How do Banks Respond to Limits on Maturity Transformation?

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- **Objective**: Investigating the response of banks to the loosening of a limit on maturity transformation.

- **Motivation**: Understanding banks' response to these limits is high on the policy agenda, especially after the recent events in the US regional banking market. However, the evidence is still scant.

- **Methodology**: DID using banks' balance-sheet data from 2002H2 to 2008H1 and exploiting an exogenous change in prudential regulation: the abolition of the Italian regulation on maturity transformation that occurred in 2006.

- **Main findings**: Banks increased their exposure to interest rate risk while we found no significant effects on credit risk and profitability.

Hypotheses to test

- Hypothesis H1: After the abolition of the prudential rule, compared to unconstrained banks, constrained banks

  (a) increase the share of long-term assets (maturity>5y), especially mortgages, and/or

  (b) increase their holding of long-term fixed-rate assets, and/or

  (c) decrease the share of long-term liabilities.

Hypotheses to test

- Hypothesis H2: The abolition of the prudential rule leads, compared to unconstrained banks, the constrained banks to higher interest rate risk exposure.

- Hypothesis H3: After the abolition of the prudential rule, compared to unconstrained banks, constrained banks reduce
  - ex-ante credit-risk$\rightarrow$ average risk weight of the loan portfolio
  - and ex-post credit risk $\rightarrow$ Bad ratio

- Hypothesis H4: The abolition of the prudential rule leads the unconstrained banks to higher profitability compared to constrained banks.
  $\rightarrow$ We use three measures:
  - Net interest margin (NIM)
  - Commission income (CI) Return on Equity (ROE)

The Italian Regulation on Maturity Transformation

1. $re + asso <= cap$
2. $lt\_assets + 0.5mt\_assets < surplus + not\_mat\_liab + lt\_liab + 0.5mt\_liab + 0.25(st\_customer\_liab + bank\_liab)$

- where
- re = real estate investments
- $asso$ = investments in associates
- cap = regulatory capital
- lt_assets = assets with residual maturity > 5 years
- mt_assets = assets with residual maturity > 1.5 and < 5 years
- $surplus = cap - re - asso$
- non_mat_liab = non-maturing liabilities
- lt_liab = liabilities with residual maturity > 5 years
- mt_liab = liabilities with residual maturity > 1.5 and < 5 years
- $st\_customer\_liab$ = customer liabilities with residual maturity < 1.5 years
- $bank\_liab$ = bank liabilities with residual maturity > 3 months and < 1.5 years.

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Identification strategy

DID rests on two foundations: the exogeneity of the decision to abolish the limit, and the exogeneity of the treated and control groups.

⇛ The repeal of the limit is a fairly exogenous shock

⇛ We lack a genuine control group as the limit applied to all Italian banks

→ two strategies to define the control group:

1. Legal status (l_l)
2. Maturity transformation level (I_{MT})

Two types of banks: the usual commercial banks and cooperative banks.

Cooperative banks are characterized by a mutual nature and are subject to cooperative-specific legal constraints, which limit their possibility to change their balance sheet composition and increase their maturity transformation beyond a certain level, regardless of the presence of any other specific prudential limit.

Legal status (I_l)

Table: Test of the difference between the average maturity transformation of the treated and controls based on the legal status

Pre-regulatory change	Treated	Controls
Average Maturity transformation	60.71	61.69
t-statistic	1.286	
P-value	0.199	

Post-regulatory change	Treated	Controls
Average Maturity transformation	78.73	74.76
t-statistic	-3.967	
p-value	0.000	

We consider the the cooperative banks as controls

Maturity transformation level (I_{MT})

We define as constrained the banks that meet the following two conditions:

(i) had a maturity transformation below but close to the regulatory limit in the period before the regulatory change, and

(ii) have increased their maturity transformation steadily beyond the limit after the regulatory change.

$\Rightarrow$ The identification of the treated and control groups on the basis of their maturity transformation could be associated with the outcome variables

We deal with this endogeneity problem by adjusting the covariates of the control group such that their distribution becomes more similar to that of the covariates of the treatment group using entropy balancing

Maturity transformation level (I_2)

Empirical Set-up
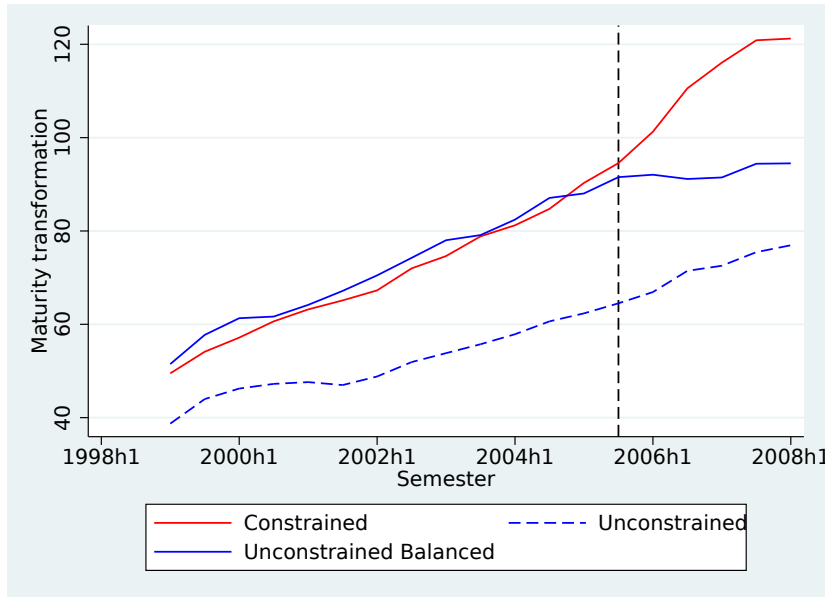
We use two alternative econometric approaches

- Bertrand Approach
  $$\bar{Y}_{i,post} - \bar{Y}_{i,pre} = \alpha + \beta_1 I_b + \beta_2 X_{i,pre} + \epsilon_i$$
  where:
  - Y_i is one of the alternative depending variables consistent with the hypothesis to test
  - $I_b = 1$ if a bank i is treated after the regulatory change (2006H1)
  - X control for bank-level covariates including bank size, liquid assets ratio, leverage ratio and operational cost ratio

- Fixed effects
  $$Y_{i,t} = \beta_1(I_i^b \times D_t) + \beta_2 X_{i,t-1} + \alpha_i + \delta_t + \epsilon_{i,t}$$
  where:
  - $Y_{i,t}$ is one of the alternative depending variables consistent with the hypothesis to test
  - $I^b = 1$ if treated bank
  - $D_t = 1$ since 2006H1

H1 - Balance sheet composition

	Bertrand		Fixed effects	
	I_I	I_{MT}	I_I	I_{MT}
LT assets	0	$(+)^{***}$	0	$(+)^{***}$
Fixed-rate LT assets	$(+)^*$	0	$(+)^{***}$	0
Mortgage Loans	$(+)^{***}$	$(+)^{***}$	$(+)^{***}$	$(+)^{***}$
LT liabilities	$(-)^*$	$(-)^{***}$	$(-)^{***}$	$(-)^{***}$

Overall, the results hint at the possibility of a positive effect of the deregulation on long-term assets, especially mortgages.

	Bertrand		Fixed effects	
	I_l	I_{MT}	I_l	I_{MT}
Interest rate risk	$(+)^{***}$	$(+)^{**}$	$(+)^{***}$	$(+)^{*}$
Ex-ante credit risk	0	0	$(-)^{***}$	0
Ex-post credit risk	0	$(-)^{*}$	0	0

While, if any, we find some evidence pointing to a reduction in credit risk, the banks' response to the regulatory change entailed an increase in the exposure to interest rate risk.

H4 - Profitability

	Bertrand		Fixed effects	
	I_I	I_{MT}	I_I	I_{MT}
Net interest margin	0	0	$(-)^{**}$	0
Commission income (CI)	0	0	$(-)^{**}$	0
CI from credit	$(-)^{***}$	0	$(-)^{***}$	0
CI from assets management	$(+)^{**}$	$(+)^{**}$	$(+)^{**}$	$(+)^{*}$
ROE	$(-)^{*}$	0	$(-)^{*}$	0

Profitability appears to not have benefited from the higher mortgage lending and the interest rate risk. This may have been due to an increase in competition during the period considered, when the Italian banking system became also more open to foreign players.

Conclusions

- Banks increased long-term assets, with a preference for mortgage lending, and decreased long-term liabilities.

- This re-balancing resulted in higher exposure to interest rate risk, with no beneficial effects on profitability.

- Italian MT vs NSFR *(less binding)*
  - If used in a time-varying fashion, loosening of a requirement similar to the NSFR could have the potential to sustain credit growth but at the cost of increasing risk.
  - *Assuming symmetric effects*, our results indirectly suggest that the NSFR, by constraining banks' incentives towards excessive maturity transformation, could reduce also banks' interest rate risk exposure.

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Thank you!