

# How does competition impact bank risk taking?

(discussant: **Olivier De Jonghe**)

The franchise value paradigm  
versus  
a risk shifting paradigm

## Summary of the results

- The franchise value paradigm
  - More competition erodes profits
  - This induces more risk-taking
- A risk-shifting paradigm (Boyd and de Nicolo)
  - Less competition in loan market results in higher lending rates
  - This results in more credit risk and problem loans
- **Setting:** Spanish banking market
  - Detailed databases
  - Adjusted Lerner index
- **Findings:**
  - Boyd and de Nicolo hypothesis is rejected in most cases
  - Support for the franchise value paradigm

## Comments on:

1. Modelling of fractional response variables
2. Measuring of Lerner index and endogeneity
3. Data-related issues
4. Inconsistent with Boyd and de Nicolo?
5. Minor comments

## 1) Fractional response variables

Conventional model  $E[y | x] = X\beta$

However:  $y$  is a fraction, hence bound within  $[0,1]$

Suggested remedy:  $E\left[\ln\left(\frac{y}{1-y}\right) | x\right] = X\beta$

However, this does not allow to recover  $E[y | x]$   
(see e.g. Papke and Wooldridge, JAE 1996)

Solution: **Generalized Linear Model**  $E[y | x] = \frac{\exp(X\beta)}{1 + \exp(X\beta)}$

Results will be different  $\rightarrow$  example

## 1) Fractional response variables: example

Q: Does non-interest income affect banks' crash probability?

	<b>ln(p/1-p)</b>	<b>GLM</b>
Constant	-6.1822*** [0.7003]	-6.0352*** [0.5733]
Commission and Fee income	5.3362*** [1.1764]	5.0109*** [1.0255]
Trading Income	6.9497*** [2.1909]	5.1616*** [1.1925]
Other Operating Income	3.1781 [3.0438]	<b>5.4674***</b> [1.8268]
Net Interest Margin	-36.4262 [24.6465]	<b>-29.0868***</b> [11.0038]
Size	0.6642*** [0.1152]	0.5366*** [0.1267]
Equity-to-Assets	-4.6641* [2.4745]	-5.4703*** [2.0252]
Cost-to-Income	-1.7943 [1.2009]	-1.5012* [0.8694]
Return on Equity	1.709 [2.3800]	1.2261 [1.8739]

- coefficients change

- significance alters

- another example

Kieschnick and McCullough

Statistical Modelling 2003

## 2) The Lerner index

Lerner index:  $(r_l - r) / r_l$

Refinement: mark-up consists of two components

1. Credit risk:  $r^{ra} \geq r$
2. Market power:  $r_l \geq r^{ra}$

where:  $1 + r = (1 + r^{ra}) \cdot (1 - PD) + (1 + r^{ra}) \cdot PD \cdot (1 - LGD)$

New Lerner index:  $(r_l - r^{ra}) / r_l$

## 2) The Lerner index

$$1 + r = (1 + r^{ra}) \cdot (1 - PD) + (1 + r^{ra}) \cdot PD \cdot (1 - LGD)$$

$$\Leftrightarrow r^{ra} = \frac{(r + PD \cdot LGD)}{(1 - PD \cdot LGD)}$$

Endogeneity problem:

PD=defaulted comm'l loans over outstanding comm'l loans

- If PD decreases, LHS variable decreases
  - But  $r^{ra}$  decreases as well, which increases Lerner index
- ➔ Negative relationship between NPL and LI !
- ➔ Possible solution: proxy PD by e.g. business failure rate

## 2) The Lerner index

$$r^{ra} = \frac{(r + PD \cdot LGD)}{(1 - PD \cdot LGD)}$$

PD varies over time

LGD is fixed at 45%: Why isn't this time varying?

- Trend: recovery rate may have changed in period 88-03
- Cycle: recovery rates may vary over business cycle

Is a negative Lerner index sustainable in the long-run?

e.g. mean of LI for credit lines  $< 0$



### 3) Data-related issues

- Very rich dataset(s)!
- Geographical segmentation: provincial level
  - E.g.: weighted concentration measure
  - But not done consistently:
    - Weighted Lerner index?
    - Regional PD in computation of Lerner index?
    - Weighted GDP growth? Provincial Industrial prod. or unemployment rate
- From '93 onwards: upward trend in Lerner index (for loans)  
downward trend in NPL ratio
  - Non-stationarity, Panel unit root and cointegration tests

## 4) Boyd and de Nicolo

- Franchise value paradigm
  - Traditional theory to explain competition-stability trade-off
  - Much empirical evidence
- Boyd and de Nicolo (2005): risk-shifting paradigm
  - Concentration-stability trade-off
  - Critical assumption: market power in lending market!
  - Empirical evidence: Boyd, de Nicolo and Al Jalal (2006)

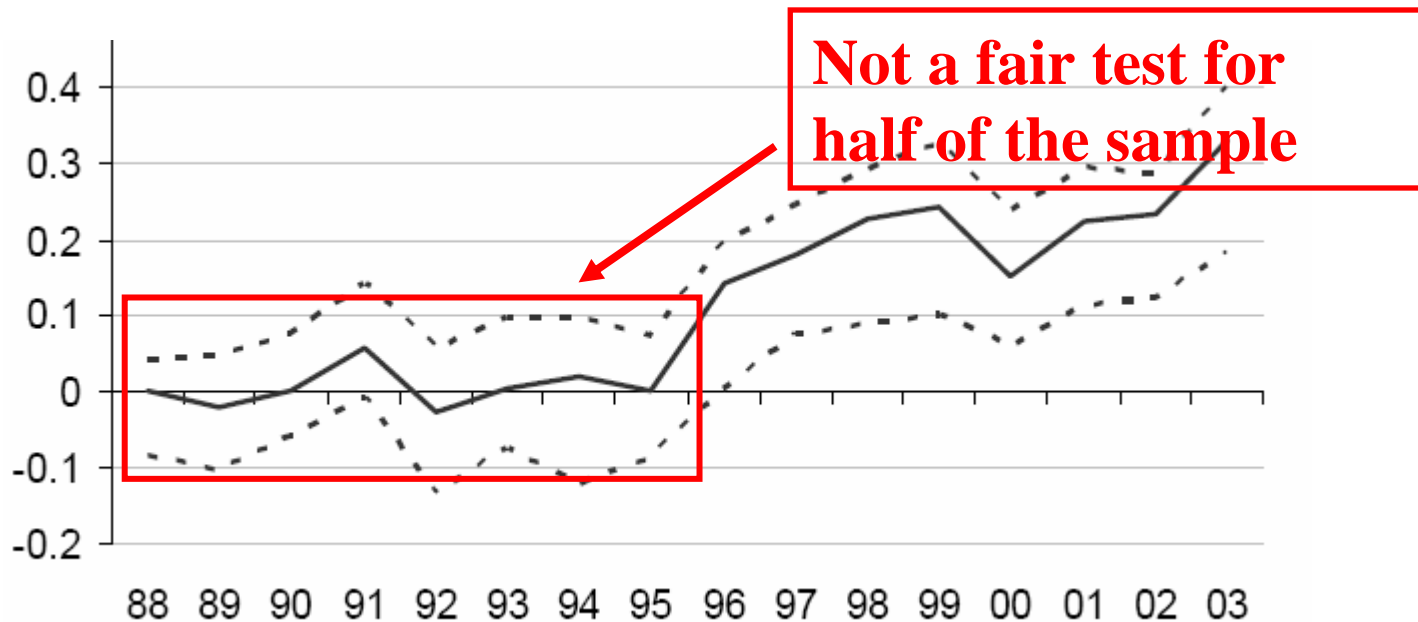
Do the results conflict with Boyd and de Nicolo?

## 4) Do the results conflict with Boyd and de Nicolo?

- Using the Lerner index for deposits: almost no significant effects
- Using the Lerner index for loans
  - Both linear and quadratic term are negative and significant
  - But: Methodology could be improved upon (GLM)

Spurious relationship (NPL affects Lerner index directly)

Crucial assumption of BdN: market power in lending market



## 4) Do the results conflict with Boyd and de Nicolo?

- Using the HHI-index for loans
  - Linear term: negative, significant
  - Quadratic term: positive, 15% sign.
  - **Test them jointly!**
    - **Correlation inflates s.e.**
- Turning point in relationship
  - HHI-Loans of 10
    - This sample: mean HHI=8.22
      - ➔ Most banks in downward sloped part
    - BdN sample 1: mean HHI=28.55
    - BdN sample 1: mean HHI=26.51
      - ➔ Most banks in upward sloped part

Column 3 of Table 3		
Dependent variable	Ln(NPLit/(100-NPLit))	
Xit	Her_loans_firms	
Estimation method	GMM First Diff	
	<i>Coefficient</i>	<i>t-statistic</i>
Ln(NPLit-1/(100-NPLit-1))	0.522	8.04 ***
GDPGt	-0.151	-12.03 ***
GDPGt-1	-0.036	-2.21 **
Xit	-0.215	-1.83 *
Xit squared	0.01	1.48
Share of the bank	-0.535	-2.69 ***
Loans to firms/Total a	-0.028	-3.53 ***
ROA	-0.025	-0.56
No. Observations	1,262	

## 5) Minor issues

- Do you control for the impact of outliers?
  - The minima of the Lerner index are very low!
- Subsample stability: boom-busts
- Reverse causality between NPL and ROA
  - Use lagged ROA
- Franchise value paradigm: competition-> profits-> risk
  - What if concentration-profits relationship is not monotonic?
    - E.g.: Boyd and de Nicolo
    - Or Quiet life hypothesis
  - Joint hypotheses!

## Conclusion

- Interesting topic!
- Unique datasets
- Some methodological improvements possible
- Careful interpretation of the results



# Faculty of Economics



## 4) Boyd and de Nicolo

Column 3 of Table 3			Column 2 of Table 4		
Dependent variable	Ln(NPLit/(100-NPLit))		Dependent variable	Ln(NPLiit/NPLit)	
Xit	Her_loans_firms		Xit	Her_deposits	
Estimation method	GMM First Diff		Estimation method	GMM First Diff	
	<i>Coefficient</i>	<i>t-statistic</i>		<i>Coefficient</i>	<i>t-statistic</i>
Ln(NPLit-1/(100-NPLit-1))	0.522	8.04 ***	Ln(NPLit-1/(100-NPLit-1))	0.498	7.30 ***
GDPGt	-0.151	-12.03 ***	GDPGt	-0.138	-11.11 ***
GDPGt-1	-0.036	-2.21 **	GDPGt-1	-0.046	-2.68 ***
Xit	-0.215	-1.83 *	Xit	0.161	2.43 **
Xit squared	0.01	1.48	Xit squared	-0.005	-3.15 ***
Share of the bank	-0.535	-2.69 ***	Share of the bank	-0.531	-2.87 ***
Loans to firms/Total assets	-0.028	-3.53 ***	Loans to firms/Total assets	-0.028	-3.86 ***
ROA	-0.025	-0.56	ROA	-0.013	-0.32
No. Observations	1,262		No. Observations	1,262	