The contribution of Cooperative Credit Banks to Financial Stability

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Motivation

- Since GF and EA Sov Debt Crisis ⇒ **Financial Stability** gained attention in research and policy debates.

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  - **Cooperative credit (mutualistic) model** might have very different response wrt **for-profit** model. Absence of moral hazard and aymm info.
- Cooperative credit model very relevant especially in EA ⇒ (Crucial for SME, who account for 50% GDP and 65% EMPL)

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Research Question:

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- ✓ Focus on the **Italian Case**
- ✓ Compile a detailed **Bank/Province Level Dataset**.
- ✓ Construct measures of Financial Stability:
  1. **Standard Measure**: zscore (Laeven and Levine (2007))
     - Higher score $\Rightarrow$ lower probability of depleting capital.
  2. **New Measures**: (i) Liquidity and (ii) Regulatory zscores.
     - Higher score $\Rightarrow$ lower probability of (i) depleting liquid assets (ii) reaching regulatory capital thresholds .

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✓ **Distribution Analysis**

✓ **Panel Regression Analysis**:
- Controlling for known determinants: **macro-environment** and **bank specific** factors,
- Isolate **differences in financial stability** scores due to CCBs' mutualistic status compared to Commercial For-Profit's one.

- **Contribution**: Assess the impact of **cooperative status** on financial stability throughout economic fluctuations.

▸ Lit. Review ▸ Contribution ▸ Results Preview

Results Preview

- Distribution Analysis.
  - CCBs tend have **higher financial stability scores** with significant proportion of **particularly virtuous entities**.
  - Main reason: **Reduced volatility** in terms of **redditivity**.
- Panel Regression Analysis.
  - Levels: **CCBs status** contributes **positively** to an entity's **financial stability score** by **15-25%**.
  - Levels: **CCBs status** contributes **positively** also to **liquidity** and **regularoty stability**.
  - Growth rates: **CCBs status** is associated to **higher liquidity deterioration** during **downturns** and **lower liquidity recovery** during **expansions**.
  - Growth rates: **CCBs status** is associated with a **faster recovery of regulatory stability** wrt to Commercial Bank status.

Back

Literature Review

Strictly Related Literature:

- **CCB & Local Banks**: Petersen and Rajan (1994), Goddard and Wilson (2005), Ho and Ishii (2011), Groeneveld (2014).
- **CCB and relationship lending**: Wheelock and Wilson (2011), Presbitero and Zazzaro (2011), Fiordelisi and Mare (2014) and Ferri et al. (2014).
- **Financial Stability of Intermediaries by type**: Cihak and Hesse (2007), Barra and Zotti (2019)
- **CCB Market Share and aggregate macro-financial soundness:** Chiaramonte et al. (2013)
- **Updated comprehensive survey of Cooperative financial institutions (focus Non-profit vs For Profit)** McKillop et al. (2020)

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Broader spectrum literature:

- Theoretical: determinants and effects of network and spillover externalities of financial stability.
- Effects on equilibrium macro outcomes considering general feedback effects.
- Micro-based evidence on determinants of financial stability
- Macro- and Micro prudential policies
- Monetary Policy

Back

Data

Dataset Features:

- **Frequency**: Annual
- **Time frame**: 2006-2018
- Level of detail:
  - **Financial Statements**: Bank-Level
    - Balance Sheet, Income Statement, Cash Flow Statement
    - Virtually entire Italian census of banks.
  - **Branch Location Data**: Bank/Province-Level
  - **Macro Data**: National/Regional/Province-Level
    - Value Added, Inflation, Investments, Public Exp ...

More on Data | Sample | Type Composition | Representativeness

Methodology

Financial Stability Measures Construction:

Financial Stability score: **zscore**

- $\frac{\text{Capital Ratio+ROA}}{\text{std.dev.(ROA)}}$
- **Intuition:** measures how far is the entity from its default point.

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Liquidity Stability score: **lzscore**.

- $\frac{\text{Liquid Assets Ratio}+\text{CFOA}}{\text{std.dev.(CFOA)}}$ $\quad$ CFOA $=$ Net Cash Flows/Total Assets
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Risk-Weighted Financial Stability score: **rzscore**.

- $\frac{\text{Tier 1 Capital Ratio}+\text{RORWA}}{\text{std.dev.(RORWA)}}$ RORWA = Net Profits/Risk-Weighted Assets
- **Intuition:** measures how is far the bank from reaching its regulatory constraint.

Go to Definitions Go to Definitions

Results

Summary Statistics

	zscore			lzscore			rzscore		
	Total	Twin Crisis	Growth	Total	Twin Crisis	Growth	Total	Twin Crisis	Growth Times
Total	38.00	28.00	47.00	5.07	4.76	5.46	35.00	18.00	50.00
Commercial	25.00	21.00	28.00	4.60	4.41	4.83	20.00	13.00	26.00
Cooperative	44.00	30.00	55.00	5.25	4.92	5.68	44.00	21.00	65.00
Saving	48.00	43.00	51.00	5.26	4.55	6.43	19.00	13.00	23.00

Notes: Estimates in the first column largely in line with Cihak and Hesse (IMF 2007).

Key Take-aways:

- For all three measures Cooperative Banks' scores are significantly higher, pointing at higher resilience.
- Results don't change in Recession and Growth Subsamples
- Main driver: CCBs have lower net income volatility >

Results on scores components

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Econometric Model

- **Methodology**: Panel Regression with Fixed Effects.
- **Regression Specification**:

$$\text{z-score}_{i,t} = \alpha_t + \alpha_{j(i)} + \beta \mathbb{1}_{\{i=\text{Bank Type}\}} + \gamma \text{Macro Controls}_{i,t} + \delta \text{Bank Controls}_{i,t} + \varepsilon_{i,t}$$

- Standard Errors: Year Clusters, Bootstrap.
- Robustness with different Balance Sheet Measures and Geographic Presence Measures.

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Baseline Results: Zscore

Static Regression - Zscore

VARIABLES	(1) Pooled OLS	(2) Year FE	(3) Full FE	(4) Bootstrap SE
Cooperative Status	7.45***	7.90***	5.79***	5.79***
	(0.80)	(0.83)	(1.35)	(1.41)
Total Assets	-0.00*	-0.02***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Value Added PC	0.17***	0.10***	0.14***	0.14***
	(0.01)	(0.01)	(0.01)	(0.01)
Inflation	-0.03**	0.03**	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
PA Expenditure	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Loans Ratio	-12.00***	-40.89***	-2.60	-2.60
	(1.77)	(2.01)	(1.66)	(1.78)
Efficiency	0.04**	0.04**	0.05	0.05
	(0.02)	(0.02)	(0.03)	(0.27)
Income Diversity	0.04***	0.04***	0.05**	0.05
	(0.01)	(0.01)	(0.02)	(0.16)
Competition	50.72***	36.12***	47.99***	47.99***
	(9.45)	(10.02)	(9.05)	(9.58)
Banking group	0.09	3.54***	-0.34	-0.34
	(0.77)	(0.78)	(0.84)	(0.81)
Constant	-127.20***	-32.35**	-97.93***	-97.93***
	(13.64)	(14.55)	(7.45)	(6.65)
Observations	6,761	6,761	6,761	6,761
R-squared	0.1	0.21	0.23	0.23

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Key Take-Away: Everything else equal CCBs' status is associated with a financial stability score level roughly 15%-25% higher.

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Additional Results: All Indicators

Static Regressions - All Indicators

VARIABLES	(1) zscore	(2) lzscore	(3) rzscore
Cooperative Status	5.79***	0.55***	7.90***
	(0.78)	(0.08)	(0.83)
Total Assets	-0.01***	0.00***	-0.02***
	(0.00)	(0.00)	(0.00)
Value Added PC	0.14***	0.01***	0.10***
	(0.01)	(0.00)	(0.01)
Inflation	0.00	-0.00	0.03**
	(0.01)	(0.00)	(0.01)
PA Expenditure	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)
Loans Ratio	-2.60	1.90***	-40.89***
	(1.84)	(0.19)	(2.01)
Efficiency	0.05***	0.00	0.04**
	(0.02)	(0.00)	(0.02)
Income Diversity	0.05***	0.00**	0.04***
	(0.01)	(0.00)	(0.01)
Competition	47.99***	6.59***	36.12***
	(9.24)	(0.88)	(10.02)
Banking group	-0.34	-0.71***	3.54***
	(0.75)	(0.07)	(0.78)
Constant	-97.93***	-2.91**	-27.19*
	(13.45)	(1.34)	(14.59)
Observations	6,761	6,592	6,135
R-squared	0.23	0.14	0.21

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Additional Results: Growth Rates

Growth Rates Regressions

VARIABLES	(1) zscore	(2) zscore Recovery	(3) lzscore	(4) lzscore Recovery	(5) rzscore	(6) rzscore Recovery
Cooperative Status	0.01	0.01	-0.03***	-0.03**	0.00	0.16***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
Inflation	-0.00	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Banking group	0.03***	0.03***	-0.03***	-0.02***	0.08***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Total Assets	-0.26***	-0.26***	-0.03***	-0.03***	-0.44***	-0.43***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)
Value Added	-0.00	0.01	0.00	-0.04	-0.36	-0.27
	(0.28)	(0.28)	(0.18)	(0.18)	(0.53)	(0.53)
PA Expenditure	0.08	0.08	-0.04	-0.03	0.78***	0.75***
	(0.13)	(0.13)	(0.08)	(0.08)	(0.22)	(0.22)
Loans Ratio	0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Efficiency	0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income Diversity	0.00	0.00	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competition	-0.08	-0.08	-0.06	-0.06	-0.32**	-0.32**
	(0.07)	(0.07)	(0.05)	(0.05)	(0.13)	(0.13)
Liquid Assets	-0.00	-0.00	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-0.00	0.00	0.01	0.00	-0.03	-0.07*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)	(0.04)
Observations	5,586	5,586	5,733	5,733	4,850	4,850
R-squared	0.09	0.09	0.09	0.09	0.12	0.12

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

1 Micro-Data Analysis:
- **CCBs status** is associated with **higher financial stability score levels** in **expansion** and **(less) recession** periods.
- with a significant long tail of high scores for CCBs.

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2 Panel Regression Analysis:

- After controlling for macro-environment and bank specific factors **CCBs' status still scores 15-25% higher than Commercial Banks** in financial stability scores.
- **Similar results** with **liquidity and regulatory score levels**.
- Growth rates: **CCBs' status** associated with **steeper declines** in **liquidity score** during **recession** and **slower growth** during **expansion**.
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3 Robustness:
- Results are robust to additional/different control variables.
- Results are robust to the use of different lags.
- Deterioration Rates.
- Survivor Bias.

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4 Caveats and Way Forward:
- Balance Sheet Policies/Zombie Lending.
- Disentangle Mutualistic-For-Profit VS Lending Style.
- Sample extension to include recent COVID crisis and recovery.
- Include "Discretionary" Capital Margins.
- Robustness wrt Rare-Events and Liquidity dry-ups.

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APPENDIX

Contribution to the literature

1. Shed light on the **differential impact on aggregate financial stability**: **profit vs mutualistic business model**

2. Systematic and updated analysis of financial stability as measured by **standard and new liquidity-based and regulatory zscores**.

3. Analysis of variations allowing for **non-linearities** over the business cycle.

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Results Preview

- Distribution Analysis.
  - CCBs tend have **higher financial stability scores** with significant proportion of **particularly virtuous entities**.
  - Main reason: **Reduced volatility** in terms of **redditivity**.
- Panel Regression Analysis.
  - CCBs are on average **15-25% higher in their Financial Stability Score**.
  - Consistent results with **two new measures of stability.**
  - Important **non-linearity**: **CCBs recover their regulatory stability much faster** than other bank types.

Back

Outline

- Introduction
- Data
- The Financial Stability Indicators
- Econometric Model
- Results
- Conclusion

Data

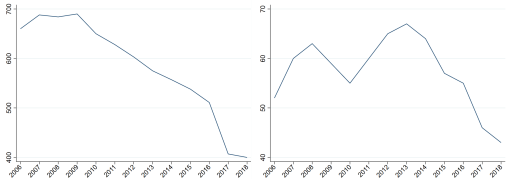
Dataset components:

- Individual Financial Statement Data for:
  1. Virtually the entier banking population in Italy.
  2. Balance Sheet, Income, and Cash Flow statement.
     More on data-cleaning.
- Macro-Data at National, Regional and Provincial Level
- Micro-Data on branches by bank and province.
  1. Inputation: each bank's micro-environment is constructed from the local level aggregates of provinces with bank's branches.[1]
  2. Commercial Banks with extensive presence are assigned with national aggregates

Back

Data

Number of banks and banking groups in the dataset.



(a) **Number of single bank entities available** (b) **Number of group bank entities available**

Notes: These are the number of entities for which the observation of Financial Statements is available.

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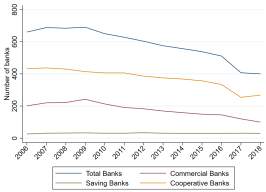
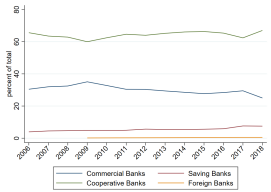
Data

Banking panorama. Decomposition by class.



(c) **Number of Banks by class**

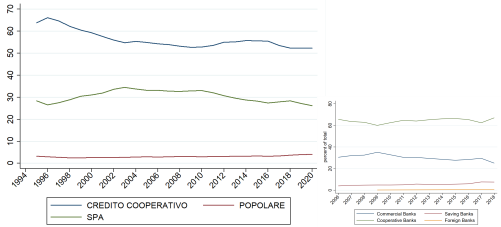


(d) **Percentage of Banks by class**

Back

Data: Comparison with Bank of Italy's Census

Banking panorama. Decomposition by class in BdI's Census and Current Datast.



(e) **BdI's Census** (f) **Current Dataset**

Notes: Bank of Italy's census includes also Banks not currently active and it is updated to November 2021.

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Key Facts

- Across the EU Cooperative Banks account for:
  - 25% of Loans and Deposits
  - 35% of Branches
- 1 out of 5 EU citizens is a member of a Cooperative Bank
- Crucial source of lending especially to SMEs
- SMEs account for:
  - 50% of EU GDP
  - 65% of EU Employment
- Surveys report SMEs were more likely to access credit from Cooperative Banks in recessionary/recovery times.

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Definitions

- ROA (Return on Assets): $\frac{NetProfits}{TotalAssets}$.
- Capital Ratio: $\frac{Capital+Reserves+SharePremiumAccount}{TotalAssets}$.
- Risk weighted ROA: $\frac{NetProfits}{RiskWeigtedAssets}$.
- Risk Weighted Capital Ratio: $\frac{Tier1Capital}{RiskWeightedAssets}$
- CFOA (Cash Flow on Assets): $\frac{NetCashFlows}{TotalAssets}$.
- Liquidity Ratio: $\frac{CashandLiquidiAssets}{TotalAssets}$.

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Results

Summary Statistics: Profit Volatility

	st.dev.(ROA)		
	Total	Twin Crisis	Growth Times
Total	0.63	0.61	0.67
Commercial	1.07	1.05	1.10
Cooperative	0.44	0.48	0.48
Saving	0.50	0.52	0.41

Notes: Estimates in line with Cihak and Hesse (IMF 2007).

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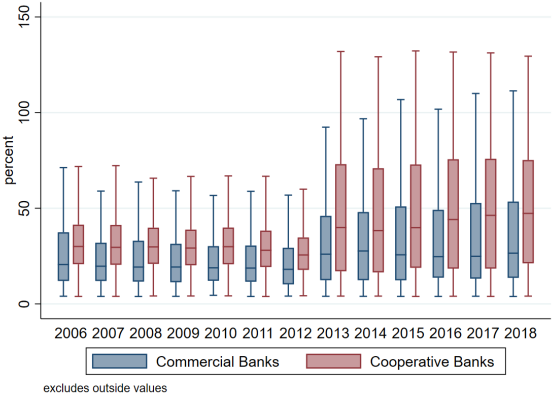
Results: Zscore Distribution over time

The Zscore Distribution over time. Decomposition by Bank type.



Notes: Bars span 25^{th} – 75^{th} percentiles, whiskers span 1.5*(Interquartile Range)

Key Take-aways:

- Cooperative Banks' zscores exhibit higher mean, quartiles, and higher "up-tail"
- Intuition: there is a significant mass of particularly virtuous cooperative banks in terms of zscores.

back | Decomposition by Size | ROA by type and size | Lzscore and Rzscore are consistent

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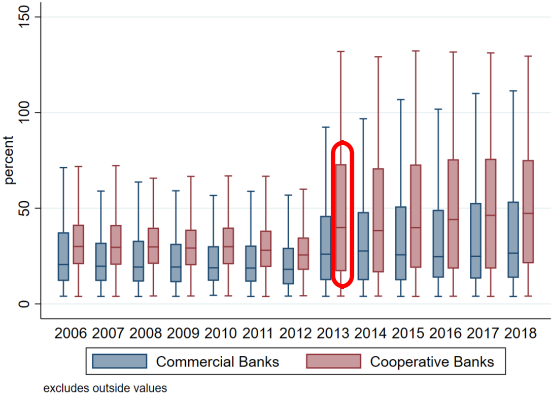

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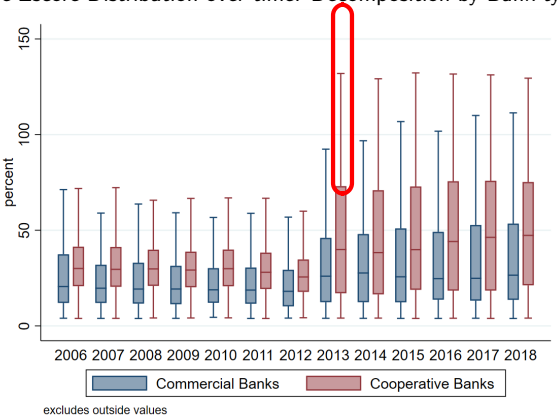

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back | Decomposition by Size | ROA by type and size | Lzscore and Rzscore are consistent

Comparison with Cihak and Hesse (IMF 2007)

Table based on Orbis

Table 3. Decomposition of Z-Scores for Selected Countries, 1994–2004

	Z-score	Equity to Assets (percent)	ROA (percent)	Standard deviation of ROA (percent)
Austria				
Commercial	33.8	11.20	0.70	0.846
Cooperative	34.3	6.02	0.39	0.407
France				
Commercial	17.8	10.69	0.39	2.088
Cooperative	42.1	6.64	0.58	0.223
Germany				
Commercial	37.3	12.05	0.48	1.197
Cooperative	78.8	5.08	0.28	0.124
Italy				
Commercial	30.7	11.44	0.43	1.246
Cooperative	40.3	12.89	0.88	0.465
Japan				
Commercial	25.8	4.47	-0.16	0.949
Cooperative	33.5	5.43	-0.04	1.001
Netherlands				
Commercial	44.4	13.31	1.07	0.471
Cooperative	82.2	5.44	0.29	0.067
UK				
Commercial	28.3	15.95	1.01	1.708
Cooperative	70.9	6.83	0.45	0.122

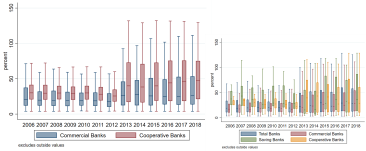
Source: Authors' calculations based on BankScope data.

Note: To avoid possible outliers in this sample, the 1st and 99th percentile of the distribution of each variable is excluded. All selected countries have a market share of cooperative banks higher than 5%.

back

Other Results: Zscore Distribution over time

The Zscore Distribution over time. Decomposition by Bank type and size.

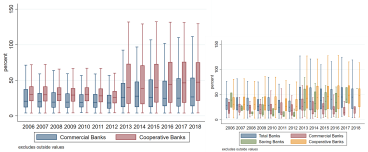


(g) **All Banks** (h) **Large Banks**

Notes: The decomposition by size is performed using the 25^{th} and 75^{th} percentiles as thresholds.

Back

The Zscore Distribution over time. Decomposition by Bank type and size.



(i) **Medium Banks** (j) **Small Banks**

Notes: The decomposition by size is performed using the 25^{th} and 75^{th} percentiles as thresholds.

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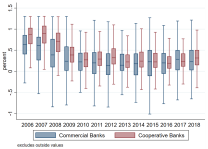
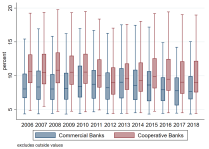
Return on Assets: Zscore over time

Zscore Components. ROA by type and size.



(k) **ROA**



(l) **Small Banks**

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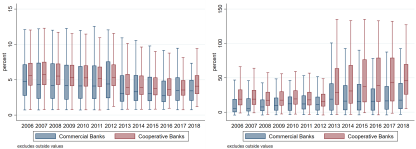
Lzscore and Rzscore: Distribution over time

Alternative Stability Measures: Lzscore & Rzscore



(m) **Liquidity Zscore** (n) **Risk Weighted Zscore**

Back

Econometric Model

- Methodology: Panel Regression with Fixed Effects.
- Regression Specification:

$$\text{z-score}_{i,t} = \alpha_t + \alpha_{j(i)} + \beta \mathbb{1}_{\{i=\text{Bank Type}\}} + \gamma \text{Macro Controls}_{i,t} + \delta \text{Bank Controls}_{i,t} + \varepsilon_{i,t}$$

- Sample: 2006-2018
- Identification Strategy: Difference in Difference
- Standard Errors: Year Clusters, Bootstrap.

1. z-score, popular measure of stability as in Boyd and Runkle (1993) and Laeven and Levine (2007) quantifying bank soundness. Alternative measures are lzscore and rzscore.
2. $\alpha_{j(i)}$ and α_t fixed effects national/non-national status and year.
3. $\mathbb{1}_{\{i=\text{Coop. Bank}\}}$ key variable: has value 1 when bank is cooperative.
4. Macro-Aggregates at the Provincial Level "aggregated" into bank-level.
5. Bank-Level Controls. List

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Econometric Model: Bank Level Controls

1. Log(Total Assets): heterogeneity due to size. (Different scale of operations and diversification of exposure)
2. Loans Ratio: importance of core banking business fo entity.
3. Cost Income Ratio: bank efficiency indicator.
4. Income Diversity: diversification capacity (Laeven & Levin (2007) Defined as $1 - \left| \frac{\text{Net Interest Income} - \text{Other Income}}{\text{Total Operating Income}} \right|$
5. Herfindal Prov: bank local competition/market power (Squared Shares of Nr branches by Province)
6. Belong group: indicator function controlling for whether an entity belongs to a banking group.

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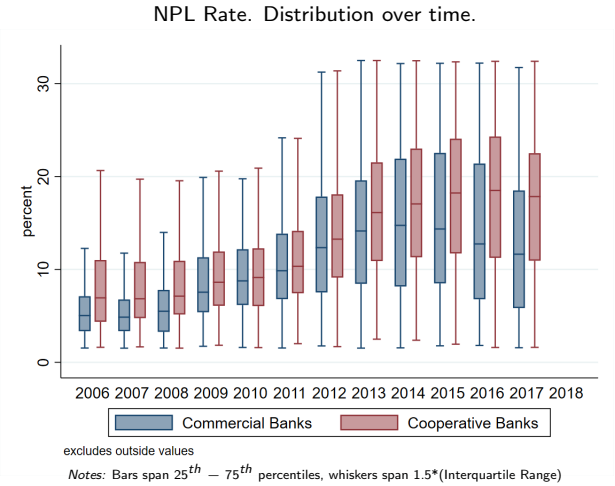
Results: NPL Rate



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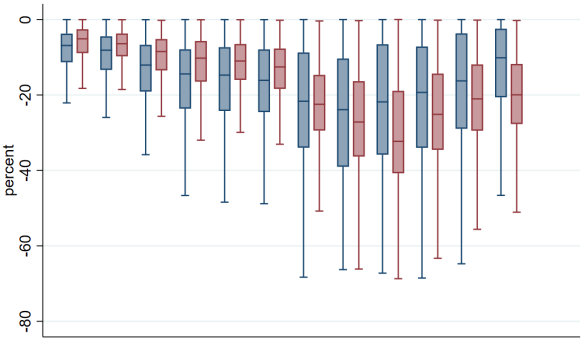
Results: Deteriorated Credits Devaluation over Intermediation Margin

Deteriorated Credits Devaluations over Interest Margin. Distribution over time.



Notes: Bars span $25^{th} - 75^{th}$ percentiles, whiskers span 1.5*(Interquartile Range)

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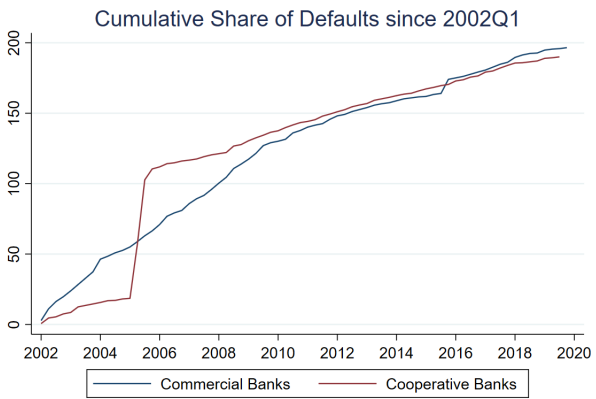
Results: Defaults over time

Defaults over time by Bank Class. Percent over 2002Q2 value



Percent over 2006 count, 440 CCBs and 266 Commercial Banks

Notes: Bars span $25^{th} - 75^{th}$ percentiles, whiskers span 1.5*(Interquartile Range)

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