Testimony of

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on

**"What Makes a Bank Systemically Important?"**

Chairman Brown, Ranking Member Toomey, and distinguished members of this Subcommittee, I am grateful for the opportunity to address you today at this hearing entitled, "What Makes a Bank Systemically Important?"

I am Jacob Safra Professor of International Banking at the Wharton School, Co-Director of the Wharton Financial Institutions Center, Co-Chair of the US Financial Regulatory Subcommittee, Executive Director of the Financial Economists Roundtable, a member of the Systemic Risk Council and the FDIC Systemic Resolution Advisory Committee as well as the Hoover Institution Stanford Resolution Project. Although my views have certainly been influenced by discussions with my colleagues in these groups, the views I express today are my own.

The question of what makes a bank systemically important continues to divide experts. Some believe that recognition that some banks are systemically important will exacerbate moral hazard, leading to competitive inequities and the misallocation of resources. The concern is that institutions designated as systemically important benefit from implicit government guarantees that will give them an unwarranted competitive advantage. This is a legitimate concern, but, of

course, much of the Dodd-Frank Act aims to eliminate the category of too-big-to fail institutions and extinguish the implicit guarantee. I think this is the correct approach, although disagreement continues about whether the goal has been accomplished.

Experience during the recent crisis indicates that the authorities are unlikely to refrain from bailouts if an institution which they regard as systemic encounters extreme financial stress. Thus I think it is pointless to deny that some institutions will be considered systemic. Rather we should aim to find ways to resolve them without creating intolerable spillovers for other institutions, financial markets and, most importantly, the real economy. If we succeed, it will end the implicit benefits banks derive from being regarded as systemic.

Since the crisis, officials have undertaken major efforts to identify the factors that make some institutions "systemic". The Financial Stability Board has developed criteria for making the designation based on several different indicators.[1] These indicators include the size of banks, their interconnectedness, their cross-jurisdictional activity, their complexity and the lack of readily available

[1] The Financial Stability Oversight Council (FSOC) has refined these criteria and applied them to a broader range of financial institutions in the United States.

substitutes for the services they provide. Each November the FSB publishes a list of G-SIBs. Currently 29 institutions are designated as G-SIBs. These 29 banks accounts for the bulk of activity in equity and bond underwriting, loan syndication, derivatives, foreign exchange and custody. Eight of the G-SIBs are headquartered in the United States and they range in size from nearly $2.5 trillion to $222 million indicating that factors in addition to size matter.

Substantial efforts are underway to refine the indicators and to model the interactions among institutions that create systemic concerns. Although these efforts may help us better understand the interconnectedness of financial institutions and markets, I think that they focus on the wrong question. In practice, the authorities treat an institution as systemic if they fear that a loss to uninsured depositors and creditors would damage the financial system and the real economy. When faced with the prospect of a disorderly resolution, officials have too often improvised bailouts over frantic, sleepless weekends. If the authorities cannot make a credible commitment to abstain from bailouts, Systemically Important Banks (SIBs) will grow larger, more complex and more dangerous.

I believe that the authorities have granted bailouts so frequently because they lacked reliable resolution tools. They relied instead on a policy of constructive ambiguity, believing they could limit moral hazard by asserting that access to the safety net was uncertain. This policy seems naïve and ineffectual. It can work only if market participants believe that bailouts will be random. But market participants do not believe that bailout policy is determined by a spin of a roulette wheel. They expect that the authorities will behave rationally and provide bailouts to institutions that are regarded as systemic.[2]

The Dodd Frank Act can be viewed as a multi-pronged attempt to eliminate bailouts and neutralize the threat posed by SIBs. Many of these measures are designed to reduce the likelihood that institutions will fail. The most important of these is the imposition of higher, better quality capital requirements with differentially higher capital requirements for SIBs. This is a welcome reversal of the policy before the crisis of giving SIBs differentially lighter capital requirements. While strengthened capital requirements will ensure that SIBs have better shock absorbers, they cannot prevent failures – nor should they. Banks are in the business of taking risks and so long as they do so prudently they

[2] This is, of course, a prime example of a time inconsistency problem: what the authorities say ex ante is quite different from what they can expected to do ex post.

provide substantial benefits to the economy by intermediating between savers and investors, buying and selling risk and operating the payments system.

If banks cannot be made fail-safe, they must be made safe to fail. This requires resolution policies and procedures that will ensure that investors and creditors bear the cost of bank failures, not taxpayers. The Dodd-Frank Act addresses this problem in Titles I and II. This is a major enhancement of the regulatory framework. Before the Dodd-Frank Act, most institutions paid no attention to how they might be resolved in the event of severe financial distress or what measures they might take to minimize the damage to the financial system. Lehman Brothers illustrated the problem starkly. It entered bankruptcy with no preparation. Indeed, the managers were uncertain about how many legal entities the holding company controlled and employees were unclear about which legal entity they worked for.

Title I requires rapid resolution plans for all SIBs. These so-called living wills show how the SIB could be resolved under bankruptcy without causing damaging spillover effects on other institutions and financial markets. Living wills must include: 1) an executive summary with a strategic analysis describing the firm's plan for a rapid and orderly resolution (without, however, defining what period of

time qualifies as "rapid"); 2) a description of how resolution planning is incorporated in the firm's corporate governance structure; 3) a description of the group's overall organizational structure that includes a hierarchical list of all material entities, as well as jurisdictional and ownership information and mapping of core business lines and critical operations into corporate entities; 4) a description of management information systems that support the covered company and its material entities, including a detailed inventory and description of key applications along with identification of the legal owner or licensor and related service level agreements; 5) a description of interconnections and interdependencies among a covered company and its material entities and the covered company's critical operations and core business lines along with a description of how service levels would be sustained during a material financial distress or insolvency; and 6) identification of supervisory authorities and regulators that oversee the covered company.

For the largest and most complicated banking groups that have thousands of subsidiaries, the third requirement has been onerous. It demands not only a mapping of lines of business into corporate entities, but also details regarding material entities, critical operations and core business that, at a minimum, describe types and amounts of liabilities. It also requires details about the

booking of trading and derivatives activities, as well as an identification of major counterparties including descriptions of any interconnections or interdependencies among them. Finally, it requires that covered companies list all material trading, payment, clearing and settlement systems in which they participate.

Most of these requirements can be seen as attempts to minimize the prospect of a Lehman-Brothers-like disorderly bankruptcy by ensuring that both covered companies and regulators have thought through the end game in advance. Although this will not ensure an orderly resolution, it increases the likelihood that SIBs can be made safe to fail. Not only will the authorities have a more accurate view of the SIB and its interactions with the rest of the financial system, but also the process and costs of drawing up rapid resolution plans and responding to regulatory evaluations, may give institutions an incentive to reduce their complexity. Moreover, the authorities have the authority to compel a SIB to simplify its structure if it is not sufficiently responsive to regulatory reviews of its resolution plan over an extended period.

While the D-F Act generally supports greater market discipline, it does not address the issue of public disclosure of resolution plans. The FRB and FDIC, however, have required disclosure of a public section of the plan containing an

executive summary that describes the business of the covered company including: "(i) the names of material entities; (ii) a description of core business lines; (iii) consolidated or segment financial information regarding assets, liabilities, capital and major funding sources." This could have been an effective way of harnessing market discipline to support the simplification of SIBs, but unfortunately, the FRB and FDIC chose to permit institutions to limit their disclosures to publicly available information.

If the information is already publicly disclosed, it's not clear what value this disclosure requirement adds. This timid approach represents a significant lost opportunity. If the authorities had been serious about enhancing market discipline, they should have required disclosure of information that would enable potential creditors of the covered company to understand the statutory hierarchy of claims on the various entities in resolution, and precisely how the authorities propose to conduct a resolution. In the absence of such information, creditors cannot be expected to price claims efficiently. Moreover, some of the information in the first rounds of disclosures falls short of the more modest goal of helping the

public understand the business of the covered company because it is difficult to reconcile with other publicly available information.[3]

Living wills must assume that resolution takes place under bankruptcy. But current bankruptcy procedures are not sufficiently swift and flexible to ensure an orderly resolution.[4] The Hoover Resolution Project has devoted considerable effort to developing a new proposal for a Chapter 14 to the Bankruptcy Code that would be able to deal with the special demands of complex financial institutions. See http://www.hoover.org/sites/default/files/rp-14-july-9-tom-jackson.pdf for a description of the proposal and an analysis of how it would improve current bankruptcy procedures. This is a particularly important initiative because bankruptcy is the default option under Title I of the Dodd-Frank Act.

At the same time, the FDIC has refined plans for implementing its stand-by authority to act as receiver under Title II of the Dodd-Frank Act. Although the FDIC has performed this role for banks of moderate size, it has never had to face the challenge of acting as receiver for a SIB. Indeed, before passage of the Dodd-

[3] For additional details, see Carmassi and Herring (2013) in Appendix 1 and The Systemic Risk Council letter (2013) re: "Improving the Public Disclosure of Large Complex Financial Institutions" in Appendix 2.

[4] The current bankruptcy process is thought to be too slow and cumbersome to deal with an institution that trades twenty-four hours a day, seven days a week and must rely on the confidence of its counterparties and creditors to maintain its operations. Moreover, a series of amendments to the Bankruptcy Code has increasingly immunized counterparties in qualified financial contracts from major aspects of the bankruptcy process, especially the imposition of automatic stays.

Frank Act its authority was limited to the insured depository institution within the SIB holding company.

The FDIC has proposed to resolve SIBs by (1) placing the parent holding company under the control of FDIC as receiver and (2) transferring to a new "bridge" financial company most of the assets and secured liabilities, leaving behind much of the unsecured debt. Regardless of where the losses occurred in the SIB, only the holding company would be taken into bankruptcy. This approach has been termed a "single point of entry" (SPOE).

In principle, the new financial company would be strongly capitalized (after shedding a large amount of its prior debt), would have the capacity to recapitalize operating subsidiaries when necessary, and would have the confidence of other market participants. This would enable it to continue its critical operations in the financial system. Since the bankruptcy would be confined to the holding company, spillover effects should be avoided.

The success of both the Chapter 14 proposal and the SPOE strategy depend on three issues that remain unresolved. First is that the bridge company have all of the assets, rights and liabilities of the holding company that has entered bankruptcy. This is crucial for maintaining business as usual in the operating

entities and would require overriding "ipso facto" clauses that permit contracts to be terminated based on a change of control, bankruptcy proceedings or a change in agency credit ratings. This is particularly a problem with regard to qualified financial contracts. Currently counterparties may liquidate, terminate, or accelerate qualified financial contracts of the debtor and offset or net them out. This can result in a sudden loss of liquidity and, potentially, the forced sale of illiquid assets in illiquid markets that might drive down prices and transmit the shock to other institutions holding the same asset. Qualified financial contracts should be transferred in their original form to the bridge company so long as the debtor and its subsidiaries continue to perform payment and delivery obligations.

Second, both approaches depend on cooperation from the relevant authorities in countries where the SIB has operations. Virtually all SIBs have substantial cross-border operations and so an orderly resolution depends on cooperation in the transfer of assets and contracts to the bridge. The FDIC has taken a leading role in trying to forge an international agreement regarding harmonization of resolution policies. It participates in crisis resolution groups that review resolution plans for GSIBs and it has published a paper with the Bank of England supporting the SPOE. Nonetheless, agreements and understandings tend to unravel in a crisis and countries may try to ring-fence the assets they

control. The recent crisis did not provide much evidence of cross-border cooperation in resolution.

Third, both approaches require that "sufficient" long-term unsecured debt be left behind in the bankrupt holding company to recapitalize the bridge company.[5] Although it is relatively easy to compute an amount of loss absorption capacity that would be sufficient under conventional stressful conditions, tail risks are crucial and inherently very difficult to measure.

I would like to conclude with a somewhat different point, however. I believe that how the long-term debt is structured can also be important. Long-term debt matters not only because of its ability to absorb loss, but also because it has the potential to incentivize banks to manage their risks more prudently and to issue new equity before they reach the brink of insolvency.

Charles Calomiris and I have argued that a properly designed contingent convertible debt (CoCo) requirement can provide strong incentives for the prompt recapitalization of banks after significant losses of equity or for the proactive raising of equity capital when risk increases.[6] Correspondingly, it can provide

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[5] In principle, if losses at a subsidiary exceed the long-term unsecured debt at the holding company, the additional loss could be imposed on creditors of the subsidiary. But, once the prospect of creditors bearing loss in subsidiary is introduced, subsidiaries may be subject to a run by creditors and counterparties.

[6] For additional details, see Appendix 3.

strong incentives for effective risk governance and help limit regulatory "forbearance," the tendency of supervisors to delay recognition of losses. We show that, to be effective, a large amount of CoCos (relative to common equity) should be required. CoCo conversion should be based on a market-value trigger that is defined by a moving average of a quasi-market-value-of-equity ratio. All CoCos should convert if conversion is triggered and the conversion ratio should be dilutive of preexisting shareholders. Unfortunately, this proposal has not received serious consideration in the U.S. because the Internal Revenue Service appears unlikely to permit interest paid on CoCos to be deducted in the computation of taxable income and so banks would prefer to issue conventional, long-term debt. In view of the enormous costs of a financial crisis and the potential for a properly structured CoCo to create incentives that would reduce the probability of a crisis, this tax policy should be reviewed.

Thank you for the opportunity to testify on this important topic.

# Living Wills and Cross-Border Resolution of Systemically Important Banks*

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## Abstract

**Purpose**- To analyze if and how 'Living Wills' and public disclosure of such resolution plans contribute to market discipline and the effective resolution of too-big- and too-complex-to-fail banks.

**Design/Methodology/Approach**- The disorderly collapse of Lehman Brothers is analyzed as a contrast to the planned new system. Large, systemically important banks are now required to prepare resolution plans (living wills). In the US, parts of the living wills must be disclosed to the public. The public component is analyzed with respect to contribution to market discipline and effective resolution of banks considered too big and complex to fail.

**Findings**- The analysis of public disclosures of resolution plans shows that they are insufficient to facilitate market discipline and, in some instances, fail to enhance public understanding of the financial institution and its business. When coupled with the uncertainty over how an internationally active financial institution will be resolved, we conclude that these reforms will do little to reduce market expectations that some financial firms are simply too big or too complex to fail.

**Originality/Value**- The financial crisis led to sweeping reforms in national and international prudential regulation and supervision. Many of these regulatory innovations focused on one of the most notable gaps in regulatory arrangements -- the lack of a framework to resolve a large, complex international financial institution in a way that does not generate intolerable systemic spillovers and does not burden taxpayers. This paper focuses on the publicly disclosed sections of living wills and how they could be enhanced to achieve the new policy objectives.



**Keywords**- Living wills, Lehman Brothers, Resolution policy, Systemic risk, Prudential Regulation

**Paper type**-Research paper

JEL Classification: G01, G15, G18, G20, G21, G24, G28.

## 1. Introduction: the peculiar absence of resolution policy from the pre-crisis Basel agenda

Although international efforts to enhance the safety and soundness of the banking system date back to the mid-seventies, the focus has been on harmonizing international banking supervision (e.g., the Basel Concordat and successive efforts to delineate best practices in supervision) or on negotiating increasingly complex, risk-based prudential capital requirements (e.g., Basel I, II, and III). These efforts aimed to prevent banks from failing – without, however, considering what might need to be done if a bank should fail.

The inadequacy of these efforts can be seen in the record of failures from 1989 through 2009. Ranking the top 100 banks by assets each year and counting the number of this group that failed[1], the implied failure rate was 1.3% (Kuritzkes, 2010) -- a failure rate roughly equivalent to that of BB-rated corporate bonds. Worse still, the lack of an effective framework for unwinding the affairs of a large international financial institution meant that official interventions were usually improvised over sleepless weekends and often involved a substantial public subsidy to facilitate the merger of the faltering institution with another larger institution in a desperate and costly attempt to avert damaging spillovers.

This contributed to the rapid growth of increasingly large, ever more complex financial institutions. The outcome has been an expanding number of financial institutions that are each too large and/or too complicated to be resolved without jeopardizing financial stability.[2] Indeed, quite apart from these subsidized mergers, the absence of a credible

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[1] Failures were counted as direct bankruptcies, conservatorships, or substantial government interventions. They numbered 26 over these two decades.

[2] For example (Dudley, 2012), in the mid-1990s, the top five banks in the United States had total assets of $1 trillion or about 14% of GDP. By the end of 2007, the top five banks had assets of $6.8 trillion or 49% of GDP.

resolution mechanism has given banks an incentive to become bigger and more complex to benefit from an implicit subsidy (in the form of a lower cost of funds) based on the beliefs of creditors that they would be protected from loss in the event of trouble. This weakening of market discipline may also have led to increased risk taking by these institutions.

Nonetheless, resolution policy was simply absent from the international supervisory and regulatory agenda – until 2008. A series of hastily improvised rescues of large financial institutions preceded the failure of a relatively large investment bank despite the attempt by the authorities to devise a rescue package over a frantic weekend in mid-September 2008.[3]

We review in Section 2 how the Lehman Brothers cross border organization contributed to value destruction under existing bankruptcy laws in the US and abroad. Lessons and policy consequences from the Lehman Brothers collapse are discussed in Section 3. These consequences include the rise in policy makers' interest in living wills. The US policy with respect to living wills is described and discussed in Section 4. Thereafter in Section 5 we ask how informative the public portions of living wills are. We emphasize the ambiguity and divergence in banks' interpretation of 'material entities' in their disclosures. The lack of clarity with respect to the definition of a material entity undermines information value of the resolution plans. Section 6 concludes that much uncertainty remains with respect to resolution of large, complex international banking groups.

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Similarly, in the mid-1990s, the top securities firms had total asset equal to about 9% of GDP. By the end of 2007, these had grown to $3.8 trillion, about 27% of GDP.

[3] The resolution process was much more orderly for smaller banks that were entirely subject to FDIC administrative procedures.

## 2. The Lehman Brothers collapse

When Lehman Brothers collapsed in September 2008 it was the 4th largest investment bank in the US, nearly twice as large and complex as Bear Stearns, which had agreed to a subsidized, shot-gun merger with JPMorgan Chase in March of 2008 when it was unable to meet calls for additional collateral. The Lehman Brothers group, with more than 25,000 employees, consisted of over 6,000 subsidiaries in more than 40 countries (Miller and Horwitz, 2013), many of which were subject to host country national regulation as well as supervision by the Securities and Exchange Commission.[4]

In 2006 Lehman made a deliberate decision to embark on an aggressive growth strategy and to take on greater risk by substantially increasing its leverage[5] and making concentrated bets on commercial real estate, leveraged lending and private-equity-like investments. These were far riskier than its usual line of business because rather than brokering risk, they were holding substantial amounts of risk on their balance sheet, financed largely by short-term repurchase agreements often amounting to hundreds of billions of dollars per day. In the words of one Lehman employee, they had shifted from the

[4] This is an unusually clear example of the law of unintended consequences. The EU threatened to force the large American investment banks to form holding companies in Europe if they did not submit to consolidated supervision by a competent authority. Although it had no prior experience, the SEC somehow convinced the EU that it was a competent supervisory authority and in 2004 the five largest investment banks became voluntary Consolidated Supervised Entities (CSEs) subject to Basel II-like capital regulation. When they measured their required capital under Basel-like rules that had been extended to the net capital computation for the broker-dealer, the five CSEs discovered that they had considerable excess regulatory capital and quickly increased their leverage, which was surely not what the EU intended. See Lo (2012, p.34) for an analysis of the regulatory change, emphasizing that before 2004, the holding companies of the broker/dealers had not been subject to any oversight or leverage constraint. Lo also raises doubts about the magnitude of the impact of the change in rules on leverage. Kwak (2012), however, notes that Lo's analysis fails to emphasize a key point: the SEC's intent was to permit the large broker/dealers to substitute mathematical models for traditional risk weights so that the net-capital calculation would "probably will be lower."

[5] Lehman's debt to equity ratios often exceeded 40:1, and during the middle of any reporting period might go up to 60:1 (Miller and Horwitz, 2013).

"moving business" to the "storage business" (Valukas, 2010). They had, in essence, taken on the risk profile of a commercial bank without the protection of the bank safety net. When the subprime crisis erupted, they saw it as an opportunity to double-down on their bets rather than a threat and consistently violated their declared risk appetite and risk limits to position themselves for a market rebound.[6]

Just after the acquisition of Bear Stearns by JPMorgan Chase, Lehman announced its first loss since going public in 1994. Nonetheless, it was able to raise $6 billion in new capital. Secretary of the Treasury Paulson, in a private communication to the CEO of Lehman, warned that this was not enough and that if Lehman were to announce a loss in the third quarter without having a buyer or a definitive survival plan in place, its existence was in jeopardy (Valukas, 2010, p. 5). Unfortunately, the Administration did not prepare a plan of action for such a contingency either.

Lehman Brothers did not succeed in finding a merger partner nor did the firm develop a survival plan. Instead it resorted to window dressing its public disclosures and regulatory filings by arbitraging accounting requirements[7] and it overstated its liquidity pool by including "comfort deposits" that it held with its clearing banks in order to continue clearing operations with them.[8] It is noteworthy that so many market participants expressed surprise when Lehman failed. It seems likely that the surprise was more due to the perception of an

[6] Lehman exceeded its risk limits by margins of 70% with regard to commercial real estate and 100% with regard to leveraged loans (Valukas, 2010, p. 50).

[7] Valukas (2010) gives a full account of the so-called 105 repo transactions that could be reported as sales rather than borrowings.

[8] By September 12, 2008, two days after reporting $41 billion in its liquidity pool, Lehman had less than $2 billion of readily monetizable assets (Valukas, 2010, p. 10).

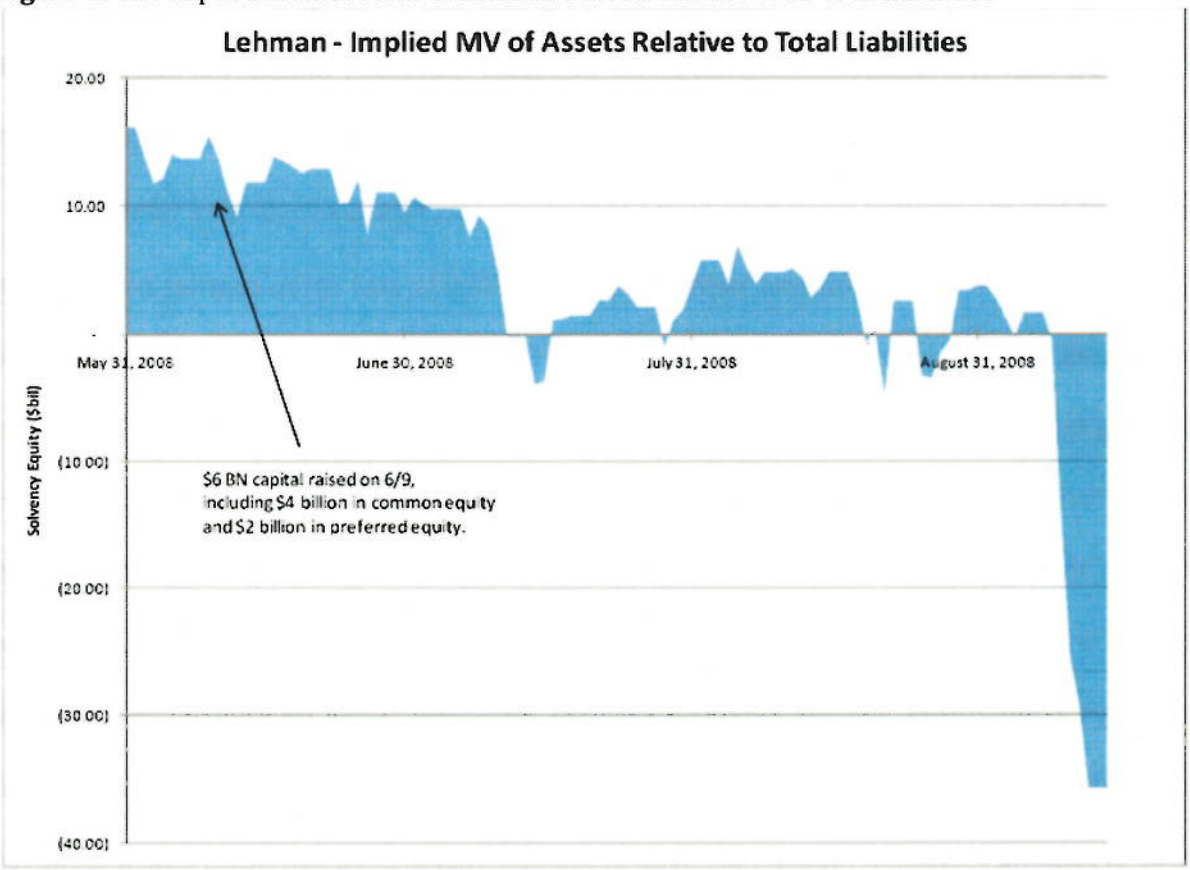
abrupt change in the US policy of providing support for any large financial institution rather than to confidence in Lehman's strength. Many market participants believed that if the authorities managed to find $29 billion to arrange a merger for Bear Stearns, an investment bank little more than half the size of Lehman, they should be willing to advance at least $60 billion for Lehman. Analysis of market prices indicates that many market participants knew that Lehman was insolvent and had been so at several times during the summer. Figure 1 below shows the implied market value of Lehman's assets relative to its total liabilities.

Nonetheless, the collapse seemed to catch officials and some market participants unawares. Over the weekend of September 12-14, 2008, US authorities met with CEOs of leading financial institutions from around the world to try to broker a merger or at least raise a fund to subsidize a merger for Lehman (much as they had accomplished for Long Term Capital Management in 1998). At one point on Sunday afternoon they believed they had struck a deal with Barclays Capital Management that would be subsidized by many of Barclays' competitors, but the Financial Services Authority in the UK refused to waive the requirement for shareholder approval. Thus with no buyer and (the authorities claimed) no way of funding a Lehman rescue[9], the head of the SEC encouraged Lehman's board to file for bankruptcy immediately, before it would be unable to meet its cash obligations when markets opened in Asia. On September 15, 2008, at 1:45 a.m. Lehman Brothers Holdings Inc. (LBHI) filed for protection under Chapter 11 of the Bankruptcy Act, becoming the largest bankruptcy in US history. The administrators of the Lehman bankruptcy in the US have

[9] The authorities claimed that they lacked legal authority to make a direct investment in Lehman and that Lehman's assets were insufficient to support a loan large enough to avoid collapse.

estimated that at least $75 billion have been wasted because of the complete lack of preparation for bankruptcy (Cairns, 2009).

**Figure 1.** The implied market value of Lehman's assets relative to its total liabilities




Source: Valukas (2010, p. 1580). The implied market value of assets is equal to the market value of equity plus the market value of its liabilities.

While the US authorities refused to support LBHI, they did support Lehman Brothers Inc. (LBI), the US broker-dealer subsidiary, for another five days until it could enter the Securities Investor Protection Act trusteeship on September 19. At this point its prime brokerage activities and a substantial portion of its clients' assets and obligations were sold

to Barclays Capital Inc. and others. This removed one of chief systemic concerns in the US. The other concern, Lehman's leading role in the opaque OTC derivatives market, turned out not to be a major problem. Most derivatives were closed-out and netted under ISDA Agreements. Although counterparties were not necessarily happy with the prices they received, no knock-on effects could be attributed to the unwinding of the derivatives book.[10]

The only domestic impact that could be labeled systemic was due to a "moral hazard" play by managers of the $62 billion Reserve Primary Fund, a wholesale money market fund that was forced to break the buck because of its outsized holdings of Lehman's commercial paper. News that one of the oldest money market mutual funds had broken the buck started a run on other money market mutual funds, which led to large sales of corporate commercial paper to meet the demand for cash withdrawals. The collapse of prices in the secondary market caused the primary market for commercial paper to shut down. Because commercial paper is the primary means of finance for much of corporate America, the Treasury hastily provided insurance for money market mutual funds. Later the Federal Deposit Insurance Corporation increased the deposit insurance ceiling for banks from $100,000 to $250,000 and provided an unlimited guarantee for all non-interest transactions accounts to reassure depositors and attempt to level the playing field between money market mutual funds and banks.

Still many observers interpreted this as a successful application of bankruptcy rules to a large, complex financial institution (Ayotte and Skeel, 2010). Apart from the

[10] It should be noted that this relatively benign result was unlikely to have happened if not for the substantial liquidity provided to the broker/dealer by the Federal Reserve while it was being prepared for a SIPC resolution.

unanticipated spillover to the wholesale money market and knock-on effect on the commercial paper market, the US had shown that the economy could get on perfectly well without Lehman Brothers.

This relatively orderly outcome contrasted with the chaos created abroad. The immediacy of the impact was largely due to the tight integration of the lines of business of the Lehman group. The operational structure bore little resemblance to its legal corporate structure. Like many other global firms Lehman managed substantially all of the cash resources centrally at the holding company. Since LBHI declared bankruptcy before cash could be swept out again to the subsidiaries, they found themselves suddenly illiquid and unable to continue operation. Uncoordinated bankruptcy proceedings were initiated in a variety of jurisdictions including Australia, Japan, Korea, and the United Kingdom. Ultimately, the LBHI chapter 11 case precipitated insolvency actions throughout the world and the appointment of receivers or administrators in over 80 insolvency proceedings.

Because London was Lehman's largest center of activity outside the United States, many of the most complex problems emerged there. The London subsidiaries, including Lehman Brothers International Europe, its largest broker-dealer in Europe, filed for bankruptcy and turned to PwC for administration. Because British law made no provision for debtor in possession financing, the administrators had to struggle to find money to keep minimal functions such as security, housekeeping, or the canteen going. PwC was confronted with forty-three thousand trades that were still "live" and would need to be negotiated with each individual counterparty.

The integration of the group was such that a trade performed in one affiliate could be booked in another, without the client necessarily being aware that the location of the asset

had shifted. Recordkeeping fell into disarray when LBHI filed for bankruptcy. At the time of filing, Lehman maintained a patchwork of over 2,600 software systems and applications, many of which were outdated or arcane. These systems were highly interdependent, but difficult to decipher and not well documented. Moreover, most systems to cover operating functions, trading, valuation, financial accounting and other data had been transferred to Barclays in the sale and Barclays had integrated its own proprietary and confidential data into some of the systems. Thus other Lehman affiliates experienced enormous difficulties even in determining what their balance sheets were and who owed what to whom.

Although arrangements were ultimately negotiated with Barclays for access to some essential information, the delay made it almost impossible to salvage much going-concern value out of the rest of the group (with the exception of the sale of the foreign equity business to Nomura). In London, where much of the prime brokerage business had shifted, it was permissible to mingle clients' funds with the firm's own funds and so several hedge funds suddenly became illiquid and faced close-out netting procedures that added further downward pressure on prices in some already illiquid markets.

The fragmented data system impeded the salvaging of going-concern value from the remainder of the Lehman group. Different parts of any particular line of business were lodged in different subsidiaries in various parts of the world with no way of reintegrating them even if they had been viable. Clearly, significant value was destroyed by the lack of cooperation in the unwinding of the Lehman group. The process (and costs) may continue for a decade.[11]

[11] Desmos (2010) reported that the total fees paid to lawyers, administrators and other advisers in the Lehman bankruptcy through October 2010 totalled nearly $2 billion. At least 1,300 people have been working on the Lehman bankruptcy since it began. This, of course, was merely an interim report.

## 3. Lessons and policy consequences from the Lehman collapse

The Lehman collapse focused the attention of world leaders on the lack of preparedness of regulators and supervisors to manage financial crises. First, Lehman provided yet another example of the inadequacy of the Basel II capital ratios.[12] Although Lehman had not technically violated its capital requirements, the denominator failed to capture the risks to which Lehman was exposed and the numerator clearly was inadequate to absorb Lehman's losses and permit it to remain as a going concern.

Second, it showed the ineffectiveness of supervisors in constraining the risk-taking of a firm determined to take greater risks. Lehman violated its own internal risk constraints and it managed to engage in accounting arbitrage to overstate its balance sheet strength without detection. When warned by the Secretary of the Treasury, the senior most financial authority in the US government, to raise more capital or prepare a recovery plan, it simply ignored the warning. Lehman did not formulate a resolution plan, but, even more remarkably, neither did the regulatory authorities. This and the inadequacy of capital adequacy measures were indications that despite roughly thirty years of effort, the international supervisory authorities had failed to implement effective prudential measures.

Third, the Lehman collapse also highlighted the complete absence of any international attention to the resolution of internationally active financial institutions even though even a casual analysis of insolvencies of international institutions since the mid-

[12] Luckily, many of the world's largest banks had not yet made a full transition from Basel I to Basel II, so that when the crisis hit these banks had a somewhat greater ability to absorb losses than if they had been fully authorized to operate under the Basel II advanced internal models approach. See Carmassi and Micossi (2012) and Micossi (2013) for a detailed criticism about the Basel risk-weighted approach to bank capital rules and a proposal of a new regulatory framework based on a straight leverage ratio.

seventies foreshadowed all of the problems revealed in the Lehman collapse (see Herring, 2002).

Since neither Lehman nor the regulatory authorities had made any plans for the resolution of the group, the last-minute filing for bankruptcy was chaotic. Even though Lehman was active in at least 40 countries, this action was taken without consultation or cooperation with any foreign government. Moreover it demonstrated the first-mover advantage in seizing assets. In this case, the US gained control over all of Lehman's liquid assets because of the timing of the bankruptcy filing. Eighty uncoordinated insolvency proceedings quickly followed.

Fourth, the lack of congruence between Lehman's lines of business and its legal corporate structure made it virtually impossible to salvage going-concern value in most of the rest of the world. This problem was exacerbated by the fact that Lehman's management information systems for valuation, accounting, risk management and even the location of assets were centralized and quickly sold to Barclays Capital Management and this meant that other resolution authorities could gain access to vital information only with a substantial lag. In addition, Lehman had engaged in regulatory arbitrage to mingle clients' funds with the firm's own funds so that many clients were surprised to find themselves general creditors of the firm.

The disorderly collapse of Lehman Brothers focused international attention on the lack of a coherent framework for dealing with the insolvency of a financial institution with substantial international operations. The Group of Twenty (G20) heads of State met in Washington just after the Lehman bankruptcy. In the Communiqué issued after meeting, they agreed that as a matter of priority (White House, 2008, p. 6): "National and regional

authorities should review resolution regimes and bankruptcy laws in light of recent experience to ensure that they permit an orderly wind-down of large complex cross-border financial institutions." Thus the issue of cross-border resolution of large complex financial institutions rose from obscurity to a prominent place on the policy agenda.

At the same meeting the leaders of the G20 expanded the membership in the Financial Stability Forum (FSF) to include the members of the G20 and in the follow-up meeting in London in 2009 rechristened the FSF as the Financial Stability Board (FSB). This was the first international institutional innovation of the G20 since the crisis. The FSB was given broad responsibility to help implement the G20 recommendations on strengthening the safety and soundness of the international financial system. At the request of the G20 during their meeting in Seoul in November 2010, the FSB (2011) set out an agreement on "Key Attributes of Effective Resolution Regimes for Financial Institutions," which attempted to fill the obvious gap in the international prudential framework highlighted by the crisis.

The FSB identified eight essential features that should be part of an effective resolution regime for banks (FSB, 2011, p.3):

1. ensure continuity of systemically important financial services and payment, clearing and settlement functions;

2. allocate losses to firm owners and unsecured and uninsured creditors in a manner that respects the hierarchy of claims;

3. not rely on public solvency support and not create an expectation that such support will be available;

4. avoid unnecessary destruction of value, and therefore seek to minimize the overall costs of resolution in home and host jurisdictions and, where consistent with the other objectives, losses for creditors;

5. provide for speed and transparency and as much predictability as possible through legal and procedural clarity and advanced planning for orderly resolution;

6. provide a mandate in law for cooperation, information exchange and coordination domestically and with relevant foreign resolution authorities before and during a resolution;

7. ensure that non-viable firms can exit the market in an orderly way; and

8. be credible, and thereby enhance market discipline and provide incentives for market-based solutions.

Many of these features can be read as attempts to establish a new regime that would prevent another disorderly, Lehman-like bankruptcy. The emphasis is on planning, sharing of information, cross-border cooperation, the protection of systemically important functions and avoiding the unnecessary destruction of value. All of these goals will be difficult to achieve, especially because many of the G20 countries have not established special resolution regimes for complex, international financial institutions. Perhaps the greatest challenge, however, is to achieve credibility. The authorities tend to be judged by what they do, not what they say, and most of the interventions and resolutions that occurred during the crisis were too late to plan for an orderly liquidation or restructuring process, failed to allocate losses to unsecured and uninsured creditors, involved major commitments of public funds, and showed little evidence of substantial cross-border cooperation. None of these interventions could be described as speedy, transparent or predictable.

The effort to establish credibility, however, is not advanced by the vague way in which the FSB (2011, p.7) describes the point at which resolution should take place: "Resolution should be initiated when a firm is no longer viable or likely to be no longer viable, and has no reasonable prospect of becoming so." Although the clear intent is for the authorities to intervene before equity is wiped out, the clause "has no reasonable prospect of becoming so" can be very permissive. Given the demonstrated tendency of managers, accountants and supervisors to take an overly-optimistic view of a firm's prospects for recovery, this clause seems to provide scope for delaying intervention until long after a firm's equity has been destroyed, which will mean more or less business as usual in ad hoc resolution improvisations.

One of the most significant new requirements was that each jurisdiction ensure that every systemically important financial institution files a "robust" recovery and resolution plan. The resolution plan should include: 1) identification of financial and economic functions for which continuity is critical; 2) suitable resolution options to preserve those functions or wind them down in an orderly manner; 3) data describing the firm's business operations, structures, and systemically important functions; 4) potential barriers to effective resolution and actions to mitigate those barriers; 5) actions to protect insured depositors and ensure the rapid return of segregated client assets; 6) clear options or principles for the exit from the resolution process; and 7) assurance that key service level agreements can be maintained in crisis situation and in resolution, and that underlying contracts include a provision that prevents terminations triggered by recovery or resolution events and facilitates transfer of contracts to a bridge institution or a third party acquirer.

Although the *Key Attributes* proclaim the intent to enhance market discipline and to provide incentives for market-based solutions, no mention is made of public disclosure of recovery or resolution plans. How market discipline is to be enhanced is far from clear.

**4. Resolution plans in the US response**

At more or less the same time that the FSB *Key Attributes* were being negotiated the Dodd-Frank (D-F) reforms were being implemented in the US. [13] A key provision under Title I of the D-F Act requires that all large, systemically important financial companies submit resolution plans[14] to demonstrate how they would be resolved under the Bankruptcy Code. This is particularly noteworthy because the US has long had an administrative procedure for the FDIC to resolve a failing bank and, when appropriate, establish a bridge bank to continue systemically important functions. The *Key Attributes* advocate that other countries adopt a similar set of powers, but Congress wanted to make clear than an institution should not count on intervention from the FDIC. Although the FDIC would continue to resolve all insured depository institutions, it would manage the resolution of the group only under Title II of the D-F Act (Orderly Liquidation Authority). They emphasized this point by insisting, in Title I of the D-F Act, that groups prepare for a resolution under Chapter 11 of the Bankruptcy Code in their resolution plans.

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[13] See Appendix A for a summary of the EU proposal on bank recovery and resolution plans, contained in the directive harmonizing bank crisis resolution tools and procedures proposed by the European Commission in 2012 and currently under discussion.

[14] Although "resolution plan" is the official name for such documents, they are commonly referred to as a "living will" or, more sardonically, a "funeral plan." In the remainder of the text we will generally use the terms "resolution plans" and "living wills" interchangeably.

Section 165(d) of the D-F Act requires that each nonbank financial company supervised by the Federal Reserve Board (FRB) and each bank holding company with at least $50 billion in assets (which together are termed "covered companies") present a plan for rapid and orderly resolution to the FRB and the FDIC. Foreign banking groups with US operations must also comply with this requirement. The plan must include (US Congress, 2010): "(A) information regarding the manner and extent to which any insured depository institution affiliated with the company is adequately protected from risks arising from the activities of any nonbank subsidiaries; (B) full descriptions of the ownership structure, assets, liabilities, and contractual obligations of the company; (C) identification of the cross-guarantees tied to different securities, identification of major counterparties, and a process for determining to whom the collateral of the company is pledged." This resolution plan is to be accompanied by a credit exposure report.

The implementation details were left to the FRB and FDIC. They published the implementing regulation on November 1, 2011 (FDIC and FRB, 2011a), that emphasized living wills should indicate how the covered company can be sold, broken up, or wound down quickly and effectively without jeopardizing US financial stability.

Living wills must include: 1) an executive summary with a strategic analysis describing the firm's plan for a rapid and orderly resolution (without, however, defining what period of time qualifies as "rapid"); 2) a description of how resolution planning is incorporated in the firm's corporate governance structure; 3) a description of the group's overall organizational structure that includes a hierarchical list of all material entities, as well as jurisdictional and ownership information and mapping of core business lines and critical operations into corporate entities; 4) a description of management information

systems that support the covered company and its material entities, including a detailed inventory and description of key applications along with identification of the legal owner or licensor and related service level agreements; 5) a description of interconnections and interdependencies among a covered company and its material entities and the covered company's critical operations and core business lines along with a description of how service levels would be sustained during a material financial distress or insolvency; and 6) identification of supervisory authorities and regulators that oversee the covered company.

For the largest and most complicated banking groups that have thousands of subsidiaries, the third requirement has been onerous. It demands not only a mapping of lines of business into corporate entities, but also details regarding material entities, critical operations and core business that, at a minimum, describe types and amounts of liabilities. It also requires details about the booking of trading and derivatives activities, as well as an identification of major counterparties including descriptions of any interconnections or interdependencies among them. Finally, it requires that covered companies list all material trading, payment, clearing and settlement systems in which they participate.

Most of these requirements can be seen as attempts to minimize the prospect of a Lehman-Brothers-like disorderly bankruptcy by ensuring that both covered companies and regulators have thought through the end game in advance.

The compliance costs for both covered companies and the regulatory authorities have been very heavy.[15] Eleven firms submitted living wills in 2012. Several of the submissions

[15] The Advance Notice of Proposed Rulemaking (FDIC and FRB, 2011b) estimated that averaged over the 124 covered companies, the initial burden of compliance would be 12,400 hours. For the largest institutions, the number of hours required to comply with the regulation was surely a substantial multiple of this amount. The burden on the supervisory agencies to analyze and evaluate the data has undoubtedly been quite substantial as well.

were reported to be thousands of pages in length. Based on an early evaluation of these submissions, William Dudley, President of the Federal Reserve Bank of New York, concluded that "this initial exercise has confirmed that we are a long way from the desired situation in which large complex firms could be allowed to go bankrupt without major disruptions to the financial system and large costs to society. Significant changes in structure and organization will ultimately be required for this to be achieved."

While the D-F Act generally supports greater market discipline, it does not address the issue of public disclosure of resolution plans. The FRB and FDIC, however, have required disclosure of a public section of the plan containing an executive summary that describes the business of the covered company including: "(i) the names of material entities; (ii) a description of core business lines; (iii) consolidated or segment financial information regarding assets, liabilities, capital and major funding sources."

During the comment period following the Advance Notice of Proposed Rulemaking (ANPR), the FRB and FDIC received many expressions of concern from the industry regarding the possibility that details of the resolution plan might be made public through the Freedom of Information Act (FDIC and FRB, 2011a, p. 67326). The ANPR dealt with the issue by requiring that any covered company that desired confidential treatment of the information must file a request for confidential treatment under the general rules of the FRB and the FDIC (FDIC and FRB, 2011b, p. 22660). This was essentially an opt-out approach that left the institution with the burden of justifying whether some information should be confidential.

In the commentary preceding the final proposal, the FRB and FDIC (FDIC and FRB, 2011a, p. 67322) tried to ease these fears and added their own concern that "release of this

information would impede the quality and extent of information provided by covered companies and could significantly impact the efforts of the Board and the Corporation to encourage effective and orderly unwinding of the covered companies in a crisis." The upshot was a disclosure requirement observing that (FDIC and FRB, 2011a, p. 67332): "While information in the public section of a resolution plan should be sufficiently detailed to allow the public to understand the business of the covered company, such information can be high level in nature and based on publicly available information." In effect, this creates a safe harbor for an institution that does not wish to disclose any information that is not already publicly available.

If the information is already publicly disclosed, it's not clear what value this disclosure requirement adds. This timid approach represents a significant lost opportunity. If the authorities had been serious about enhancing market discipline, they should have required disclosure of information that would enable potential creditors of the covered company to understand the statutory hierarchy of claims on the various entities in resolution, and precisely how the authorities propose to conduct a resolution. In the absence of such information, creditors cannot be expected to price claims efficiently. Moreover, some of the information in the first round of disclosures falls short of the more modest goal of helping the public understand the business of the covered company because it is difficult to reconcile with other publicly available information. The next section summarizes and analyzes the data provided by the eleven banking groups that submitted resolution plans during 2012. The final section argues that the lack of agreement on how cross-border firms will be resolved casts a huge uncertainty over how an international insolvency would be dealt with.

## 5. How informative are public sections of living wills?

The eleven banking groups that submitted their living wills in 2012 include seven US institutions – Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, State Street Corporation – and four foreign banking groups - Barclays, Credit Suisse, Deutsche Banks, UBS.[16] In their implementing regulation, the FRB and FDIC specified the format that each resolution plan should follow. We focus on aspects of the public section of the living will that might have improved market discipline if they had been more rigorously specified and carefully implemented.[17]

A major weakness of the disclosure format is the vague way in which the authorities have defined material entities: "*material entity* means a subsidiary or foreign office of the covered company that is significant to the activities of a critical operation or core business line" (FDIC and FRB, 2011a, p. 67335). Critical operations, in turn, are defined as "those operations of the covered company, including associated services, functions and support, the failure or discontinuance of which, in the view of the covered company or as jointly directed by the Board and the Corporation, would pose a threat to the financial stability of the United States" (FDIC and FRB, 2011a, p. 67335). No specific asset or income threshold has been set for identifying material entities that may be either branches or subsidiaries.[18] This may be

[16] The resolution plans filed by foreign banking groups mainly focused on US operations and entities.

[17] We will not, for example, comment on the institution's responsibility to provide a high-level resolution plan because in most instances the information was so high-level as to be uninformative. In addition, we have sympathy with the reluctance of institutions to specify to whom they might sell various lines of business because the grounds for maintaining confidentiality about this sort of information seem self-evident on competitive grounds.

[18] Luciano and Wihlborg (2013) emphasize that the practical distinction between a subsidiary and a branch in cross-border banking is often quite blurred. Some countries oblige foreign branches to meet liquidity and capital requirements within the host country as if they were separately incorporated subsidiaries.

appropriate in cases in which a key entity that services the group, such as providers of information technology or risk management services, has been set up as a separate entity. In fact, such entities are material even though they have negligible income or balance sheets.

Although we have no way of identifying material entities that have negligible income statements or balance sheets, it is possible to check whether the material entities that the banking groups chose to list include all of the entities that have a balance sheet size exceeding the $50 billion threshold - the same threshold which at the consolidated level would require bank holding companies to file a resolution plan under the D-F Act. To determine whether entities that exceed the $50 billion threshold have been omitted, we have used Bankscope data from May 2013, data from SEC filings as of yearend 2011, Federal Reserve/National Information Center data as of June 2012, information available in the banks' annual reports and other information published on their websites.[19]

The results (see Figure 2) indicate that eight of the eleven banking groups did not identify a few large subsidiaries with assets greater than $50 billion as material entities. Figure 2 displays the number of material entities reported by each of the eleven banking groups and the number and name of subsidiaries with more than $50 billion that were not identified as material entities in the public section of the resolution plan. Most "missing" material entities are intermediate holding companies, but in the absence of additional information about where such holding companies sit in the legal organization structure of the group, it is impossible to tell whether such information might be redundant because all of the material entities that are subsidiaries of an holding company – or its parent holding

[19] See Appendix B for details regarding the statistical benchmarks.

company – have been reported. Of course, even if all of the main subsidiaries, or controlling entities, of the holding company are reported, information about an omitted holding company may be important as well, especially if it issues debt or makes guarantees to other affiliates.

**Figure 2:** Material entities in resolution plans

| | Number of material entities reported in public section of 2012 resolution plan | Large majority-owned subsidiaries (total assets of at least US$ 50 bn)* not included in material entities list |
|---|---|---|
| **Bank of America**[1] | 7 | 4<br>BAC North America Holding Company (US); BANA Holding Corporation (US); Merrill Lynch UK Holdings (UK); NB Holdings Corporation (US)[3] |
| **Bank of New York Mellon** | 14 | 0 |
| **Barclays (US)**[2] | 6 | 0 |
| **Citigroup** | 17 | 7<br>Citicorp (US)[4]; Citigroup Financial Products Inc. (US); Citigroup Funding Inc. (US); Citigroup Global Markets Europe Limited (UK); Citigroup Global Markets Holdings Inc. (US); Citigroup Korea Inc. (KR); Citigroup Overseas Holdings GK (JP) |
| **Credit Suisse** | 16 | 1<br>Credit Suisse Investments (UK) (UK) |
| **Deutsche Bank (US)**[2] | 7 | 1<br>Taunus Corporation (US)[5] |
| **Goldman Sachs** | 22 | 1<br>Goldman Sachs Group Holdings (U.K.) (UK) |
| **JPMorgan Chase** | 25 | 2<br>CMC Holding Delaware Inc. (US); J.P. Morgan Equity Holdings, Inc. (US)[6] |
| **Morgan Stanley** | 18 | 2<br>Morgan Stanley (the group holding company) (US)[7]; Morgan Stanley International Limited (UK) |
| **State Street Corporation** | 11 | 0 |
| **UBS (US)**[2] | 11 | 1<br>UBS Americas Inc (US) |

* As reported by the Bankscope database, as of May 2013; majority-ownership defined as a minimum ownership of 50.01% in each step of the ownership chain. [1] The bank acknowledges that the reported list of material entities is not exhaustive. [2] Only material entities relevant for US resolution are reported in the resolution plan. [3] The latest available consolidated financial data for BAC North America Holding Company, BANA Holding Corporation and NB Holdings Corporation date back to 2005 or 2006, with total assets well above $50 billion for all three entities. Unconsolidated data reported in Federal Reserve form FR Y-9LP (June 2012) confirm that all three companies are still well above the $50 billion threshold, even without taking into account consolidation. [4] No recent consolidated data are available for Citicorp, but its unconsolidated total assets are well above $50 billion. Citicorp is not among the material entities identified, but it is indicated as one of the three main management segments: it holds the core business segments of the group, Global Consumer Banking businesses and Institutional Clients Group. [5] Taunus Corporation is mentioned as the company controlling other material entities, but it is not separately indicated as a material entity. [6] The latest available consolidated financial data for CMC Holding Delaware Inc. and J.P. Morgan Equity Holdings, Inc. date back to 2005, with total assets above $50 billion for both entities. CMC Holding Delaware Inc. controls, among other subsidiaries, Chase Bank USA NA, a depository subsidiary with about $116 billion in total assets as of June 2012; and J.P. Morgan Equity Holdings, Inc. controls CMC Holding Delaware Inc.. On this ground, we have considered the two entities to be still above the $50 billion threshold. [7] The Morgan Stanley parent is repeatedly mentioned throughout the resolution plan, but it is not included in the list of material entities. Sources: elaborations on data of banks' 2012 resolution plans, banks' annual reports, Bankscope, Federal Reserve/National Information Center, Orbis database, SEC, SNL database.

The FDIC/FRB implementing rule requires that each group provide a hierarchical list of material entities. Oddly, these appear to have been omitted from the public section. No organization or corporate structure tree chart is provided,[20] much less information about the percentage of ownership in each subsidiary. Presumably, the confidential section of the plan contains such information, but no clear case has been made about why such information should be excluded from the public portion of the plan. With considerable effort some of this information can be gleaned from other public documents, but it is not readily available in a format that is easy to compare across institutions.

At least some of these "missing" material entities might be regarded as material. For example, both Bank of America and Citigroup have disclosed high level organizational structure trees on their websites. These are purported to include the material holding companies of each group, but some of these holding companies are not included in the public

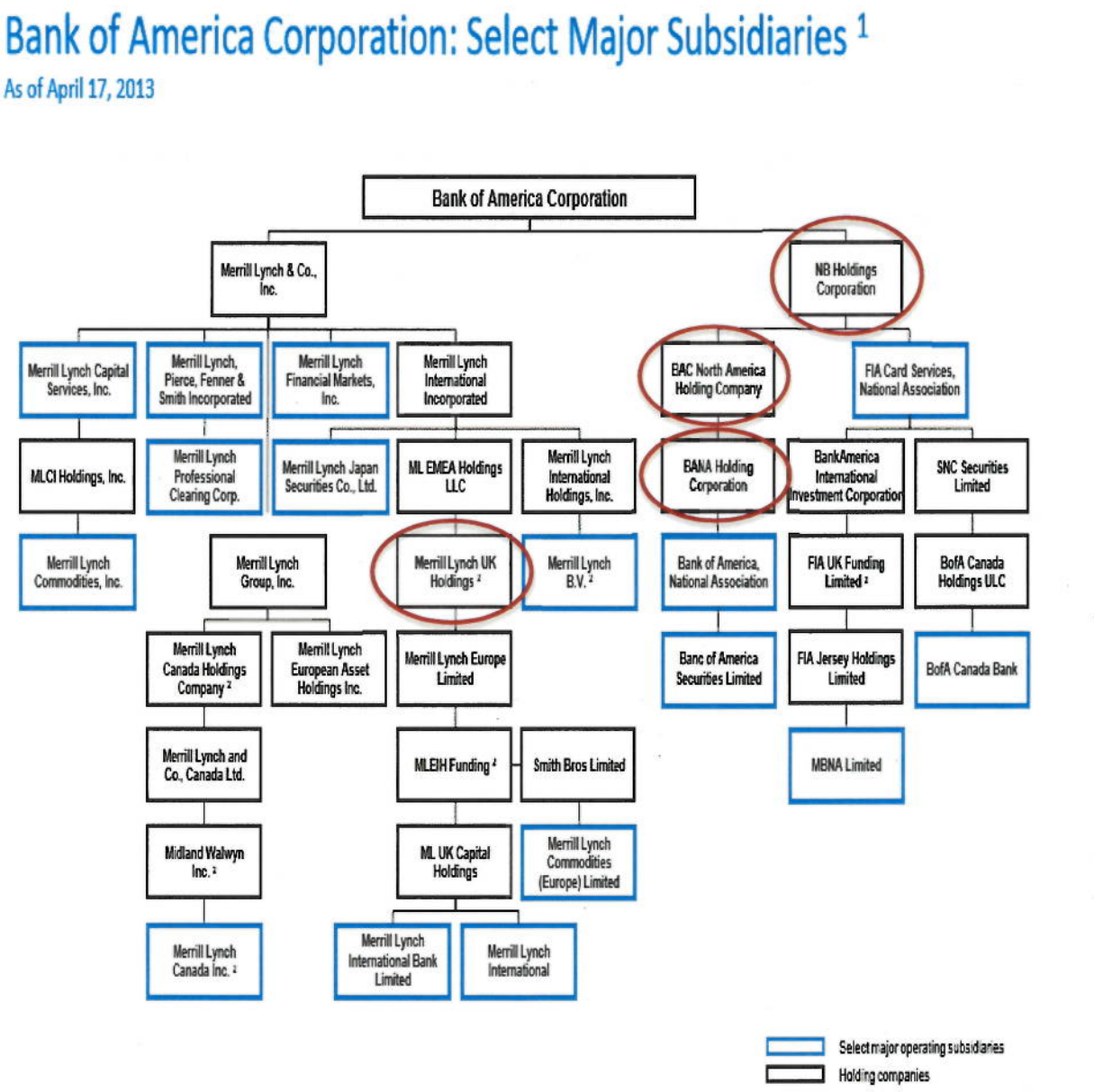
[20] With the partial exception of Morgan Stanley's submission for the depository institution (2012, p. 24).

sections of their resolution plans. In Figure 3.a and 3.b, we have circled the large subsidiaries (all holding companies) that are missing from the relevant public section of each living will.[21] In some cases it is clear from information outside the living wills that such entities could have important interactions with other affiliates in the group. For example, Citigroup Global Markets Holdings Inc. may have significant liabilities to affiliated depository institutions. [22]

[21] Three "missing" material entities of Citigroup are not displayed in Figure 3.b: Citigroup Funding Inc., Citigroup Korea Inc. and Citigroup Overseas Holdings GK. Citigroup Funding Inc. was merged into Citigroup Inc. and ceased to exist on December 31, 2012, which explains why it is not included in Figure 3.b, referred to January 2013.

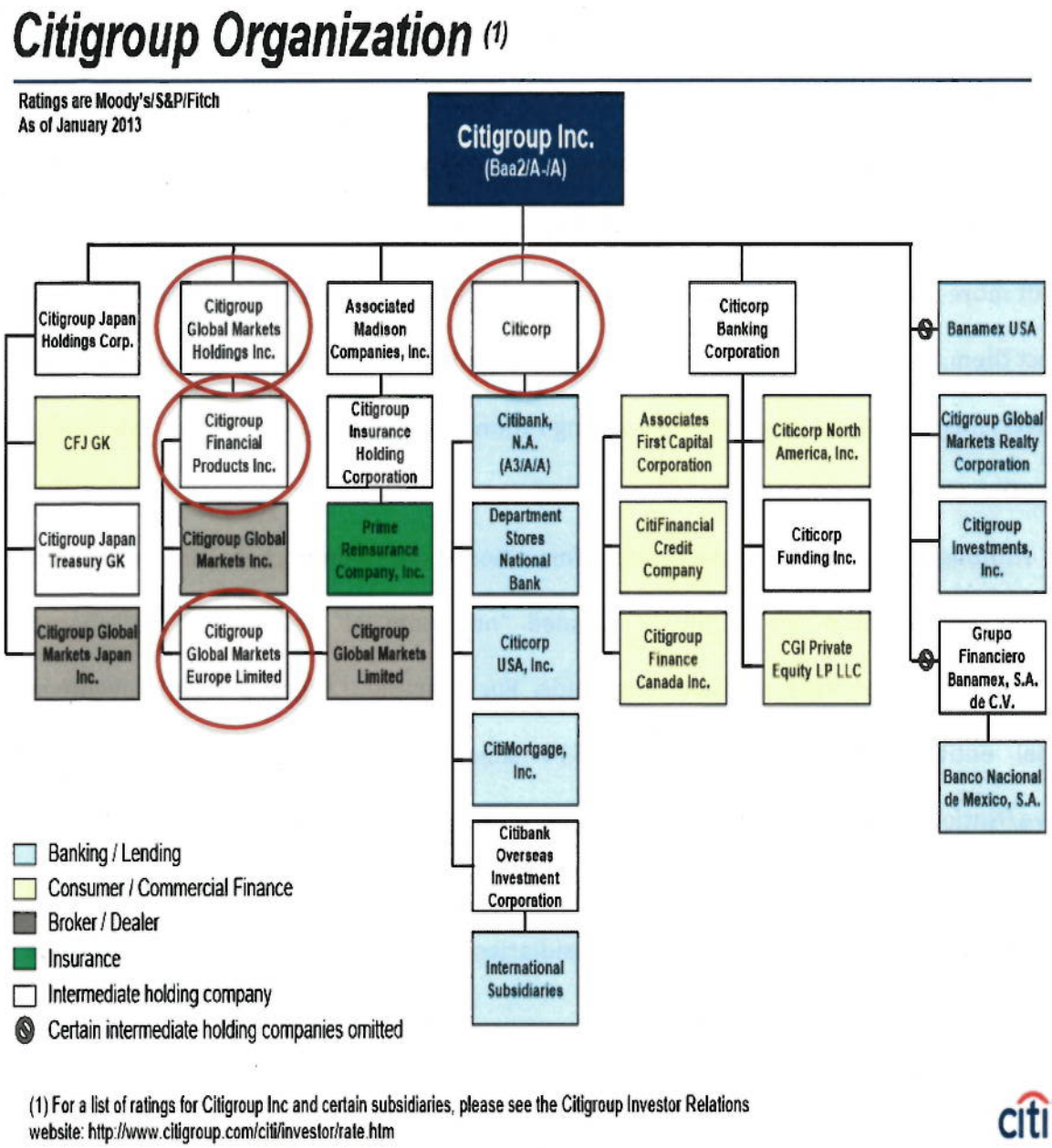
[22] "Some of Citigroup's non-bank subsidiaries have credit facilities with Citigroup's subsidiary depository institutions, including Citibank, N.A. Borrowings under these facilities are secured in accordance with Section 23A of the Federal Reserve Act. Citigroup Global Markets Holdings Inc. (CGMHI) has borrowing agreements consisting of facilities that CGMHI has been advised are available, but where no contractual lending obligation exists. These arrangements are reviewed on an ongoing basis to ensure flexibility in meeting CGMHI's short-term requirements." (Citigroup, 2012a, p. 217).

**Figure 3.a:** The corporate structure of Bank of America*




*Red circles indicate the large subsidiaries not included in the material entities list in the public section of Bank of America resolution plan submitted in 2012. Source: Bank of America website, own elaborations.

**Figure 3.b:** The corporate structure of Citigroup*




*Red circles indicate the large subsidiaries not included in the material entities list in the public section of Citigroup resolution plan submitted in 2012. Source: Citigroup website, own elaborations.

One can only speculate about why such entities are omitted from the public sections of living wills, but this does raise troubling questions about the criteria that have been employed to select the reported entities.

Surely investors would gain a better understanding of the groups' business and structure if they were required to provide detailed explanations about their decision criteria and an organizational chart including, at a minimum, the type of business, the legal form, the location, total assets and the percentages of ownership for each of the displayed entities. Without more quantitative and qualitative details on material entities and the methodology to select them, the public sections of the living wills are less informative than they should be. Moreover, it is difficult to imagine that a strong rationale could be advanced that this sort of information should be proprietary.

Although it is crucial to have better information about the reported material entities, the other entities that are implicitly deemed "non-material" should not be ignored altogether, if only because of their magnitude. For example, Citigroup listed seventeen material entities, but in fact it had 2,319 subsidiaries according to the Federal Reserve/National Information Center data as of June 30, 2012. While many of these subsidiaries may be irrelevant for understanding how an institution would be resolved, the living will should at least categorize these subsidiaries and explain why they are not relevant to the orderly resolution of the group.

More broadly, much of the other information contained in the public section of the living wills seems far more general than it should be if the objective is to enhance public understanding of the group's business or enhance market discipline. Figure 4 summarizes the information provided regarding the number of core business lines, the number of entities

with balance sheet or income statement data reported, the number of material payment, clearing and settlement systems in which the group participates and the number of supervisory authorities that oversee the firm.

In virtually every case, the lack of specificity in the "material entity" concept undermines the usefulness of the other information disclosed and the resulting differences across institutions can be very large. For example, the number of core lines of business varies from State Street Corporation, which lists 2, to JPMorgan Chase, which identifies 30. The average for the eleven institutions is eight. While business models across the eleven banking groups do differ significantly in many respects, one is left with the uncomfortable feeling that differing definitions of "core business lines" may also play a role.[23] Although the groups report basic information about the business conducted by each material entity, it is generally left to the reader to map lines of business into material entities and, even then, it is not clear how these might be preserved in the bankruptcy process.

Financial data about material entities are very sparse, usually including only the assets and liabilities (and sometimes income data) of the largest depository institution, which must disclose its balance sheets periodically in any event.[24] While this is consistent with the FRB/FDIC requirement, it leaves huge gaps in a reader's understanding of the material entities and how they operate.

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[23] The FDIC/FRB regulation defines core business lines as "those business lines, including associated operations, services, functions and support that, in the firm's view, upon failure would result in a material loss of revenue, profit, or franchise value" (FDIC and FRB, 2011a, p. 67334).

[24] Moreover, banking groups also have to submit to the FDIC a resolution plan for their depository institutions with at least $50 billion in total assets, as required by a January 2012 FDIC rule. In most cases this plan was incorporated in the same public document with the resolution plan for the banking group.

**Figure 4:** Overview of selected information provided by banking groups in the public portion of resolution plans

| | Number of core business lines | Number of entities with individual balance sheet/income data reported | Number of material payment, clearing and settlement systems | Number of material supervisory authorities[2] |
|---|---|---|---|---|
| **Bank of America** | 5 | 2 (depository institutions) | 15 | 8 |
| **Bank of New York Mellon** | 4 | 1 (depository institution) | 15 | 11 |
| **Barclays (US)[1]** | 4 | 2 (1 depository branch, 1 broker-dealer) | 18 | 19 |
| **Citigroup** | 12 | 1 (depository institution) | 16 | 10 |
| **Credit Suisse** | 11 | 0 | 11 | **18** |
| **Deutsche Bank (US)[1]** | 10 | 0 | 16 | **10** |
| **Goldman Sachs** | 4 | 1 (depository institution)[3] | 19 | 45 |
| **JPMorgan Chase** | 30 | 2 (depository institutions) | 18 | 11 |
| **Morgan Stanley** | 3 | 1 (depository institution) | 19 | **19** |
| **State Street Corporation** | 2 | 0 | 10 | **13** |
| **UBS (US)[1]** | 7 | 0 | n.a. | 14 |

[1] Information largely related to US operations. [2] Bold indicates that the bank reports only supervisory authorities of material entities. We have included in our calculations only supervisors explicitly named. [3] Included in the resolution plan for the depository institution submitted as a separate document. Source: public section of banks' 2012 resolution plans.

The systemically important financial institutions were required to indicate the number of "material" payment, clearing and settlement systems in which they participate, as well as the number of "material" supervisors and regulators with whom they must interact. This information is often used as a proxy for the complexity and interconnectedness of a financial institution that are believed to be two aspects of systemic risk.

Clearly the groups have taken the materiality guideline quite rigorously in reporting these two dimensions of proxies for systemic risk. Citigroup is reported to be a participant in 550 clearing and settlements systems in another source (Herring, 2013). While many of these may not be material, it is crucial to understand what standard of "materiality" is being applied. Similarly, the largest number of material supervisory authorities, 45, is reported by Goldman Sachs, which is by no means the largest or most complicated group. Indeed, most of these groups are active in more than 45 countries and so it is difficult to infer what standard of materiality has been employed and what the information implies about the difficulty of resolving the firm.

In short, the FDIC/FRB regulation set up guidelines for the public section of living wills that permitted groups to avoid providing any new information even if it was critical to understanding how difficult it would be to resolve an institution. Our examination of the actual public sections of the reports indicates that most groups took full advantage of their discretion to maintain confidentiality of information that is crucial to understanding how easily they could be resolved without, in many cases, any plausible rationale for holding such details in confidence. Nonetheless, even if the groups had been more forthcoming with information, investors and creditors would still be unable to price claims efficiently because officials have not yet agreed on how to handle cross-border resolutions.

## 6. Why resolution policy remains uncertain

The crisis revealed the US lacked a coherent regime for resolving systemically important global financial institutions. In this it was not alone. The Basel Committee on Banking Supervision (2010) concluded that no country had a framework for adequately

addressing the problems that arise in the resolution of a purely domestic banking conglomerate, much less a cross-border or global systemically important institution.

The D-F reforms were intended to enhance the ability of the authorities to resolve a purely domestic institution. Since the new regime remains untested, it is too early to judge whether it is sufficient to resolve a large institution without cost to taxpayers and without threatening financial stability. The cross-border aspects of resolution policy remain a challenge and the obstacles are formidable.

A cross-border resolution is bound to involve multiple supervisory authorities with differing statutory powers and responsibilities. Some may be charged with taking financial stability into account, others may simply be responsible for taking whatever measures they can to protect the customers of the part of the group they oversee. In addition to these differences in objectives, bankruptcy and administrative processes differ markedly, as do the competencies and powers of individual supervisory and regulatory authorities. The sheer number of authorities whose actions must be coordinated is mindboggling. One moderately large foreign bank, not large enough to be included on the FSB list of Global Systemically Important Banks (G-SIBs), held a meeting of its key national and international regulators to discuss its resolution plan and was obliged to convene the meeting in a large hotel ballroom.

Since November 2010, the members of the FSB have been developing resolution strategies, operational resolution plans and firm-specific cross-border cooperation agreements that establish a process for cooperation and information sharing. In its April 2013 progress report, however, the FSB (2013, p. 1) concluded that "[P]rogress has been relatively slow both because the issue is complex and because in many jurisdictions the

powers necessary for implementing a preferred resolution strategy have not yet been provided."

This is particularly worrisome with regard to the European Union because it is home to a large number of G-SIBs and several of these institutions hold more assets outside their home country than within.

**Figure 5:** Large international banking groups with >50% of assets outside home country, yearend 2011

| Banking groups | Total assets | World assets rank | Home country | Rest of region | Rest of world |
|---|---|---|---|---|---|
| | in US$ billion | | as % of total assets | as % of total assets | as % of total assets |
| 1. Deutsche Bank (Germany) | 2,800 | 1 | 34% | 32% | 34% |
| 2. HSBC (UK) | 2,556 | 3 | 35% | 11% | 54% |
| 3. BNP Paribas (France) | 2,543 | 4 | 49% | 34% | 17% |
| 4. Barclays (UK) | 2,417 | 7 | 34% | 27% | 39% |
| 5. Citigroup (US) | 1,874 | 14 | 36% | 21% | 43% |
| 6. Banco Santander (Spain) | 1,619 | 17 | 27% | 41% | 32% |
| 7. UBS (Switzerland) | 1,508 | 19 | 36% | 20% | 44% |
| 8. ING Bank (Netherlands) | 1,244 | 23 | 40% | 38% | 22% |
| 9. UniCredit (Italy) | 1,199 | 24 | 42% | 56% | 2% |
| 10. Credit Suisse Group (Switzerland) | 1,115 | 25 | 21% | 26% | 53% |
| 11. Nordea Group (Sweden) | 927 | 27 | 21% | 74% | 5% |
| 12. Standard Chartered (UK) | 599 | 41 | 15% | 4% | 81% |

Source: Schoenmaker (2013, p. 62).

Figure 5 lists 11 European banking groups and one US banking group (Citigroup) that have less than half of their assets in the home country. In order for the market to function

properly, it needs to understand not only living wills, but also what the authorities will do in a crisis. In the absence of firm, credible and binding cooperation agreements, it must remain a matter of speculation.

The problem is complicated by the fact that the authorities have not achieved a consensus on the appropriate model for cross-border resolution. Idealists favor a universalist approach in which insolvency laws are harmonized and an insolvent firm's assets are pooled in one proceeding and shared equitably across claimants without regard to where they reside or which part of the group they have dealt with. Cynics consider this approach to be the Esperanto of resolution policies and believe that no matter what officials say they will ring fence those parts of the failing institution that they can control in the end.

These extremes are reflected to some extent in two approaches that are widely discussed: a single point of entry strategy (SPE) and a multiple point of entry strategy (MPE). The Bank of England and the FDIC (2012) have developed a SPE strategy. This approach attempts to leapfrog the seemingly hopeless task of harmonizing national bankruptcy laws and resolution procedures by vesting resolution powers in a single resolution authority that is responsible for overseeing the top holding company or parent company in a G-SIB. The responsibility of the single resolution authority would be to ensure that the top level institution would be restructured in such a way that it would serve as a source of strength by recapitalizing subsidiaries and down-streaming liquidity as necessary. The hope is that this would finesse most cross-border problems by preserving the assets and operations of subsidiaries on a going concern basis.

This presumes that the top level entity will be required to be sufficiently well-capitalized to absorb losses throughout the group – and, indeed, that the group is structured

in such a way that there is a clear top-level entity. Of course, this can only work if the single resolution authority has access to sufficient resources to maintain the subsidiaries in the group while the restructuring of the top level institution takes place, which may be an issue in several countries that are host to institutions with liabilities that are a substantial multiple of domestic GDP. Moreover, in the case of the US it appears to assume that resolution will take place under the administrative procedures of Title II of the D-F Act rather than the bankruptcy resolution plans required in the livings wills.

This approach raises tricky issues in a scenario in which a foreign subsidiary is the major source of losses and should be liquidated. The authorities, of course, do not want to be in the position of propping up an institution that has no going-concern value. But once they admit the possibility that some foreign subsidiaries may not be protected, creditors have reason to be concerned about all of the foreign subsidiaries and it may not be possible to implement the resolution without creating unwanted spillovers as creditors engage in a flight to quality.

In addition to the hope that foreign authorities can be convinced to forbear and leave the resolution to the headquarters authority, the laws underlying many financial contracts will need to be changed or the single resolution authority will need to have the ability to impose a stay. Otherwise the initiation of resolution proceedings with regard to the top-level entity can be interpreted as an event of default that permits counterparties to terminate their financial contracts. This could destabilize markets and frustrate the attempt of the single resolution authority to ensure the continuity of operations.

A MPE strategy involves the application of resolution powers by multiple authorities to multiple parts of the group and the break-up of the group into separate parts along

national, regional or functional lines. Unless the multiple authorities have firm agreements about how to coordinate their actions and allocate losses, this approach amounts to ring fencing.[25] This approach is opposed by most G-SIBs because they believe it would reduce the efficiency with which they can allocate capital and liquidity within the group.

It is difficult to imagine both approaches operating simultaneously without causing enormous uncertainty -- not unlike the current situation. The key point, however, is that how the cross-border resolution will be conducted is a critical factor that must be taken into account in valuing the claims on any entity within the group. When this uncertainty is considered in conjunction with the meager public disclosures in living wills, market discipline cannot be expected to reinforce and support regulatory discipline.

Despite an enormous amount of effort, one must conclude that we do not yet have the framework to undertake the orderly resolution of a G-SIB. This means that these institutions are likely to enjoy an implicit subsidy that is completely unrelated to their efficiency or the quality of their services. Too-big-to-fail may be too-costly-to-continue, but a solution to the problem remains elusive.

[25] New Zealand has taken this position and attempted to apply it more rigorously than any other national authority. It has tried to ensure that even if the foreign parents of their four largest banks should fail, the New Zealand subsidiaries could continue to operate. See the contribution of David Mayes (2013) in this issue.

## Appendix A

## The EU approach to bank recovery and resolution plans

In the European Union, the European Commission presented in June 2012 a proposal for a directive on bank recovery and resolution, with the goal of introducing new bank crisis management and resolution tools to facilitate orderly resolution and avoid bailouts (European Commission, 2012). Negotiations with the European Parliament and the Council of the European Union to adopt the final legislation are still in progress (the most recent compromise has been reached at the end of June 2013, with a final approval expected by the end of 2013).

The directive aims to harmonize policy instruments and procedures to deal with banking crises across EU countries and to improve the ability to manage the crisis and failure of cross-border banks. The proposal included provisions on preparation and prevention, early intervention and resolution tools and powers. Preparation and prevention measures include the requirement for banking groups and individual institutions within a group to prepare recovery plans, and for authorities to draw up resolution plans for them. Colleges of resolution authorities are also introduced, in which home and host countries resolution authorities participate under the lead of the group (home) resolution authority; the European Banking Authority would participate too, facilitating joint actions and acting as binding mediator in case of need. Finally, the proposed directive also requires the creation of national resolution funds to bear the costs related to resolution procedures (e.g. provide capital for a bridge bank), but never to bail out banks: these funds would have to be financed to a large extent by risk-based fees paid ex-ante by banks.

The directive introduces a requirement for banking groups to prepare and submit a recovery plan to their consolidating supervisor, which will transmit it to resolution authorities. The plan should include measures for the stabilization of the group as a whole in case of distress, indicating also arrangements for intra-group financial support. The preparation and submission of the recovery plans shall have at least an annual frequency, and an updated version should be presented in case of changes to the legal or organizational structure of the institution, its business or its financial situation. The plans must include a wide range of information, including: a communication and disclosure plan outlining how the firm intends to manage any potentially negative market reactions; a range of capital and liquidity actions required to restore the institution's financial position; the identification of critical functions; a detailed description of the processes for determining the value and marketability of the core business lines, operations and assets of the institution; arrangements and measures to reduce risk and leverage, to restructure liabilities and business lines, to maintain the continuous functioning of the institution's operational processes, including infrastructure and IT services; preparatory arrangements to facilitate the sale of assets or business lines in a timeframe appropriate for the restoration of financial soundness.

Competent authorities, after consultation with relevant foreign authorities, must assess the effectiveness of the measures proposed in the recovery plan to rapidly restore viability without producing adverse effects on the financial system; the European Banking Authority will develop guidelines specifying minimum criteria to be followed for such assessment. If competent authorities are not satisfied with the plan, they may request the institution to revise the plan: if it fails to submit the revised plan or changes are not

considered satisfactory, then authorities may direct the institution to take corrective measures, such as a reduction of the risk profile of the bank, timely recapitalization, changes to the funding strategy or to the governance structures.

While banks are required to draw up recovery plans, resolution authorities are entrusted with the preparation of resolution plans, outlining the resolution measures that will be adopted if the bank is taken through resolution. Resolution authorities, however, may require the banks to assist them in the preparation and updating of the resolution plan, and their requests may concern, among other issues, the following information: a detailed description of the institution's organizational structure including a list of all legal entities; the identification of the direct holder and the percentage of voting and non-voting rights of each legal entity; the location, jurisdiction of incorporation, licensing and key management associated with each legal entity; a mapping of the institution's critical operations and core business lines by reference to legal entities; a detailed description of the components of the institution's and all its legal entities' liabilities, separating at a minimum by types and amounts of short term and long term debt, secured, unsecured and subordinated liabilities; a description of the off-balance sheet exposures of the institution and its legal entities, including a mapping to its critical operations and core business lines; the identification of the major or most critical counterparties of the institution as well as an analysis of the impact of the failure of major counterparties on the institution's financial situation; each payment, clearing or settlement system of which the institution is directly or indirectly a member, including a mapping to the institution's legal entities, critical operations and core business lines; an identification and mapping of the legal entities and the interconnections and

interdependencies among the different legal entities (e.g. capital, funding and liquidity arrangements, cross-guarantee arrangements).

As for recovery plans, resolution plans must be updated at least annually or in case of changes to the legal or organizational structure of the institution, its business or its financial position that might have an impact on the plan. The latter shall include a demonstration of how critical functions and core business lines could be legally and economically separated from other functions so as to ensure continuity upon the failure of the institution; a description of the processes for determining the value and marketability of the critical functions, core business lines and assets of the institution; an explanation by the resolution authority on how the resolution options could be financed without any extraordinary public financial support; a detailed description of the different resolution strategies that could be applied according to the different possible scenarios; a description of critical interdependencies; a description of essential operations and systems for maintaining the continuous functioning of the institution's operational processes.

If resolution authorities identify significant impediments to the resolvability of a group, they may require the institution to take measures in order to facilitate its resolvability. Such measures might include a reduction of complexity through changes to legal or operational structures in order to ensure that critical functions can be legally and economically separated from other functions; the drawing up of service agreements to cover the provision of critical functions; limits to maximum individual and aggregate exposures; imposition of reporting requirements; restrictions of activities and new business lines or products; requirement to issue additional convertible capital instruments.

**Appendix B**

**Methodology for the identification of large subsidiaries not listed by banking groups as "material entities" in the public section of resolution plans**

Figure 2 displays the number of material entities listed by the eleven banking groups[26] in the public portion of their resolution plans as well as the number, name and location of large subsidiaries which have not been included in the list of material entities. To identify these "missing" material entities we have first collected information on large subsidiaries provided by the Bankscope database (as of May 2013): we have chosen $ 50 billion of total assets as the size threshold to select large entities and selected all subsidiaries that Bankscope reported to have surpassed such threshold, based on the latest financial data indicated by Bankscope in the list of subsidiaries. To obtain the Bankscope list of subsidiaries we have used the 50% majority-ownership filter made available by the database: companies included in the list of subsidiaries are only those that the banking group owns with at least a 50.01% stake in every single piece of the ownership chain.

Second, we have excluded some large subsidiaries included by Bankscope but not active any longer (e.g. due to bankruptcy or merger): for this purpose, we have used information provided by Bankscope in other sections of their database and by the Orbis

[26] These groups were required to submit their resolution plans by July 1st, 2012 as their nonbank assets (US nonbank assets for foreign covered companies) were at least equal to $ 250 billion. A second group of banks, with total nonbank assets between $ 100 billion and $ 250 billion, had to submit their plans by July 1st, 2013; finally, covered companies with less than $100 billion in total nonbank assets must submit their plans by December 31st, 2013. BNP Paribas, HSBC, Royal Bank of Scotland and Wells Fargo submitted their plans in the second round and the public sections were released by regulators on July, 2nd, 2013. In our analysis we have focused on the resolution plans submitted in the first round in 2012.

database (which follows the same criteria and format of Bankscope but has a wider coverage with regard to details on subsidiaries).

Third, we have checked whether any large subsidiary included by Bankscope was not in the material entities list provided by banking groups in the resolution plan, finding a few "missing" entities for 8 out of the 11 banking groups of our sample.

Fourth, in order to double-check our results with official regulatory sources and to make sure that large subsidiaries identified by Bankscope as of May 2013 were existing at the time of submission of the resolution plans, we have verified whether the missing entities were included by banking groups in the list of subsidiaries displayed in the SEC 10-K form for US groups and in the SEC 20-F form for foreign groups; we used data for year-end 2011 as this is the most recent date before the submission of the resolution plans for which SEC data were available. For a couple of foreign banking groups we were not able to find the list of subsidiaries in the SEC 20-F form and performed the double-check with 2011 annual reports or other official documents published by the banks.

Moreover, we have performed this double check also with Federal Reserve data on banks' organization hierarchy made publicly available through the National Information Center database. Since these data can be retrieved for any point in time, we have used the end of June 2012 data, corresponding to the timing of submission of resolution plans.

Our missing entities were included in both the SEC and the Federal Reserve data, or in documents published by the banks (only in one case a subsidiary was included in the Fed data as of June 2012, but not in the SEC list as of yearend 2011, while being included in the SEC list for yearend 2010).

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# The Systemic Risk Council

December 2, 2013

The Honorable Mary Jo White
Chair
Securities and Exchange Commission
100 F Street, N.E.
Washington, D.C. 20549

**RE: Improving the Public Disclosure of Large Complex Financial Institutions**

Dear Chair White:

The Systemic Risk Council (Council)[1] is writing to request that the SEC examine the level and quality of disclosures being provided by large complex financial institutions ("LCFIs") and take steps to strengthen that disclosure. While public companies are required to provide detailed information to their investors about their activities, risks and financial condition, current disclosures by LCFIs are too opaque and leave investors and markets at risk, undermining efficient capital allocation and contributing to "too big to fail" fears. While we understand that markets receive a significant *amount* of disclosure, the quality, clarity, and comparability of important risk and intra-organizational disclosure is lacking. The simple fact is that, in general, LCFIs are much less transparent than other large public corporations. Greater transparency from LCFIs would help investors better comprehend the risks and corporate structures of these entities, enabling them to make better investment decisions and hold senior executives and board members more accountable. It also has the potential to play an important role in helping investors, counterparties, policymakers and the public, assess whether these institutions can fail without taxpayer support: bringing back essential market discipline.

A number of investors and other commenters have noted that rigor and transparency of such disclosures has declined in recent decades, to the point that few such issuers in this category meet the full and fair requirements of the Securities Exchange Act of 1934 and related provisions of Regulation SK. Better, more targeted and comprehensible disclosures are necessary to significantly improve investors' and other users' ability to properly analyze and make well-informed investment decisions about these LCFIs' risks, exposures and the complexity of business lines, including their general and business line profitability.

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[1] Systemic Risk Council: The independent non-partisan Systemic Risk Council was formed by CFA Institute and the Pew Charitable Trusts to monitor and encourage regulatory reform of U.S. capital markets focused on systemic risk. The statements, documents and recommendations of the private sector, volunteer Council do not necessarily represent the views of the supporting organizations. The Council works collaboratively to seek agreement on all recommendations. This letter fairly reflects the consensus views of the Council, but does not bind individual members. www.systemriskcouncil.org.

The Commission should require at least, the same level and detail of disclosures from LCFIs as from other large corporate entities. Yet, the quality of the information LCFIs currently provide through public documents clearly lags non-financial corporate disclosure, particularly regarding operational complexity, risk management and exposure risks. What disclosures are made predominantly take the form of boilerplate statements, rather than clear, understandable descriptions of the LCFI's circumstances. We believe there is enormous room for more transparency and detailed information to be provided without compromising proprietary information. We also believe this information should be provided in a format that is easily accessible to all manner of users, including average investors.

In general, we are concerned that disclosure practices for LCFIs fail to meet the standards that non-financial companies have had to meet for the past decade. For example, banks have historically obfuscated the disclosure of challenging or difficult information by burying such information deep within boilerplate presentations; a practice we believe that should be examined and eliminated. By comparison, non-financial companies must adhere to financial reporting rules that adequately describe their operations and risks, while presentation of financial information in earnings releases must enable readers to distinguish between "spin" and reality. Important and relevant information that is highlighted early in corporate disclosure documents should be the goal, as is generally the case now with non-financial firms.

We believe disclosures providing clear, concise and plain language information about the following issues would enable investors to more accurately assess the condition and performance of banks and to hold these institutions accountable for poor decisions. Given their size, complexity and role within in the financial system, these institutions should have better and more thorough disclosure than other types of companies, not worse. For example, LCFI disclosures should include:

- Information about their organizational structure and cross-organizational risks in a format that can be easily compared across institutions. Firms should be required to provide a group corporate structure chart, map business lines into legal entities and disclose their cross-organizational profitability, risks, credit lines and guarantees;

- Information about LCFIs' unencumbered assets that might be available to pay creditor claims in the event of failure;

- Information about the manner in which LCFIs allocate capital and expenses when they calculate returns on investment for individual business lines;

- Holdings of assets such as debt securities and loans sorted by type and by option-adjusted duration, which would better enable investors to assess sensitivity of an institution's assets and liabilities to changes in interest rates;

- Discussions about market-making, hedging and proprietary trading activities to enable investors to understand the extent of those activities and distinguish them from more traditional banking activities;

- Improved disclosure about the institutions' derivatives activities and exposures (on a gross and netted basis), including the risks and interconnections that flow therefrom. Positions on a non-netted basis by type of derivatives instrument, volume of transactions on a yearly or other periodic basis, profits/losses from derivatives trading, number and nature of counterparties and other information probably should be disclosed, as should interest income and expenses related to derivatives activities to enable investors to determine the net interest margin on the basis of reported balance sheet items, as well as on the basis of consolidated assets and liabilities;

- Non-loan financial instruments by asset class, including fixed-income, currencies, commodities and derivatives, among others;

- Value-at-risk measures using consistent assumptions about parameters of the underlying distribution, segmented by asset class in a manner consistent with disclosures made about non-loan financial instruments – and detailed explanations of why and when such risk measures change;

- Stress test results under different economic and financial scenarios;

- All major reserve categories including, specifically, legal reserves based on the type of financial activity; model-based reserves related to trading activities; reserves for credit losses, and operational reserves; and

- The effect on executive compensation of a) annual financial performance, b) contingent liabilities such as deferred compensation, and c) diluted share counts. This information should be provided in sufficient detail to enable investors to understand how firms' compensation policies affect their earnings performance and incentives for risk-taking.

Much of this vital information is currently lacking from LCFI public disclosures.

We recognize that the SEC is working extremely hard to implement regulations resulting from the Dodd-Frank Act, in addition to the myriad of market structure and trading issues that demand immediate attention. As discussions continue about too-big-to fail institutions and their resolution, enhanced disclosure could significantly improve the quality of ongoing efforts to address this issue. We hope that the SEC will begin taking steps to address the shortcomings in LCFI disclosure. One step would be for the SEC to lead an interagency effort with other FSOC regulators to improve the public disclosures of these complex institutions. For instance, the SRC also strongly supports greater public disclosure of LCFI "living wills" required by Title 1 of Dodd-Frank which are subject to the jurisdiction of the Federal Reserve Board and FDIC.[2] The Commission might also consider hosting a roundtable with representatives from the other FSOC agencies and the Office of Financial Research to discuss these issues more fully. This approach worked well during the Commission's thorough consideration of the systemic risks created by money market mutual funds. Investors could also provide invaluable assistance in these efforts.

[2] See Letter from the Systemic Risk Council to Ben Bernanke, Chairman, Federal Reserve Board and Martin Gruenberg, Chairman, Federal Deposit Insurance Corporation, Dec. 2, 2013. (Attached).

In addition, the boards of directors of these LCFIs play an essential role in sound governance. We believe boards, and particularly their Audit and Risk Committees, should play an enhanced role in the disclosure process and ensure that all public information is provided in a transparent manner. Even conscientious LCFI boards may not fully understand or appreciate the disclosure requirements applicable to banks and thus fail to exercise the guidance and oversight that is needed. In this regard, we encourage the SEC to provide greater guidance to boards of directors in ensuring full compliance with essential disclosure requirements.

As we reach a critical juncture in strengthening our financial system and addressing too-big-to-fail, regulators, investors and the marketplace all need a better understanding of LCFI operations on a number of levels that would allow a realistic exploration of restructuring and investor choices. SEC disclosure rules are a critical factor in the effort to strengthen our financial system.

Respectfully submitted,

The Systemic Risk Council

*Chair:* Sheila Bair, The Pew Charitable Trusts, Former Chair of the FDIC
*Senior Advisor:* Paul Volcker, Former Chair of the Federal Reserve Board of Governors
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# APPLIED CORPORATE FINANCE

In This Issue: **Executive Pay and Corporate Governance**

**How to Design a Contingent Convertible Debt Requirement That Helps Solve Our Too-Big-to-Fail Problem**

*Charles W. Calomiris, Columbia University, and Richard J. Herring, University of Pennsylvania*

# How to Design a Contingent Convertible Debt Requirement That Helps Solve Our Too-Big-to-Fail Problem*

by Charles W. Calomiris, Columbia University, and Richard J. Herring, University of Pennsylvania

Although debates still rage over the causes of the financial crisis of 2007-09, one thing is clear: several of the world's largest financial institutions—including Fannie Mae, Freddie Mac, Citigroup, UBS, AIG, Bear Stearns, Lehman Brothers, and Merrill Lynch—had amassed huge and concentrated credit and liquidity risks stemming from subprime mortgages and other risky investments, but they maintained equity capital that was too small to absorb the losses that resulted from those investments. In other words, relative to their risks, their equity capital proved inadequate to insulate these firms—and many others—from insolvency when the risks materialized.[1] Internal bank risk management and external prudential regulation and supervision failed precisely because they did not compute risk correctly and require the appropriate amount of equity *relative to risk*. The regulatory failure was not that equity capital requirements were too low *per se*. After all, as of mid-2006, the ratio of the market value of Citigroup's equity to the market value of its assets was nearly twice that of Goldman Sachs; but it was Citigroup, not Goldman Sachs, whose losses produced insolvency. The difference occurred because Citigroup's risk exposures, including the off-balance sheet risks associated with its implicit obligation to clean up problems in its special purpose entities and special investment vehicles, were disproportionately larger than Goldman's.

Examples of failures to constrain risk within a firm's capacity to bear loss are not hard to find. Chief executive officers and boards appeared to lack either an effective framework or the willingness to apply the appropriate tools to measure risk correctly or to constrain aggregate risk-taking within prudent limits.[2] One recent study reported that banks that provided risk managers with greater compensation and standing within their organizations not only experienced smaller crisis-related losses, but had lower stock price volatility prior to the crisis. This finding suggests that top management decisions not to prioritize and empower risk management were an important contributor to the crisis.[3]

This defect can take many forms within a bank's risk management system. It can show up as overreliance on risk decisions taken at a low level in many product lines and trading desks, without consideration of how such exposures might interact under various macroeconomic conditions. Or it can take the form of a tendency to follow the herd in an attempt to grow revenues and market share rather than questioning the adequacy of capital to absorb risks inherent in particular strategies. Other sources of vulnerability include reluctance to question fundamental assumptions about basis risks and hedges, general disregard for the risk inherent in the centuries-old challenge of funding long-term assets with short-term liabilities, and neglect of liquidity risk more generally. And coming on top of all these common risk management failings are a handful of others: the well-known tendency of people inside large organizations to override limits when they conflict with revenue goals; the difficulty of tracking aggregate exposures over complex legal structures and product silos in any reasonable amount of time; and the failure to "risk-adjust" the price of internal transfers of funds and compensation more generally.

As a fairly direct consequence of these kinds of errors of risk management, the bonuses and compensation that many financial firms granted were real, but the profits used to justify those payments were not. Not only did stockholders suffer as a result of these errors, but taxpayers were ultimately obliged to bail out insolvent large institutions or face the possibility of significant spillover costs to the rest of the financial system.

Examples of these problems can be found in the bankruptcy of Lehman Brothers, the losses sustained by UBS and AIG, the collapse of Northern Rock, the forced merger of Bear Stearns, and the collapses of Indy-Mac, Washington Mutual, and Wachovia as well as the string of losses reported by Citibank, Merrill Lynch, and Bank of America. Studies of all of these experiences have questioned whether anyone,

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1. By "equity capital" we refer here and elsewhere in this article to the economic value of equity (which we later proxy with a moving average of the market value of equity) rather than the book value of equity.

2. See Coffee (2010) for the view that these apparent failures in corporate governance may in fact be the consequence of pressure from institutional shareholders for managers to take greater exposures to risk. To the extent that this view has merit, our proposal addresses it by creating substantial dilution risk for shareholders, including the CEO, who is also at risk of losing both his equity interest and his institution-specific human capital.

3. See Ellul and Yerramilli (2010).

including corporate board members, senior management, or supervisors, even comprehended their institutions' exposure to subprime mortgage risk.[4]

These widespread failures to maintain adequate capital and to exercise effective governance of risk are all the more remarkable because regulators and supervisors have been focusing on the problems of risk measurement and capital budgeting for more than two decades. Risk-based capital is precisely the measure the Basel Committee says it has been targeting all along when setting its minimum standards for capital. Obviously, despite broad agreement that risk-based capital was the key concept on which to focus prudential regulation of capital, both bank risk managers and supervisors failed to measure risk correctly and to require capital commensurate with that risk.

Why did the regulatory system perform so badly? The failure was not the result of a lack of attention to the challenge of defining risk. The Basel Accord on Minimum Capital Requirements has undergone numerous refinements since its initial publication in 1987, including a major amendment in 1996 to account for market risks and a complete renovation of risk measurement with the announcement of Basel II in 2004. Principles for enhancing governance of risk have been addressed in a series of supervisory studies.[5] Indeed, the Basel Committee report on "The Core Principles of Banking Supervision," published as far back as 1997, incorporates sound corporate governance of risk as a key principle.[6]

Prudential regulation failed to require financial institutions to maintain adequate capital for two main reasons. First, incentive problems distorted the measurement of risk; second, incentive problems discouraged the timely replacement of lost equity capital.

With respect to the first of these problems, the process for measuring risk—on which capital requirements are based—encourages the understatement of risk. Under existing rules, banks and rating agencies control the measurement of risk that is used by regulators. Bankers and rating agencies, however, suffer from conflicts of interest that provide incentives to understate risk. Banks that understate their risk enjoy lower capital requirements; and rating agencies that do so receive larger fees, which are allocated through a competitive process known as "ratings shopping." And this means that prudential regulatory authorities, given their reliance on banks' internal models of risk and on rating agency opinions, have no credible, independent information to serve as a basis for forcing banks to raise their internal assessments of risk.

When bank risk is not measured correctly, it cannot be managed properly. And since banks have a strong incentive to understate their risks, they may often fail to identify the magnitude of their exposures to risk. If they have not measured risks properly, they cannot take appropriate measures to penalize excessive risk-taking within their firms.

With respect to the second problem—the failure to replace lost capital in a timely fashion—it is instructive to consider how long it took Citigroup and other financial institutions to deplete their capital during the recent financial crisis. Many months passed between the initial financial shocks of the crisis—the first revelations of the spring of 2007, the August 2007 run on asset-backed commercial paper, the Bear Stearns bailout of March 2008—and the systemic collapse of mid-September 2008. During the year and a half leading up to this collapse, roughly $450 billion in capital was raised by global financial institutions. Clearly, global capital markets were open, and there were many willing investors, especially hedge funds and private equity funds, as well as wealthy individuals. But many of the financial institutions most deeply affected by the crisis prior to September 2008, despite persistent and significant declines in the market value of their equity relative to assets, chose not to raise sufficient capital.

A top executive at one of those banks confessed to one of us during the summer of 2008 that, despite the need to replace lost equity, the price of his bank's stock was "too low." He was concerned that issuing significant equity in the summer of 2008 would have resulted in substantial dilution of stockholders—including existing management. Institutions that had suffered large losses preferred to wait, hoping for an end to the crisis in the summer of 2008 and the elevation of the prices of risky assets that would accompany that market improvement. After the bailout of Bear Stearns, they also believed that if their situation deteriorated severely, the government would be likely to step in. That expectation further undermined any incentive to replace equity capital promptly, much less preemptively. On balance, the best strategy was to wait and hope for the best.

Of course, these two problems—*ex ante* risk mismeasurement and mismanagement and *ex post* failure to replace equity once it is lost—are related. If banks believed that they would be forced to replace lost capital in a timely fashion, they would have greater incentive to manage risk properly and to maintain adequate equity capital commensurate with that risk in the first place. Why? Because they would face the prospect of a significant cost (in the form of stockholder dilution) from having to replace lost equity capital in a troubled market.

If regulation failed because of distorted or inadequate incentives to measure and manage risk and gains from

4. For a study of the collapse of Lehman Brothers, see Valukas (2010). For an account of the losses sustained by UBS, see UBS (2008). For AIG, see Eisenbeis (2009) and Special Inspector General for TARP (2009). For Northern Rock, see Kirkpatrick (2009). For Bear Stearns, see Kirkpatrick (2009) and SEC (2008). For Indy-Mac and Washington Mutual (WaMu), see Office of the Inspector General (2010) and Kelly (2008). For Wachovia, see Corston (2010). For Citibank, see Special Inspector General for TARP (2011). For Merrill Lynch and Bank of America, see SEC (2010).

5. See BCBS (1997); BCBS (1999a); BCBS (1999b); BCBS (2005); BCBS (2006); BCBS (2008); BCBS (2010a); BCBS (2010b); Joint Forum on Financial Conglomerates (1998); and Davies (2003).

6. BCBS (1997).

postponing the replacement of lost capital, then it follows that a central focus of reform should be to address those two incentive problems. How can we change bankers' incentives to improve the accuracy of their risk assessment, manage risk better, and replace lost equity capital faster?

In this article, we show how a properly designed *requirement* for convertible contingent capital (or "CoCos") can provide strong incentives for systemically important financial institutions (SIFIs) to make two critical changes: (1) implement strong systems of risk governance to measure and manage risk; and (2) raise additional capital or sell assets in a timely fashion, when necessary, to minimize the chance of violating minimum capital adequacy standards. In addition, our proposed requirement would supplement an institution's capacity to bear loss. Finally, a suitably designed CoCo requirement would supplement supervisory oversight with market discipline. Of course, other complementary reforms of prudential regulatory standards would also be desirable,[7] but we show that they are not substitutes for CoCos, which would play a unique and critically important role in improving incentives for risk management and the maintenance of adequate capital, especially for large, "too-big-to-fail" institutions.

## Why Equity Capital Requirements Are Not Enough

Basel III has placed its main emphasis on requirements for more and better-quality capital and more intensive supervision. But do the increases in capital contemplated by the Basel Committee offer a solution to the two crucial problems of risk mismeasurement and failure to replace lost capital in a timely fashion? History does not provide much reason to be optimistic about the solutions proposed to either of these problems.

Although the emphasis on increasing shareholders' equity is a move in the right direction, these reforms will not solve the fundamental problems of accurate risk measurement and maintenance of adequate capital. The measure of shareholders' equity employed by Basel is an accounting measure that inevitably lags its true economic value, thus avoiding timely recognition of loss. The ability to avoid timely recognition of loss encourages banks to understate risk, since they will not be forced to raise dilutive equity in the wake of losses. And after unrecognized losses occur, banks' incentives for risk management can become even more distorted, since the temptation to "gamble for resurrection" can lead thinly capitalized banks to increase their risk exposure.

Why does the Basel approach to capital requirements produce errors and lags in the recognition of loss? The measure of shareholders' equity continues to rely on accounting principles that, while they vary from country to country, combine book values and "fair values" when measuring capital compliance.[8] This approach inevitably delays the recognition of losses and permits banks and supervisors—both of whom may perceive benefits from postponing the recognition of loss—to conceal losses in a number of ways.[9] Bankers can be very creative in their use of complex transactions to disguise losses. Supervisors face major challenges in detecting and preventing manipulation of book values through gains trading—for example, the common practice of recognizing capital gains on positions that are held at book value while deferring the recognition of losses. The bankruptcy of Lehman Brothers revealed another device to exaggerate capital adequacy measures—the so-called Repo 105 or 108 transactions, which disguised repos (a collateralized borrowing) as a removal of assets and thus a reduction in the size of the balance sheet.[10]

The agility of firms in devising strategies for regulatory and accounting arbitrage makes it unlikely that supervisors will ever be able to keep up. Effective regulation is a continual contest between those who are being regulated and their generally less well-paid and less well-informed supervisors. Even when regulators attempt to close a loophole, regulatees usually find another in only a matter of weeks.

Supervisors not only can be caught unaware of losses, they may also prefer not to recognize them for regulatory purposes. "Forbearance"—especially the ever-greening of loans to borrowers who would otherwise be delinquent, just enough to keep them current on their debt service payments—remains a constant challenge for supervisors, who often find themselves under substantial political pressure to delay bank loss recognition.

We emphasize that delayed recognition is not only a technical challenge. Supervisors are subject to substantial political pressure, and that pressure often leads them to prefer to forbear and "play for time" rather than enforce capital adequacy requirements. The purposeful delays by the U.S. authorities in the 1980s, and by the Japanese and Mexican authorities in the 1990s, are just the most visible examples of a widespread phenomenon that has been documented time and time again. Supervisors also may lack incentives to enforce the spirit of prudential rules because they are likely to be challenged in judicial or administrative proceedings or legislative hearings for any action that forces an institution to recognize losses, especially when there is some hope that losses will be reversed in time. Moreover, in some countries, supervisors have been held personally liable and subject to criminal penalty for such supervisory errors. That legal liability is often

7. See Calomiris (2011).

8. This, of course, creates problems in comparing capital adequacy across countries. For example, countries that follow international financial reporting standards take a much stricter view of netting off-balance sheet positions than does the U.S., which follows generally accepted accounting principles (GAAP), so that the leverage for the five major U.S. dealers in derivatives is substantially understated relative to that of their European peers.

9. For evidence of such understatements of loss during the recent crisis, see Huizinga and Laeven (2012).

10. Valukas (2010).

used to threaten supervisors against taking aggressive actions. The result of these measurement and incentive problems is that supervisory action is often delayed until losses become indisputable instead of when they actually occur.

Given these information and incentive problems that face supervisors, there is little reason to have confidence in new supervisory powers to bring about timely recognition of loss. For example, Britain's Financial Services Authority, which was widely regarded as one of the most effective, forward-looking supervisory authorities in the world, provided an especially egregious example with regard to its oversight of Northern Rock. Just weeks before the bank collapsed, supervisors authorized it to adopt the advanced internal measurements approach to risk weighting its mortgages, which reduced its required capital by 30% and permitted that amount to be paid out to shareholders.

Accounting loss recognition lags were substantial during the recent crisis. For example, Darrell Duffie notes that "Citibank, a SIFI that did receive a significant government bailout...had a Tier 1 capital ratio that never fell below 7% during the course of the financial crisis and was 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, or about 1% of its total accounting assets."[11] Moreover, as we have seen, the thin layer of equity capital maintained by most financial institutions can be overwhelmed by sudden losses that occur in a crisis, especially if they respond by selling illiquid assets into thin markets.

The IMF has shown that all of the banks that required bailouts in the crisis reported higher-than-average levels of capital in the last period before the intervention.[12] Moreover, the recent crisis made clear that all three components of the regulatory capital adequacy ratio are fundamentally flawed: one, the measure of capital in the numerator did not reflect an institution's ability to absorb loss without going through some kind of resolution process; two, the risk adjustment of assets in the denominator did not reflect some of the most important risks that banks faced; and three, the minimum acceptable level of capital so reported was much too low.

The ease with which banks, especially SIFIs, can evade capital regulation and engage in regulatory arbitrage suggests a need for creating some form of reliable, incentive-based regulation that makes maximum use of available information (including market-based information) to force them to recognize and replace lost capital and to measure and control their risks more effectively. The current approach of understating risk *ex ante*, disguising loss *ex post*, and seeking to avoid dilutive equity issues when they are needed most leaves SIFIs with few options if that risky gamble does not pay off—apart from an appeal for a bailout accompanied by the implicit threat that their demise will cause chaos if they do not receive a bailout.

Of course, one could argue that making initial book equity capital requirements much higher would solve some of the incentive problems that distort risk measurement and risk management, even without providing effective incentives for the timely replacement of capital. Recently, several academic proposals for reform have called for significant increases in bank equity requirements. Clearly, if banks maintained, say, 50% of their financing in the form of book equity, then bank stockholders, rather than taxpayers, would almost certainly pay the full cost of any understated risks gone wrong. But would that approach encourage proper risk management by banks? Would it produce banking system outcomes consistent with the public interest?

We do not think so. First, a draconian increase in equity requirements would raise the costs of finance for banks. That increase in cost would translate into a contraction of banking activity—most importantly, bank lending. A recent paper argues that more equity finance might not substantially increase the funding cost of banks.[13] We do not agree. Equity is costlier to raise than debt for fundamental reasons associated with both information and managerial agency problems.

With respect to information problems, a seminal paper by Stewart Myers and Nicholas Majluf (1984) showed that there can be large "adverse selection" costs associated with raising external equity that result from information "asymmetries"—that is, the possibility of significant differences between management's and other insiders' views of a company's future earnings prospects, and what outside investors, and hence the market, are able to know.[14] Such adverse selection costs are reflected, first and foremost, in the significant negative average market reactions to the announcement of equity offerings.

Such costs are also reflected in the much higher underwriting costs paid by companies to issue equity rather than debt. These underwriting costs reflect the attempts by issuers to overcome asymmetric information problems during "road shows" in which their investment bankers meet with institutional investors to explain the issuers' motives for raising capital and attempt to allay any concerns they may have about the prospects of the issuer.[15] And consistent with this argument about the high information costs of equity, studies of bank "capital crunches" provide clear evidence that shocks to bank equity capital have large contractionary effects on the supply of lending—presumably because it is more costly to replace lost equity than to reduce loans.[16]

To be sure, the negative signaling effects associated with equity offerings will tend to be mitigated if equity offerings

11. Duffie (2009)
12. IMF (2008)
13. Admati and others (2011)
14. Myers and Majluf (1984).
15. See Calomiris and Tsoutsoura (2011).
16. As assumed by Myers and Majluf (1984) Bernanke (1983), Bernanke and Lown (1991), Kashyap and Stein (1995 and 2000), Houston, James, and Marcus (1997), Peek and Rosengren (1997 and 2000), Campello (2002), Calomiris and Mason (2003), Calomiris and Wilson (2004), and Cetorelli and Goldberg (2009).

## More on the Information and Agency Costs of New Equity

Companies with unused debt capacity and profitable uses for more capital but whose managers believe their shares are undervalued will generally issue debt rather than equity to avoid diluting the value of existing stockholders' claims. Conversely, companies whose managers think their companies are overvalued may be tempted to issue equity, even if they have no current profitable uses for the capital. But sophisticated investors understand these motives, as well as the tendency of managers (especially in mature industries) to waste excess capital on low-return investments. And such investors are accordingly skeptical about announcements of plans to raise outside equity, especially when companies have no clearly profitable uses for the capital. Recognizing their own informational disadvantage and managers' incentives to issue overpriced securities (or at least to avoid issuing undervalued ones), investors usually respond to announcements of new equity offerings by significantly reducing the value of the shares.[20]

are mandated by regulatory actions rather than chosen voluntarily. But the costs associated with such signaling effects will not be eliminated by a regulatory mandate. First, even if all banks went to the equity market at the same time to raise equity, banks whose managers know they are in better condition will have an incentive to spend more on underwriting to ensure that investors receive credible information of their superior condition. Those expenditures contribute to the costs of equity capital requirements. Second, there will still be differences among banks in the extent to which they choose to raise equity, which suggests that there will still be material signaling costs associated with announcing equity offerings. For example, some banks—particularly those with high-quality risky assets whose value might be very hard to reveal to outsiders—may well decide to avoid equity offerings and meet their higher equity ratios by selling some of their less opaque assets instead. For both of those reasons, higher equity capital requirements will not eliminate the information costs and attendant adverse selection risks that make equity offerings costly.

In addition to the information costs associated with raising equity, very high equity ratios are likely to have undesirable effects on managerial efficiency—effects that are well understood by investors, and almost certainly part of the explanation for their negative reaction to such offerings under many circumstances. Although a moderate increase in equity requirements can encourage better risk management by bankers, a dramatic increase could have the opposite effect. As Anil Kashyap, Raghuram Rajan, and Jeremy Stein argued in a 2008 paper, requiring banks to hold too much equity is likely to create significant agency problems by insulating bank managers from market pressures and blunting the urgency of their push for efficiencies.[17]

Whether the tax benefits of debt—stemming from the deductibility of interest in corporate taxation—should be included when measuring the relative *long-run* costs of equity finance has been hotly debated.[18] But even if tax savings matter only from a transitional perspective, banks that were permitted to raise capital in part through CoCos[19] would almost certainly choose to issue capital faster—and thus restrict loan growth less—during the transition to higher capital. And given the desirability of improving access to credit as one of the means of promoting economic recovery, transitional issues are far from trivial.

All of this is not to say that we oppose a significant increase in capital requirements. We believe that a significant increase is necessary. At the same time, however, we are convinced that there are negative—not just diminishing—social returns to achieving a higher amount of capital solely by raising equity capital requirements beyond a certain point. In our view, raising equity requirements on SIFIs to 9.5% of risk-weighted assets under the new Basel III requirements makes sense, and we could also see legitimate arguments for raising capital requirements even higher. But a draconian increase in equity capital requirements would not be desirable because the risk of default at SIFIs can be reduced in less costly ways. Moreover, we emphasize that the moderate increase in the required capital ratio under Basel III would not alone be sufficient to allay all concerns about the adequacy of capital to cover potential losses on assets, much less enough to ensure the adequacy of capital after a significant loss. That becomes especially clear when one recognizes the ability of financial institutions to target a higher level of risk that would more than compensate for any moderate rise in capital requirements.

17. Kashyap, Rajan, and Stein (2008).

18. See, for example, Admati and others (2011).

19. The CoCo that we propose is designed to be converted from debt to equity only in rare circumstances. Thus we would argue the tax authorities should permit the deduction of interest on CoCos, like interest on straight debt, for tax purposes.

20. By contrast, the average market reaction to new debt offerings, though also negative, is not significantly different from zero.

Furthermore, it is hard for regulators to determine the appropriate amount of capital for a bank, a task that is complicated by the reality that that amount changes over time with changes in risks. A given amount of equity, even if appropriate today, may not be the right amount tomorrow. Because a properly designed CoCo requirement creates incentives for banks to issue equity to maintain the right amount of capital—that is, equity plus CoCos—relative to risk, CoCos encourage not only timely replacement of lost capital and better management of risk, but also decisions to respond to increased risk with higher equity.

The limitations of equity capital requirements as a prudential device that we have just identified—problems of measuring and enforcing book capital requirements, the asymmetric information costs and managerial efficiency problems of excessive reliance on equity requirements, the manifestation of those costs in inadequate credit supply, the social costs of potentially inadequate capital, and the need to respond to losses and increases in risk through timely increases in capital—all of these considerations motivate our proposal for a contingent capital requirement. Our proposed contingent capital requirement retains debt finance as the dominant form of bank finance. Most importantly, it ensures that management would face strong incentives to manage risk, set capital appropriately, and replace any significant loss of equity capital with new equity capital offerings on a timely basis.

The case for CoCos over equity requirements alone can also be justified in terms of political economy and fair treatment of bank shareholders. Banks that currently benefit from the safety net will undoubtedly resist any increase in capital requirements because, thanks to implicit and explicit government protection of their liabilities, they already benefit from the lower borrowing costs they would otherwise expect to gain by raising more equity. When faced with a choice between issuing CoCos or equity, however, bankers should prefer CoCos. CoCos permit banks to continue to make use of the tax shield provided by the different treatment of interest and dividends in the tax codes of most countries.[21] But most important, the issuance of CoCos need not result in the significant loss of value to bank shareholders that a mandate to issue new equity almost certainly would inflict on them.

## Design Choices of the Various CoCo Proposals

The essential idea of a CoCo has been widely discussed for a number of years by a number of banking and finance scholars. Despite numerous differences in design and specific intent, virtually all versions of CoCos have the common goal of establishing a contractual structure that increases bank capital in adverse states of the world. That can occur either directly through contractual convertibility or indirectly through incentives to raise new equity capital voluntarily. Recapitalization restores the bank to a viable position of capital adequacy and thereby avoids regulatory resolution.

The existing proposals can be characterized according to how they differ with regard to three critical features: (1) the amount of CoCos required to be issued as a percentage of the total book value of assets; (2) the trigger for conversion from bonds to equity; and (3) the conversion rate, or the amount of equity to be issued in exchange for CoCos when converted. The differences among proposals with respect to these three key design features (which are laid out in detail in the Appendix) reflect differences in the weights that the various CoCo proposals attach to the following three objectives:

1. providing a contingent cushion of common equity that results from the conversion of debt when the CoCo is triggered, which we label the "bail-in" objective;
2. providing a credible signal of default risk in the form of the observed yield spread on convertible debt prior to any conversion, which we call the "signaling" objective; and
3. providing strong incentives for the voluntary, preemptive, and timely issuance of equity (or rights offerings) as a means of avoiding highly dilutive CoCo conversion, which we call the "timely equity-issuance" objective.

The particulars of the design characteristics of our proposal reflect our view that the primary objective of a CoCo should be the timely issuance of equity objective. Our recommendations regarding the amount, the trigger, and conversion terms of CoCos all reflect our view that the central objective served by requiring CoCos should be to encourage the prompt voluntary issuance of equity in response to significant losses of equity by a SIFI. Rather than focusing on facilitating a more orderly liquidation of assets, as advocates of the bail-in objective propose, or on creating a convertible debt instrument that would credibly suffer substantial default risk via conversion and so provide useful, forward-looking prices embedding the perceived possibility of default, our proposal aims primarily to provide institutions with a strong incentive to strengthen risk management and take remedial measures to raise equity *well before* they face a substantial risk of insolvency.

As pointed out in a study by D'Souza and others (2009), the incentive to issue equity preemptively will be strong given the following three conditions: (1) the amount of CoCos to be converted is large relative to the book value of equity; (2) the trigger is credibly and observably based on market prices and

21. Albul, Jaffee, and Tchistyi (2010) suggest that a plausible way to limit the tax shield benefit from issuance of CoCos might be to permit a full deduction for "interest payments that correspond to the coupon on similar, straight bank debt, but to exclude any part of the [CoCo] coupon that represents compensation for the conversion risk. As McDonald (2010) notes, tax deductibility may have "political value" by virtue of eliminating a reason for banks to oppose contingent convertibles. Although CoCos are of value even without the tax shield, if banks are deprived of a tax benefit that is available to other institutions, some business is likely to migrate from the banking sector to the shadow banking sector, where it is more difficult to monitor and regulate. Of course, the first best solution to this problem would be to eliminate the asymmetry in the tax treatment of dividends and interest payments.

pegged to a high ratio of equity to assets (and thus conversion would take place well before serious concerns about insolvency arise); and (3) the conversion ratio is dilutive of existing common shareholders, creating a "sword of Damocles" that makes the prospective dilution from issuing preemptive equity appear desirable by comparison.[22] Under these conditions, a SIFI experiencing significant loss and approaching the point at which dilutive conversion would be triggered would choose to issue significant equity, possibly combined with asset sales, which would raise the market value of its outstanding equity relative to assets, thereby avoiding the conversion trigger.

To be effective for this purpose, the required amount of CoCos must be a significant percentage of total bank assets to make the threat of dilution from conversion a serious concern for bank managers and shareholders. And the dilutive conversion rate, in combination with the size of the CoCos being converted, must result in more dilution of common stockholders than the alternative preemptive stock offering. By a "dilutive" CoCo conversion, we mean a conversion that will leave the holders of CoCos with at least as much value in new equity as the principal of the bonds they surrender.

The study by D'Souza and others emphasizes that CoCos designed to result in substantial dilution upon conversion not only encourage banks to voluntarily raise preemptive equity capital to avoid CoCo conversion but also have another practical advantage as debt instruments. The strong incentives they provide management to avoid conversion are likely to make CoCos trade more like fixed-income instruments than ordinary convertibles. As a result, CoCos are likely to have greater appeal to institutional investors,[23] who tend to prefer low-risk debt instruments.[24] In the colorful words of Thomas Huertas, "To the common shareholder, contingent capital holds out the prospect of death by dilution, and it can be anticipated that shareholders would task management to undertake the necessary measures to avoid such dilution."[25]

Given the strong incentives embedded in our version of CoCos to promote timely equity offerings, we believe that our CoCos would almost never convert into equity. And as a consequence, they are likely to play little if any role in either "bail-ins" or in signaling CoCo holders' losses, which should be expected to be nearly zero. Of course, if a bank experienced a sudden and complete loss of market confidence (say, as the result of accounting fraud á la Enron or WorldCom), then the SIFI would probably be unable to avoid conversion through a preemptive equity offering. Although we value the ability of CoCos to absorb losses under such circumstances, our main interest is in creating very strong incentives for managers to take corrective action while they still have multiple options for doing so.

Not only would the corrective action of a preemptive stock issue or asset sale preserve high ratios of equity to assets in the wake of significant shocks, but the knowledge of the existence of CoCos and the anticipation of the possibility of facing dilutive CoCo conversion would create strong incentives for management to maintain high ratios of capital, accurate measures of risk, and effective controls on risk at SIFIs. CoCo conversion would be a CEO's nightmare: not only would existing stockholders diluted by the conversion be calling for his head, but he would also face an onslaught of sophisticated new block holders of stock—the institutional investors who formerly were CoCo holders—who would also likely be eager to sack senior management for its demonstrated incompetence.

The literature on CoCos has become vast in a short period of time, with numerous studies highlighting the potential value of requiring some form of contingent equity capital infusion for banks through conversion of existing debt, insurance contracts, or rights offering as buffers against loss.[26] The Dodd-Frank Act has mandated that the Federal Reserve study the scope for use of some minimum amount of contingent capital as part of regulatory capital requirements.[27] And a statement released by the Basel Committee (2011) sets out standards that CoCos must meet to qualify as tier 1 or tier 2 capital. The Swiss have specified a requirement for CoCos. In addition, the European Commission in 2011[28] proposed standards for debt "bail-ins" that are designed to avoid the use of taxpayer funds by requiring mandatory conversions of debt to equity. And several banks have begun issuing one or another version of them. Thus requiring a minimum amount of subordinated debt instruments that convert automatically into equity in adverse states of the world prior to reaching the regulatory insolvency intervention point has been endorsed by numerous regulators as a credible means of promoting market discipline.

In the past, financial economists and regulators have

22. This can be viewed as a reversal of the debt overhang problem, in which shareholders are reluctant to issue equity because most of the gains will go to creditors. Our approach provides incentives for shareholders to issue equity preemptively in order to avoid massive dilution.

23. Some insurance companies and bond mutual funds, which have been substantial holders of subordinated debt in the past, have protested that their regulators will not permit them to hold CoCos because they may convert to equity. But if the conversion occurs, the equity could be quickly sold and reinvested in bonds; therefore that does not seem to be an insuperable constraint.

24. D'Souza and others (2009) runs simulations to show that the strong incentives for CoCo issuers to avoid conversion would make conversions extremely rare; thus they would have yields quite close to those of traditional subordinated debt. During the Brookings-Nomura-Wharton Conference on Capital and Financial Markets, at which an earlier draft of this chapter was presented, Shigesuke Kashiwagi reported on the results of a survey of more than 150 institutional investors around the world, which was conducted by Nomura. The survey was designed to gauge the appetite of institutional investors for contingent capital instruments. The survey showed that 74 percent of respondents were either "relatively comfortable" or "very comfortable" with their ability to value Crédit Suisse Buffer Capital Notes (an early example of a CoCo). Of the 150 respondents, 46 percent had purchased Crédit Suisse Buffer Capital Notes and 50 percent had purchased varieties of CoCos issued by Lloyds Bank and Rabobank.

25. Huertas (2009), p. 5.

26. See, for example, Doherty and Harrington (1995), Flannery (2005), Kashyap and others (2008), D'Souza and others (2009), Huertas (2009), Duffie (2009), Pennacchi (2010), Pennacchi and others (2009), Bolton and Samama (2010), and Hart and Zingales (2010). For a review of this literature, see Murphy and Willison (2011).

27. See section 112 (a).2.I of the Dodd-Frank Act.

28. European Commission (2011).

assumed that at least some measure of market discipline would be achieved by having banks issue traditional subordinated (or sub) debt that does not convert into equity.[29] But CoCos are superior to straight sub debt as a form of required capital from several perspectives. First, by making subordinated debt convert into equity *prior to* bank insolvency, CoCos eliminate the necessity of a politically charged decision about whether to impose losses on debt holders after intervention—something most regulators were reluctant to do in the recent crisis. Since CoCos will have already converted into equity, they will share in any losses suffered by equity holders, and so the issue of imposing loss is removed from consideration. CoCos, unlike straight subordinated debt, will offer greater credible protection for deposits against loss in adverse times.

Second, because CoCos would credibly remain in the bank and suffer losses in insolvency states, the prices of CoCos will accurately reflect their true risks. Given the widespread practice of bailing out subordinated debt during the crisis, sub debt can no longer serve this function.

Third, in the event that conversion is triggered, CoCos provide a better buffer against losses to depositors, counterparties, and senior debtors than subordinated debt because CoCos cease to accrue interest once they convert and therefore reduce liquidity pressures on the bank to some extent.

Fourth, and most importantly, if properly structured (as discussed above), CoCos will give incentives to boards and senior managers to replenish any significant losses of equity on a timely basis and also to strengthen controls over risk and corporate governance.

Of course, if an institution waits too long, or experiences a sudden, dramatic loss of market confidence (as in the Enron collapse), it may find that equity markets are closed to it or that it can sell assets only at distressed prices. That is why SIFIs are likely to launch new issues or sell assets long before they approach the CoCo conversion point, particularly if the CoCo trigger is set high enough so that this point is reached long before insolvency (when it may be too late to issue new shares).[30]

## Setting an Appropriate Trigger and Related Issues

An appropriate trigger must be accurate, timely, and comprehensive in its valuation of the issuing firm.[31] What's more, it should be defined so that it can be implemented in a predictable way so that CoCo holders can price the risks inherent in the instrument at the time of its offering. The latter point has been emphasized by one rating agency that refused to rate a CoCo in which the conversion is contingent upon the decision of a regulator or of bank management.[32]

Some proposals for contingent capital assume that the book values of the institution's equity relative to its assets would be the appropriate conversion trigger for CoCos.[33] But as an accounting concept, book value is subject to manipulation and is inevitably a lagging indicator of deterioration of a bank's balance sheet.[34] And the problem with using book value as the trigger is not just one of managerial dishonesty.[35] As we saw earlier, regulators and supervisors have consistently shown a marked reluctance to opine negatively about SIFIs in a way that will become public. Such forbearance leads to protracted delays in recognizing problems. Thus, a principal rationale for requiring the issuance of CoCos is to reinforce official supervision with market discipline.

What market-based measures could be employed as the

29. A long tradition in the theory of capital regulation suggests that some form of credibly unprotected subordinated debt would be useful to include as part of a bank's capital requirement because of its role as a disciplinary device. The primary motivation behind the subordinated debt idea (Horvitz (1983); Guttentag and Herring (1987); Calomiris (1999); Shadow Financial Regulatory Committee (2000); Herring (2004)) is that requiring a bank to issue a minimum amount of junior, unprotected debt, which would suffer first loss in the event of an insolvency, helps to publicize market perceptions of default risk. That could inform bank supervisors about the condition of a bank and make supervisors more likely to act rather than forbear from disciplining banks (since the signal is public). Junior debt yields are especially useful as indicators to policymakers since the FDIC is in a senior position relative to junior debt. Thus, observing the yields on junior, subordinated debt provides a helpful indicator of market perceptions of the risk borne by the FDIC. If supervisors can detect risk in a timely fashion, bank failures will be less likely because, first, banks will have to react to supervisors' concerns by limiting their risk and raising their equity capital once they suffer losses that increase their default risk on debt; second, banks that are unable to prevent continuing deterioration in their condition will be subject to credible prompt corrective action (PCA) to prevent them from becoming deeply insolvent. Indeed, the advocates of sub debt requirements therefore have traditionally seen a sub debt requirement as a complement to PCA. PCA envisions rule-based interventions by regulators (triggered by indicators of weakening bank condition) to require that banks increase capital and reduce risk prior to becoming insolvent. The problem in practice, however, is that intervention, which is triggered by book value ratios, typically has not been sufficiently prompt to permit any effective corrective action to be taken.

In response to the mandate within the Gramm-Leach-Bliley Act of 1999 that required the Federal Reserve and the Treasury to study the efficacy of a sub debt requirement, a Federal Reserve Board study reviewing and extending the empirical literature broadly concluded that sub debt could play a useful role as a signal of risk. Despite that conclusion, no action was taken to require a sub debt component in capital requirements; instead the Fed concluded that more research was needed. The development of the credit default swap (CDS) market and recent research showing that CDS yields contain important information about bank risk not otherwise available to supervisors (Segoviano and Goodhart (2009)) has added further to interest in finding ways to harness the information content of sub debt for regulatory purposes. Other observers, however, have noted that actual sub debt yields and CDS spreads were quite low during the financial boom of 2005-07, indicating that they would not have provided a timely signal of increased bank risk in 2006 and early 2007. On the other hand, advocates of sub debt requirements have noted that outstanding bank sub debt in 2006 and 2007 was not credibly unprotected, and in fact was bailed out during the crisis in most cases. Indeed, all of the subordinated debt of Fannie Mae and Freddie Mac was bailed out. In that sense, the failure of sub debt to signal problems could simply reflect correct expectations by market participants that the debts that they were holding were not effectively at risk.

30. One problem frequently noted by Charles Goodhart—which does not apply to our proposal—arises with CoCos that aim to achieve the bail-in objective. Bailing in debts via conversion when banks are near the insolvency point may make it harder for banks to raise funds as they near that low CoCo trigger. In other words, since bail-in CoCos are intended to give haircuts to debt holders, investors will not be keen to buy them when the prospect of a haircut is near. Under those conditions, equity issues also may not be feasible. Goodhart worries that bail-in CoCos, therefore, could be destabilizing for banks nearing financial distress and thus would either be counterproductive or not enforced. Our emphasis on CoCos with high triggers, which dilute stockholders in favor of debt holders, does not suffer from this problem.

31. D'Souza and others (2009).

32. This point may be an important constraint on sales of CoCos because some institutions that would be natural holders of CoCos are not permitted to hold unrated securities.

33. See D'Souza and others (2009) and Hart and Zingales (2010).

34. For example, the Japanese banking system was insolvent for almost a decade while still satisfying its minimum book value capital requirements under the Basel standards.

35. It may also involve the complicity of accounting firms in window-dressing transactions as shown in the Lehman Brothers case.

trigger? The two obvious candidates are credit default swap (CDS) spreads and stock price movements. CDS markets seem less desirable for the purpose of deriving triggers for two reasons. First, the markets are relatively shallow and thus may be more susceptible to manipulation. Second, the pricing of risk is not constant over time; an observed spread at one point in the business cycle under one set of market conditions can be indicative of a higher level of risk than the same spread observed at another time under a different set of business conditions.[36]

Equity values, if used properly, would provide the best source of information for designing a trigger. Indeed, some of the best-known cases of large-firm failures that surprised rating agencies and regulators were signaled well in advance by *severe and persistent declines in the aggregate market values of their equity.* For example, KMV's ratings of WorldCom's and Enron's debts were relatively successful in predicting their defaults. The reason for KMV's success was that their model is based on the Black-Scholes approach to measuring default risk as a function of two market-based variables: leverage (as measured using *market* values) and asset risk (which is also derived from the volatility of stock returns). Similarly, market value information about Lehman Brothers provided an early warning of its problems. One study, after evaluating the company's assets and liabilities on a market value basis, concluded that the substantial and protracted decline in Lehman's share price rendered it insolvent on several occasions during July and August 2008.[37] If Lehman had been required to issue CoCos with a trigger based on its market value of equity, this decline in Lehman's market value would have produced conversion of debt into equity long before insolvency.

As we have noted, the existence of a properly designed CoCo requirement would also provide all financial firms with strong incentives to voluntarily raise equity capital in large amounts before hitting the CoCo trigger. Lehman postponed a significant issuance of equity capital during the summer of 2008, in the hope that its share price would rise. If it had faced the prospect of CoCo conversion, it would almost certainly have issued new equity to avoid a much more dilutive conversion of CoCos. Provided the CoCos have face value that is a substantial proportion of the face value of equity, and that the conversion is triggered well above the point of insolvency—and at a rate that is at least sufficient to maintain the face value of the CoCos in terms of the market value of new equity—the voluntary issuance of equity above the trigger point is likely to be more favorable to shareholders than the conversion of CoCos, even under extreme assumptions about the potential decline in share prices in reaction to the announcement of an equity offering.[38] Bank managers who seek to maximize the value of shareholders' claims in the firm always have a strong incentive to prevent the triggering of the conversion of CoCos by strengthening the governance of risk and, if necessary, preemptively issuing equity into the market or selling assets, *as long as the dilution effect of the CoCo conversion is sufficiently large.* Even managers not intent on maximizing shareholder value *per se* will want to avoid the potential corporate governance consequences of a massive CoCo conversion, which would almost certainly produce a shareholder revolt that is led by preexisting shareholders who have been diluted and joined by former holders of CoCos who have become inadvertent shareholders. That might improve the market for corporate control, which is virtually dormant for most highly regulated institutions.

Of course, there is cause for concern that stock market prices may be unreliable measures of true value. Declining equity values are reliable only as rough measures of a SIFI's health if the declines are sufficiently large and persistent—and even in such cases, stock price declines offer only a rough indication of the actual extent of the deterioration of the firm's financial health.

Fortunately, that indication is good enough to serve as an effective trigger for CoCos. And with the aim of smoothing fluctuations in share prices and reducing the noise in market value signals, we suggest using a 90-day moving average of the ratio of the market value of equity to the sum of the market value of equity and the face value of debt. We refer to this ratio as the quasi-market-value-of-equity ratio, or QMVER.[39] Besides limiting the effects of share price fluctuations and noise, the use of such a ratio would also make it more difficult for speculators to force a CoCo conversion through a coordinated bear run on a bank's stock.[40] (See Figure 1 for an illustration of the smoothing effect of the 90-day moving average on the QMVER of Citigroup and JPMorgan Chase

36. See, for example, Bekaert, Hoerova, and Lo Duca (2010).

37. See Valukas (2010), which derived the market value of assets by adding the equity market capitalization and the market value of liabilities. The study then used the balance sheet identity to infer the market value of assets, which could be compared with the face value of Lehman's liabilities.

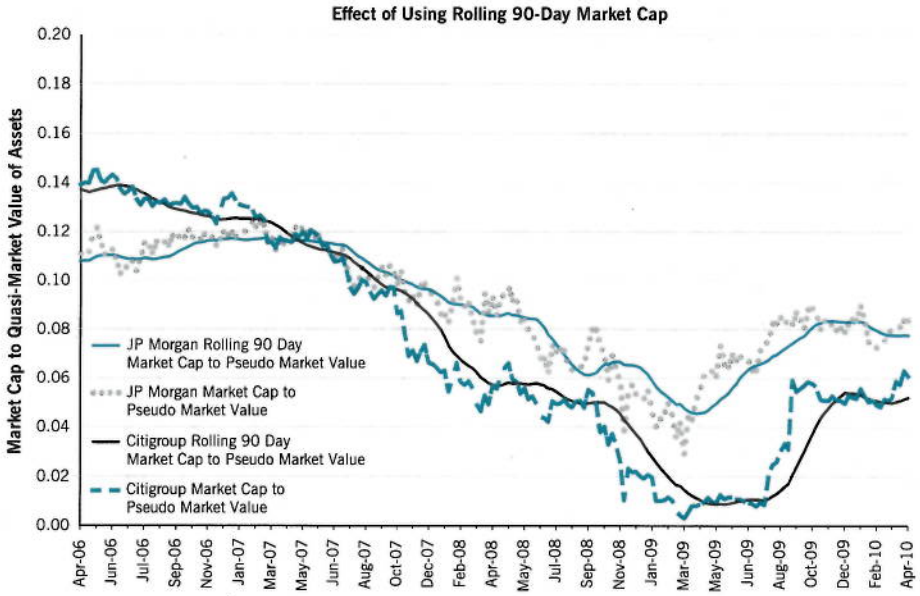
38. As demonstrated by D'Souza and others (2009).

39. Given the practical difficulties of pricing bank debt on an ongoing basis and the fact that in equilibrium, the structure of CoCos that we propose would result in little risk of conversion, we believe that it is not worthwhile to attempt to price bank debt when determining the denominator of the QMVER, hence our reliance on a "quasi" market-value-of-equity ratio rather than a true one. Because the market value and face value of debt are likely to remain reasonably close to one another (except in the case of major interest rate shocks), we do not regard this as an important deficiency. Furthermore, one can argue that using the face value of debt when setting a QMVER trigger is conservative, since it does not allow the ratio to rise as the result of decreases in the value of debt related to increased *default* risk.

In principle, liabilities could be adjusted for movements in the risk-free rate but not for movements in the risk premium. So long as monetary conditions are stable, however, that is a second-order refinement of a straightforward measure that would tend to undermine its transparency.

40. Albul, Jaffee, and Tchistyi (2010) find that holders of CoCos will have an incentive to manipulate the equity price only if the ratio of the equity conversion value to CoCo value is high enough to make the conversion profitable for the holders of CoCos. In contrast, bank equity holders have an incentive to manipulate equity prices only if the ratio of equity conversion value to CoCo value is low enough to make the forced conversion profitable for them. Note that if the trigger is a long moving average, the resources required to manipulate the share price over a sufficiently long period would be very substantial. Moreover, a sustained departure from the equilibrium price is likely to attract speculators who can profit from resisting the attempt to manipulate share prices.

Figure 1 **The Smoothing Effect of a Ninety-Day Moving Average on the Quasi-Market-Value-of-Equity Ratio, April 2006–April 2010**




Source: CRSP Database

during the period April 2006-April 2010.)

Would a trigger based on the QMVER be desirable based on the criteria of predictability, timeliness, comprehensiveness, and accuracy? Clearly, it is a comprehensive measure of firm value. (In fact, the market capitalization of a bank would be viewed by most economists as *the only* reliable comprehensive measure of value—one that includes, in principle, the value of tangible and intangible assets as well as off-balance sheet positions.)

Because the market values of the shares of SIFIs are continuously observable in broad, deep, resilient secondary markets—markets that continued to trade actively even during the depth of the financial crisis (when many other markets ceased to function)—a trigger based on equity valuation will be timely. There is an obvious trade-off between the greater timeliness of a short moving average period and the greater reliability of the signal from a longer time period. We suggest 90 days for the moving average based on the experience from the recent crisis, which suggests to us that 90 days offers plenty of time for policymakers to respond to low-frequency disruptions—such as the August 2007 run on asset-backed commercial paper—and also plenty of time for banks to respond to declines in equity value by raising new equity in the market.

With respect to the latter point, we note that between September 2007 and September 2008, some $450 billion in capital was raised by financial institutions. A typical road show for a fully marketed seasoned equity offering is measured in weeks. Although many seasoned equity offerings nowadays are executed on an expedited basis, especially by large firms, it is probably reasonable to assume that the due diligence required to issue equity into the market during a time of severe loss would require the offering to be fully marketed, with a somewhat protracted road show. Hence, we think that a 30-day moving average window for the trigger may be a bit short if the intent is to motivate share offerings in the wake of equity value losses.

A trigger based on the QMVER would also make the valuation of CoCos more predictable. We do not mean to imply, of course, that stock market returns are predictable but rather that markets are able to forecast the time-varying volatility of those returns and therefore to make reasonable inferences about the probabilities of different potential states, including movements into the neighborhood of the trigger. That is useful for pricing CoCos and bank stock, since in the presence of a CoCo requirement the anticipated effects of dilution—both from CoCo conversion and from preemptive equity offerings to prevent CoCo conversion—would factor into the pricing of both CoCos and bank equity. The ability to model conversion when it is based on observable functions of market equity prices is a highly desirable feature of the QMVER trigger.

Will the QMVER be a sufficiently accurate measure of financial condition? Yes, so long as the demands placed on the measure are not excessive. Equity prices are not perfectly reliable, and they are especially unreliable in detecting small

valuation changes over short periods of time. They also may be subject to manipulation. For those reasons, it is useful to sacrifice some degree of timeliness by relying on a moving average. But for the purpose of constructing a credible, predictable, comprehensive, and reasonably accurate measure of large swings in the market value of a SIFI, the market value of the firm is the only real possibility. So long as the user does not seek to achieve false precision, equity is reliable.

For example, suppose a trigger were defined as follows: the CoCo will convert from debt to equity if and when the ratio of the market capitalization of the bank to the quasi-market value of the bank falls to 4%.[41] Assuming the bank started with a prudent ratio of market cap to the quasi-market value of assets, a decline to this trigger point would provide a reasonably accurate measure of a sustained decline in the value of the firm. Since the share prices are 90-day moving averages, no SIFI could reasonably argue that the decline in the value of its equity was the product of market manipulation or irrational shareholder behavior.

Is there cause for concern that CoCo holders might try to force conversion through a coordinated bear run on a bank's stock? We believe that the length of the moving average, the liquidity of the equity market, and the ability of banks to issue equity in response to price declines (discussed further below) would prevent such a strategy from yielding a profit. Nevertheless, as an added precaution against any possibility of market manipulation, we suggest limiting investments in CoCos to qualified nonbank institutional investors and requiring that any such investor be prohibited from simultaneously holding a bank's CoCo and shorting its equity position.[42] That prohibition would not limit short selling in a bank's equity, but would prevent CoCo holders from coordinating a short-selling strategy designed to force CoCo conversion.

Many policymakers and academics have argued in favor of cyclical variation in capital standards, which has also been embodied in the buffer component of the Basel III approach to capital requirements. That topic is beyond the scope of this chapter, but suffice it to say that by fixing the minimum proportion of CoCos relative to the quasi-market value of the firm's assets, our approach would provide strong incentives for firms to raise capital during good times, when they can do so most cheaply. It would also encourage banks to be more cautious about funding unsustainable lending booms with small capital buffers. In that sense, CoCo requirements could automatically help to achieve a key objective of cyclical variation in capital standards even without varying actual capital requirements over the cycle. At the same time, we recognize that time-varying capital requirements for equity and CoCos may be desirable because they would allow firms to reduce outstanding CoCos somewhat in recessions, and to mitigate the contractionary effects of capital requirements on lending. But such reductions should be allowed only if CoCo requirements are raised to above-average levels during expansion periods, otherwise the relaxation of capital requirements will provide inadequate protection against the risk of insolvency.

Because the trigger for CoCo conversion would occur while the SIFI is still demonstrably solvent and because preemptive equity issues (before the trigger point) would result in further increases in equity, the CoCo requirement would arguably make insolvency extremely unlikely. Nevertheless, because unusually severe shocks will occasionally happen, it is still important to have available a prompt corrective action (PCA) regime as well as an effective system of resolution to go with it. And for the same reasons that a ratio of market value to the quasi-asset value of the firm would serve as the best trigger for CoCo conversion, it would also serve as the best trigger for PCA. If the CoCo conversion trigger occurred at 4%, then the PCA trigger should start if the firm breaches the 2% ratio again after the recapitalization achieved by the CoCo conversion.

But this raises another important policy question: If CoCos convert, how quickly should the firm have to reissue a new batch of CoCos? Under our proposal, CoCo conversion would happen only for firms that experience a sudden and lasting loss of the confidence of the equity market. Such firms are likely to become distressed and enter into resolution. But if they do not, they should be required to place new CoCos into the market within a reasonable period of time—say, within a year.[43]

Should CoCo conversion be triggered by *system-wide losses* of capital or other macroeconomic indicators instead of an individual bank's losses? While indexation of bank debts to system-wide states of the world can be justified from a variety of perspectives,[44] in order for CoCos to provide incentives for the appropriate management of risk and capital at each bank, there must be a link between the individual bank's circumstances and the triggering of CoCo conversion. For that reason, system-wide triggers—which are potentially useful for some purposes—are not useful for CoCo requirements of the kind that we envision.

## The Right Amount and Conversion Ratio for the CoCos

Because the comparative efficacy of CoCos as an incentive device depends crucially on their dilutive effects on equity holders, it is important that CoCos be issued in sufficient

41. We have chosen a 4% trigger for illustrative purposes because it is roughly equivalent to the 4% Tier One Ratio that prevailed at that time. Since then, the Basel Committee has concluded that standard was not nearly high enough and we concur.

42. Our proposal also prohibits banks from purchasing CoCos—both their own and those issued by other banks.

43. See also Flannery (2009).

44. Diamond (1984); Hellwig (1998); Gersbach (2010).

## Poorly Designed and Well-Designed CoCos.

Two issues of contingent capital—one by Rabobank (a cooperative) and the other by Lloyds—have proven to be significantly more expensive than subordinated debt. But it is important to note that those two issues present very different incentives to the managers than those that would be provided by the CoCos contemplated in our proposal. In the case of Rabobank, which is a mutual, there are no shareholders to be diluted and the conversion terms are extremely unfavorable to the holders of CoCos—an 85% reduction in the value of their claims upon conversion. The Lloyds issue of CoCos was part of an exchange in stressed circumstances. Moreover, the issuance of the bonds during the crisis probably increased their cost.

A more interesting—and to us more instructive—experiment is the February 2011 issue of CoCos by Crédit Suisse. This issue, which was made by a bank that fared comparatively well during the crisis, was designed to buttress the new Basel III capital requirements. Although many institutional investors (especially regulated insurers and bond mutual funds) that have been the main buyers of hybrid capital instruments have warned that they cannot hold the bonds without changing their investment mandates to allow them to hold equity-linked debt, Crédit Suisse reported a large number of inquiries from wealthy individuals seeking higher yields as well as hedge funds and other asset managers hoping to exploit the "price anomalies inherent in a nascent market."[47] Clearly the traditional holders of hybrid capital—instruments that the tax authorities are willing to treat as tax deductible but the regulatory authorities have been willing to count as capital for regulatory purposes—are reluctant to exchange them for CoCos because the regulators have shown by their actions during the recent crisis that they will protect holders of hybrid capital from loss, preferring instead to shift the losses to taxpayers. When the $2 billion Crédit Suisse issue was made, it proved to be an overwhelming success. The CoCos featured a coupon of 7.875% and would be converted if the common equity tier 1 ratio of Crédit Suisse fell below 7%. Crédit Suisse received orders exceeding 11 times the amount on offer.

quantity, especially relative to the amount of equity capital required (since relative dilution is key to ensuring preemptive offerings of equity). For that reason, we suggest that, alongside a roughly 10% requirement for the ratio of book equity[45] relative to book assets, regulators require a similar ratio of CoCos relative to book assets.

To see how such a requirement might have worked during the recent crisis, in which banks were required to hold a minimum of 2% common equity relative to risk-weighted assets (both measured in book value terms), it seems plausible to propose that the minimum required amount of CoCos consistent with our proposal would have been set at roughly 2% of the quasi-market value of the firm's assets.[46] Under those assumptions—employed for illustration only—we note that a 4% trigger would set off a conversion of CoCos equal to 2% of the quasi-market value of the bank's assets. That would imply a huge potential dilution of equity holders. To maximize the incentive effects from the threat of dilution upon conversion, all of the required CoCos should be converted when the ratio hits the trigger.

Similarly, to ensure incentives for preemptive equity offerings, the conversion ratio should be set so that stockholders face significant dilution from conversion. Conversion should thus require the issuance of enough new shares per face value of CoCos that the post-dilution market value of the shares received is greater than the face amount of the CoCos.

To be more specific, and to ensure adequate incentives for timely equity offerings while the bank still has access to the equity market, we propose the following combination of CoCo design features (which are summarized in Table 1): Commensurate with the current Basel III book equity requirement for SIFIs—which envisions as much as a 9.5% tier 1 equity requirement relative to risk-weighted assets—we propose that the amount of CoCos be set at 10% of the book

45. Our CoCos proposal does not link the amount of CoCos to off-balance sheet asset positions, such as derivatives. That could be done, in several possible ways. For example one could use accounting concepts such as the loan equivalent value of the derivatives portfolio, to compute an additional amount of assets or risk-weighted assets, over and above on-balance sheet assets and risk-weighted assets, for purposes of the equity and CoCos requirements. Alternatively, one could argue that improvements in disclosure of derivatives positions might be adequate in the presence of our on-balance sheet CoCos requirement, even in the absence of such additional adjustments. If detailed public disclosures were made about (1) the net long or short positions of the total off-balance sheet positions with respect to the major asset pricing factors (various benchmarks, such as credit risk measures, exchange rate risk, interest rate risk, etc.), (2) the "deltas" of each of those positions (that is, the sensitivity of the value of the net position to changes in the various factors), and (3) the concentration of counterparty risk and the quality of counterparty risk in the gross positions, then the market value and volatility of the bank share price would reflect off-balance sheet exposures reasonably accurately. In the presence of our CoCos trigger, this would incentivize management to manage off-balance sheet risks conservatively, since the failure to do so would create a risk of adverse market reactions, which might require preemptive and dilutive equity offerings, or in extreme cases, even trigger a CoCo conversion.

46. The crisis showed that the regulatory definition of the numerator, the risk-weighted denominator, and the minimum acceptable ratio were completely inadequate. Nonetheless, for this retrospective examination of the crisis it is interesting to see whether employing the quasi-market-value-of-equity ratio would have been informative in separating SIFIs that would require intervention from SIFIs that did not. Basel III will require a much higher level of equity and the issuance of CoCos should be larger as well.

47. Hughes (2011).

Table 1 **Summary of Key Features of Proposed CoCo Requirement**

| Feature | Recommendation |
|---|---|
| Primary goal | Prompt recapitalization |
| Minimum amount of CoCos | 10 percent of book value of assets |
| Trigger | QMVER of 8 percent, using a ninety-day moving average of market value |
| Conversion ratio | 5 percent dilutive of the market value of stockholders' shares relative to the face value of their shares |
| Conversion amount | All CoCos are converted on reaching the trigger |
| Holders | Qualified nonbank institutional investors holding no short equity positions in the common equity |
| PCA trigger | If 8 percent trigger is reached twice |
| Time to replace converted CoCos | One year |

value of assets. To ensure adequate dilution risk to shareholders, we propose that all CoCos convert upon hitting the trigger with a conversion ratio that is 5% dilutive of equity holders, meaning that the value of the shares upon conversion is 1.05 times the face value of the bonds. And we suggest an 8% QMVER trigger for CoCo conversion based on a 90-day moving average.

## Does Our CoCo Proposal Suffer from a "Multiple-Equilibria" Problem?

Some finance scholars have challenged whether CoCos of the type that we propose are feasible. In particular, Suresh Sundaresan and Zhenyu Wang—hereinafter SW—argue in a 2010 paper that CoCos with market value triggers can suffer from a "multiple-equilibria problem" unless conversion is carefully designed to avoid any dilution of preexisting holders of common stock.[48] In their model, dilutive CoCo conversion leads to the possibility of more than one potential time path of stock prices for any given time path of asset values. SW suggest that such multiple equilibria in share prices could make it impossible to price CoCos and could also lead to potentially destabilizing bear runs on bank stocks, as small perturbations in market prices might lead market participants to switch from a belief in one equilibrium to another. SW therefore conclude that CoCos should not both be based on market equity triggers and convert into equity at ratios that favor CoCo holders—that is, conversion ratios in which the face value of CoCos is converted into more shares than the equivalent amount of equity, using the equity price at the date of conversion.

But, as we demonstrate below, that conclusion, when applied to our proposed CoCo requirement, is incorrect. Nevertheless, as we also show, SW's analysis (and example) can be used to motivate the specific design features of a proper CoCo requirement, which we now provide.[49]

Following SW, we assume a bank with the following asset and liability structure (in which all values are defined in market value): assets of $100; senior bonds (or deposits) of $80; and CoCos of $10. There is also one share of equity whose initial value is $10, and thus the total market value of the bank's equity also starts out at $10. In the absence of a CoCo, the bank's equity share would be valued at $10. But as SW show, in the presence of a CoCo with a market value trigger and a dilutive conversion feature, $10 is only one of the possible values of the equity share.

The following example illustrates the problem identified by SW. We assume that the CoCo conversion trigger is set based on a market value of equity of 5% or less of assets, which in the SW example translates into a stock price of $5 per share or less. The conversion ratio is assumed to be dilutive of preexisting shareholders. Specifically, we assume that the $10 in CoCos converts into three shares of stock if the stock price is $5 (the trigger price). Such a conversion ratio is "dilutive" because the value of the CoCos after conversion—at roughly $15—would be greater than their face value of $10. (A non-dilutive conversion—one in which the value of the CoCo's claim would be roughly the same after conversion as before it—would require a conversion ratio of CoCos into two shares of equity when the equity price is $5.)

Under these circumstances, SW show that there are two equally plausible expected outcomes (or "rational expectations equilibria"): one in which the stock price is $10 per share and no conversion takes place and another in which the stock price is $5 and conversion takes place. Both outcomes are "rational" in the sense that they are consistent with expectations and are fulfilled by equilibrium prices. That is, if the market believes that the price should be $5 per share, conversion will happen, the new number of shares will be four, and the original owners of the bank, who owned 100% of the

48. Sundaresan and Wang (2010).

49. Concerns about multiple equilibria have encouraged some CoCo proponents to design triggers based on book value ratios or to give banks an option to convert rather than require conversion (see Bolton and Samama (2010)). Those design choices are problematic. As we have already noted, a book value trigger depends on the behavior of management and supervisors (which is not easily predictable) and thus makes the probability of CoCo conversion difficult to quantify. Giving banks the option to convert creates a different problem: during a crisis, if banks believe that asset prices are temporarily depressed, they may prefer not to convert, thus reducing the benefit of adding new capital to the bank. Furthermore, in a model in which banks have the option to convert, the existence of CoCos will not encourage pre-emptive offerings of equity. Here we show that neither a book value trigger nor a bank option for conversion is necessary to deal with the potential problem of multiple equilibria.

bank's equity prior to conversion, now own only 25%. The new amount of equity will be $20, since $10 in CoCo debt was cancelled upon conversion causing net worth to rise by the same amount. And the price per share of equity will be $5.

But what if instead the market believes that the price should be $10? In that case, conversion will not occur (since the market value of equity does not hit the 5% trigger). And so we have an example in which two different share values can be described as rational expectations equilibria. That is to say, if the market believes the price is $5 per share, then that belief would turn out to be true—but if the market believes the price is $10 instead, then that belief would turn out to be true.

There is, however, a problem with this argument. Without stating it, SW make a critical assumption that effectively determines their conclusion: namely, that the market *knows* that the bank will take no action to prevent the low-stock price equilibrium of a $5 share price from occurring. In other words, SW's argument implicitly requires that the bank refrain from issuing new equity if the price of equity begins to fall toward the lower equilibrium value of $5.

To see why this implicit assumption is important, consider the following amendment to the SW example. We make all the same assumptions employed in SW but make two additional assumptions: one, it is possible for the bank to issue new shares prior to conversion if the price of shares in the market starts to move toward the lower equilibrium price; two, a moving average trigger is used whereby the triggering of conversion occurs only if the stock price falls to the trigger value or below for a finite length of time.

Under these assumptions, if the share price begins to fall below $10, the bank could issue one share of common stock into the market at, say, any price between $10 and $5 a share. To be more specific, suppose that the stock price falls to $5 and that the bank issues one share of stock into the market at $5 a share. Doing so raises both the value of assets and the value of equity by $5. Because the trigger for CoCos is defined in terms of the ratio of market value of equity relative to assets (the QMVER), at a $5 share price, *conversion will not take place,* since the offering of a new share has raised the new QMVER above 5%.

Note that without conversion the lower equilibrium price of $5 a share is no longer a rational expectations equilibrium, since the expectation of conversion that underlay the $5 price will not be realized. Indeed, the price of equity would rebound to $7.50 a share (which contradicts the $5 equilibrium assumption) if the share price had actually fallen to $5, prompting the bank to issue the single share into the market.

But this "out-of-equilibrium" offering and price volatility should not occur, since the $5 share price is no longer a rational expectations equilibrium; therefore, there is no reason to expect that the price would ever have fallen to $5 in the first place. The bank will never have to issue into the market at $5 a share, since $10 is now the unique equilibrium price (and arbitrage in the market will ensure that the market price will never fall below $10). Moreover, as our example makes clear, the bank will want to announce and follow this share-issuance policy, since this would enable it to avoid the dilutive conversion of CoCos that occurs in the lower price equilibrium.[50]

Several clear lessons emerge from this analysis. First, in light of the possibility of multiple equilibria, it is especially desirable to put a moving-average process into the definition of the trigger, which would require, as in the example above, that the QMVER trigger be hit over a period of time, not just at a moment. Second, when considering the necessary length of time for that moving average, it is important to make sure that the period is long enough to give management time to arrange for a preemptive equity offering to prevent conversion. As stated earlier, we believe that a 90-day moving average would allow plenty of time for a stock offering. In the next section of the paper, we show that using a 90-day moving average during the crisis of 2007-09 would have provided ample opportunity for banks that were losing equity value to have issued equity to restore their QMVERs.

Third, CoCo triggers should be set relative to the QMVER, *not* the share price. Stock offerings could change the price per share (as could a stock split); obviously, it is the total equity buffer that should matter from the perspective of the CoCo trigger, and that should be set as a proportion of assets.

In summary, we have shown that our CoCo proposal does not suffer from the SW multiple-equilibria problem. A substantial CoCo requirement—one that requires banks to maintain a significant proportion of their balance sheet financing in the form of CoCos—with a dilutive conversion ratio that is triggered by a smoothed QMVER trigger (which we define as the 90-day moving average) would not produce multiple equilibria in the pricing of bank stock.[51]

## How the CoCos Requirement Would Have Worked in 2007–08

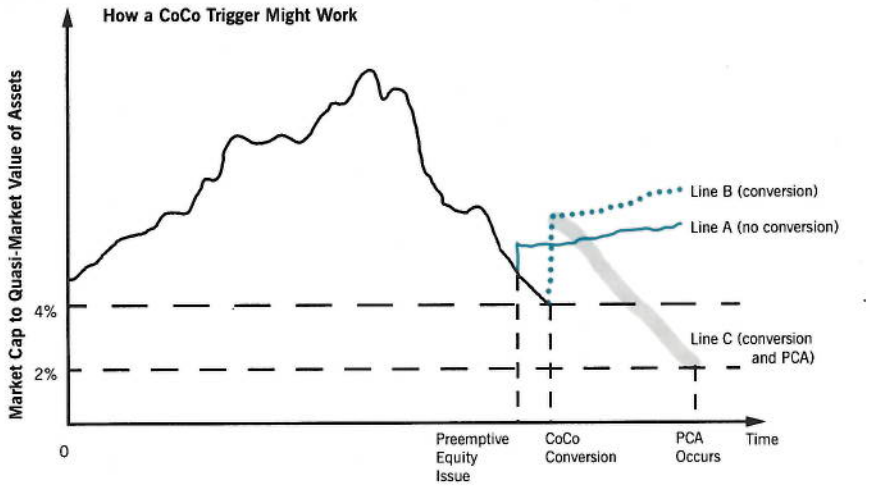
Figure 2 illustrates how the proposed CoCo trigger would work for three different firms in somewhat different circumstances.

As the QMVER falls, approaching the trigger, a firm like A (whose path of values is shown in line A) would issue equity (or sell assets) to avoid hitting the trigger.

50. As early as 2009, many advocates of CoCos with dilutive conversion were pointing precisely to the incentives CoCos can create for timely issuance of common stock to prevent dilutive CoCo conversion (D'Souza and others (2009)). Indeed, as we emphasize, this feature of CoCos has been central to the discussion of why they would be helpful in preventing "too-big-to-fail" bailouts.

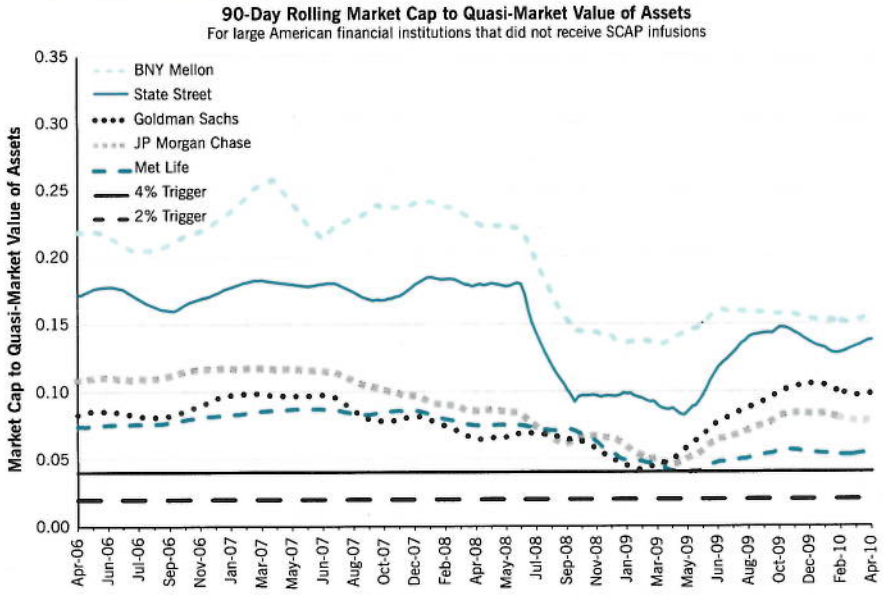
51. Our solution to the multiple-equilibria problem is different from that in Pennacchi, Vermaelen and Wolff (2010) and Pennacchi (2010). In that proposal, incumbent stockholders have the right to purchase converted equity at a non-dilutive price from new (post-conversion) stockholders. That option avoids multiple equilibria, but because it eliminates the cost of dilution on incumbent stockholders, it also dampens the incentive to raise new capital to replace lost capital or to manage risk better *ex ante*, which we see as central advantages of our proposal.

Figure 2 **How a CoCo Trigger Might Work**




Source: Author's illustration.

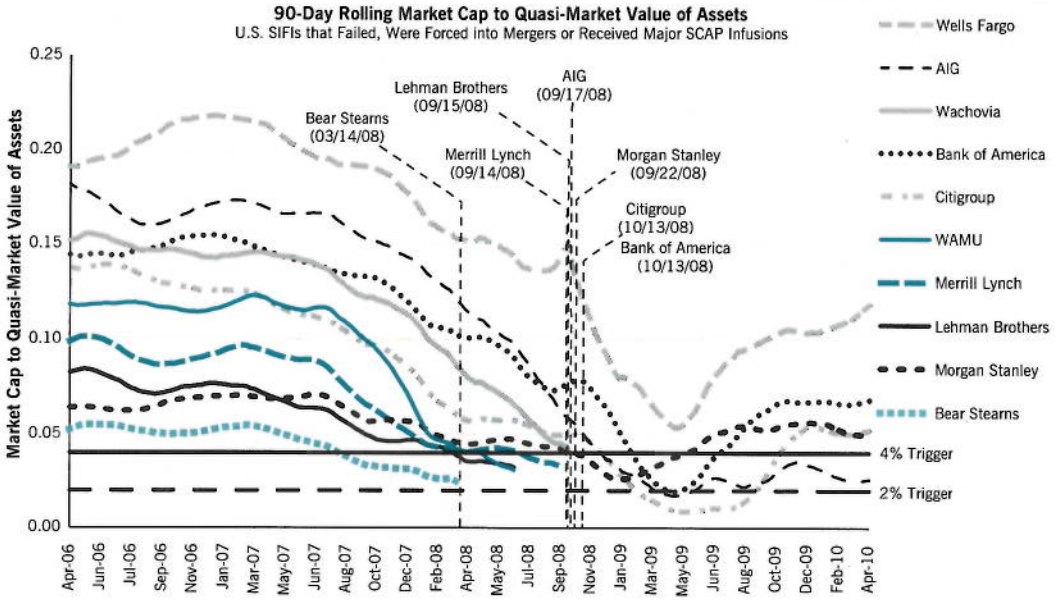
Figure 3 **Ratio of the Market Cap to the Quasi–Market Value of Assets for the Five SIFIs That Did Not Require Substantial Government Intervention, April 2006–April 2010**




Source: Author's illustration.

If for some reason a firm like B is unable or unwilling to issue equity or sell assets, the conversion of CoCos is triggered (line B). That will result in massive dilution of existing shareholders, who will undoubtedly be angry, and the new shareholders who formerly held CoCos are likely to be unhappy as well. Shareholder dissatisfaction on this scale is likely to lead to the ouster of the existing management and the installation of new management that will strengthen the governance of risk. And so CoCo conversion might enhance the virtually moribund market for corporate control of regulated financial institutions—an important element of market discipline that is largely ineffectual among regulated banks. It will certainly add management's motivation to take corrective action before reaching the trigger. The doubling of capital and reduction in

Figure 4 **The Ratio of the Market Cap to the Quasi–Market Value of Assets for Ten Banks That Required Substantial Government Intervention, April 2006–April 2010**




Source: Author's illustration.

liquidity pressures (and perhaps a new management team) may buy the firm enough time to successfully restructure.

Finally, we come to the case of firm C, which may be unable to use the additional capital and time to accomplish restructuring or recapitalization. Its value continues to decline until prompt corrective action is triggered at, say, 4% (line C).

Figure 3 shows the movement from April 2006 to April 2010 of the ratio of the 90-day moving average of the market cap to the quasi-market value of assets for five SIFIs that did not require government support. It is important to emphasize that this simply illustrates the ability of the QMVER ratio measure to distinguish between soundly managed institutions and weaker institutions; it does not show what would actually have happened if all institutions had been subject to a CoCo requirement.[52] Note that none of these institutions fell below the 4% ratio. If the CoCo requirement had been in place, only Goldman Sachs and MetLife might have triggered a conversion. The prospect of dilution, however, would almost certainly have caused the managers of both firms to issue more equity or sell assets to avoid hitting the trigger.

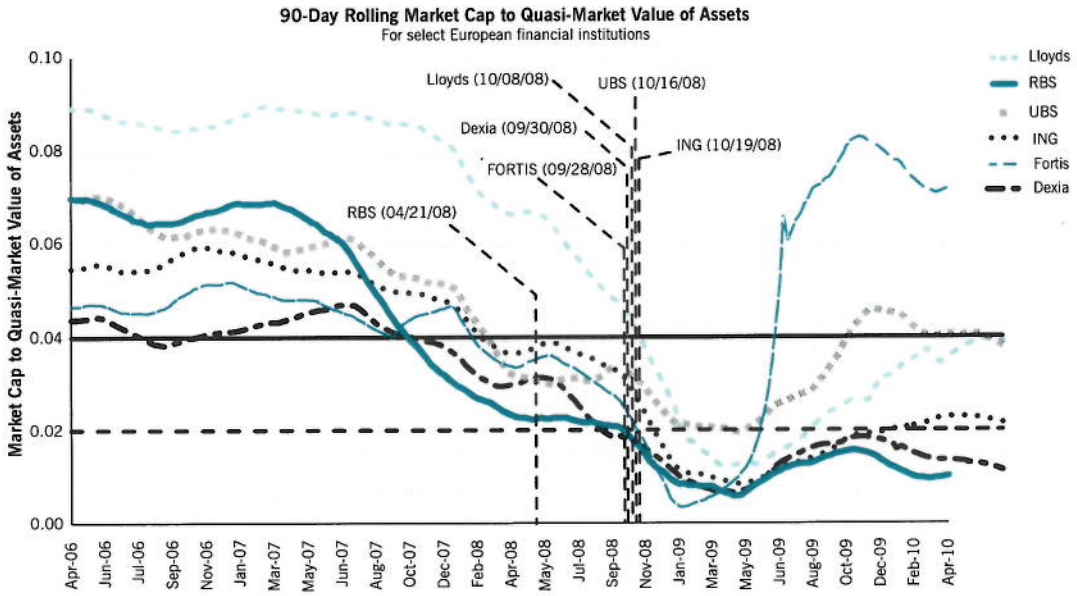
Now consider the contrast of Figure 3 with Figure 4, which shows the movement of the ratio of the market cap to the quasi-market value of assets for ten banks that required substantial government support, were forced to merge, or entered bankruptcy. Note that all of these firms breached the 4% ratio and, in most cases, they did so many months before they were subject to intervention. It is especially noteworthy that Bear Stearns, Lehman Brothers, and AIG—all of which appeared to catch the supervisory authorities by surprise and were subject to different interventions, hastily improvised over sleepless weekends—had in fact fallen below the 4% trigger several months earlier. It is possible that a CoCo requirement might have induced those firms to adopt higher standards of risk governance and make more aggressive attempts to raise capital or sell assets. At a minimum, it would have bought them additional time to prepare for an orderly resolution and would have been a clear warning to regulators to refine their rapid resolution plans.

Figure 5 shows a similar pattern for the European banks that required large-scale intervention. In almost every case, the 4% ratio was breached long before intervention was hastily arranged.

In summary, a 4% trigger based on the ratio of the market cap to the quasi-market value of assets might have been an effective device for preventing the collapse of all of these troubled SIFIs during the 2008-09 crisis. Moreover, each of these institutions would have faced strong incentives to strengthen preemptively the corporate governance of risk and,

52. In the presence of our proposed CoCo requirement, the rate of decline in the QMVER would be higher than in the absence of the requirement. Stock prices would take into account the small probability of conversion, and as the QMVER approached the trigger and that probability increased, two effects would reduce stock prices: the dilution that existing shareholders would suffer from conversion, and the loss of tax savings from the deductibility of interest. Those effects, however, would be small, since the probability of conversion would remain small (banks would endogenously prevent the QMVER from getting too close to the trigger value by issuing equity).

Figure 5 **Ratio of the Market Cap to the Quasi–Market Value of Assets for European Banks That Required Substantial Government Intervention, April 2006–April 2010**




Source: Author's computation based on data from Datastream.

if necessary, issue equity or sell assets to avoid triggering their CoCos months earlier. And the supervisors could not have claimed to be taken by surprise at the sudden collapse of the firms. Although we illustrate our counterfactual with a 4% trigger, we suggest an 8% trigger for our CoCo conversion requirement because it would have worked even more effectively to prevent the post-September 2008 collapse by creating stronger incentives for voluntary equity issuance by banks long before September 2008.

In particular, our proposed CoCo requirement would have reduced the damage from the two largest failures—those of AIG and Lehman Brothers. Although counterfactuals are speculative by definition, at least three reasons suggest that such a system would have been effective if AIG and Lehman Brothers had been identified as SIFIs.

First, the issuance of CoCos would have enhanced market discipline and limited their risk taking.

Second, both firms crossed the CoCo trigger six to eight months before their demise. Since Lehman was heavily owned by its managers and employees, the prospect of dilution would have surely concentrated their minds on raising new equity, while they still had access to equity markets, or on selling lines of business or assets. And even if they had hit the conversion trigger, the automatic recapitalization would have given them more time to find a private solution to their problems, which might have involved a merger, a restructuring, an additional recapitalization, or a change in management. At a minimum, it would have warned the supervisors and resolution authorities of impending trouble so that there would have been no need to engage in desperate measures over a sleepless weekend. Breaching the PCA trigger would have conserved liquidity by restricting dividends, share buybacks, and bonuses.

Third, the primary supervisor and the college of supervisors would have had warning to prepare for the challenges that they would face in a resolution.

Fourth, even if the proposed CoCo requirement had not prevented the disorderly failures of Lehman Brothers and AIG, the consequences for other financial institutions of those failures, and for the financial system as a whole, would have been far milder under our proposed requirement. If other large financial institutions had been encouraged by CoCo requirements to maintain higher capital ratios in 2007 and 2008, the severe consequences of the collapse of money markets might have been averted. The collapse of interbank deposit, repo, and asset-backed commercial paper markets reflected ballooning counterparty risks among these global intermediaries. If large banks had issued sufficient capital in response to their losses in 2007 and early 2008, such counterparty risk would have been contained.

Since regulation of book capital ratios and supervision has proven so ineffectual, it is high time to place a greater emphasis on market signals that discipline SIFIs. CoCos, suitably designed, can be an ideal instrument for channeling such discipline in a way that strengthens the stability of the financial system.

## Conclusion

We have developed a proposal for a contingent capital (CoCo) requirement and shown that CoCos can play a unique and critically important role alongside a standard minimum book-value-of-equity-ratio requirement. If properly designed, a CoCo requirement can provide a more effective solution to the too-big-to-fail problem by ensuring adequate capital relative to risk, and it can do so at a lower cost than a simple equity requirement. A proper CoCo requirement can provide strong incentives for the prompt recapitalization of banks after significant losses of equity or for the proactive raising of equity capital when risk increases. Correspondingly, it can provide strong incentives for effective risk governance by regulated banks, and help limit regulatory "forbearance," supervisors' well-known reluctance to recognize losses.

Different proposals for CoCo requirements reflect different regulatory objectives, including facilitation of bail-ins, signaling of bank risk, and encouragement of timely voluntary offerings of equity into the market by banks that have suffered significant losses. We argue that the third of these objectives is the most important, especially for dealing with the too-big-to-fail problem.

Thus, the emphasis on the need to provide effective incentives for the timely issuance of equity informs our discussion of the proper design of CoCo contracts that would be implemented by the CoCo requirement. We show that, to be as effective as possible, a large amount of CoCos (relative to common equity) should be required; CoCo conversion should be based on a market value trigger that is defined by a moving average of a quasi-market-value-of-equity ratio; all CoCos should convert if conversion is triggered; and the conversion ratio should be dilutive of preexisting equity holders. (The details of our proposal are summarized in Table 1.)

Finally, our proposed CoCo requirement does not suffer from a potential problem of multiple equilibria, as some banking and finance scholars have claimed. Judging as best we can from the experience of the recent crisis, our proposed requirement would have been very effective in encouraging the timely replacement of lost capital early in the crisis. If a CoCo requirement had been in place in 2007, the disruptive failures of large financial institutions and the systemic meltdown after September 2008 may well have been avoided.

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## Appendix The Smoothing Effect of a Ninety-Day Moving Average on the Quasi-Market-Value-of-Equity Ratio, April 2006–April 2010

| Source | Amount of CoCos to be issued | Trigger for conversion | Terms for conversion |
|---|---|---|---|
| Doherty and Harrington (1995) | Authors use the term "reverse convertible debt." Issue will be the optimal amount of leverage for the firm. All debt will be converted when trigger is reached. | At the discretion of shareholders. | The value of new shares given to bondholders is less than the face value of the debt. |
| Huertas (2009) | An amount equal to some specified proportion of risk-weighted assets. From the diagram on p. 4, that appears to be the same proportion as that of core tier 1 capital to risk-weighted assets. | Finding by regulators that the core tier 1 capital ratio has fallen below a specified level. | Implicitly all contingent capital will be converted. Although Huertas stresses the importance of the threat of dilution, he does not specify the terms for conversion. |
| D'Souza and others (2009) | The amount issued should be large enough that the firm can be recapitalized even in dire circumstances. (Back tests suggest that CoCos equal to 6 percent of RWA would have avoided government intervention in the 2007–09 crisis.) | A "true" measure of capital above the solvency point. Authors reject market values as too volatile and accounting measures as too slow to reflect deterioration. Prefer SCAP-like stress test that would calculate a two-year forward capital ratio for the firm. | Conversion terms must be sufficiently dilutive to original shareholders to motivate them to raise equity before hitting the trigger. The more dilutive the terms of conversion and the higher the trigger point, the lower the cost of issuing CoCos because they are less likely to be converted. |
| Dudley (2009) | Amount should be large because cost should not differ much from cost of straight debt and shareholders must face the potential for automatic and substantial dilution. Full amount issued will be converted when trigger is reached. | Trigger could be tied to deterioration in the condition of a specific bank and/or to the banking system as a whole. It also could be tied to regulatory measures of capital, but Dudley prefers market measures because they tend to lead regulatory-based measures. | "The conversion terms could be generous to the holder of the contingent capital instrument" (p.7). Conversion terms should be set so that debt holders could expect to get out at or close to par value. |
| Duffie (2009) | Duffie assumes the full amount would be converted when the trigger is reached. | The trigger that converts debt to equity should be set to eliminate the debt claims before a liquidity crisis is likely to begin and with a strong enough impact on the balance sheet to forestall a self-fulfilling presumption of a liquidity crisis. Duffie rejects a regulatory capital trigger. Favors tangible common equity trigger if restricted to accounting measures. Advocates a market value trigger but warns that unless a moving average is used, it can precipitate a "death spiral." | Debt conversion should be accompanied by another sort of contingent capital that will immediately improve the cash position of the bank. Duffie favors a rights offering. |
| Flannery (2009) | Flannery uses the term "contingent capital certificates" (CCCs). Firms would not be required to issue CoCos, but CCCs could be used to offset the required amount of equity capital. Some of the CCCs would be converted to equity to replace lost equity value. Supervisors determine the minimum equity capital ratio and trigger point. SIFIs cannot hold any CCC for their own account. Since conversion may be partial, it must rely on an allocation mechanism: convert shortest remaining maturities first; sell with various seniorities so that some bonds must convert fully before others can begin to convert; select bonds randomly within a common maturity or common seniority tranche; select CCCs by lottery. | Would convert into equity if firm's capital falls below some critical, prespecified level. Conversion trigger must be expressed in terms of contemporary value of equity and scaled by the book value of assets. | The contemporary market price determines how many shares the holders of CCCs obtain. The terms for conversion should ensure that they suffer no capital loss. Conversion must happen the day after the trigger is reached. If firm is insolvent because of a sudden collapse in asset prices, covenants in CCCs must specify a conversion price that wipes out original shareholders. |
| Rajan (2009) | Banks should issue sufficient CoCos so that, when converted, they will dilute the value of old equity substantially. | Two triggers: the system is in crisis based on objective indicators such as aggregate bank losses; and the bank's capital ratio falls below a certain value. | The number of shares the debts convert into should ensure substantial dilution of old equity. |

| Source | Amount of CoCos to be issued | Trigger for conversion | Terms for conversion |
|---|---|---|---|
| Squam Lake Working Group (2009) | Banks must be required to issue CoCos because they will otherwise issue other debt securities more likely to shift costs of risky activities to government. When conversion is triggered, presumably all CoCos are converted. | Two triggers: declaration by regulators that the financial system is suffering from a systemic crisis; and the bank is found in violation of covenants in its CoCo contract expressed as a ratio of Tier 1 capital to risk-weighted assets. | Authors fear that a conversion rate based on market values would trigger market manipulation. They prefer to convert each dollar of debt into a fixed quantity of equity shares rather than a fixed value of equity. |
| Hart and Zingales (2010) | Authors reject CoCos, arguing that by limiting defaults, CoCos will provide more resources for inefficient managers to waste, while a default would force an inefficient business to restructure and incompetent managers to be replaced. They argue instead for direct issues of equity triggered by CDS price of a bank's debt exceeding a specified threshold. | An example suggests trigger might be that a bank's CDS price exceeds 1 percent on average over the previous month. Authors express concern about finding an appropriate CoCo trigger. If based on accounting numbers, it is likely to trigger remedial action that will lag actual deterioration in bank assets. If conversion is triggered when market prices are low, managers could deliberately talk down bank's value to activate trigger and obtain equity on the cheap. | Direct issuance of equity would substitute for conversion of debt. Presumably sufficient equity must be issued to reduce the CDS price below 1 percent. |
| Albul, Jaffee, and Tchistyi (2010) | Full amount will be converted. Authors also stipulate that CoCos should be substituted for straight debt. They do not specify the amount to be converted. | Conversion is triggered when capital reaches a "distressed level," but regulatory benefits are greater the higher the trigger at which conversion occurs. | No exact ratio is given, but authors emphasize that the conversion ratio of CoCos into shares should not motivate either holders of CoCos or shareholders to manipulate share prices. |
| McDonald (2010) | Amount of CoCos issued has an initial value equal to the initial value of equity. All will be converted when dual triggers are reached. If CoCos are not converted, bonds would be retired gradually and randomly as maturity approaches to avoid large gains that could occur from manipulation at maturity. | Conversion with a dual price trigger: the bank's shareholders' equity price must fall below a threshold *and* an index of financial firms' stocks must breach a pre-specified threshold. The rationale is to ensure that conversion is permitted only during a financial crisis. Market price triggers should reduce pressure on regulators and accountants at critical times. | Conversion occurs into a fixed number of shares at a premium price (so that the value of the shares upon conversion is lower than the par value of the bonds) in order to minimize concerns about share price manipulation and equity death spirals. Author expresses concern that unprofitable stock price manipulation might create a profit if trader also holds a position in market-triggered CoCos. Author believes fixed-share conversion is most likely to deter such behavior. |
| Pennacchi (2010) | Assumes that all contingent capital converts to equity when a threshold is breached. (Partial conversion introduces additional complications because the value of shareholders' equity at conversion will depend on the value of unconverted CoCos.) | Trigger is stated as ratio of market value of equity to face value of deposits. | If threshold is stated in terms of market value of original shareholders' equity and contingent capital converts at a discount to face value, the resulting total capital will be less than if the conversion were at par. To correct for this, a higher threshold should be used when conversion is at less than par than when conversion is at par. Concludes that CoCos would be a low-cost means of mitigating financial distress and would reduce a bank's moral hazard incentives so long as the conversion threshold is set at a relatively high level of original shareholders' equity. |
| Coffee (2010) | Amount of CoCos issued should be set relative to a firm's short-term debt in an amount large enough that short-term creditors will not fear insolvency. May be negotiated case by case. | Multiple triggers for partial conversion set relative to substantial declines in share price. For example, 25 percent of CoCos might be converted with a 25 percent decline in share prices since the time that the CoCos were issued. Another 25 percent would convert if the share price decline reached 50 percent, and the balance would convert if the share price fell by 75 percent. | Conversion would be for an equal face value of cumulative, senior, nonconvertible, preferred stock with voting rights. The intent is to dilute equity to deter excessive risk taking and to create a class of voting preferred shareholders who would be rationally risk averse and would curb pressures for excessive risk taking. |

| Source | Amount of CoCos to be issued | Trigger for conversion | Terms for conversion |
|---|---|---|---|
| Sundaresan and Wang (2010) | Full amount will be converted. Amount issued not specified. Upon conversion, dividends are automatically suspended. | Trigger price and conversion ratio cannot be chosen independently. | Mandatory conversion must not result in any value transfer between equity and CoCo holders. The authors conclude that only one conversion ratio is an equilibrium, and it depends on the design of the CoCo. The CoCo must be designed so that the coupon payments are indexed so that the CoCo always sells at par. In this case, the conversion ratio is simply par value divided by the trigger level of the stock price at which mandatory conversion will occur. |
| Swiss State Secretariat for International Financial Matters (2011); Swiss Commission of Experts (2010) | The authors envision two kinds of CoCos with two different triggers. Up to 3 percent of buffer capital (= 8 percent of risk-weighted assets) may be composed of CoCos. The progressive component of capital requirements is to be composed of 6 percent CoCos. That leads to a total capital requirement of 19 percent of RWA, comprising at least 10 percent common equity and up to 9 percent CoCos. | CoCos with a trigger of 7 percent of risk-weighted assets serve as a capital buffer. CoCos with a trigger of 5 percent of RWA should ensure the necessary capital reserve to finance the maintenance of systemically important functions and to see to the orderly resolution of the remainder of the bank in the event of threatened insolvency. | Conversion rate is not specified explicitly; appears to be 1 unit of equity for 1 unit of convertible debt. |

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