CoCo Bonds Issuance and Bank Funding Costs

Stefan Avdjiev, BIS
Patrick Bolton, Columbia
Wei Jiang, Columbia
Anastasia Kartasheva, BIS
Bilyana Bogdanova, BIS

Conference on Financial Regulation
Becker Friedman Institute
University of Chicago October 2–3, 2015
Early Proposals

1. Flannery (2002, 2009): an automatic conversion of subordinated (unsecured) debt into common equity when the stock price crosses a pre-specified floor (common equity market value falls below 4% of total assets)

2. Duffie (2009): automatic conversion if ratio of tangible common equity to tangible assets falls below a threshold

3. Mc Donald (2010): two price triggers for conversion; one is the bank’s own stock price and the other is a financial stock index
Motivation of Early Proposals

• A simple substitute for a *bank resolution* procedure
• An ex-ante commitment to *private sector involvement*
• Reduce reliance on *bail-outs*
• Mitigate *moral hazard in lending*
Problems with Early Proposals

1. Capital ratio triggers are subject to accounting manipulation & impossible to track continuously; Ratio may move too slowly at the onset of a crisis

2. Conversion trigger based on stock price can give rise to *multiple equilibria* (Sundaresan and Wang, 2015) and lead to ‘death spirals’
   
   – Pennacchi and Tchistyi (2015): infinite maturity CoCos are much less subject to such problems

3. Both types of *CoCo* instrument are difficult to *price*. 
Bolton and Samama (2012): Capital Access Bonds

- A bond that is convertible by the **issuer**
- No automatic ‘**trigger**’
- Fixed maturity (say 10 years)
- Convertible any time before maturity (American option)
- If not converted investors get a regular coupon (interest + put premium)
- If converted investors get a fixed number of newly issued shares

=> A collateralized put option
Early Examples

1. **Lloyds bank**: in November 2009 issued £7.5bn of *Enhanced Capital Notes*: sub. debt (lower Tier 2) of 10-15 year maturities **convert** into **common stock** if Lloyds’ core Tier 1 capital ratio falls below 5%

2. **Rabobank**: in March 2010 issued *CoCos* such that investors face a 75% automatic **haircut** if Tier 1 ratio falls below 7%

3. **Credit Suisse**: issued $2 bn. of 30-year maturity *Buffer Capital Notes* in February 2011 with a coupon of 7.875% per annum; bonds convert into equity if risk-based capital ratio falls below 7%
4. Barclays PLC: 13-Nov-2012, $3 bn. principal write down CoCo:

“A trigger event will occur upon any reporting date prior to the CRD IV adoption date on which Barclays PLC reports a consolidated quarter-end Core Tier 1 ratio of less than 7.00%, or upon any reporting date following the CRD IV adoption date on which Barclays PLC reports a consolidated quarter-end Common Equity Tier 1 ratio of less than 7.00%, or on any date that the FSA instructs Barclays PLC to calculate its Core Tier 1/Common Equity Tier 1 ratio and the ratio falls below 7.00%. Upon a trigger event, the Notes will be transferred to Barclays PLC for no consideration and holders will lose all claim to the full principal amount of the Notes and any interest that would have been due and payable on the next interest payment date.”
Main design features of CoCos

Structure of CoCos

Main design features of CoCos

- Trigger
  - Mechanical
    - Book-value
    - Market-value
  - Discretionary
- and
- Loss absorption mechanism
  - Conversion to equity
  - Principal writedown
CoCo’s position in banks’ capital structure

CoCos’ position in Basel III capital requirements

- Tier 2 (T2)
  - Non-CoCo subordinated debt
  - Low-trigger CoCos

- Additional Tier 1 (AT1)
  - Preferred shares
  - High-trigger CoCos

- Core Equity Tier 1 (CET1)
  - Common shares
  - Retained earnings

CET1 + AT1 + T2 ≥ 8% RWA

CET1 + AT1 ≥ 6% RWA

CET1 ≥ 4.5% RWA
Current Context

- A growing source of capital for banks in Europe and China, but not in the US
- Low interest rate environment and capital *chasing yields*
- The **new bank resolution model** for G-SIFIs under **SPOE** with a **TLAC** requirement that in effect amounts to a CoCo requirement…
CoCos issuance by regulatory capital classification
CoCos issuance by conversion
Why Issue CoCos?

• Two **roles** of CoCos
  1. (Ex-post) Loss absorption
  2. (Ex-ante) Management of risk-taking incentives

• The **potential benefits** of CoCos
  – a cost effective solution to boost bank capital at a time of financial distress
  – a tool for managing risk-taking incentives
Why Issue CoCos?

• **Potential shortcomings of CoCos**
  – **Investor base**
    • Potential misallocation to investors ill-equipped to take sudden and large losses
    • Potential misperception of risks by CoCo investors
    • Investors chasing yields may underestimate the true probability of conversion
  – **Loss absorption capacity**
    • The layer of protection provided by CoCos may be too thin
1. Do CoCos reduce banks’ insolvency risk?
   – How much does this depend on:
     • the design of CoCos
       – loss-absorption mechanism
       – trigger level
     • issuing banks’ characteristics
       – balance sheet size
       – GSIB status

2. To what extent do investors anticipate to absorb the losses?
   – What likelihood do investors assign to the possibility of conversion?
CoCo contract features and bank solvency

- **Loss absorption mechanism**
  - **MC**: Possibility of equity dilution at conversion represents a potential threat to existing shareholders; May reduce risk taking
  - **PWD**: CoCo holders absorb losses ahead of equity-holders; May increase risk taking

- **Trigger level**
  - **Low trigger**
    - activated closer to insolvency
    - similar to a bail-in instrument (TLAC)
  - **High trigger**
    - better suited to keep the bank away from insolvency
    - additional loss-absorbing capital must be sufficiently large
1. Impact of CoCo issuance on bank CDS spreads

a) How does the impact depend on the main contract features?

<table>
<thead>
<tr>
<th></th>
<th>Loss-absorption effect</th>
<th>Incentive effect</th>
<th>Overall impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC CoCos</td>
<td>Lower spread</td>
<td>Lower spread</td>
<td>Lower spread</td>
</tr>
<tr>
<td>PWD CoCos</td>
<td>Lower spread</td>
<td>Higher spread</td>
<td>Unclear</td>
</tr>
</tbody>
</table>

The overall effect should be strongest for MC/high-trigger CoCos.

b) How does the impact depend on bank characteristics?
   – Balance sheet size
   – GSIB status
Design of the empirical exercise

• **Event window**
  – In most event studies - all relevant info simultaneously announced to all agents at a clearly defined point in time;
  – In our case – info spreads in a diffusion-like process
  – We consider three event windows:
    • 21-day window: \{T-15; T+5\}
    • 15-day window: \{T-15; T-1\}
    • 6-day window: \{T; T+5\}

• **Set of issuers** – banks from:
  – Advanced Economies, excluding the Euro Area periphery
  – Advanced Economies
  – All jurisdictions
Design of the empirical exercise

• **Benchmarks**
  – CDS regional indices are constructed from *iTraxx Senior Financials constituents* augmented by liquid bank names from the region

• **Prediction errors:**
  – Following the methodology in James (1987), we compute the $Z$–value defined as $Z = \sqrt{N} \text{ (ASPE)}$, where ASPE is the average standardized prediction error and $N$ is the sample size
  – The **prediction error** is defined as: $PE_{jt} = R_{jt} - R_{mt}$
  – We also compute the proportion of negative prediction errors, with the null set at 0.5.
## Impact of CoCo issuance on CDS spreads

Sample includes banks from all developed economies, except EA periphery

<table>
<thead>
<tr>
<th>21-day window (-15, 5)</th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>All CoCos</td>
<td>-3.66</td>
<td>0.00</td>
<td>0.75</td>
<td>0.00</td>
<td>72</td>
</tr>
</tbody>
</table>

### Loss absorption

<table>
<thead>
<tr>
<th></th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWD</td>
<td>-1.51</td>
<td>0.13</td>
<td>0.65</td>
<td>0.02</td>
<td>43</td>
</tr>
<tr>
<td>MC</td>
<td>-3.92</td>
<td>0.00</td>
<td>0.90</td>
<td>0.00</td>
<td>29</td>
</tr>
</tbody>
</table>

### Trigger

<table>
<thead>
<tr>
<th></th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6%</td>
<td>-2.06</td>
<td>0.04</td>
<td>0.73</td>
<td>0.00</td>
<td>40</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>-2.93</td>
<td>0.00</td>
<td>0.79</td>
<td>0.00</td>
<td>29</td>
</tr>
</tbody>
</table>

### PWD and trigger

<table>
<thead>
<tr>
<th></th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6%</td>
<td>-1.27</td>
<td>0.20</td>
<td>0.65</td>
<td>0.07</td>
<td>31</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>-0.81</td>
<td>0.42</td>
<td>0.67</td>
<td>0.23</td>
<td>12</td>
</tr>
</tbody>
</table>

### MC and trigger

<table>
<thead>
<tr>
<th></th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6%</td>
<td>-1.99</td>
<td>0.05</td>
<td>1.00</td>
<td>0.00</td>
<td>9</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>-3.15</td>
<td>0.00</td>
<td>0.88</td>
<td>0.00</td>
<td>17</td>
</tr>
</tbody>
</table>
CDS reaction conditional on bank characteristics

### Impact of CoCo issuance on CDS spreads

Sample includes banks from all developed economies, except EA periphery

<table>
<thead>
<tr>
<th>21–day window (−15, 5)</th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>All CoCos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-3.66</td>
<td>0.00</td>
<td>0.75</td>
<td>0.00</td>
<td>72</td>
</tr>
<tr>
<td>CoCo Issue size (Amt issued/ RWA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; median</td>
<td>-2.71</td>
<td>0.01</td>
<td>0.78</td>
<td>0.00</td>
<td>41</td>
</tr>
<tr>
<td>≥ median</td>
<td>-2.46</td>
<td>0.01</td>
<td>0.71</td>
<td>0.00</td>
<td>31</td>
</tr>
<tr>
<td>Issuer size (total assets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; median</td>
<td>-1.87</td>
<td>0.06</td>
<td>0.71</td>
<td>0.01</td>
<td>24</td>
</tr>
<tr>
<td>≥ median</td>
<td>-3.16</td>
<td>0.00</td>
<td>0.77</td>
<td>0.00</td>
<td>48</td>
</tr>
<tr>
<td>Issuer size (total assets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $500bn</td>
<td>-1.08</td>
<td>0.28</td>
<td>0.78</td>
<td>0.07</td>
<td>9</td>
</tr>
<tr>
<td>≥ $500bn</td>
<td>-3.50</td>
<td>0.00</td>
<td>0.75</td>
<td>0.00</td>
<td>63</td>
</tr>
<tr>
<td>Issuer size (total assets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $1,000bn</td>
<td>-2.16</td>
<td>0.03</td>
<td>0.70</td>
<td>0.00</td>
<td>30</td>
</tr>
<tr>
<td>≥ $1,000bn</td>
<td>-2.96</td>
<td>0.00</td>
<td>0.79</td>
<td>0.00</td>
<td>42</td>
</tr>
<tr>
<td>Issuer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GSIB</td>
<td>-2.75</td>
<td>0.01</td>
<td>0.69</td>
<td>0.00</td>
<td>49</td>
</tr>
<tr>
<td>no GSIB</td>
<td>-2.45</td>
<td>0.01</td>
<td>0.87</td>
<td>0.00</td>
<td>23</td>
</tr>
</tbody>
</table>
## CDS reaction conditional on bank characteristics 2

<table>
<thead>
<tr>
<th>Principle writedown</th>
<th>Mandatory conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trigger</td>
</tr>
<tr>
<td></td>
<td>High (≥ 6%)</td>
</tr>
<tr>
<td>All</td>
<td>Issues amount in USD bn</td>
</tr>
<tr>
<td></td>
<td>Number of issues</td>
</tr>
<tr>
<td>GSIB</td>
<td>Issues amount in USD bn</td>
</tr>
<tr>
<td></td>
<td>Number of issues</td>
</tr>
<tr>
<td>No GSIB</td>
<td>Issues amount in USD bn</td>
</tr>
<tr>
<td></td>
<td>Number of issues</td>
</tr>
</tbody>
</table>

- PWD/LT account for the majority of GSIB CoCos
- Non-GSIB CoCos are fairly evenly distributed
Equity price reaction

### Impact of CoCo issuance on equity prices

Sample includes banks from all developed economies, except EA periphery

<table>
<thead>
<tr>
<th></th>
<th>Z-value</th>
<th>P-value</th>
<th>Proportion negative</th>
<th>Wilcoxon test p-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>21-day window (-15, 5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All CoCos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.50</td>
<td>0.13</td>
<td>0.63</td>
<td>0.14</td>
<td>76</td>
</tr>
<tr>
<td>Loss absorption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWD</td>
<td>-0.15</td>
<td>0.88</td>
<td>0.63</td>
<td>0.71</td>
<td>46</td>
</tr>
<tr>
<td>MC</td>
<td>-2.21</td>
<td>0.03</td>
<td>0.63</td>
<td>0.06</td>
<td>30</td>
</tr>
<tr>
<td>Trigger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6%</td>
<td>-0.88</td>
<td>0.38</td>
<td>0.65</td>
<td>0.37</td>
<td>46</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>-0.99</td>
<td>0.32</td>
<td>0.59</td>
<td>0.41</td>
<td>27</td>
</tr>
<tr>
<td>PWD and trigger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6%</td>
<td>-1.15</td>
<td>0.25</td>
<td>0.70</td>
<td>0.28</td>
<td>37</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>2.00</td>
<td>0.05</td>
<td>0.33</td>
<td>0.16</td>
<td>9</td>
</tr>
<tr>
<td>MC and trigger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6%</td>
<td>0.33</td>
<td>0.74</td>
<td>0.44</td>
<td>0.65</td>
<td>9</td>
</tr>
<tr>
<td>≥ 6%</td>
<td>-2.62</td>
<td>0.01</td>
<td>0.72</td>
<td>0.03</td>
<td>18</td>
</tr>
</tbody>
</table>
2. Are investors chasing yields?

- CoCos conversions have never been tested

- Issuance has mostly occurred in a low interest rate environment

- Pricing of CoCos is complex
  - Restrictions on participation of retail investors in some jurisdictions
What are investors’ views on CoCos?

- Do investors price in the possibility of conversion?
- We test predictions for correlations between spreads of CoCos and prices of other instruments (Equity, Subordinated Debt, Senior Debt)
  - The predictions differ depending on the probability of various funding instruments incurring losses.
- Evidence
  - Estimated daily correlations between CoCos spreads and equity prices, debt spreads and CDS spreads of the same issuer
  - Compare the estimation results to model predictions
Scenarios 1 and 2 involve no losses for (CoCo and non-CoCo) bonds

Scenario 3 involves losses for CoCos, but no losses for non-CoCo bonds

Scenario 4 involves losses for CoCo and non-CoCo bonds

CoCo conversion and the value of bank securities

<table>
<thead>
<tr>
<th></th>
<th>Scenarios 1 and 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoCo spread – Equity price</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>CoCo spread – Senior unsecured spread</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>CoCo spread – Subordinate spread</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>CoCo spread – CDS spread</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Scenario 4: CoCo is triggered and the loss is so large that it disfigures not only CoCo but also subordinated and senior unsecured debt

---

**Estimation results**

<table>
<thead>
<tr>
<th>Correlations between CoCo bond spreads and prices/spreads of other instruments of the same issuer</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoCo spread – Equity price</td>
<td>-0.25</td>
<td>-0.22</td>
<td>-0.57</td>
<td>0.11</td>
<td>67</td>
</tr>
<tr>
<td>CoCo spread – Senior unsecured spread</td>
<td>0.45</td>
<td>0.58</td>
<td>-0.65</td>
<td>0.96</td>
<td>34</td>
</tr>
<tr>
<td>CoCo spread – Subordinate spread</td>
<td>0.53</td>
<td>0.54</td>
<td>-0.62</td>
<td>0.98</td>
<td>37</td>
</tr>
<tr>
<td>CoCo spread – CDS spread</td>
<td>0.36</td>
<td>0.30</td>
<td>-0.03</td>
<td>0.85</td>
<td>74</td>
</tr>
</tbody>
</table>

1 Daily changes in the spread between the yield to maturity (YTM) of a CoCo bond and a corresponding government bond (matched by currency and maturity).
2 Daily percentage changes.
3 Daily changes in the spread between the YTM of a non-CoCo subordinated bond and a corresponding government bond (matched by currency and maturity).
4 Daily changes in the spread between the YTM of a senior unsecured bond and a corresponding government bond (matched by currency and maturity).
5 Daily changes.
Policy implications:
Impact of CoCos on issuer credit risk

• CoCo issuance reduces banks’ insolvency risk

• Contract features matter for the ability of CoCos to absorb losses and influence risk-taking incentives:
  – MC/high-trigger CoCos are most effective in reducing banks’ insolvency risk
  – PWD CoCos are not as potent

• But there are other factors to consider:
  – PWD CoCos may be easier to price than MC CoCos
  – MC CoCos may be less attractive to fixed income investors due to the possibility of conversion to equity
Policy implications: Investor base

• It is important to monitor the investor base
  – Risk should be transferred outside the banking system
  – CoCo holdings should not be concentrated

• The stability of the investor base is untested
  – CoCos are marginal asset class for most investors
  – CoCos are high beta assets

• Current pricing suggests that investors view CoCos as risky instruments
Annex
An overview of CoCo issuance

CoCo bond issuance

1a: By regulatory capital classification

USD bn


Additional tier 1  Tier 2

1b: Ratio of CoCos with a trigger ≥ 5.125

Ratio

2010 2011 2012 2013 2014 2015

1c: By loss absorption mechanism

USD bn


Principal writedown  Conversion to equity

1d: By nationality of issuer, in USD bn

Rest of the world  Switzerland

Australia  Brazil

China  France  Spain

United Kingdom

Sources: Bloomberg; Dealogic.
CoCo yields over time

CoCo Effective Yield (*BAML index*)

32
CDS spreads around CoCo bond issuance
Who invests in CoCos?

Distribution of primary market CoCo bond investors for selected AT1 instruments

By investor type

By regions