Financial Innovation, Regulation, and Reform

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I. Introduction

Financial innovations often respond to regulation by sidestepping regulatory restrictions that would otherwise limit activities in which people wish to engage. Securitization of loans (e.g., credit card receivables, or subprime residential mortgages) is often portrayed, correctly, as having arisen in part as a means of "arbitraging" regulatory capital requirements by booking assets off the balance sheets of regulated banks. Originators of the loans were able to maintain lower equity capital against those loans than they otherwise would have needed to maintain if the loans had been placed on their balance sheets.[1]

Capital regulation of securitization invited this form of off-balance sheet regulatory arbitrage, and did so quite consciously. Several of the capital requirement rules for the treatment of securitized assets originated by banks, and for the debts issued by those conduits and held or guaranteed by banks, were specifically and consciously designed to permit banks to allocate less capital against their risks relating to those conduits than they would have had to maintain against similar risks if they had been held on their balance sheets (Calomiris 2008a). Critics of these capital regulations have rightly pointed to these capital requirements as having contributed to the subprime crisis by permitting banks to maintain insufficient amounts of equity capital per unit of risk undertaken in their subprime holdings.

[1] Financial innovations involving regulatory arbitrage can be complex. Securitized assets implicitly often remain connected to the balance sheet of the bank that originated them despite the fact that the liabilities issued by the securitization conduits are not legally protected by the originating bank; lenders not only provide explicit credit enhancements to their off-balance sheet conduits, they also offer implicit "guarantees" to the market, which are valued by the market, which expects originators to voluntarily stand behind the securitized debts of their off-balance sheet conduits, at least under most circumstances (this phenomenon is known as implicit recourse – see Calomiris and Mason 2004).

Investment banks were also permitted by capital regulations that were less strict than those applying to commercial banks to engage in subprime-related risk with insufficient budgeting of equity capital. Investment banks faced capital regulations under SEC guidelines that were similar to the more permissive Basel II rules that apply to commercial banks outside the US. Because those capital regulations were less strict than capital regulations imposed on US banks, investment banks were able to lever their positions more than commercial banks. Investment banks' use of overnight repurchase agreements as their primary source of finance also permitted them to "ride the yield curve" when using debt to fund their risky asset positions; in that respect, collateralized repos appeared to offer a substitute for low-interest commercial bank deposits. [2] But as the collateral standing behind those repos declined in value and became risky, "haircuts" associated with repo collateral became less favorable, and investment banks were unable to roll over their repos positions, a liquidity risk that added to their vulnerability and made their equity capital positions even more insufficient as risk buffers.

There is no doubt that the financial innovations associated with securitization and repo finance were at least in part motivated by regulatory arbitrage. Furthermore, there is no doubt that if on-balance sheet commercial bank capital regulations had determined the amount of equity budgeted by all subprime mortgage originators, then the leverage ratios of the banking system would not have been as large, and the liquidity risk from repo funding would have been substantially less, both of which would have contributed to reducing the magnitude of the financial crisis.

[2] Repos grew so fast in recent years that they came to exceed in size the total assets of the commercial banking system, as discussed in Gorton (2009).

And yet, I do not agree with those who argue that the subprime crisis is mainly a story of government "errors of omission," which allowed banks to avoid regulatory discipline due to the insufficient application of existing on-balance sheet commercial bank capital regulations to the risks undertaken by investment banks and off-balance sheet conduits. The main story of the subprime crisis instead is one of government "errors of commission," which were far more important in generating the huge risks and large losses that brought down the U.S. financial system.

II. What Went Wrong and Why?

The subprime crisis reflected first and foremost the willingness of the managers of large financial institutions to take on risks by buying financial instruments that were improperly priced, which made the purchases of these instruments contrary to the interests of the shareholders of the institutions that invested in them. As Calomiris (2008a) shows, on an ex ante basis, risk was substantially underestimated in the market during the subprime boom of 2003-2007. Reasonable forward-looking estimates of risk were ignored intentionally by senior management of financial institutions, and senior management structured compensation packages for asset managers to maximize incentives to undertake these underestimated risks. In the absence of "regulatory arbitrage," budgeting a little more regulatory capital would have reduced the amount of risk undertaken, and would have given the system more of a cushion for managing its losses, but the huge losses from underestimated subprime risk still would have occurred.

The risk-taking mistakes of financial managers were not the result of random mass insanity; rather, they reflected a policy environment that strongly encouraged

financial managers to underestimate risk in the subprime mortgage market. Risk taking was driven by government policies; government's *actions* were the root problem, not government *inaction*. How do government policy actions account for the disastrous decisions of large financial institutions to take on unprofitable subprime mortgage risk? In what follows, I review each of the major areas of government policy distortions (see also Calomiris 2008a and 2008b, Calomiris and Wallison 2008, and Eisenbeis 2008) and how they encouraged the conscious undertaking of underestimated risk in the market.

Four categories of government error were instrumental in producing the crisis: First, lax Fed interest rate policy, especially from 2002 through 2005, promoted easy credit and kept interest rates very low for a protracted period. The history of postwar monetary policy has seen only two episodes in which the real fed funds rate remained negative for several consecutive years; those periods are the high-inflation episode of 1975-1978 (which was reversed by the anti-inflation rate hikes of 1979-1982) and the accommodative policy environment of 2002-2005. According to the St. Louis Fed, the Federal Reserve deviated sharply from its "Taylor Rule" approach to setting interest rates during the 2002-2005 period; fed funds rates remained substantially and persistently below the levels that would have been consistent with the Taylor Rule, even if that rule had been targeting a 3% or 4% long-run inflation target.

Not only were short-term real rates held at persistent historic lows, but because of peculiarities in the bond market related to global imbalances and Asian demands for medium- and long-term U.S. Treasuries, the Treasury yield curve was virtually flat during the 2002-2005 period. The combination of low short-term rates and a flat yield curve meant that long-term real interest rates on Treasury bonds (which are the most

relevant benchmarks for setting mortgage rates and other long-term fixed income assets' rates) were especially low relative to their historic norms.

Accommodative monetary policy and a flat yield curve meant that credit was excessively available to support expansion in the housing market at abnormally low interest rates, which encouraged overpricing of houses. There is substantial empirical evidence showing that when monetary policy is accommodative, banks charge less for bearing risk (reviewed in Calomiris 2008a), and this seems to be a pattern common to many countries in the present and the past. According to some industry observers, low interest rates in 2002-2005 also encouraged some asset managers (who cared more about their fees than about the interests of their clients) to attract clients by offering to maintain preexisting portfolio yields notwithstanding declines in interest rates; that financial alchemy was only possible because asset managers decided to purchase very risky assets and pretend that they were not very risky.

Second, numerous government policies specifically promoted subprime risk taking by financial institutions. Those policies included (a) political pressures from Congress on the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac to promote "affordable housing" by investing in high-risk subprime mortgages, (b) lending subsidies policies via the Federal Home Loan Bank System to its member institutions that promoted high mortgage leverage and risk, (c) FHA subsidization of high mortgage leverage and risk, (d) government and GSE mortgage foreclosure mitigation protocols that were developed in the late 1990s and early 2000s to reduce the costs to borrowers of failing to meet debt service requirements on mortgages, and – almost

unbelievably – (e) 2006 legislation that encouraged ratings agencies to relax their standards for measuring risk in subprime securitizations.

All of these government policies contributed to encouraging the underestimation of subprime risk, but the politicization of Fannie Mae and Freddie Mac and the actions of members of Congress to encourage reckless lending by the GSEs in the name of affordable housing were arguably the most damaging policy actions leading up to the crisis. In order for Fannie and Freddie to maintain their implicit (now explicit) government guarantees on their debts, which contributed substantially to their profitability, they had to cater to the political whims of their masters in the government. In the context of recent times, that meant making risky subprime loans (Calomiris and Wallison 2008, Calomiris 2008b). Fannie and Freddie ended up holding $1.5 trillion in exposures to toxic mortgages, which constitutes half of the total non-FHA outstanding amount of toxic mortgages (Pinto 2009).

A review of email correspondence between risk managers and senior management at the GSEs (Calomiris 2008b) reveals that those positions were taken despite objections by risk managers, who viewed them as imprudent, and who predicted that the GSEs would lead the rest of the market into huge overpricing of risky mortgages. Indeed, it is likely that absent the involvement of Fannie and Freddie in aggressive subprime buying beginning in 2004, the total magnitude of toxic mortgages originated would have been less than half its actual amount, since Fannie and Freddie crowded in market participation more than they crowded it out.

What aspects of GSE involvement in the market suggest that on net they crowded in, rather than crowded out, private investment in subprime and Alt-A mortgages? First,

the timing of GSE involvement was important. Their aggressive ramping up of purchases of these products in 2004 coincided with the acceleration of subprime growth. Total subprime and Alt-A originations grew from $395 billion in 2003 to $715 billion in 2004 and increased to $1,005 billion in 2005 (Calomiris 2008a, Table 2). Furthermore, the GSEs stayed in these markets long after the mid-2006 flattening of house prices, which signaled to many other lenders the need to exit the subprime market; during the last year of the subprime and Alt-A origination boom, when originations remained near peak levels despite clear evidence of impending problems, the GSEs were crucial in maintaining financing for subprime and Alt-A securities.

The GSEs also were uniquely large and protected players in the mortgage market (due to their GSE status), and thus could set standards and influence pricing in ways that other lenders could not. These unique qualities were noted by Freddie Mac's risk managers when they referred to Freddie's role in "mak[ing] a market" in no-docs mortgages. After 2004, and continuing long after the subprime market turned down in 2006, originators of subprime and Alt-A mortgages knew that the GSEs stood ready to buy their poorly underwritten instruments, and this GSE legitimization of unsound underwriting practices gave assurance to market participants that there was a ready source of demand for the new product. That had important consequences both for initially accelerating and later maintaining the large quantity of subprime and Alt-A mortgage deal flow and for promoting the overpricing and overleveraging of these instruments. That "market mak[ing]" role of the GSEs had consequences for the expansion of the market and the pricing of subprime and Alt-A mortgages and mortgage-backed securities that exceeded the particular securities purchased or guarantees made by the GSEs.

Third, government regulations limiting who can buy stock in banks made effective corporate governance within large financial institutions virtually impossible, which allowed bank management to pursue investments that were unprofitable for stockholders in the long run, but that were very profitable to management in the short run, given the short time horizons of managerial compensation systems.

Pensions, mutual funds, insurance companies and banks are restricted from holding anything but tiny stakes in any particular company, which makes these informed professional investors virtually impotent in promoting any change within badly managed firms. Hostile takeovers, which often provide an alternative means of discipline for mismanaged nonfinancial firms, are not a feasible source of discipline for financial companies; banks are service providers whose franchise consists largely of human capital, and the best parts of that human capital can flee to competitors as soon as nasty takeover battles begin (a poison pill even better than standard takeover defenses). What about the possibility that a hedge fund or private equity investor might intervene to become a major blockholder in a financial firm and try to change it from within? That possibility is obviated by the bank holding company act, which prevents any entity with a controlling interest in a nonfinancial company from acquiring a controlling interest in a bank holding company (the definition of the size of a controlling interest was relaxed in the wake of the 2008 crisis to encourage more blockholding, but that change was too little and too late).

When stockholder discipline is absent managers are able to set up the management of risk within the firms they manage to benefit themselves at the expense of stockholders. An asset bubble (like the subprime bubble of 2003-2007) offers an ideal

opportunity; if senior managers establish compensation systems that reward subordinates based on total assets managed or total revenues collected, without regard to risk or future potential loss, then subordinates are incentivized to expand portfolios rapidly during the bubble without regard to risk. Senior managers then reward themselves for having overseen that "successful" expansion with large short-term bonuses, and make sure to cash out their stock options quickly so that a large portion of their money is safely invested elsewhere by the time the bubble bursts.

Fourth, prudential regulation of commercial banks by the government has proven to be ineffective. That failure reflects (a) problems in measuring bank risk resulting from regulation's ill-considered reliance on credit rating agencies assessments and internal bank models to measure risk, and (b) the too-big-to-fail problem (Stern and Feldman 2004), which makes it difficult to credibly enforce effective discipline on large, complex banks even if regulators detect that they have suffered large losses and that they have accumulated imprudently large risks.

With respect to the former, I reiterate that the risk measurement problem is not merely that regulators and their rules regarding securitization permitted the booking of subprime risks off of commercial bank balance sheets; the measurement of subprime risk, and the capital budgeted against that risk, would still have been much too low if all the subprime risk had been booked entirely on commercial bank balance sheets. Regulators utilize different means to assess risk, depending on the size of the bank. Under the simplest version of regulatory measurement of bank risk, subprime mortgages have a low asset risk weight (50% that of commercial loans) even though they are much riskier than most bank loans. The more complex measurement of subprime risk (applicable to larger

US banks) relies on the opinions of ratings agencies or the internal assessments of banks, and unsurprisingly, neither of those assessments is independent of bank management.

Rating agencies, after all, are supposed to cater to buy-side market participants, but when their ratings are used for regulatory purposes, buy-side participants reward rating agencies for underestimating risk, since that helps the buy-side clients avoid regulation. Many observers wrongly believe that the problem with rating agency grade inflation of securitized debts is that sellers of these debts (sponsors of securitizations) pay for ratings; on the contrary, the problem is that the *buyers* of the debts want inflated ratings because of the regulatory benefits they receive from those inflated ratings.

The too-big-to-fail problem relates to the lack of credibility of regulatory discipline for large, complex banks. For small banks, the failure to manage risk properly results in "intervention" by regulators, under the Federal Deposit Insurance Corporation Improvement Act (FDICIA) framework established in 1991, which forces sale or liquidation of sufficiently undercapitalized banks. But for large, complex banks, the prospect of intervening is so potentially disruptive to the financial system that regulators have an incentive to avoid intervention. The incentives that favor "forebearance" can make it hard for regulators to ensure compliance.

The too-big-to-fail problem magnifies the so-called "moral-hazard" problem of the government safety net; banks that expect to be protected by deposit insurance, Fed lending, and Treasury-Fed bailouts, and that believe that they are beyond discipline, will tend to take on excessive risk, since the taxpayers share the costs of that excessive risk on the downside. And just as importantly, banks that are protected by the government from the discipline of the marketplace will be too tolerant of bad management, since

managerial errors normally punished by failure will be hidden under the umbrella of government protection.

The moral hazard of the too-big-to-fail problem was clearly visible in the behavior of the large investment banks in 2008. After Bear Stearns was rescued by a Treasury-Fed bailout in March, Lehman, Merrill Lynch, Morgan-Stanley and Goldman Sachs sat on their hands for six months awaiting further developments (i.e., either an improvement in the market environment or a handout from Uncle Sam). In particular, Lehman did little to raise capital or shore up its position. But when conditions deteriorated and the anticipated bailout failed to materialize for Lehman in September 2008 – showing that there were limits to Treasury-Fed generosity – the other major investment banks immediately either became acquired or transformed themselves into commercial bank holding companies to increase their access to government support.

The too-big-to-fail moral-hazard problem is not a natural consequence of the existence of large, complex institutions. Like the other policy failures enumerated here, it reflects government decisions. In the case of too-big-to-fail, the government has made two key errors: First, protection has been offered too frequently (e.g., the bailout of Continental Bank in 1984 was not justified by plausible "systemic risk" concerns); some of the moral-hazard cost associated with too-big-to-fail could be eliminated just by being more selective in applying the doctrine. Second, if the government did more to create a credible intervention and resolution process for large, complex banks that become troubled, then much of the cost of too-big-to-fail could be eliminated. If, for example, the government required that a feasible and credible intervention plan be maintained on an

ongoing basis for every large, complex institution, then it would not need to forebear from intervening in such institutions when they become deeply undercapitalized.

To be feasible and credible an intervention plan would have to ensure the seamless continuing operation and funding of the institution's lending and other important market transactions, and would have to define in advance loss-sharing arrangements among the subsidiaries within the organization that deal with one another (and those loss-sharing arrangements would have to be approved in advance by the various countries' regulators in which the subsidiaries are located). One of the most intractable problems of complex globally diverse banks is defining loss-sharing arrangements across borders in the midst of a financial crisis. Bankruptcy procedures appear to be too cumbersome for dealing with the smooth transfer of control and funding, and the lack of a prearranged agreement among regulators about loss sharing means that bankruptcy (as in the case of Lehman) can entail complex and protracted adjudication of inter-subsidiary claims in many different legal venues.

The "bridge bank" structure exists in the US and a few other countries as a means of transitioning to new control and funding sources, but this structure has not been used during the subprime crisis, perhaps because it is too difficult to define its structure and determine loss sharing arrangements across subsidiaries after the fact. The primary policy failure relating to too-big-to-fail problems is not the decision to forebear from intervening in the midst of the crisis, but rather the decision not to have prepared properly for the eventuality of having to intervene.

In summary, the greatest threats that financial sector policy must confront have to do with the ways that the rules of the game shaped by government policy promote

willfully excessive, value-destroying risks. The pursuit of value-destroying risks arises most easily during moments of accommodative monetary policy, and the low interest rate environment of 2002-2005 was among the most accommodative in US history. Value-destroying risk taking during the recent subprime mortgage boom and bust was motivated by (1) political pressures to lend unwisely (e.g., the pressures that led Fannie and Freddie to pursue the expansion of "affordable housing" despite its costs to taxpayers and unwitting home buyers), (2) bank agency problems (i.e., policies that allow bankers to avoid stockholder discipline in pursuit of their own self interest), and (3) safety net protections (including too-big-to-fail policies) that make value-destroying risks personally beneficial to financiers and their stockholders.

III. Regulatory Reform for a World Populated By Humans

One response to the litany of woe outlined above is to suggest that the raft of government distortions that produce financial sector disasters be eliminated. If there were no governmental safety nets, no government manipulation of credit markets, no leverage subsidies, and no limitations on the market for corporate control, one could reasonably argue against the need for prudential regulation. Indeed, the history of financial crises shows that in times and places where these government interventions were absent, financial crises were relatively rare and not very severe (Calomiris 2007).

That laissez faire argument, however, neglects two counterarguments: First, there may be substantial negative externalities associated with bank risk management. Part of the benefit from one bank's reducing its risk is shared by other banks (since the failure of one large institution can have repercussions for others), and that implies that if banks are

left to their own devices they will choose levels of risk that are higher than the socially optimal levels.

Second, it is not very helpful to only suggest regulatory changes that are very far beyond the feasible bounds of the current political environment. It is useful to point to the desirability of many simultaneous fundamental reforms of government policy, but it is also useful to outline a policy reform strategy for a world that is not amenable to the reasoned arguments of libertarian economists. Absent the elimination of government safety nets, government credit subsidies, and government limits on corporate control, government prudential regulation is a must, even for those who are not convinced by the prior argument about risk-management externalities. Until and unless these three categories of existing government distortion are eliminated, we must mitigate their harmful effects by establishing effective prudential regulations.

If one is going to design a regulatory system that works in the presence of these various distortions, it will have to be designed on the basis of principles that transcend the mathematics of finance. As Barth, Caprio and Levine (2006) rightly note, bankers are not angels, and neither are bank regulators or congressmen or cabinet secretaries. Bank managers often are willing to take advantage of stockholders or game the government safety net. Regulators are corruptible, particular when they are threatened by superiors who encourage them to follow the path of least political resistance. Politicians will pressure banks to make unprofitable loans and will be too generous in their construction of bank safety nets because of constituencies that reward them for doing so.

Successful bank regulation takes into account all these human failings and devises mechanisms that are able to succeed reasonably well in spite of them. The trick in

regulatory reform is to use the public outrage during a moment of crisis as an opportunity to pass robust reforms that will work after the crisis is gone and the threats of political influence, safety nets and managerial agency have returned. That is not easy, but experience and empirical evidence suggests that some solutions to these problems are more successful than others.

In the remainder of this essay, I review several ideas for regulatory reform that are desirable not only because they make sense technically as ways to measure and manage risk, but also because of the effect they have on the incentives of bankers and bank regulators; in other words, because they are relatively robust to the government policy problems, and human failings, that were at the heart of the subprime crisis. This is not an exhaustive review of financial regulation, or even banking regulation. My focus is on the structure and content of bank prudential regulation, with an emphasis on how to structure regulatory mechanisms that would improve the effectiveness of the measurement and management of risk in the banking system.

I review six categories of policy reform that would address weaknesses of the policy environment that gave rise to the subprime crisis, including those reviewed above. These six areas are: (1) smarter "micro prudential" regulation of banks, (2) new ideas for "macro prudential" regulation of bank capital and liquidity standards, (3) the creation of detailed and regularly updated prepackaged "bridge bank" plans for large, complex financial organizations, (4) reforms to eliminate the distortions in housing finance induced by government policies that encourage high risk and leveraging, (5) reforms that would improve stockholder discipline of banks, and (6) initiatives to encourage greater transparency in derivatives transactions.

Making Micro Prudential Capital Regulation Smarter

Prudential capital regulation refers to regulations that try to measure bank risk and budget capital (equity plus other capital accounts) accordingly to protect against potential loss related to that risk. "Micro" prudential capital regulation refers to the setting of capital based on the analysis of the circumstances of the individual institution. Below I also consider "macro" prudential regulation, which refers to variation over time in the minimal amounts of capital, liquidity, and provisioning for loss required of banks that occurs as a function of the macroeconomic state of the economy.

The two key challenges in micro prudential capital regulation are (1) finding ways to measure the value and the riskiness of different assets accurately, and (2) ensuring speedy intervention to prevent losses from growing once banks become severely undercapitalized. I emphasize that these are not just technical issues. Banks, supervisors, regulators, and politicians often have incentives to understate losses and risks and to avoid timely intervention. Timely intervention is crucial, however. If subprime risk had been correctly identified in 2005, the run-up in subprime lending in 2006 and 2007 could have been avoided; banks would have had to budget much more capital against those positions, which would have discouraged continuing growth in subprime lending. Furthermore, banks that have experienced large losses often have incentives to further increase their risk, since they have little of their own capital left to lose; that go-for-broke "resurrection" risk taking can only be prevented by regulators if they timely identify and intervene in severely undercapitalized banks.

How can regulation ensure accurate and timely information about the value and riskiness of assets? The key problem with the current system of measuring asset values and risks is that it depends on bank reporting, supervisors' observations, and rating agencies' opinions. None of those three parties has a strong interest in correct and timely measurement of asset value and risk. Furthermore, even if supervisors were extremely diligent in their effort to measure value and risk accurately, how could they successfully defend low valuations or high risk estimates that were entirely the result of the application of their models and judgment?

The essence of the solution to this problem is to bring objective information from the market into the regulatory process, and to bring outside (market) sources of discipline in debt markets to bear in penalizing bank risk taking. These approaches have been tried with success outside the United States, and they have often worked. With respect to bringing market information to bear in measuring risk, one approach to measuring the risk of a loan is to use the interest rate paid on a loan as an index of its risk. Higher risk loans tend to pay higher interest. Argentine bank capital standards introduced this approach successfully in the 1990s by setting capital requirements on loans using loan interest rates (Calomiris and Powell 2001). If that had been done with high-interest subprime loans, the capital requirements on those loans would have been much higher.

Another complementary measure would be to require banks to issue some form of credibly uninsured debt. Forcing banks to access uninsured debt markets forces them to meet an external source of discipline from the market, which means that they have a strong incentive to credibly satisfy market concerns about the value and riskiness of their assets. Furthermore, the interest rates paid on at-risk debts provide valuable information

about market perceptions of bank risk (a proverbial canary in the coal mine), which would be immune to manipulation by bankers, supervisors, regulators, or politicians.

Segoviano (2008) shows that bank CDS spreads contained very informative market opinions about differences in risk across banks in 2008, and about the mutual dependence among large banks with respect to risk. That experience is not unusual; there is a large body of evidence in support of the efficacy of using market information and discipline to measure and control bank risk. The evidence of the effectiveness of this approach spans many countries, and comes from historical as well as current examples.

The Gramm-Leach-Bliley Act of 1999 required the Fed and Treasury to consider that approach in the form of a subordinated debt requirement. A Fed report (Board of Governors 1999) showed that substantial research favored this approach, but lobbying from the big banks to avoid discipline encouraged Treasury Secretary Lawrence Summers and Fed Chairman Alan Greenspan to kill this promising idea. Now is the time to bring this idea back by requiring banks to offer credibly uninsured debt instruments as part of their capital structure. There are a variety of possible instruments that could be required to provide market information about risk and market discipline on banks. The Shadow Financial Regulatory Committee (2000) offered a blueprint of how to structure the rules surrounding a minimum subordinated debt requirement. That proposal was written prior to the development of the CDS market, which likely could provide a useful alternative to subordinated debt in the form of the market pricing of credit risk insurance. Flannery (2009) discusses the potential advantages of "contingent capital certificates" (CCC) – debts that convert to equity when banks suffer sufficient portfolio losses – rather than straight subordinated debt for this purpose; Flannery argues that CCC might work

better than subordinated debt as a source of information about risk and a form of market discipline, given the greater potential for rapid loss on CCC in states of the world where losses become large.

Finally, with respect to the use of credit rating agencies opinions to measure the riskiness of assets held in bank portfolios, given the low likelihood that regulators will be willing to eliminate entirely the use of ratings in favor of reliance on market opinions, there is a second-best alternative reform. Ratings used for regulatory purposes should be provided in numerical form, not as letter grades. Letter grades as forward looking opinions have no objective meaning that can be evaluated and penalized for inaccuracy after the fact. But numerical estimates of the probability of default (PD) and loss given default (LGD) do have objective, measurable meanings. Rating agencies that provide ratings used by regulators (so called NRSROs) should have to provide specific estimates of the PD and LGD for any rated instrument, not just a letter grade.

Rating agencies already calculate and report such statistics retrospectively on instruments that they rate, and presumably their letter grades are meant to translate into forward looking predictions of these numbers. But requiring NRSROs to express ratings using numbers would alter their incentives to rate risk dramatically. If NRSROs were penalized for underestimating risk (say, with a six-month “sit out” from having their ratings used for regulatory purposes), they would have a strong self interest in correctly estimating risk, since the reduced demand for their services during the sit out would affect their fee income. It would be easy to devise an algorithm for such a sit out: if an NRSRO’s estimates of either the PD or the LGD are sufficiently low relative to actual experience for a sufficiently long time, they would be punished with a six-month sit out.

Another proposal for making micro prudential regulation smarter would be to raise regulatory requirements for organizations that are large and highly complex. This policy could take the form of a higher capital requirement, a higher provisioning requirement, or a higher liquidity requirement. The argument in favor of such a policy is that, in the presence of the too-big-to-fail problem, large, complex banks are (1) less likely to manage risk properly, and (2) more likely to create problems for the financial system if they become undercapitalized. Thus, forcing them to maintain higher capital and/or greater liquidity would offset some of the social costs associated with their decisions to become too big to fail.

These proposed reforms to micro prudential regulation could be extremely helpful, but by themselves they are insufficient. Recent experience has shown that even honest market opinions and bona fide credit ratings vary in quality over time, and regulatory surcharges for large banks probably would not have been adequate for deterring the credit boom of 2002-2007. During the subprime boom, especially given the agency problems in asset management that accompanied the policy-induced bubble, risk was underestimated in the market across the board. Micro prudential rules that rely on signals from the market will not work adequately during episodes when distortionary policies promote the systemic underestimation of risk in debt markets. Recognizing that limitation to micro prudential regulation is the primary motivation for adopting additional reforms, including a relatively new idea in financial regulation known as “macro” prudential policy.

Macro Prudential Regulation Triggers

Macro prudential regulation means making the key parameters of prudential regulation (capital requirements, liquidity requirements, and provisioning policies) vary according to macroeconomic circumstances. That variation takes two forms: (1) normal cyclical variation in minimum capital requirements as part of countercyclical economic policy, and (2) special triggering of increased prudential requirements during states of the world in which "asset bubbles" are probably occurring.

The first of these ideas reflects the longstanding recognition that minimum capital requirements that are constant throughout the business cycle are procyclical in their effects: recessions produce bank loan losses, which reduce capital, which forces banks to shrink their lending, which deepens recessions. Repullo and Suarez (2008) simulate bank capital and asset decisions in a model of dynamically optimizing banks under the Basel standards and show that the standards induce substantial procyclicality of credit supply. Adding a simple leverage limit (like the one that already exists as an additional capital requirement in the US) reduces the procyclicality of credit somewhat, but the best approach is to vary prudential regulation over the business cycle so that capital, reserve, and provisioning standards are loosened a bit at the onset of recessionary shocks. To maintain the adequacy of those requirements during recessions, therefore, one would have to raise minimum capital requirements during boom times, probably substantially above the current minimum capital requirements that apply under either the Basel standards or the US leverage standard.

The second macro prudential idea – increasing capital requirements by more than normal during boom times when the boom also coincides with a high degree of financial

vulnerability, as during an asset bubble – has been a topic of debate for the past decade, and reflects the commonly held view that both the pre-2001 internet bubble and the pre-2007 subprime bubble (and the related phenomena that occurred in parallel outside the US) could have been avoided if policy makers had leaned against the wind to prevent the bubbles from inflating.

Before embracing that idea, however, advocates of macro prudential regulation must be able to answer three questions: (1) Why should prudential regulation, rather than monetary policy, be the tool used to lean against the wind during bubbles? (2) Is it feasible to reliably identify bubbles in real time and vary prudential requirements to respond to the bubble? (3) What are the potential costs of implementing such an approach?

In answer to the first question, the Fed and other central banks already have their hands full using one tool (the short-term interest rate controlled by the central bank) to hit two targets (low inflation and full employment). Adding a third target to monetary policy (namely, identifying and deflating asset bubbles) would be undesirable because it would complicate and undermine the ability to use interest rates to meet the key goals of monetary policy, and this distraction would also make it harder to hold central banks to account for achieving low inflation and high employment: if we try to incorporate secondary objectives into interest rate policy, we may give central banks an excuse for failing to meet their primary objectives.

Furthermore, prudential regulation is ideally suited to addressing asset market bubbles, since loose credit supply has been so closely identified historically with the growth of asset bubbles. Prudential regulations would clearly succeed in reducing the

supply of credit by tightening capital, liquidity and provisioning requirements, and this is the most direct and promising approach to attacking the problem of a building asset price bubble, assuming that one can be identified.

How good are we at identifying bubbles in real time? Is it realistic to think that policy makers can identify a bubble quickly enough, and adjust prudential regulations in a timely manner to mitigate bubbles and increase the resilience of the banking system in dealing with the consequences of the bubble's bursting? Recent research and experience is encouraging in this respect. Borio and Drehmann (2008) develop a practical approach to identifying ex ante signals of bubbles that could be used by policy makers to vary prudential regulations in a timely way in reaction to the beginning of a bubble. They find that moments of high credit growth that coincide with either unusually rapid stock market appreciation or unusually rapid house price appreciation are followed by unusually severe recessions. They show that a signaling model that identifies bubbles in this way (i.e., as moments in which both credit growth is rapid and one or both key asset price indicators is rising rapidly) would have allowed policy makers to prevent some of the worst boom and bust cycles in the recent experience of developed countries. They find that the signal-to-noise ratio of their model is high; adjustment of prudential rules in response to a signal indicating the presence of a bubble would miss few bubbles and would only rarely signal a bubble in the absence of one.

Recent experience by policy makers has also been encouraging. Spain (the thought leader in the advocacy of macro prudential regulation) displayed success in leaning against the wind recently by establishing provisioning rules that are linked to

aggregate credit growth. Colombia also was successful in applying a similar approach in 2007 and 2008 (Uribe 2008).

Financial system loans in Colombia grew from a 10% annual rate as of December 2005 to a 27% rate as of December 26. Core CPI growth also rose from 3.5% in April 2006 to 4.8% in April 2007, real GDP was growing at 8% for 2007, and the current account deficit doubled as a percentage of GDP from the second half of 2006 to the first half of 2007, rising from 1.8% of GDP to 3.6%. Interestingly, that credit boom occurred in spite of attempts by the central bank to use interest rate policy to lean against the wind; interest rates were raised beginning in April 2006, and by mid-2008 had been raised a total of four percentage points. In 2008, the central bank and the bank superintendency took a different tack, raising reserve requirements and provisioning requirements on loans, and imposing other rules to limit borrowing from abroad. The banking system's risk-weighted capital ratio rose to 13.9%, and credit growth fell to 13% in 2008. Colombian authorities are now basking in praise for having reduced credit growth and strengthened their banks capital positions in a manner that will substantially mitigate the backlash suffered by Colombian banks from the global financial collapse.

Macro prudential regulation could use a variety of warning signs as triggers for increases in regulatory standards. Rather than simply focusing on credit growth, Borio and Drehmann's (2008) findings suggest that a combination of credit growth and asset price appreciation may be optimal. Brunnermeier et al. (2009) argue for the desirability of including measures of systemic leverage and maturity structure.

What would be the economic costs associated with adopting macro prudential triggers to combat asset bubbles? Presumably, the main costs would result from false

positives (i.e., the social costs associated with credit slowdowns and capital raising by banks during periods identified as bubbles that are in fact not bubbles). These costs, however, are likely to be small. If a bank believes that extraordinary growth is based in fundamentals rather than a bubble, then that bank can raise capital in support of continuing loan expansion (in fact, banks have done so during booms in the past). The cost to banks of raising a bit more capital during expansions is relatively small; those costs consist primarily of adverse-selection costs (reflected in fees to investment banks and underpricing of shares), which tend to be small during asset price booms. Indeed, some researchers argue that "hot" markets tend to produce overpriced equity, meaning that banks might enjoy negative costs (positive benefits) of raising capital during such periods.

Most importantly, macro prudential triggers would promote procyclical equity ratios for banks, which would mitigate the agency and moral-hazard problems that encourage banks to increase leverage during booms. Adrian and Shin (2008) show that during the subprime boom, commercial banks and (even more so) investment banks substantially raised their leverage (which was permitted by the underestimation of their asset risk by regulatory capital standards).

Prior to the establishment of government safety nets and other policies noted in Section II, however, banks behaved differently. Calomiris and Wilson (2004) show that during the boom era of the 1920s, New York City banks expanded their lending dramatically, and their loan-to-asset ratios also rose as the banks participated actively in promoting the growth in economic activity and stock prices during the 1920s. But the banks also recognized the rising risk of their assets, and made adjustments accordingly.

Rising asset risk led the banks to substantially raise their equity capital. New York banks went to the equity market frequently in the 1920s, and on average increased their market ratios of equity to assets from 14% in 1920 to 28% in 1928. Virtually no New York City banks failed during the Depression. In a sense, the primary goal of macro prudential regulation can be viewed as restoring the natural procyclical tendency of bank equity ratios. That tendency has been discouraged by government policies that removed market constraints and incentives and thus discouraged banks from budgeting increased capital during booms.

Prepackaged "Bridge Bank" Plans for Large, Complex Banks

The too-big-to-fail problem can only be addressed adequately if regulators and bankers alike believe that regulators will be willing and able to intervene and resolve undercapitalized large, complex banks in a timely fashion. The US established prompt corrective action guidelines in the 1991 FDICIA legislation, which was meant to constrain regulatory discretion about intervention and resolution, avoid regulatory forbearance, and ensure rapid action by regulators. And the US has established a bridge bank structure that can be applied to speed the resolution of banks that are taken over by regulatory authorities (Herring 2009). Despite these actions, however, none of the large banks in the US that became undercapitalized during the recent crisis has been resolved through such a structure.

The only way that prompt corrective action can be credibly applied to large, complex banks is if the social costs of intervening in those banks is considered sufficiently low at the time intervention is called for; otherwise, political and economic

considerations will prevent intervention. To that end, commercial banks should be required to maintain updated and detailed plans for their own resolution, with specific pre-defined loss-sharing formulas that can be applied across subsidiaries within the institution operating across national borders. Those loss-sharing formulas must be pre-approved by the regulators in the countries where those subsidiaries operate. The existence of such a prepackaged plan would make intervention and resolution credible.

Requiring detailed and credible prepackaged and pre-approved resolution plans would have ex ante and ex post benefits for the financial system. Ex ante, it would make large, complex banks more careful in managing their affairs, and internalize the costs the complexity within those organizations. In other words, because complexity and its risks are hard to manage, that makes planning the resolution of large, complex institutions harder and more costly. If the institutions are forced to plan their resolutions credibly in advance, and if it is very costly for them to do so, then they may appropriately decide to be less complex and smaller. Ex post, changes in the control over distressed banks would occur with minimal disruption to other financial firms, and because financial problems could be resolved more quickly, managerial incompetence would be more speedily corrected, and "resurrection risk taking" would be avoided.

Reforming Housing Finance

The US has made access to affordable housing a centerpiece of government policy for generations. The philosophy behind this idea is that homeowners have a stake in their communities and in their society, and thus make better citizens. That argument may have merit, and the costs of promoting access to housing (especially the cost from

crowding out of non-housing investments) may be warranted. But highly leveraged homeowners (e.g., those borrowing 97% of the value of their homes using an FHA guarantee) have little stake in their homes; indeed, it might be more accurate to refer to them as homeowners in name but renters in reality.

The key error in US housing policy has been the use of leverage subsidies as the means used by the government to encourage homeownership. Prospective homeowners are helped by the government only if they (or their lending institution) are looking for cheap credit, and the size of the subsidy they receive is proportional to their willingness to borrow. FHA guarantees, Federal Home Loan advances, and government guarantees of GSE debts all operate via leverage.

These subsidies are delivered in an inefficient and distorting manner. Subsidizing the GSEs has been inefficient, since much of the government subsidy has accrued to GSE stockholders; only a portion has been passed on to homeowners in the form of reduced interest rates on mortgages. And leverage subsidies distort bank and borrower decisions by encouraging them to expose themselves and the financial system to too much risk related to interest rate movements and housing price changes. It is remarkable to think that the US financial system was brought to its knees by small declines in average US housing prices, which would have had little effect if housing leverage had been maintained at reasonable levels.[3]

The GSEs, which are now in conservatorship, should be wound down as soon as possible, and the FHA and Federal Home Loan Banks should be phased out. In their

[3] The most popular measure of house prices, the Case-Shiller index, substantially overstates house price decline due to regional bias and selectivity bias in the measurement of price change, as discussed in Calomiris (2008a). Average house prices in the US, properly measured, probably declined from their peak by less 10% as of the end of 2008.

place, the US could establish an affordable housing program that assists first-time homeowners with their downpayments (e.g., offering people with low income a lump sum subsidy to apply toward their downpayments).

Improving Bank Stockholder Discipline

Sweeping changes should be made to the regulation of bank stockholders. As described above, current regulations almost guarantee that large banks will be owned by a fragmented group of shareholders who cannot rein in managers, thus encouraging managers to use the banks to feather their own nests. That agency problem not only produces significant waste within banks on an ongoing basis, it makes the allocation of capital in the economy inefficient; banks are supposed to act as the brain of the economy, but will not do so if their incentives are distorted by managers in pursuit of ends other than the maximization of value for their shareholders. And, in the presence of circumstances conducive to bubbles, as we have seen recently, incentive problems can translate into systemic crises with deep costs, including interruptions in the normal flow of credit, widespread job losses and destruction of wealth throughout the economy.

A first-best solution would be outright repeal, or at least a significant relaxation, of the bank holding company act restrictions on ownership of banks, along with the removal of other restrictions that make it hard for stockholders to discipline managers (ceilings on institutional investors' holdings, and the Williams Act). These reforms seem unlikely to be enacted at the present time. In the presence of continuing distortions relating to corporate governance, bank stockholders – who should be the first line of defense in the financial system against unwise risk taking by bank management – are

unable to exert much of a role. That implies even more of a burden on regulators to implement reforms in micro prudential regulation, macro prudential regulation, and resolution policies that will limit the social costs associated with banking crises.

Transparency in Derivatives Transactions

The growth of over-the-counter (OTC) transactions in recent years has raised new challenges for prudential regulation. OTC transactions are not always cleared through a clearing house. Counterparty risk in transactions that do not involve a clearing house is borne bilaterally by contracting parties, and the true counterparty risk can be hard to measure, since the aggregate amount of transactions and the net amounts of transaction exposures of any one counterparty are not known to the other counterparties. This problem is magnified by the "daisy chain" effect: If A is a counterparty of B, and C is a counterparty of B, then the counterparty risk A bears in its dealings with B is partly the result of the counterparty risk B bears in its dealings with C, which is unobservable to A.

The lack of transparency about counterparty risk not only creates risk management problems for banks, it also complicates the regulatory process. Regulators are not able to monitor or control individual institution risk (via micro prudential rules) or aggregate risk (via macro prudential rules) if they cannot observe risk accurately. Furthermore, since the counterparty risks in OTC transactions are especially great for large, complex banks, the opacity of those risks aggravates the too-big-to-fail problem. Large, complex banks may even have incentives to undertake more hard-to-observe risk precisely because its complexity and opacity helps to insulate them from intervention.

How should prudential regulatory policy respond to this problem? There are two separate issues that must be addressed by regulators: encouraging clearing and encouraging disclosure. Policy reforms related to clearing mainly address the problem of counterparty risk opacity. Policy reforms related to disclosure mainly address the problem of monitoring and controlling the net risk positions of individual banks and the systemic consequences of those positions.

With respect to clearing, one option for dealing with systemic consequences of opacity in counterparty risk would be to require that all derivatives contracts be cleared through a clearing house. Note that this is not the same as requiring that all transactions be *traded* on an exchange. Some OTC derivatives are cleared in clearing houses even though they are not traded on the exchanges affiliated with those clearing houses. When clearing through the clearing house, counterparty risk is no longer bilateral, but rather is transferred to the clearing house, which effectively stands in the middle of all transactions as a counterparty and thereby eliminates the problem of measuring counterparty risk, or having to worry about "daisy chain" effects relating to counterparty risk. Of course, relying on clearing houses to centralize counterparty risk requires faith in the efficacy of the self regulatory rules that ensure the stability of the clearing house (e.g., margin requirements), but to date that self regulatory record has been exceptionally good.

The problem with requiring that all OTC transaction clear through a clearing house is that this may not be practical for the most customized OTC contracts. A better approach would be to attach a regulatory cost to OTC contracts that do not clear through the clearing house (in the form of a higher capital or liquidity requirement) to encourage, but not require, clearing house clearing. For contracts where the social benefits of

customization are high, banks' fees will compensate them for the higher regulatory costs of bilateral clearing.

With respect to disclosure, one option would be to require that all derivatives positions be publicly disclosed in a timely manner. Such a policy, however, has undesirable consequences. Bankers that trade in derivatives believe that if they had to disclose their derivatives positions that could place them at a strategic disadvantage with respect to others in the market, and believe that this might even reduce aggregate market liquidity. For example, if Bank A had to announce that it had just undertaken a large long position in the dollar/yen contract, other participants might expect that it would be laying off that risk in the future, which could lead to a decline in the supply of long positions in the market and a marked change in the price that would clear the market. A better approach to enhancing disclosure, therefore, would be to require timely disclosure of positions only to the regulator, and public disclosures of net positions with a lag.

IV. Conclusion

This essay has reviewed the major government policy distortions that gave rise to the subprime turmoil, and has suggested robust policy reforms to deal with them (i.e., reforms that take into account the existence of those distortions and the political economy of regulation and supervision). The proposed reforms would reduce the costs of distortions related to agency problems, too-big-to-fail problems, and government manipulation of housing credit markets.

Proposed reforms fall into six areas: (1) micro prudential regulation, (2) macro prudential regulation, (3) the creation of credible plans for resolving large, complex

banks, (4) the reform of housing policy to eliminate leverage subsidies as the means of promoting home ownership, (5) the removal of barriers to stockholder discipline of bank management, and (6) policies that promote improvements in counterparty risk management and transparency in OTC positions.

The following is a summary of the twelve policy reforms proposed in this essay:

1. The use of loan interest rates in measuring the risk weights applied to loans for purposes of setting minimum capital requirements on those loans.
2. The establishment of a minimum uninsured debt requirement, in addition to other capital requirements for large banks. The specific form of this requirement requires further discussion (candidates include a specially designed class of subordinated debt, CDS issues, or contingent capital certificates).
3. The reform of the use of credit rating agencies opinions to either eliminate their use or require that NRSROs offer numerical predictions of PD and LGD, rather than letter grade ratings, and be held accountable for the accuracy of those ratings.
4. A regulatory surcharge (which takes the form of higher required capital, higher required liquidity, or more aggressive provisioning) on large, complex banks.
5. Macro prudential regulation that raises capital requirements during normal times in order to lower them during recessions.
6. Additional macro prudential regulatory triggers that increase regulatory requirements for capital, liquidity, or provisioning as a function of credit growth, asset price growth, and possibly other macroeconomic risk measures.
7. Detailed and regularly updated plans for the intervention and resolution of all large, complex banks should be prepared by these banks, which specify how control of the

bank's operations would be transferred to a prepackaged bridge bank if the bank became severely undercapitalized. These plans would also specify formulas for loss sharing among international subsidiaries of the institution, and the algorithm specifying those loss-sharing arrangements would be pre-approved by the relevant regulators in the countries where the subsidiaries are located.

8. The winding down of Fannie Mae and Freddie Mac, and the phasing out of the FHA and Federal Home Loan Banks, and the replacement of those leverage subsidies with downpayment assistance to low-income first-time homebuyers.

9. The elimination of bank holding company restrictions on the accumulation of controlling interests in banks.

10. The relaxation of Williams Act requirements that require buyers of more than a 5% interest in a company to announce that they are acquiring a significant interest in a company, and the elimination of regulatory limits on the percentage ownership interests that institutional investors can own in public companies.

11. The enactment of regulatory surcharges (via capital, liquidity, or provisioning requirements) that encourage the clearing of OTC transactions through clearing houses.

12. Requirements for timely disclosure of OTC positions to regulators, and lagged public disclosure of net positions.

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