Anything but Equity?
On Banks' Preference for Hybrid Debt

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Bail-in Instead of Bail-out

- We cannot let banks fail like regular firms due to their systemic risk
- But: We don't want taxpayer-funded bail-outs
- Basel III introduced **bail-in tools** as part of Tier 1 capital
- In the European Economic Area (EEA): **CoCos**
  (Contingent Convertible Bonds)
  - ▸ Hybrid debt instruments
  - ▸ Require lower returns than equity
  - ▸ But often fail to absorb losses before a bank's default
- Central question: **Who issues CoCos and for what reasons?**

A Bank's "Regulatory Balance Sheet"

"Regulatory" Balance Sheet

Assets	Liabilities
Asset 1 * weight$_1$	Common Equity Tier 1 (CET1)
Asset 2 * weight$_2$	Additional Tier 1 (AT1)
Asset 3 * weight$_3$	
$\vdots$	Other Capital
Risk-Weighted Assets (RWA)	

Tier 1 = Common Equity Tier 1 (CET1) + Additional Tier 1 (AT1)
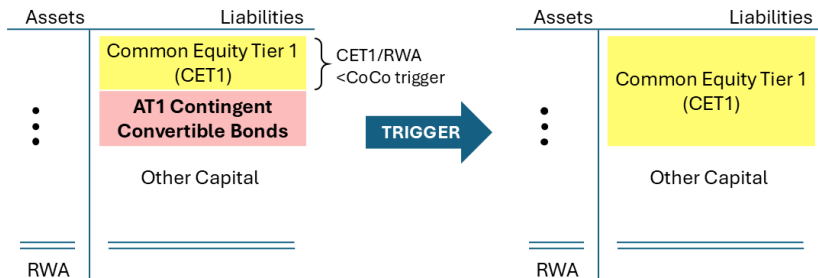
Basel III Capital Requirements

$$CET1\ Ratio = \frac{CET\ 1}{RWA} \geq 4.5\ \%$$

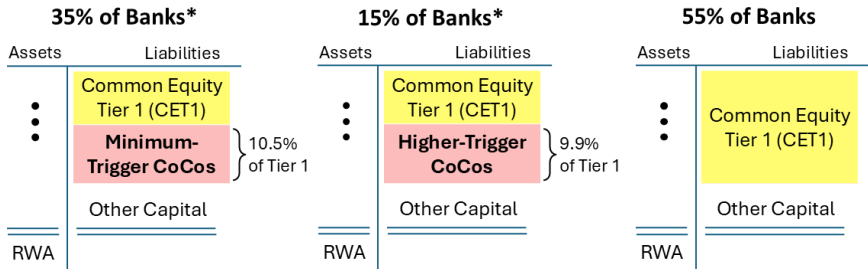$$Tier\ 1\ Ratio = \frac{Tier\ 1}{RWA} \geq 6\ \%$$

Triggering AT1 Contingent Convertible Bonds (CoCos)

- CoCos absorb losses before default if a pre-specified trigger is hit
- The trigger is defined as the ratio of CET1 capital to RWA
- Minimum trigger level for Tier 1 eligibility: 5.125%

Under Financial Distress

How Banks in the European Economic Area Fulfill Tier 1 Capital Requirements

35% of Banks*

Assets — Liabilities

Common Equity Tier 1 (CET1)

Minimum-Trigger CoCos } 10.5% of Tier 1

Other Capital

RWA

15% of Banks*

Assets — Liabilities

Common Equity Tier 1 (CET1)

Higher-Trigger CoCos } 9.9% of Tier 1

Other Capital

RWA

55% of Banks

Assets — Liabilities

Common Equity Tier 1 (CET1)

Other Capital

RWA

*: 5% of banks issue both CoCo types

Who are the issuers and non-issuers of CoCos?

- *CoCo literature* (e.g., Avdjiev et al., 2020, *JFE*):
  Relatively better-capitalized banks issue CoCos (includes non Tier 1-eligible)

- *Regulatory arbitrage literature* (e.g., Boyson et al., 2016, *RFS*):
  Banks unconstrained by capital requirements don't issue Tier 1 hybrid debt

Findings

Distinguishing between minimum-trigger and higher-trigger CoCos I find:

1. Less capitalized banks are more likely to issue *minimum-trigger* CoCos, whereas *higher-trigger* CoCo issuers are better-capitalized than other banks (through CoCos).

2. Less capitalized banks issue *minimum-trigger* CoCos sooner.

3. *Higher-trigger* CoCos can lower a bank's probability of default. *Minimum-trigger* CoCos are considered gone-concern instruments by market participants.

Data

- 155 banks in the European Economic Area (EEA) from 2006 to 2022
- 69 CoCo issuers covering 90% of total CoCo volumes
- CoCo data from Bloomberg, bank balance sheet data from Orbis
- Computation of *Adjusted Tier 1 Capital Ratios* excluding CoCo volumes from the calculation of Tier 1 capital:
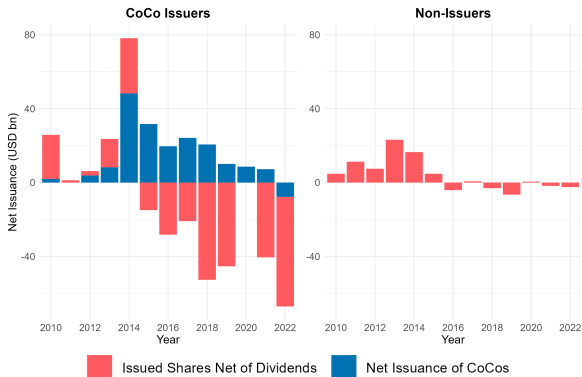
$$\text{Adjusted Tier 1 Capital Ratio} = \frac{\text{Tier 1 Capital} - \text{CoCo Volumes}}{\text{Risk Weighted Assets}}$$

- Systemic risk measures provided by Gehrig and Iannino (2021, JFS)
- CDS data from Markit and net issuance data on (preferred) shares from S&P Capital IQ Pro

Table 1: Deciles of Asset Values (in USD billions)

Decile	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Higher-Trigger Issuer	9	43	65	74	333	607	1050	1413	1927	2565
Both Type Issuer	13	28	119	156	169	370	722	928	1151	1637
Minimum-Trigger Issuer	3	4	10	14	20	45	181	330	748	2563
Nonissuer	1	3	5	11	15	23	41	80	175	1221

Figure 1: Aggregate Net Issuances of Shares net of Dividends and CoCos

(Adjusted) Tier 1 Capital Ratios
of *Minimum-Trigger* Issuers and Non-Issuers

Figure 2: Time-Series Plot of Minimum-Trigger CoCo Issuers' vs. Non-Issuers' (Adjusted) Tier 1 Ratios
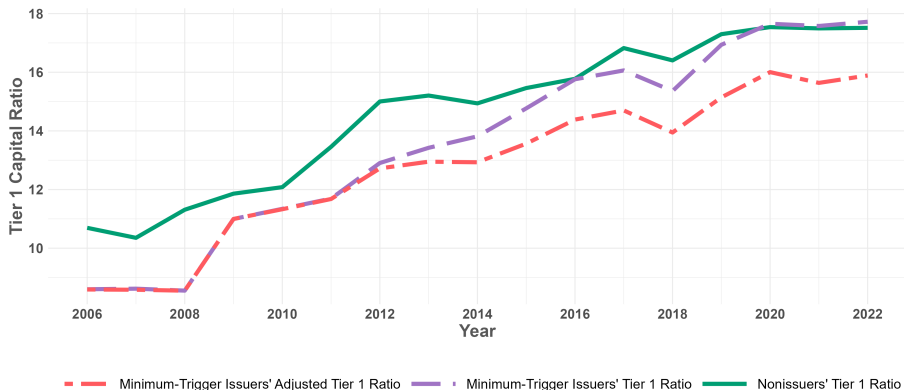
(Adjusted) Tier 1 Capital Ratios
of *Higher-Trigger* Issuers and Non-Issuers

Figure 3: Time-Series Plot of Higher-Trigger CoCo Issuers' vs. Non-Issuers' (Adjusted) Tier 1 Ratios
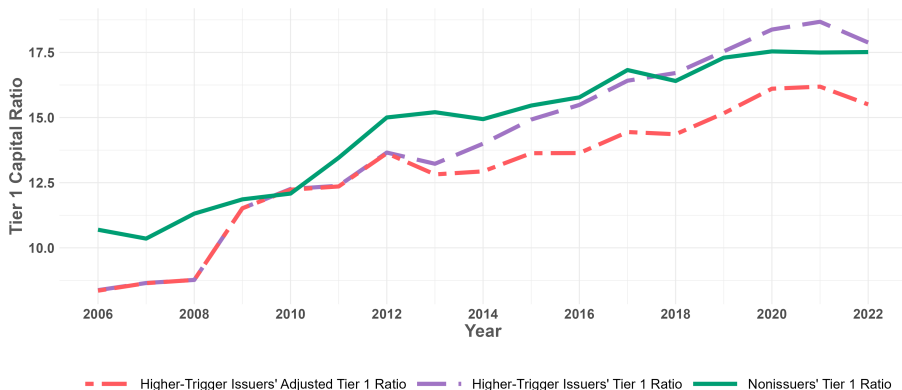
CoCo/Tier 1 Ratio Determinants (2010-2022)

Tobit regression analyzing the determinants of CoCo/Tier 1 capital.

$$
\begin{aligned}
\text{CoCo/Tier 1}_{i,t} = {} & \beta_1 * (\text{Adj.}) \text{ Tier 1 Ratio}_{i,t-1} + \beta_2 * DeltaCoVaR_{i,t-1} \\
& + \beta_3 * ROA_{i,t-1} + \beta_4 * LTA_{i,t-1} + \beta_6 * ILL_{i,t-1} \\
& + \beta_7 * DTA_{i,t-1} + \beta_8 * TAX_{i,t-1} + \beta_9 * TA_{i,t-1} \\
& + \beta_{10} * GSIB_{i,t-1} + \beta_{11} * GDPP_{c,t-1} + \delta_t + \alpha_i + \varepsilon_{i,t}
\end{aligned}
$$

Table 2: Minimum-Trigger CoCo/Tier 1 Ratio Tobit Regression (2010-2022)

	Minimum-Trigger CoCo/Tier 1 Ratio (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
Adjusted Tier 1 Ratio$_{t-1}$ (%)	-2.26**		-2.26*		-0.58*	
	(1.13)		(1.15)		(0.33)	
Tier 1 Ratio$_{t-1}$ (%)		-0.49		-0.24		-0.20
		(0.45)		(0.40)		(0.28)
Delta CoVaR$_{t-1}$ (%)			11.76**	11.03*	-0.82	-1.12
			(5.77)	(6.50)	(2.01)	(1.95)
ROA$_{t-1}$ (%)			0.71	-0.59	1.49	1.25
			(1.56)	(1.52)	(1.11)	(1.19)
Net Loans to Assets$_{t-1}$ (%)			0.11	0.19	0.49*	0.49*
			(0.10)	(0.13)	(0.27)	(0.27)
Impaired Loans to Net Loans$_{t-1}$ (%)			0.10	0.19	-0.08	-0.04
			(0.18)	(0.19)	(0.10)	(0.09)
Deposits to Assets$_{t-1}$ (%)			0.24	0.26	-0.18	-0.14
			(0.16)	(0.17)	(0.27)	(0.28)
Effective Tax Rate$_{t-1}$ (%)			-0.02**	-0.02**	-0.01	-0.01
			(0.01)	(0.01)	(0.01)	(0.01)
Log(Total Assets (in USD mm))$_{t-1}$	3.29***	3.73***	4.08***	4.42**	-1.39	-1.43
	(0.81)	(0.95)	(1.47)	(1.76)	(6.37)	(6.55)
G-SIB$_{t-1}$			1.78	5.37	2.73	2.44
			(5.27)	(5.67)	(1.86)	(1.63)
GDPP (in USD tsd)$_{t-1}$			0.12	0.08	-0.08	-0.07
			(0.13)	(0.16)	(0.12)	(0.12)
Region or Bank FE	REGION	REGION	REGION	REGION	BANK	BANK
Year FE	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.1123	0.0841	0.1244	0.099	0.4284	0.4262
Observations	1241	1241	1241	1241	1241	1241

Note: Standard errors are clustered at the bank level; $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

	Higher-Trigger CoCo/Tier 1 Ratio (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
Adjusted Tier 1 Ratio$_{t-1}$ (%)	-0.55		-0.13		-0.03	
	(0.57)		(0.42)		(0.23)	
Tier 1 Ratio$_{t-1}$ (%)		0.16**		0.22***		0.41**
		(0.07)		(0.08)		(0.19)
Delta CoVaR$_{t-1}$ (%)			-6.82	-6.96	4.36	4.92
			(4.87)	(4.81)	(3.18)	(3.27)
ROA$_{t-1}$ (%)			-0.66	-0.75	-0.41	-0.75
			(0.74)	(0.76)	(1.07)	(1.00)
Net Loans to Assets$_{t-1}$ (%)			0.10	0.12	0.14	0.14
			(0.14)	(0.14)	(0.10)	(0.10)
Impaired Loans to Net Loans$_{t-1}$ (%)			0.37***	0.39***	0.12**	0.12**
			(0.12)	(0.13)	(0.06)	(0.06)
Deposits to Assets$_{t-1}$ (%)			0.11	0.12	-0.14	-0.16
			(0.17)	(0.17)	(0.13)	(0.14)
Effective Tax Rate$_{t-1}$ (%)			-0.00	-0.00	0.01*	0.01*
			(0.01)	(0.01)	(0.01)	(0.01)
Log(Total Assets (in USD mm))$_{t-1}$	3.88***	4.17***	5.06***	5.25***	-10.08**	-9.49**
	(0.96)	(0.96)	(1.66)	(1.68)	(4.04)	(3.83)
G-SIB$_{t-1}$			3.84	4.39	-1.25	-1.05
			(5.49)	(5.42)	(5.15)	(5.06)
GDPP (in USD tsd)$_{t-1}$			-0.10	-0.10	0.96***	0.95***
			(0.16)	(0.16)	(0.27)	(0.26)
Region or Bank FE	REGION	REGION	REGION	REGION	BANK	BANK
Year FE	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.1120	0.1106	0.1303	0.1328	0.5034	0.5052
Observations	1241	1241	1241	1241	1241	1241

Note: Standard errors are clustered at the bank level; *p<0.1; **p<0.05; ***p<0.01

Duration Analysis: Determinants of First-Time CoCo Issuance

- **Model:** Cox Hazard Model (2010–2022) estimates likelihood of first-time CoCo issuance
- **Robustness:** Tests whether non-issuers are unlikely to become issuers in the future and rules out mechanical effects

- **Findings:**
  - Less-capitalized banks issue minimum-trigger CoCos sooner
  - Less profitable banks and those with more impaired loans issue higher-trigger CoCos sooner

Are CoCos Going-Concern Instruments?

- CoCo issuances lower CDS spreads on senior unsecured debt (e.g., Avdjiev et al., 2020)
- But CoCos do not necessarily lower banks' default probabilities:

$$CDS_i = \frac{1}{(1 + r_f)} PD * (1 - RR_i)$$

- CDS_i: CDS Spread of Debt Class i
- PD: Default Probability
- RR: Recovery Rate of Debt Class i

- A necessary (but not sufficient) condition for CoCos to be going concern instruments is a reduction in CDS spreads of junior debt.

Table 4: Event Study of CoCo Issuance Effects on Senior and Junior CDS Spreads

Variable Event Window (Announce Date – Issue Date)

Panel A	Senior CDS CAAR	Junior CDS CAAR	Number of Events (Number of Banks)
All CoCos	-60.76	16.21	161 (24)
Min.-Trigger	-22.58	19.99	105 (16)
High.-Trigger	-132.34*	9.13	56 (13)
Principal Write-Down (PWD)	-57.17	-78.37	87 (15)
PWD and Min.-Trigger	1.56	-36.76	70 (12)
PWD and High.-Trigger	-299.01	-249.72*	17 (7)
Equity Conversion (EC)	-64.97	127.41*	74 (14)
EC and Min.-Trigger	-70.85	133.48	35 (7)
EC and High.-Trigger	-59.70	121.96	39 (8)

Conclusion

- *Minimum-trigger CoCos:*
  - Issuing banks take effort to include *anything but equity* in their capital structure and have lower *Adjusted Tier 1* capital ratios.
  - Are not perceived as going-concern capital by market participants.

- *Higher-trigger CoCos:*
  - Issuing banks achieve higher Tier 1 ratios through the issuance.
  - Those with a principal write-down mechanisms may be viewed as going-concern capital.

- Final note: Trigger levels of 5.125% are too low for CoCos to function as going-concern instruments.

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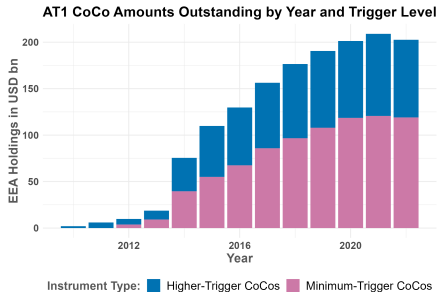
CoCo Issuance and Holding Amounts

Figure 4: Aggregate Issuances and Holdings of Minimum-Trigger and Higher-Trigger CoCos in the EEA (USD bn)
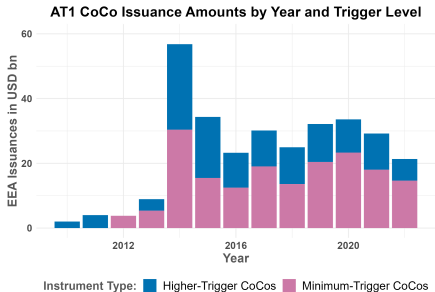
(a) CoCo Issuances

(b) CoCo Holdings

Appendix B

Table 5: Cox Proportional Hazard Model (2010-2022).

	Minimum-Trigger CoCo Issuance	Higher-Trigger CoCo Issuance
	(1)	(2)
Tier 1 Ratio$_{t-1}$ (%)	−0.222**	-0.055
	(0.063)	(0.074)
Delta CoVaR$_{t-1}$ (%)	0.523	0.020
	(0.505)	(0.676)
ROA$_{t-1}$ (%)	0.038	-0.183**
	(0.188)	(0.145)
Net Loans to Assets$_{t-1}$ (%)	0.031**	0.020
	(0.012)	(0.019)
Impaired Loans to Net Loans$_{t-1}$ (%)	0.008	0.038***
	(0.019)	(0.023)
Deposits to Assets$_{t-1}$ (%)	-0.007	0.020
	(0.012)	(0.019)
Effective Tax Rate$_{t-1}$ (%)	-0.005**	-0.0002
	(0.002)	(0.002)
Log(Total Assets (in USD mm))$_{t-1}$	0.240	0.522**
	(0.126)	(0.187)
G-SIB$_{t-1}$	1.331	0.222
	(0.602)	(0.758)
GDPP (in USD tsd)$_{t-1}$	0.023*	-0.017
	(0.011)	(0.019)
Region FE	YES	YES
Observations	1072	1192
Max. Possible R^2	0.453	0.228

Note: standard errors are clustered at the bank level; *p<0.1; **p<0.05; ***p<0.01