of equity needed per unit of risk (through improved risk measurement and management) have been large and will remain large, even if there is a substantial permanent shrinkage in securitized assets.

The housing finance sector shock that started the current problems was small relative to the economy and financial system (estimated losses on subprime mortgages range from \$100 billion to \$200 billion, according to Kiff and Mills 2007). It was magnified because of the increased use that has been made of subprime MBS in the creation of other securitization conduits, and because of the connection of the instruments issued by those conduits to short-term ABCP financing (discussed further below). We have learned from the recent turmoil that mistakes in the pricing of fundamental risks can have large consequences for the financial system (more on this below). I believe that there are other additional potential risks in the prime mortgage market that have not been fully recognized, and these may produce continuing "surprises" to the prime mortgage market and its derivative instruments over the next year or so.

As some observers have been noting for months, the prime mortgage market may experience larger than forecasted defaults, reflecting a variety of factors that ratings agencies may not have fully taken into account (e.g., declining underwriting standards, changes in the nature of mortgage products, increased mitigation of mortgages, and the absence of proper disclosure of mitigation practices).¹ Regulatory policy has been remiss in not recognizing the need to bolster disclosure of mitigation practices, and this failing should be corrected immediately, as discussed further below. These additional potential problems, however, are not just indicative of a deepening of the current shock, but rather a recognition of separate long-run problems in risk management and measurement that have needed correcting for several years. To avoid further painful lessons policy makers should address these problems immediately.

¹ The performance of home equity lines of credit and credit card receivables also seem to be slipping, especially for more recent cohorts of originations, suggesting that poor underwriting standards in consumer credit, especially in 2006, was not confined to the subprime mortgage market.

One important consequence of the subprime mortgage shock has been significant damage to the credibility of ratings agencies, which play a key role in engineering securitizations, and this will not be restored easily, as it reflects incentive problems that have undermined the meaning of ABS, MBS, and ABCP ratings. The ratings agencies earn roughly half of their fees from securitizations, in which they play an active role in determining the permissible leverage of these conduits, act as monitors who inform investors of conduit performance on an ongoing basis, and determine actions necessary for conduits to restore market confidence. For the most part, they have performed this function well for many years, although there have been various securitization problems relating to surprising credit losses that have occurred periodically, especially in response to continuing product innovation in the market (i.e., the process of learning by losing).

A serious long-term problem has been grade inflation in the rating of securitizations, especially for collateralized debt obligations, or CDOs (Mason and Rosner 2007a, 2007b). This reflects the use of ratings in the regulatory process, which has led regulated investors to demand grade inflation as a means to broaden their menu of permissible investments. Grade inflation in the ratings of securitizations has been known for more than a decade, but it still produces substantial confusion in the market, as ratings have different meanings in units of expected loss for different securities.

The ratings confusion is particularly pronounced in newer fast-growing instruments, like CDOs and their derivative instruments – innovations that were associated with some of the current turmoil. Table 1 shows that subprime, Alt-A, and HELOC mortgage originations rose over the past few years. CDOs also grew rapidly in recent years (see Figure 1) and CDO conduit organizers made increasing use of lower-quality MBS in constructing their pools. From 2000 to 2005, the percentage of non-conforming mortgages that became securitized as MBS increased from 35% to 60%, while the percentage of conforming mortgages securitized rose from 60% to 82%. In 2005, 81% of CDO collateral pools issued consisted of MBS, and as of October 2006, 39.5% of existing CDO pools covered by Moody's consisted of MBS, of which 70% were subprime or second-lien mortgages (Mason and Rosner 2007a, p. 28).

Despite CDOs' increasing reliance on subprime MBS, and its observably low quality as an asset (i.e., high subprime foreclosure rates have been visible for years), CDO pools issued large amounts of highly rated debts backed by these assets.² The CDO over-rating problem became magnified by the creation of additional layers of securitization involving the leveraging of the "super-senior" tranches of CDOs (the AAA-rated tranches issued by CDO conduits). These so-called leveraged super-senior conduits, or "LSS trades," were financed in the ABCP market. Some banks structured securitizations that levered up their holdings of these super-senior tranches of CDOs by more than 10 times, so that the ABCP issued by the LSS conduits was based on underlying organizer equity of only one-tenth the amount of the ABCP borrowings, with additional credit and liquidity enhancements offered to assure ABCP holders and ratings

² Mason and Rosner (2007b) argue that high foreclosure rates did not produce large losses in the past because losses from foreclosure were low in a liquid and appreciating housing market, but that forward-looking ratings should have recognized the risk implied by high foreclosure rates.

agencies.³ When CDO super-senior tranches turned out not to be of AAA quality, the leveraging of the CDOs multiplied the consequences of the ratings error, which was a major concern to ABCP holders of LSS conduits.⁴ It also turned out that some of the enhancements offered in the LSS conduits, which are an important basis for commercial paper ratings, were not as good as ABCP holders thought they were. Canadian banks, for example, offered credit enhancements that typically only protected against a general seizing up of the market, which banks providing the enhancements claimed had not happened. The ratings agencies' failure to measure risk properly in securitized instruments reflects a combination of factors, including the regulatory use of ratings. That problem should be addressed by regulatory policy reform, as discussed further below.

Also contributing to the delay in resolving the turmoil is the delayed recognition of losses by holders of securitized debts, which reflects normal accounting lags as well as various accounting reporting conventions. Financial institutions account for their profits by valuing their positions, based on three levels of valuation quality, which amount to either truly marking to market (level 1), marking to a model based on "observable inputs" in the form of prices on comparable transactions (level 2), or marking to a belief based on very limited information (level 3). Analysts have become increasingly skeptical of the reliability of level 3 earnings measures.⁵ It is important not only that losses be recognized by financial institutions, but that they be recognized credibly – that is, that outsiders have some basis for believing that recognized losses, particularly on level 3 positions, are conservative. Delay in achieving that objective will prevent the market from seeing exactly who has suffered how much loss from the shocks. Earnings reports by many large financial institutions, including Citigroup, Credit Suisse, UBS, and Deutsche Bank have already recognized significant turmoil-related losses, and these announcements indicated an appreciation that banks benefit by recognizing losses quickly.⁶ Although substantial information is being revealed as time goes on, it will probably be several more weeks, or possibly months, before we have a full picture of the fallout from the shock.

³ See Fitch Ratings (2005) and Citigroup Global Markets (2007).

⁴ LSS conduits also contain a variety of "triggers," that can force an unwind of the conduit if asset performance deteriorates, which requires that the bank arranging the conduit fund the payout to ABCP holders prior to the maturity of their paper.

⁵ See Weil (2007).

⁶ On October 1, Citigroup announced quarterly earnings for the quarter ending August 2007, including its recognition of \$1.4 billion in writedowns of leveraged loan commitments (related to private equity transactions), \$1 billion in writedowns of MBS, \$250 million of writedowns on collateralized loan obligations, and \$600 million in writedowns on credit trading losses. On the same day, UBS announced that it would write down the value of assets in its fixed income business by \$3.7 billion (the largest thus far), and that writedown was accompanied by the firing of the head of its investment banking division and a statement by one UBS banker that "we can't afford to disappoint again," suggesting that UBS expected no further writedowns in the next quarter. On October 1, Credit Suisse revised its profit outlook for the quarter downward by nearly \$300 billion. Stock prices for UBS and Credit Suisse rose on their announcements of expected losses, by 3% for UBS and by 1.8% for Credit Suisse (*Financial Times*, October 2, pp. 1, 16). On October 3, Deutsche Bank indicated \$3.1 billion in charges relating to leveraged loans, structured credit products and trading, but still predicted profits for the quarter in excess of \$1.9 billion and reiterated its 2008 guidance. Shares of Deutsche Bank rose on the announcement (*Financial Times*, October 4, pp.1).

Furthermore, the shock occurred at a time when credit spreads seemed unreasonably low to many of us, reflecting the unusually high level of liquidity in the marketplace and the willingness of investors consequently not to charge sufficiently for bearing risk. In this sense, it is quite possible that credit spreads, once disturbed from those unrealistically low levels, will remain somewhat elevated after the shock dissipates.

None of this is good news. But in my view, it is too early to conclude that the U.S. banking system will find itself unable to reallocate risk in an orderly fashion, and end up having to dramatically curtail the supply of credit.

II. Limited Fallout

The late Hyman Minsky developed theories of financial crises as macroeconomic events, reflecting unrealistically high asset prices and build ups of leverage based on momentum effects and myopic expectations, which lead to asset price collapses and declines in economic activity (Minsky 1975). I am sympathetic to the view that, particularly in highly innovative financial systems during times of high market liquidity, booms accompanied by excessive leveraging can result in subsequent asset price declines and financing constraints on consumers and firms, which severely reduce economic activity (indeed, I have written numerous studies that give some support to that claim). But in my view, the correct application of the Minsky model to the current data indicates that the financial system may be able to absorb the subprime mortgage and securitization technology shocks in an orderly fashion, without a large “financial accelerator” effect.

The financial system has suffered a significant liquidity shock, and it is not over yet. But the worrying turmoil does not necessarily mean that the turmoil resulting from this shock should be viewed, as some have labeled it, as a “Minsky moment” – that is, the beginning of a severe economic decline produced by a collapse of credit, which would magnify adverse aggregate demand shocks. Such collapses of credit, in the Minsky framework, tend to occur in reaction to asset price collapses, which are themselves partly a result of the widespread overleveraging of consumers and firms. At the moment, however, it is not obvious that housing or other asset prices are collapsing, or that leverage is unsustainably large for most firms or consumers. That is not to say that the economy will avoid a slowdown, or possibly even a recession. My main focus is not on forecasting changes in housing prices or consumption, per se, which are very hard to predict; rather, I am interested in assessing the likelihood that financial weakness will substantially magnify aggregate demand shocks through a “financial accelerator” (otherwise known as a credit crunch).

It is important to distinguish a “Minsky moment” from a less dramatic contraction in the supply of credit, which is likely underway. Risk reallocation has already produced a decline in the supply of available credit, and this will not be fixed overnight. Furthermore, it is now apparent that the financial system was devoting too little equity to intermediating risk in the mortgage securitization market, and that implies that even once balance sheets of banks and other financial intermediaries have readjusted, in comparison

to the pre-shock financial structure, there will be a reduction in the amount of credit that can be supplied per unit of equity capital in the financial system. Another contributing factor to tightening credit supply is that many market observers believed that an upward correction in credit default spreads was long overdue; the extreme optimism on which paper thin spreads were based has now disappeared. Finally, some housing markets are experiencing price declines, which could accelerate, and which could contribute to financial system losses substantially exceeding the effects of the subprime shock, per se.

But these adjustments, at least for now, do not a financial crisis make. It is possible that the financial system and economy could follow the patterns of 1970, 1987, and 1998 and recover from financial disturbances quickly without experiencing a recession, even without any further monetary policy stimulus by the Fed.⁷ My view of the limited fallout from the recent liquidity shock rests on eight sets of empirical observations:

- (1) If housing prices fell by 50% nationwide (as some have argued is “entirely possible”) there is no question that the impact on consumers would be severe, both directly (via the decline in wealth) and indirectly (through its effects on the financial system). Judging from previous episodes of real estate price collapses, it would take years to sort out the losses. Real estate in liquidation is notoriously illiquid and hard to value; in the 1980s and early 1990s, banks and S&Ls that were stuck with large inventories of real estate took years to liquidate it, and given the valuation challenges associated with that real estate, found it costly to raise equity capital in the meantime. A real estate collapse would not only cause a decline in consumption via a wealth effect, it could produce a major financial accelerator effect. But housing prices may not be falling by as much as some economists say they are.

Too much weight is being attached to the Case-Shiller index as a measure of the value of the U.S. housing stock. Stanley Longhofer and I, along with many others, have noted (Calomiris and Longhofer 2007) that the Case-Shiller index has important flaws. Most obviously, it does not cover the entire U.S. market, and the omitted parts of the U.S. market seem to be doing better than the included parts. A comparison between the Case-Shiller and OFHEO housing price indexes shows that the Case-Shiller index provides a strikingly different, and less representative, picture of the U.S. housing stock than OFHEO’s index. According to the OFHEO index, as shown in Figure 2, housing prices continue to rise on average through June 2007.⁸

⁷ Recent Fed actions through the discount window and the fed funds rate (discussed below) are comparable to the Fed actions in 1970, 1987, and 1998 – episodes during which Fed loosening was confined to fed funds rate declines that averaged 1.1 percent over the three episodes. To be specific, in 1970 the fed funds rate fell from 7.80% on June 17 to 6.34% on August 26; in 1987 it fell from 7.59% on October 14 to 6.43% on November 4; in 1998 it fell from 5.50% on September 29 to 4.75% on November 17.

⁸ The OFHEO index shows an appreciation of 3.2% from the quarter ending June 2006 to the quarter ending June 2007, in contrast to the Case-Shiller index, which shows a decline of 3.2% over that period.

The two indexes differ in at least four important respects.⁹ The OFHEO index is not value-weighted, it includes only homes with conforming mortgages – meaning that it excludes houses with mortgages in excess of \$417,000, and excludes subprime mortgages – it uses a broader base of housing transactions, including the appraised values of refinancings, as well as actual sales (which reduces selectivity bias related to the choice to sell)¹⁰, and it includes the areas of the country that are omitted by the Case-Shiller index. Leventis (2007) reports that the Case-Shiller index omits 13 states and has incomplete coverage of another 29 states. According to the 2006 American Community Survey estimates of the number of single-family, owner occupied units in each state, the Case-Shiller national index entirely misses states with 11.28% of the housing stock, has only partial coverage in states containing 78.58% of the housing stock, and has full coverage for states with only 10.13% of the housing stock. As Figure 3 shows, the omitted or incompletely covered regions have had a different and more positive experience from the complete coverage regions, according to the OFHEO data.

Even when one compares the two indexes for locations that both cover, there are important differences. As Figure 4 shows, far fewer MSAs covered by both indexes show declines in recent housing prices when one measures declines using the OFHEO index. Figure 4 also shows that differences in average price declines across MSAs reflect differences in their proportions of expensive homes (that is, homes with values greater than \$500,000).

Foreclosure experience, like price changes, shows substantial variation across states. Figure 5 shows that foreclosure inventories relative to mortgages (both observed at the state level) can be accurately predicted by OFHEO state-level price changes. The R-squared in the regression illustrated in Figure 5 is 0.64. As shown in Figure 6, at the national level, the inventory of foreclosures relative to mortgages is similar to levels experienced a few years ago, although new foreclosures are occurring at a high rate.¹¹ Figure 7 shows that

⁹ There are other differences; see Leventis (2007).

¹⁰ Because the Case-Shiller index only includes sales of homes, it is subject to selectivity bias that may exaggerate housing price swings over the cycle if the qualities of the homes of sellers, or the pricing behavior of sellers varies over the cycle. For example, if sellers who sell early in the cycle are selling because they are being offered prices that are very high (higher than fair value), or if sellers that sell late in the cycle (after the boom) systematically are eager to sell (and so underprice their homes compared to what a buyer with average patience would demand) that will make home prices appear more volatile than they actually are. The OFHEO index suffers less from this bias, since it covers a broader base of transactions, including refinancings. Both indexes only cover same home transactions (which compare the value of the same home at two points in time), and avoid any attempt to compare (via hedonic pricing) the pricing of different homes over time.

¹¹ New mitigation practices, discussed in detail in Section III, could partly explain why the inventory of foreclosures declined after 2002 even as delinquencies rose, but the rise in foreclosures is mainly attributable to the experience of subprime mortgages, and these have not experienced the changes in mitigation practices mandated by Fannie Mae, Freddie Mac and the FHA that are discussed in Section III below, since private subprime mortgage originators do not have to follow the protocols established for FHA mortgages or for conforming mortgages sold to Fannie and Freddie.

almost all of the recent runup in foreclosures for non-FHA/VA mortgages consist of subprime mortgage foreclosures, which are not representative of the mortgage market as a whole (Calomiris and Longhofer 2007).

With respect to teasing out the implications of housing value changes for consumption, the fact that the OFHEO index includes appraised values from refinancings suggests an additional reason to prefer it; appraised value is the basis for borrowing against one's home in a refinancing, and thus has direct bearing on the ability to consume housing wealth. Furthermore, even if one were to accept the Case-Shiller index as the more accurate measure of average trends in prices nationwide, because the measured depreciation of housing prices appears to be driven in large part by the high-price segment of the housing market, it is unrepresentative of the experience of housing more broadly, and the consequences for aggregate consumption may be substantially lessened. Consider the recent microeconomic study by Gan (2007), who criticizes existing empirical studies of the housing wealth effect in the U.S. (which she argues suffer from poor data availability) and provides estimates of housing wealth effects on consumption based on the household behavior of Hong Kong residents (for whom better data are available). She finds a marginal propensity to consume from household wealth of 1.6%, on average, an effect that is driven by the behavior of young people who substitute between housing wealth gains and precautionary savings from income. If Gan's results generalize to the U.S., they imply that wealthier (older) homeowners have lower marginal propensities to consume out of their housing wealth, which implies a smaller prospective consumption decline per dollar of housing wealth decline in the U.S. today than if the decline in housing wealth were broad-based.

- (2) Although the inventory of homes for sale has risen, it is also worth noting that housing construction activity has fallen substantially, implying that the reduced supply of new housing should be a positive influence on housing prices going forward. Single-family housing starts dropped 7.1% in August relative to July and are down 27.1% on a year-to-year basis. Building permits for single-family homes slumped 8.1% in August (the largest decline since March of 2002) and are down 27.9% on the year. This decline in residential investment responded to an apparent excess supply problem; homeowner vacancy rates, which had averaged 1.7% from 1985 to 2005, jumped to 2.8% in 2006. The decline thus far in residential investment by the household sector as a share of GDP has been comparable by historical standards to the declines in the 1950s, 1960s, 1970s and 1980s (most, but not all, of which preceded recessions), as shown in Figure 8.¹²

¹² Also, some economists see the large downward adjustments in housing construction that have taken place as positives from the standpoint of aggregate demand going forward. As Kevin Hassett (2007) notes: "the boom [from the beginning of the recovery in 2002 until 2006] was not nearly as high as past indiscretions, and the bust [of the last year] has already reversed it."

- (3) The shock to the availability of credit has been concentrated primarily in securitizations rather than in credit markets defined more broadly (for example, in ABCP but not generally in the commercial paper market). ABCP conduits have been particularly hard hit because of the short-term nature of commercial paper, and because of the increasing use of subprime mortgages (or their derivative instruments, like CDOs) as backing for ABCP, sometimes in a highly leveraged way (e.g., through LSS trades described above). More generally, ABCP has been used by banks as a device for managing their working capital arising from securitizations and other financial transactions. ABCP is typically guaranteed by the conduit's sponsoring bank, so any failure to rollover ABCP requires the bank that sponsors the conduit to provide the necessary cash. As long-term debt markets from securitizations dried up, and as ABCP holders became unwilling to hold paper backed by those assets, sponsoring banks had to fund the retirement of a large proportion of ABCP.

As Figure 9 shows, almost all of the decline in commercial paper in recent months has come from a contraction of ABCP, while financial commercial paper has contributed somewhat to the decline, and nonfinancial commercial paper has remained virtually unchanged. This shows that the fallout from the shock has mainly to do with the loss in confidence in the architecture of securitization per se, and secondarily with rising adverse-selection costs for financial institutions, but has not produced a decline in credit availability generally. It is interesting to note that even within ABCP, it appears that a significant share of ABCP is being rolled over. That is, the decline of ABCP appears to be substantially less than the decline that would have occurred if all maturing ABCP had been withdrawn from the market. Apparently, there has not been a categorical refusal to roll over ABCP. At the same time, it is possible that some of the apparent "rollover" of ABCP reflects banks purchasing their own paper to avoid having to lend to liquidate it.¹³

How big is the liquidity risk for U.S. banks from the contraction of ABCP? Interestingly, it appears to not be very large, although Citigroup stands out as the U.S. bank with more than its share of liquidity risk exposure (including its so-called structured investment vehicles, or SIVs, which issue a variety of debts, including ABCP). Much of U.S. ABCP consists of paper issued by so-called "multiseller issuers," which tends to be maturity-matched so that liquidity risk is minimal. Most of the remaining ABCP can suffer from significant liquidity risk due to the mismatch between longer maturing assets (which include a wide variety of securities, loans, receivables, swaps, and repos) and short-term commercial paper liabilities. Most of that paper, however, was issued by foreign institutions.

¹³ From a regulatory capital standpoint, under Basel I rules, banks may have an incentive to purchase ABCP rather than fund its retirement via a line of credit, since a loan has a full risk weight, but commercial paper does not. Banks may also wish to purchase ABCP to resell it, once market liquidity improves. It is unclear the extent to which ABCP that remains outstanding according to these data is being effectively retired by being purchased by banks that run the ABCP conduits.

According to data from Moody's, on average during the first quarter of 2007, of the \$1.3 trillion in average ABCP outstanding administered (and, to a first approximation, issued by) the top 20 ABCP administrators, Citibank accounted for \$98 billion, Bank of America accounted for \$49 billion, and JPMorgan Chase accounted for \$45 billion. Given the shrinkage in ABCP that has occurred over the past weeks, the total remaining liquidity risk exposure to U.S. banks from ABCP issues, including any ABCP issued from SIVs, is roughly \$100 billion, with Citigroup accounting for about half of that. This is a very small liquidity risk for the three American banks, given the sizes of their balance sheets and their liquid asset holdings.¹⁴

Figure 10 shows that the spread between jumbo mortgage interest rates and conforming mortgage interest rates has widened, which reflects in part the greater premium attached to liquid assets (like conforming mortgages), and in part the fact that relatively expensive homes have been suffering greater risk of depreciation. On September 20, there were reports that Fannie Mae and Freddie Mac might be granted temporary authority to intermediate in the non-conforming mortgage market, which is intended to help narrow the spread visible in Figure 10.

As Figure 11 shows, during the recent turmoil, financial commercial paper rates rose relative to those for nonfinancial paper, although the gap closed after the Fed rate cut on September 18. This gap likely reflected perceived adverse selection costs that were particular to the financial sector (a concern that one is lending to an unobservably bad risk). Interbank rates also exhibit interesting patterns during the turmoil, which indicate that adverse selection costs may have increased the spread between overnight Libor and fed funds, and also widened the Libor term spread, as shown in Figure 12.

Figure 13 shows that the spread between the overnight Libor and fed funds rate in August and early September becomes extraordinarily large. Both rates are for uncollateralized, one-day, interbank loans. Previous research (Bartolini, Hilton, and Prati 2005) on the Libor-fed funds spread has indicated that, since 1990 (which marked an important regulatory change, eliminating reserve requirements on interbank borrowing in the Libor market) the two markets have been closely integrated. Bartolini, Hilton, and Prati (2005) found that during the 660 days of trading from February 11, 2002 to September 24, 2004, using actual transactions data from the two markets to compute hourly and daily spreads between the two markets, the two rates were always very similar. Using hourly data, the two rates never diverge by more than 15 basis points, and reveal temporally scattered observations of gaps of 10-15 basis points only for 20 hours of trading during the 660-day period. Daily differences between the two rates are even smaller; spreads only exceed 5

¹⁴ This discussion draws on data from Moody's ABCP Program Index, March 31, 2007, and descriptions in JPMorgan Securities Inc. (2007).

basis points on 5 out of the 660 days, and never exceed 8 basis points. Figure 13, therefore, marks an unprecedented departure from the previously observed behavior of these two interest rates. The spread peaks August 10 at 128 basis points, and averages 49 basis points in the period August 9 to September 11.

What can explain this unprecedented widening of the Libor-fed funds spread shown in Figure 13? Bartolini, Hilton and Prati (2005) point out that “the Eurodollar market may draw a greater share of larger, more internationally-oriented institutions, which are more likely to operate foreign branches or International Banking Facilities through which they can borrow Eurodollars.” Bartolini, Hilton and Prati (2005) emphasize, therefore, that the counterparty risks in the two markets may not be identical. That observation suggests that the widening spread during the turmoil of August and September reflects adverse-selection problems that increased the counterparty risks for large-size transactions involving large, international banks (possibly the European banks with the large ABCP exposures discussed above). The fed funds market, which often entails smaller transactions between small bank lenders and large bank borrowers should have been less affected by adverse-selection problems, and apparently was.

Higher adverse-selection and/or moral-hazard costs can also explain the widening term premium in the Libor market. The term spread was zero at the beginning of August. After becoming negative for a few days in mid-August, it became positive and remained significantly positive through September. The brief period of negative term premium occurred when overnight Libor spiked higher briefly, perhaps reflecting temporary differences in transaction volume and the characteristics of transactions and counterparties in the overnight and longer term markets. What explains the widening of the Libor term premium that occurred during most of the period from mid-August through mid-September? The theoretical framework of Calomiris and Kahn (1991) and Calomiris, Kahn and Krasa (1992), in which very short-term (demandable) bank debt (in this case, overnight funds) is the equilibrium contract owing to its superior ability to discipline bank risk taking (by withdrawing funding) in an environment of highly asymmetric information; any bank that would attempt to borrow at longer term under current circumstances would both be avoiding discipline of short-term debt (hence, giving rise to a moral-hazard cost) and revealing a desire to avoid that discipline (hence, giving rise to an adverse-selection cost), and would thus pay a higher interest rate. Only banks with risky intentions or unobservably weak banks would try to lock in credit for long periods of time. This adverse-selection/moral-hazard term premium explains why longer term, one-month or three-month Libor rates were rising in September even as an imminent cut in the fed funds rates was all but certain.¹⁵

¹⁵ Mishkin (1991) analyzed various interest rate spreads during historical banking panics, and argued that temporary widening of spreads reflected adverse selection premia in debt markets.

- (4) Aggregate financial market indicators improved substantially in September. As Figure 14 shows, stock prices have risen, treasury yields have risen, and bond credit spreads have fallen relative to their levels during the flight to quality (although Tbill yields remain low relative to other money market instruments). Figures 12 and 14 show that, although Libor-Tbill spreads remain somewhat elevated (reflecting adverse selection costs in the financial sector), other spreads (in particular, the spread between nonfinancial commercial paper and the overnight fed funds rate) returned to normal by about September 10. The subsequent rise in the fed funds rate and decline in the nonfinancial commercial paper rate between September 10 and 18 reflected the return to normalcy in the fed funds market, and the expectation of a fed funds rate cut on September 18 (which should have been reflected in the 30-day nonfinancial commercial paper rate's decline, but not in the overnight fed funds rate).

The adverse selection costs banks are facing could be a potential problem, particularly as it is possible that banks may need to increase equity going forward in order to absorb off-balance sheet risks. If adverse selection costs are visible in the Libor and financial commercial paper interest rates, they will be all the more costly to a bank trying to raise equity capital, since adverse selection problems are much greater for (junior) equity offerings than for (senior) short-term debts (Myers and Majluf 1984). But regulators and banks share a strong interest in reestablishing bank credibility by timely disclosure of existing losses, which will substantially mitigate adverse selection problems. During historical banking panics, when confusion about the incidence of shocks produced large adverse selection costs in banking, actions by banks, clearing houses, and regulators that resolved uncertainties about the incidence of shocks were crucial to bringing the panics to an end.¹⁶

- (5) As Figure 15 shows, nonfinancial firms are highly liquid and not overleveraged. Thus a key component of the Minsky model's reasoning for a substantial reduction in investment in the wake of a financial shock and a contraction of credit is not present under the current circumstances. Gross and net corporate leverage are not at historically elevated levels, and corporate cash assets (the difference between gross and net leverage) remain quite high. Corporations have substantial unused debt capacity, and can access public debt markets, as well as banks, to raise funds, if needed. Thus, even if equity markets became unfavorable for stock flotations, there is plenty of "financial slack" in the form of debt capacity. The limited corporate leveraging during the current expansion is partly owing to the reduced government subsidization of leverage brought about by the 2003 tax policy changes.
- (6) As David Malpass (2007) has emphasized, households' wealth continues to grow, as shown in Figure 16. Per capita net worth is at an historic high.

¹⁶ See Sprague (1910), Gorton (1985), Calomiris and Gorton (1991), Calomiris and Schweikart (1991), Calomiris and Mason (1997), and Bruner and Carr (2007).

However, as Figure 17 shows, because debt has grown more than net worth during the recent expansion, consumer leverage has risen. At the same time, the effects of higher than average leverage on the ratio of debt service costs to income have been largely offset by the low level of interest rates and by growth in household income. Nevertheless, Figure 17 does indicate a potential risk if interest rates should rise sharply, or if the unemployment rate should jump – both of which are remote near-term prospects at the moment.

- (7) As Fed Chairman Ben Bernanke noted from the outset of the recent difficulties, financial institutions' balance sheets remain strong, for the most part, even under reasonable worst case scenarios about financial sector losses associated with the subprime fallout. According to the Federal Reserve Board Statistical Release H8, large, domestically chartered U.S. commercial banks (the primary point of vulnerability in the financial system to the current securitization shock) maintained a seasonally adjusted capital account of \$702.5 billion, as of September 12, which is 12.1% of seasonally adjusted assets. Their assets include \$1,346.9 billion in securities, most of which are U.S. Treasury and Agency securities. These banks have significant capacity for absorbing additional loans and mortgage backed securities, as needed, if they want to do so. It is true that September saw a dramatic reduction in some securitization flows. For example, according to Bear Stearns (2007), commercial mortgage backed securities issues had averaged \$18 billion per month for January through August 2007, and fell to only \$4 billion in September. As Figure 18 shows, however, commercial and industrial lending expanded rapidly during the August and September upheaval, demonstrating the banking system's ability to absorb risk and provide liquidity to borrowers during the turmoil.

Can banks continue to grow their loans? At the present, even if one assumed a reasonable worst case scenario for unrecognized current losses for these banks, and even if securitizations remained depressed for some time, so long as banks wish to continue lending (or wish to continue supporting their MBS and ABS conduits by absorbing new securities issued by those conduits that are not placed in the market) they still have substantial room to add to their on-balance sheet assets, or to substitute new mortgage loans or MBS and ABS for Treasury and Agency securities, without coming near to violating their minimum regulatory capital requirements.¹⁷ As of December 2006, total equity for the largest 50 U.S. bank holding companies (which is distinct from the data on the chartered banks of those holding companies, cited above) was

¹⁷ Regulatory requirements include a 4% tier 1 risk-based capital requirement (as a fraction of risk-weighted assets), an 8% tier 1 plus tier 2 risk-based capital requirement (as a fraction of risk-weighted assets), and a leverage requirement ("adequately-capitalized" banks generally must maintain 4% of tier 1 capital relative to total assets; "well-capitalized" banks must maintain a ratio of 5% of tier 1 capital relative to total assets). It is highly desirable for banks to be considered "well-capitalized," and banks maintain a buffer above their minimum requirements. The leverage requirement is probably the most binding of these constraints going forward, especially since banks will be re-intermediating mortgage assets, which have less than a full risk weight, and likely will continue to maintain less than a full risk weight under Basel II.

\$819 billion, and tier 1 capital for these holding companies was \$570 billion of that amount, while total holding company assets were \$9.6 trillion. Thus, the tier 1 leverage ratio, on average, was 6.17% for this group, implying that banks should be able to accommodate substantial new mortgage originations and other lending on balance sheet in an orderly fashion. And, so long as financial institutions' earnings remain positive, they will be able to accumulate additional equity going forward.

Is it possible, however, that individual banks (especially some of the largest banks with significant exposures to off-balance sheet risks) might experience losses that make it harder for them to increase loans or MBS and ABS holdings significantly? The alignment of the distribution of surplus equity and off-balance sheet exposures within the banking system is potentially important for gauging the banking system's ability to re-intermediate off-balance sheet activities, since banks do not provide perfect substitutes for each other's credit supply. The regulatory capital positions of the three largest U.S. banks (Bank of America, JP Morgan Chase, and Citibank), alongside their outstanding amounts of sold or securitized residential loans on which servicing is retained or which have explicit recourse or credit enhancements, as of June 30, are shown in Table 2. Table 2 suggests that taking new originations onto its balance sheet instead of placing them off-balance sheet, or standing ready to clean up problems that arise in its MBS conduits, could be a bit more challenging for Citibank than for the other two banks, and the higher levels of mortgage originations for Citibank shown in Table 1 is consistent with that view. Still, total originations of mortgages by Citibank shown in Table 1 (which were placed both on or off its balance sheet) could be easily accommodated for a substantial period of time by absorbing these mortgages on-balance sheet going forward in the unlikely event that the MBS market dries up; that is, there is no reason at this time to think Citibank would be unable to take on significant additional assets (say, growing by 10% or more), assuming that its equity position does not deteriorate dramatically.¹⁸ And loan growth could be even greater, since loans could substitute for securities without affecting Citibank's ability to satisfy its tier 1 leverage requirement. Other large banks have even greater capacity to grow their loans.

Finally, even if securitizing banks experience significant additional losses and have limited existing risk-absorption capacity, so long as adverse-selection problems are resolved quickly, banks should be able to raise additional equity capital to supplement existing equity as needed.¹⁹ Thus, the

¹⁸ I was unable to obtain in a timely fashion the June holding company data on the capital positions of the three largest U.S. institutions. The December 2006 leverage ratios, however, are quite similar to the bank-level data reported in Table 1 for June 2007. The December holding company leverage ratios are as follows: Bank of America (6.36%), JPMorgan Chase (6.19%), and Citigroup (5.16%).

¹⁹ Creative approaches to raising new equity may be worthwhile for banks to consider in the current environment. During the early 1990s, when adverse-selection costs for banks remained significant (due to

process of adjusting to the securitization shock need not be characterized by a major credit crunch caused by a persisting scarcity of bank equity.

This optimistic point of view about avoiding bank equity scarcity, however, rests importantly on three key factors: (1) the implementation of appropriate and predictable regulatory standards (which will soon be defined for large U.S. banks under the new Basel II internal modeling of risk), (2) speedy and credible disclosure by banks of their existing losses, and (3) the absence of substantial additional shocks that would make loans, MBS, and ABS riskier (and hence more difficult for banks to absorb onto their balance sheets, while maintaining prudent risk management), reduce banks' net worth (and, therefore, reduce their risk absorption capacity), and lead to new adverse selection problems (making lost equity hard to replace). A sufficiently large decline in real estate prices (which would result in large losses for banks, and long-term uncertainties about the magnitude of those losses), for example, could undermine the basis for these optimistic premises.

- (8) Banks hold much more diversified portfolios today than they used to, they are less exposed to real estate risk than in the 1980s, and much less exposed to local real estate risk, although U.S. banks' exposure to residential real estate has been rising since 2000 (Wheelock 2006). In previous episodes of real estate decline (the 1920s, 1930s, and 1980s) much of the distress experienced by the banking sector resulted from its exposure to regional shocks, because of the absence of nationwide branch banking. In the 1980s, shocks associated with commercial real estate investments in the northeast, and oil-related real estate problems in the southwest, were particularly significant sources of banking distress.²⁰ During the last two decades, however, banks have become much more diversified regionally, owing to state-level and federal reforms of branching laws. Banks also have a more diverse income stream due to the expansion of bank powers, which culminated in the 1999 Gramm-Leach-Bliley Act. The data in Figures 2-4 indicate substantial variation in price changes across different regional real estate markets, but banks should be able to weather these shocks much better than in the 1930s or late 1980s, when variation in regional circumstances led to significant shocks to regionally isolated banks and to the supply of bank credit.²¹

I conclude from this evidence that the consequences of the recent shocks for the supply of bank credit may turn out to be modest. A moderate shock originating in

lingering information problems), Citibank employed convertible preferred stock as a means of raising tier 1 equity with downside protection for new equity purchases.

²⁰ Wheelock (2006) finds that, in the 1980s, substantial declines in real estate prices translated into significant deterioration in local banking condition.

²¹ For a review of branching deregulation and its positive effects on banking sector performance, see Calomiris (2000) and Jayaratne and Strahan (1996). Evidence on the role of regional shocks in banking distress and credit contraction during the 1980s is provided in Wheelock (2006); for the 1920s and 1930s, see Alston, Grove, and Wheelock (1994), Alston (1984), Calomiris (1992), Calomiris and Mason (1997, 2003a, and 2003b), and Calomiris and Wilson (2004).

housing and subprime mortgage markets was substantially magnified temporarily by the problems in securitization architecture (which reflected concerns about the quality of underwriting standards and ratings methodologies for MBS and ABS, and similar concerns, along with liquidity risks, related to ABCP). The financial system is adjusting to that shock. Unless large new problems arise, the risk reallocation problem can be resolved perhaps in a matter of a few months as confidence is restored (albeit with higher equity allocated per unit of risk for some asset classes going forward).

III. Policy Implications

A proper regulatory response to the current turmoil (especially aggressive policies to recognize losses quickly, and appropriate and predictable implementation of risk-based capital requirements by bank regulators under Basel II) will contribute significantly toward avoiding a bank capital scarcity problem and restoring banks' abilities to absorb risk. When considering other policy responses, it is useful to divide the discussion into three areas: (1) short-term responses to ease adjustment problems for mortgage borrowers; (2) longer term changes in the regulation of the mortgage market and the securitization markets; and (3) central bank policies toward banks during the crisis.

Short-Term Assistance to Borrowers

Many homeowners, particularly highly levered subprime borrowers who are facing rising interest rates as the result of teaser rate contracts, are facing increased risk of foreclosure. Compassion motivates various proposals to bail out homeowners with federal government aid. The costs of doing so would be large. Those costs include not just the dollars spent on aid, but the moral hazard consequences of encouraging high-risk borrowing in the future. To the extent that aid is provided, it should be targeted (limited to forestalling foreclosures on the primary residences of low-income homeowners), and should depend on market renegotiation by creditors and lenders, not government intervention into the foreclosure process. Similarly, any expansion of the authority of Fannie Mae and Freddie Mac, including the current proposal to allow them to enter temporarily into the jumbo mortgage market, should be crafted very carefully. There are significant long-term problems with allowing these GSEs to continue to dominate mortgage markets (Wallison 2001), which explains why many members of Congress, Fed and Treasury officials, and others have been eager to rein them in. It would be unfortunate if those long-term efforts were undermined by the short-term desire to shave a few basis points off of the cost of jumbo mortgages.

One idea for assisting borrowers that is worth pursuing is to exempt debt forgiveness resulting from renegotiation from federal taxation. Other ideas (e.g., including the recent bills being considered by Congress to reduce or eliminate FHA downpayment requirements below their already low level of 3%; or intervening to encourage lenders to engage in more "mitigation" of delinquent mortgages) could be counterproductive. Some of the current mortgage mess reflects government-encouraged

relaxation of mortgage underwriting standards that have encouraged high-risk borrowers to see homeownership as entailing no risk of loss. Furthermore, the government policy of subsidizing homeownership through FHA loans and the mortgage interest deduction is based on the belief that when people have a stake in their communities, they become better citizens; but if homeownership entails no significant economic stake in one's home, it cannot accomplish that objective.

Not only are FHA down payment requirements very low (3% for new mortgages, and 5% for cash out refinancings), but FHA, along with Fannie Mae and Freddie Mac, substantially changed their mitigation protocols in the late 1990s and early 2000s to require mortgage originators to renegotiate rather than foreclose delinquent mortgages. In 1998, 77% of mortgages that were 90 days delinquent were foreclosed. In 2002, only 15% of 90-day delinquent mortgages were foreclosed. This suggests a huge change in the willingness to renegotiate delinquent mortgages, which has not been generally recognized. Mitigation may be an efficient means of reducing liquidation costs for borrowers and lenders, but it is not costless, and it is not properly disclosed in the marketplace. Rough calculations based on FHA aggregate data (micro data are not available on mitigation practices for FHA, and neither micro nor aggregate data are available on Fannie Mae's or Freddie Mac's mitigation practices²²) suggest that as many as half of mitigated FHA mortgages eventually become delinquent again and result in foreclosure. Mitigation has created an invisible deterioration in the quality of FHA, Fannie Mae, and Freddie Mac portfolios, since defaults are hidden and "performing" mortgages on average are riskier than they appear based on comparisons with experience prior to the establishment of the new mitigation practices.

Subprime mortgage securitizations may not be subject to similar mitigation protocols as FHA and Fannie and Freddie portfolios; here, encouragement for private renegotiation may be warranted. According to one report, lenders had eased terms on only 1% of the subprime mortgages resetting at higher interest rates in January, April, and July of 2007.²³ To reduce rising debt service costs on adjustable rate mortgages facing big interest cost increases, it may make sense to refinance into a lower rate mortgage. Government assistance could take the form of government loss sharing arrangements to encourage private lenders to renegotiate loan terms quickly (following, for example, the approach of the Mexican "Punto Final" program, which encouraged speedy renegotiation by sharing in private lenders' losses so long as renegotiation was speedy, as discussed in Calomiris, Klingebiel and Laeven 2005). To limit moral hazard consequences, government loss sharing offers should not rise to a large share of loss, and loss sharing should be contingent on rapid renegotiation, say within several months (since the social gain from resolving financial distress depends on quick resolution). It may be hard to measure effective "loss" from renegotiation that results in a lower interest rate than the actuarially fair one (since lenders lose promised interest but gain higher

²² That is, to my knowledge, it is not possible for pool investors or Fannie or Freddie stockholders to know exactly how many mitigations occurred, overall, or within each pool, or the precise terms of the mitigations. There is at least one detailed empirical study of Freddie Mac's mitigation experience (Cutts and Green 2004), so the data have been compiled on a loan-by-loan basis and could be made public easily.

²³ "Lenders Facing 'Traffic Jam' of Renegotiated Mortgages," *Financial Times*, October 4, 2007, p. 1.

probability of repayment). But there are a variety of approaches to accomplishing this objective which, while inexact, would be reasonable. For example, the FHA might agree to assume existing subprime mortgages (for primary residences of low-income borrowers) in order to restructure them as reduced-principal, low-interest, fixed-rate mortgages, and purchase them from subprime lenders at some fraction (e.g., 75%) of their face value.

Long-Term Changes in Regulation

Three areas of long-term regulatory change are worth considering: (1) a change in the regulatory use of letter grades by ratings agencies; (2) the disclosure of mitigation practices by Fannie Mae, Freddie Mac, and the FHA; and (3) improved consumer protection regulation in the mortgage market.

The Regulatory Use of Ratings:²⁴ Ratings agencies have been blamed for understating the risks of default on subprime mortgages and securitizations that contain them or their derivative securities. Savvy investors should not invest only on the basis of a rating, but such admonitions ring hollow; ratings agencies do more than opine; they play an active role in structuring MBS and CDOs (effectively determining their leverage); they serve as key sources of information about performance; and often enumerate measures that issuers must take to maintain ratings in troubled securitizations.

Unlike typical market actors, ratings agencies are more likely to be insulated from the standard market penalty for being wrong, namely the loss of business. Issuers must have ratings, even if investors don't find them accurate. That fact reflects the unique power that the government confers on ratings agencies to act as *regulators*, not just opinion providers. Portfolio regulations for banks, insurers, and pensions set minimum ratings on debts these intermediaries are permitted to purchase. Thus, government has transferred substantial regulatory power to ratings agencies, since they now effectively decide which securities are safe enough for regulated intermediaries to hold.

Ironically, giving ratings agencies regulatory power reduces the value of ratings by creating an incentive for grade inflation, makes the meaning of ratings harder to discern. Regulated investors encourage grade inflation to make the menu of high-yielding securities available to them to purchase (if they so desire) larger. The regulatory use of ratings changed the constituency demanding a rating from free-market investors interested in a conservative opinion to regulated investors looking for an inflated one.

Grade inflation has been concentrated particularly in securitized products, where the demand is especially driven by regulated intermediaries. Even in the early 1990s, it was apparent how regulation was skewing the ratings industry. Cantor and Packer (1994) pointed out that grade inflation was occurring, and that it was driven initially by ratings agencies other than Moody's and S&P: "Rating-dependent financial regulators assume that the same letter ratings from different agencies imply the same levels of default risk.

²⁴ The discussion here relies heavily on Calomiris and Mason (2007).

Most ‘third’ agencies, however, assign significantly higher ratings on average than Moody’s and Standard & Poor’s.” In fact, those “third” agencies were already pushing more heavily into structured finance than Moody’s and Standard & Poor’s, rating deals that the two main agencies did not. Moody’s and Standard & Poor’s eventually chose to join the others in what turned out to be an incredibly lucrative fast-growing product area, which now accounts for huge shares (roughly half) of ratings agencies’ fees.

Although Moody’s and S&P remained more conservative than others when rating structured products, they also allowed the ratings scale for securitized products to become inflated. According to *Bloomberg Markets* (July 2007, p. 56) “Corporate bonds rated Baa, the lowest Moody’s investment grade rating, had an average 2.2 percent default rate over five-year periods from 1983 to 2005, according to Moody’s. From 1993 to 2005, CDOs with the same Baa grade suffered five-year default rates of 24 percent, Moody’s found.” Long before the recent turmoil, Moody’s was aware that its Baa CDO securities were about 10 times as risky as its Baa corporate bonds. There was improvement in default experience on CDOs in 2006, and the default rate fell to 17%, reflecting that some previous impairments were cured in 2006. Nevertheless, the gap between corporate bonds and CDOs remained large.²⁵ Despite ratings’ agencies statements that letter grade ratings should represent consistent portrayals of risk across different debt instruments (e.g., corporate debt and debts from securitizations), in fact, this has not been the case.²⁶

Given the different and shifting meanings of Baa and other ratings as measures of risk, and given the high rate of financial innovation and the lack of transparency inherent in multi-layered structured finance deals, perhaps it is not surprising that investors underestimated risks so badly leading up to the recent subprime collapse.

It is no use blaming the ratings agencies, who are simply responding to the incentives inherent in the regulatory use of ratings. The right solution is for regulators to reclaim the regulatory power that has been transferred to ratings agencies to both award ratings *and* determine the meanings attached to ratings. Such reform becomes even more important in light of soon-to-be-adopted Basel II capital rules, which allow bond ratings to be used to measure default risk in regulating the portfolios of banks that do not develop their own models under Basel II’s Internal Risk-Based (IRB) Capital Rules.

How can regulatory power be reclaimed? Regulating how ratings agencies set standards is one possibility, but that solution would compromise the ability of ratings agencies to use independent discretionary judgment. A better solution is to reform existing regulations to avoid the use of letter grades in setting standards for permissible investments by regulated institutions. In the absence of regulatory use of letter grades, banks and their regulators would look at the underlying risks of investments (their default probabilities and the expected losses given default), not ratings. Indeed, ratings agencies sell tools to investors that permit exactly this sort of analysis, and the IRB framework

²⁵ Based on additional data, through 2006, the comparable numbers are 2.1% and 17.0%. Moody’s refers to missed payments in CDOs as “impairments,” which are curable prior to maturity.

²⁶ For statements by ratings agencies affirming that ratings should have a consistent meaning “without regard to the bond market sector” see Mason and Rosner (2007b, pp. 7-8, 19).

under Basel II presumes the existence of such data, which would render letter ratings rather superfluous. Full disclosure by regulated institutions of these new measures of portfolio risks, and a greater reliance on market discipline to discourage excessive risk taking would further improve the regulatory process.

An even better solution, at least with respect to banks and insurance companies, would be to eliminate the use of ratings in prudential regulation. Regulation could substitute true market discipline through mandatory subordinated debt requirements, as proposed in Calomiris (1997, 1999), and Shadow Financial Regulatory Committee (2000).²⁷ Not only would requiring banks to issue sub debt provide discipline from debtholders who place their own money at risk, the opinions of these at-risk market participants would be publicly observable in bond prices and thus would provide useful information to bank and insurance company investors and regulators.

Disclosure of Mitigation Practices: As noted above, mitigation has substantially altered the consequences of delinquency for mortgage borrowers whose mortgages are intermediated by FHA, Fannie Mae, or Freddie Mac. *Ceteris paribus*, these practices raise default risk invisibly, since the proportion of loans mitigated, and the outcomes of mitigation, cannot be observed or tracked by investors, and thus, cannot factor into mortgage default risk analysis. FHA, Fannie Mae and Freddie Mac should have to disclose their mitigation practices in detail publicly so that investors can judge the effects of mitigation for themselves. There is a further reason for FHA to disclose its practices, namely, the need for an informed public policy discussion about the costs and benefits of the mitigation policy change enacted by the FHA in 2002.

Improved Consumer Protection: The “democratization of finance” in the 1990s and the related phenomenon of the increasing use of credit scoring to price risk in the mortgage market meant that borrowers who previously would be denied access to mortgage finance could now have access, albeit at high rates of interest. Most observers welcomed these changes, but politicians, consumer advocates, academics and regulators have noted that some undesirable “predatory lending” practices have accompanied the opening up of the subprime mortgage market. This is not the place to fully expound on this issue or fully deal with the policy options or tradeoffs, but there is little doubt that the subprime default wave will increase interest in regulating mortgage lending. It is likely and perhaps desirable that relatively unregulated mortgage market participants (brokers that connect borrowers with finance company lenders) come under increasing scrutiny and regulation to ensure that anyone dealing with consumers has to meet the highest standards of disclosure and ethical behavior when selling mortgage products to the public. Furthermore, there seems to be serious interest in Congress to reform mortgage disclosure regulations to focus on meaningful disclosures and reduce the volume of unnecessary and distracting paperwork currently required by regulation.

²⁷ For evidence of the desirability and feasibility of employing greater market discipline, see Board of Governors (1999), Mishkin (2001), and Barth, Caprio and Levine (2006).

Central Bank Policies

Central banks have responded to the liquidity shock by extending assistance to financial intermediaries, through interest rate reductions and open market operations. At least two interesting questions arise: (1) How much should monetary policy react to the current turmoil? and (2) How should assistance be channeled to the market (e.g., via discount window lending or open market operations)?

How much assistance is needed?: I will not address this topic in detail, except to say that there are large social gains to be had from constraining inflation (which has been drifting higher recently) and from avoiding moral hazard problems that come from bailing out banks or investors that would otherwise suffer losses. These considerations are not to say that the Fed should permit a recession to occur just to teach the markets a lesson, but they do imply a cost to society of the Fed's erring on the side of providing too much assistance to banks and others. When one considers some of the transactional structures that aggravated the illiquidity problems banks experienced during the recent turmoil, it is clear that individual bank decisions to pursue very questionable transactions (like LSS trades) underlay many of the problems that individual banks experienced. Central bank assistance, whatever its positive effects, necessarily has the undesirable effect of removing the cost of having undertaken very questionable risks. In my view, monetary policy should not loosen further in the near term, and the Fed should stand ready to raise interest rates in response to an economic rebound.

How should assistance be channeled?: The Fed, the ECB, the Bank of England, and most other central banks have responded to the liquidity shock by expanding market liquidity. The Fed did so through a combination of policies, including a temporary reduction in the fed funds rate (i.e., open market purchases, primarily involving repurchase agreements), a 50 basis point cut in the fed funds rate on September 18, and a reduction in the cost of borrowing from the Fed (i.e., reducing the discount rate twice, reducing the rate from 6.25% to 5.25%, and making it clear that it was encouraging the use of the discount window to absorb shocks related to mortgage finance by establishing favorable terms for the use of mortgages and related securities as collateral for discount window borrowing). As part of expanding access to the discount window, on at least one occasion, the Fed also apparently relaxed Section 23a limits on the amounts of lending from a bank to one of its affiliates, in order to allow a pass through of discount window lending to an affiliate of a large U.S. bank that was experiencing securitization-related illiquidity. The ECB has mainly employed open market operations (primarily through repurchase agreements) to assist its banks (many of which had substantial illiquidity problems related to the retirement of ABCP). The British government also decided, regrettably, to bail out Northern Rock by guaranteeing its deposits to prevent a bank run from causing its closure.

There are tradeoffs involved in choosing whether to use fed funds interest rate changes (via open market operations) or discount window lending policy to respond to financial turmoil. On the one hand, there are arguments in favor of using the discount window. The discount window is a more focused tool (see Calomiris 1994), which can

allow the central bank to combat localized problems (like the current securitization shock) without changing fed funds rates, and through them, interest rates throughout the entire financial system. On the other hand, discount window lending, like bank bailouts, can entail its own adverse moral-hazard consequences, particularly if the central bank uses such lending to provide subsidies or bailouts to insolvent institutions (as the Fed did, and was roundly criticized for doing, during the 1980s). The bailout of Northern Rock is a sobering reminder of the need to reform government safety nets around the world to establish credible ex ante market discipline (as discussed above) and ensure the existence of politically viable ex post loss sharing arrangements. Otherwise, the moral hazard costs that grip banking systems will worsen.

It is also important to bear in mind that if the Fed wishes to preserve a “penalty rate” gap between the market rate (i.e., the fed funds rate) and the discount rate, and if it wishes to cut the costs of borrowing for banks, then it may have to pursue a combination of cutting both the fed funds rate and the discount rate; a large cut in the discount rate without a corresponding cut in the fed funds rate would eliminate the penalty rate gap.²⁸ Maintaining a “penalty rate,” which is consistent with Bagehot’s rule for central bank lending (to lend freely on good collateral at a penalty rate) can make sense from a variety of perspectives. For example, a bank may choose to use the discount window to obtain reserves in order to avoid participating in the Fed’s morning repo auction, perhaps because high-quality collateral is absent on its balance sheet. A penalty rate would ensure that such a bank would pay more for funds than banks actively participating in repo auctions as a means of accessing reserves. This avoids free riding on the public good of liquidity creation by encouraging banks to hold liquid assets (good quality collateral). Thus, a second argument for using the discount window as the means of intervention is that it may have favorable incentive consequences for bank liquidity management.

IV. Conclusions

The current financial market turmoil resulted from a moderate shock to the housing and mortgage markets, which was magnified by the uses of subprime mortgages in a variety of securitizations (MBS, CDOs, LLS, and ABCP), which produced a collapse of confidence in the architecture of securitization and led to a sudden need to reallocate and reduce risk in the financial system. The liquidity risks inherent in maturity mismatched ABCP conduits (primarily used by European banks) substantially aggravated the short-term problem. Despite these disruptions, the fallout thus far in the financial system has been limited and appears to have been contained by a combination of market discipline and short-term central bank intervention. It is hard to know whether new financial shocks will occur (e.g., large housing price declines, or substantial increases in defaults on other consumer loans), or whether consumption demand will decline independent of financial system problems; but there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the

²⁸ There are other ways to define a “penalty rate.” For example, one could define it as the rate above the rate that would prevail in the absence of the liquidity shock giving rise to central bank lending (see Calomiris 1994).

shocks we have already seen and turn them into a recession. Hence, we have not (yet) arrived at a Minsky moment.

The main concern about a finance-induced recession today is the possibility of a bank “capital crunch” akin to the U.S. experience in the 1930s or the late 1980s and early 1990s (as discussed by Bernanke and Lown 1991, Baer and McElravey 1993, and Boyd and Gertler 1994) – a situation in which banks have to substantially reduce credit supply to the economy because of their own scarcity of equity. Although this is a real risk, it is important to remember all the things that are different about the economic situation today and the situation during 1989-1990. In the late 1980s, bank balance sheets were extremely weak, owing to the series of shocks banks had faced. Banks had suffered losses due to interest rate rises in the early 1980s, LDC loan problems, agriculture land value collapses in the mid-1980s, commercial real estate collapse in the late 1980s, and southwestern oil and real estate distress in the mid-to-late 1980s. Moreover, the overall economic environment was one of anemic macroeconomic performance. Banks were not well diversified regionally, and had limited sources of income. By the end of the 1980s some money center banks were barely solvent. Corporate leverage was very high and had been growing rapidly during the 1980s. In contrast, today the banking system displays strong balance sheets and a diverse portfolio and income stream. Corporate leverage is low, and economic growth, within and outside the U.S., has been strong. Although the housing market remains a concern as a potential influence on consumer confidence, it is noteworthy that August consumption data were robust and third-quarter GDP growth is still projected at roughly a 3% annual rate.

These differences matter for how the banking system and the economy are likely to weather the current turmoil. If additional losses arise, making existing bank equity inadequate for absorbing off-balance sheet risks onto banks’ balance sheets, and if the resulting adverse-selection costs discourage banks from raising new equity, a credit crunch could occur. But the initial subprime shock is of limited magnitude and so far has produced limited and localized rises in financing costs in the economy. Most worrying is the fact that many off-balance sheet activities must now be transferred onto banks’ balance sheets, due to the disruption in the financial architecture of securitization, and that disruption is unlikely to be resolved quickly. However, the combination of high existing bank equity capital (which was maintained to provide a cushion for exactly such circumstances), appropriate and predictable implementation of capital regulatory changes under Basel II, and a rapid and credible disclosure of existing losses related to subprime exposures (which would ensure continuing access by banks to the equity market to raise additional capital) should permit the economy to avoid a credit crunch.

Even if bank credit supply does decline further, corporate balance sheets show substantial debt capacity, which offers corporations an alternative option for accessing external finance. The effects on public corporations of a small contraction in the supply of bank credit would be limited, since that contraction could be offset in large part by expanded offerings of corporate public debt and equity. Consumers’ leverage is high, but it has been high for several years. The main concern about consumers’ leverage would be

rising debt service costs in the wake of a rise in interest rates, or a jump in unemployment, both of which are remote prospects at the moment.

Finally, while the effects of a housing price collapse on the financial system and consumers' balance sheets could be severe, it is not clear that a severe decline is underway. The OFHEO national housing price index suggests flat rather than declining prices, on average, and shows that in many parts of the country there is continuing price appreciation. The decline in housing starts and building permits over the past year has a bright side – it will limit supply going forward and reduce downward pressure on prices.

I conclude that the likely credit supply contraction resulting from this turmoil, while potentially significant, has been exaggerated. The policy responses to combat mortgage foreclosures or to stimulate the economy should be measured and should take into account the social costs of those policies (higher inflationary momentum and moral hazard). Empirical evidence suggests that moral-hazard costs of protection are significant.²⁹ The most obviously desirable long-term financial sector reforms pertain to the need to eliminate or at least reform the use of ratings agencies opinions in prudential regulation, the need to disclose the mitigation practices applied to delinquent mortgages by the FHA, Fannie Mae and Freddie Mac so that similar securitization confusions do not grip the (prime) mortgage market in the future, and the need to establish credible ex ante market discipline and ex post loss sharing in prudential bank regulation.

²⁹ There is a large literature measuring the moral-hazard costs of protection. These costs take various forms. For example, Alston (1984) shows that the foreclosure relief measures instituted to combat the agricultural distress of the 1920s and 1930s raised credit market costs for non-defaulting borrowers. Additionally, there is the cost of wasteful resource allocation from increased risk taking. The academic literature looking at the adverse consequences for risk management of protecting banks is large. See, for example, Barth, Caprio and Levine (2006).

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Table 1

Mortgage Originations
by Product and by Originator
(Billions of Dollars)

	2007 (6 mo)	2006	2005	2004	2003	2002	2001
FHA/VA	42	80	90	130	220	176	175
Conv/Conf	570	990	1090	1210	2460	1706	1265
Jumbo	242	480	570	510	650	571	445
Subprime	151	600	625	530	310	200	160
AltA	205	400	380	185	85	67	55
HELOC	200	430	365	355	220	165	115
TOTAL	1410	2980	3120	2920	3945	2885	2215
ARMs	460	1340	1490	1464	1034	679	355
Refis	765	1460	1572	1510	2839	1821	1298
<u>Top 10 Originators</u>							
Countrywide (CA)	245						
Wells Fargo (IA)	148						
Citi (MO)	116						
Chase (NJ)	109						
B of A (NC)	96						
WaMu (WA)	83						
Resid. Cap. (NY)	58						
Wachovia (NC)	55						
IndyMac (CA)	48						
Am Home Mort (NY)	35						
TOTAL for Top 10	993						
TOTAL for Market	1410						

Source: Originations data are from "Current Mortgage Market Conditions," Housing Data Users Group, September 26, 2007.

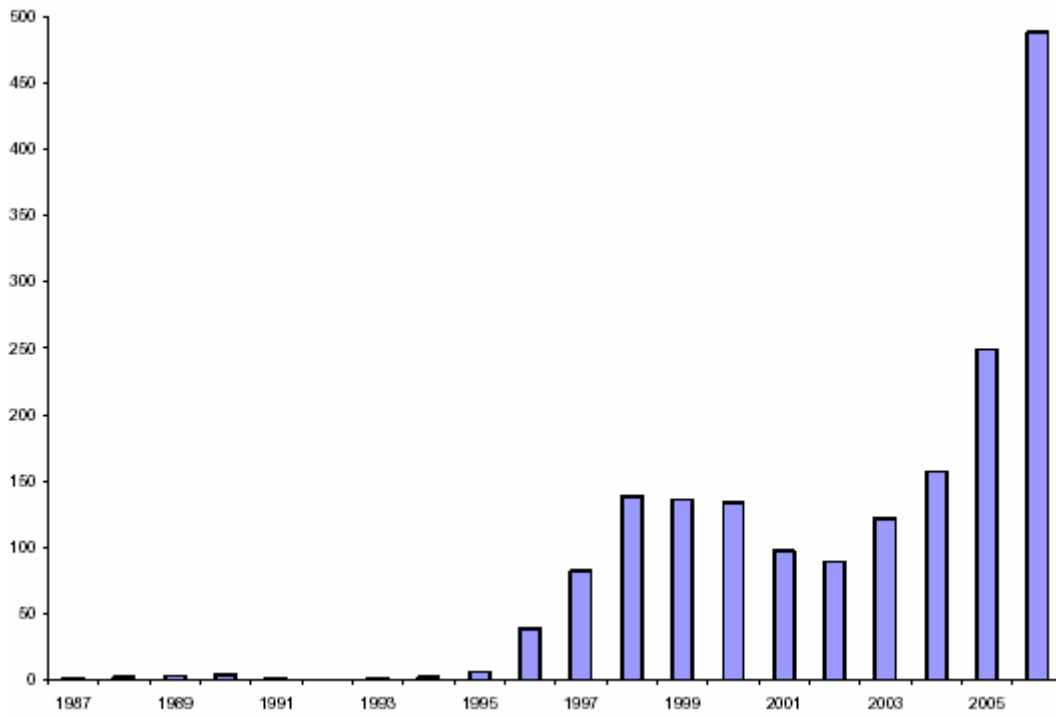
Table 2

Absorption Capacity of Three Largest U.S. Banks, June 30, 2007
(Billions of Dollars)

	Bank of America	JP Morgan Chase	Citibank
Consolidated Assets	\$1,252	\$1,252	\$1,133
Tier 1 Leverage Ratio	0.063	0.059	0.058
Tier 1 Risk-Based Capital Ratio	0.085	0.078	0.082
Total Risk-Based Capital Ratio	0.109	0.110	0.122
Outstanding principal balance of residential loans sold and securitized with servicing retained, or with recourse, or seller-provided credit enhancement.	\$ 73.6	\$ 80.5	\$ 584.9

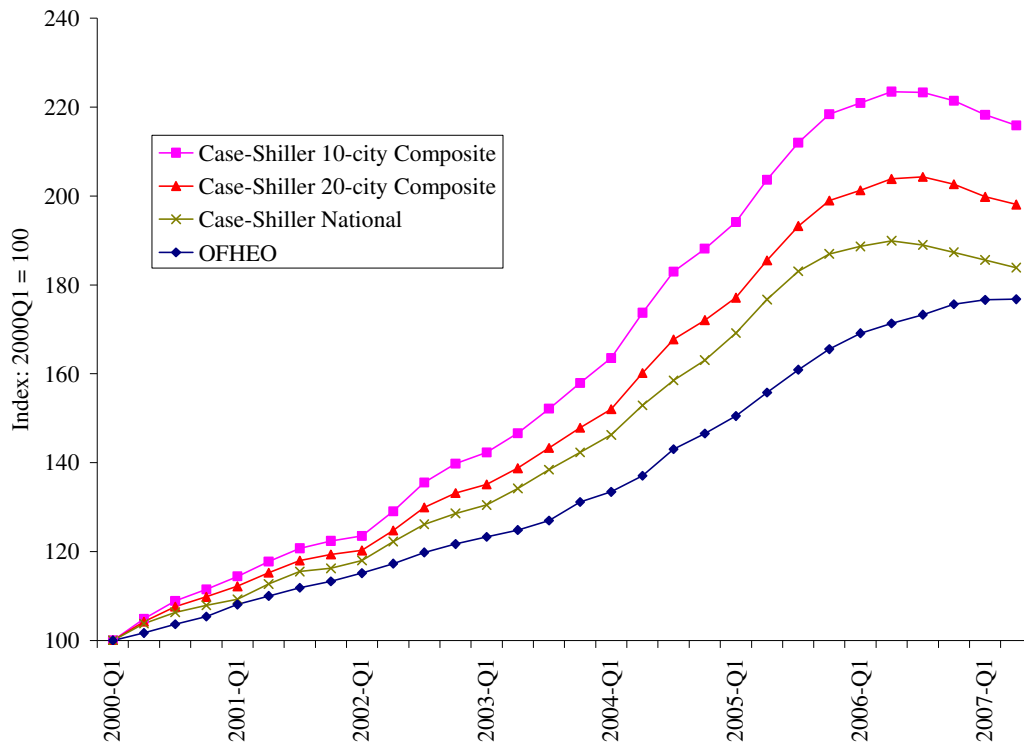
Source: Call report data, June 30, 2007. Data are reported for banks, and do not include financial subsidiaries of holding companies.

Figure 1: Annual Cash CDO Issuance



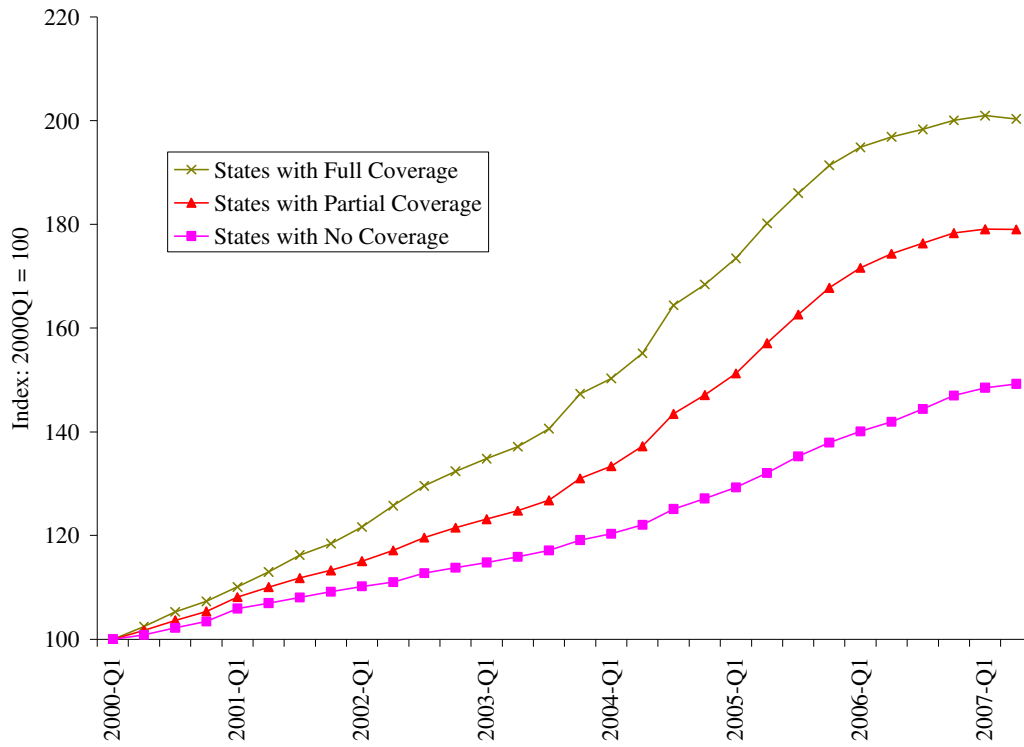
Sources: Mason and Rosner (2007), derived from Lucas, Goodman and Fabozzi (2006).

Figure 2: U.S. Home Price Appreciation



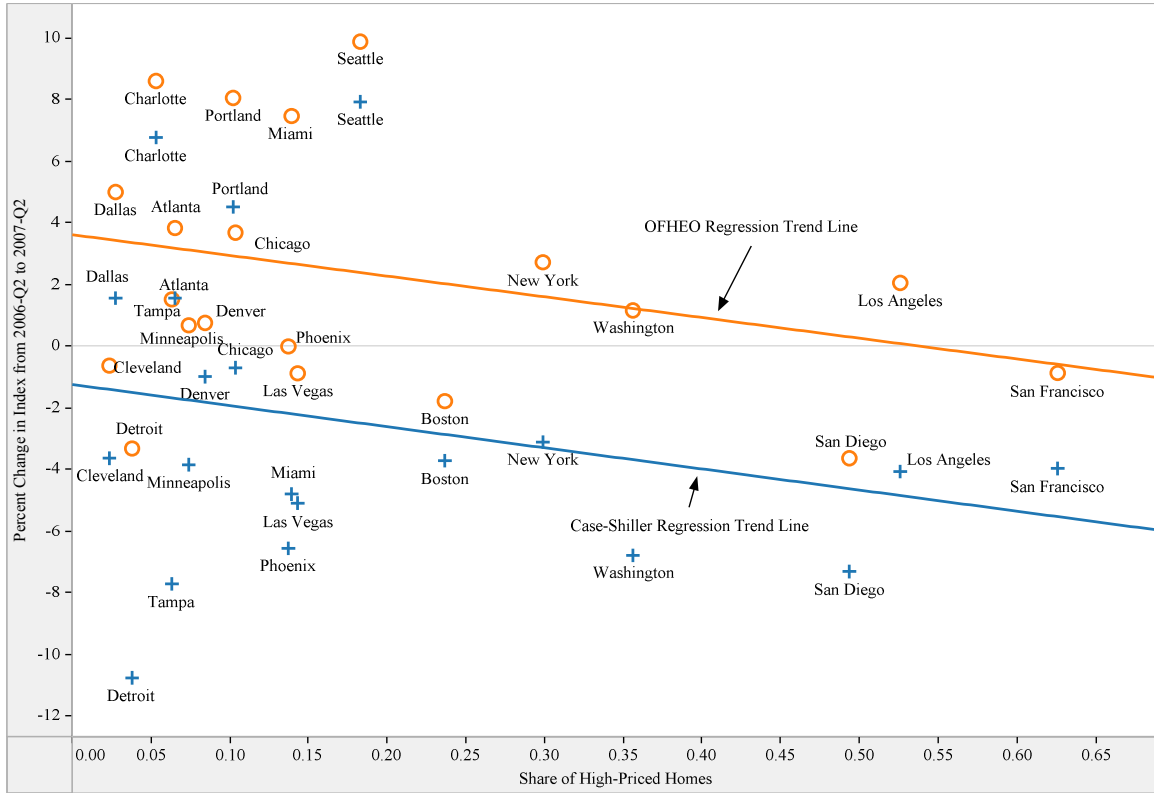
Sources: Calomiris & Longhofer (2007).

Figure 3: OFHEO HPI
Disaggregated by Case-Shiller Coverage



Sources: Calomiris & Longhofer (2007).

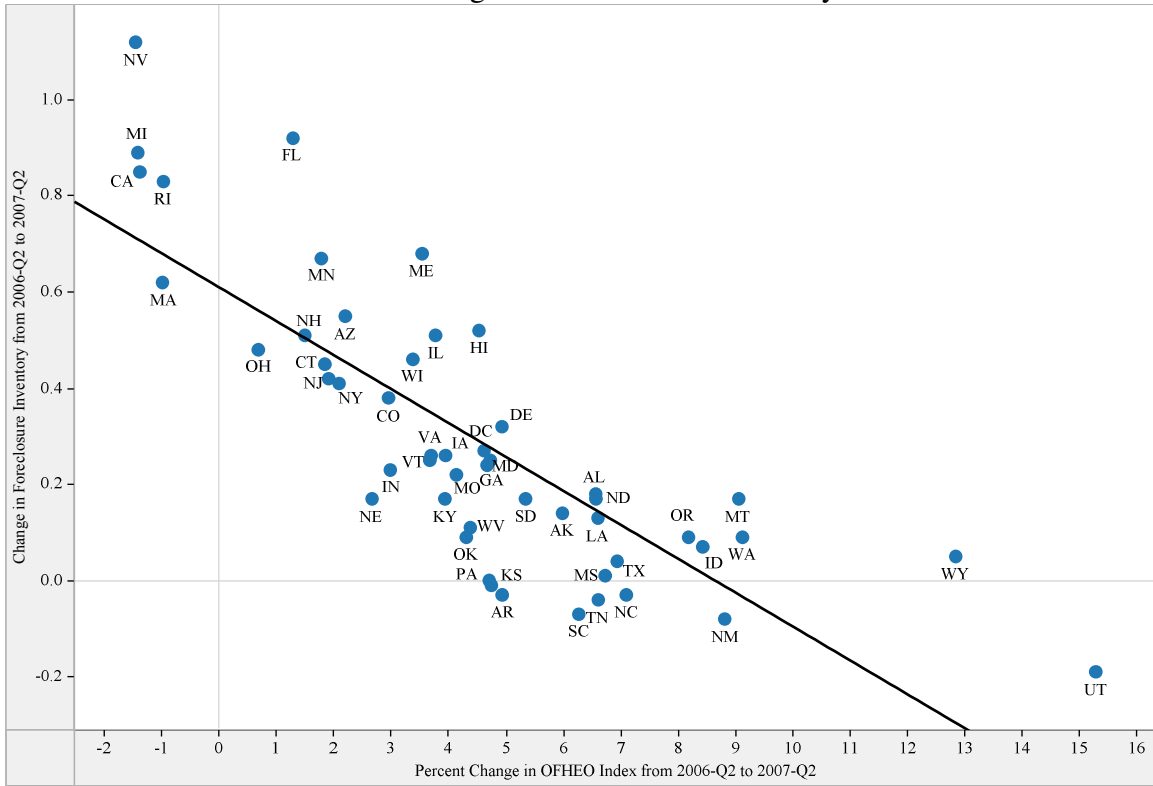
Figure 4: Annual Home Price Appreciation (OFHEO & Case-Shiller) vs. Share of Homes Valued Above \$500,000



Index
 ○ OFHEO
 + Case-Shiller

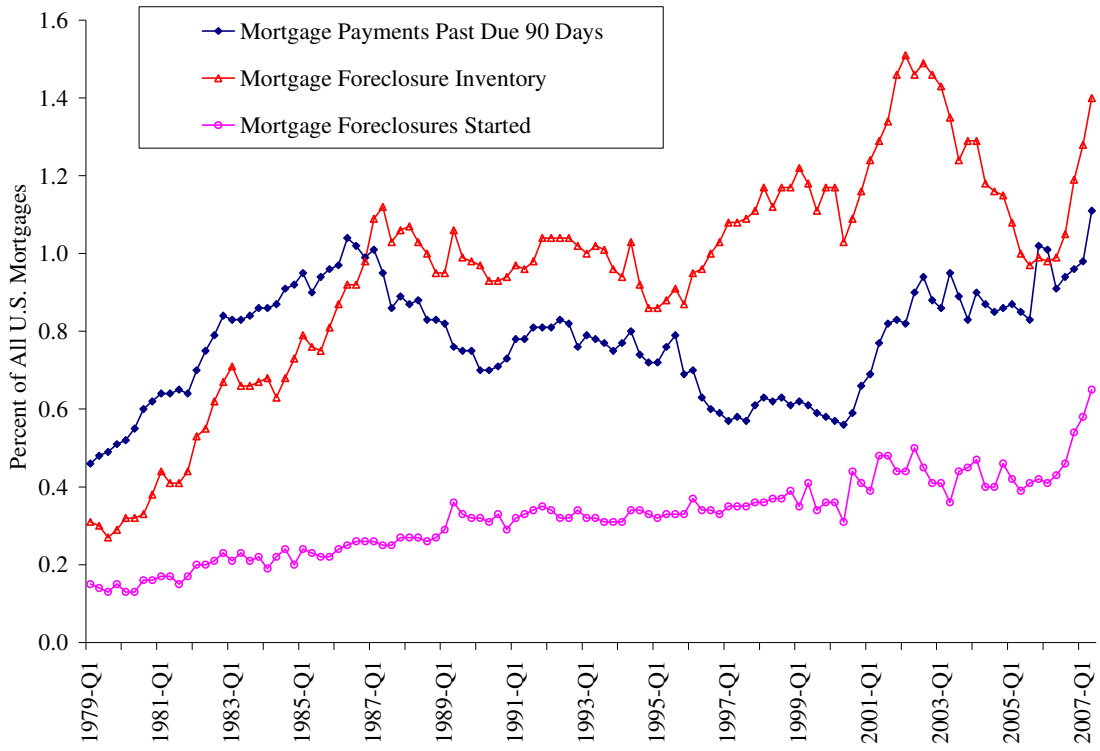
Sources: Calomiris & Longhofer (2007).

Figure 5: State-Level Annual Home Price Appreciation (OFHEO) vs. State-Level Changes in Foreclosure Inventory Rates



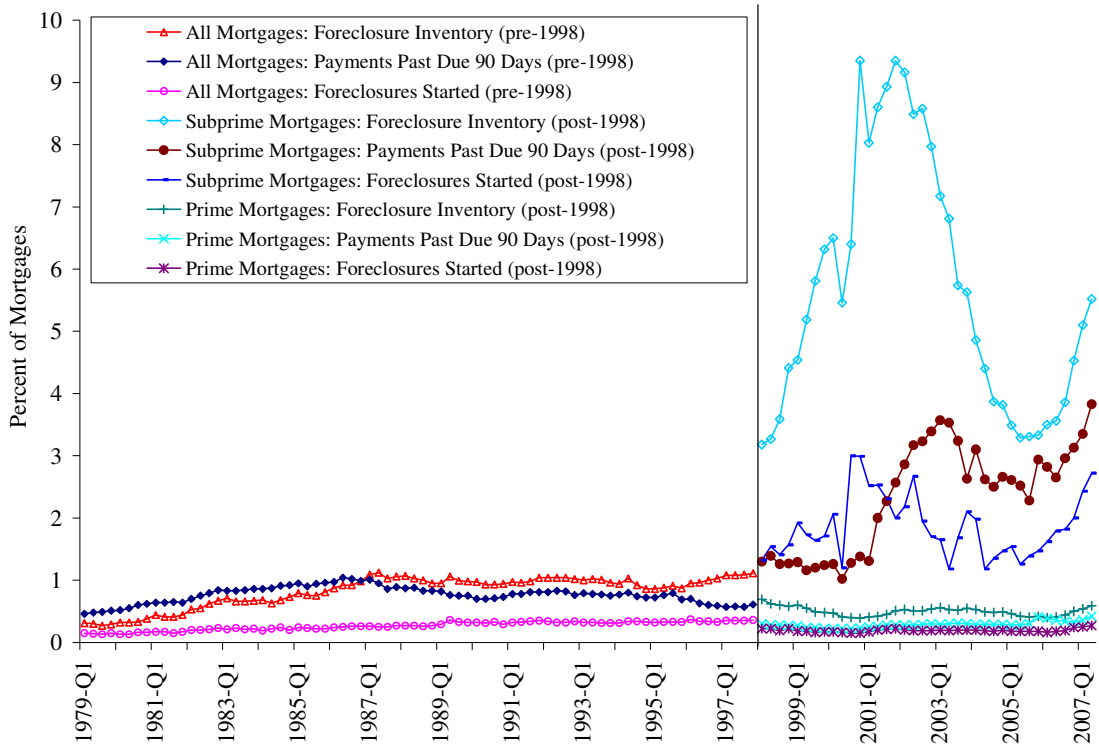
Sources: Calomiris & Longhofer (2007); Mortgage Bankers Association, National Delinquency Survey.

Figure 6: Foreclosure and Delinquency Rates



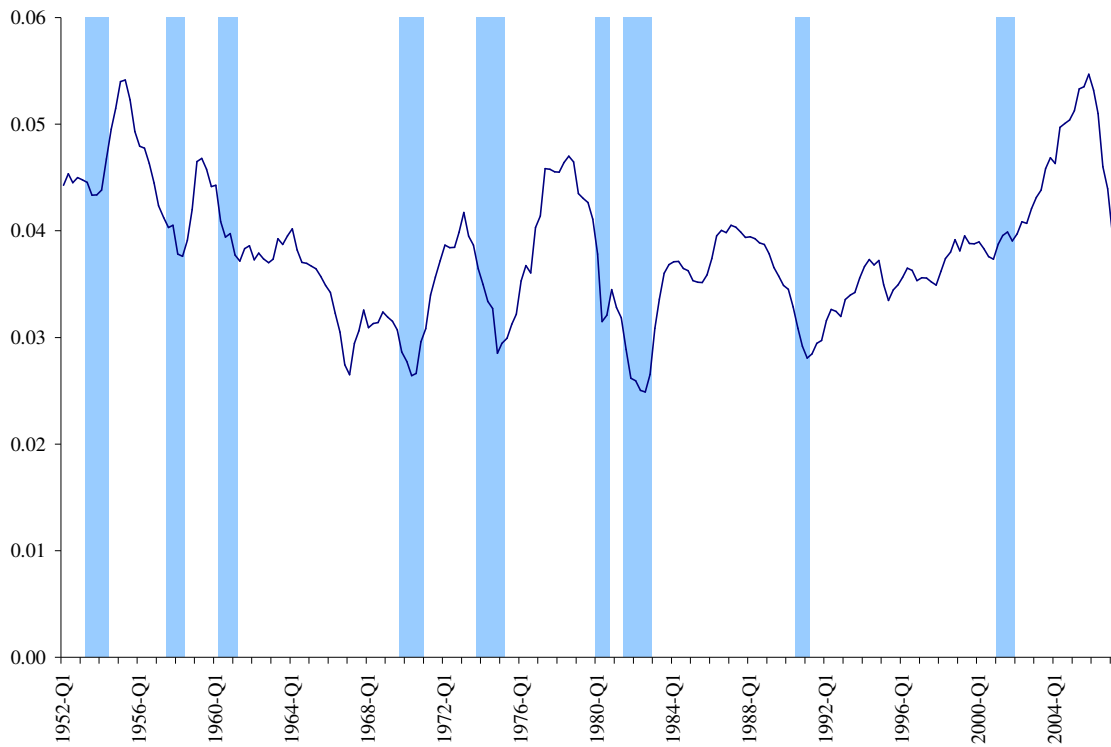
Source: Mortgage Bankers Association, National Delinquency Survey.

Figure 7: Foreclosure and Delinquency Rates



Source: Mortgage Bankers Association, National Delinquency Survey. FHA and VA mortgages, and jumbo mortgages, are included in the pre-1998 aggregate data, but VA and FHA mortgages are not included in the post-1998 samples of prime and subprime mortgages; jumbo mortgages are included in those samples.

Figure 8: Residential Investment by Household Sector Relative to GDP

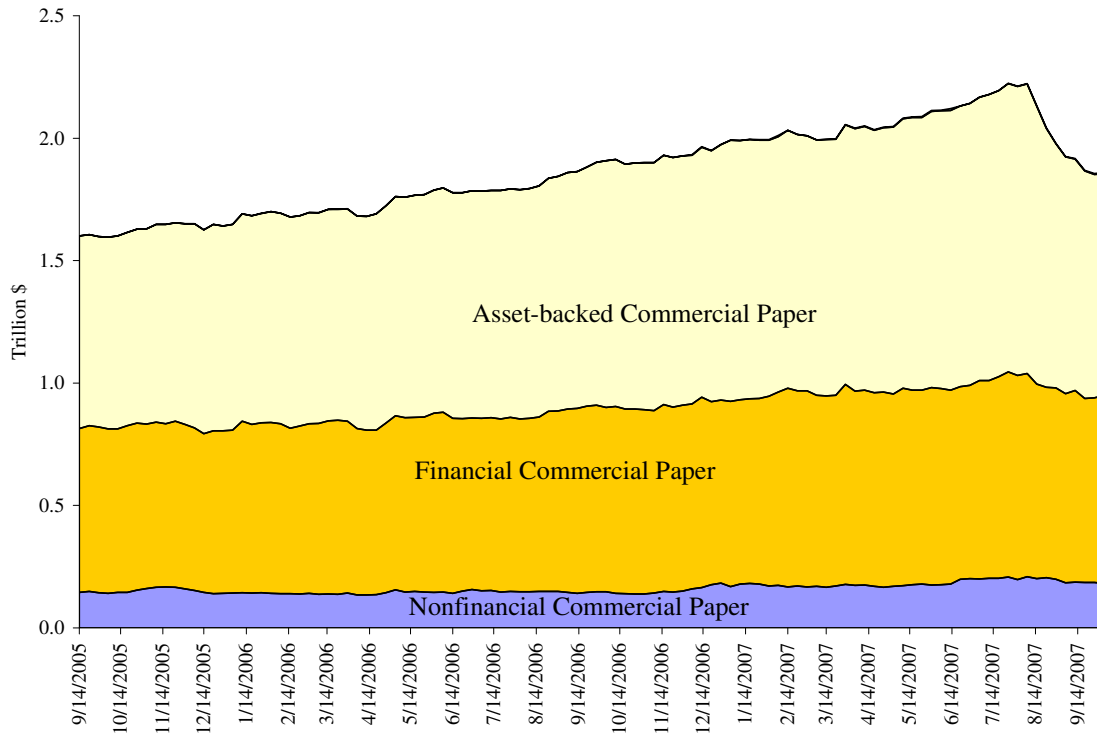


Note: Recessions are shaded.

Sources: Federal Reserve Statistical Release Z.1, Table F.6

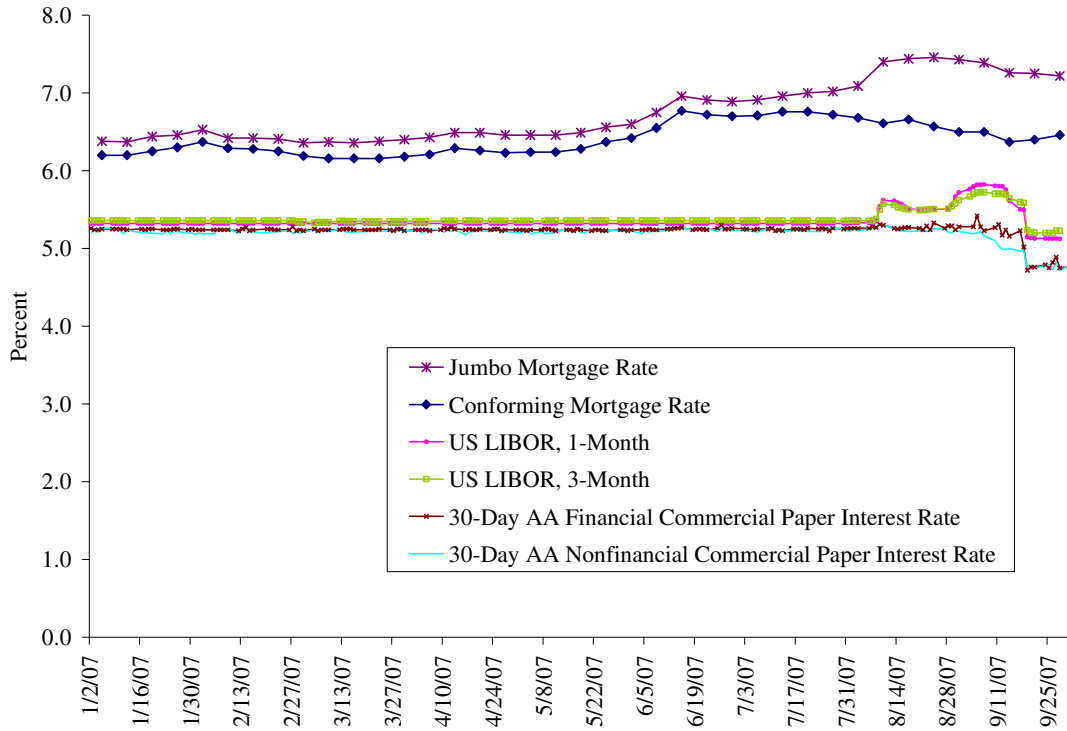
(<http://www.federalreserve.gov/releases/z1/Current/data.htm>); National Bureau of Economic Research, Business Cycle Expansions and Contractions (<http://www.nber.org/cycles.html/>)

Figure 9: Commercial Paper Outstanding (Weekly, Seasonally Adjusted)



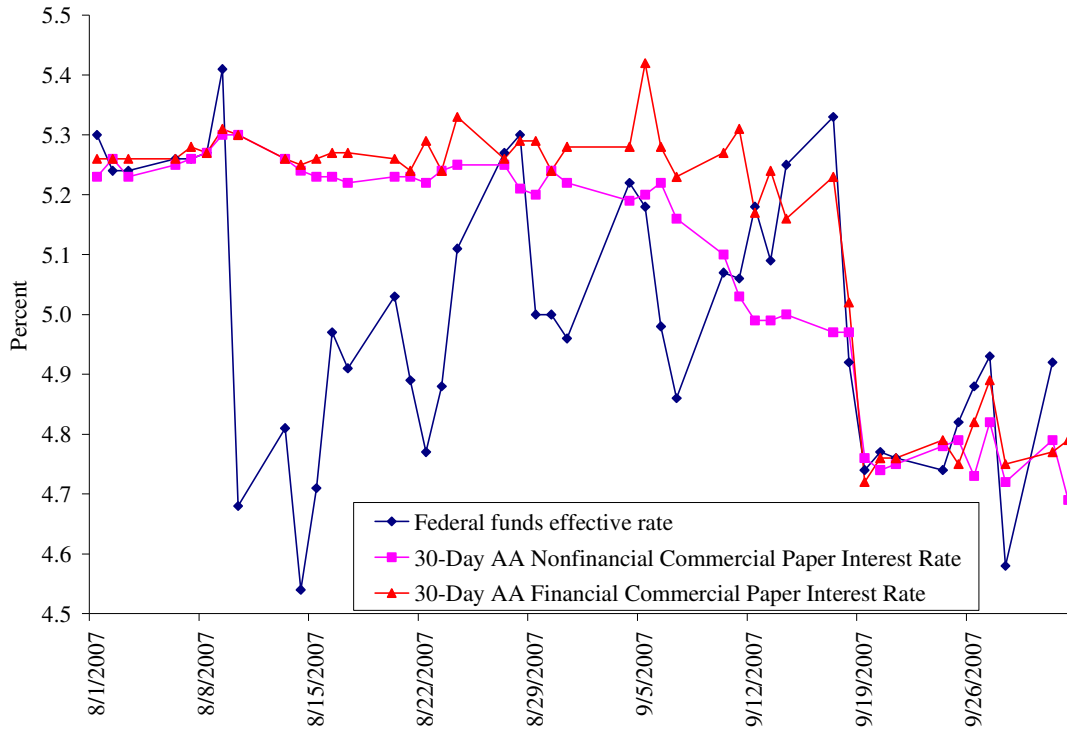
Source: Federal Reserve (<http://www.federalreserve.gov/DataDownload/Choose.aspx?rel=CP>)

Figure 10: Commercial Paper Rates, LIBOR, and Mortgage Rates



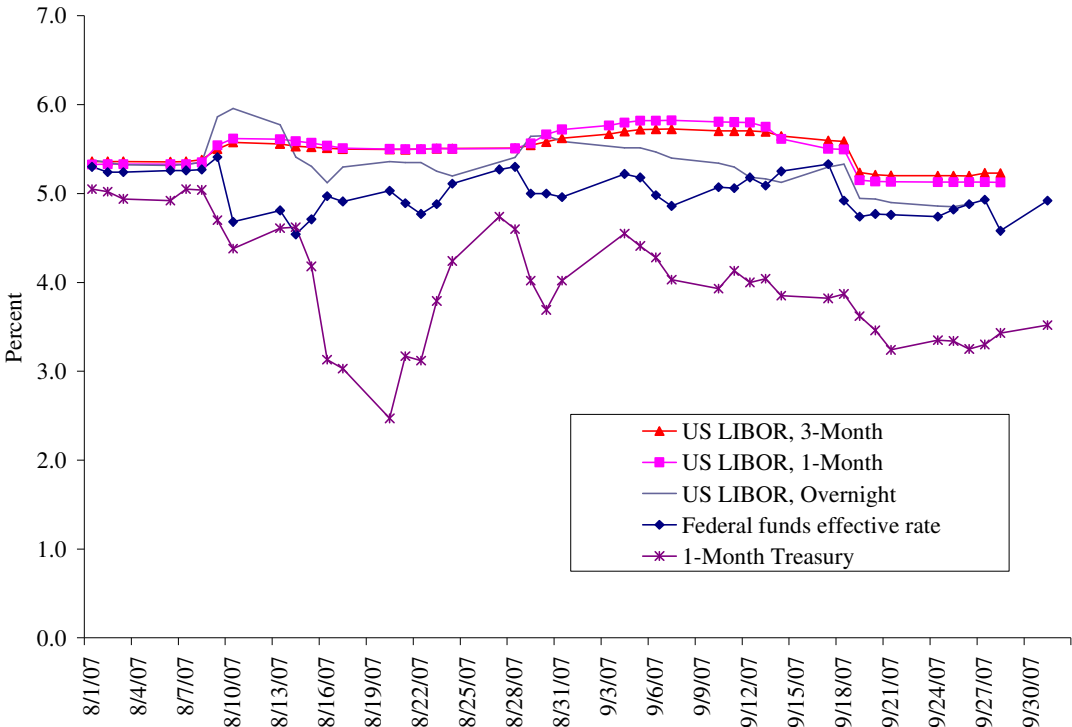
Sources: Federal Reserve (<http://www.federalreserve.gov/DataDownload/Choose.aspx?rel=CP>); British Bankers Association, Historic BBA LIBOR Rates (<http://www.bba.org.uk/bba/jsp/polopoly.jsp?d=141&a=627>); HSH Associates, www.hsh.com.

Figure 11: Commercial Paper Rates vs. Federal Funds Rate



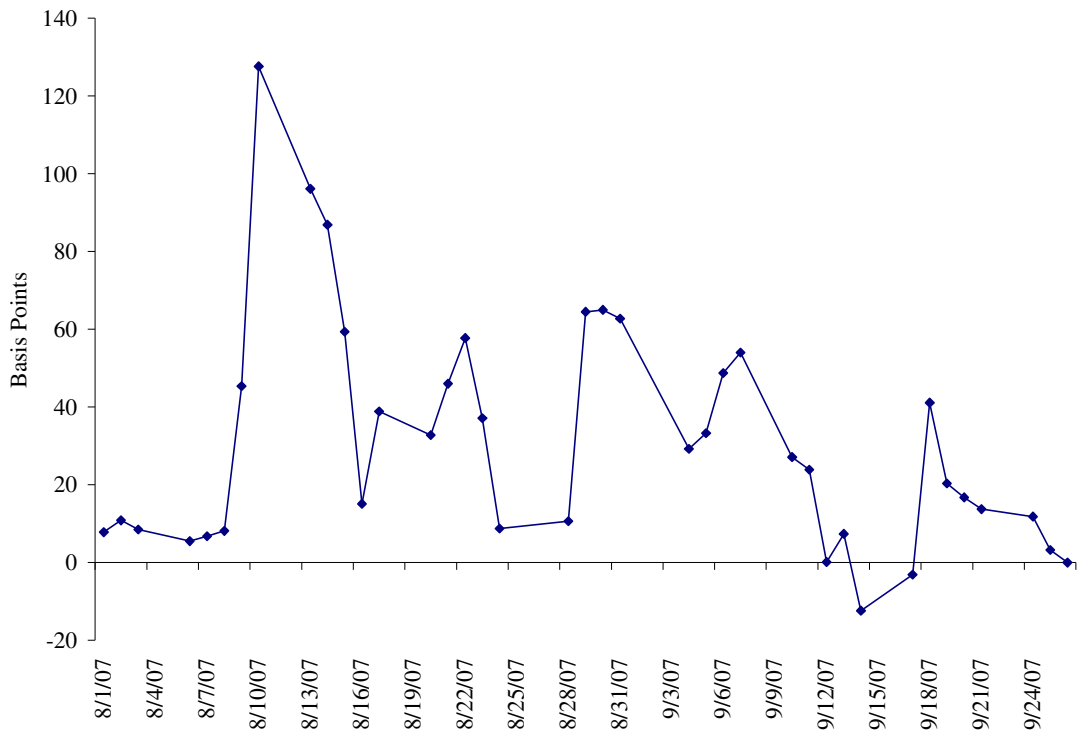
Sources: Federal Reserve Statistical Release H.15.

Figure 12: LIBOR, Treasury Bill, and Fed Funds Rates



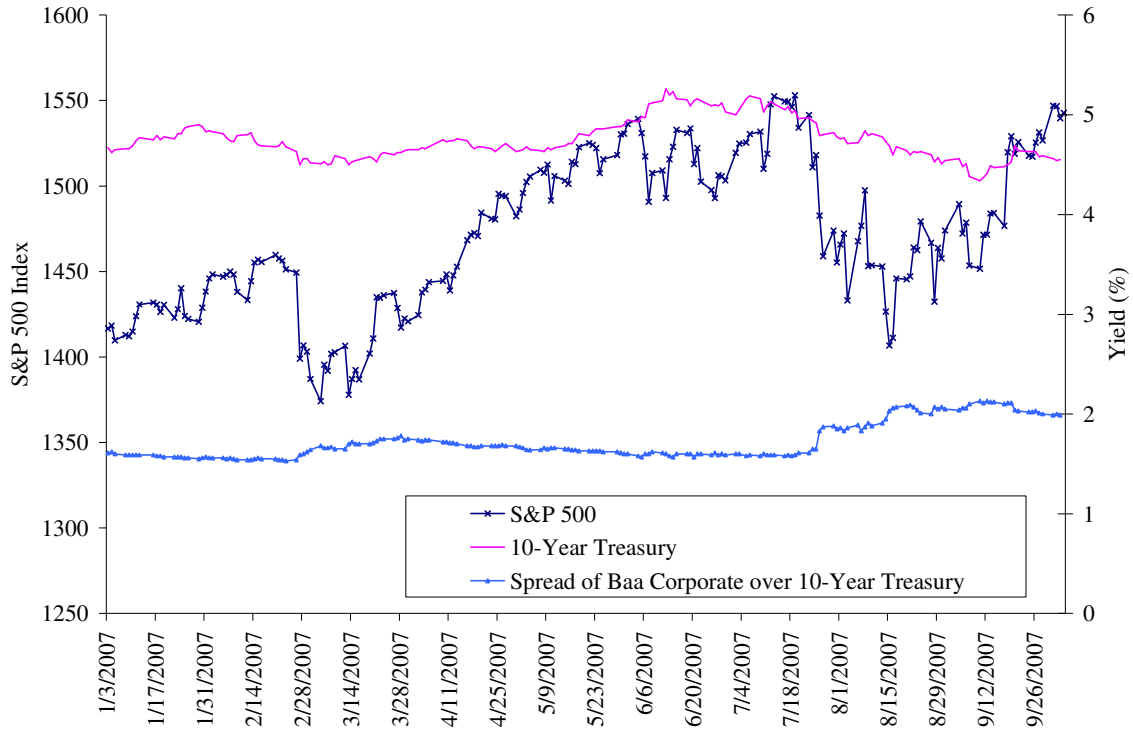
Sources: Federal Reserve Statistical Release H.15; British Bankers Association, Historic BBA LIBOR Rates (<http://www.bba.org.uk/bba/jsp/polopoly.jsp?d=141&a=627>).

Figure 13: Overnight Libor-Fed Funds Spread



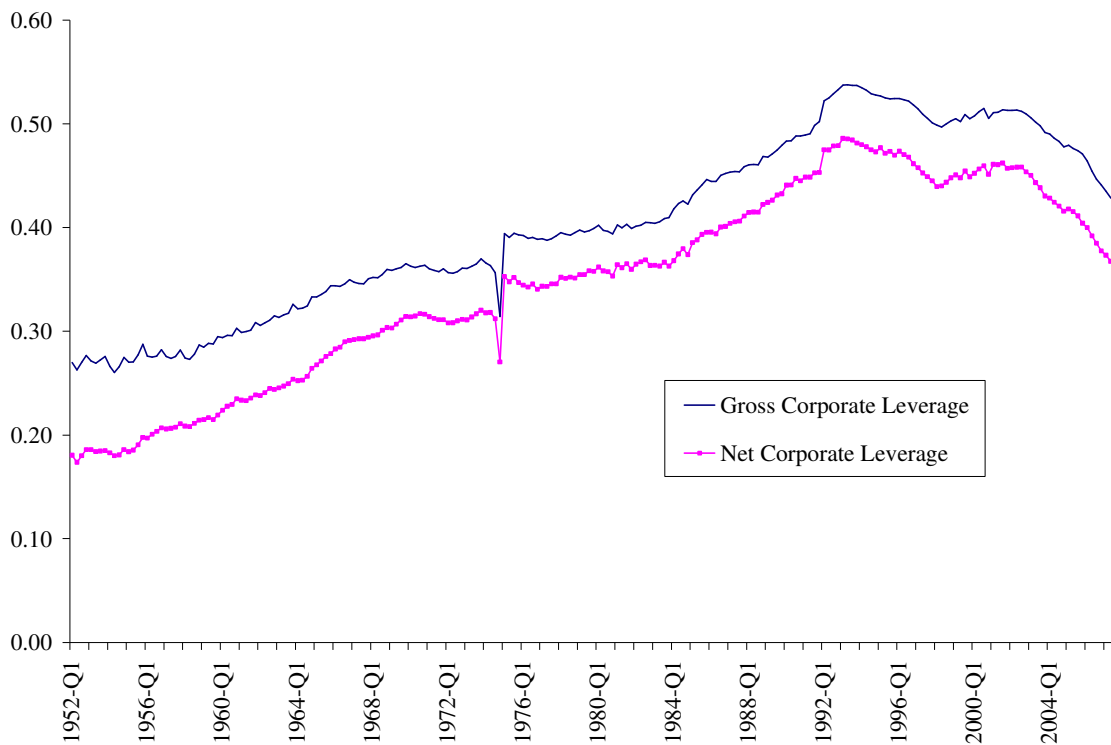
Sources: Federal Reserve Statistical Release H.15; British Bankers Association, Historic BBA LIBOR Rates (<http://www.bba.org.uk/bba/jsp/polopoly.jsp?d=141&a=627>).

Figure 14: S&P 500 vs. 10-Year Treasury Yields vs. Spread Between Moody's Seasoned Baa Corporate Bonds and 10-Year Treasury Yields



Sources: Yahoo! Finance (<http://finance.yahoo.com>); Federal Reserve Statistical Release H.15.

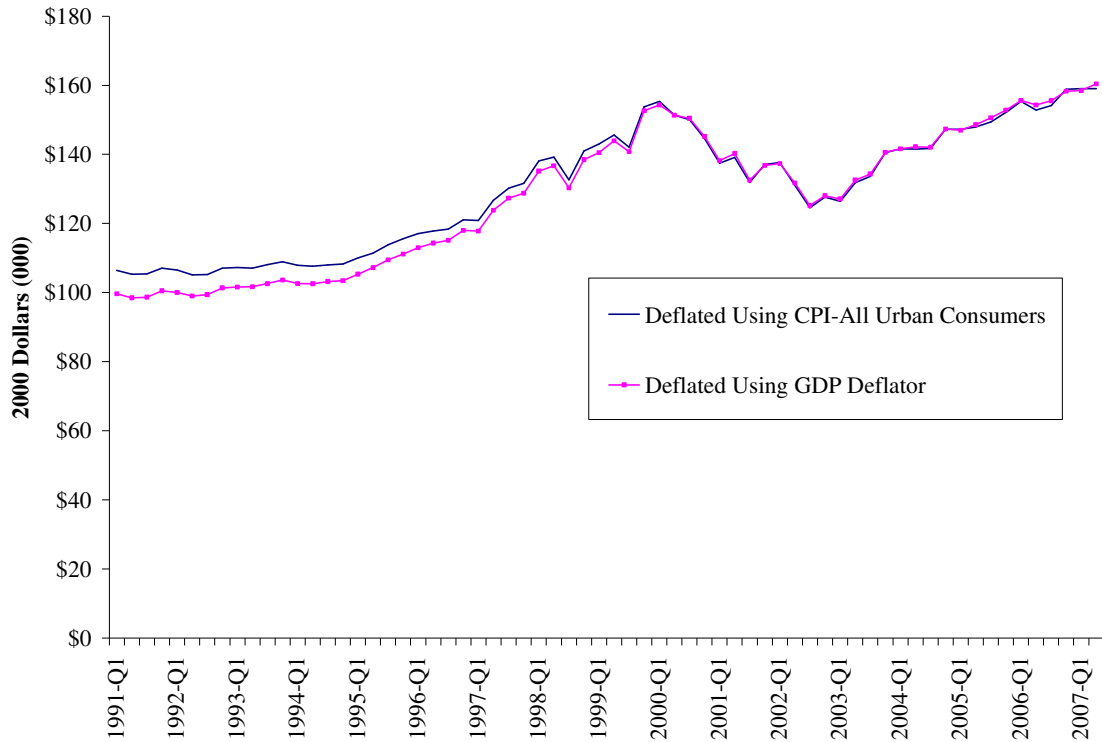
Figure 15: Corporate Leverage



Note: Gross corporate leverage is defined as liabilities divided by assets. Net corporate leverage is defined as liabilities, less cash, divided by assets. Cash is defined as total financial assets, less trade receivables, consumer credit, and miscellaneous assets.

Sources: Federal Reserve Statistical Release Z.1, Table B.102 (<http://www.federalreserve.gov/releases/z1/Current/data.htm>)

Figure 16: Real Household Net Worth Per Capita



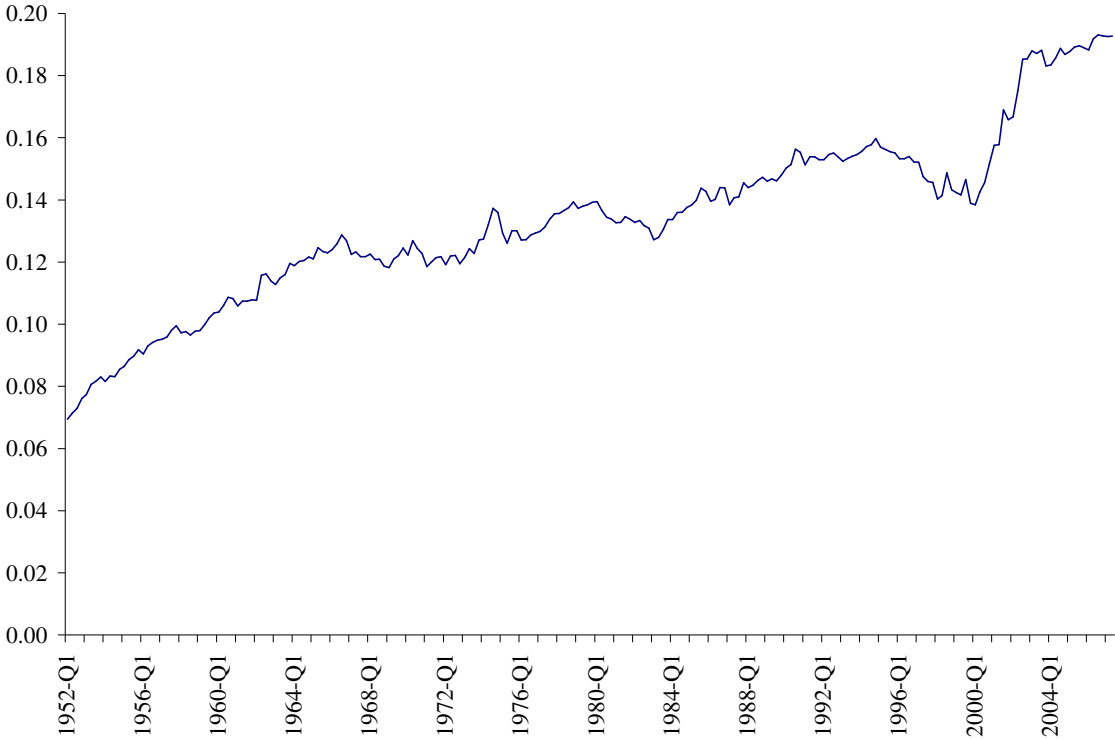
Note: Household net worth includes net worth of non-profit organizations.

Sources: Federal Reserve Statistical Release Z.1, Table B.100

(<http://www.federalreserve.gov/releases/z1/Current/data.htm>); U.S. Census Bureau, Monthly National Population Estimates (<http://www.census.gov/popest/national/NA-EST2006-01.html>); U.S. Census Bureau, National Intercensal Estimates (1990-2000)

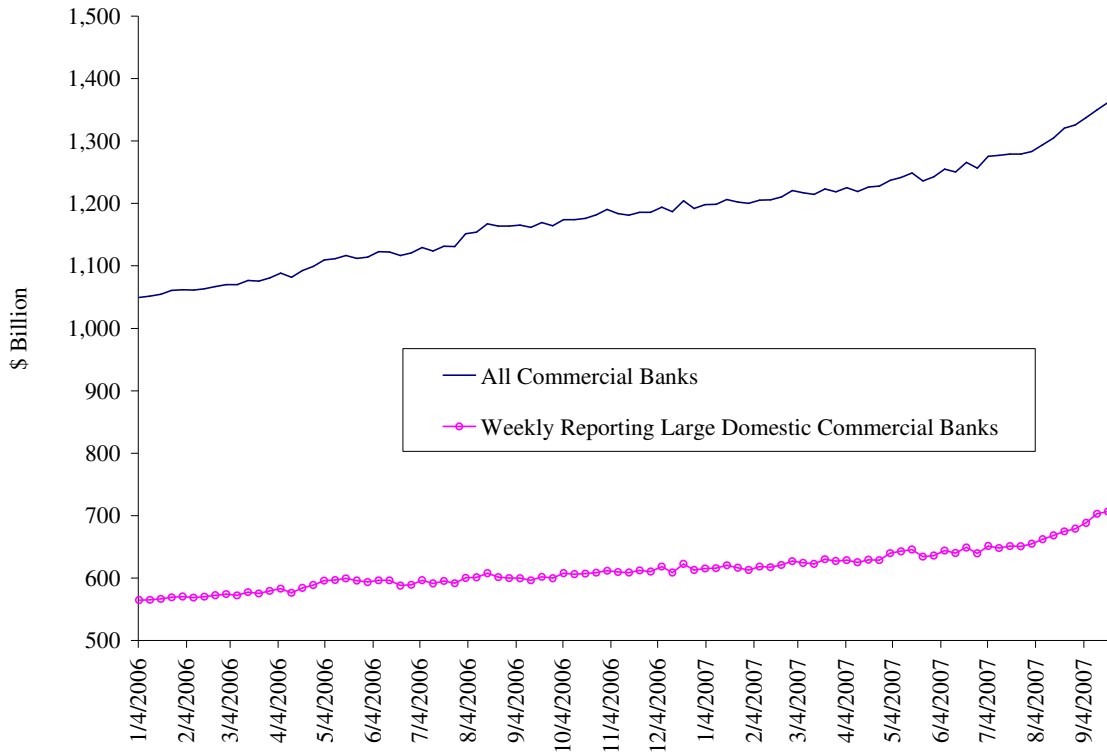
(<http://www.census.gov/popest/archives/EST90INTERCENSAL/US-EST90INT-datasets.html>); Bureau of Labor Statistics, Consumer Price Index (<http://www.bls.gov/cpi/home.htm>); U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.1.9. Implicit Price Deflators for Gross Domestic Product (<http://www.bea.gov/bea/dn/nipaweb/SelectTable.asp?Selected=Y>).

Figure 17: Household Leverage



Note: Household data includes non-profit organizations. Household leverage is defined as household liabilities divided by household assets.
Sources: Federal Reserve Statistical Release Z.1, Table B.100
(<http://www.federalreserve.gov/releases/z1/Current/data.htm>)

Figure 18: Commercial and Industrial Loans



Note: Data are seasonally adjusted.

Source: Federal Reserve Statistical Release H.8

(<http://www.federalreserve.gov/releases/h8/data.htm>).