The systemic implications of bail-in: A multi-layered network approach

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$\rightarrow$ Is bail-in possible without the **risk of contagion**?

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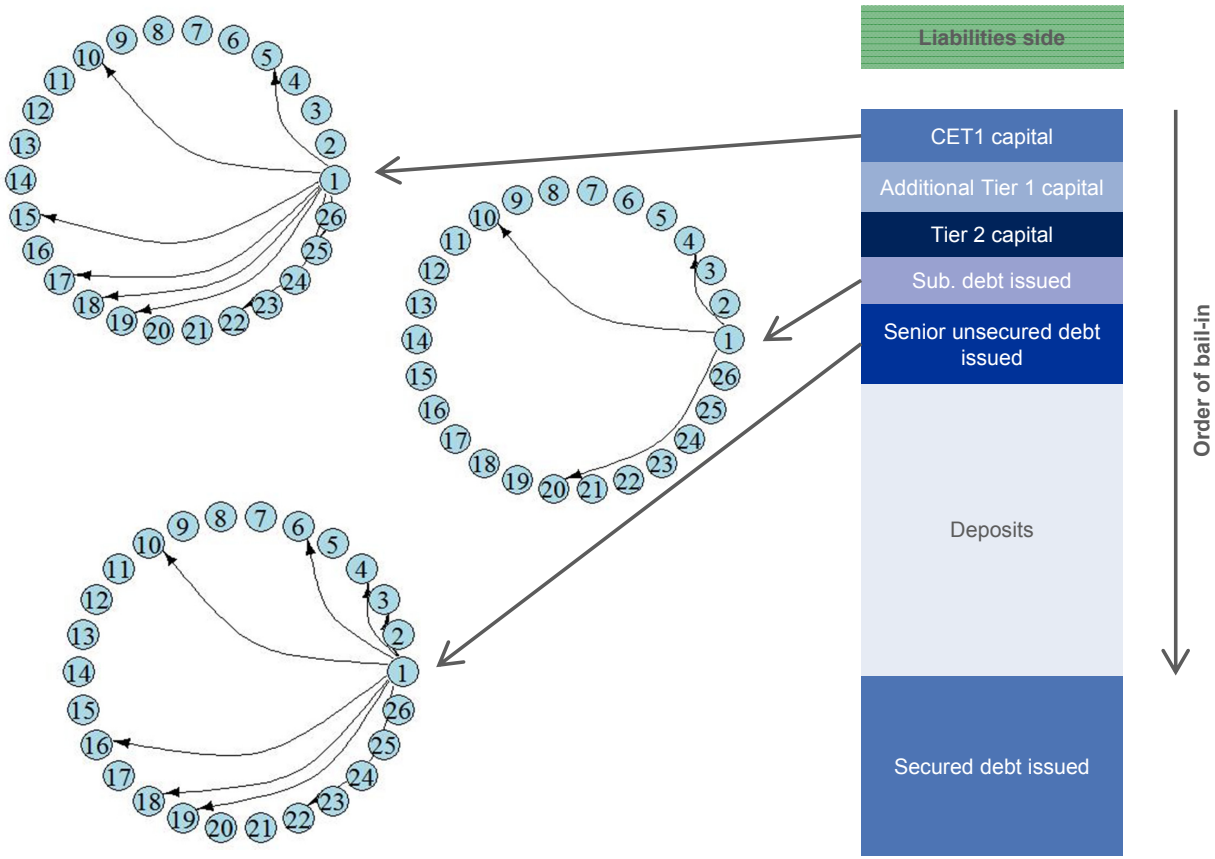
Beyond the network of 26 banks, also able to capture the **impact** of a bail-in at one of these banks on **individual euro area banking sectors**.

Potential contagion channels from bank 1 to its counterparties



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→ The bank under resolution becomes more central within the equity network layer after the bail-in.

Literature contribution

Financial networks literature

- **Contagion model that respects the creditor hierarchy**: Elsinger (2009).
- **Empirical studies of multi-layer networks:** Aldasoro and Alves (2015); Bargigli et al. (2014); Langfield et al. (2014); Molina-Borboa et al. (2015); Montagna and Kok (2013).
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Literature on resolution regimes and bail-in

- **ABM:** Klimek et al. (2015).
- **Theory:** Faia and di Mauro (2015).
- **Empirical:** Schäfer et al. (2016); Conlon and Cotter (2014).

Data

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For all the results displayed below we use data for Q1 2015.

Descriptive statistics of banks' balance sheets

Table: Average funding structure of the banks in the sample in percent of total funding for Q1 2015 (in%)

	Average bank
Secured debt	24.33
Deposits	57.18
Senior unsecured debt	11.1
Subordinated unsecured debt	1.68
T2	1.07
AT1	0.22
CET1	4.42

Topology

Table: Network measures for the individual layers for Q1 2015

	Mean Geodesic	**Av. Degree**	**Density**	**Diameter**
Equity	Inf	16.38	0.33	Inf
Subordinated unsecured debt	Inf	15.15	0.3	Inf
Senior unsecured debt	1.4	30.92	0.62	3
Secured debt	1.34	34.69	0.69	3
Total cross-holdings	1.2	40	0.8	2

Loss exposure of the holding bank

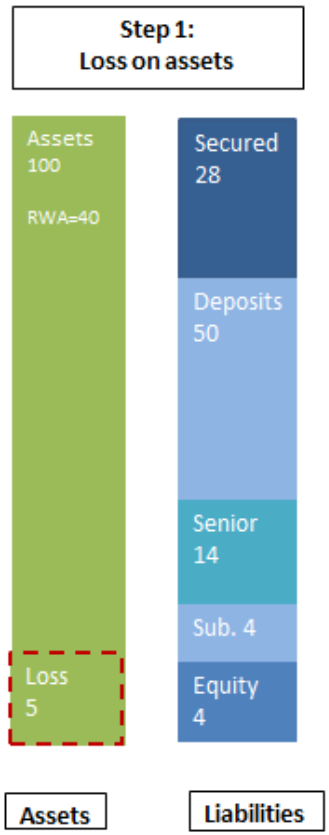
Potential loss a holder *j* faces if an issuer *i*'s equity or debt is written down relative to *j*'s total assets.

	min	**mean**	**max**
Senior unsecured debt	0	0.02	1.15
Subordinated unsecured debt	0	0	0.03
Equity held	0	0.0029458	0.28

Note: This is index I_6 in the paper.

Baseline scenario: Stylized example

Step 1: 5% shock to total assets.



Note: Block sizes are not to scale. For ease of exposition, AT1 and T2 capital have been omitted.

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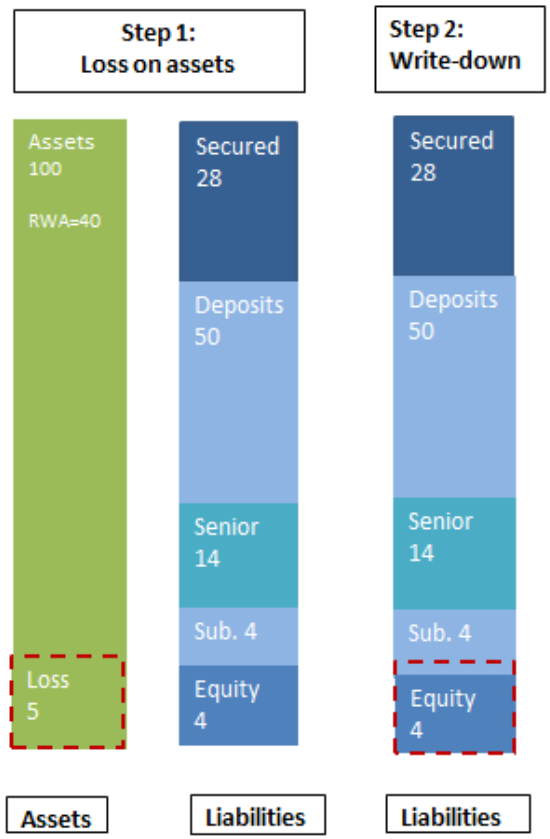
Step 2: All equity and some sub. debt written down. Bank needs recapitalization.



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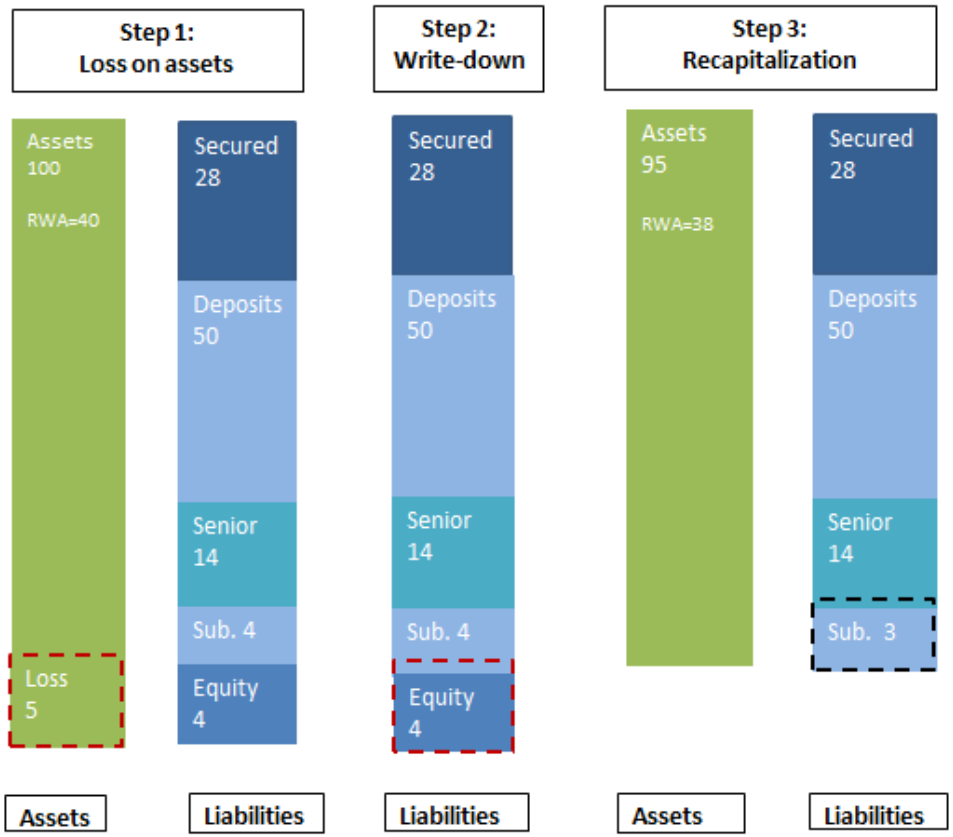
Step 3: The bank is recapitalized to 10.5% CET1 via a debt-to-equity conversion.



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Baseline scenario: Stylized example

Step 4: Bank fulfills the prudential requirements again.

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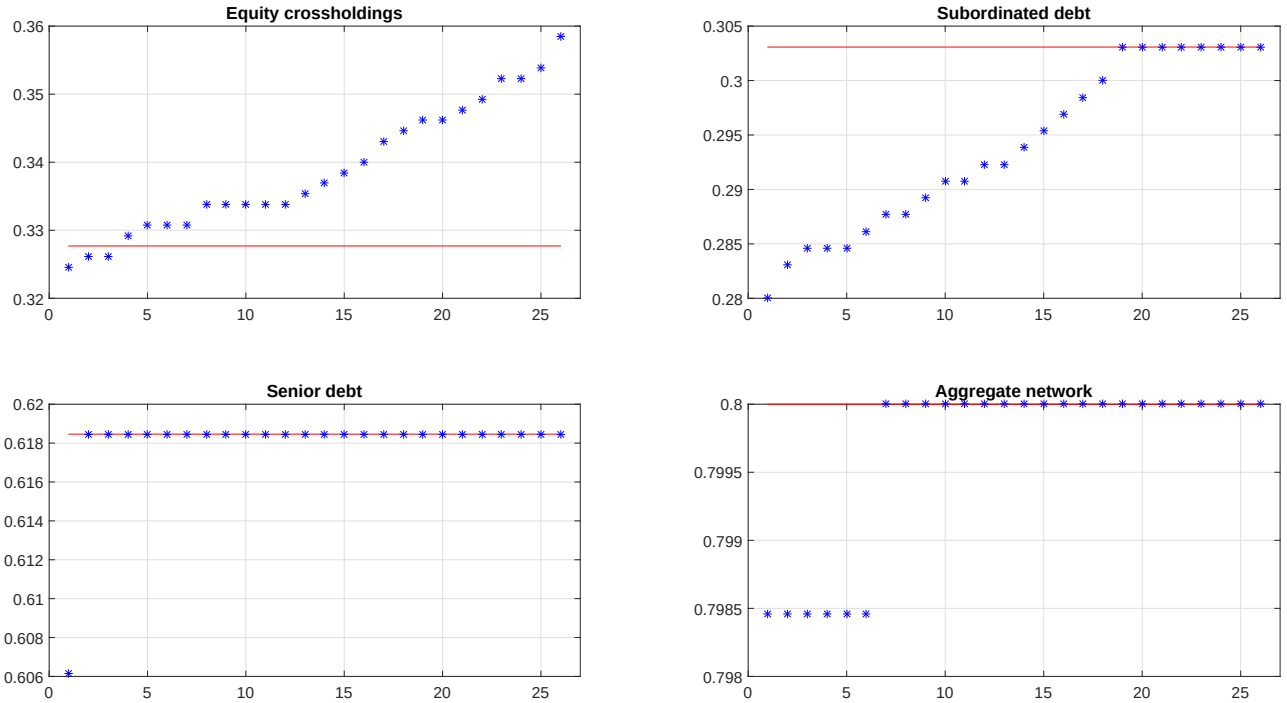
3. ... of the **lack of data on risk weights**.
   - RWAs are updated using a rule-of-thumb.
   - Resulting equity ratios are likely to underestimate their true decrease following asset losses at a bank.

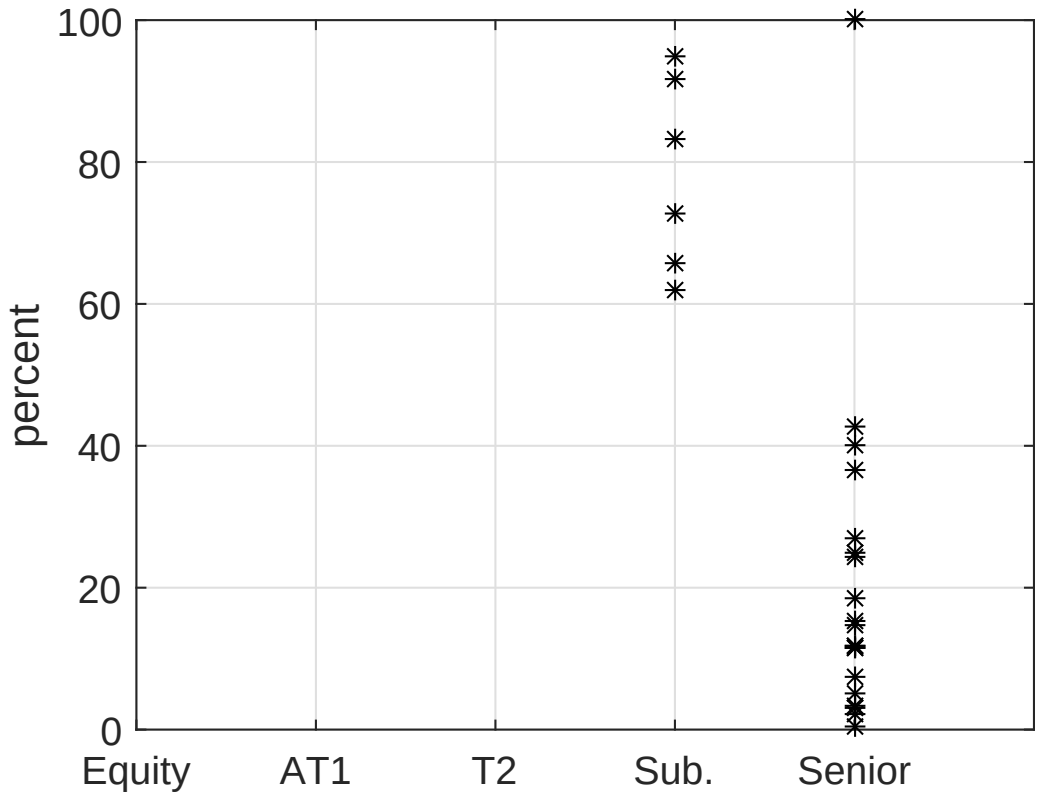
Baseline results: Effect on network topology

Figure: Distribution of the density of network layers after bail-in (blue stars) for the 26 simulations (red line represents initial density)



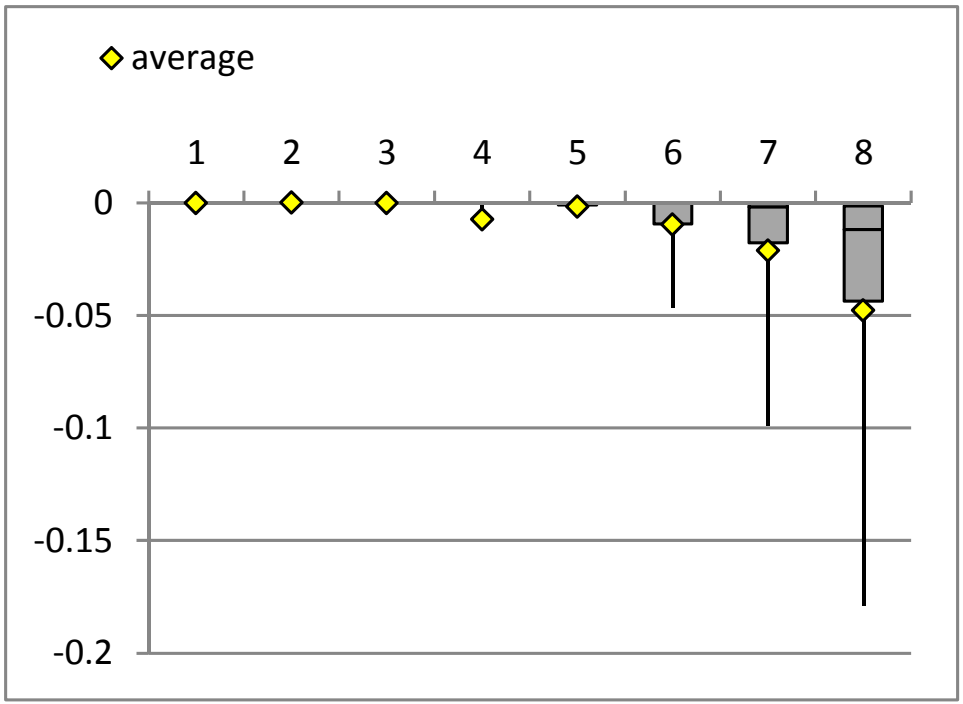
Baseline results: Balance sheet effect

Figure: Percentage loss in the most senior layer affected at the bank under resolution after bail-in



Baseline results: Contagion effects

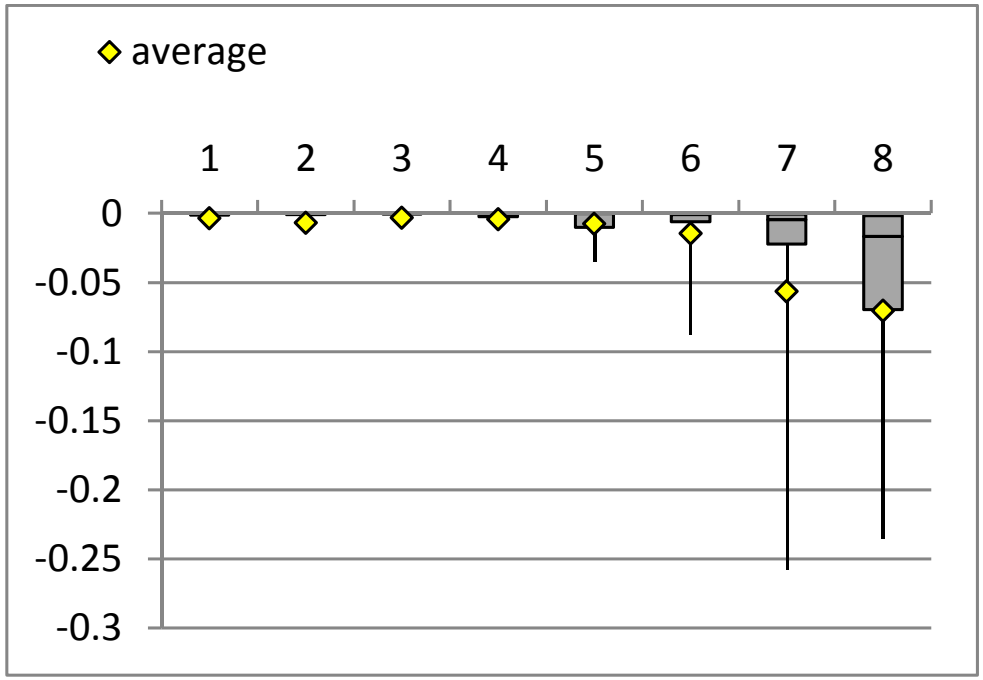
Figure: **Decrease in CET1 ratios at the counterparties** of the bank under resolution in the baseline scenario



Note: Boxplots display 10th and 90th percentiles, interquartile distribution and median.

Baseline results: Contagion effects

Figure: **Decrease in CET1 ratios in euro area banking sectors** after the bail-in of a bank in the baseline scenario



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Adverse scenario

Common shock

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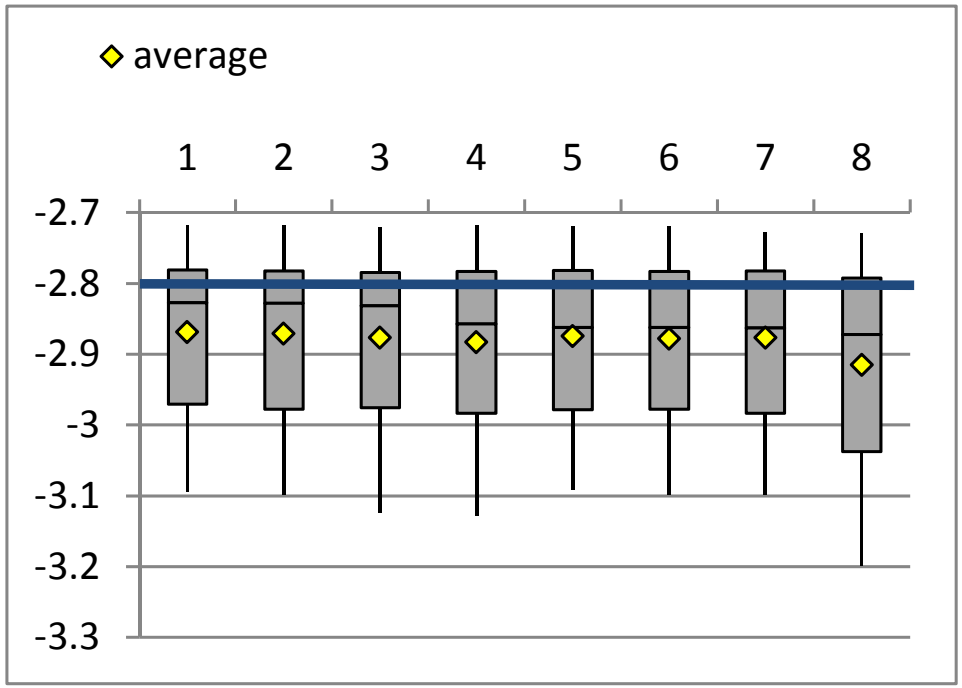
The procedure is repeated a 1000 times for each of the 26 banks.

Adverse scenario: Results

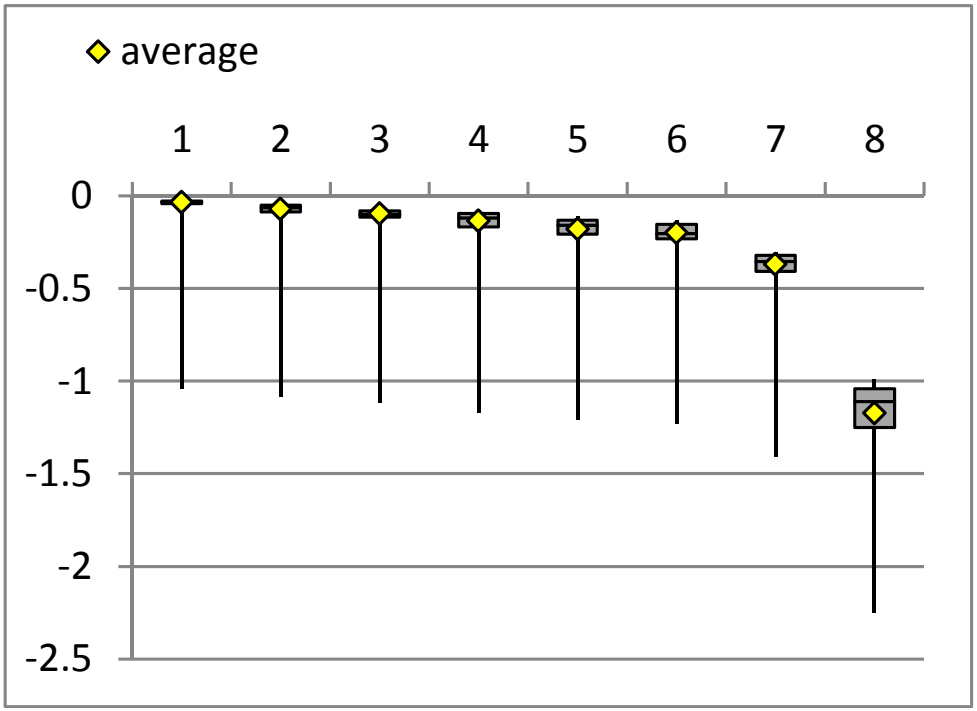
Figure: Percentage point **decrease in CET1 ratios at counterparties** in the adverse scenario (averaged across the 1000 simulations)



Note: Boxplots display 10th and 90th percentiles, interquartile distribution and median. Blue line represents the average impact of the common shock.

Adverse scenario: Results

Figure: Percentage point **decrease in CET1 ratios in euro banking sectors** in the 5th percentile after the bail-in of bank *i* in the adverse scenario



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   - Underpins the BCBS considerations to limit smaller international banks' holdings of GSIB TLAC instruments.

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