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Mega-Banks' Self-Insurance with Cocos: A Work in Progress*

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Abstract

When contingently convertible debt securities trigger and convert into common equity well before the capital ratio of a financial institution has reached its regulatory minimum, they are known as going-concern or go-cocos. Their objective is to recapitalize an institution under stress and not to facilitate its resolution as would be the task of low-trigger goner-cocos. Because cocos are an "infant instrument" that grew out of the 2007-2009 crisis, few of their design features, their tax treatment or role in bond indexes are settled. Their portfolio fit with unsecured senior non-contingent debt on the one hand and common equity on the other is also an open question. Its resolution has much to do with how adding go-cocos may affect debt overhang in a firm.

This paper attempts to clarify such underexposed open issues. Its chief contribution, however, lies in sifting through the experience with cocos triggers and conversion methods in order to link both actual, and one proposed, conversion methods to the recovery rates on cocos likely to be obtained from the common shares received by conversion. Experimenting with sparsely parameterized survival patterns that reach specified survival-rate levels after 10-years, and with the implied hazard rates and default rates conditional on survival, then allows a schedule of CDS premiums to be derived. These provide insight into the competitiveness of pricing the loss-of-value risk in go-cocos, instead of in the common-equity premium, over AAA-rated bonds.

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1. Introduction

Bankruptcies of Global Systemically Important Banks, G-SIBs, are inevitably disruptive and costly not only for the financial system. Bunched in a financial crisis, the economic damages they could ultimately cause at home and abroad are difficult to contain. This is why G-SIBs are treated as too-big-to-fail by national regulatory and supervisory authorities.[1] Their government rescues not only tend to compromise monetary and fiscal management, they also feed the moral hazard that encouraged the excessive risk taking to start with. Adding a layer of buffer capital would shield the banks from insolvency through greater self-insurance. Banks depend less on the government's lifeline if that insurance can be relied upon to shore up their tangible common equity capital in a crisis so that they may continue to function as going concerns.

Capital buffers should be strengthened in good times so as to offer generally adequate protection from failing in bad times. Then new capital would rarely have to be raised in financial markets in the middle of a crisis when attempting to recapitalize externally is most expensive and least convenient. Capital injections do not translate into greater credit supply until bank balance sheets have been sufficiently strengthened. Hence having a thick buffer to draw on to restore capital adequacy rapidly in a crisis will shorten periods of economic decline.

Contingently convertible debt securities, now commonly known by the – originally mocking – acronym *cocos*, offer stabilization benefits from improved crisis-proofing. They represent debt that is issued with the risk of being converted automatically into common equity under pre-specified terms of conversion when the chosen regulatory capital ratio has fallen to a level triggering conversion. Trigger points are set by Common-Equity-Tier-1, CET1, core capital in percent of Risk-Weighted Assets, RWA, although suitability and harmonization of the risk weights assigned by national authorities remains an issue. Depending on whether the trigger level is a "high" or "low" core capital percentage, cocos are viewed more as going-concern, *go-cocos*, than as gone-concern, *goner-cocos*. Section 2 elaborates on this fluid distinction.

Focusing on go-cocos rather than on the goner-cocos embraced by the ICB (2011), Sections 3 and 4 describe the instrument and its issuers. Section 5 provides an extended discussion of one proposed, and two already applied conversion methods and what they imply for the different groups of equity and debt investors in financial firms. Section 6 follows up by considering ways of keeping the conversion terms of long-term cocos from becoming outdated on account of changes in company characteristics or financial markets or in legal and regulatory requirements. Section 7 discusses how the issuance of cocos may affect debt overhang when cocos are treated as substitutes either for senior non-contingent debt or for common equity. Section 8 turns to neglected tax aspects of the interest payments on cocos and of debt forgiveness upon conversion. Section 9 highlights another

[1] To reduce the failure rate and to discourage further growth of banks that are already too big, such global banks will be required to hold extra capital initially of between 1% and 2.5% of Risk-Weighted Assets (RWA) under Basel III.

underexposed issue, the proper role of cocos in bond indexes. The main messages of each of these sections are summarized in italics at their end.

The concluding evaluation Section 10 offers are acompilation of the stylized facts emerging from cocos issues. It allows the expected recovery rates on cocos to be clearly associated with established methods of conversion. The stylized facts are then used at the end of the paper to estimate the fixed premium rates that would have to be paid by a buyer of Credit Default Swap (CDS) protection at alternative recovery and cocos survival rates. Since G-SIBs may issue, but not own, cocos and since they should not be exposed to any risk from actual or notional reference to cocos, they should not take net positions on either side of the cocos-CDS market. Nevertheless the prices agreed in that market between qualified participants could provide valuable insights into the competitiveness of cocos with issuing common equity up front rather than conditional on cocos conversion.

2. Going-Concern vs. Gone-Concern Cocos

The immediate costs of bankruptcy resolution of financial institutions headquartered in the United States, including Lehman, typically have averaged as much as one-third of their pre-resolution balance sheet, or total assets.[2] There are further losses from network disruption to counterparties and from liquidity squeezes and fire-sales that may adversely affect the entire intermediation system and economic performance. Hence it is of great value to reduce the risk that banks become so undercapitalized as or to have to be put through regulatory receivership and bankruptcy resolution at the point of non-viability. The alternative, of rescuing at least the G-SIBs[3] through injection of public funds, costs perhaps only one-tenth as much on average, or about 3% of the total assets of assisted institutions, according to my earlier estimates (2011b, pp. 13-16). Faced with such a choice, too-big-to-fail subsidies, with all their adverse side effects, are unlikely to be withheld from G-SIBs in an acute financial crisis once their own defenses have crumbled. Hence shoring up these defenses is widely understood to be imperative.

In addition to higher capital requirements in the form of common equity, going-concern cocos, here *go-cocos*, which trigger well before resolution is impending, can strengthen financial institutions' self-insurance. Cocos should be viewed as substitutes for senior unsecured term debt on the balance sheet. Then issuing them adds to the sum of actual and contingent common equity capable of absorbing losses. ICB (2011, p. 115) shows that in 2010 the stock of such senior debt has ranged from 12% to 31% of RWA for the six biggest UK banking groups. Percentages in this wide range also appear to apply to G-SIBs headquartered elsewhere. Even though non-cocos debt is much smaller in percent of total assets than of RWA, there is ample room for cocos to substitute for some of it. Under

[2] For the details see my Discussion Paper (2011a, p. 41) and Working Paper (2011b, p. 14).

[3] The FSB (2011, Annex) in November 2011 named 29 financial institutions, including 17 headquartered in Europe, 8 in the United States, and 4 in East Asia as important to the world's financial system. They were identified in BCBS (2011c, p. 5) as Global Systemically Important Banks, G-SIBs, by five equally-weighted indicators: Global activity across multiple jurisdictions, size, interconnectedness with the financial system, lack of substitutability (alternative supplies or suppliers) for some of the critical infrastructure services provided, and complexity of operations making them difficult to unwind.

Basel III, cocos may meet one-quarter of the tier-1 capital requirement, equal to 6% of RWA, effective in 2015 if they satisfy a number of conditions set for "additional tier-1" (AT1) capital, with the remainder met by CET1. Moreover, the BCBS (2011c, p. 20) supports the use of cocos to meet national loss absorbency requirements that exceed the global requirement. AT1 and CET1 are defined in BCBS (2010b, pp. 13-17).

Go-cocos contribute to financial and general economic stability by strengthening the resistance to failure and to behavior, such as relying on too-big-to-fail subsidies, that risks it. Gone-concern cocos, here *goner-cocos*, have a narrower purpose. It is to shift some of the immediate costs of bankruptcy resolution to private investors in these instruments. Their holders have accepted the contingent obligation to absorb losses before all other debt holders if a low-trigger event occurs. Such an event happens when capital ratios have shrunk to the point of non-viability, common shares, including those obtained by conversion, threaten to become worthless, and resolution appears imminent. Having debt that can be bailed-in on the firm's balance sheet lowers the cost of government rescues that burden the taxpayer, but such debt is triggered too late to help financial institutions survive. A medical-care analogy may be helpful to explain the distinction: The triggering of go-cocos sends financial institutions to the rehab and wellness clinic, while goner-cocos confine them to hospice care when triggered. FINMA's (2011) characterization of go-cocos as *recovery* and goner-cocos as *resolution* cocos is apt.

Just as a patient should not be treated for (capital) anemia before she has had a positive diagnosis, interest payment on go-cocos should be mandatory unless and until these cocos have automatically been triggered and converted. The EBA's (2011a, pp. 16-21) Common Term Sheet for Buffer Convertible Capital Securities correctly forbids conversion features that restrict the automaticity of the conversion. However, like the BCBS (2010b), it insists on optional coupon cancellation on a non-cumulative basis "at its sole discretion at all times" prior to conversion, regardless of whether go-cocos or goner-cocos are involved. Thus even go-cocos are exposed to risks from regulatory discretion that will hinder their marketability and raise costs.

Low-tier cocos are commonly defined as triggering when the core capital percentage CET1/RWA is close to its unconditional minimum. Under Basel III, the minimum that must be maintained from the start of 2015 on is 4.5% of RWA (BCBS, 2010b, p, 28), so that a 5% trigger would be classified as low-tier. An issue with a trigger of no less than 7%, would be classified as high-trigger cocos. That percentage is equal to 4.5% plus the full conservation buffer of 2.5% of RWA that is to consist of additional CET1 and required from 2019 on (BCBS, 2010b, p. 55). The use of yet higher triggers, up to 10%, may well be advisable in countries like Switzerland whose international banks are particularly large in relation to fiscal capacity. Switzerland already has chosen 5.5%, rather than 2.5%, as the conservation buffer for its two largest banks.

The distinction between go-cocos and goner-cocos is fluid; the two types may even cross over. For instance, when high-trigger cocos are issued by a firm, any low-trigger cocos it has already

outstanding are better defended and less likely to be triggered. The low-tier cocos in the mix thus may become less goner-cocos and more like plain (non-convertible) long-term unsecured debt.[4] Goner-cocos can also function like go-cocos if they are issued in such volume that converting them all at once would leave the firm very well-capitalized and free from any imminent threat of resolution. The two Swiss global G-SIBs, for instance, will be required to issue low-tier cocos with a 5% trigger up to an amount equal to 6% of RWA in coming years. If these cocos have the same specifications so that they are triggered all at once, the CET1 capital ratio would jump from 5% to 11%, enough to restore the firm to being very well capitalized.

Bank of Cyprus, a 2011 issuer of cocos named Convertible Enhanced Capital Securities (CECS) with a 5% CET1 trigger, in November 2011 found a way to convert cocos at a higher trigger level than specified in their covenant. This happened after CET1 had dropped to 5.8% of RWA after a 50%, €1 billion, write-down of its holdings of Greek government bonds. Seeing conversion coming, the bank accelerated the process by sweetening the terms for converting cocos first into short-fused Mandatory Convertible Notes (MCNs) of equal par value and then into common shares. Terms were reset from 1 share per 1 euro of principal amount of cocos, the maximum share amount per euro specified in the cocos contract, to 1-1/3 share per euro of MCN. This was done to incentivize cocos holders to participate in the exchange and subsequent conversion before the company's prospects and the price of its shares could deteriorate further.

To sum up: Goner cocos are valued by regulators because they provide loss absorbency through contingent-debt write-off prior to bankruptcy resolution. By contrast, the main function of go-cocos is to contribute to bankruptcy prevention in a crisis by contingently providing a quick boost to the common equity of a viable financial concern. Both types of cocos are designed to reduce moral hazard, especially those afflicting G-SIBs, and to improve corporate governance. One distinction between them is that discretionary authority to cancel interest payments and to precipitate or suspend the operation of the contractual cocos trigger mechanisms should not be granted to bank supervisors, least of all for go-cocos[5] which are our sole concern .[6] Otherwise voluntary issuance of such cocos, with tangible common equity tier-1 capital CET1/RWA triggers normally in the range of 7% to 10%,[7] is unlikely to develop.

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4 To avoid windfalls for the holders of lower-trigger cocos from the unexpected issuance of cocos with higher triggers, the latter should always be issued, or at least announced, before the former. Furthermore, the amount outstanding of each type of issue which the firm intends to maintain even after individual issues have matured should be outlined for investors as a matter of the firm's policy. Credit Suisse, but not Rabobank, has followed the correct sequencing in this regard. CS issued high-trigger (7%) cocos before turning to low-trigger (5%) cocos while Rabobank issued a cocos with a higher trigger (8%) than the high-trigger (7%) cocos already outstanding.

5 OSFI's (2011) following assertion of unchecked powers is disconcerting in this regard: "Canadian authorities will retain full discretion to choose not to trigger [cocos] notwithstanding a determination by the Superintendent that a [Deposit Taking Institution] has ceased, or is about to cease, to be viable. Under such circumstances, the DTI's creditors and shareholders could be exposed to losses through the use of other resolution tools or in liquidation."

6 For the opposite choice -- making "no recommendations" on go-cocos, or their design, while strongly advocating goner-cocos -- see ICB (2011, pp. 102-103).

7 The width of this range is due in part to the risk-weight, which is the ratio of RWA to total assets, TA, differing greatly between countries and institutions. For recent cocos issuers, RWA/TA at the end of the third quarter of 2011 was 37.8%

3. The Cocos Instrument to be Considered

Cocos should be created as full-fledged long-term debt instruments that are distinguished from each other mostly by their trigger level and terms of conversion but also by their fixed coupon rates, original maturity and call features. Periodic non-deferrable interest payments should be required on all classes of them until maturity or conversion or until they are called subject to replacement. Regrettably conversion or write-off triggers based on capital ratios or other measures are not required under Basel III. Instead it is left to the discretion of national regulators to declare a trigger event at the point of non-viability as they perceive it. Taking full advantage of this opening for discretion, Canada's Superintendent of Financial Institutions has advised that to qualify as an Additional (non-common) Tier-1 and Tier-2 capital instrument specified in Basel III, these instruments must include one purely discretionary trigger. That trigger would be activated by the Superintendent's issuing an "opinion that the [bank] has ceased, or is about to cease, to be viable and that, after the conversion of all contingent instruments ... it is reasonably likely that [its] viability will be restored or maintained" (OSFI, 2011, p. 2).

Official preference for regulatory discretion over "automatic sprinkler" systems for crisis prevention is unwarranted in view of the initial passivity of regulators and their multiple failings in the run-up to the most recent financial crisis.[8] Regulators have a massive conflict of interest which will make them slow to act against impending disasters for fear of being blamed for stirring them up. Furthermore, making ALL cocos subject to simultaneous conversion by order of the regulators, irrespective of their capital-ratio based triggers, precludes cocos portfolio differentiation with trigger sequences (e.g., 7% before 5%) that the market could learn to price. It also would create massive contagion as it would strip the financial system of its cocos shields all at once. The tendency to severely restrict the cocos design choices of issuing banks is also evident in the EBA's (2011a, pp. 17-18) form sheet. It dictates that cocos must all be perpetual (undated) and that they may be redeemed by a bank starting five years after the first interest payment date "all but not some" as if there were only a single class of cocos.

Perhaps recognizing that go-cocos, at least, should not be subject to discretionary conversion risk that could keep them from being issued voluntarily, the Basel Committee's "proposed minimum requirements for going-concern contingent capital" refer only to automatic triggers of either a permanent write-off or of conversion to common shares. The trigger point is reached "when the Common Equity Tier 1 of the banking group subject to the additional loss absorbency requirement falls below at least 7% of risk-weighted assets" (BCBS, 2011a, p. 26).

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for Lloyds Banking Group, only 19.8% for Credit Suisse, but 66.5% for the Bank of Cyprus Group. Such risk-weights alone are insufficient indicators of risk even for otherwise comparable banking institutions. For instance, UBS had a risk weight of only 11% (Basel II) on its total assets at the end of 2007 shortly before, unlike CS, it needed to be bailed out by the Swiss government. On the other hand, as of 09/30/2011, Rabobank (2011, p. 19), which, like now also Nomura Holdings, is an issuer of the debt write-off-only type of cocos, had a 91.8% ratio of "risk-weighted exposure" to the principal amount of assets according to its consolidated financial statements. Yet Rabobank, an institution for banking cooperatives, has retained a top rating from all major credit agencies for years.

[8] The *New York Times* of January 13, 2012 notes the utter "lack of comprehension" evident from the transcripts of the 2006 meetings of the U.S. Federal Open Market Committee in this regard.

Taxes aside, debt write-off that occurs upon cocos being triggered makes the same contribution to the book value of common equity whether or not cocos are converted into such equity. A trigger event would cause holders of write-off-only cocos to lose everything except the interest payments already received. Bank employees participating in the bonus pool in Barclays Plc have become holders of similar, but nontransferable, contingent write-off instruments that should properly be called contingently vesting bonuses or cobos rather than cocos. Payment of these bonuses is deferred for at least five years and cancelled if a specified capital-ratio trigger event occurs prior to the end of the deferral period. Existing shareholders would be the principal contingent beneficiaries and senior managers the losers though managers may find a way to raise the bonuses conditionally promised to compensate for the uncertainty that they will be paid.

The go-cocos here envisioned are dated debt instruments paying mandatory and tax-deductible interest. They convert to CET1 when CET1/RWA has declined to the trigger level set for a particular cocos issue. Some of my previous work (2011a, pp. 8-10, 16-17, 67-68; 2011b, pp. 10-13, 17-20) examined triggers based on the price of individual shares or of ETFs for the financial sector, macro/micro "dual" triggers, systemic triggers, and triggers that may be activated by regulatory authorities even for go-cocos. Triggers based on specified percentage declines of the trailing monthly average share price below its level around the time of cocos issue are especially likely to lead to unintended consequences.[9] *These types of trigger arrangements appear inferior to bank-specific triggers based on reported capital ratios which "align better with a regulatory framework and objectives" (Pazarbasioglu et al., 2011, p. 9). Such triggers are also the only ones that have been used so far according to the terms given for all the cocos issues since 2009 in Tables 1 and 2 of my earlier work (2011b, pp. 32-33)*[10]*. Leverage-ratio triggers which are based on CET1 divided by total assets rather than RWA could be a desirable alternative because they are least subject to conflicting national applications. However, doing away with risk-weighting entirely would be out-of-step with the Basel process.This process of risk differentiation needs to be further improved through continuous adaptation even though it has hitherto been just as slow as financial markets to learn about new risks and their appropriate weighting and pricing.*

[9] The average monthly stock price at the open for the IYF iShares Dow Jones U.S. Financial Sector declined relentlessly from $114.50 in March 2007 to $82.07 in March 2008 and then to $32.13 in March 2009, a decline of 72%. If, instead of using regulatory capital ratios based on book values, some fraction of the trailing average monthly share price at the time of cocos issue had been specified as the trigger, the jointly suffered stock market convulsions typical of financial crises, and not the recapitalization needs of individual firms, would drive cocos conversion. Basing both the trigger- and the conversion-price on the latest market price of shares would give markets that are severely unsettled by a financial crisis even more capacity to rattle the financial system. Elsewhere (2011b, pp. 17-19) I have spelled out 8 *other* reasons for rejecting conversion triggers based on stock prices or stock price indexes for the financial sector.

[10] The company announced on May 20, 2011 that only EUR 890 mn of the up to 1.342 bn Enhanced Capital Securities (CECS) authorized for Bank of Cyprus in March were actually issued. Taking advantage of the enhancement feature that combines the characteristics of a regular convertible bond with those of a contingent convertible issue, some of these CECS were converted by their holders into common shares during the first optional conversion period of September 1-15, 2011 at a share price of EUR 3.30 on the upside.

4. The Cocos Issuers

Cocos are contingently convertible term debt issued by the same bank holding company or financial group, containing one or more banks, that also issues common shares and to which regulatory (Basel) capital-ratio requirements apply. Stand-alone banks that had been spun off by a financial group and have their own common shares and capital requirements are qualified issuers of cocos. In converting them when triggered, bank subsidiaries of a holding company would provide either their own shares to the outside nonbank[11] holders of cocos or shares of the holding company. Even if a fully consolidated bank subsidiary is located in a different jurisdiction from that of the holding company, components of its regulatory capital, such as minority interests not funded directly or indirectly by the parent or affiliates, may be counted at the bank holding company level as well as the bank level under certain conditions. BCBS (2010b, pp. 19-21 and pp. 66-68) provides regulations and examples of the treatment of qualifying capital issued by consolidated subsidiaries.

Most large and internationally active institutions are joint stock companies and have publicly-held shares outstanding. Mutuals, cooperatives, and savings banks are the exceptions. As in BIS publications (e.g., BCBS 2010b, p.12), the term "bank" is used here to mean bank, banking group, or other entity such as a holding company *whose capital is being measured*, noting that the Basel requirements are for consolidated group levels (BCBS, 2011b, p.2). The relevant jurisdiction is the one in which the capital is given recognition for regulatory purposes.

Summarizing: The cocos issuers considered in this paper are joint-stock companies at the group level which are subject to regulatory capital requirements at that level. These requirements are set by the home-country regulator for the group as a whole.

5. Methods for Cocos Conversion and Redistribution

Cocoskeptics and others have advocated using the specter of extreme dilution from conversion to scare existing shareholders into ponying up more capital when needed and pressuring management to do its utmost to keep clear of the trigger.[12] This tactic is likely to be self-defeating and time inconsistent because existing stockholders will not agree to the issuance of an instrument that could wipe them out upon conversion without first going through bankruptcy. Furthermore shareholders by conversion, no matter how much favored initially, or those to whom they sell their shares, become existing shareholders after conversion. They could expect the same fate if another issue of cocos were to be triggered later on under the same punitive method. Thus the sword of extreme dilution hung over existing shareholders could come to smite the former cocos holders, or those to whom they sell, in due course, souring the entire scheme.

[11] Banks rightly are discouraged from investing in cocos by having to "deduct such investments from their Common Equity Tier 1 in accordance with the treatment of common stock investments under Basel III" (BCBS, 2011a, p. 26).

If conversion terms were tilted instead to the other extreme, giving cocos holders less consideration, i.e., fewer shares than the cancellation of their debt claim would merit by what it contributes to common equity, existing shareholders could come to rely excessively on cocos conversion because for them it would then be anti-dilutive. They might even increase risk-taking to precipitate conversion though the prospects of coming under regulatory supervision until the cocos shield has been rebuilt, most likely under fairer terms, might temper such recklessness.

5.1 The Distributionally Neutral "Fair Rule," FR, the Benchmark for Dilution

It would be preferable for the rule of conversion to be such that distributional neutrality between existing shareholders and cocos holders is maintained. Deviating from this principle of neutrality is a form of regulatory mispricing that reduces the amount of cocos business that can be agreed to between the parties as one of them is being favored by regulators over the other. To achieve an efficient outcome, the number of common shares outstanding, N, must be raised on account of conversion by the same percentage as the book value of tangible common equity. The result then is that the book value, henceforth of tangible common equity, per share, CET1/N, is unchanged by conversion. Hence if the conversion price were specified to be the book value (BV) per share just prior to conversion, P_{0c}^{BV}, dilution and its opposite, which in physical usage is *concentration* and in finance *anti-dilution*, would be prevented at conversion. CET1/N is routinely reported at set (quarterly) intervals. It uses data concepts familiar from regulatory accounting. Making it the conversion price would not impose large extra verification burdens.

Choosing this "fair rule" or FR method has precise implication for the choice of the appropriate conversion terms. To reinforce algebraically what has just been laid out, let the Principal Amount of Cocos outstanding be PAC, the book value of common equity capital CET1, and the number of common shares prior to conversion N_0. Then conversion (subscript c) should be such that book value per share, P^{BV}= CET1/N, does not change from moment 0c to 1c when $CET1_{0c}$ increases by PAC to CET_{1c}. Hence setting Δ(CET1/N) = 0, applying the quotient rule, and substituting PAC for ΔCET1, application of the FR method yields the following rate of increase from conversion in the number of shares outstanding prior to conversion:

$$\Delta N_{1c}^{FR}/N_{0c} = PAC/CET1_{0c} . \quad (1)$$

Adding 1 to both sides, and distinguishing book value per common share after conversion (subscript 1c), P_{1c}^{BV}, from its value just prior to conversion (subscript 0c), P_{0c}^{BV},

$$N_{1c}^{FR}/N_{0c} = (PAC+CET1_{0c})/CET1_{0c} = CET1_{1c}/CET1_{0c} \equiv P_{1c}^{BV}N_{1c}^{FR}/P_{0c}^{BV}N_{0c} \quad (1a)$$

[12] My Working Paper (2011b, p. 5) provides a record of such advocacy. See also Berg and Kaserer (2011).

Comparing the outer terms of equation (1a) shows that under FR, book value of tangible common equity per share is unchanged since P_{1c}^{BV}/ P_{0c}^{BV} must equal 1.

5.2 The CS, CS-min, and LBG Conversion Methods Actually Used So Far

In spite of the appeal of the FR conversion method and its consistency with regulatory accounting concepts, P_{0c}^{BV} has not been chosen as the conversion price by any of the cocos issuers to date. Instead two other methods have been applied. The first one, with floor price either binding (CS-min, CS*) or not (CS), was pioneered by Credit Suisse and the second by Lloyds Banking Group (LBG). What the CS, CS-min, LBG and FR methods have in common is that the product of a designated conversion price or book value per share and the number of shares to be issued in conversion is set equal to 100% of the face value, PAC, of the cocos that have been triggered. Knowing PAC and either the specified conversion price per share or the number of shares to be issued in conversion is sufficient for implementing any of the conversion methods prescribed for a particular issue of cocos.

The conversion price to be used under the CS method is equal to the market price per share, P_{1c}^{CS}, established just after the announcement of conversion as long as it is at least equal to a minimum level indicated by superscript CS*. This minimum share-price level, P_i^{CS*}, is set already at the time of cocos issue (subscript i).[13] First assume that this floor price is not binding so that fewer than the maximum permissible number of shares will be issued in conversion under the CS method. Then the number of shares issued, given the market price observed after the announcement of conversion, P_{1c}^{CS} and given PAC, will be:

$$\Delta N_{1c}^{CS} = PAC / P_{1c}^{CS}, \quad P_{1c}^{CS} = P_{1c} > P_i^{CS*}. \tag{2}$$

If the floor price is binding (add *),

$$\Delta N_{1c}^{CS*} = PAC / P_i^{CS*}, \quad P_{1c} \leq P_i^{CS*}. \tag{2a}$$

The lower stock-price limit has a high probability of being binding when conversion actually occurs. For example, CS issued cocos on February 24, 2011 with a floor price on conversion of USD20 per share. This was somewhat less than half the stock price, P_i, of USD46 on the date the cocos were issued. Since then CS has repeatedly closed under USD22 per share. However, its cocos were far from triggering in late 2011 because (CET1/RWA)% was in double digits rather than approaching 7%. Thus if these cocos were ever to trigger in the next five or ten years, they would do so most likely

[13] While a cap could equally well be placed directly on the maximum number of shares that may be issued in conversion, as the BCBS (2011a, p. 26) has proposed, all existing "CS" cocos specify a floor price instead.

when the share price is well below USD20.The pre-specified minimum, P_i^{CS*}, then would be binding, arresting any death spiral.[14]

The second alternative to FR uses the stock market price at the time of cocos issue, P_i, as LBG has done. The number of shares to be issued in conversion under this method is:

$$\Delta N_{1c}^{LBG} = PAC/P_i \, . \qquad (3)$$

Both the floor price under the CS method, P_i^{CS*} , and the market price around the time of issue, P_i, applied under the LBG method, are announced or observed at the time of issue, years before the time of conversion: *P_i^{CS*} so far has been set at about half of P_i*.

Just as the low of CS has already been more than 50% below its stock price at the time of cocos issue, the price of LBG's stock (LLOY.L) has fallen steeply from P_i of 53.2093 pence on volume-weighted average for November 11-17, 2009, shortly before the date of cocos issue, to a closing low of 21.64 pence two years later as shown in Table 1. Hence CS and LBG cocos would have been triggered within 9 months (CS) to two years (LBG) if the trigger had been set at 50% of the price of their shares at the time of cocos issue.[15] Wiping out the leading cocos so soon after origination would have defeated both their longer-term insurance purpose and undermined the ability to sell new cocos to investors. Price-based triggers would have been unsafe.

5.3 Redistribution from Conversion under the Different Methods

Gains and losses from conversion are distributed between cocos holders, pre-existing shareholders, and other bond holders.[16] In so far as cocos are issued as a substitute for senior unsecured regular debt and not for common equity, having go-cocos on the balance sheet to convert outside of bankruptcy will necessarily improve the position of the other bondholders by making their claims less risky. As between go-cocos holders and existing shareholders, better terms of conversion for one group must come at the expense of the other although near the point of non-dilution both groups may still gain from conversion due to bankruptcy avoided.

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[14] Death spirals are unlikely under the FR method of conversion because that method does not reference stock market prices at all. Short sales of shares that do not produce an increase in the number of shares outstanding or automatically raise funding and collateral requirements when stock prices fall may speed needed price adjustments but do not cause death spirals. Under the LBG and CS-min methods, the number of shares to be issued in conversion is fixed at the time of cocos issue except for an adjustment for dilution for instance through rights issues. Death spirals are conceivable only under the unconstrained CS method, a favorite with cocoskeptics which has never been applied in practice and should be avoided.

[15] De Spiegeleer and Schoutens (2011, pp. 26-28) , using a method similar to the credit derivatives method, have associated an implied stock market trigger price with the LBG accounting trigger of 5% of core tier 1 capital. They estimated that implied price as 22.5 pence which is close to the market price of LBG in November 2011 and equal to 38% of the conversion price of 59.21 p. specified at the time of cocos issue (see Table 1).

[16] Because switching to alternative conversion methods changes the distribution of net benefits, it is unhelpful to call for conversion to harm *all* stakeholders, "managers, shareholders and bondholders" for the sake of "enhancing market discipline" (Ötker-Robe *et al*., 2011, p. 14). It is difficult to see why cocos should ever be allowed to be issued if their conversion harmed all stakeholders instead of conveying net benefits on at least some of them. Cocos are recapitalization tools that are beneficially used in emergencies.

If P_{1c}^{CS} is the applicable conversion price, it is in theory equal to the market price, $P_{1c,}$ established after the conversion announcement. Small differences may arise from the practical need to determine P_{1c}^{CS}, and hence the number of shares to be issued in conversion, prior to the act of conversion itself though not before its announcement has hit the market. When conversion is at P_{1c}^{CS}, cocos holders obtain the full principal amount which may differ from the market value of their claim before there was a clear prospect of conversion. In the more likely event that $P_{1c} < P_i^{CS*}$ and the market price ends up below the floor price, cocos holders upon conversion get a value of less than PAC in the form of common shares. The outcome would be qualitatively the same if the stock market price after the announcement of conversion, P_{1c}, were less than the stock price, P_i, recorded at the time when a cocos was issued under the LBG method of conversion. *Indeed, empirically P_{1c} so far has been less than half of P_i.*[17] Table 1 provides some useful indications of stock price relations for three cocos issuers and the volatility of their share prices. While application of the proposed FR method would keep P_{1c}^{BV} the same as P_{0c}^{BV}, *book value of tangible common equity on the verge of conversion is likely to be about twice as high as market value per share for struggling banks* that had issued cocos in better times.[18]

Observed outcomes therefore point to cocos holders salvaging 40% (LBG) to 50% (FR) of PAC from conversion. There are two possibilities for cocos holders to do better. Both arise under the CS method: (i) When the floor price is binding but considerably less than twice the market price at conversion, so that $P_{1c} < P_i^{CS*} << 2P_{1c}$, well over half of the value of PAC, such as 80% (CS-min), is obtained and (ii) in the unlikely event that $P_{1c} = P_{1c}^{CS} \geq P_i^{CS*}$ so that the floor price is not binding, the full face value of 100% (CS) is received.

5.4 An Application of the Book-Value Based Fair Rule (FR) of Conversion

The first case of a major cocos conversion on record, described below, provides an opportunity to measure the extent of dilution of pre-existing shareholders against the neutral standard and benchmark set by the FR method.

After writing off € 1 billion amounting to 50% of the face value of its holdings of Greek government bonds, the Bank of Cyprus (BOC, 2011, pp. 28, 31) fell short of meeting the minimum core tier-1 capital ratio of 8% required in 2011 by its regulator. With a core capital ratio of only 5.8% in the Fall of 2011, BOC was approaching the 5% trigger for conversion of its cocos. In November the Bank

[17] Bank of Cyprus in effect imposed a minimum market price per share of EUR1.25 (80% of which is the minimum conversion price of EUR1) if the CECS it issued 5/18/2011 should have to be converted. The market price of its shares two days before the cocos issue was € 2.61. This price fell to less than €0.60 in November 2011 when conversion of cocos became imminent. Tables 1 and 2 of my WP (2011b, pp. 32-33) provide further details on the terms and conditions of large cocos issues.

[18] Taking two still rather challenged U.S. G-SIBs as examples, for Citigroup the book value (of tangible common equity) per share at the end of 2011:Q2 was $48.75 compared with a closing price of $41.64 on 06/30/11. Citigroup's stock closed at $25 on 11/21/11.This was about half of its extrapolated book value per share at that time. For Bank of America the corresponding three values were $12.65 for book value per share and $10.96 and $5.49 for the two closing prices. Hence book value was again twice the market value per share on the latter (11/21/11) date. Bank of Cyprus, which actually was on the verge of converting about 70% of the €860.4 million cocos outstanding at the end of 2011:Q3, had a tangible net value of common equity per share of €1.70 when the closing price was €1.17.

announced that it expected €600 million of the total of €860.4 million cocos (named CECS) outstanding at the end of 2011:Q3 to be converted. Since the cocos contract had specified a minimum price of €1 per common share to be assumed in conversion under the CS-min method, BOC first offered voluntary conversion of €600 CECS into the same face amount of Mandatory Convertible Notes (MCNs). Within 8 days after voluntary conversion, the MCNs were then to be exchanged into 600 million common shares plus an additional 200 million bonus shares granted as sweeteners for initiating the two-step conversion process.

Table 2 shows that the CECS holders, instead of receiving 352.44 million shares under the distributionally neutral and book-value-per-share preserving FR method, would obtain 800 million shares from conversion. The result is that they would end up owning 47.08% [800/(899.2+800)] instead of 28.16% [352.44/(899.2+352.44)] of the ordinary BOC shares outstanding, while the equity stake of existing shareholders would be a mere 52.92% rather than 71.84% as under the FR method. The ownership stake of existing shareholders would therefore be reduced to 73.7% (52.92/71.84) of what it would be under the FR method. Equally diminished would be book value per share which now falls to 1.254 = (2130.8/1699.2) rather than remaining at 1.7024=(1,530.8/899.2) as shown for the FR method in Table 2.

As I have discussed elsewhere (2011b, p. 20), Calomiris and Herring (2011, p. 17) define a cocos conversion as dilutive if it leaves the holders of cocos with no less value in new equity as the principal amount of the bonds they surrender. The opposite outcome would then have to be called anti-dilutive. Applied to the present case, cocos holders, while being greatly favored over existing shareholders, are still not likely to get all their money back. Even with sweeteners that have augmented the number of shares issued through cocos conversion by one-third and thereby lowered the least share price to be subsumed in conversion from €1 to €0.75, the market price is likely to be less. In fact, the closing price of BOC.AT has been consistently below €0.6 from 11/18/2011 at least through that year's end. Calomiris and Herring (2011) thus would misleadingly conclude that the conversion would be anti-dilutive even though it greatly *reduced* book value per share for existing shareholders. I therefore continue to prefer to define cocos conversion as dilutive if it gives cocos holders a larger fraction of the total number of shares outstanding after conversion than corresponds to their contribution to (book) equity through conversion. By this standard, the cocos conversion scheme planned by BOC is strongly dilutive for existing shareholders, not anti-dilutive, with the FR method providing the correct benchmark.

5.5 Coping with the Reporting Lag under the Accounting-Based Fair Rule

In the United States, companies whose outstanding common-equity market capitalization, net of the value of common equity held by affiliates, amounts to at least $75 million of "public float" are required to file quarterly (10-Q) and annual (10-K) reports with the SEC. For fiscal years ending on or after December 15, 2005 they have had to do so within 35 days and 60 days from the end of the respective fiscal quarter or year respectively. Only annual statements filed subsequent to the statement for the

fourth quarter of the company's fiscal year must have been audited. Nevertheless, the SEC (2002, pp. 8, 61) notes that "the information in [Securities] Exchange Act reports, due to its required nature and the liability to which it is subject," mandated extensive periodic disclosure that has been reviewed by independent public accountants. Since 2002 it also has been certified by the principal executive officer and principal financial officer of the company as required by the Sarbanes-Oxley Act. Hence the same quarterly reports that provide regulators with information on the capital-ratio cushions of financial institutions in relation to their triggers for cocos can also be used to adjust the terms of conversion for the inevitable reporting lag encountered in regulatory and financial accounting. The objective is to compensate for any loss of book value per share up to the end of the quarter during which the trigger event has occurred, judging from data reported for the end of that quarter which become available 35 days after its close.

A numerical example may be helpful to show how one may proceed when accounting data cannot be used to pinpoint exactly when the trigger event occurs in real time, as my initial exposition of the FR method had assumed. Here are the data used for this illustration:

(a) The CET1 trigger is 7% of RWA, with 1 million shares outstanding prior to conversion.
(b) Cocos outstanding with that trigger are equal to 2.8% of RWA.
(c) CET1/RWA falls from 8% to 5% from the end of one quarter to that of the next, indicating that a trigger event must have occurred in the second of the two quarters.

Since 7% is twice as close to 8% as to 5%, linear interpolation suggests that the trigger event may have occurred at the end of the first month of the second quarter. On the presumed date of the trigger event, application of the FR method would have required issuing 400,000 shares by conversion of cocos to common equity, giving cocos holders a 28.57% ownership stake. However, conversion could not have taken place so promptly because the trigger event could be inferred only later from published accounting reports. Because the ownership stake of existing shareholders had declined further from 7% to 5% of total assets by the end of the second quarter, the number of shares actually issued would be 560,000, raising the ownership share of cocos holders to 35.90%.[19] Only any further change in book value per share from the end of the second quarter until 35 plus 5 days thereafter, when conversion could finally occur, would not be taken into account. The combined effect of the 35-day reporting and 5-day implementation lag is ignored because the required correction in the number of shares to be issued cannot be derived from regularly-scheduled accounting data. Hence 560,000 is the number of shares issued in cocos conversion in this illustration, with conversion quite generally feasible within 40 (35+5) to130 (40+90) days from the presumed date of the trigger event.

In sum, applications of the existing LBG and CS-min conversion methods are likely to result in cocos holders recovering 40% to 80% of PAC. The benchmark for dilution cannot be set by whether cocos holders are paid in full. Using the book value per share just prior to conversion, P_{0c}^{BV}*, as the*

[19] Conversion, if occurring at the end of the second quarter rather than at the time of the trigger event earlier, would have raised common equity from 5% of RWA to 7.8%, or by 56%, rather than from 7% of RWA to 9.8%, or by 40%.

conversion price establishes a clear standard from which deviations in either direction can be measured. Since book value per share is unaffected by conversion under the FR method, both cocos holders and existing shareholders get what they bring into the pool of common equity at the point of cocos conversion. If cocos holders get more than that, then the result is dilutive for existing shareholders, and if less it is anti-dilutive by this robust metric.

6. Cocos Updates and Calculability

Because cocos are long-term debt securities, their triggers and conversion terms may become unsuitable as time goes by. For instance, go-cocos would have turned into goner-cocos and failed in their mission to maintain viability if they were not triggered in time to avert default on contractual payments due. To avoid such an outcome, the trigger must be kept well above the absolute minimum of the regulatory capital ratio that prevails at a particular time. Hence if this unconditional minimum level of the regulatory capital ratio, which is net of all buffer capital potentially available for use, is raised for any financial institution, that institution should be entitled to call outstanding cocos, subject to replacement with higher-trigger cocos reflecting the raised minimum. An exchange offer may achieve the same objective. The form sheet published in EBA (2011a, p. 21) provides useful guidance on how to adapt, call in, or exchange cocos in conformance with changes in regulatory or legal requirements in future years. However, the issues of how fast cocos have to be replaced after being triggered in any financial institution, and what happens until they are replaced, are not addressed in that document.

Another implication of the need to keep go-cocos fit for their task is to avoid conversion terms that prescribe use of a fixed price per share in calculating how many shares would have to be issued in conversion to come up to the face value of the cocos to be converted. Cocos should be dated debt securities issued with a mix of maturities which could well extend to 20 or more years as argued in my DP (2011a). Maintaining fixed and – except for application of anti-dilution provisions – unadjustable nominal reference prices for shares over long periods can render the conversion terms set on cocos economically obsolete.

This concern applies to the LBG and CS-min methods which use fixed nominal conversion prices per share determined around the time the cocos are issued. If the conversion price is set instead by the market price at the time of conversion under the CS method without any minimum, shareholders by cocos conversion are assured of full value at any nonzero share price, while existing shareholders are left with all the risk. In all these cases, reference to current share prices as well as historical prices fixed at time of cocos issue in determining the number of shares due upon conversion could expose holders of long-term cocos and existing shareholders to large and incalculable risks. These would discourage the issuance of long-term cocos.

Designating the book value per share just prior to conversion, P_{0c}^{BV}, as the conversion price would provide for regular updating from the time of cocos issue to its possible conversion. It would also bring

much greater stability to what cocos holders and existing shareholders may expect conditional on conversion because cocos holders would then be treated exactly like the existing shareholders whom they would join. There would be far less volatility and risk and more predictability if conversion terms made no reference to stock market prices at all. Instead the contribution of cocos conversion to the book value of common equity at the trigger point should be recognized fairly whenever that conversion occurs. The result would be that the book value of equity per share is unchanged by the act of conversion. This means that systematic redistribution through planned dilution or its opposite of the stakes of (the former) cocos holders and existing shareholders is precluded for all cocos, regardless of the length of their original term to maturity.

Without considering this preferable alternative, regulators have converged on the CS method with floor price while reserving their discretionary trigger-or-override prerogatives. For instance, Principle # 4 of OSFI (2011) is that the conversion terms of the new instruments must reference the market value of common equity on or before the trigger event. The conversion method must also include a limit or cap on the number of shares issued upon the trigger event. This Principle leaves open whether the market value per share of common is to be established from the price data from before or after *the announcement, leak, or common anticipation* that a trigger event is imminent or has already occurred. BCBS (2011c, p. 26) likewise includes a cap on the number of shares that can be issued when the CET1 ratio "falls below at least 7% of risk weighted assets" among its "straw man criteria" as the basis for discussion.

For greater certainty of what to expect if a trigger event should occur, Chant (2011, p.4) prefers conversion based on issue price. He points out that, if there is conversion, the share price is likely to have fallen well below its level at around the time of cocos issue. "[Compared with application of the unconstrained CS method,] more of the losses ... would then be shifted onto holders of convertible debt by exposing them to the full deterioration in equity value from the time of issuance to the time of conversion... Using initial equity prices generates greater market pressures on the pricing of contingent capital that would make it a barometer of a bank's riskiness." This argument is persuasive enough to keep the LBG method in contention for cocos with terms of up to five years. This is about as long as a nominally fixed P_i may remain relevant if stock price fundamentals diffuse slowly in an environment of low inflation.

To provide for updating while also bracketing the range of outcomes to be encountered by stakeholders conditional on conversion, the conclusion is this: The LBG method may remain in contention together with the FR method for issues with maturities of up to5 years. The FR method appears superior for longer-term issues because, unlike LBG and CS-min, it updates automatically and transparently within the firm's regulatory accounting framework.

7. Cocos and Debt Overhang

Debt overhang refers to risky debt that discourages new equity financing because that financing would partly benefit debt holders by making their claims less risky. Assume that one-quarter of the total business risk for the firm is initially born by debt holders when the firm is 95% debt-financed. If that debt is made riskless when the equity share in the total financing is doubled, risk exposure per share is not cut in half, as it would be if the debt had been riskless from the start. Instead the fraction of the underlying business risk borne by shareholders is increased from 75% to 100%. Dividing 100 by 2 for the doubling of the number of shares outstanding, risk exposure per share declines by only one-third, and not one-half, on account of the risky debt overhang first being reduced or eliminated. Doubling the equity portion thus is denied its full reward for shareholders because part of the benefit goes to the debt holders. New stock issue is discouraged.

To discuss how changing the financing structure through cocos can affect debt overhang requires holding the total size of the balance sheet fixed and specifying whether cocos substitute (i) for straight unsecured long-term debt or (ii) for common equity. In the first case, debt overhang is immediately reduced even though the total amount of debt is unchanged. The reason is that go-cocos are designed to be triggered and converted to common equity before the firm can reach insolvency. Knowing this, investors feel assured that if the firm should experience difficulties leading to a trigger event, cocos debt-for-equity conversion would be automatic. Debt overhang thus would be reduced as soon as the cocos are issued because the firm's existing non-contingent debt would fall, and all such debt would immediately be viewed as less risky.

In the second case, cocos are treated as a 1:1 substitute for common equity. They still provide assurance that the equity will be rebuilt automatically upon conversion. After that event, the balance sheet would look basically no different than if the common equity had not been reduced and no cocos had been issued in the first place. Forward-looking markets thus will find that debt overhang is unchanged by the issuance of cocos as a substitute for common equity, because, when the firm gets into difficulties, that substitution is self-reversing.

7.1 Why Issue Go-Cocos Rather than Common Equity?

This leaves the hotly debated question why cocos should be issued at all. If their strategic importance lies in converting to equity under specified conditions, and if cocos, like common equity, are best issued in good times, would it not be simpler just to issue more common equity when the market is equally receptive to both? Cocos are hybrids. Initially they are just debt securities. Unless and until converted, interest payments on them are mandatory while dividend payments on common shares are voluntary. Thus common equity provides more flexibility in managing cash flow. However, cocos, being hybrids, should in other respects be counted as (contingent) equity. For instance, insolvency risk is unaffected by having more cocos and less common equity on the balance sheet, as after a stock buyback financed by issuing cocos.

Cocos convert to common equity just when restoring that equity is most needed. In the final section of this paper, conditions are derived under which they should be less expensive than common equity until converted. Indeed they should not be issued otherwise except perhaps to overcome the "infant instrument" stage through which innovative financial products may have to pass before becoming profitable. While regulatory cocos mandates, say for systemically important financial institutions, can help spread the costs of introduction, such help should not for long remain essential for the development and growth of cocos. Once the market becomes receptive to them, they should be allowed to participate in complying with supervisors' directives for individual banks to raise more capital.

If issuers find it cheaper to issue cocos than common equity, cocos should be allowed to join the list of instruments that can contribute to the capital buffers which regulators require. Calomiris and Herring (2011, pp. 12-13) explain why equity, after adjusting for its being the most junior claim, is still costlier to raise than debt for fundamental reasons associated with asymmetric information, and with managerial agency costs.[20] If these reasons apply, some financial institutions eventually will find it cheaper to turn to cocos to fill some of their capital needs. If cocos substitute for otherwise comparable non-contingent debt, they might be even more attractive. The added protection they then provide against decapitalization and regulatory insolvency would immediately benefit the remaining bondholders and existing shareholders.

8. U.S. Tax Issues with Cocos?

Prominent cocoskeptics (e.g., Goodhart, 2010, p. 33) have given the impression that "CoCos would most likely not be considered debt for U.S. tax purposes" to drive the last nail into their coffin for cocos. Hence this section considers only the controversy over the U.S. tax treatment of cocos. Misinformation abounds in this area because matters too often are represented as settled when they are wide open. For example, a July 19, 2011 Bloomberg Report on "Basel Regulators Force Banks to Cut Plans for Contingent Convertible Bonds" asserts that "the [U.S.] Internal Revenue Service [IRS], unlike its European counterparts, treats CoCos as equity rather than debt: issuers' interest payments on convertible bonds aren't tax deductable (*sic*)." In fact, deductions of interest on instruments on which principal or interest may be payable in stock are disallowed if there is a substantial degree of

[20] The ICB's final report (2011, p. 86) states, "equity is by far and away the best form of loss-absorbing capacity," without discussing these opposing arguments. The reasons given for the ICB's conclusion are unconvincing. It claims, for instance, that more equity and less debt mitigate the debt overhang problem. But so do more cocos and less other debt. It argues that equity cannot run away, but neither can long-term cocos, and it forgets that go-cocos, which it does not favor, turn into equity before anyone would want to run. It still has the specter of destabilizing death spirals (p. 102) cast a shadow over cocos, although such spirals would have to be based on irrationality and inefficient markets under all methods of conversion that have been applied so far. For cocos to be the reason why investors panic when a bank's reported capital ratio sinks to a level that would require remedial attention with or without cocos would be particularly perverse because the conversion of go-cocos helps with timely recapitalization just when issuing new equity in other ways would prove difficult. In a crisis, individual banks have only the options of cutting costs and dividends and trying to reduce leverage and RWA if they cannot recapitalize through new stock issues from cocos conversion. Attempting to reduce the size and risk-weighting of their assets will be much more urgent if there are no go-cocos to convert. This makes a collapse in share prices in view of a reported decline in capital ratios much more likely without go-cocos than with them.

certainty that the option or contingent obligation to pay in stock will be exercised or triggered.[21] Cocos with the features described in Section 3 of this paper that are issued by a well-capitalized firm should thus qualify for deductibility of interest paid.

Under U.S. law there may be a question, however, whether all the interest is deductible or only that part that would be paid on an otherwise comparable bond without the adverse conversion feature.[22] In other words, there is a question whether the non-contingent bond method, described in § 1.1275-4(b) of the IRS Tax Regulations, applies to cocos. The comparable yield for the contingent debt instrument is the yield at which the issuer would be able to issue a fixed-rate non-contingent debt instrument with terms and conditions similar to those of the contingent debt payment instrument. Among these terms are the level of subordination, term-to-maturity, timing of payments, and general market conditions. However, "no adjustments are made for the riskiness of the contingencies or the liquidity of the debt instrument" [§ 1.1275-4(b)(4)(i)(B)] so that the instruments compared may differ in these regards.

The entire amount of interest paid is in fact deductible on debt that is convertible at the holders' option into equity as long as the conversion price per share was initially above the stock price prevailing at the time of the debt issue. Now the interest rate required on debt that was sweetened by the holder's call option to convert is of course lower than that on comparable straight debt. By contrast, the interest rate on cocos must be higher because of the issuer's contingent "put" right and obligation. Holders of cocos have to include the full amount of interest received in their taxable income in either case. But IRS would be violating symmetry in the taxation of interest paid on different instruments if it required that the non-contingent bond method be applied to determine how much less than the interest actually paid is deductible on cocos but not how much more interest than paid is deductible on (optionally) convertible bonds.

Several academic commentators have made the point that if interest payments on cocos are deductible from taxable income of corporations in whole or part while dividend payments and other returns on capital are not, cocos have a taxpayer-financed cost advantage over common equity. They argue that such a private advantage should be left out of account in comparing the economic costs and benefits of cocos and common equity without explaining why comparing these two instruments is the most apt. If cocos are a substitute for comparable non-cocos debt on the balance sheet of financial institutions, the deductibility of some or all of the interest paid on them raises no new tax

[21] Title 26 of the Internal Revenue Code, Subtitle A, Chapter 1, Sec. 163(k)(1) (1)-(3)(A)-(C) first denies the interest deduction for a *disqualified* debt instrument defined as "indebtedness of a corporation which is payable in equity of the issuer or a related party or equity held by the issuer." However, Revenue Ruling 2002-31 then reminds that under §163(*l*) indebtedness shall be treated as payable in equity only if "a substantial amount of the principal or interest is required to be paid or converted, or at the option of the issuer or a related party is payable in, or convertible into, such equity" *and* "the indebtedness is part of an arrangement which is reasonably expected to result in a transaction described [above]"and that there is "substantial certainty" that any conversion options involved will be exercised. Since cocos conversion is neither unconditionally required nor optional, and since the triggering of conversion is a low-probability event, cocos are not disqualified debt instruments as defined in the above Section.

[22] At least since 2004 there has been some disagreement on whether the non-contingent comparator should or could be fixed-rate debt that is convertible, rather than nonconvertible, into stock.

neutrality issues. Provision of the valuable insurance services which cocos can yield should not be discouraged by biasing the tax system against issuing cocos debt.

8.1 Tax Aspects of Debt Write-Off

By contrast, tax aspects arising from debt-write off (cancellation of indebtedness) either by itself or in conjunction with conversion to common equity have not received adequate attention. When cocos are converted, the difference between their face value (or actual acquisition-cost basis if bought in the secondary market) and the, normally much lower, fair market value of the common equity received in return could be regarded as a tax-effective capital loss for their holders. Correspondingly, the cocos debt cancellation associated with cocos conversion could give rise to taxable income, or, more pertinently, reduced loss carryforward, for their issuers.

However, PriceWaterhouseCoopers (2009, p. 1) advises that "[u]pon conversion, the issuer will generally reclassify the carrying value of the convertible debt instrument to equity with no gain or loss recorded." If that is so, and the net income from debt-cancellation is not taxable to the firm, the costs associated with generating potential income from write-off by paying that much higher interest rates beforehand should also not be deductible for consistency. Application of the non-contingent bond method would achieve this and appears to that extent justified. Hammer, Chen and Carman (2011, p. 97) further state that "[a] holder of a convertible debt instrument generally does not recognize gain or loss when the holder exchanges the debt for stock in the corporation that issued the debt security. Instead, the holder will receive a carry-over basis in the stock received upon conversion." A deductible capital loss could then be realized when the stock is sold. This partly justifies taxing all the interest income on cocos to their holders as currently done. All these matters are far from settled. They call for much further guidance from the U.S. tax authorities and the Office of Domestic Finance of the U.S. Treasury, as KPMG (2011, pp. 10-11), in its treatment of tax issues surrounding cocos, has pointed out.

The conversion terms on cocos may also have a bearing on whether they are characterized as debt for U.S. tax purposes. Hammer and Bush (2011, p. 142) find that if the conversion price is the amount of the issuer's tangible common equity per share, as under the FR method here favored, the probability of that cocos being classified as debt could be improved. They note that in a panicked market, the prices at which shares of common stock trade arguably are not a reflection of true Fair Market Values, and tangible common equity may then be viewed as a better measure of value (satisfying the requirements of Revenue Ruling 85-119).

Cocos should be viewed not as a substitute for equity, but as a substitute for unsecured non-contingent long-term debt. Interest payments on them should always be deductible for the payer, even in the United States, at least up to the level determined by the non-contingent bond method. Logically, the debt cancellation attending cocos conversion should be taxable to the issuer and tax deductible for the investor who held the debt, net of the fair-market value of common equity issued or received in

conversion. However the realization of deductible capital losses by cocos holders would require sale of the shares they received by conversion, while cocos issuers generally recognize no gain from conversion for tax purposes at all.

9. Cocos in Convertible Bond Indexes?

If cocos could become part of a major index referenced in bond funds, demand for them would increase. Some so-called cocos bond funds have in fact mixed them in with other convertible bonds and subordinated debt. Nevertheless, caution is in order because subindexes are valuable structural elements for portfolio composition to the extent they reliably represent the underlying characteristics of a particular sector. Convertible bond indexes such as the BoA-Merrill Lynch All U.S. Convertibles Index are composed of non-contingent convertibles with an average conversion premium of 25% or more. For cocos issued in good times to come a cropper and be converted by management would normally involve a fall in the share price at conversion, P_{1c}, to less than half of the stock's price at the time of cocos issue, P_i. For other convertible bonds the stock price would have to rise above the implied conversion price to encourage conversion by investors. Hence the usefulness of including cocos in convertible bond indexes requires skeptical rethinking: When capital ratios fall and share prices are depressed, cocos behave more like equity while regular convertible bonds behave more like debt. On the other hand, when credit risk is perceived to rise, both non-contingent and contingent convertible bonds will be similarly exposed to rating downgrades[23] and markdowns.

Disparate price movements could mean low or no correlation between non-contingent convertibles and cocos, thereby producing an index not representative of either sector. Hymas (2011) provides a careful consideration of this matter. Once cocos issues have grown in number and size per issue around the globe, they deserve an index of their own. Such a cocos bond price index might well come to be seen as charting the state of health of the international banking system: When this index rises ceteris paribus, so might the perceived health of that system.

10. Concluding Comments on Data and Financing Cost Relations

This paper focused first on a few central aspects, like the actual and preferred terms of conversion to be applied to cocos. These terms, and their distributional implications, are not yet well understood or adequately developed. Secondly it delved into a few relatively neglected aspects, such as tax issues with cocos. Because the main messages of each of the preceding sections were summarized in italics at their end, only a few need to be reinforced here. Some of the remaining issues have been taken up in my other papers (2011a, 2011b) and the literature cited therein. Among them are the derivation of the loss premium on cocos that is required in view of their conversion-trigger risk and how thick an

[23] Zähres (2011, pp. 10-11) explains the difficulties rating agencies have had in rating cocos. Such a rating is necessary for a debt instrument to be included in a bond price index. Fitch (2009, p. 2) adopted a formula approach by which cocos generally are rated at least three notches below the issuer default rating, IDR. Thus differences in cocos triggers, conversion terms, and undergirding by higher-trigger cocos in the financing mix get short shrift.

adequate cocos shield would need to be.[24] Only the first of these derivations is revisited at the end of this section using the stylized fact laid out below.

It bears repeating that cocos should be truly debt-like unless converted and become common equity on equal terms with existing shareholders by preserving book value per share if converted. The BCBS's (2011c) and EBA's (2011a) insistence on cocos that have equity-like features from the start, such as optional interest payments and perpetual maturities if they are to be counted as "additional tier 1 capital" for regulatory purposes, is needlessly restrictive. Such a treatment is also injurious to the tax deductibility of the interest on cocos by their issuers in some jurisdictions, such as the United States (see Hammer, Chen and Carman (2011, p. 102); Allen & Overy (2011, p. 44)). Furthermore it discourages investors everywhere from integrating cocos into their portfolios at a moderate premium over comparable non-contingent debt. Such a premium should have to compensate only for the conditional likelihood that, in the unlikely event that conversion is triggered, on average between 20% and 60% of the principal amount of the cocos involved will be lost, depending on their method of conversion. There should be no other adverse features to cocos, such as optional interest and perpetuity, to detract from them .

A new method for cocos conversion should also be considered. In addition to striking the proper balance of incentives to utilize cocos, the FR method has at least two advantages. First it encourages choosing high triggers for cocos. Existing shareholders may favor such go-cocos because, when triggered, they would not lose control to holders of the new shares as long as they still contribute more than the latter to the tangible common equity in the firm. Secondly, having both the trigger and the conversion price based on book values of CET1 (relative to RWA and the number of common shares outstanding, respectively) rather than on market capitalization and stock prices is stabilizing in a financial crisis. It prevents a panic in stock market valuations of financial corporations from immediately spilling over into widespread debt forgiveness and a flood of new stock issues through cocos conversion lowering recovery rates. Instead tailor-made pre-positioned help with recovery would be available to companies with cocos individually.

10.1 A First Harvest of Stylized Facts

The evidence gleaned from the few cocos issues so far and from one cocos conversion currently under way is consistent with the following observations about conversion-price and market-price relations. These observations may turn into valid generalizations or stylized facts that deserve to be pulled together because they may inform future risk analyses and the pricing of cocos.

(a) Conversion under the CS method is highly likely to occur at the minimum conversion price specified at the time of cocos issue that limits the number of common shares to be issued in

[24] The author has estimated elsewhere (2011b, pp. 13-16) that a cocos buffer equal to 3% of total assets, TA, would have been sufficient to recapitalize the largest U.S. banks on average during the 2007-2009 financial crisis. If RWA/TA = 0.3, the buffer percentage corresponding to 3% of TA would be 10% of RWA. Methodologically similar estimates, but in percent of RWA rather than TA, are given in BCBS (2010a).

cocos conversion to fewer than would convey full value to cocos holders. That minimum conversion price is set at about half the level of the actual stock price observed around the time of cocos issue which is the conversion price specified under the LBG method. Thus, the market price at the time of conversion is likely to be *less than half* of the market price per common share around the time of issue. The expected relations are:

$$P_i \approx 2P_i^{CS^*} > 2P_{1c}\,. \tag{4}$$

(b) The net value of tangible common equity per share at the time of conversion may come to be chosen as the preferred conversion price, particularly for long-term cocos. It marks the point of non-dilution when specified as the conversion price under the FR method. This book value per share before and after conversion tends to be around twice as high as the market price per share of common stock after mandatory conversion, so that:

$$P_{0c}^{BV} = P_{1c}^{BV} \approx 2P_{1c}\,. \tag{5}$$

(c) The implication of equations (4) and (5) is that the conversion price specified under the LBG method is higher than the unchanging book value per share under the FR method of conversion which, in turn, is higher than the floor price under the CS method which is above the market price per share upon conversion:

$$\infty > P_i > P_{0c}^{BV} > P_i^{CS^*} > P_{1c} \geq 0 \tag{6}$$

The limited experience with cocos available so far suggests that the LBG method will be anti-dilutive, the CS method with floor price dilutive, and the FR method neutral or non-dilutive. Cocos holders may expect to recoup less than half of the principal, say 40%, under the LBG method, about 50% under the FR method, and about 80% if conversion occurs under the CS* method. The latter percentage assumes that P_{1c} post-conversion is on average about 20% below the minimum price per share set under the CS*conversion method and 60% below the conversion price set under the LBG method. Under all of these methods, cocos holders may expect receiving stock valued at less than the face value of their claim at conversion though the extent of the shortfall may differ greatly. Write-down-only cocos, favored by UBS, are, of course, the most anti-dilutive of all, laying any of their buyers open to exploitation and excessive risk taking by existing shareholders.[25] Such cocos can be represented as convertible at a share price of infinity in the scheme above (Berg and Kaserer, 2011), thus yielding no shares from conversion at all. If the market price of shares upon conversion fell to

[25] Logutenkova (2011) reported 11/17/2011 that [the new] CEO Ermotti and CFO Naratil said that "[t]he bank [UBS] still prefers contingent instruments that are not dilutive to shareholders, such as bonds that are written down when triggered." This leaves the false impressions that (1) write-down cocos are merely not dilutive, rather than strongly anti-dilutive, for existing shareholders and (2) cocos that actually convert to common equity are necessarily dilutive. It may be helpful to think of write-down cocos as equivalent to cocos that convert at an assumed share price of infinity, therefore yielding no shares at conversion, while cocos holders would come to own all but an infinitesimally small fraction of the shares outstanding upon conversion if the conversion price were assumed to be asymptotically equal to zero. Berg and Kaserer (2011, p. 6) have emphasized that, in the latter case, cocos holders can have a net gain from the adversity triggering a high-trigger conversion. They favor that method nonetheless even though it would turn seniority rules upside down and give cocos holders undue risk-taking incentives and control.

zero instead, cocos holders also would be left empty-handed but existing shareholders would share their lot.

10.2 CDS-Pricing of Cocos

Using the recovery rates, R, of 0, 0.4, 0.5, and 0.8 as representative for the debt write-off only, LBG, FR, or CS* conversion method respectively, the problem of pricing cocos can be represented as putting a value on the respective single-asset Credit Default Swap (CDS) of the same reference entity. Such a CDS purchase at the price of fixed periodic premium payments conditional on survival of the cocos would free the cocos from exposure to losses from conversion provided mandatory conversion is identified as a credit event in the CDS contract. As a first approximation, the riskless rate plus the annualized premium payment could therefore be viewed as the appropriate market interest rate on cocos. Allowing for the likely illiquidity of cocos and the imperfect pricing of the credit default swaps on this reference object as well as counterparty risk would add to this constructed rate depending on the cocos issue in question. The objective is to compare the extra yield required on cocos due to the CDS premium with the risk premium required on common equity into which they turn upon conversion.

Considering a 10-year cocos with an end-of-quarter fixed premium payment of K/4 conditional on survival through that quarter, a discount factor curve, DF_t, and a survival curve representing the declining probability of survival through any of the *t* quarters, PS_t, must still be specified to estimate the fixed quarterly premium payment. Such payments at the quoted annual rate of K, paid quarterly at K/4, cease from the quarter with the credit event, i.e., upon conversion. Their present value, conditional on survival of the cocos to the end of any of the 40 quarters, at par must be equal to that of (1-R) times the conditional probability of default, CD_t, occurring during any of the t=1 to 40 quarters.[26] The par-value condition means that the present value of the premium leg is the same as that of the default leg so that there is no upfront payment associated with this exchange of contingent payments. Thus the equation to be solved for K with summation over all 40 quarters is:

$$0.25K \, \Sigma_{t=1...40} \, (DF_t \, PS_t) = (1\text{-}R) \, \Sigma_{t=1...40} \, (DF_t \, CD_t). \qquad (7)$$

The "riskless" discount curve DF_i was estimated using the SNACDiscountCurve Function in the toolkit of the Cross-Assets Analytics Provider Numerix. It requires cash quotes and interest-rate swap quotes as inputs. The inputs used here were the 1-month, 3-month, and 6-month Eurodollar deposit rates and the 2- through 5-year, 7-year, and 10-year interest rate swap rates for February 1, 2012 from the Federal Reserve's H.15 release on selected interest rates. To allow for sensitivity testing to the level of interest rates, the square of the resulting USD.SNAC.DF.curve values was taken also. This implied roughly doubling all interest rates implied in the quarterly discount curve over the 10-year horizon. For instance, the discount factor after 20 quarters was 0.951466, and 0.905288 after squaring, implying

[26] The calculation is simplified by assuming that the time of valuation and default coincide with one of the quarterly payment dates on the CDS schedule and that the quarterly discount factor and survival rates stretching 10 years into the future are deterministic, with alternative parameter values assigned for sensitivity testing.

annualized interest rates of 1.00% and 2.01%, respectively, while the discount factor after 40 quarters was 0.820425 and 0.673097 after squaring, implying interest rates of 2.00% and 4.04%.

The specification of the cocos survival curves involves first a choice of the endpoints reached after 40 quarters. These were represented by the survival rates at maturity of 90%, 80%, 70%, or 60%. Cumulative default rates, in the present context actually cocos conversion rates, are the complement of the cocos survival percentages. For some background, global corporate issues initially rated B had an average cumulative default rate of 30% after 10 years while those initially rated BB, still below investment grade, experienced just under 20% default by that time (S&P, 2011, p. 4). Comparability is limited because go-cocos as opposed to goner-cocos are to help prevent default by the company so that conversion, while a credit event, is not tantamount todefault except in the CDS terminology here followed. Hence conversion rates on go-cocos should be higher than their participation rates in bankruptcy resolutions. S&P data more directly applicable to cocos show that the cumulative default rates on the issues initially rated below investment grade rise at a strongly decreasing rate as the time horizon lengthens, while the opposite pattern of increasing at an increasing rate applies to the investment-grade issues. In other words, seasoning is salutary for those entities which start out with poor ratings but survive the initial years of high mortality while the passage of time is detrimental to those which start out with top ratings and next to no defaults only to experience growing reversals later on. Equation 8 captures these different patterns of the survival curves through suitable assignment of values of *s*, such as 0.75 and 1.25, on either side of unity in the exponent $-\lambda t^s$ The decline to the specified endpoints at PS_{40} is fastest in the initial years with s=0.75; it starts most slowly with s=1.25.

$$PS_t[\lambda(PS_{40},s), s] = e^{-\lambda(t^s)} \tag{8}$$

Four alternative values of the (conversion) hazard rate λ, which is also the first-quarter default rate in the CDS terminology here adopted, are calculated with each of the 3 values of *s* from equation (8) for (cocos) survival rates, PS_{40}, of 60%, 70%, 80% or 90% at T=40. Thus 12 values of λ are found in all. These range from a low of 0.001047 with a 90% survival endpoint and s=1.25 to a high of 0.0321165 with a 60% endpoint and s=0.75. Corresponding to the 12 survival curves that result there are 12 conditional default rates[27] in any quarter t which are generated simply as:

$$CD_t = PS_{t-1} - PS_t, \text{ where } PS_0 = 1 \text{ and } t = 1 \ldots 40. \tag{9}$$

There is one dimension of sensitivity testing that can be dropped before turning to the presentation of results. Empirically it was found that changing the discount factors by squaring, as described, affected the values of K that satisfied equation (7) hardly at all. The intuition behind this finding is most easily explained for s=1 in continuous time. The time derivative of the downward sloping survival curve (8)

[27] The unconditional default and hazard rate at time t is defined as $D_t=(S_{t-1} - S_t)/S_{t-1}$. However, it is that rate conditional on survival, $CD_t = D_t (S_{t-1}) = S_{t-1} - S_t$ that is needed for present purposes since the CDS contract pays off the default leg in any quarter with the probability of the reference entity experiencing default in that quarter.

with sign reversed is equal to the default rate conditional on survival at that point in time, and the slope of the default rate is equal to the second derivative of the survival curve with sign reversed. If s=1, the result is that the slope of the survival curve used in the premium leg is simply $-\lambda PS_t$ and the slope of the default curve used in the default leg on the other side of equation (7) is $-\lambda CD_t$, Since the time variation of these two elements that are multiplied by a discount factor on each side of equation (7) is the same, changing the discount factors that apply to them equally on both sides of this equation has symmetric multiplicative effects so that K does not change. If s≠1 the interest sensitivity of K is still very low. Hence the results that follow are all based on the single actual discount-factor curve, DF_t, estimated with data for February 1, 2012.

The notes to Table 3 explain that before assessing the competitiveness of the premium rates for covering default risk, two adjustments to the equity premium are required if what remains of it is to be comparable to the estimated CDS risk premiums on cocos. First, when estimated over 10 years rather than 30 years, the equity premium of 5.5% is raised because the riskless rate falls by 25 bps when represented by 10- rather than 30-year U.S. Treasury bonds. Secondly the equity premium is lowered by about 105 bps on account of illiquidity and factors other than default risk which raise the interest rate on AAA-rated corporate debt (whose effective maturity is around 10 years) compared with 10-year Treasuries. The net result is an equity premium over the yield on AAA corporate bonds that is required to be about 4.7% to cover default-related risks alone which are specifically addressed by purchasing CDS for cocos.

Table 3 shows that, except for debt write-off-only types of cocos issued with R=0 by high-risk companies for which the cocos survival rate over 40 quarters is only 60%, the premium required on cocos is always less than 4.7% of the notional reference amount. Lowering the finance experts' estimate of the equity premium by one standard deviation, 1.7%, from its mean to 3.8% and again adding 25 bps and subtracting 105 bps, leaves 300 bps to compare with the CDS premium rates on cocos. Even if one took away another full percentage point by arguing that a premium in excess of 2% over the yield required on AAA-rated debt might not be tolerated by go-cocos issuers, all the combinations except those shown in italics in Table 3 would remain viable. Thus go-cocos, unlike goner-cocos that can be associated with R=0,[28] in most cases would be significantly less costly than issuing a supplementary common-equity buffer front-up. The rationale for making this further subtraction could be that 2% is still almost twice as high as the historical (geometric) average spread between Moody's Baa- and Aaa-rated seasoned corporate bonds.[29] Then issuing debt securities at

[28] If R were treated as stochastic, zero recovery from equity obtained by conversion could also be identified as complete loss of equity value associated with bankruptcy. This is a possibility which even having go-cocos on the balance sheet can not exclude entirely. However, only investors in goner-cocos should expect R=0 as the most likely outcome from the start. Table 3 then shows that low-trigger goner-cocos would be so expensive that there would be little if any demand for them. The condition R=0 thus can be associated, but with very different implications, both with debt write-off-only cocos which can be placed only by financial institutions of the highest quality and with goner-cocos that bear a high risk of ending up worthless.

[29] The source of the historical Aaa and Baa corporate bond yields back to January 1919 is the Federal Reserve Bank of St. Louis via wikiposit.org/uid?FRED.AAA or BAA. Because the yield difference between Baa- and Aaa-rated bonds appeared to be lognormally, rather than normally, distributed, the geometric mean of 1.04 percentage point, rather than the arithmetic mean of 1.20% is reported in the text for monthly data through January 2012.

more than 2 percentage points above the AAA (S&P) or Aaa (Moody's) yield might put them at risk of being viewed as barely at or below investment-grade. At the same time the deleveraging of financial institutions in recent years may have lowered the required rate of return on equity by about 1 percentage point along Modigliani-Miller lines,[30] producing an equivalent reduction in the equity premium that serves as the comparator. Cocos, upon conversion, would themselves contribute to deleveraging.

Overall Table 3 clearly shows that the higher the expected terminal survival rate PS_{40} and the greater the recovery rate R, the more qualified a financial institution would be to issue cocos. Compared with these two parameters, the discount factor curve and the time structure of the survival curve, determined by *s*, hardly matter to the results in Table 3. The expected recovery rate is largely governed by the choice of the method of conversion and the terminal survival rate up to 10 years is a function, in part, of the amount of go-cocos to be issued and the height of their triggers. Hence these are the factors which cocos issuers should principally consider to assess the appropriate level of the interest margin above the AAA/Aaa rate on corporates to be offered on cocos to cover their conversion risk.

[30] While deducing an equity risk premium of 5.3% for a panel of 54 international banks, an unsigned contribution in the ECB's *Financial Stability Review* of December 2011, pp. 128-130, finds substantial, though less than full, M-M effects ranging from 41% to 78% of the predicted full effect.

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Table 1. 52-Wk Low-High Stock Prices to 12/01/11, Volatility (V) & P_i on Date of Cocos Issue

	LOW		HIGH		When COCOS Issued	
	Stock Price	Date	Price	Date	Clos.Price	Date
BOC.AT (€)	0.5	11/30/2011	3.58	2/18/2011	2.21	5/18/2011
CS ($)	21.18	11/23/2011	47.63	2/18/2011	46.13	2/24/2011
LLOY.L (£)	0.2164	11/23/2011	0.9195[a]	2/25/2011	0.5414[b]	12/1/2009
LYG/4 ($)	0.3325	11/23/2011	1.12	2/18/2011	NA	NA

	BOC.AT	CS	LYG
Implied[c] V.	NA	71.10%	86.80%
Historical[d] V.	70.38%	48.80%	57.60%

Glossary

BOC.AT (€)	Bank of Cyprus Public Company Ltd., Athens Stock Exchange
CS ($)	Credit Suisse Group AG ADS, 1 ADS rep. 1 Registered Share, NYSE
LLOY.L (£)	Lloyds Banking Group PLC, London Stock Exchange
LYG ($)	Lloyds Banking Group PLC ADR, 1 ADR rep. 4 Ordinary Shares, NYSE

Sources: Yahoo Finance (historical stock prices), Ameritrade (volatility).

Notes to Table 1

[a] This intraday outlier was recorded before the NYSE opened on a high-volume day on the LSE on which the stock opened and closed at £0.63 in London.

[b] The specified P_i calc. w. volume-weighted data for 11-17/11/09 was £0.592093 after being adjusted for a rights issue that took effect on 11/27/11.

[c] For trailing 1-year volatility only one observation is refreshed per trading day. Implied volatility, however, is a function only of current option prices and much more variable. Example LYG: 77.2% reported 12/01, but 86.8% 12/02/11.

[d] Historical or statistical volatility = standard deviation of log rates of change in daily closing prices, multiplied by square root of N=252 for 12/01 2010 to 2011.

Table 2. Bank of Cyprus Cocos Conversion if the Fair-Rule (FR) Method had been Followed
Values, except for No. of shares or per share, are in € millions at end of 2011:Q3.

A. Immediately prior to cocos (BOC calls them CECS) conversion

1. The net value of tangible common equity, ***CET1***, is ***1530.8*** (BOC (2011, p. 31)).
2. The number of ordinary shares outstanding, ***N***, also in millions is ***899.2*** (p. 23).
3. Hence the per-share value, $(CET1/N)_{0c}$, is 1.7024, down from 2.71 at end 2010.[a]

B. Immediately after expected conversion of 600 of the 860.4 CECS outstanding

4. The **PAC** expected to be converted soon after the end of 2011:Q3 is ***600***.
5. The increase in the number of shares outstanding under the FR method, PAC/CET1, is 39.20% from 899.2 to 1251.64, or by 352.44 million shares.

C. Validation of results from the FR method of conversion

6. After the 39.20% increase in the number of shares from their pre-conversion level, shares issued in conversion in % of all N_{1c} shares outstanding account for PAC/(CET1+PAC) = 28.16%. This percentage is equal to the contribution of conversion that is included in the book value of CET1 post-conversion.
7. The two percentages differ only in whether they use conditions pre- or post-conversion as reference. Their link is shown by 0.392/1.392 = 0.2816.
8. Book value (BV) of CET1 per share is unchanged by conversion as the new BV, (CET1+PAC)= 2130.8, divided by the new number of shares N_{0c}(CET1+PAC)/CET1 = 1251.64, returns $(CET1/N)_{1c}$ = €1.7024 post-conversion, equal to $(CET1/N)_{0c}$.

Source: BOC (2011), in particular, pp. 23, 25, 31, 36.

Notes to Table 2

[a] The 50% write-down of Greek Government bonds contributed to the steep drop that also reduced the bank's core tier-1 capital ratio, CET1/RWA, to 5.8%. As a result, the EBA (2011b) determined that BOC would fall €1.56 billion short of reaching the 9% core tier-1 capital ratio required by the middle of 2012 unless that amount of new capital were to be raised in part through cocos conversion.

Table 3. The Annualized Fixed Premium Leg in % of Notional for a par value CDS for Combinations of Structural Parameter s=0.75, 1, or 1.25 for Survival Curves with Endpoints PS_{40} of 0.90, 0.80, 0.70 or 0.60 with Recovery Rates R = 0, 40%, 50% or 80%

		R = 0	R=0.4	R=0.5	R=0.8
s = 0.75	**PS_{40}=0.9**	**1.08**	**0.65**	**0.54**	**0.22**
	PS_{40}=0.8	***2.30***	**1.38**	**1.15**	**0.46**
	PS_{40}=0.7	***3.72***	***2.23***	**1.86**	**0.74**
	PS_{40}=0.6	***5.41***	***3.24***	***2.70***	**1.08**
s = 1.00	**PS_{40}=0.9**	**1.06**	**0.63**	**0.53**	**0.21**
	PS_{40}=0.8	***2.24***	**1.34**	**1.12**	**0.45**
	PS_{40}=0.7	***3.58***	***2.15***	**1.79**	**0.72**
	PS_{40}=0.6	***5.14***	***3.08***	***2.57***	**1.03**
s = 1.25	**PS_{40}=0.9**	**1.04**	**0.62**	**0.52**	**0.21**
	PS_{40}=0.8	***2.19***	**1.31**	**1.09**	**0.44**
	PS_{40}=0.7	***3.47***	***2.08***	**1.74**	**0.69**
	PS_{40}=0.6	***4.94***	***2.96***	***2.47***	**0.99**

Notes: The Market Risk Premium (MRP) used in 2011by finance professionals for estimating the required rate of return to equity is reported in Fernάndez, Aguirreamalloa, and Corres (2011) as averaging 5.5% with a standard deviation of 1.7% across estimates. In the United States this premium may be calculated as an addition to the yield on 30-year Treasury securities,viewed as free of default risk. The Required Equity Premium (REP) should not differ greatly from the Expected Equity Premium (EEP) over such a long horizon. What then does Table 3 suggest as an adequate yield on 10-year go-cocos and would that yield be competitive with common equity for which they become a perfect substitute when triggered?

Two adjustments need to be made before the cocos risk premiums shown above can be evaluated. First the equity premium is a little wider when measured against 10-year, rather than 30-year Treasuries as the yield on 30-year Treasuries on average has been 25 bps (with a standard deviation of 0.38 bps) higher since February 1977 when calculated with a data gap from March 2002 to January 2006. This gap was due to entries in one of the needed series being missing in the Federal Reserve's H.15 statistical release on selected interest rates. Secondly, even without taking account of default risk, as a debt instrument of perhaps severely limited liquidity 10-year go-cocos would still require a higher yield than 10-year Treasuries. Although bonds originally rated AAA by S&P are not entirely free from default risk, their 10-year cumulative default rate averages only 0.79 percent in their (2011, p. 31) cohorts. Hence almost the entire average spread of 105bps found in the data described above between AAA-rated seasoned corporates and 10-year Treasuries is attributable to factors other than default risk that would also raise the yield required on cocos. To make the add-ons for loss-of-value risk commensurate and hence comparable for common equity and go-cocos, the equity premium as well as the CDS premium on go-cocos are measured and interpreted as add-ons to the AAA/Aaa rate on corporate bonds.