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Are CoCo Bonds Suitable as Core Capital Instruments?

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Abstract

Basel III introduced significant innovations in bank regulation. One of them is the minimum required leverage ratio. To help banks implementing the new measure, Basel III created two different core capital measures: Common Equity Tier 1 (CET1) and Additional Tier 1 (AT1). Since raising capital for CET1 is expensive, other instruments are used to build up AT1 in case of need, like for example Contingent Convertible (CoCo), which can convert to equity or written-down when a bank is under stress. In this paper we show that CoCos are not suitable as regulatory core capital instruments. Problems of timing, incentives, systemic risk, regulatory discretion and regulatory capture make CoCos unreliable as core capital instruments, and regulators should not treat them as such.

Keywords

Basel III, minimum required leverage ratio, Common Equity Tier 1, CET1, Additional Tier 1, AT1, Contingent Convertible, CoCo, regulatory capital, systemic risk

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“The big lesson from this history [of innovative capital instruments being included in regulatory measures of core capital] is that a going concern capital instrument must unambiguously be able to absorb losses when the bank is a going concern. Apologies for stating the blindingly obvious, but history painfully demonstrates why it is important to state the obvious.”

Andrew Bailey (2014)

“... for AT1 capital, which regulation treats as akin to common equity, there are questions about investor understanding, market liquidity, the possibility of downward share price spirals (if the trigger were a market price), the credibility of conversion (if the trigger is a regulatory value, as in fact) and the corresponding risk that regulatory values will be manipulated or relaxed (e.g. by delaying asset impairments or by reducing risk weights) to forestall conversion.”

Sir John Vickers (2017)

“Would it not be simpler and easier to raise equity capital requirements directly, rather than go through this more complicated rigmarole?”

Charles Goodhart (2010)

One of the central innovations of the Basel III bank capital regime is the introduction of a minimum required leverage ratio for regulated banks. Basel III defines the leverage ratio as the ratio of Tier 1 capital to a measure of the total “amount at risk” known as the leverage exposure¹, and the leverage ratio so defined is required to be at least 3%. This minimum leverage ratio requirement is intended to complement a revised version of an earlier core capital ratio, now known as the CET1 ratio, the ratio of Common Equity Tier 1 capital to Risk Weighted Assets. The upshot is that Basel III specifies two different regulatory core capital

ratios, the new leverage ratio and the revised CET1 ratio, with two different measures of core capital as their numerators and two different “amount at risk” measures as their denominators.²

It is odd, however, that Basel III has *two* different core capital measures rather than one. The use of two core capital measures is intellectually unconvincing and creates scope for arbitrage, encouraging banks to game the difference between the two different measures.

The narrower measure is CET1 and the broader measure is Tier 1, where Tier 1 is defined as the sum of CET1 plus Additional Tier 1 (AT1) capital. Capital instruments are eligible to be classified as AT1 if they meet certain conditions, e.g., that they be issued and paid-in, be perpetual and be subordinate to depositors, general creditors and subordinated debt.

³ In practice, the AT1 instruments that matter most are certain forms of Contingent Convertible bonds, known as CoCos, that convert to equity or write-down under certain conditions.

The market for CoCos: “has been growing rapidly in recent years. Between January 2009 [when the first “modern” CoCo was issued] and September 2015, banks around the world have issued a total amount of \$450 billion in CoCos through 519 different issues. As a comparison, the asset quality review (AQR) of the largest European financial institutions undertaken by the European Central Bank in October 2014 revealed that out of a total of 92 billion Euros of new securities issues by the reviewed banks from July 2013 to August 2014, 32 billion Euros (or over one third) were through CoCo issues, and just under two thirds were through equity issues” (Avdjiev, et al. (2015) p. 2).

The question, then, and the focus of this article, is whether these AT1 CoCos are suitable as regulatory core capital instruments.

This question is an important one because major claims have been made about the usefulness of CoCo bonds as a means of recapitalizing a bank in a solvency crisis. Investors in CoCo bonds take on the *de facto* role of providing capital “insurance”, providing for their investments to be converted into equity or written down when a boost to capital is most needed.

This provision for contingent capital enables a bank to be recapitalized without it needing to raise additional equity on the market or be bailed out by the taxpayer. As Avdjiev, et al. continued, “CoCos [could] be seen as a simple way of *bailing in* a bank and of cutting through all the existing complexities hindering bank restructuring on an ad hoc basis in the midst of a crisis” (p. 2-3). If this contingent capital can be relied upon, then it would give banks a less expensive way of raising core capital when they need it most. But if it cannot, the contingent capital provided by CoCos must be seen as inferior and CoCos should not be qualify as core capital. In this case, the Tier 1 capital measure that recognizes AT1 instruments as core capital for regulatory capital adequacy purposes should be done away with and only CET1 should be recognised as regulatory core capital.

This article is organized as follows. Section 1 explains the basics of CoCos: how they are structured, their purpose, how they work and how they compare to related instruments. Section 2 examines the issues surrounding the CoCo trigger, the breach of which allows a CoCo to be converted or written down. Section 3 discusses CoCos from the insurance perspective and compares them to catastrophe bonds and longevity derivatives. Section 4 examines the market for CoCos and, in particular, investigates which types of investor might be interested in buying them. Section 5 discusses the impact of CoCos on financial market and financial system stability. Section 6 looks at the lessons to be drawn about CoCos from the experience of earlier debt-equity hybrid instruments during the Global Financial Crisis (GFC). Section 7 discusses the implications of declassifying AT1 CoCos as regulatory core capital and section 8 concludes.

The bottom line is unmistakable: for all sorts of reasons, CoCos cannot reasonably be regarded as core capital instruments and regulators should not treat them as such.

1. CoCo Basics

Let's start with the notion of a hybrid capital instrument, a financial instrument that combines features of both debt and equity. CoCos can then be defined as hybrid capital instruments that absorb losses when the capital (or more precisely, the capital ratio) of the issuing bank falls below a certain level. As thus described, CoCo bonds can refer to a wide range of contingent capital instruments, but my focus here is on that subset of actively traded contingent capital instruments commonly known as CoCos, and I gloss over related instruments that have been proposed but do not yet exist. Prominent examples of these latter instruments are the Capital Access Bonds proposed by Bolton and Samama (2012)⁴ and the Equity Recourse Notes proposed by Bulow and Klemperer (2015).⁵

CoCo bonds can be compared to conventional bonds in that they offer investors the prospect of periodic coupon payments. They differ from conventional bonds in that they have a trigger, the breach of which can lead to them being converted into equity or written down in value. The trigger is expressed in terms of a bank's ratio of Common Equity Tier 1 capital to its Risk-Weighted Assets (RWAs), its so-called CET1 ratio.⁶ A common trigger is 5.125% expressed in terms of the CET1 ratio, for example.

The idea behind CoCos is that in good times when the bank is doing well and its CET1 ratio is high, then CoCos function as coupon-paying bonds, but in bad times when the bank's equity falls below the trigger value, they can be used to recapitalize the bank. Their attraction—and it is a big one—is that they offer a bank a means to recapitalize itself when its capital ratio has fallen to a critical low level given by the trigger value, but without the drawbacks involved in a taxpayer-funded bailout and without the bank having to recapitalize on the adverse terms that would otherwise prevail using a traditional rights issue when the bank has a low share price.⁷ Investors in CoCos are said to be “bailed in” when the bonds' triggers are breached and bonds are then converted into equity or written down. In the words of Thomas F. Huertas,

CoCos/bail-ins “amount to a pre-pack recapitalisation of the bank that the authorities can invoke at the point of intervention” (Huertas (2012) p. 2).

CoCo bonds differ from conventional bonds in a number of respects. (1) A conventional bond requires that the issuing bank make coupon payments on penalty of default, but CoCo bonds allow banks to suspend their coupon payments without being in default of the contract under which they were issued. (2) All CoCo bonds count as regulatory capital, either as AT1 capital or as Tier 2 capital. To count as AT1, however, CoCos must meet two additional criteria:

- Their triggers must be at least 5.125%, specified in terms of the ratio of CET1 capital to RWAs.
- They must be issued as perpetual bonds (i.e., bonds with no maturity or set retirement date), although they can in some cases be bought back by the issuing bank after a specified period (e.g., 5 years or more after their issue).

A CoCo bond investor will be offered a coupon payment higher than that offered on conventional bonds. The difference between the payments offered by the two bonds is an inducement for CoCo investors to take on the extra risks involved, i.e., the risks that coupon payments might be missed or that the bond might be bailed in. Should the CoCo bond subsequently maintain its coupon payments and not be bailed in, then the investor will have realized a higher return ex post than the investor in a conventional bond. On the other hand, if the CoCo bond misses a sufficient number of payments and especially if it is bailed-in, then the CoCo investor could be worse off ex post than the investor in a conventional bond. In a typical bail-in, the CoCo holder’s investment will experience a loss (known as a “haircut”) on conversion, and which can be as high as 100%.⁸ The risk that the investor might lose on the CoCo investment gives the investor an incentive to monitor the bank management and this incentive is, indeed, a key design feature.

From the issuer's perspective, a CoCo bond is a cheaper source of finance than equity. Bankers however are always saying that equity is "expensive" and looking for less "expensive" sources of funding. These claims should be dismissed as self-serving propaganda intended to bolster their permanent lobbying campaign against higher capital standards. True, high levels of equity might be privately expensive to bankers, because they would reduce the subsidies they currently receive from high leverage (such as tax incentives to prefer debt to equity, Too Big to Fail and so on), but high equity is not expensive from a societal point of view. For more on this important point, see Admati, et al. (2013) and Admati and Hellwig (2014) or any sensible analysis that starts from the Modigliani-Miller theorem (Modigliani and Miller (1958)).

From bankers' (private) point of view, debt is good because it is "cheap" but if they issue too much debt they over-leverage themselves and run into capital adequacy constraints. The attraction of CoCos is then two-fold:

- CoCos give them contingent equity, which is intended to boost their equity when required, and which is a less expensive (to them) source of funding than actual equity.
- Under current Basel III capital adequacy rules, CoCos count as regulatory capital that qualifies to meet banks' Basel III capital requirements.

The market price of CoCos would then signal the financial strength of the bank. If the bank is considered to be in good financial shape, then CoCo bonds should trade not too far from par, with any deviation from par mainly depending on how interest rates have changed in the period since the bond was issued. But if investors start to see the bank as financially vulnerable, then the price could fall well below par, with the discount from par reflecting the market's perception of the anticipated losses from a possible default.

An example is given from a Daily Telegraph article published on 21 February 2016 (Wallace (2016)). In the early part of this period, we see that this CoCo was trading mostly above par, but from October it started to show fall well below par, and in early 2016 it fell sharply to a little over 70% of par before rebounding.

Figure 1

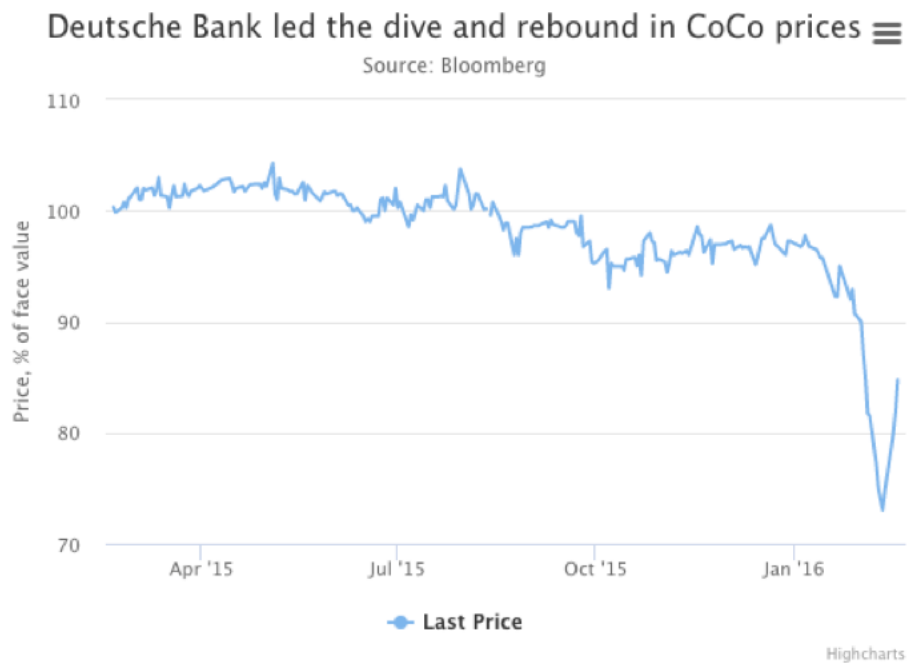


Figure 1. The loss absorption mechanism.

CoCo bonds have two distinctive features. The first is the loss absorption mechanism, which can absorb losses in one of two ways:

The loss absorption mechanism can convert the CoCo into common equity, in which case there is an injection of new equity into the bank. This conversion-to-equity (CE) CoCo increases CET1 by converting to equity at a pre-defined conversion rate. This conversion rate might be based on the market stock price at the time of conversion or on some pre-specified price, or some combination of both (e.g., the market price subject to a pre-specified floor). Note that the conversion of a CE CoCo bond could in some cases dilute the holdings of existing shareholders.⁹

The loss absorption mechanism can write down the principal, in which case the value of the existing equity increases because the bank is now carrying less debt. The write-down might be full, in which case we have a “sudden death” or “wipeout” Principal Write Down (PWD) CoCo, or partial, in which case CoCo investors would only lose part of their investment.¹⁰ In practice most PWD CoCos specify full write-downs, but there are exceptions.¹¹ Note that existing shareholders do not suffer any dilution if PWD CoCo investors are bailed in.

Furthermore, European PWD CoCos can have no less than three write-down formats (McCunn (2015) (2016b)):

- Permanent write-down: the CoCo is cancelled once the CET1/RWA ratio falls below the trigger level;
- Staged write-down: the coupons are cancelled in stages as the CET1 level deteriorates e.g., an investor might receive 75%, 50%, 25%, or 0% of their coupon entitlement as the CET1 level deteriorates; and
- Temporary write-down: the coupons of these instruments are cancelled when the CET1 ratio falls below the trigger level, but if the bank recovers then the coupons are reinstated.

These latter temporary PWD CoCos are becoming increasingly popular among issuers. Their usefulness is however distinctly limited because they do not provide much additional share capital and therefore provide investors with only weak incentives to monitor bank management.

A second source of concern with all PWD CoCos is that these CoCos invert the normal investor pecking order by making CoCo investors subordinate to equity holders, who are traditionally the most junior class of investor. This inverted pecking order can then weaken the incentives of existing shareholders to inject additional capital. Since shareholders would

benefit from a PWD bail-in, they might take no actions to avert one, e.g., they might refrain from a rights issue that would otherwise have gone ahead.¹² Or their managers, acting in shareholders' interests, might increase their risk-taking, e.g., as Chan and van Wijnbergen (2016). From a financial stability perspective, anything that discourages fresh equity investment by existing shareholders or encourages greater risk-taking in the face of an impending bail-in is seriously perverse.

2. The CoCo Trigger

The other distinctive feature of a CoCo is the trigger, the point beyond which the loss absorption mechanism can be activated.

Book vs. market value

The trigger is specified in terms of the ratio of CET1 capital to RWAs. Triggers can be book-value (also known as accounting-value) triggers or market-value triggers, but in practice all existing CoCos use book-value triggers.¹³

Book value triggers are subject to timeliness issues, however, because book values are only released every so often (e.g., once a quarter). It is then possible for a bank to become distressed or even fail before any trigger is hit. Two examples:

- Had Citibank issued a CoCo with even a high book value trigger before November 2008, the trigger would not have been activated prior to the U.S. government's rescue that month. The crisis unfolded suddenly between reporting dates and the previously reported CET1 ratio gave no indication of impending trouble.
- On July 15th, 2011, the European Banking Authority reported that Dexia bank had a Tier 1/RWA ratio of 12.1% and had easily passed its stress tests. Dexia was one

of the strongest banks in Europe, it reported. Dexia then reported losses in October that led it being bailed out by the Belgian government.

Market weather can also change rapidly and unexpectedly. As Charles Goodhart ((2010) p. 4) observes:

“Markets can move rapidly from complacency, in which protective action seems unnecessary, to such fear, that new issues become unviable, in quite a short period of time. Consider what happened to the assessment of sovereign risk in 2010, or of equities in 2008.”

In addition to their potential lack of timeliness, book-value regulatory capital ratios based on an RWA denominator are unreliable because they have a poor predictive track record and are open to manipulation.

This market timeliness issue in conjunction with the dependence on unreliable capital ratios is a concern because we cannot be confident that a book-value CoCo will save a problem bank before it reaches the point of financial non-viability.¹⁴

CoCos with discretionary triggers...

In practice, real-world CoCos all involve triggers that are dependent on regulatory discretion: when the trigger is breached, it is up to regulators to decide whether to implement the bail-in.

However, there may be strong reasons why regulators might be reluctant to “pull the trigger”. First, there is the danger that regulators might fear that authorizing a bail-in could send a distress signal that might make the situation worse, either by undermining confidence in the bank concerned or by creating the potential for contagion that adversely affects other banks. I will return to such issues in section 5 below. Second, regulators might prefer a different response, such as a lifeboat operation, a bailout (e.g., a government or central bank guarantee

or injection of new capital) or nationalization. And third, regulators can anticipate being lobbied to avoid a bail-in by CoCo investors or by other interested parties, notably the government, that would themselves be under lobbying pressure from those same investors.

So, the underlying problem is that whatever political leaders or financial regulators threaten to do in advance—in this context, to authorize creditors to be bailed in—when push comes to shove, the authorities will often lack the resolve to follow through on those threats. A case in point is that of the Dutch bank SNS Reaal. Having earlier promised that there would be no further taxpayer-funded bailouts, in February 2013 the Dutch government decided to nationalize the bank and bail out senior bond holders. Shareholders and junior bond holders were wiped out, but senior bond holders and depositors had their claims made good. The operation cost Dutch taxpayers €3.7 billion euros. The operation was justified by Dutch finance minister Jeroen Dijsselbloem who said in a statement that the takeover “was made necessary by the extreme situation” of the bank and by the “serious and immediate threat posed by that situation to the stability of the financial system, i.e., exigent circumstances.”¹⁵

Another example of senior bondholders being bailed out was the case of Banco Espírito Santo, which filed for bankruptcy in July 2014. As Avinash Persaud observes:

“Banco Espírito Santo would appear to be precisely the kind of bank that the authorities would want to make an example of. The Espírito Santo family controlled the bank with little capital and much leverage through a complex layering of shareholdings held in offshore entities, family members proliferated in its management, allegations of cronyism were rife, especially in dealings in Portugal’s former colony, Angola, and when the economic climate called for caution they invested in assets that didn’t perform and funded themselves by stuffing the clients of one of their investment subsidiaries with the debt of their banking subsidiaries. ... the decision to bail out the senior creditors and

depositors underscores the practical, financial, psychological, political, and moral complexities of bail-ins even when they are part of a gone concern.”¹⁶

The political problems of bailing-in investors are also apparent in recent cases in Italy. In December 2015 CoCo investors in 4 small banks in central Italy were bailed in. It turned out that 12,500 of these were retail investors who had been mis-sold their investments—some €430 million in total—by unscrupulous salespeople (Bernabei and Za, 2015). The result was a major public outcry that made the government very reluctant to authorize the bail-in of big Italian banks such as Monte dei Paschi the next year. Indeed, the Italian government was so concerned about the political consequences of further bail-ins that it went out of its way in June 2017 to bail out the two mid-sized Veneto banks—Banca Popolare di Vicenza and Veneto Banca. These actions highlighted the political difficulties of bail-ins even with banks that were acknowledged to pose no systemic threat. Exigent circumstances again, in this case, political ones. They also made a mockery of the EU’s new Bank Recovery and Resolution Directive, the express purpose of which is precisely to avoid any further taxpayer-funded bailouts.¹⁷ A cynic might suggest that the Italian authorities had *deliberately* sought to undermine the new regime, either as payback for the Germans blocking their preferred solution to the problems facing the Italian banks, i.e., another state bailout, or else to demonstrate that the new system was not working so alternatives had to be sought, e.g., another state bailout.

To return to topic, follows that the probability of a bail-in should the trigger be breached is always going to be less than 100%. No one will know in advance whether a bail-in would be authorized or not, and no-one can quantify the odds either.¹⁸

However, given the various reasons why regulators might be reluctant to authorize a bail-in, it is probably safe to say that the odds of them doing so would be low for any major institution, especially a systemic one. In the limit, as those odds are perceived to go to zero, we could have a situation where investors are earning a surplus on their yield that does not go to

zero to bear a risk that does go to zero. The general point is that if there is perceived to be a low probability of a bail-in because of a belief that the regulators lack the resolve to authorise one, then investors would be paid excessively, and this might be one reason why the market has been growing rapidly. One might even say that CoCo investors are being rewarded for calling regulators' bluff.

To give an example, a statement by ECM Asset Management, an affiliate of Wells Capital Management, discusses the performance of a portfolio with 56% CoCos and only 9% senior debt, which has a performance benchmark of 1-month Euribor. This portfolio is “a carry trade of egregious proportions” as Cavin O’Driscoll observes. This is one of a number of portfolios that currently perform very well but could blow up if there was further trouble in the CoCos market.

The regulators would then be caught in a classic time-inconsistency trap. They implement a policy, the promise of a CoCo bail-in to deliver their hoped-for outcome (*A*) in which bail-ins will occur if triggers are breached. However, investors buy the CoCos in the knowledge that there is a high probability that regulators will not be able to make good on that promise, and the result is an anticipated outcome (*B*) in which there is a high probability that bail-ins will not occur regardless of the trigger being breached. The uncertainty over whether a bail-ins would or would not occur is highly damaging, and regulators do not achieve their desired outcome *A* but instead get the inferior anticipated outcome *B*.

...*Vs. CoCos with automatic triggers*

A solution to this time-inconsistency problem is to replace a discretionary trigger with an automatic one, i.e., to have the regulators have their hands in advance like Odysseus did when he wished to hear the Sirens without wrecking his ship. If the trigger is automatic—and therefore credible—then everyone would know that the bail-in *would definitely* occur should

the trigger be breached and there would be nothing to be gained from investors lobbying regulators to prevent being bailed in.

However, no bank actually issues CoCos with automatic triggers, so this solution is currently moot.

Is the trigger sufficiently high?

Another issue is whether triggers are high enough. Recall that the trigger is specified in terms of the CET1 ratio. Two cases then arise:

- If the trigger is reasonably high, then CoCos allow the bank to be recapitalized whilst it is still a going concern, but if the trigger is too high, it may give the false impression that a strong bank could appear to be capital deficient because its trigger may be imminently breached.¹⁹
- If the trigger is too low, then the bank will be distressed and potentially facing the imminent prospect of being put through resolution or bankruptcy by the time that the trigger is breached. In this case, the CoCo bonds might provide “gone concern” but they will not provide “going concern” capital.

In this context, I would note that the point of core capital is to provide going concern capital, i.e., to support the bank in a crisis whilst it is still a going concern, not to support it afterwards when it is a gone concern undergoing resolution or bankruptcy procedures. Therefore, a CoCo capital instrument can only be considered as potential core capital if its trigger is sufficiently high: the height of the trigger is a critical issue for purposes of core capital adequacy.

But there is still the question of how high the triggers should be for a CoCo to serve as going concern capital. Some insight on this issue is provided by Vickers (2017):

“Unless conversion is triggered well above levels at which resolution becomes an issue, the theoretical benefit of Cocos as going-concern capital could be evaporated. But the EU Capital Requirements Regulation requires a minimum trigger level of only 5.125% of CET1 capital in terms of RWAs. The [Prudential Regulation Authority] PRA requires UK banks to have a minimum trigger level of 7% of CET1 capital, which is better but not a high figure, especially when the possibility of regulatory mismeasurement is allowed for.”

That 5.125% is an extremely low trigger is confirmed by a 2014 Bank of America Merrill Lynch report that noted that 5% triggers are to be found among Swiss banks’ Tier 2 CoCo issues and then stated that “we consider this trigger to be the point-of-non-viability”, i.e., the point of gone concern. I see no reason to dispute their assessment, but the question arises as to how Basel regulators can justify 5.125% as going concern if 5% is gone concern. One doubts that 0.125% of CET1 to RWA can really make that much difference.

In sum, existing regulatory rules are inadequate because they allow CoCos with low triggers based on questionable regulatory and accounting measures to count as AT1 and hence core capital.

It is worth considering these two trigger values a little further:

Consider first Deutsche Bank. The benchmark trigger applied to Deutsche is 5.125% in terms of the CET1/RWA ratio. According to its 2016 *Annual Report*, Deutsche had a RWA/TA ratio of 23.5%, so the Deutsche trigger translates into a trigger equal to 1.21% in terms of the CET1/TA ratio. This is a very low trigger for an AT1 CoCo that is meant to shore up a bank as a going concern. Furthermore, as of the time of writing (5th November 2017), Deutsche had a price-to-book (P2B) ratio of just 44%, so the same trigger in terms of the market value of CET1/TA was 0.53%. No way are these triggers remotely high enough.

Then consider the UK. The PRA applies a minimum trigger of 7%. As of the end of 2016, the bigger 5 UK banks had average RWA/TA ratio of about 32%, so the minimum trigger for an AT1 CoCo in terms of CET1/TA = 2.28% and the market value equivalent (at a then-prevailing P2B ratio of 67%) was just over 1.52%. These are better than those for Deutsche but they are still nowhere near high enough.

Expert in this field suggest that the trigger probably needs to be at least 11% of CET1 to RWA for the CoCo to be a going concern instrument. If the trigger is too low, CoCos also involve forbearance incentives that undermine this primary purpose. To quote Ayonwande McCunn in a recent working paper:

“CoCos were designed by regulators to absorb losses prior to resolution to create incentives for stakeholders to monitor. However, CoCo stakeholders have incentives to forbear (delay triggering CoCos). This incentive means that CoCos may be triggered as part of resolution (or other insolvency process) rather than being triggered in advance (p. 1). [Primary CoCo stakeholders...] all have an incentive to forbear and avoid a CoCo being triggered. First, regulators have an incentive to forbear in order to protect their institutional or individual reputation. Second, bank managers have an incentive to forbear in order to gamble for resurrection without alerting the market and regulators to their distressed situation. Third, CoCo investors have an incentive to promote forbearance because their payoff in resolution might be higher than their payoff outside of resolution. [...] Fourth, the forbearance incentives for shareholders are more complex. A conversion will always dilute their governance (voting) rights. In addition, conversion will reveal adverse information about the bank. In these two ways, conversion is costly to shareholders. “ (p. 11-12)

“In fact, if CoCos are triggered as part of resolution then they are unlikely to create incentives for stakeholders to monitor. As a consequence, it is difficult to justify the existence of CoCos as regulatory [core] capital. Accordingly, it might be argued that CoCos operate, in an economic sense, in a similar way to preference shares with tax deductible interest payments.” (McCunn (2016a) p. 1, *my italics*).

It is noteworthy in this context that the CoCos’ poster boy “success story”—the June 2017 bailing-in of CoCo investors in Banco Popular in Spain—failed in its principal purpose of supporting the bank as a going concern. The main reasons for this failure were the low triggers on its CoCos, which meant that the bank’s CoCos only provided gone concern capital, and the scale of the losses that the bank was carrying, the full extent of which are still unknown but are now Santander’s concern.²⁰

3. Cocos as Cats?

If one were trying to explain CoCos to a lay audience, one might describe them as providing a form of insurance against the risk that a bank’s capital ratio will fall to some critically low level. This insurance comparison provides a helpful way to look at CoCos, but also provides a number of reasons to doubt their intrinsic usefulness.

The natural comparison is with catastrophe (“cat”) bonds. These are risk-linked securities that transfer a specified set of risks from a sponsor to investors. They were created and first used in the mid-1990s in the aftermath of Hurricane Andrew (1992) and the Northridge earthquake (1994). Cat bonds emerged from a need by insurance companies to alleviate some of the risks they would face from a major catastrophe. An insurance company issues these bonds through an investment bank, which sells them on to investors. These bonds are inherently risky and usually rated as junk. They often structured as floating-rate notes and

typically have maturities of less than 3 years. Whilst no catastrophe occurs, the insurance company would pay a high coupon to investors, but if a catastrophe occurs as specified under the contract, then the principal would be written down or forgiven. Investors include hedge funds, catastrophe-oriented funds, and asset managers. Catastrophe bonds are typically used by insurers as an alternative to traditional catastrophe reinsurance.²¹

There are also bonds (and other derivatives, such as swaps) designed to hedge extreme forms of mortality or longevity risk.²² The first such bond issued was the Swiss Re mortality bond—known as Vita I—which came to market in December 2003. This bond was designed to securitize Swiss Re’s exposure to mortality risk. Vita I was a 3-year bond that allowed the issuer to reduce exposure to catastrophic mortality events: a severe outbreak of influenza, a major terrorist attack using weapons of mass destruction or a natural catastrophe. The \$400m principal was at risk if, during any single calendar year, a specified mortality index exceeded 130% of the baseline 2002 level and would be exhausted if the index exceeded 150%. In return for having their principal at risk, investors received quarterly coupons of 3-month USD Libor + 135bp. The main investors were pension funds. For them, the bond provided both an attractive return and a good hedge: if there had been a catastrophic mortality event during the life of the bond, the bond’s principal would have been reduced, but so would the payouts to pensioners who would also be victims of the event.²³

At the time, many of us involved in this area expected that the market for longevity bonds would soon take off, but it did not. Further bonds were issued but it gradually became clear that the demand for capital market i.e., bond-type, solutions was low. Death might be certain, but how best to hedge it was anything but. Instead, to our surprise, the focus of the life market switched to bespoke insurance products. The main examples are the buy-out, the buy-in and longevity insurance, also known as a longevity swap:

- A buy-out is where a Defined-Benefit pension plan or an annuity provider sells the liability via an insurance or reinsurance contract.
- A buy-in is an insurance transaction that involves the bulk purchase of annuities by the pension plan to hedge the risks associated with a subset of the plan's liabilities, typically those associated with retired members. The annuities become an asset of the plan and reflect the mortality characteristics of the plan's membership in terms of age and gender.
- Longevity insurance or a longevity swap involves the buyer of the swap paying a pre-agreed fixed set of cash flows to the swap provider and receiving in exchange a floating set of cash flows linked to the realized mortality experience of the swap buyer, the latter payments being used to pay the pensions for which the swap buyer is liable.

In other words, pension plan advisers and trustees preferred dealing with mortality and longevity risks by means of insurance contracts which fully removed the risk concerned and were not comfortable with capital market hedges that left some residual basis risk.

Now note a number of characteristics of cat and longevity instruments and how they are risk-managed:

First, cat and mortality/longevity instruments meet a well-defined risk management purpose, i.e., to hedge a *specific* tail risk eventuality. A cat bond might hedge a specific hurricane risk, e.g., the property damage from a hurricane hitting Miami over some period, or a longevity bond or swap might cover the losses to a pension fund from mortality rates for over-80s declining more than a certain amount, and so forth.

Second, the parties involved will have done extensive analysis to quantify and price the risk, and to design suitable hedges. For example, when David Blake, Andrew Cairns and I were working with JP Morgan's LifeMetrics team in London a while back we sought to design the

infrastructure needed to trade wholesale longevity derivatives that could be used to design real-world longevity hedges. To achieve this objective, we had to assemble and understand the available data, build new mortality risk models, compare them to existing models, assess their goodness of fit, back test their projection capabilities and then assess the effectiveness of various hedge instruments calibrated to best fit existing data sets.²⁴ It was a lot of work.

Third, entities assuming the risk will have a sense that they will be taking on the losses themselves should the risky outcomes occur or they will be hedging them or passing them along to underwriters. Investors will not be taking a particularly short-term view nor manage them in the way that day-to-day market risks are managed, whereby holders would use daily VaR models that start issuing sell signals when prices fall and aggravate short-term instability by encouraging everyone to sell at the same time. Instead, with cat bonds or longevity derivatives, decisions to bear the risks involved would be taken well in advance on a buy and bear it basis.

Fourth, the risk concerned will have a zero or close to zero correlation to most other risks (e.g., hurricane risks or longevity risks have little correlation to the risk of a market crash). Zero correlation makes these instruments attractive in a diversified portfolio and holdings would be small relative to the holder's overall exposure. Importantly, *zero correlation also means that these instruments are not suitable to hedge systemic risks*, e.g., the risk of a general market downturn.

Most of all, these bonds are not designed to backstop banks, let alone backstop the entire banking system in a systemic crisis.

None of these considerations apply to CoCo bonds, but if CoCo bonds are not issued for plausible risk management reasons, one must presumably conclude that they are issued for regulatory purposes, i.e., CoCo bonds are a creature of regulation, in the sense that absent the regulation, they would have no reason to exist.

To explore these issues further, let's examine the market for CoCos, i.e., why would banks issue them and which investors might buy them?

4. The Market for CoCos

Why would banks issue CoCos?

If banks want to increase their capital, then the usual means of doing so are by building up their equity from retained earnings or via a rights or new share issue. CoCo investors should then ask themselves why a bank would issue CoCos instead. One answer that will commonly be suggested is that a bank might issue CoCos to guard against the possibility that it might want to recapitalize quickly (so ruling out the slower retained earnings route to recapitalization) but would not want to issue new shares when share prices are low.

But why might investors buy these bonds?

Let's go through the possibilities.

Banks

Banks are the least desirable investors in bank CoCos. The banking system can hardly be recapitalized by banks' CoCo positions being bailed-in—a negative sum game if ever there was one—but there are contagion issues too. If banks hold each other's CoCos, then trouble leading to a bail-in at one bank could spread to other banks and contagion would be reinforced rather than countered, i.e., the opposite of what is desirable from a systemic risk perspective.

Pension funds

At first sight pension funds might look like suitable investors because they take a long-term perspective and hold large asset positions.²⁵ Such characteristics might make them

attractive to issuers but not to investors, however.²⁶ The best assets for pensions are long-term assets whose main risk is illiquidity risk, which falls as the investment horizon lengthens.

Examples of such assets would be infrastructure bonds, Asset-Backed Securities, real estate, government bonds and longevity bonds—i.e., the assets they typically hold—and these positions might be hedged (e.g., by guarantees) against major market or credit risks. CoCos are not suited to pension funds because their main exposure is credit risk and credit risk exposure lengthens with the investment horizon. In addition, many institutional investors' investment strategies are driven by Asset-Liability Management (ALM), by which assets are matched to liabilities of a similar duration, but the long and sometimes uncertain duration of CoCos can make them undesirable for ALM purposes.

Pension funds also operate under mandates that limit their exposure to equities and for the most part require them to hold highly rated fixed income assets. They are not allowed to hold bonds that are below investment grade (i.e., junk) or to hold bonds that are unrated, and yet Avdjiev, et al. ((2013) p. 50) reported that over 50% of CoCo issues were unrated. Many other institutional investors face similar constraints. These issues are relevant because rating agencies are often reluctant to rate CoCos and those that do get rated are often rated as junk. And even where pension funds or similar investors could hold bonds such as CoCos, they would be pressured or even obliged to sell them should their ratings fall in a crisis.

Perhaps the biggest problem with pension funds holding large-scale CoCos positions is what would happen in a crisis. If pension funds' CoCos were bailed-in during a crisis then pensioners would be thrown under a bus to protect taxpayers and the political fallout would likely be on a potentially worse scale than would occur with a good old-fashioned taxpayer bailout. The prospect of such fallout in the white heat of a banking crisis hardly bears thinking about. There would be enormous pressure against a bail-in—not just by CoCo investors but also by pensioner advocacy groups including pension regulators—and authorities would

already have their hands full trying to avert a banking collapse. The chances of a bail-in in such circumstances must then be considered remote.

This latter problem points to a major contradiction at the heart of the regulatory system. On the one hand, banking regulators are keen to promote CoCos and imagine that institutions like pension funds would be ideal investors. But such thinking merely demonstrates their own ignorance. From the pension funds' perspective, CoCos are far from ideal, not least because they are potentially very risky and the foremost responsibility of any pension fund is to seek to achieve a *safe* retirement pension income for their clients. Pension regulators exist to impose rules to help pension funds achieve this object, and it is their job to discourage pension funds from investing in inappropriate and excessively risky assets. The two sets of regulators are then at loggerheads and we have another regulatory failure, this time due entirely to banking regulators' inadequate understanding of pension funds and the role of pension fund regulators. Or as Persaud ((2014) p. 4) gently puts it, there is a conflict between regulators that "points to a lack of reflection and coordination ... over who they expect to hold the very instruments they consider to be so important to systemic resilience."

Insurance companies

Similar considerations apply to insurance companies as well and these companies provide a much smaller potential investment pool. Insurance companies are also subject to additional constraints—such as mark to market rules and short-term solvency constraints—that make it difficult for them to hold large CoCo positions.

Retail investors

Retail investors are not suitable CoCo investors because the risks involved are so complex and opaque that neither they nor their advisors can be expected to understand them.

So, whilst they might be willing to buy retail CoCos, they are wide open to be exploited by unscrupulous salespeople who spin the line that the higher yields they offer are somehow risk-free. However, higher yields are never risk free! For this reason, UK regulators have banned retail investors from holding CoCos and since the well-publicised CoCo mis-selling scandals in Italy in late 2015, European regulators have been having second thoughts about allowing retail investors to invest in them (Arnold and Hale (2016)).

Sovereign Wealth Funds

Sovereign wealth funds (SWFs) are another class of investor and have reasonably large holdings of assets. According to the Sovereign Wealth Fund Institute's *Sovereign Wealth Fund Rankings*, SWFs had \$7.5 trillion in assets in October 2017. Traditionally, SWFs invested in government bonds, equities and in foreign direct investments, but a growing number are now investing in various forms of alternative investments, which could conceivably include a (small) allocation in speculative assets such as CoCo bonds.

Hedge funds

The last obvious investor class consists of short-termist investors such as hedge funds and the Bank of England's July 2014 *Financial Stability Report* stated that "recent AT1 deals in Europe" seem to be "dominated by fund managers and hedge funds in the United Kingdom" (p. 35). These institutions hold assets that have market risk exposures or credit risk exposures such as equities, foreign exchange, yield bonds or credit derivatives. They manage these risks by pooling them and selling when their risk models suggest that risks are rising. A common strategy is a carry trade, in which they seek to exploit differences in yield across otherwise similar instruments. If interest rates in one currency are higher than in another, and the exchange rate is fixed, they go long on the first currency and short on the second. While the

exchange rate remains fixed, they rake in apparently riskless profits. Then once in a while, the exchange rate changes unexpectedly, the underlying risks reveal themselves and they take heavy losses. These are exactly the sort of investors that would be interested in CoCos or other high-yield bonds. In the case of CoCos, they would seek to exploit the difference in yields by going long CoCos and short conventional bonds, and then sell their CoCos at any sign of an impending bail-in. CoCos might be particularly attractive to them if the yields were sufficiently high and if they had good reason to believe that regulators would not dare to bail them in. So, hedge funds would be natural CoCo investors, but are not the kind of investor that regulators would want.

There is thus a second contradiction at the heart of regulatory policy towards CoCos. Bank regulators want investors who would take a buy and hold position, and thereby tough out the losses they would suffer in a market downturn. Unfortunately, few such investors exist. The obvious large institutional investors that operate on a long horizon have good reasons to avoid CoCos, and in any case operate under mandates that would make it difficult for them not to sell in a crisis. On the other hand, the obvious investors who would buy CoCos if the yields were high enough—investors like hedge funds that operate on short-term horizons—would bolt for the door on the first sign of trouble. The only potentially suitable investors left would be the occasional SWF or Berkshire Hathaway-type long-term asset manager, but these are few and far between.

5. Stability Issues

There are also concerns relating to the impact of CoCos on market and financial system stability.

On the former subject, CoCos create the possibility of price manipulation and gaming around triggers. As triggers are approached, incentives can be created for market players to

manipulate the prices of bank stock or CoCos to trigger conversion and these incentives create the possibility of death price spirals (see also Alloway (2011)). As Duffie ((2009) p. 4-5) explains, if:

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

A standard counter-argument is that death spirals would be more likely with market-value rather than book-value triggers, but this argument only provides a limited consolation: even with book-value triggers, the incentives for death-spiral behavior could still emerge as key dates, e.g., reporting or coupon payment dates, approach. To quote Martin Taylor from the Bank of England’s Financial Policy Committee in 2015: “I [still] worry that CoCos may be subject to potentially destabilizing manipulation by convertible arbitrageurs...”

In fact, similar concerns were expressed when the first post-GFC CoCos were initially proposed:

“... investors and regulators alike have voiced concerns that these bonds, by design, convert into equity at a time when the bank’s share price is likely to

already be under pressure. “If you had too much contingent capital, the very act of converting it could be unsettling,” said one European regulator. One investor called the instruments “equity time bombs”. ...

Some critics have made the comparison with so-called “death spiral convertible” bonds, used in Japan in the early 1990s. Ultimately, many experts concluded the instruments did more harm than good because the expectation of a swathe of debt converting into equity exacerbated share price declines and investor panic” (Sakoui and Jenkins (2009)).

The bigger issues relate to systemic stability. None of the CoCos developed since the GFC have been tested in a major crisis. To quote a recent Bank of England article, there are “a number of issues concerning how this *new and untested* form of capital will work to mitigate risks to financial stability ...

While AT1 can potentially increase CET1 of banks under a stress, a sharp market reaction following a trigger event, or as understanding of the features and risks of AT1 instruments evolve, could limit banks’ ability to raise further capital and affect confidence in the banking system. It could also impose significant losses on holders of AT1 instruments, some of which may be systemically important. ... [W]ith only limited information on the investor base available at present, *it remains difficult to assess precisely this risk for financial stability.*”²⁷ (My italics).

But if we can’t assess this risk, then it follows that we cannot rely on CoCos in a crisis, right?

So, the question arises: if the Bank of England regard CoCos as posing a difficult-to-assess risk for financial stability, then why does the Bank still allow banks to include CoCos in AT1 capital?

Compare the above statement to former Bank of England Deputy Governor Andrew Bailey's contemporaneous statement that:

“The big lesson from this history [of debt-equity hybrids] is that a going concern capital instrument must *unambiguously* be able to absorb losses when the bank is a going concern. Apologies for stating the blindingly obvious, but history painfully demonstrates why it is important to state the obvious” ((2014) p. 2, my italics).

It would appear that different parts of the Bank are not talking to each other.

A test of whether a new policy or instrument will help deal with a crisis is whether it will moderate the collective enthusiasm to buy assets during the prior boom or to sell them during the subsequent crisis. However:

“Bail-in securities held by hedge funds or other short-term, leveraged institutions would fail this test. During the boom years when short-term risks appear low and this assessment is repeatedly validated over short periods of time, these investors will demand more bail-in securities, driving down their yield, encouraging their issuance, and enabling banks to expand their balance sheets and loan portfolios. Short-term investors, aware that they are not in a position to be converted into a long-term equity investor, will try to pre-empt any change in the environment that suggests what was previously safe is no longer so. When a few read signs of trouble ahead and start to exit, others will quickly follow. There will be a herding and self-feeding effect across the asset class, putting scrutiny on good and bad

banks alike as yields on cocos rocket across the board and rating agencies follow with widespread downgrades of the securities” (Persaud (2014) p. 7).

If they are to work at all, CoCos would work best when we are dealing with a single, small non-systemic bank. In the best-case scenario, regulators would be in a position to resist lobbying from CoCo investors who did not want to be bailed-in and regulators would have few systemic risk concerns if they did authorize a bail-in.

Such a scenario may be fanciful, however. Regulators must *always* expect lobbying and it cannot be assumed that such lobbying would be ineffective even for a small bank. Nor can it be taken for granted that regulators would always be unconcerned about potential systemic risks even for a small financial institution.

Yet these concerns almost pale into insignificance when we are dealing with a large bank whose failure or distress would have systemic implications or if we are dealing with a group of banks or, conceivably, the banking system as a whole.

Suppose that a big systemic bank has its CoCos bailed in. Leaving aside that investors might interpret the bail-in as a distress signal that further undermines confidence in their bank and might even lead to a run, we can then envisage *three* different systemic channels by which news of the bail-in can adversely impact other banks:

- There is the “bad news about our bank” channel through which investors perceive the bail-in as conveying bad news about their own banks’ financial condition.
- There is the “fire-sale” channel: investors perceive the bail-in as bad news and then anticipate a greater likelihood that the bailed-in bank will be forced to fire-sale its assets, thereby forcing their banks to write down the values of similar assets in their own portfolios.
- There is the “increased bail-in probability” channel: investors in other banks and their CoCos perceive an increased probability that their banks’ CoCos will be

bailed-in as well. An immediate consequence would be that the prices of these other CoCos would fall, with potentially adverse impact on the other banks' share prices.

The point, yet again, is that CoCos cannot be relied upon to work in a systemic crisis (see also Allen, 2016). As Avinash Persaud (2014) observes:

“Bail-in securities may make sense for an idiosyncratic bank failure—like the 1995 collapse of Baring Brothers, which was the result of a single rogue trader. But they do not make sense in the more common and intractable case where many banks get into trouble at roughly the same time as the assets they own go bad. On such occasions these securities, which may also have encouraged excessive lending, either will inappropriately shift the burden of bank resolution on to ordinary pensioners or, if held by others, will bring forward and spread a crisis. Either way they will probably end up costing taxpayers no less and maybe more. In this regard, fool’s gold is an apt description. ... Either we need real gold—more equity capital—or not. Fool’s gold is no alternative. ...

Bail-in securities are not the silver bullet... they will likely make matters worse. If more gold plating of bank capital is what is required, then this fool’s gold will not do.”

The underlying problem is obvious: if there is any danger that authorizing a bail-in could trigger a crisis, then regulators would be reluctant to do so—and this is so even if we put aside the (enormous?) pressure that would be put upon them by interested parties lobbying them not to bail-in CoCo investors, including those from the government. Taking all these considerations into account, the chances of regulators authorizing a bail-in with potentially adverse systemic implications must be low to negligible.

It follows that we cannot rely on CoCos to recapitalize banks in the very circumstances in which we would most wish them to do so.

But if CoCos are unlikely to be bailed-in in a systemic crisis, CoCos will serve no use as a core capital in a crisis when it matters. Their impact will then only be *ex ante*, serving to inflate perceptions of core capital, specifically, banks' reported Tier 1 capital numbers, giving the impression that banks are better capitalized than they actually are. This false risk comfort in the run-up to the next systemic crisis will then leave the banking system even more exposed than it would otherwise have been when the next crisis hits.

Unless we can be confident that CoCo investors would actually be bailed-in during a crisis—and we cannot—then CoCos would be harmful *ex ante*, because they provide false risk comfort. They would also be harmful *ex post* because it would then be revealed during the subsequent crisis that their hoped-for contingent capital could not be drawn upon to recapitalize the banks.

It is also possible that the CoCo market could itself become a systemic stability concern. Recall that in February 2016, Deutsche Bank's well publicised problems led the prices of its CoCos to plunge to about 70% of par before they later rebounded. Prices of other banks' CoCos also fell sharply and new issuance in the market dried up. These falls reflected major concerns focused mainly around Deutsche's solvency but also, to a lesser extent, about the solvency of other big European banks as well.

This episode revealed a number of worrying features of the CoCo market in distress. (1) The price discounts made the issue of further CoCos expensive and temporarily closed off this route to bank recapitalization as the crisis escalated. (2) The price discounts were sufficiently high as to suggest that investors were worried about more than the banks temporarily suspending CoCo coupon payments, i.e., investors must have had serious worries about being bailed in and/or about the banks' underlying solvency. (3) The market

subsequently recovered, but one could imagine that it might have deteriorated further, in the worst-case scenario front-running a solvency crisis across the entire European banking system. This concern implies, in turn, (4) that the CoCo market could serve as a new and potentially significant channel of contagion in a future crisis.

6. Lessons from pre-Crisis Hybrids

CoCos/bail-ins are often described as new capital innovations that seek to learn from the lessons of the GFC. Such claims provide a convenient narrative for both regulators and bankers but in truth it is a case of new lamps for old. Hybrid capital instruments that convert into equity have been around for a long time. To quote an overview from a few years ago, “Broadly speaking, contingent capital is just another hybrid security.” (Green, et al. (2012/2013)) To give a sense of their scale, Boris Vallée ((2013) p. 3) observed that

“Hybrid bonds proved to be very popular: worldwide, they amounted to more than USD 1 trillion in 2008. In 2008, European Hybrid Bonds amounted to EUR 701bn, or 38.3% of European banks' regulatory capital.”

The key phrase is “innovative tier 1 capital.” These instruments were issued in a vast array of different forms before the GFC. Consider this quote from the Basel Committee:

“National supervisors expect banks to meet the Basle minimum capital ratios *without undue reliance on innovative instruments* ... Accordingly, the aggregate of issuances of non-common equity Tier 1 instruments with any explicit feature - other than a pure call option - which might lead to the instrument being redeemed is limited - at issuance - to 15% of the consolidated bank's Tier 1 capital.” (My italics).

This statement indicates the Committee’s concern to restrict the inclusion of “innovative hybrid instruments” into Tier 1 and for an obvious reason, namely, to protect the

integrity of Tier 1 capital. Good to see the Basel Committee on the ball on this issue. The obvious first-best solution would have been to cap their inclusion at 0%, but the Committee felt unable to do so because of lobbying from the banks.

However, this quote is taken from a press release issued in October 1998 (!) and the point that leaps from the page nearly 20 years on and one GFC later is that the 15% cap has since been *raised* to 25% in response to further lobbying by the banks.

As we all know, these earlier instruments then performed dismally during the GFC. To quote a speech by Bank Deputy Governor Sir Jon Cunliffe in 2014:

“The market in 2008 and 2009 clearly did not believe either the numbers for bank capital or for bank assets. Capital was not just pure equity. Tier 1 capital also included so-called ‘hybrid’ capital instruments—debt that was supposed to convert to equity to absorb losses. However, the ability of these instruments to absorb losses proved to be illusory...”

But if hybrids didn’t work the last time round, why on earth would we rely on them to perform successfully the next time? If the old chocolate teapot melted during the heat of the last crisis, it might be unwise to assume that the new chocolate teapot that replaced it will prove to be heat resistant the next time.

Unfortunately, having put his finger on the problem, Cunliffe then draws exactly the wrong conclusion:

“We have tightened up on the required quality of regulatory capital. The ‘hybrid’ debt instruments that proved not to be loss-absorbing no longer count as Tier 1 capital” ((2014) p. 1).

What he means is that the particular (i.e., pre-GFC) hybrids that proved not to be loss-absorbing no longer count as Tier 1, but new post-GFC hybrids that share many of the same features as the old hybrids are allowed in AT1 and therefore in Tier 1. I would suggest that the

conclusion he should have drawn was that since hybrids failed the last time, then it would be unsafe to rely on them the next time: CoCos should have been excluded from Tier 1 altogether. In failing to exclude them, regulators are making the same mistake they made before. Same mistake, same outcomes...

7. Implications of Declassifying AT1 CoCos as Core Capital

So what would be the impact on regulatory measures of core capital and the leverage ratio if all AT1 capital instruments were declassified as AT1 (and hence as core capital) and reclassified instead as Tier2?²⁸ This change would be equivalent to getting rid of the AT1 classification and moving all instruments that are currently classified as AT1 into Tier 2. Since this change would abolish the distinction between CET1 and Tier 1, then the latter would be redundant and could be abolished. Or, focusing on the regulatory leverage ratio, what would be the impact of replacing the Tier 1 numerator in the Basel III leverage ratio with CET1 capital?

The first impact would be on the specification of the regulatory minimum required leverage ratio. The Basel III leverage ratio rules currently require a minimum ratio of Tier 1 capital to leverage exposure equal to 3%. They also specify that 75% of the minimum required Tier 1 capital should consist of CET1, i.e., that up to 25% of Tier 1 capital can consist of AT1 capital. The minimum required leverage ratio expressed in terms of the ratio of CET1 capital to leverage exposure is then 2.25%. Thus, the maximum permitted leverage in terms of Tier 1 capital is 33 times capital, whereas the maximum permitted leverage in terms of CET1 capital is 44 times capital. If AT1 were declassified as core capital, then the core capital numerator would become CET1 and the Basel Committee would then presumably have to decide whether to keep the existing CET1 minimum standard as 2.25% (which would at least make the 44x

leverage ceiling more explicit) or raise it to the current Tier1 minimum of 3% (which would be better, because it would increase the minimum requirement by a third).

Then there is the impact of such a change on the stock of capital designated as core. In Europe the entire €125 billion or so outstanding stock of European CoCo bonds would be declassified as core capital and no longer count towards banks' (Tier 1) Basel III leverage ratios.

Third, there is the impact this change would make on individual banks' reported core leverage ratios. Take Deutsche Bank. Using data from (2016) *Annual Report*, its Tier 1 leverage ratio, the ratio of T1 to leverage exposure, was 3.5%, which is to be compared to the minimum required leverage ratio of 3.0%. If we replace Tier 1 with CET1 as the numerator in the leverage ratio, then its leverage ratio falls to 3.1%.²⁹ Thus, in the case of Deutsche, whether we include AT1 in core capital makes a notable difference to its regulatory leverage ratio—and we have to view this difference in the context of Deutsche's other well-known issues. It would also be prudent to replace the leverage exposure denominator by total assets or the minimum of the leverage ratio or total assets. If we make this further adjustment then Deutsche's leverage ratio falls to 2.8%. In addition, it would be prudent to measure the leverage ratio using market values rather than book values, and if we make this change, Deutsche's leverage ratio falls to a mere 1.2%. These calculations highlight not only how weak Deutsche actually is, but also demonstrate the extreme mildness of the Basel III minimum leverage ratio requirement. Frankly, it is ridiculous that any bank could be leveraged by a factor of $1 \div 1.2\% = 83.3$ and still be judged to be capital adequate for regulatory purposes.

Declassifying CoCos as core capital would highlight a key inadequacy of the Basel capital adequacy system. However, neither European banks nor their regulators would welcome this spotlight given the existing strains on European banking, and for that reason I do not expect any such reform to be implemented any time soon, notwithstanding its desirability, even necessity, from a first principles perspective. But hiding the problem does not make it go

away. Labelling AT1 CoCos as core does not make them so in terms of their underlying economic function and there is no escaping this reality however much European regulators might wish to. Unfortunately, one can only expect European regulators to address this problem as they have addressed most other European banking problems in recent years—to kick the problem down the road.

8. Conclusions

The best that can be said for CoCos is that they can help address idiosyncratic bank failures in circumstances unique to one bank and in which confidence in the system is not at risk. Cases like the Bank of Commerce and Credit International and Barings Bank come to mind. However, these are small problems and authorities have other means of resolving them: ideally, they should just let such a bank fail. Thus, in the circumstances in which CoCos might conceivably help, we don't need them.

The main problems with CoCos emerge when facing the prospect of a systemic crisis, and in these circumstances, bail-ins can only be described as hugely counter-productive.³⁰

Why are CoCos unreliable as core capital?

One reason is that to function as core capital, these instruments must offer the prospect of new going concern capital, but CoCos can only be going concern if their triggers are high enough and the Basel rules allow CoCos with triggers as low as 5.125% to qualify as AT1 capital. Leaving aside that this trigger is awfully precise, it is far too low.

A second reason is that for CoCos to function as core capital we must be able to be confident *in advance* that they *would* be converted *if* triggers were breached, but given the need for regulatory approval, the pressures on regulators not to approve bail-ins, the availability of excuses to avoid bail-ins (those handy “exigent circumstances” etc.) and overall regulatory capture, then this requirement can hardly be said to have been met. To regard CoCos as core

capital is as sensible as buying home insurance whilst being confident that you cannot claim on it when you need to. It would be better to save the premium and self-insure.

A third reason is that even if we *could* be confident that regulators *would* authorize a bail-in *if* a breach of the trigger *did* occur, it might still be unwise to take for granted that the CoCo trigger would identify a weak bank before it hit the buffers. The book-value CET1/RWA metric used in existing CoCos is known to provide a less than 100% reliable signal of impending distress.

A fourth reason is that the experience of other hybrids during the GFC gives us no reason to believe that we can rely on CoCo hybrids in the next crisis. In fact, we can be fairly confident that we cannot: CoCos are a form of debt-equity hybrid capital instrument and hybrids failed to perform in the GFC when they were needed. There is no reason to think that CoCos would perform any better than these hybrids did.

In sum, CoCos give rise to a number of serious financial stability concerns.

A final reason is that we should be suspicious of the reliability of CoCos as core capital instruments when the evidence indicates that the primary driver behind the issue of these instruments is to game the Basel III regulatory capital rules.

The bottom line is that CoCos cannot reasonably be regarded as core capital instruments and regulators should not treat them as such.

Or to quote my friend David Blake from the Pensions Institute, CoCos “are moral hazard cubed—how could any regulator allow these things.”

Quite.

Footnotes

1. This leverage exposure replaces the old total assets measure and was introduced in part to harmonize the denominators in EU and US leverage ratios in light of the differences between IFRS and US GAAP accounting measures of total assets.

2. Under the earlier Basel II regime, there were also two different core capital measures, core Tier 1 and the broader measure, Tier 1. Core Tier 1 was transformed into Common Equity Tier 1, whilst the definition of Tier 1 was tightened somewhat.

3. For more on the qualifying conditions for AT1 capital, see (Basel Committee on Banking Supervision (2011) p. 15).

4. The key feature of this proposal is an American-style put that gives the issuing institution the right to sell its shares at a fixed price. In theory, if various conditions hold, then this option would allow a bank to recapitalize at above market prices should its share price fall far enough. However, there are at least three problems. (1) American puts are expensive to issue and maintain, especially on the scale that would be needed in a crisis, so the question arises as to whether it would be better for the bank to self-insure by issuing more capital instead. (2) The effectiveness of this approach is dependent on the credit quality of the issuer's counterparties at the time that the bank might want to exercise its put option. If the ability of the counterparty to make good in a systemic crisis is questionable (and surely, it must be) then this approach to recapitalization is itself unreliable. (3) This approach does not scale. Even if it worked on an ad hoc basis for an individual bank, it could hardly backstop the banking system in a crisis.

5. These are debt notes with embedded European call options based on share price triggers and are designed to allow for the gradual automatic recapitalization of banks, thereby boosting countercyclical capital when required. These instruments have a number of advantages over CoCos and Bulow and Klemperer make ambitious claims for them, suggesting

not only that they should replace CoCos but also that any optimal bank capital structure would be a mix of equity and ERNs. However, Klein (2013) suggests that they are “likely to do more harm than good” and highlights two problems with them. The first is that these are complex instruments that are difficult to price, at least for most investors. This concern is self-evidently true, but hardly damning. The second, potentially more serious concern, is that they could create death spirals of their own. Personally, I am not convinced that a capital structure based on equity plus ERNs is superior to one based on equity alone, provided that the latter involves a sufficiently high ratio of capital to total assets (say, at least 15%). The problems that can be handled by supplementing existing equity with ERNs can be better handled by issuing even more equity. See also Admati, et al. (2013, section 2) or Goodhart (2010).

6. This said, Vanessa (2017) reports that are plans being drawn up to introduce CoCo bonds that would be indexed to banks’ market share prices, and not to their CET1 or CET1 ratio. Two things to be said in favor of this proposed new index is that market share prices give a better indication of a bank’s state of financial

7. Arguments for CoCos are set out, e.g., by Flannery (2005, 2009), Duffie (2009), Calomiris and Herring (2011), Huertas (2012) and von Furstenberg (2015, 2017). The latter reference also provides a nice analysis that debunks some common misconceptions about CoCos.

8. For example, in the recent case of Banco Popular in Spain, CoCo investors lost all their holdings when these were bailed-in on June 7th 2017 and the Bank was sold to Banco Santander for €1.

9. A common misconception is that CE CoCos are inherently dilutive. However, as von Furstenberg (2017, p. 176) points out, CE CoCs are only dilutive if the conversion price is lower than the share price at conversion.

10. An advantage of PWD CoCos relative to CE CoCos is that they can be held by fixed-income investors that operate under mandates that prevent them holding equity instruments. It is also worth noting that whilst almost all of the theoretical analysis of CoCos has focused on CE CoCos, over half—54% in the sample of Avdjiev, et al. (2015)—of CoCo issues have been of the PWD variety.

11. Avdjiev, et al. (2013) give the example of a CoCo issued by Rabobank in March 2010, in which holders would lose 75% of their holding and receive the remaining 25% in cash. However, a disadvantage of a partial writedown is that the issuer would have to pay out cash while in distress—and distressed banks are always short of cash.

12. Shareholder incentives are somewhat different with CE CoCos, because if CE CoCos are bailed in, then shareholders will suffer dilution losses that would they normally seek to avoid.

13. There is a disconnect here between real-world triggers, which are always based on book values, and the theoretical literature, which is (entirely?) focused on market-value triggers. Thus, the largely academic theoretical literature on CoCos has limited usefulness to real-world CoCo issues.

14. All CoCos give rise to pricing problems. For example, depending on the precise circumstances, there may be no equilibrium price or there may be multiple equilibrium prices for CoCos with market-value triggers (see, e.g., Sundaresan and Wang, 2011, or Prescott, 2011). CoCos with book-value triggers introduce additional issues (e.g., of timeliness or timing of reports or coupon payments) that complicate pricing further.

15. Quoted in Jolly and Ewing (2013).

16. Persaud, 2014, p. 6, note 2.

17. On June 25th, 2017, these two banks were sold to Intesa for €1. Unlike the case of Banco Popular in Spain earlier the same month, in which the CoCo investors were bailed-in

and there was no state financial support, the resolution of the Veneto banks involved a bail-out and no bail-in: the Italian government gave €5.2 billion to Intesa for its trouble and guaranteed an extra €12 billion to cover further potential losses on these banks' portfolios. The bail-out was made possible by exploiting loopholes in the new regime that allowed the Single Resolution Board to pass the responsibility back to the Italian government after declaring that the two banks concerned did not pose a significant adverse threat to financial stability, despite the (huge) damage to the credibility of the new regime. To quote Ferdinando Guigliano (2017): "It's hard to see how this doesn't involve state aid, which the EU forbids. ... Credibility, however, is hard to build and very easy to destroy."

18. This probability will be unquantifiable in advance because of the presence of strategic (or game-theoretic) uncertainty. This uncertainty alone makes it nearly impossible to price these instruments in a theoretically sound way.

19. Persaud (2014) p. 2.

20. The "resolution" of Banco Popular was widely hailed as a success for the new Single Resolution Mechanism that came into effect in January 2015. I am not convinced. Santander had taken over Popular's €150 billion asset portfolio when it was known that Popular had a big bad assets problem, and Santander did not have time to do its due diligence properly. So, Santander could have had little idea what it was taking on, and it was reported that Popular's management had little idea of the scale of its problems either. Popular's bad asset problem was not so much resolved as passed on to Santander.

21. For more on cat bonds, see Froot (ed.) or Lewis (2007).

22. Mortality-related bonds were first proposed by Blake and Burrows (2001).

23. For more on this market see Blake, et al. (2008, 2018).

24. This work was subsequently published in a number of actuarial journals. See, e.g., issue #2 of the 2011 *North American Actuarial Journal*.

25. According to data in Willis Towers Watson's *2017 Global Pensions Asset Study*, pension fund assets worldwide were over \$36.4 trillion in 2017.

26. Different financial instruments offer returns over risk-free as compensation for bearing different financial risks. The main risks are market, credit and liquidity risks and these risks must be managed differently to reflect the different horizons and the nature of the liabilities of the investors concerned.

27. Bank of England, *Financial Stability Report*, June (2014) Box 3.

28. I gloss over two knock-on issues. First, I am assuming that other capital instruments currently included in AT1 such as preference shares should also be reclassified as T2. This reclassification seems reasonable to me and I see no good reason why these should be reclassified as CET1 instead, which is the obvious alternative. Second, I am glossing over the impact that this reclassification would have on requirements based on the CET1 (to RWA) ratio. The current requirements listed in the 3 bullet points in the Appendix would collapse to just two: that CET1 should be at least 6% of RWAs; and CET1 + T2 should be at least 8% of RWAs. Most banks however have CET1/RWA and (CET1+ T2)/RWA ratios that are comfortably above these minima.

29. If one replaces the leverage exposure with total assets as the denominator, the Tier 1 to total assets ratio falls to 2.9%, which falls further to 2.7% if one uses Tier 1 with CET1.

30. I have not even begun to address some further issues. For example in his article, "The case for bail-ins," Thomas F. Huertas sets out a list of pre-conditions that would have to be satisfied if bail-ins are to be successful including, e.g., the need for liquidity support for bailed-in institutions, the need to address ancillary issues such as those related to the close-out of derivative positions and the sale of repo collateral, the need for appropriate coordination between authorities where firms operate across different jurisdictions and, most pressing of all, the need for it "to be so well prepared that it could be executed within 48 hours." Dr. Huertas

acknowledges that this is a tall order. I would merely add that to advocate CoCos, one must also be confident that one can rely in advance on everything working as planned—and that is a *very* tall order. See also Avgouleas and Goodhart (2014).

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Appendix: Regulatory Requirements

Basel III requires that banks maintain a minimum Tier 1 leverage ratio of 3%. Tier 1 capital consists of the sum of CET1 capital and AT1 capital, and least 75% of Tier 1 must consist of CET1 capital. Therefore, AT1 is constrained to be no more than 25% of total Tier 1.

Capital instruments must meet certain requirements to qualify as AT1 capital and some forms of preferred shares (specifically, non-cumulative preferred shares) meet this requirement. As noted earlier, CoCo bonds can also qualify as AT1 capital provided that their triggers are at least 5.125% and the bonds are issued as perpetuals.

Other capital instruments—such as CoCos with lower triggers or certain forms of non-CoCo subordinated debt—can still count as Tier 2 (or gone concern) capital. We are not especially concerned with Tier 2 capital here as our focus is on AT1 and, in particular, with AT1 CoCos.

Basel III also imposes minimum requirements on the CET1 ratio:

- CET1 should be at least 4.5% of RWAs;
- CET1+ AT1 should be at least 6% of RWAs; and
- CET1+ AT1 + T2 should be at least 8% of RWAs.

I gloss over various additional buffers—CounterCyclical Buffers, Systemic Buffers, etc. and the additional requirements relating to Total Loss-Absorbing Capacity (TLAC).

The point is that there are certain benefits to a bank from issuing CoCos that qualify as AT1. To spell these out:

- AT1 capital can count towards the minimum leverage T1 leverage ratio requirement up to a limit of 25% of Tier 1 capital.
- AT1 capital can count towards the CET1 ratio requirements up to a limit of 1.5 % of RWAs.

It is the ability to achieve these regulatory benefits that is the principal driver underlying their issuance.