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Regulation of Large Financial Institutions: Lessons from Corporate Finance Theory

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Abstract

Equity capital is the shock absorber for our financial system and the current financial crisis, like a bumpy road for an auto designer, provides a unique opportunity for financial regulators to evaluate the predictions of theory and improve the design of the regulatory system. The purpose of this paper is to apply a simple model of firm capital structure to the current situation and summarize the insights it provides regarding the regulation of large financial institutions in a post-crisis world. The paper begins with a brief summary of the model and uses the results of that model to place the evolution of the current crisis into perspective. The paper concludes with forward-looking observations and suggestions for future regulation.

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Equity capital is the shock absorber for our financial system and the current financial crisis, like a bumpy road for an auto designer, provides a unique opportunity for financial regulators to evaluate the predictions of theory and improve the design of the regulatory system. The purpose of this paper is to apply a simple model of firm capital structure to the current situation and summarize the insights it provides regarding the regulation of large financial institutions in a post-crisis world. The paper begins with a brief summary of the model and uses the results of that model to place the evolution of the current crisis into perspective. The paper concludes with forward-looking observations and suggestions for future regulation.

A Simple Model of Firm Capital Structure

The study of firm capital structure is basically the analysis of how firms finance their economic activities – in particular, the allocation of funding between equity and debt or firm leverage (the ratio of debt to equity). In much of the literature, the fundamental risk of the firm's assets is taken as given by economic forces outside the control of the firm and the choice of leverage can be viewed as allocating that risk between different providers of capital. In general, the use of debt financing results in creating a lower risk/lower return investment opportunity for debt providers and a higher risk/higher return investment for equity providers.

Leland (1994) develops a simple model of the choice of firm capital structure that has proven to provide valuable insights into important questions.¹ In Leland's model, a private firm

¹ Leland, Hayne E. (1994): "Corporate Debt Value, Bond Covenants, and Optimal Capital Structure," *The Journal of Finance*, 49(4): 1213-1252.

in a given industry must fund its initial investment in productive assets with a combination of debt and equity. The return on the firm's assets evolves stochastically, but the firm has limited ability to adjust its capital structure in response to the actual asset outcomes.² As a result, the firm's managers must choose their initial leverage to maximize the expected present value of the firm's future operations in the presence of taxes, bankruptcy costs and tax-deductible interest payments on the debt. In this model, firms rationally choose to fund themselves with some debt and some equity as they trade-off expected bankruptcy costs that could be avoided if the firm chose all equity and the tax advantage of debt, which is maximized by choosing all debt.

A key lesson of this paper arises from the author's consideration of the firm's choice of a bankruptcy threshold – the level of asset value at which the firm's owners voluntarily turnover the assets to the debt holders for liquidation. In financial terms, the firm's owners have a call option on the assets with a strike price equal to the debt payoff. Because an option can never have a negative value, ignoring the periodic debt service payment, firm equity could never be negative and the owners would never choose bankruptcy.³ However, to keep their option alive, the owners must make the periodic debt service payments and thus choose bankruptcy when the cost of the required debt service payment exceeds the current call option value. Two important insights from Leland's analysis are that for reasonable parameter assumptions owners will choose to continue to operate the firm (maintain their option value) until the market value of assets falls well below the face value of debt and the key factor that limits this behavior of owners is the required debt service to bond holders.

² While such a restriction may seem unrealistic, the recent crisis has demonstrated that firms experiencing financial difficulties often have no access to additional equity capital at the time of distress. This fact places more importance on the forward-looking choice of initial leverage.

³ A call option provides the holder the right, but not the obligation, to purchase a security or asset at a fixed price. Such an option always has a positive value regardless of the current value of the asset as long as there is some chance that the value of the asset may rise above the strike price. See Hull (2008) for a complete introduction to options and their valuation. Hull, John C. 2008. *Options, Futures, and Other Derivatives*. Upper Saddle River, NJ: Prentice-Hall.

Because equity holders can choose the best time (from their perspective) to turn over the firm to debt holders, the bond holders are exposed to greater risk by the continued operation of an insolvent firm. Once declines in asset values have made a firm insolvent, the equity holder's decision whether to continue operating the firm only depends upon the subset of outcomes where asset values recover sufficiently for the firm value to exceed debt obligations. The return to equity holders is zero in all other scenarios, no matter how bad the outcome. However, debt holders care about the expected future value of assets over all states of the world, but are especially concerned about situations where asset values continue to erode because they will be the owner of the assets in those states of the world. Furthermore, insolvency is likely to affect the equity holders' choice of investment risk because, from their perspective, they still benefit from exceptionally good outcomes and do not bear any increased losses if the bad outcomes become worse. Such increased investment risk exposes debt holders to substantially more risk than the likely investment decisions of a solvent firm.⁴

The providers of debt capital can anticipate this behavior on the part of owners and demand fair compensation for bearing the risk of significant losses from asset declines by increasing the required coupon rate on the debt. However, this creates "risky" debt and limits the ability to allocate risk that was one of the original motivations for leverage.⁵ A common solution to this problem is for equity and debt providers to negotiate bond covenants whereby owners

⁴ This behavior arises from the limited liability exposure of equity holders so that owners of an insolvent firm face no downside risk and benefit from large risks that have a low probability of success, but if successful create the potential for future positive net worth of the firm. Easterbrook, Frank H and Daniel R. Fischel. 1996. *The Economic Structure of Corporate Law*. Cambridge, MA: Harvard University Press (p. 49-50).

⁵ To see the intuition underlying this claim, envision a continuum of risk measured along a straight line where the firm's assets are located in the middle of the line. Adding leverage to the firm creates one security with less risk (debt) and another with more risk (leveraged equity) – splitting the single center point into two, one to the safer side of center and one to the riskier side. To the extent that more of the risk of future outcomes falls on the debt holders, the two new points must remain closer to the original center point.

contract to transfer control of the firm to debt holders at a higher threshold value of assets.⁶ For example, a positive net worth covenant would transfer control when the market value of assets first falls below the face value of debt.⁷

A final important result from Leland's model is that whether or not the debt is protected by bond covenants, the optimal choice of initial leverage provides a substantial equity "cushion" above the bankruptcy threshold. Leverage levels near the bankruptcy threshold raise the risk of incurring the transactions costs associated with bankruptcy. Since debt holders will bear those costs in bankruptcy, firm owners must pay for those costs in higher interest rates and so have an incentive to hold additional equity in order to lower their interest rate on debt.

Regulated depository institutions have two significant differences from the firms Leland studies: they are able to issue debt at the riskless rate without regard to their individual financial condition or the selected leverage, and they are subject to binding capital regulation. These capital regulations can be viewed in Leland's terms as an exogenously determined bankruptcy threshold at which level the debt holders are paid in full and the assets turned over to the regulator for liquidation. As a result of the reduced market discipline via debt cost, many scholars have discussed the concern that deposit insurance creates a moral hazard that encourages owners of insured depositories to select very high levels of leverage, i.e., hold the

⁶ In this context, the establishment of bond prices in advance is comparable to a standard "Hold up" problem in economics. Both parties would be better off if the equity holder would promise to dissolve the firm, but this commitment is not credible due to the "Hold up" problem that arises if the firm becomes insolvent. Bond covenants provide a contractual solution by legally enforcing the commitment. For recent discussions see Rogerson (1992) and Edlin and Reichelstein (1996). Rogerson, William. "Contractual Solutions to the Hold-Up Problem." *Review of Economic Studies*, October 1992, 59(4), pp. 774-94. Edlin, Aaron and Reichelstein, Stefan. "Holdups, Standard Breach Remedies, and Optimal Investment." *American Economic Review*, June 1996 86(3), pp. 478-501.

⁷ There are many possible variations of this basic idea. For example, some covenants might limit the managers' ability to finance new growth or sell assets in lieu of transferring total control to debt holders. Another variation might provide debt holders representation on the board when certain financial thresholds are crossed. Smith, C and J. Warner (1979). "On Financial Contracting: An Analysis of Bond Covenants." *Journal of Financial Economics*, 7: 117-161.

minimum capital allowed by the capital regulations.⁸ On the other hand, Buser, Chen and Kane (1981) point out that banks incur significant costs that are not explicitly priced attributable to regulations, investment restrictions and monitoring.⁹ Merton (1978) and Markus (1984) argue that these costs increase when banks have weak capital positions creating an equity favoring factor that offsets the incentives created by deposit insurance and could lead to banks choosing to hold high levels of equity and so provide very limited deposit services.¹⁰

Ideally, regulation should preserve incentives for owners to operate as deposit issuing banks, while selecting a prudent level of leverage tailored to the riskiness of their asset strategy – voluntarily holding capital in excess of the specified minimum. It is unreasonable and impractical to expect regulators to be able to establish capital standards tailored to an individual bank's operating strategy and asset risk. Similarly, regulators cannot monitor the portfolios of all financial institutions closely enough to accurately classify banks by the riskiness of their assets. Consequently, it is important that the capital regulation framework provides owners and managers sufficient incentives to provide a capital cushion that reflects the operating strategy of the bank and appropriately reduces the risk of violating the standards in adverse times.

Harding, Liang, and Ross (2008) (HLR) extend Leland's model to incorporate the additional factors influencing bank capital choices.¹¹ They find that capital regulation alone is not effective for establishing an incentive for banks to hold capital reserves in excess of the

⁸ See Gueyie and Lai (2003), Keeley (1980), and Marshall and Prescott (2000). Gueyie, J.P., and V.S. Lai (2003): "Bank Moral Hazard and the Introduction of Official Deposit Insurance in Canada," *International Review of Economics and Finance*, pp. 247-273. Keeley, M. (1990): "Deposit Insurance, Risk, and Market Power in Banking," *The American Economic Review*, 80(5), 1183-1200. Marshall, D.A., and E.S. Prescott (2000): "Bank capital regulation with and without state-contingent penalties," Federal Reserve Bank of Chicago Working Paper.

⁹ Buser, S. A., A. H. Chen and E. J. Kane. 1981. "Federal deposit insurance, regulatory policy and optimal bank capital." *Journal of Finance* 36:51-60.

¹⁰ Marcus, A.J. (1984): "Deregulation and Bank Financial Policy," *Journal of Banking and Finance*, 8, 557-565. Merton, R.C. (1978): "On the Cost of Deposit Insurance When There Are Surveillance Costs," *Journal of Business*, 51, 439-452.

¹¹ Harding, J., X. Liang and S.L. Ross. (2008). "Bank Capital Requirements and Capital Structure." Working Paper. <http://www.econ.uconn.edu/working/2009-09.pdf>

minimum capital standards. Bankruptcy costs and insurance benefits both vary with capital structure in such a way that banks would rationally choose to operate with the minimum capital allowed or forego being a bank entirely (i.e., choose all equity financing), depending upon the strictness of capital regulation. A bank will only choose to hold capital reserves in excess of minimum capital requirements if there is some additional firm franchise value that is placed at risk by the capital regulation.

HLR find that tax-advantaged debt as parameterized by Leland (1994), or any franchise value that depends upon the total amount of an institution's deposits, creates such a franchise value and, when this franchise value is considered, banks will hold excess capital without shifting to the extreme of foregoing issuing deposits. Counter-intuitively, the tax benefits of debt or the franchise benefits of the deposit base lead to lower leverage which is quite striking given that tax advantaged debt traditionally is viewed as increasing the incentive for firms to take on more debt. The result is explained by the fact that a firm's franchise value is placed at risk by capital standards causing firms to choose lower levels of leverage in order to protect this value for equity holders. Overall, the combination of capital standards with the power of the regulator to wipe out equity when the standard is violated acts like the bond covenants discussed in Leland encouraging managers to operate with a capital cushion above the threshold that would trigger takeover.

HLR demonstrate that it is the regulator's ability to move swiftly to place a firm that violates capital standards into receivership that leads firms to hold excess capital. Alternative structures such as warning thresholds that trigger additional regulatory burdens have little effect on leverage. It is the ability to liquidate the firm, placing the franchise value at risk, that leads to more conservative choices of leverage. Consistent with these predictions, the authors note that

commercial banks, that are subject to dissolution if capital standards are violated, hold a substantial capital cushion above the minimum capital requirement while the mortgage GSEs, Freddie Mac and Fannie Mae, who prior to the summer of 2008 were free from the risk of receivership, held little or no capital cushion through the same period.¹²

Understanding the Current Crisis

The origins of the current financial crisis are complex and no single factor can be singled out as the primary cause. However, most observers believe that increasing use of leverage, broadly defined, was a contributing factor. The U.S. Government Accounting Office (GAO) report to Congress on the origins of the crisis (GAO, 2009) shows that total debt in the U.S. economy rose significantly in the years preceding the crisis. Measured as a ratio to nominal GDP, total debt rose from roughly two times GDP in 2002 to 2.25 times GDP in 2007.¹³

By their nature, financial institutions have always been some of the most highly leveraged firms. The five largest U.S. investment banks together had an average leverage ratio of about 30 to 1 during the Asian Financial Crisis in 1997. While this ratio declined to 22 to 1 in

¹² Fannie Mae and Freddie Mac first began operating under the statutory minimum capital requirement in 1993, and in that year they held excess capital of roughly \$1 billion and \$.7 billion, respectively. These amount expressed as a percentage of assets plus Mortgage Backed Securities (MBS) outstanding were .14% and .13%, respectively. In most of the eight subsequent years, Fannie Mae held excess capital well under \$1 billion and in 1998 and 1999 its excess capital was 1/100th of a percent of the assets and MBS. Freddie Mac's excess capital, while slightly higher when measured as a percentage of assets and MBS, was smaller when measured in dollars and is also consistent with the claim that the firm intended to meet but not exceed its capital standard. On average over the period from 1993 through 2001, Fannie Mae and Freddie Mac held less than 1/10th of a percent of excess capital. The period from 2002 through 2007 is distorted by the effects of financial restatements arising from accounting problems experienced in the period from 2003 through 2005. However, the numbers for 2007 most likely reflect the firms' contemporaneous intentions, and they still suggest that the firms were not holding precautionary excess capital. FHFA and OFHEO Annual Reports to Congress 1994-2008. <http://www.fhfa.gov/Default.aspx?Page=240> From 2001 through 2008, commercial banks held total capital (Tier I plus Tier II) of 12.3% of risk-based assets. During this period, a bank was deemed to be well-capitalized with a total capital ratio of 10% of risk-based assets and adequately capitalized with a ratio of 8%. Data on commercial bank capital ratios is available at <http://www2.fdic.gov/SDI>

¹³ See Figure 3 in *Financial Markets Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across System*. 2009. GAO Report to Congressional Committees. Washington D.C.: U.S. Government Accounting Office.

the period following 1997, it had risen back to 30 to 1 by 2007. The five largest bank holding companies had an average leverage ratio of about 13 to 1 throughout the same period.¹⁴

However, the effective growth of leverage at financial institutions in recent years is difficult to measure precisely because recent developments in financial assets and derivatives allow institutions numerous opportunities to effectively leverage their risk “off balance sheet” while still maintaining excess capital as measured by traditional measures of on-balance sheet risks. For example, before the development of credit default swaps, an institution willing to bear the credit risk of an industrial firm would make a loan or purchase the debt of that company and report the loan as an asset, thereby increasing its required capital. In recent years, institutions could take on that same credit risk without making a loan by writing an insurance policy through a credit default swap.

Leverage in the economy also increased with greater use of hedge funds, Special Purpose Entities (SPE) as part of holding company structures and the ability to issue structured debt securities. One sector of the economy that made prominent use of structured debt to expand credit was the housing sector where subprime mortgages were used to expand the population of mortgagors. The resulting pools of subprime mortgages were structured in ways to attract investment from a wide array of non-traditional investors. While most large investment banks and bank holding company subsidiaries that originated subprime mortgages operated with the intent to pool and sell mortgage-backed securities as soon as a sufficient number of loans had been originated, at any given time, they nevertheless had significant exposure to subprime loans because they were holding mortgages as inventory awaiting future sales or holding securities as

¹⁴ At the time, the five largest investment banks or broker-dealer holding companies were Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley. The five largest bank holding companies were Bank of America, Citigroup, JPMorgan Chase, Wachovia, and Wells Fargo. These numbers are drawn from figures 4 and 5 of the GAO report on Financial Markets Regulation (GAO, 2009).

part of their underwriting and trading operations. In some cases these institutions also bought mortgage related securities as investments through special purpose entities or subsidiaries.¹⁵

The role of SPE's is especially instructive. If a regulated financial institution committed to provide contingent funding for a SPE, such as liquidity facilities or credit enhancements, the institution would have been required to hold capital against that commitment. In many cases, however, the institutions establishing the SPE's provided no such guarantees and so the business activities of the SPE were not considered in calculating capital requirements. Nevertheless, these institutions still faced both reputation and legal risks associated with the possibility of an SPE failure. Many of these SPE's increased returns by investing in long-term assets like mortgage-backed securities and financed these investments with short term commercial paper. As the financial crisis began in 2007, many of these SPE's could not renew their debt financing and the regulated financial institutions either extended financing themselves or directly brought the SPE's onto their books in order to avoid the reputation damage associated with SPE failure.¹⁶

The first signs of the current crisis arose in the subprime mortgage market where delinquencies and defaults began to increase in the first half of 2007. In June, 2007, Standard and Poor's and Moody's began to downgrade structured debt backed by subprime mortgage securities. This, in turn, led Bear Stearns to suspend redemptions in certain subprime investment funds it was managing, and later in July to liquidate two hedge funds that invested in subprime mortgage-backed securities. By March 2008, Bear Stearns was taken over by JPMorgan Chase in a deal brokered by the U.S. government.¹⁷ Throughout this period, subprime mortgage securities market values fell sharply as uncertainty increased about the ability of the structures to

¹⁵ The GAO report on Financial Markets Regulation (GAO, 2009, p 19-20).

¹⁶ The GAO report on Financial Markets Regulation (GAO, 2009, p 56-58).

¹⁷ For a detailed timeline of events, see the Financial Crisis website <http://timeline.stlouisfed.org/index.cfm?p=home> maintained by the Federal Reserve Bank of St. Louis.

withstand higher levels of delinquency and default.¹⁸ These concerns were exacerbated when home prices began to fall in several major markets.¹⁹

While much of the public attention was focused on “toxic assets”, the combination of declining asset values with high leverage and increasing uncertainty and risk aversion resulted in a rapid spread of the crisis throughout the global financial system. Asset value declines forced institutions to deleverage initially by raising capital,²⁰ but as raising capital became more difficult institutions were forced to deleverage by selling assets into markets dominated by sellers.²¹ Brunnermeier (2000) and Kashyap, Rajan, and Stein (2008)²² emphasize the role of deleveraging in asset price declines suggesting that deleveraging could trigger downward spirals as asset sales depress asset prices requiring further deleveraging. Further, Mark-to-Market²³ rules could exacerbate a deleveraging based price spiral as financial institutions are forced to re-value assets in the face of rapid declines in asset prices and then due to Mark-to-Market rules must respond to those lower values with further deleveraging. However, it is important to recognize that the falling prices of assets are not simply the result of psychology and forced sales but also reflect declines in value due to greater economic uncertainty in general and/or a higher likelihood

¹⁸ For example, see How the Bear Stearns Deal Got Done Mar 17, 2008 CNN Money.com <http://money.cnn.com/> and Testimony before the Joint Economic Committee U.S. Congress Chairman Ben S. Bernanke Economic Outlook Apr 2, 2008 <http://www.federalreserve.gov/newsevents/testimony/bernanke20080402a.htm> .

¹⁹ For example, see Home Prices See Another Record Plunge Oct 28, 2008 and Home Prices in Record Decline Nov 25, 2008 CNN Money.com <http://money.cnn.com/> .

²⁰ The GAO report on Financial Markets Regulation (GAO, 2009, p 20).

²¹ If a firm is levered 30:1 and experiences a 10% decline in value on 10% of its assets, its equity base declines by 30% and its leverage increases to more than 40:1. In order to return leverage to the original ratio of 30:1, it must sell close to one third of its assets.

²² Markus K. Brunnermeier, “Deciphering the 2007-08 Liquidity and Credit Crunch,” *Journal of Economic Perspectives* 23, no. 1 (2009), pp. 77-100; Anil K., Kashyap, Raghuram G. Rajan, and Jeremy C. Stein, “Rethinking Capital Regulation,” paper prepared for Federal Reserve Bank of Kansas City symposium on “Maintaining Stability in a Changing Financial System,” Jackson Hole, Wyoming, August 21-23, 2008 (September 2008).

²³ Mark-to-Market is a way to measure assets and liabilities that appear on a company’s balance sheet and income statement that involves an attempt to measure companies’ assets and liabilities at fair or market value. For more detailed information, see SEC’s Office of Chief Accountant and Division of Corporate Finance, “Report and Recommendations Pursuant to Section 133 of the Emergency Economic Stabilization Act of 2008: Study on Mark-To-Market Accounting” (SEC, 2008).

of extreme or tail events in the fundamental markets on which those assets draw their value. Further, even without a deleveraging price spiral, real declines in complex asset values such as subprime mortgage-backed securities could be exacerbated by a lemon's problem where firms have private information on the quality of securities and sell the lowest quality assets as they deleverage.²⁴

The initial regulatory reaction focused on the immediate symptom – the freezing up of markets – by providing liquidity in the hope of stabilizing the markets by stimulating buyers of assets. In August 2007, the Federal Reserve publicly emphasized its role and intention to provide reserves as necessary to meet the needs of depository institutions,²⁵ and then lowered the federal funds rate throughout the fall of 2007. In December 2007, the Federal Reserve Board announced the creation of a Term Auction Facility (TAF) that would auction fixed amounts of term funds to depository institutions allowing those institutions to use a wide variety of assets including mortgage-backed securities as collateral. This action was followed by related efforts throughout the spring and summer of 2008 including legislative authority to extend credit to the Government Sponsored Enterprises (GSE's) Fannie Mae and Freddie Mac.²⁶ These efforts proved to be ineffective in containing the crisis and repeated waves of deleveraging asset sales simply led to further asset value declines and the need for additional deleveraging. By the end of the summer

²⁴ See the GAO report on Financial Markets Regulation (GAO, 2009, p 15-23) for a general discussion of the deleveraging of financial institutions during this period.

²⁵ The Federal Reserve is often viewed as limiting the use of its discount window to meet reserve requirements by requiring detailed explanationa for substantial requests (Hall, Robert E. and John B. Taylor. 1988. *Macroeconomics: Theory, Performance, and Policy*, 2nd Edition. New York: W. W. Norton & Company. p 327), and so banks usually meet this requirement via inter-bank lending (OECD Glossary of Statistical Terms.

<http://stats.oecd.org/glossary/detail.asp?ID=1385>). Accordingly, this statement addressed the increasing illiquidity in inter-bank lending markets as indicated by an increasing London Inter-Bank Offer Rate (LIBOR). Sarkar, Asani. 2009. Liquidity Risk, Credit Risk, and the Federal Reserve's Response to the Crisis. Federal Reserve Bank of New York Staff Report. http://www.newyorkfed.org/research/staff_reports/sr389.pdf

²⁶ Credit was not granted prior to the GSE's being placed in receivership in September. However, the recovery act passed in the summer of 2008 did authorize the U.S. Treasury Department to extend credit to the GSEs if necessary and was intended to improve the GSE's borrowing ability by increasing investor confidence. Again see the timeline on the Financial Crisis website <http://timeline.stlouisfed.org/index.cfm?p=home> .

of 2008, U.S. regulators shifted focus from providing liquidity and shoring up specific markets to working to preserve the solvency of financial institutions through the infusion of capital. Most notably, this shift was signaled by the U.S. Treasury Department proposed legislation to purchase “troubled assets” of financial institutions that was eventually passed by congress in October as the Troubled Asset Relief Program (TARP). Soon after passage, the plan to purchase “troubled assets” was abandoned and replaced by efforts to directly infuse capital into financial institutions through the purchase of preferred shares of stock.²⁷

Clearly leverage was a key element of the financial crisis and understanding the drivers that led to the sharp increase in leverage is critical for planning the future regulatory regime.²⁸ HLR’s model of bank capital regulation provides useful insights. First, consider entities such as investment banks, the two large mortgage GSEs and other non-depository financial institutions. Most of the larger firms in this category had significant benefits from relationships with the federal government and arguably were protected by the “Too Big to Fail” principle. Such firms differ significantly from the purely private firms studied by Leland in that they benefit from an implicit government guarantee of liabilities due to the risk their failure would pose to the national economy. This implicit guarantee meant that these institutions were similar in some respects to depository institutions in that they could issue debt at lower cost and with less market scrutiny than private firms. Significantly, however, there was no direct mechanism for regulatory

²⁷ Again, see the Financial Crisis website <http://timeline.stlouisfed.org/index.cfm?p=home>

²⁸ As noted earlier, leverage cannot be singled out as the sole or even primary contributing factor. Like a “perfect storm” several factors came together to create the financial crisis. Low interest rates encouraged institutions and investors to seek out higher risk/higher return investment opportunities. Technology enabled investment banks to quickly create and sell structured securities. The global trade imbalances led to rapid growth of dollar balances in the portfolios of developing nations and as those investors sought out higher return investments they financed increased leverage by consumers and institutions in developed countries. Cohen-Cole, E., B. Duygan-Bump, J. Fillat, J. Montoriol-Garriga (2008) Looking Behind the Aggregates: A Reply to “Facts and myths about the financial crisis of 2008”. Working Paper. <http://www.bos.frb.org/bankinfo/qau/wp/2008/qau0805.pdf> Chari, V.V., L.J. Christiano, and P.J. Kehoe (2008), Facts and myths about the financial crisis of 2008. Working Paper. <http://www.minneapolisfed.org/research/WP/WP666.pdf>

authorities to take control of these firms and wipe-out the equity holders' claims if the firms' operations became too risky, and therefore these firms did not face the direct threat to franchise value that HLR emphasize is essential to motivate maintaining a capital cushion.

As discussed earlier, the two mortgage GSEs operated throughout the 2002-2007 period with essentially the minimum capital required by their regulator and returned excess capital to equity holders through dividends and share repurchases. Similarly, the largest commercial banks (those with assets in excess of \$10 billion) maintained an average total capital ratio of 11.8% from 2001 through 2008 compared to the 12.3% average for all commercial banks, which is a substantial difference when compared to the 10% standard for well-capitalized banks. Many of the banks in this category might have viewed themselves as being too big to fail and were therefore willing to carry a smaller capital cushion.²⁹ HLR point out that this behavior is entirely rational and predictable for owners of firms in their position. The debt-favoring factors (tax-benefits and implicit insurance benefits) significantly outweigh the expected cost of lost franchise value when early intervention by a regulator is unlikely. Thus, the optimal leverage for these firms lies above that implied by the capital standard and they rationally choose to hold no more capital than they were required.

As noted above, during the same 2002-2008 period, commercial banks that did face the threat of loss of franchise value for violating capital standards maintained regulatory capital of 12.3% on average, well in excess of the required minimum. In addition, these institutions were able to further circumvent regulation by using derivatives and special purpose subsidiaries of holding companies to undertake additional financial risk in ways that entailed less risk of early regulatory takeover and loss of franchise value. Further, while subject to capital regulations,

²⁹ Data on commercial bank capital ratios is available at www2.fdic.gov/SDI.

neither bank holding companies nor investment banks are subject to statutory threat of receivership for violating capital standards under Prompt Corrective Action (PCA).³⁰

During a crisis that involves substantial deleveraging that is destabilizing markets, regulators may have an incentive not to enforce capital standards. Enforcing capital standards during a period of rapid asset price decline and thin securities markets will lead to additional asset sales exacerbating asset price declines. As noted by HLM, it is the threat of receivership that causes financial institutions to hold a capital buffer, and those institutions will not hold a sufficient buffer if they know that regulators are unlikely to enforce capital standards during a financial crisis.³¹ PCA might be viewed as a reasonable policy to address this problem in that the government has committed to act when banks violate capital standards by placing a legislative mandate on bank regulators.³²

Finally, the HLR model suggests that an additional factor contributing to the trend toward higher leverage was diminished franchise value. Franchise value has many different sources, but a common source is the restriction of competition. In the last two decades, there has been a strong trend toward deregulation and the elimination of barriers to competition. Before 1999, in the U.S. the Glass-Steagall Act limited competition between commercial banks and investment banks for the provision of certain financial services. In 1999, the Gramm-Leach-Bliley Act reduced those barriers. While increased competition may well lead to the elimination of excess profits and more competitive pricing of services, it also eliminates a factor that contributes to

³⁰ The GAO report on Financial Markets Regulation (GAO, 2009, p 28-42)..

³¹ In game theory, this situation is known as a non-credible threat where an individual cannot commit to an action in the future (a priori) because all players know that the action will be irrational in the future (ex post). A standard solution in such situations is a commitment device that the player imposes on themselves requiring the action in the future even though irrational ex post. Dutta, Prajit K. (1999), *Strategies and games: theory and practice*, Cambridge, MA: MIT Press.

³² While a minority view, some have argued that the federal government is not enforcing PCA in violation of federal law during this crisis. See William K. Black on the Prompt Corrective Action law, Bill Moyer's Journal 2009 http://www.pbs.org/moyers/journal/blog/2009/04/william_k_black_on_the_prompt.html

franchise value.³³ In saying this, we are not attributing blame to the Gramm-Leach-Bliley Act, but rather simply pointing out that regulators need to monitor all sources of franchise value and react appropriately. The loss of franchise value due to increased competition domestically and globally might help explain the increasing levels of leverage and other risk taking behavior of well established financial institutions, such as the major investment banks and the mortgage GSEs, over the past decade as global competition, in the case of investment banks, and an expanding subprime market, in the case of the GSEs, eroded the franchise values of those firms.³⁴

Implications for Regulatory Reform

Recent actions to prevent the failure of many large financial institutions have significantly extended the “Too Big to Fail” umbrella and suggest an extension of the moral hazard problem well beyond the realm of depository institutions. We believe an essential element of the new regulatory framework must include an effective method for dealing with this extension. Based on our work, we believe a critical element of the new regulatory framework must be the implementation of substantive capital regulation for all large highly-levered financial institutions (i.e., all institutions “Too Big to Fail”). The U.S. Treasury Department’s recent legislative proposal to create a single regulator responsible for the capital regulation of systematically important firms provides a fairly simple and straightforward mechanism for accomplishing this goal.³⁵

³³ See Hellman et al. (2000) for a discussion of how increased competition can reduce franchise value and increase risk taking by financial institutions. Helmmann, T.F., K.C. Murdock and J.E. Stiglitz (2000): “Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?” *American Economic Review* 90(1), 147-165.

³⁴ See Does Competition Kill Relationships? Inside Investment Banking. Anand, Bharat and Alexander Galetovic. 2002 Working Paper.

http://www.webmanager.cl/prontus_cea/cea_2002/site/asocfile/ASOCFILE120030327160830.pdf

³⁵ A general outline of this proposal can be found at <http://www.treasury.gov/press/releases/tg72.htm>. Also, see Appelbaum (2009) for a discussion of non-legislative actions to tighten regulation of financial institutions.

Moreover, to achieve the appropriate incentive structure, regulators must have the clear authority to move quickly to takeover firms that violate those standards and wipe-out the shareholder equity claims. Only by putting significant franchise value at risk will the capital standards provide the incentive for owners and managers to maintain excess capital appropriate to the unique risks of their firms. As discussed earlier, we believe that it is not feasible to expect regulators to have as much detailed knowledge of a financial institutions investment strategies and risk exposure as the institution's employees, and so it is important to have a regulatory system that causes the institutions themselves to maintain a capital cushion out of self-interest based their own mix of financial assets and risk exposure.

A credible threat of receivership requires that regulators be committed to enforcing capital standards for large financial institutions in the midst of serious financial turmoil. If large institutions believe that regulators will be unwilling to enforce capital regulations during major economic downturns they will not view the threat of receivership as credible. Legislative requirements of Prompt Corrective Action or PCA is one possible commitment tool that might be imposed on "Too Big to Fail" institutions in order to create the proper incentives for these large financial institutions.

At the same time, regulators must consider the implications of enforcing capital standards during economic crises on deleveraging and asset prices when designing policies for capital regulation. During the crisis, financial institutions may not be able to raise capital and might be forced to sell assets further depressing asset values if capital regulation is strictly enforced. One solution to deleveraging is to actually take over the failed institution allowing regulators to hold onto assets until the market has stabilized much like the Resolution Trust Corporation did during

Appelbaum, Binyamin. 2009. Obama Administration Pushing for Regulatory Reform on Many Fronts. *Washington Post* (Sep 23, 2009).

the Savings and Loan crisis.³⁶ Further, it may be very difficult to value assets in order to “Mark-to-Market” during these periods as a result of the lemons problem and/or very few trades in the asset markets. There are no clear solutions to the problem of marking assets to market during periods of financial turmoil, but at a minimum we believe that “Mark-to-Market” should be based on Generally Accepted Accounting Principles (GAAP).³⁷

Further, the new regulatory framework must be comprehensive and flexible enough to adapt to changing financial instruments. For example, we must avoid the problem of basing capital standards on balance sheet assets and liabilities while institutions use off balance sheet derivatives to take on equivalent risks. Compartmentalizing regulatory authority based on type of instrument will provide institutions tempting opportunities for circumventing the intent of the regulation. However, recognizing that no regulatory scheme can keep ahead of the market in terms of security design just re-emphasizes the importance of a regulatory capital scheme that provides incentives for firm managers themselves to assess the risk of new securities and provide a sufficient capital cushion against future shocks.

Finally, the new framework should provide that when capital standards are violated, unsecured debt holders are not necessarily fully protected as they have been in the current crisis. Properly motivated, unsecured, debt holders can provide significant market discipline to an institution. Throughout the public debate over “bailing out” various firms, most attention has been given to the fact that in some cases the owners have retained a valuable equity stake (e.g., Bear Stearns, Merrill Lynch, Countrywide and AIG) and managers have received significant

³⁶ Resolution Trust Corporation was created by the federal government during the savings and loan crisis in order to hold and dispose of assets of insolvent thrifts. Davison, Lee. 2005. Politics and Policy: The Creation of the Resolution Trust Corporation. FDIC Banking Review 17(2): 17-44.

³⁷ During the Savings and Loan crisis, S&L’s were subject to Regulatory Accounting Principles rather than GAAP. In May 1987, the Federal Home Loan Bank Board began phasing in the use of GAAP in response to concerns that regulatory accounting principles had contributed to the crisis. See the S&L Crisis Timeline. <http://www.fdic.gov/bank/Historical/s&l/>

bonuses (famously, AIG).³⁸ However, little attention has been placed on the fact that in most cases, debt holders were the major beneficiaries of the bailouts. The government intervention and apparent willingness to fund future operating losses via further infusions of capital provides assurance of payment in full to debt holders.³⁹ Regulators should have powers similar to those of a bankruptcy court to impose modifications to unsecured debt contracts to avoid such windfalls and in fact to impose a share of the loss on unsecured debt holders so that debt holders will have an incentive to monitor and assess the investment and financial decisions of large, highly levered financial institutions.

Finally, because franchise value plays such an important role in encouraging prudent managerial choices, the new regulatory framework must be prepared to react to market developments that affect franchise value. Global competition, domestic and international tax policies, technological changes and regulatory changes all have the potential to erode franchise value. Clearly, concerns about financial institution franchise value cannot and should not drive policy in these areas. However, regulators need to be cognizant that financial institution managers will rationally react to declines in franchise value by taking on additional risk. Capital standards and regulatory monitoring activities need to reflect this reality.

³⁸ AIG Bonuses: \$235 Million To Go. CNN Money.com July 10, 2009 <http://money.cnn.com>.

³⁹ For example, the first business day after the mortgage GSEs were placed in receivership, the market value of GSE debt and MBS securities jumped significantly providing a windfall profit to recent purchasers.