

Concocting Marketable Cocos

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George M. von Furstenberg^{*}

Abstract

Adding contingently convertible debt securities, cocos, in an amount equal to about 3% of the total tangible assets of financial institutions to the financing mix is a promising reform idea. Its time has come because a cocos mandate would make these institutions invest more to insure their recapitalization and the reduction of leverage and debt overhang in a crisis, and to do so by themselves, rather than by relying on fiscal support. If cocos are to live up to their promise and to become readily marketable, much work is needed on their optimal design. That design should include a trigger that is couched in a regulatory capital ratio referenced in Basel III. The trigger may be set at, or somewhat above, the minimum required. The basic design should also include conversion terms that would make the share of common equity contributed by conversion equal to the book value of that contribution in percent of total book equity after cocos conversion.

Keywords: Contingent convertibles, cocos design, contingent capital, financial reform

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^{*} J.H. Rudy Professor of Economics, Indiana University. Address: Department of Economics, Wylie Hall, Indiana University, Bloomington IN 47405 USA. E-mail yonfurst@indiana.edu .

I. Introduction

Contingent capital that can be called upon to recapitalize a company in distress can take many forms. Among them are Rights Issues, Capital Calls, Mandatory Convertible Bonds and Notes, and Reverse Convertible Securities and Debentures. The only subspecies here considered is cocos whose conversion is triggered when a level, no less than the minimum set for a specified capital ratio referenced in regulatory accounting, has been breached. After the first such issue in the United Kingdom in late 2009, by Spring 2011 cocos had been issued only in two other European countries, the Netherlands and Switzerland. This paper investigates how to appropriately design such a, still non-standard, instrument and offers some recommendations.

As documented by me (2011, pp. 13-18) elsewhere, there has been much *official* support for cocos and cocos mandates. Unfortunately, outside Switzerland, that support has remained rhetorical and non-committal. The Dodd Frank Wall Street Reform and Consumer Protection Act of 2010 calls on the “independent” Financial Stability Oversight Council it has created, which is composed mostly of the top financial regulators and housed at the Board of Governors of the Federal Reserve System (the Fed), to make recommendations to the Fed “concerning the establishment and refinement of prudential standards” (Sec. 115(a)(1)). The Council is also to “conduct a study of the feasibility, benefits, costs, and structure of a contingent capital requirement” for bank holding companies and nonbank financial companies (now) supervised by the Fed. It is to submit this study to the Congress within *two* years and then make recommendations on whether these institutions are “to maintain a minimum amount of contingent capital that is convertible to [common] equity in times of financial distress” (Sec. 115(b)(1) and Sec. 115(c)(1),(2), and (3)).

Six issues are listed which the study should include. The first four of them are summarized in italics in what follows and then discussed. Of the two remaining subject areas identified in the Dodd-Frank Act, one contains “implementing regulations.” The other calls in part for studying what adding cocos to the financing mix would do to a firm’s cost of capital and what interest rate premium over the rate on Treasuries of comparable maturity may be required. Glasserman and Nouri (2010), have provided concrete pricing formulas and estimates that depend on the size and design of cocos issues. My own study (2011, pp. 46-56) estimated expected deadweight losses from bankruptcy to be borne by all equity holders and to a lesser extent by holders of senior non-cocos debt either without or with cocos in the financing mix. Starting from a very well-capitalized position, results depend crucially on the length of the financing horizon considered.

Here then are four of the six research issues identified in the Dodd-Frank Act and discussed::

1. *An evaluation of the degree to which a cocos requirement would enhance the safety and soundness of companies subject to it.* Shedding light on this subject by subjecting an initially very well capitalized financial institution to a binomial expansion process causing diffusion in the gross rate of return and, eventually, a chance of bankruptcy was the main subject of my earlier study. It showed that cocos conversion gives the company a second life so that two low-probability series of decapitalizing events would have to occur in succession for the firm eventually to fail. The percentage reduction in the expected annual bankruptcy resolution costs would rise with the initial maturity of the cocos debt up to a term of 30 years, and holders of senior non-cocos debt would gain but not as much as shareholders otherwise wiped out in any bankruptcy.
2. *An evaluation of the characteristics and amounts of contingent capital that should be required.* This issue is addressed in Sections IV (amounts) and V of the present paper.

3. *An analysis of the standards that should be used to determine whether the cocos of a company should be converted to equity in times of financial distress.* This question relates to the choice of trigger and conversion terms for cocos discussed in Section V.
4. *An evaluation of the effect of cocos requirements on the international competitiveness of companies and the prospects for international coordination in establishing such a requirement.* Allowing cocos to meet a portion of the buffer-capital or progressive-capital requirements or actually introducing a cocos mandate for contributing to such capital is continuing to be under active consideration under Basel III (see BIS, 2010a; 2010b). Necessary international differentiation in some respects and coordination in others are only touched on in this paper. However, “the extent to which foreign banks are subject on a consolidated basis to home country capital standards comparable to United States capital standards” (Dodd-Frank Act, Sec. 174(b)(3)), and vice versa for U.S. banks abroad, and equally for cocos standards, is clearly important to international competition in financial services and the conditions under which it will be permitted. Section II documents fresh official support for cocos, and Section III examines macroprudential reasons for issuing cocos. Both sections also introduce and discuss the most prominent criticisms of cocos and the extent to which they subsume a flawed design.

Sections IV and V then hone in on cocos design issues in view of these criticisms and because design questions have been answered quite differently in successive cocos issues. Section IV uses several approaches to gauge how big cocos issues might have to be in percent of the tangible assets of US-based Systemically Important Financial Institutions (SIFIs) if they are to be sufficient to recapitalize these banks in a crisis like that of 2007-

2010. Section V focuses on the specification of the conversion trigger, the conversion terms, and the reduction in debt overhang, and Section VI concludes.

I. Private Doubts and Official Support for Cocos

As detailed in my earlier paper (2011, pp. 13-19), cocos mandates, at least for SIFIs, have received official support from central bankers and regulators of financial markets and institutions in North America and Europe, particularly in Canada, Switzerland, the United Kingdom and the United States. Since then, the UK's Independent Commission on Banking (ICB) has presented an interim consultation report on reform options. Annex 6 (ICB, 2011, pp. 180-183) discusses contingent capital instruments in some depth. The ICB's specification for cocos instruments requires that conversion should be triggered while the institution still is a viable going concern that can be recapitalized by cocos debt being converted into common equity. Cocos thus "provide pre-resolution loss-absorbing capacity and aim to reduce both the probability and impact of bank failure".

The ICB notes correctly (p. 180) that cocos help address the debt overhang problem but then goes on to stipulate (p. 182) that, on conversion, the aim should be to engineer a transfer of (some) value from shareholders to bondholders. I will argue instead that cocos conversion that lifts or at least defers the threat of bankruptcy and reduces the expected present value of the attendant deadweight losses benefits existing shareholders. This is the group of investors who would have stood to lose everything in a liquidation. Senior non-cocos debt holders, if otherwise facing haircuts, would benefit as well from the firm's reaching the conversion trigger long before the liquidation trigger. Expected future debt overhang then would be reduced and future equity issues would be facilitated as further explained in the last part of Section V.

The ICB also calls for providing as much clarity and predictability as possible around both triggers and loss distribution if a broad market for cocos is to have a chance to develop (p. 181). Uncertainty about the consequences of a given risk event would make rating and pricing cocos difficult so that issuing them would remain needlessly expensive. However the ICB then punts on whether rules-based capital-ratio triggers driven either by a market indicator or based on the book values used in regulatory accounting should be preferred to triggers set off at regulators' discretion (p. 182). It notes that concern over a bank entering a death spiral when it approaches the conversion-trigger point "would be most acute if a trigger was driven off market indicators." Yet it fails to heed that any market-based trigger, including one established by the trailing average price method it favors, makes it impossible for strategic investors to gauge well ahead of time what share of the company's equity they could eventually end up with.

Marking assets not held to maturity to market is part of regular (US GAAP and IFRS) book-value accounting. It is meaningful to compare this adjusted asset value with the face value of debt conditional on survival to see how far the firm is from insolvency. Any negative book value of equity so derived, in contrast to its market value which is constrained to be non-negative under limited liability, also has useful information on how much debt liabilities will need to be written down or how much debt overhang there is to discourage new equity issues.

If the utility of accounting or book value triggers is indeed undermined by their allegedly lagging real time events (ICB, 2011, p. 182), this lag should not be taken as given. Accelerated regulatory examinations and forward-looking accounting can seek to combat the tendency of management to hide losses. Kane, Bennett and Oshinsky (2008) have shown that the FDICIA (Federal Deposit Insurance Corporation Improvement Act of 1991) legislation has been beneficial in this respect. It has empowered regulators to wind up the affairs of troubled

institutions before their accounting net worth is exhausted. Moreover, examining them more frequently the closer they get to the liquidation trigger has produced more accurate and effective accounting, provisioning, and intervention. It has also incentivized managers to take timely corrective actions or solicit mergers on their own and has made troubled banks respond more promptly to examiner criticism while lessening their incentives to go for broke.

Clearly “the market” and its rigging, such as rating agencies, have not been able to pierce the veil pulled over underreported losses with unfailing alacrity (see Enron and Lehman Brothers). Hence supervision and enforcement of regulatory accounting standards remain necessary to inform the investing public correctly. It is difficult for all but adherents of the strongest version of the efficient-markets hypothesis to see how financial markets could function well otherwise.

As explained further in Section V of this paper, I do not agree with the claim that an “important advantage” (ICB, 2011, p. 182), and “socially best” thing (Goodhart, 2011, p. 117) of properly constructed cocos is that their conversion would impose such a large dilution on existing shareholders as to ensure that the bank remains well capitalized – and so clear of the trigger – at all times. Milder versions of this recommendation that relate also to the size of the cocos issue and the desirability of converting the cocos of a firm all at once to produce “severe” dilution are presented by SFRC (2010). Shareholders realistically believe that crises can happen so that cocos are not “safe” from ever having to be converted. Hence threatened with near-wipeout through extreme dilution in the event of cocos conversion to save the company, the existing shareholders would strongly oppose any issuance of cocos in the first place. Otherwise upon conversion they might end up with next to nothing, while the new shareholders could get the equivalent of the face value of cocos in shares.

The ICB (2011, p. 181) rightly shows concern about enhancing the marketability of cocos on one page (p. 181) but then fails to note on the next page that the conversion terms it favors make cocos toxic for existing shareholders who would have to approve their issuance. These shareholders would have to be able to generate very high expected returns from investing in cocos to accept the risk of wipeout foisted on them by bad cocos design . In addition, having cocos on the balance sheet, under such ruinous terms of conversion could discourage raising equity capital through new stock issues *prior* to cocos conversion because any equity infusion could be diluted along with any other “existing” capital if conversion should later occur anyway. These multiple dysfunctions, and worries about a death spiral (p. 182) if conversion of cocos should ever appear imminent at which existing shareholders are to be savaged, are due to the crippling and arbitrarily redistributive conversion terms. Sceptics find cocos “in some cases positively dangerous” (Goodhart, 2011, p. 117) or simply “a very dangerous instrument” that would wreak havoc and contagion if ever triggered (Grübel, 2011). They do not recognize that these dangers stem in part from fixation on an inappropriate design.

As explained in Section V, to minimize these dangers I continue to prefer a capital-share-based trigger for conversion that is distributionally neutral between existing shareholders and the new shareholders through cocos conversion. That method was independently proposed and applied by Glasserman and Nouri (2010) and in my earlier paper (2011, pp. 34-38). Under this method, existing shareholders are not harmed by conversion on terms that make their share of the common equity held proportional to the share of the book value of capital they brought to the recapitalized firm. Instead, the loss from the dilution of their stake is fully compensated by their pro rata share of the benefits from the cocos debt being cancelled when book values and market values coincide.

Glasserman and Nouri (2010, p. 26) have pointed out that those who are obliged to accept the stock of financial institutions at the worst of times under this, not value-diluting, conversion method, will appreciate that the conversion has increased the probability of survival of the firm. Then “conditional on survival, the contingent capital investors can benefit substantially from an increase in equity value.” Existing shareholders would stand to benefit equally from such a recovery to which cocos conversion would contribute. Hence they might learn to welcome adding cocos to the financing mix once the threat of confiscatory conversion has been lifted.

II. Macroprudential Reasons for Adding Cocos but not a Dual Trigger

Sovereign debt and banking crises, and -- particularly in developing countries with their own money -- currency crises, have long been intertwined. Reinhart and Rogoff (2009) have further distinguished defaults on externally- and domestically-owed sovereign debt where only the latter is issued under the country’s own jurisdiction. A sovereign debt crisis that starts in a particular country may affect foreign banks hosted by it as well as home-country banks elsewhere that have direct exposure to that country. If a country’s sovereign debt, or bloated real-estate finance which is a form of domestically-owed debt, is widely held by other countries’ banks, these banks too may be imperiled. The costs of bank resolution, in turn, will strain the fiscal capacity of these other countries. Even if the sovereign debt and mortgages of a country were all held by its own domestic banks, other interconnections with foreign banks through the interbank market and a network of cross-border lending and borrowing arrangements could cause first the banking crisis, and then the sovereign debt crisis, to spread to more countries.

Throughout this process, counterparty risk rises while liquidity and asset values decline. In the disorderly deleveraging process that follows, the capacity and efficiency of the

intermediation system shrinks, often with disastrous effects on economic growth. The combination of surging bailout costs with declining economic activity may explain why, on average, the real stock of government debt rises by 86 percent during the three years following a banking crisis (Reinhart and Rogoff, 2009, p. 170) even though a sovereign debt crisis may have contributed to the banking crisis in the first place. The United States has stayed close to that average experience in the latest crisis as the federal debt held by the public grew by 79% from fiscal year 2007 (ending September 30, 2007) to the end of fiscal 2010. Thus there is a tendency for going from bad to worse in the maelstrom of crisis dynamics until agreements on the size of the haircut on sovereign debt and on costly restructuring of the banking system eventually permit a new, though encumbered, start.

In the European Union (EU), the fiscal problems associated with the 2007-2010 financial crisis have lingered. Bailing out home-country banks that were considered too big to fail worsened the fiscal and economic outlook and intensified the debt crisis of affected countries, most conspicuously Ireland. An April 2011 estimate puts net Irish bank bailout costs at an amount equal to about 40% of its 2010 GDP. The bad-debt problems of this country could spread to holders of its debt in other countries, such as Germany and France, even if they did not have a real estate bubble or comparable sovereign debt problems of their own. To ward off such a painful burden shifting from countries at the periphery to countries at the center of the EU, the latter may provide concessional loan support to the former in return for austerity measures that may eventually lead back to fiscal sustainability and a resumption of economic growth. The effectiveness of this loan support for debtors to prevent failure would need to be weighed against that of support for creditors, the SIFIs in the center countries, after their loans and credits to, or in, the peripheral countries have been allowed to fail.

Adapting advice first given by Rajan (2010), if leading EU-based banks cannot be prevented from remaining too big to fail and if they continue to be heavily exposed to each other's real estate and sovereign debt -- though perhaps at more adequate default risk premiums than in the past -- at least their capital buffers should be strengthened. One of the most promising ways of investing in greater self-insurance would be for financial institutions to issue cocos. The total size of their issue would have to be equal to about 3% of the total tangible assets or 6% of the much smaller sum of risk-weighted tangible assets of financial institutions. According to the estimates in the next section, such an amount would have provided an adequate supplement for recapitalization of the banking system in the wake of the most recent crisis.

Cocos are an innovative financial buffer instrument adopted so far only in European countries starting with the UK in 2009 and followed by a Dutch banking cooperative in 2010-11 and by Credit Suisse in 2011. Their issuance may be supported in coming years by regulatory cocos mandates under Basel III and by even higher mandates set by the Swiss Financial Market Supervisory Authority, FINMA. Guided by a Too-Big-To-Fail Commission of Experts, FINMA has also proposed a cocos "buffer" equal to 3% of Risk-Weighted Assets (RWA) with a 6% of RWA cocos "progressive component" added on. Of this 9% of RWA total for cocos which sits on top of a 10% of RWA tangible common equity requirement, the Commission wanted an amount of cocos not to exceed 3.5% of RWA to be creditable toward the 8% minimum capital requirements for Swiss SIFIs (Raaflaub, 2011). According to this "Swiss Finish", cocos would thus be an intentionally rich part of the buffer capital of systemically important financial institutions. To reach 9% of RWA, about \$70 billion's worth might have to be issued by UBS and CS combined by 2013, perhaps mostly in CHF, under Basel III rules for estimating RWA.

Rajan's (2010) recommendation to keep SIFIs from failing by creating additional private-sector buffers which should include cocos is very welcome. However, the dual-trigger arrangement he proposes for cocos to meet both micro- and macro-prudential objectives is unworkable and counterproductive. The two events he requires for triggering conversion would be (i) that the bank's designated regulatory capital ratio falls below a value that is set at or somewhat above the regulatory minimum. This I would support. However he would also install a second lock that could only be opened by regulators based on "objective indicators" such as aggregate bank losses (Rajan, 2010, p. 28). McDonald (2010) similarly proposes a second lock that would open automatically when a designated stock price index for financial institutions falls to or below a specified trigger level. In both cases conversion of cocos could occur only when there are widespread and pronounced falls in earnings, and presumably in the share prices, of financial firms.

There are several reasons to do without this second trigger. The least of these is that there would be an element of redundancy because a financial crisis is marked by idiosyncratic risk being overshadowed by systemic (highly correlated) risk. The likelihood that cocos with just a single bank-specific trigger will be converted is, of course, much greater during a financial crisis than in normal and more profitable times. Hence their conversion has some automatic countercyclical effect and need not have to wait for an official determination or ETF (Exchange-Traded Sector Fund) signal that the banking system as a whole is under stress. Indeed, requiring conversions to wait until the entire banking system is in deep trouble causes dangerous delay. When the authorities decide to pull the second trigger that lets all already first-triggered conversions finally be carried out, there is a bunching of mandatory conversions and a flood of newly-issued bank stocks that would raise their price volatility. Furthermore, from a marketing

standpoint, valuing cocos would become very difficult under the dual-trigger arrangement. It would involve speculations about the behavior of the economy *and* the responses of regulators. Regulators are unlikely to submit to any automatic macroeconomic trigger without taking exceptions by invoking “unusual and exigent circumstances” as under Section 13(3) of the Federal Reserve Act.

Rajan’s (2010, p. 29) desire to preserve “debt discipline” over the management of individual institutions by preventing cocos conversion except when the entire banking system is in distressed is troubling also. Denying cocos conversion to any SIFI, or to a group of interconnected financial institutions that together reach the heft of a SIFI, could bring on the very bankruptcies (and negative externalities) against which cocos are meant to guard. Moreover, the “discipline” argument is usually made to explain why banks use short-term secured finance for long-term assets, but cocos would take the form of long-term, not short-term, unsecured debt.

Cocos are likely to be light in covenants. However, their covenants might provide for regulatory verification of a low-rated company’s capital ratio in relation to its cocos conversion trigger through a timely special audit if requested by the firm’s Board or a qualified group of stakeholders. Regulators could, of course, also initiate such a special audit on their own. Under properly configured terms of conversion, existing shareholders could have an interest to press for careful monitoring and timely conversion. But management may be opposed to conversion and stall because such an event could require it to resign under rules agreed in advance. Upon conversion the company could be placed under ongoing regulatory review until it has recovered sufficiently for the cocos shield to be rebuilt. For these reasons it is hard to see how making cocos less likely to convert by adding a second lock could better serve to discipline management.

On the other hand, single-trigger countercyclical buffer requirements, such as the 0-2.5% of RWA countercyclical buffer proposed under Basel III, could make it less likely that a financial institution's single-lock cocos conversion would be triggered, but not because tripping that individual trigger is insufficient to cause conversion. The countercyclical buffer requirement now envisioned would be triggered and calibrated by national regulators for all banks, foreign and domestic, in their jurisdiction (BIS, 2010c). Regulators would mostly be looking out for significant positive deviations of national credit to GDP ratios from trend and assess how much to lean against any excess perceived. Countercyclical buffer requirements thus may be helpful to protect a company and its cocos, but neither this buffer nor its trigger should be linked to the stock of cocos or its conversion.

Actual capital-ratio targets chosen by financial institutions have properly been regarded as the result of optimization subject to constraints, such as the regulatory minima set for such ratios, and the penalties for violating them. In this case, violation of a countercyclical capital requirement after the period allowed for implementation of any regulatory changes in that requirement is punishable by restrictions on the percentage of earnings that may be used to pay for dividends or stock buybacks. These restrictions are to be graduated with the extent of joint violation of conservation and any countercyclical capital buffer requirements under Basel III.

III. How Big is the Hole from Banking Crises that must be Filled?

The capital infusions needed to tide over and restore normal functioning for those financial institutions that are too big to fail are surprisingly small when compared with the losses incurred by sudden collapse. Lehman Brothers crashed in September 2008 when the firm was already deeply under water, and its going-concern value was destroyed almost instantly. Lehman

reported total stockholders' equity of \$66 billion for September 14, 2008, just before the weekend on which its fate was sealed, and of -\$54 billion for March 31, 2010, the next time it could report at all. Its leverage ratio went from 10.5% of total reported assets of \$626 billion to -21.4% on \$253 billion of assets remaining between the two dates. Taking the \$120 billion loss of equity from September 14, 2008 to March 31, 2010 over average assets of \$440 billion yields a loss equal to 27% of total assets for the first 18 months of bankruptcy alone. Taking only the negative equity in percent of total assets on the latter date yields a 21% shortfall of the value of assets from that of all other liabilities. These losses most likely already have matched the FDIC experience of a mean discounted total resolution cost to asset ratio of 33.6% (see von Furstenberg, 2011, p. 41).

Judging by the U.S. experience which may be similar to that of other advanced countries, such a percentage appears to be about 10 times as high as the funds required to recapitalize banks that are too big to fail in a financial crisis. The four estimates presented below point to a range centered on about 3% of total assets rather than 30% as above.

1. The IMF's *Global Financial Stability Report* (GFSR), April 2009, p. 36, estimates that by the end of 2008 the first two years of the 2007-2009 financial crisis had reduced the ratio of tangible common equity (TCE) to total tangible assets (TA) to 3.7% in the United States. TCE is defined as total equity less preferred shares, intangible assets, and good will, or as core tier-1 capital. Reported write-downs of \$510 billion exceeded capital of \$391 billion raised during 2007-2008 by \$119 billion. For 2009-2010, the IMF expected write-downs of \$550 billion to exceed net retained earnings of \$300 billion by \$250 billion. To both raise the leverage ratio, TCE/TA, from a little over 3.7% to 4% and to keep it at 4% would require an equity infusion of \$275 billion in 2009-2010 according to

this April 2009 estimate. The TA value for the U.S. that is implicit in these calculations is \$11,250 billion. All these and subsequent estimates for the U.S. do not include the GSEs.

2. To raise the leverage ratio to the “well-capitalized” level of 6%, the “approximate leverage of U.S. banks in the mid-1990s, prior to the buildup in leverage in the banking system that contributed to the crisis,” would require a total equity infusion \$500 billion according to the April 2009 IMF estimate. *These two IMF estimates combined imply that the financial crisis required an additional equity cushion of at least 275/11250 or 2.4%, and at most 500/11250 or 4.4% for the crisis to be overcome by the end of 2010.*
3. Funding under the U.S. Treasury’s Troubled Asset Repurchase Program (TARP) amounted to barely 2% of the 2008:Q4 assets of the three largest U.S. financial institutions. At the time they were in order of total assets JPMorgan Chase, Citigroup, and Bank of America, with the latter having overtaken the two others since. These three largest banks held over half of the assets of the 19 banks regarded, on the basis of their inclusion in the Federal Reserve’s stress tests, as too big or interconnected to fail. They received \$115 billion, or about two-thirds of all the TARP funds invested by the Treasury from 10/28/2008 to 09/30/2010 in these 19 largest institutions under its Capital Purchase Program and Targeted Investment Program combined. *Yet their Tarp funding was equal to only 1.9% of their combined assets of \$5,931 billion at the end of 2008.*
4. The Federal Reserve, in a March 18, 2011 press release announcing completion of its Comprehensive Capital Analysis and Review of the capital plans of the 19 largest U.S. bank holding companies reported that from the end of 2008 through 2010, “common equity increased by more than 300 billion” at these 19 companies. Considering that some of the smaller banks also issued common equity in 2009-2010, the combined equity issue

of approximately \$325 billion would have been quite enough to meet the IMF's 4% leverage target set in April 2009 for the end of 2010 under the then-assumed write-off and retained-earnings conditions. The Fed appears to have been satisfied that most of the 19 largest banks tested (one significant exception was Bank of America) had reached a level of capitalization sufficient to allow a resumption of, initially still modest, dividend payments and stock buy-backs. The common equity raised has been sufficient to allow TARP funding to be repaid by the end of 2010 by all of the 19 banks, except Ally Bank, GMAC's troubled successor. Since the assets of these 19 banks at the end of 2010 were \$12,065 billion, *a capital increase equal to 2.5% of total assets appeared all that was needed to restore normal operating conditions for most banks.*

In sum, it appears that the recent financial crisis left a hole of 1.9% to 4.4% of total assets, with additional indications pointing to 3% as the most representative round number in this range. Because long-term debt only amounts to about 12% of the assets of large banks, cocos, would account for about a quarter of long-term debt, or to 20% when added to, rather than substituted for, non-cocos long-term debt. This indicates that had cocos in the amount of 3% of total assets or about 6% of RWA (which appear to be at most half as large as total, unweighted, assets) been outstanding at the start of the 2007-2010 financial crisis, their amount might have been sufficient to recapitalize the banking system during the crisis. At yearend 2010, 3% of the tangible assets of the 19 largest U.S. financial institutions would have been just over \$360 billion.

Greatly in excess of this calibration, the Shadow Financial Regulatory Committee (SFRC, 2010, p.2) suggested an amount of cocos equal to 10% of a bank's assets which it defined as the market value of equity plus the face value of its debt. By rule of thumb, this would be equivalent to about 20% of RWA, and most of the long-term debt banks care to hold then would have to

take the form of cocos. Assuming that the book value of equity in financial firms, in normal times, is not much different from its market value so as to allow direct comparison, the Committee therefore asked for more than three times as high self-insurance from banks than necessary for a country like the United States. In that country, more than in most other financially advanced countries, even the largest banks are not too big to save through government intervention because bailout costs in relation to GDP would not be prohibitive.

In Switzerland, the total unweighted assets of its two largest banks at the end of 2010 were 424% (420% if goodwill and intangible assets are excluded) as large as Switzerland's 2010 GDP. Even the 19 largest banks in the United States at the end of 2010 had combined assets equal to "only" 82% of that year's GDP. Hence injecting capital equal to 3% of unweighted assets into SIFIs in a crisis would have represented a budgetary outlay or "investment" equal to 12.7% of GDP in Switzerland compared with 2.5% of GDP in the United States. Switzerland's planned investment in cocos which is to amount to roughly 4.5% of the total assets of UBS and CS combined according to FINMA (or to 9% of their RWA), is fittingly 50% higher than the 3% (or 6% of RWA) just suggested for the United States. It would be less than half as large as the U.S. target of 10% (or 20% of RWA) suggested by the SFRC (2010, p. 2) as "sufficient to cause significant dilution to shareholders if the conversion is triggered." This is a misguided objective to which I have objected already and not a proper guide to the proper size of cocos issues.

IV. Designing Cocos

The Trigger. Having already rejected a dual trigger or double lock for cocos conversion, it is still necessary to confront the common directive, found in Goodhart (2010, p. 30) -- and others including Flannery (2009, pp. 10, 16) -- that "CoCo convertibility must be triggered by falls in

market, not in accounting valuations.” This presumption is unjustified but often treated as self-evident and thus not in need of justification. The issue of whether to use accounting-based or market-based triggers has been discussed extensively in von Furstenberg (2011, pp. 8-10). *There the following points are made to support the view that triggers should reference capital ratios referenced in regulatory accounting and insolvency proceedings:* (i) Market pricing errors are not random in a major financial and market-illiquidity crisis. Rather they are positively correlated across financial firms and time on account of a surge in counterparty risk and growing illiquidity. (ii) Capital ratios based on regulatory book-value accounting do not necessarily lag behind market-based measures particularly since such measures have become more forward-looking, for instance in the recognition of impairment. (iii) Indeed, market valuations react strongly to quarterly earnings announcements and reports of a firm’s end-of-quarter regulatory capital ratios, even if they do not deviate from the average forecast. Because priors become highly diffuse and tentative in a financial crisis, reassurance matters. Hence market valuations are informed by the results of book-value accounting. (iv) Regulatory capital ratios are routinely monitored and reported under standing rules which accounting departments, outside auditors and government regulators can apply with a high degree of legal certainty and (official) assurance. (v) Finally, constructing a financial firm’s balance-sheet entries for non-par items simply, or even largely, by use of an uninterrupted and “thick” flow of auction-market prices is rarely an option, least of all in a financial crisis. (vi) Whether or not assets, and, more controversially, liabilities, are marked to market, stockholders’ equity must be the respective residual. It cannot be independently marked to market *and* be consistent with the rich information, transparency and completeness provided by *any* internally-consistent method of balance-sheet accounting.

Myers (1977, p. 150) contains the additional point that while book values refer to assets already in place, a significant part of many firm's market values is accounted for by assets not yet in place, i.e., by the present value of future growth opportunities. While Myers had nonfinancial firms in mind, the investments in reputation, customer good will, franchise value, and in networks with their supporting ITC infrastructure -- all important for financial institutions -- also present valuable growth opportunities. However, the market value of these opportunities, and with it the market value of the entire firm, becomes highly volatile and hard to keep aligned with fundamentals when market liquidity and short-term funding shrink in a serious financial crisis. Such a crisis clouds the business outlook and makes the future of a company quite uncertain thereby adding large amounts of noise to stock price movements not just in the high-frequency domain of flash-crash minutes but over months, though probably not years. Stock prices thus tend to lose their usefulness for accurately measuring net worth, which may be positive or negative, just when such an accurate measurement is most needed to assess solvency.

The Conversion Rate. At least three methods are available. (i) The first has a pre-assigned market-value target to determine the number of shares to be issued and valued at conversion. If the target is equal to the face value of the cocos to be converted without a haircut, as coco-sceptics tend to assume and prefer, achieving it could violate seniority rules in favor of cocos holders over more senior debt. It would also deny equality of treatment with existing shareholders. (ii) The second method fixes the number of shares to be obtained in the conversion, except for any anti-dilution provisions, at the time cocos are issued. Under this method, the number of shares is determined so that their value evaluated at a nearly current volume-weighted average price (which may be only slightly trailing or leading from the date of issue), would be

equal to the face value of cocos. The value (and hence number) of shares obtained at conversion but determined at the time the cocos are issued could also be required to be a little more, such as 105% of the face value of cocos. This was stipulated in a fanciful proposal by the SFRC (2010, p. 3) to give cocos more “upside.” (iii) The third method fixes in advance, by a formula based on book values, that portion of the total common equity outstanding after conversion that was issued to cocos holders upon conversion. This portion is equal to the book value of all the cocos converted divided by the sum of that amount and the book value of tangible common equity remaining just prior to conversion. In other words, the number of shares issued in cocos conversion would have a value that is proportional to their contribution to the book value of common equity made by that conversion. If that contribution were 50%, the number of newly issued shares would equal to the number of shares previously outstanding. Thus, the former cocos holders would have lost their seniority over the existing shareholders whom they have joined on equal terms. Unlike in all other methods, there is no redistribution between existing shareholders and the holders of shares newly issued through conversion, and hence no uncertainty about the extent of the eventual redistribution. All three methods are illustrated in order below.

(i) Under the first and worst method, the number of shares obtained in the conversion is determined so that their value at a “recent average price (as further specified)” would be equal, at that price, to the face value of the cocos being converted. Use of the “recent average price” may be qualified by the phrase, “but not less than \$x per share,” where x is a floor price. This price is designed to limit dilution by placing an upper bound on the number of shares to be issued in the conversion. If the floor-price constraint is binding, the violation of seniority in favor of cocos holders would be less as their claims could be subject to a substantial haircut. Except when the

floor price is firmly expected to be binding, the number of shares obtained from the conversion is not known until the “recent average price” has been recorded. Cocos then are converted at full face value as if they were called at par, thereby violating the hierarchy of pre-existing debt.

A recent cocos issue illustrates application of the first method with a stopping point on dilution. The tier 2 Buffer Capital Notes (BCNs), when to be converted, “convert into Credit Suisse Group ordinary shares at their prevailing market price over a 30-day period preceding the notice of conversion, subject to a minimum price of USD 20” (Credit Suisse, 2011, 1). On March 16, 2011, CS (as an ADR) was trading in the \$41-\$42 range in New York.

Here is some background on this issue: Credit Suisse announced in February 2011 that it had agreements with some of its strategic investors, Qatar Holding and the Olayan Group, to swap \$6.2 billion worth of certain hybrids, that soon will no longer qualify as tier 1 capital, for cocos. Interest rates on the cocos are lower than on the hybrid capital they will replace. Announcement of this agreement with strategic investors was to help generate interest in its \$2 billion Capital Buffer Note (BCN) offering of cocos. That issue turned out to be oversubscribed by a factor of 11. The BCNs had a final maturity of 30 years but were callable at par at any time from August 2016. They were issued at par with a coupon of 7.875%. This was 322 basis points above the yield on 30-year U.S. Treasuries on the BCNs’ issue date of February 17, 2011 and about 200 basis points above the yield required on long-term corporates which were rated A by S&P with a “stable” outlook like Credit Suisse Group. The initial yield of 7.875% fell to 7.35% within a week after issue and then further to about 7% as the price of the issue continued to climb in the secondary market.

(ii) The second method has been used in the first cocos issue pioneered by Lloyds Banking Group (LBG). To determine how many shares would match the face value of cocos at the time of

issue, its exchange offer of November 3, 2009 of certain hybrid securities for cocos specified the following price: the volume-weighted average price of ordinary shares of LBG for each of the five consecutive trading days included in the period November 11-17, 2009. This number of shares was raised to compensate for the decline in their theoretical value produced by a massive rights offering later that month.

(iii) The third, and preferred, method has not yet been used. It focuses on the fair share (S) of new shares (NS), SNS , in the total number of equity shares outstanding after conversion, $NS + ES$, where ES is the number of existing shares prior to conversion. SNS would be determined by just two comparable statistics that allow NS to be expressed as b times ES . For instance, if the face value of cocos is equal to 4% of total (not risk-weighted) assets as reported in a company's last *Quarterly Report* and the trigger level of the leverage ratio is 3% of such assets, $NS=(4/3)ES$ if the cocos are converted all at once as assumed throughout. Then $SNS = NS/(ES+NS) = 4/7$, and the new shares account for a majority of the total number of shares outstanding because the cocos conversion contributed more to regulatory capital than the 3% that was left over from before. On the other hand, if cocos amounted to only 2% of total assets so that $NS=(2/3)ES$ at the time of conversion, then the new shares would account for $2/5$ or 40% of the total number of shares outstanding after conversion.

By making the number of shares issued independent of their market value at conversion in this way, downward stock-price spirals and the resulting dilution of the value of the stakes of existing shareholders can be avoided. Furthermore, new shareholders by conversion and existing shareholders are treated exactly the same, with the share of the combined equity allocated to each of the two groups exactly equal to the share of the book value of capital which they brought into the recapitalized firm.

If instead of following this preferred scheme, cocos holders were accorded a much larger pre-determined share of common equity in the event of conversion of this (lowest-ranked subordinated) debt than would be proportional to the book-value addition to common equity which they brought, cocos holders could benefit greatly from conversion and from gaining the valuable control rights it would confer. If that share had been fixed at or near 1 at the time of cocos issue, existing shareholders would have been wiped out by conversion and any losses remaining to be absorbed would fall on the new shareholders. Aghion et al. (1992, p. 535, fnnt. 30) describe a pre-arranged scheme where junior creditors end up with all the new shares, senior creditors are paid off in full, and the old shares are cancelled since the expected net worth of the bank is negative. At least formally, absolute seniority is preserved in their scheme that can be applied by prior agreement outside bankruptcy. It involves a somewhat complicated resolution formula involving granting out-of-the-money, in their case eventually worthless, subscription rights to existing shareholders. This makes the “benefits” of bankruptcy, wiping out existing shareholders, and those of recapitalization, finding new shareholders, coincide.

In any of the inferior methods or incorrect calibrations of the preferred method, the prospect of partial or total expropriation of existing shareholders for the benefit of the new shareholders would destabilize the stock price as “conversion risk” grows. Any such systematic risk can, however, be avoided. For this, the share of new equity by conversion in the resulting equity total should be proportional to book values so that the theoretical stock price before and after the conversion would be the same: What remains after dilution for existing shareholders plus their share of the gains from cocos debt cancellation would be equal to what the new holders receive as a transfer from dilution plus their proportional share from cocos debt cancellation. Furthermore, the theoretical price per share would remain the same as prior to conversion

because the aggregate dilution effect would be compensated by the equity value created by cocos debt cancellation, as my earlier article (2011, p. 35) demonstrates.

Debt Overhang. The debt overhang problem arises when informed investors choose not to inject additional equity since some of the proceeds of the tangible investment would go to existing holders of the company's risky debts rather than to the equity holders. See Myers (1977) for the detailed development of the concept and Occhino (2010) for an accessible introduction to it.

(i) The first question is: If cocos are risky debt, does taking on more such debt increase the debt overhang problem and discourage equity finance of future investments which are profitable overall, but not profitable for shareholders? The answer here is that cocos are normally issued in times when default risk is low and necessarily converted to equity when default risk is high and conversion is triggered. Rather than contributing to debt overhang, their issuance reduces any debt overhang problems that may be associated with non-cocos long-term debt that is senior to cocos. Such long-term debt constitutes only about 12% of the total assets of U.S. financial institutions when bankruptcy is imminent (von Furstenberg, 2011, p. 41 provides details).

(ii) The second question is whether the design of cocos militates against the development of debt overhang in the first place. Part of the answer is that the trigger for cocos should be set at or slightly above the minimum regulatory capital ratio referenced in its covenant. As this minimum is raised further during implementation of Basel III, any prospect of bankruptcy, or the fear that conversion might come too late to save the company, would be diminished.

(iii) It is further worth noting that the debt overhang problem, as in Myers (1977, p. 148) and the literature cited therein, is usually represented as if bankruptcy of financial institutions did not in itself represent a value-destroying activity, producing average losses equal to about one third

of the total assets of the institution being resolved (see von Furstenberg, 2011, p. 41 for reference to the documentation). But to the extent having cocos on the balance sheet greatly diminishes prospects of bankruptcy, as rigorously demonstrated in my earlier article (2011) under an assumed binomial disturbance process, there is value added for all stakeholders in the company who are exposed to the risk that it may fail. Common shareholders, who would stand to lose everything in a bankruptcy, would be particularly benefitted.

V. Conclusions

While it is true that the only immediate cash-flow benefit which the conversion of cocos brings is the cessation of their interest payments, as Goodhart (2010, p. 30) stated dismissively before calling for a ban on dividend payments under similar conditions instead, this is by no means the only benefit of conversion. Deleveraging through debt write-off outside bankruptcy that brings regulatory capital back up to adequate or well-capitalized levels, depending on the strength of the cocos shield, brings additional advantages. For instance, cocos conversion can reduce collateral requirements imposed on loans and other liabilities of a financial institution, improve the rating of its remaining debt, and increase borrowing capacity, for instance on trade credit and commercial paper, which could bring in cash. The counterparty risk of dealing with such an institution would fall. Debt overhang would also be reduced for the future as the larger equity base reduces the riskiness of the debt remaining after conversion and lowers the extent to which the returns on profitable investments would have to be diverted to make risky debt whole. Hence more equity financing of profitable investments would now become feasible for the future. Emergence of this prospect would add value to the equity currently outstanding and encourage additional equity issues, productive investment, and economic growth.

While promising in principle, cocos have been held back by insufficient functionality and lack of standardization in their design. Using data from the most recent financial crisis as a guide, this paper tried to analyze first how large the cocos buffer should be. It concluded that this buffer would not need to be greater than 3% of total tangible assets, and not nearly as high as 10% of a similar total as the SFRC (2010, p. 2) baselessly suggested. It then showed why the trigger should be based on regulatory accounting measures of the type referenced in Basel III, preferably a leverage ratio with core tier-1 capital, also known as TCE, in the numerator and total tangible assets in the denominator. The latter may have to be risk-weighted if “Basel III” insists.

Finally it explained that many problems attributed to cocos can be attributed to poor design of their terms of conversion, such as those used in practice so far. I argued strongly that there should be nothing arbitrary or redistributive in these terms, and nothing that disrespects seniority rules or treats new and existing shareholders differently. Instead newly issued shares through conversion should amount to the same fraction of the total number of shares outstanding after conversion as the book value of cocos in relation to the total book value of tangible equity after conversion. That total includes the trigger level of core tier-1 capital brought over by existing shareholders into the recapitalizes company. The conversion terms thus would be known beforehand in terms of the share of the total equity that would be generated by cocos conversion regardless of the market price of shares either at the time of cocos issue or conversion.

Calculability and marketability of cocos would benefit if the design of successive issues would conform to the basic specifications here laid out. That would still leave much else to standardize and then to reduce to a manageable number of cocos variants that could gain a substantial primary market and an active secondary market after suitable experimentation.

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