

Contractual Methods for Out-of-Court Restructuring of Systemically Important Financial Institutions

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Here, I briefly outline some approaches to the “automatic” out-of-court recapitalization of financial institutions whose distress may pose risks to the economy.¹ The main objectives are (1) to reduce the incentive of a large financial institution to take socially inefficient risks while relying on the backstop of a government bailout, and (2) to reduce the likelihood that, once distressed, the financial institution indeed suffers a severe failure with adverse spillover effects to the economy. I emphasize two mechanisms. The first is distress-contingent convertible bonds, which are claims to interest and principal that automatically convert to shares of equity if and when the financial institution fails to meet a stipulated capital requirement. The second mechanism is a regulation mandating an offer to existing shareholders to purchase new equity at a low price when the financial institution fails to meet a stipulated liquidity or capital requirement.

Other approaches that have been used in practice include the purchase by insurance and re-insurance firms of put options on their own shares that can be exercised when loss claims in designated lines of insurance exceed stipulated triggers, or bonds whose principal is contractually reduced in proportion to designated loss claims (Punter, 1999; Culp, 2009).

Roadblocks to Regulation-Free Recapitalization of Distressed Firms

When a financial institution has a low level of capital relative to its assets, there are several impediments to its recapitalization, absent regulation.

The existing equity owners of the financial institution are typically reluctant to issue new equity. The price at which new equity can be successfully issued is likely to be so dilutive as to be against the interests of those shareholders. Despite the potential

¹ I am grateful for extensive conversations with Mark Flannery, fellow members of the Squam Lake Group, Chris Culp, Andrew Gladin, Barbara Havilcek, Dick Herring, Bev Hirtle, Ernst Schaumberg, and many Stanford colleagues, particularly Peter DeMarzo.

for new capital to significantly reduce the firm's distress costs, a large amount of the total-firm value added by new equity capital would go toward improving the position of creditors, who would otherwise absorb losses at default. Current shareholders are not interested in "donating" wealth to debtholders. This roadblock to equity issuance is called "debt overhang" (Meyers, 1984).

Furthermore, new shares offered to the market by a weak financial institution may be viewed by potential buyers as "lemons." A potential investor might ask: "Why would I pay \$10 a share if the bank is willing to sell shares at that price. The bank knows more than me about the value of the new shares. Thus, if the bank is willing to sell at \$10, then the shares could be worth at most \$10, and possibly much less." This impediment to a sale is called adverse selection. It often follows, as suggested by Akerlof (1970) as well as Leland and Pyle (1977), that the new shares would need to be sold at such a low price that the existing shareholders would prefer that they are not offered at all.

Raising cash from the sale of assets is also unattractive to equity owners. By lowering the leverage of the financial institution, they would lose of the advantage of profiting from any upside return on the assets and the advantage of the option to default if the return on assets is poor, in which case creditors (or taxpayers) would absorb the default losses. Further, asset sales may themselves suffer from a severe "lemons" discount.

Faced with the prospect of severe bankruptcy costs, the creditors of the weakened financial institution might prefer to voluntarily reduce their contractual claims. For example, by offering to exchange each dollar of debt principal for a package of new debt and equity claims worth a market value of 75 cents, they would come out ahead if this avoids a bankruptcy in which they would recover only 50 cents in market value. Rarely, however, are the creditors of a firm headed for bankruptcy able to coordinate such an out-of-court restructuring. If all but one of them were to agree to this, for example, then the last has an incentive to hold out, given the likelihood that the restructuring would save the firm from default, leaving the hold-out creditor with a full payment of his original claim. Perhaps the remaining creditors would be willing to go ahead anyway, bailing out one or a few small hold-out creditors, but rarely would the remaining creditors avoid a defection in their own ranks. This situation is sometimes called a "prisoners' dilemma." Even though the creditors would be better off, as a group, to commit to a restructuring of their claims, it is unusual in practice to obtain the individual consents of sufficiently many of them.

Bankruptcy is normally an effective mechanism for breaking through the recapitalization "gridlock" described above. A distressed firm can emerge from bankruptcy with a new and less risky capital structure. More broadly, as has been shown in theoretical work by Innes (1990), Hart and Moore (1998), and DeMarzo and Duffie (1999), a conventional capital structure consisting of pure equity and pure debt, with a bankruptcy-style "boundary condition," is an efficient contractual

approach for raising capital and for allocating a firm's cash flows and control rights. This theoretical foundation, however, does not consider systemic-risk externalities.

An alternative to the bankruptcy resolution of failures is government coordinated receiverships or conservatorships, which can also consider the costs and benefits to the taxpayer and the general economy.

There are currently proposals to adapt one or both of these approaches, bankruptcy or government-led receiverships, for the restructuring of systemically important financial institutions (SIFIs). The objective of all proposals is to improve the balance between firm-level efficiency and economy-wide costs. My goal here is a further consideration of complementary pre-failure restructuring mechanisms for resolving distressed SIFIs.

Distress-Contingent Convertible Debt

As originally envisioned by Flannery (2005), distress-contingent convertible bondholders receive equity shares in lieu of future claims to interest and principal if and when the issuer fails to meet certain capital requirements. There are a number of alternative designs for the distress trigger and for the conversion ratio, the number of shares of equity to be received in exchange for each dollar of bond principal. I will discuss these later. There are also various proposals for the degree to which such debt issues would contribute to meeting a financial institution's regulatory capital requirement. It is also an open question whether the issuance of these bonds would be a regulatory requirement, or would be an optional method of meeting capital requirements, and if so, the quantitative formula by which distress-contingent convertible debt, equity, preferred shares, and other instruments would be weighted in measuring regulatory capital. If the issuance of such bonds is not required by regulation, an incentive to issue these "hybrid" securities could be based on an adjustment to tax codes that allows their pre-conversion interest payments to be deductible from income for tax purposes, just as for ordinary corporate debt.

In November, 2009, Lloyd's Bank announced that it would issue 7.5 billion Pounds of such bonds, called "CoCos," with conversion to common equity if the bank's Tier-1 capital ratio falls to 5%. The Royal Bank of Scotland is said to be planning a similar issuance. These announcements are part of a general recapitalization of these two banks that includes new equity rights issues and involves a participating investment by the United Kingdom. The President of the New York Federal Reserve, William Dudley, as well as the Chairman of the Federal Reserve System, Ben Bernanke, have recently spoken in favor of the general concept of distress-contingent convertible debt for SIFIs (Dudley, 2009; Bernanke, 2009). The governor of the Bank of England, Mervyn King, although more skeptical, has said that these instruments are "worth a try."

If the trigger for automatic conversion is an accounting capital ratio, such as the Tier-1 capital trigger used in the design of the Lloyd's Bank issuance, there should be some concern over the failure of accounting measures to capture the true financial condition of the bank. For example, Citibank, a SIFI that did receive a significant government bailout during the recent financial crisis, had a Tier-1 capital ratio that never fell below 7% during the course of the financial crisis, and was measured² at 11.8% at roughly its weakest moment in December 2008, when the stock-market capitalization of Citibank's holding company fell to around \$20 billion dollars, or about 1% of its total accounting assets. Because of the limited-liability treatment of equity and because of significant prevailing uncertainty over the true valuation of Citibank's assets, this stock-market valuation suggests that Citibank's assets probably had a market value well below its debt principal in late 2008. Nevertheless, any reasonable Tier-1-capital-based tripwire for distress-contingent convertible debt would probably not have been tripped.

If restricted to accounting measures of capitalization, perhaps a more effective trigger could be based on the ratio of tangible common equity (TCE) to tangible assets, a measure that excludes preferred shares and intangible assets such as goodwill and tax shields from net-operating-loss carry forwards, all of which are relatively useless assets during a solvency crisis. At the end 2008, Citibank had tangible common equity of only \$31 billion,³ for a TCE ratio of about 1.5%, effectively signaling that Citibank was substantially less well capitalized than most of its peer SIFIs. (Among large banks, only Bank of New York–Mellon had a similarly low tangible-common-equity capital ratio.) The "S-Cap" stress tests, by which the U.S. government measured shortfalls in the capitalization of large banks in the spring of 2009, were based instead on accounting common equity (which includes goodwill). Even tangible common equity reacts slowly to market conditions, given the typical lag in marking down bad loans for accounting purposes. Nevertheless, a trigger based on tangible common equity seems worthy of serious consideration.

If, instead, the envisioned debt is converted to equity when the market value of equity falls to a sufficiently low level, then short sellers may, depending on the conversion price and the number of new equity shares created, be tempted to "attack" the issuer's stock in order to trigger the conversion and profit from the resulting dilution or the reduction in the market value of equity shares associated with a reduced value of the option to default. Short sellers might further increase their profits by acquiring the convertible debt in advance of attacking the stock, so as to obtain new shares cheaply through conversion. Even in the absence of such an attack, merely a rational assumption by some shareholders that sales of shares by other shareholders might trigger a conversion could indeed lead many shareholders to fulfill this prophecy, through the resulting short-term impact of sudden sales on

² Citibank's Tier-1 capital ratio was 7.1% in the fourth quarter of 2007. See, for example, <http://seekingalpha.com/article/115374-citigroup-inc-q4-2008-earnings-call-transcript?page=1>

³ See www.citibank.com/citi/fin/data/090807a.pdf

share prices. Markets need not be so efficient that bargain-hunting buyers of shares would react quickly enough to offset the downward price impact caused by sellers.

Such a self-generating decline in share prices, sometimes called a “death spiral,” could be mitigated by a trigger that is based instead on a trailing average share price, for example, the average closing price of the shares over the preceding 20 business days. In that case, any adverse price impact on a given day would receive a weight of $1/20$ toward the trailing average price used in the conversion trigger.

Flannery (2009b) explains that the incentive for a speculative attack is lessened or eliminated by a sufficiently high contractual conversion price P , according to which each dollar of principal of debt is converted to $1/P$ shares. Flannery explains that if the conversion price is higher than the conversion trigger price of equity (that market price for shares at which conversion is contractually triggered), then conversion is effectively anti-dilutive, raising the price of shares. This leaves open the question of how to set the trigger price and the conversion price so that, despite any anti-dilutive effect of conversion, the original equityholders have a strong incentive to keep the financial institution well capitalized.

The presence of distress-contingent convertible debt in the capital structure of a dealer bank is unlikely to stop a liquidity crisis once it begins (Duffie, 2009). Short-term creditors, over-the-counter derivatives counterparties, and prime-brokerage clients who anticipate the potential failure of the bank are unlikely to be dissuaded from a “run” merely by the fact that the future principal and interest claims of the bonds have been converted to equity. This conversion does nothing for the immediate cash position of the bank. Once a rush for the exits begins, it is rational that it would continue in a self-fulfilling manner. The trigger that converts the debt to equity should be set so as eliminate the debt claims before a liquidity crisis is likely to begin, and hopefully with a sufficiently strong impact on the balance sheet to forestall a self-fulfilling presumption of a liquidity crisis.

In my view, distress-contingent debt claims should be complimented by different forms of “contingent capital” that immediately improve the cash position of the bank. I will now give some examples.

Mandatory Rights Offerings of Equity

Distressed financial institutions, among other firms, sometimes offer rights to existing shareholders to purchase new shares at a price that is typically well below the current market price. Obviously, given the effects of dilution, debt overhang, and adverse selection, an offering price near the current market price is unlikely to be exercised by many shareholders. When offered at a sufficiently low price, however, many existing shareholders would subscribe, given that a failure to do so would result in a costly dilution of their share claims and an effective transfer of wealth to those who do subscribe. Any shareholders without the cash necessary to

take up the offer would do best by selling their shares before the expiration of the offer to those who do have the cash. Thus, a mandatory rights offering at a sufficiently low price is likely to be well subscribed, so long as the issuer indeed has some value left in its business for long-run equity investors.

A rights offering at a low price largely finesses the adverse-selection problem that I described earlier. In effect, the buyers and the sellers of the new shares are the same investors. Nevertheless, because of debt overhang, the existing shareholders may prefer not to conduct such a mandatory rights offering. Thus, due to the social costs of systemic risk, it may be appropriate to introduce a regulation that forces an automatic rights offering as soon as a financial institution hits specified tripwires in its measured financial condition.⁴ If the short term creditors, clients, and other counterparties of a financial institution know that a rights offering of sufficient size will occur at stipulated liquidity triggers, they may view a liquidity crisis to be sufficiently unlikely that they are unlikely to start one with a run.

Even in existing U.S. regulation, banks are required to issue new shares, or otherwise raise new regulatory capital, when they do not meet stipulated capital-adequacy standards. In practice, however, most banks that have failed have not been forced to raise new capital under this regulation. Presumably, the triggers are not sufficiently well designed, or regulators have used excessive forbearance.

As opposed to the conversion of debt to equity, a mandatory rights offering provides new cash that may reduce the risk of a liquidity crisis. Indeed, the presence of a regulation mandating a rights offering when the capital position of a financial institution deteriorates may forestall the self-fulfilling prophecy of a run by creditors and others who have the discretion to drain cash from the weakened institution. Because of the time lag between the offering and the cash settlement of the new share purchases, however, even a mandatory rights offering is unlikely to stop a run in progress. The triggers must be set so that the new shares are sold before the cash is likely to be needed. Thus, as opposed to the case of distress-contingent convertible debt, there should be a bias toward triggers that are based on the cash liquidity of the financial institution, as opposed to overall balance-sheet solvency.

In the introduction, I mentioned another approach to the automatic restructuring of distressed financial institutions, the purchase by financial institutions of put options on their own shares. The puts could have a contractually stipulated exercise event, as has been the case for certain insurance companies such as Aon and Swiss Re, that is based on designated business losses. An alternative would be American options that could be exercised at the discretion of the financial institution. Obviously, the exercise price should be designed so as to recapitalize the financial institution before a liquidity crisis.

⁴ I am grateful to Peter DeMarzo for a conversation suggesting this approach.

Unfortunately, however, a financial institution relying on such put options is also relying on the credit quality of the seller of the puts. If the source of distress is a general financial crisis, the put seller may itself be distressed, and unable to honor the obligation to purchase shares. Some insurance firms have opted to buy their put options from a special-purpose entity that is required to invest in relatively safe assets that could be used to cover the exercise costs, as explained by Culp (2009). Mandatory rights offerings of shares are also effective, in this respect, because once granted to existing shareholders, they can be sold to any investor with the cash necessary to exercise the rights. Thus, a distressed financial institution making a rights offering at a sufficiently low share price has access to the entire pool of investible cash held in global capital markets. This reduces the adverse impact of flights to quality during financial crises by funneling capital back to providers of credit.

Concluding Remarks

In new work, I plan to examine the design of triggers for debt conversion and equity rights offerings from the viewpoint of the incentive of financial institutions to take inefficient risks.

References

- Akerlof, George. (1970) "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 84. 488-500.
- Ben S. Bernanke (2009) "Financial Regulation and Supervision after the Crisis: The Role of the Federal Reserve," Remarks Given At the Federal Reserve Bank of Boston 54th Economic Conference, Chatham, Massachusetts, October 23.
- Culp, Christopher L. (2009) "Contingent Capital Versus Contingent Reverse Convertibles for Banks and Insurance Companies," Working Paper, Compass Lexecon and The University of Chicago Booth School of Business, Forthcoming in *Journal of Applied Corporate Finance* Vol. 20, No. 4 (Fall 2009).
- Dudley, William (2009) "Some Lessons from the Crisis," Remarks at the Institute of International Banks Membership Luncheon, New York City, October 13.
- Duffie, Darrell. (2009) "The Failure Mechanics of Dealer Banks," Working Paper, Stanford University, forthcoming in *Journal of Economic Perspectives*.
- Duffie, Darrell, and Peter DeMarzo. (1999). "A Liquidity-Based Model of Security Design," *Econometrica* 67. 65-99.

Flannery, Mark J. (2005) “No Pain, No Gain? Effecting Market Discipline via ‘Reverse Convertible Debentures,’ ” in Hal S. Scott, editor, *Capital Adequacy Beyond Basel: Banking, Securities, and Insurance* (Oxford: Oxford University Press).

Flannery, Mark J. (2009a) “Stabilizing Large Financial Institutions with Contingent Capital Certificates,” Working Paper, University of Florida.

Flannery, Mark J. (2009b) “Market-Valued Triggers Will Work for Contingent Capital Instruments,” Solicited Submission to U.S. Treasury Working Group on Bank Capital, University of Florida.

Leland, Hayne, and David Pyle (1977) “Informational Asymmetries, Financial Structure, and Financial Intermediation,” *Journal of Finance* 32. 371-387.

Lloyds Bank (2009), “Lloyds Banking Group PLC Announces Exchange Offer To Eligible Investors of Certain Existing Securities for Enhanced Capital Notes,” Press Release, November 3, 2009.

Hart, Oliver, and John Moore (1998) “Default and Renegotiation: A Dynamic Model of Debt,” *Quarterly Journal of Economics* 113. 1-41.

Innes, Robert. (1990) “Limited Liability and Incentive Contracting with Ex-Ante Choices,” *The Journal of Economic Theory* 52. 45-67.

Myers, Stewart C. (1984) “The Capital Structure Puzzle,” *Journal of Finance*, 39. 575-592.

Punter, Alan (1999) “The Spectrum of Alternative Risk Financing Opportunities,” in Neil Britton, editor, *The Changing Risk Landscape: Implications for Insurance Risk Management*, Proceedings of a Conference sponsored by Aon Group Australia Limited.

Squam Lake Working Group on Financial Regulation (2009), “An Expedited Resolution Mechanism for Distressed Financial Firms: Regulatory Hybrid Securities,” Policy Paper, Squam Lake Working Group, April.