Testing for the risk-taking channel in an emerging economy: do non-linearities matter?

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Definition of risk-taking and motivation:

- *"…impact of changes in policy rates on either risk perceptions or risk-tolerance and hence on the degree of risk in the portfolios, on the pricing of assets, and on the price and non-price terms of the extension of funding."*

  (Borio and Zhu, 2008)
- General conclusion from the literature: low interest rates result in shift towards more risky borrowers or an increase in overall bank risk
- So far limited results for emerging economies
- Policy-relevant issue in Poland
  - ✓ Prolonged period of historically low nominal interest rates and expectations that interest rates will remain low
  - ✓ Is the level of interest rates low enough to activate the risk taking channel?
  - ✓ Is the financial deepening process influencing operation of the risk taking channel?

Measuring and identifying bank risk taking:

- We attempt to measure new risk exposure resulting form current period business decisions of bank managers
- Combine volume and riskiness of newly granted loans; ideally, granular forward-looking risk information to be used
- Actual bank risk taking might be influenced by demand-side developments on the credit market
- Control for the effects of changes in risk in the existing loan portfolio

Data sources and sample:

- Supervisory confidential bank reporting
- 26 banks covering 84% of the sector assets; 2008Q1–2018Q1
- Risk measures based on the whole loan portfolio (aggregate information at the bank level) and more granular information from large exposures data base
- Large exposures data base (reporting threshold: ~ EUR125.000) – not fully credit register, but still some benefits.
- Classification according to NACE Rev. 2.0

Risk measures:

- $$\Delta R_{i,t} = \frac{\sum_{j=1}^{J} w_{i,j,t-1} \Delta L_{i,j,t}}{L_{i,t-1}}$$

  where: $\Delta R_{i,t}$ – risk taken by *i-th* bank in period *t*, $\Delta L_{i,j,t}$ – quarterly growth of loans classified to *j-th* category, $w_{j,t}$ – risk weight attributed to *j-th* category of loans, $L_{i,t}$ – volume of loans
- Risk weights in ΔR^1: ratio of loan loss reserves to total loans for a given NACE section
- Risk weights in ΔR^2: ratio of loan loss reserves to total loans for business lines (investment/other loans to non-financial corporations, loans to sole enterprises, housing/consumption/other loans to households)
- Risk weights in ΔR^3: implicit expected loss equalising expected profits per business line (as a robustness check)

Model:

- $$\Delta R_{i,t} = \alpha_i + \beta i_{t-1} + \sum_{j=1}^{4} \beta_j^* B_{i,t-1}^j i_{t-1} + \eta i_{t-1}^2 + \sum_{j=1}^{4} \eta_j^* B_{i,t-1}^j i_{t-1}^2 + \sum_{j=1}^{4} \delta_j B_{i,t-1}^j + \sum_{j=1}^{4} \gamma_j M_{t-1}^j + \lambda \Delta R_{i,t-1} + \sum_{j=1}^{3} \mu_j Q_t^j + \varepsilon_{i,t}$$

  $\Delta R_{i,t}$ – a measure of risk taken in a given quarter, i_t – monetary policy measure, M_{t-1} – macro control variables, B_{t-1} – bank-specific control variables, Q_t– quarterly dummies
- Estimation by bias-corrected fixed effect estimator, to benefit from relatively large time dimension of the sample (T=39, N=26)

Results:

Table 1. Estimation results

	ΔR^1	ΔR^2	ΔR^3
nominal interest rate			
i	-10.97***	-4.35**	-2.54**
i^2	1.60***	0.69***	0.37**
interest rate interacted with bank characteristics			
$i \times assets$	-8.10**	-3.03	-0.80
$i \times liquidity$	0.63**	0.37*	-0.03
$i \times capital\ buffer$	0.29	1.60	0.64
$i \times deposit\ ratio$	0.52***	0.14	0.06
squared interest rate interacted with bank characteristics			
$i^2 \times assets$	1.12**	0.46	0.11
$i^2 \times liquidity$	-0.09**	-0.05*	0.00
$i^2 \times capital\ buffer$	-0.11	-0.33	-0.12
$i^2 \times deposit\ ratio$	-0.06**	-0.02	-0.01
bank characteristics			
assets	9.71	4.61	2.35
liquidity	-1.01*	-0.47	0.08
capital buffer	0.63	-0.95	-0.51
deposit ratio	-1.07***	-0.2	-0.1
control macro variables			
output gap	2.21***	0.89**	0.31
core inflation	13.34***	0.52	1.23
ΔNER	0.39*	0.67***	0.30***
default prob. of corporations	-82.85***	-19.26***	-9.92***

Figure 1. Change in risk measure ΔR^1 after the reduction of interest rate by 100 bps for different levels of the interest rate

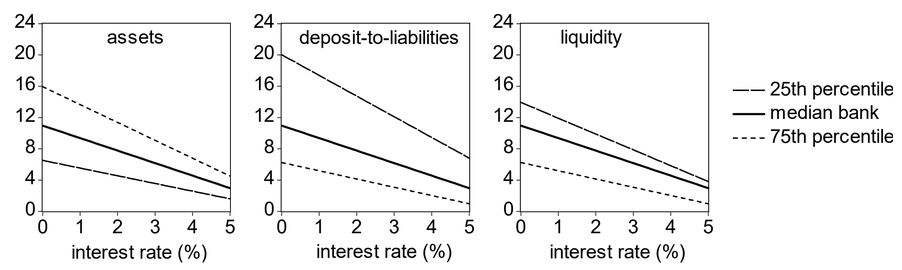


Figure 2. Distribution of changes in risk measure ΔR^1 in individual banks after the reduction of interest rate by 100 bps for different levels of interest rate

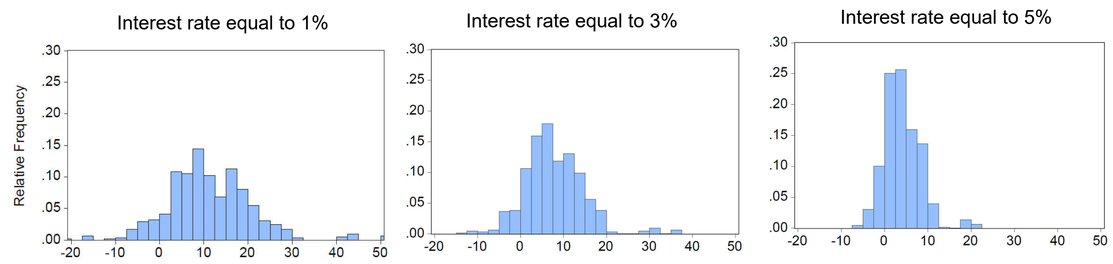
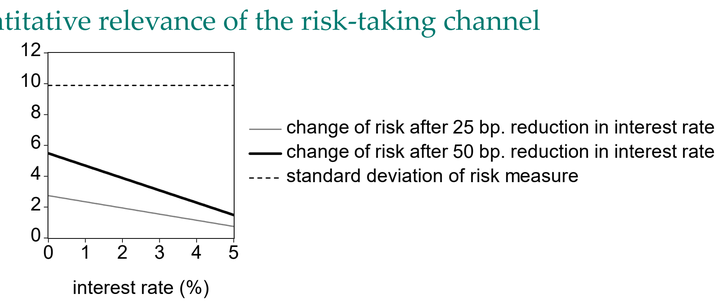


Figure 3. Quantitative relevance of the risk-taking channel



Conclusions:

- Main contributions:
  - ✓ A novel approach to measure the new risk taken by banks, capturing both changes in volumes of loans directed to different sectors of the economy and risks of those exposures
  - ✓ We tested the operation of the risk-taking channel in the Polish banking sector, analysing non-linear impact of interest rates on the risk taken by banks
- Main findings:
  - ✓ Lowering interest rates shifts banks operating in Poland towards more risky loans, with the magnitude of this effect stronger when interest rates are low
  - ✓ Taking into consideration the whole portfolio of loans to the non-financial sector, we are not able to unambiguously claim that it is a supply-driven phenomenon
  - ✓ But in the segment of large corporate loans in Poland we provide a robust evidence that this response is different across banks, with larger reaction displayed by large banks, banks with low liquidity and banks with deposits being the most important funding source. It suggests that supply-side factors explain the above relationship
  - ✓ The impact of typical interest rate reductions on risk taken by banks, even if non-negligible, is substantially lower than usual variation of risk, independently of the initial level of interest rates