

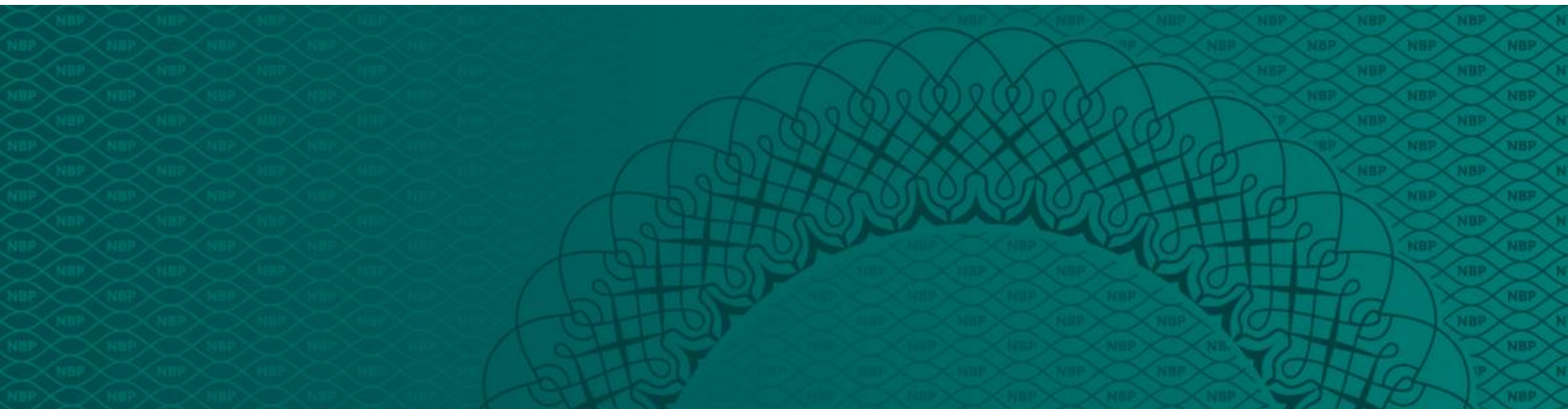
**NBP**

Narodowy Bank Polski

Tomasz Chmielewski, Tomasz Łyziak, Ewa Stanisławska

# Risk taking channel – does it operate in the Polish banking sector?

7<sup>th</sup> Summer Workshop, NBP, 13 June, 2018



## Banks and low interest rate environment

- Low interest rates with negative impact on bank profitability
  - Lower net interest margin → lower RoA / RoE
  - Nominal profit targets might activate *search for yield* mode
- Impact on bank risk appetite and (actual and perceived) credit risk
  - Improved valuations might increase capital buffers
  - Default of existing borrowers (perceived as) less likely
    - Is a decrease in loan repayment-related cash flows compensating for the deterioration in general economic activity (the ultimate cause of low interest rates)?
  - Some investment projects might have become profitable only after the fall in interest rates
    - Volume-based bonuses for loan officers
    - Is this increase in possible lending opportunities dispersed equally among types of economic activities (e.g. NACE classification)?
  - Some lending decisions might be taken under (not necessarily correct) assumption of interest rates "low for long"
- As the result, both volumes and structure of lending flows might be affected
  - Testing for this important both for monetary policy and financial stability

## Empirical literature so far

- Granularity level of risk measurement
  - for individual loan contracts (often using credit register data) – e.g. Ioannidou, Onega, Peydro (2009), Dell’Ariccia, Laeven, Suarez (2013), Jimenez, Ongena, Peydro, Saurina (2014)
  - at the bank level (market-based indicators) – e.g. Gambacorta (2009), Altunbas, Gambacorta, Marques-Ibanez (2014)
  - country level – e.g. Maddaloni, Peydró (2010)
- Risk measures
  - Internal credit rating – Dell’Ariccia, Laeven, Suarez (2013)
  - Credit spread – Paligorova, Santos (2012)
  - SLOS answers – Maddaloni, Peydró (2010)
  - EDF – Gambacorta (2009), Altunbas, Gambacorta, Marques-Ibanez (2014)
  - Non-performing loans (NPLs) – Delis and Kouretas (2011)
- General conclusion: low interest rates result in shift towards more risky borrowers or an increase in overall bank risk

## Measuring bank risk taking

- Several drivers of changes in overall bank credit risk
  - Existing loan portfolio – economic situation of borrowers
  - New lending
  - Other factors (collateral valuation, PD correlations etc.) – may be sometimes important, but hard to measure or lack of proper data
- In practice, limited availability of forward-looking risk information
  - Anyway, forward looking risk measures might be contaminated by excessive optimism, fear, intertemporal profit management etc.
  - In future research, IFRS 9 might be of some help
- We try to be flexible

## Defining low interest rate periods

- Just level of nominal or real interest rates not fully satisfactory
- Deviations from estimated Taylor rules (several versions)

- Taylor rule with interest rate smoothing:

$$i_t = \kappa_0 i_{t-1} + (1 - \kappa_0) [\kappa_1 + \kappa_2 (\pi_t^{core} - \pi_t^{target}) + \kappa_3 \hat{y}_t] + \varepsilon_t$$

- Backward-looking Taylor rule:

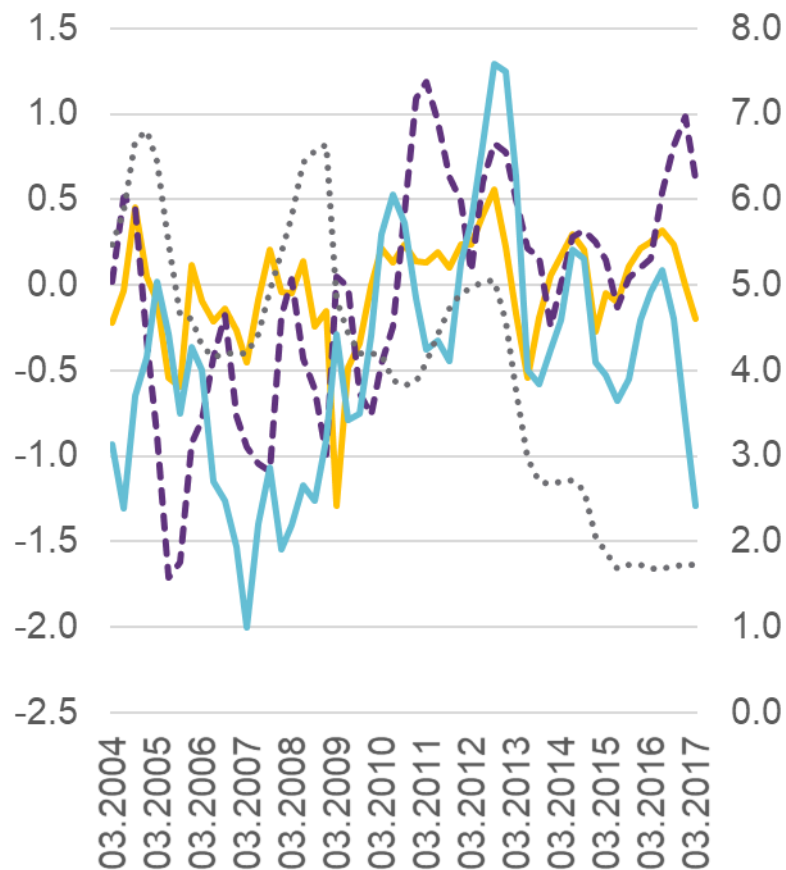
$$i_t = \kappa_1 + \kappa_2 (\pi_{t-1}^{core} - \pi_t^{target}) + \varepsilon_t$$

- Forward-looking Taylor rule:

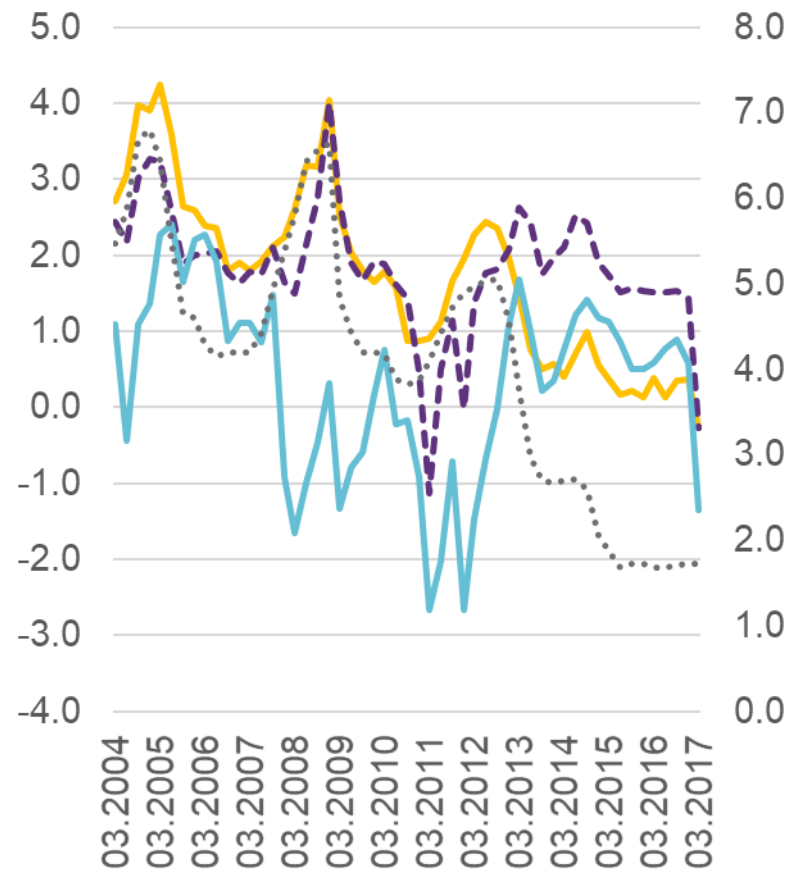
$$i_t = \kappa_1 + \kappa_2 (\pi_{t+1}^{core} - \pi_t^{target}) + \varepsilon_t$$

- In the last two specifications output gap not significant

# Taylor rule deviations and real interest rate levels



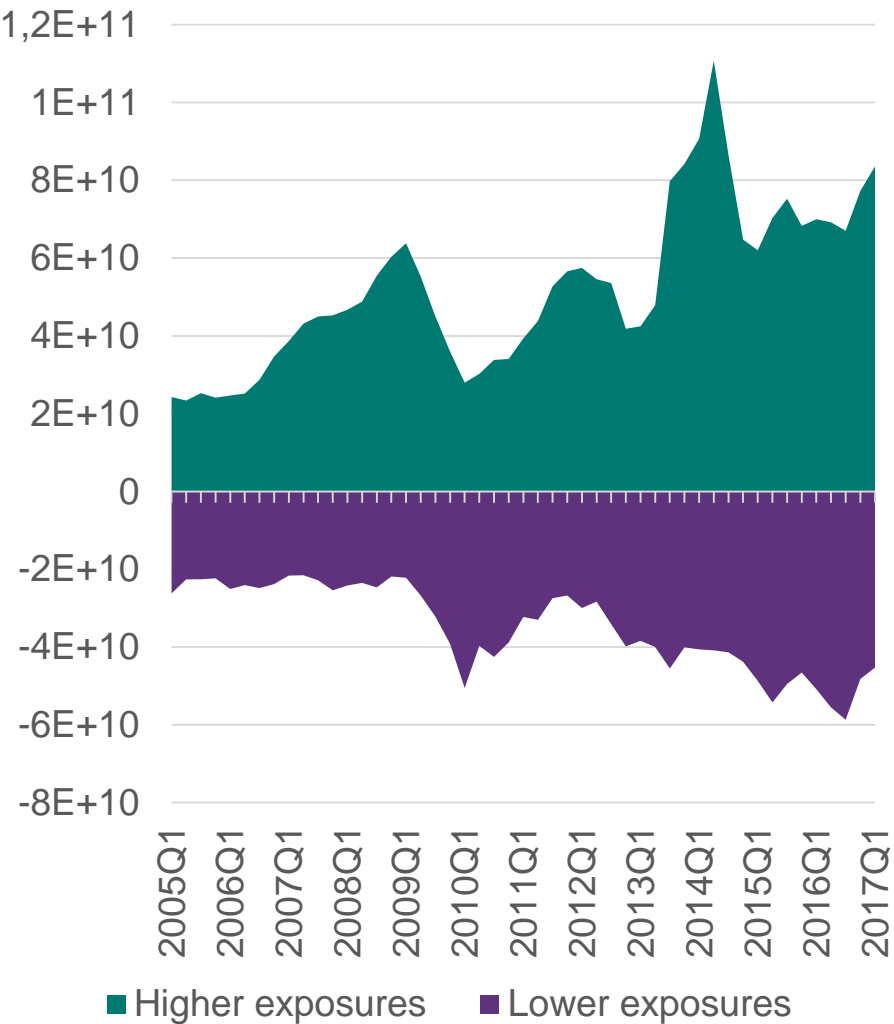
- Taylor, interest rate smoothing
- - - Taylor, backward looking
- Taylor, forward looking
- ..... WIBOR3M (rhs)



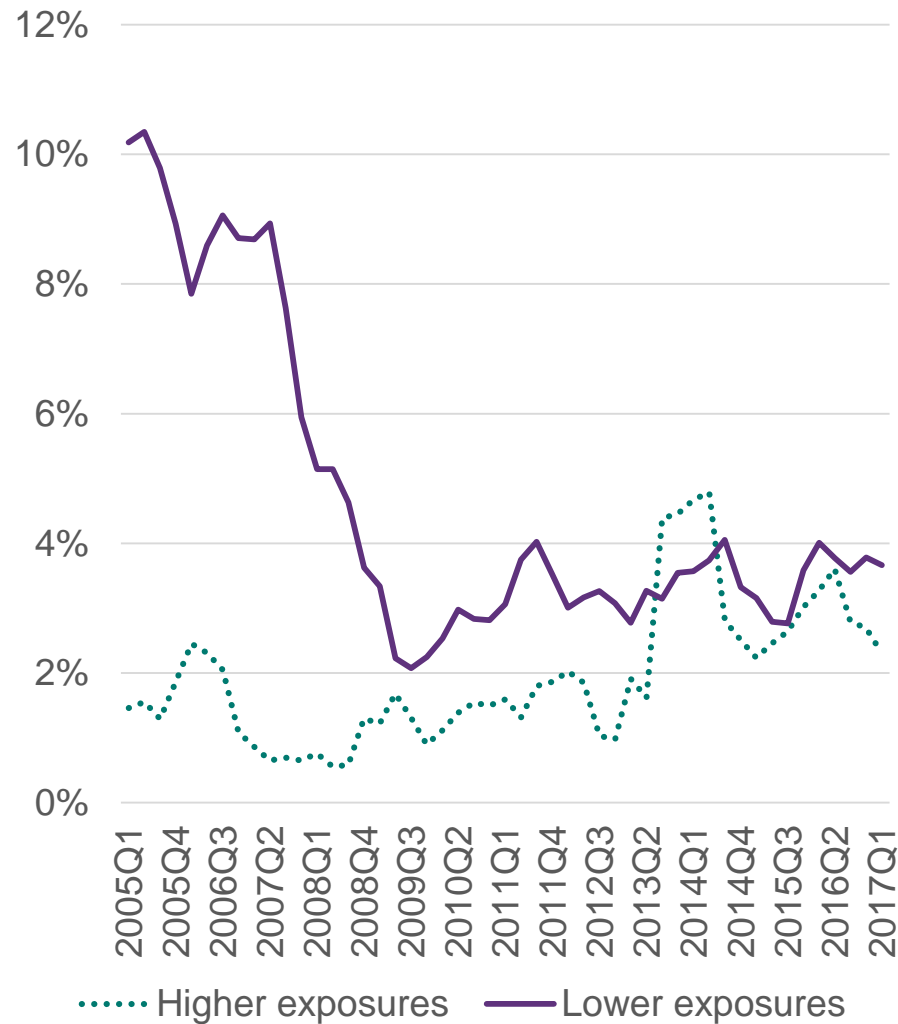
- Real IR, forecasters
- - - Real IR, firms
- Real IR, households
- ..... WIBOR3M (rhs)

# Loan growth and lending risk

## Change in volumes



## Borrower quality (reserves)



## Data sources and sample

- Supervisory confidential reporting
- Large exposures data base
  - Not fully credit register, but still some benefits
  - Reporting threshold: ~EUR125.000
  - Classification according to NACE Rev. 2.0
- Banks with at least 1% share in banking sector assets (covering 84% of the sector, 26 banks after M&A adjustments)
- Time span: 2004Q1–2017Q1 or 2007Q3–2017Q1
- Extreme observations winsorized
- Macroeconomic control variables



## Risk measures

- General approach: 
$$\Delta R_{i,t} = \frac{\sum_{j=1}^J w_{i,j,t} \Delta L_{i,j,t}}{A_{i,t-1}}$$
  - $\Delta R_{i,t}$  – risk taken by i-th bank in period t,
  - $L_{i,j,t}$  – quarterly growth of loans classified to j-th category in i-th bank,
  - $w_{j,t}$  – risk weight attributed to j-th category of loans,
  - $A_{i,t}$  – bank's assets (alternatively – bank equity)
- Definitions of risk weights:
  - Ratio of loan loss reserves to total loans for a given NACE section [risk measure 1]
  - Ratio of loan loss reserves to total loans for business lines [risk measure 2]:
    - investment loans to non-financial corporations,
    - other loans to non-financial corporations,
    - loans to sole enterprises,
    - housing loans to households,
    - consumption loans to households,
    - other loans to households.
  - Implicit expected loss equalising expected profits per business line (as a robustness check) [risk measure 3]

A: Agriculture, Forestry,



B: Mining, Quarrying



C: Manufacturing



D: Electricity, gas, ...



E: Water supply, ...



F: Construction



G: Trade, vehicle repair



H: Transportation, storage



I: Accomodation, food



J: Information, communication



K: Financial, insurance



L: Real estate



M: Professional, Scientific



N: Administrative, support



O: Public administration



P: Education



Q: Health, social work

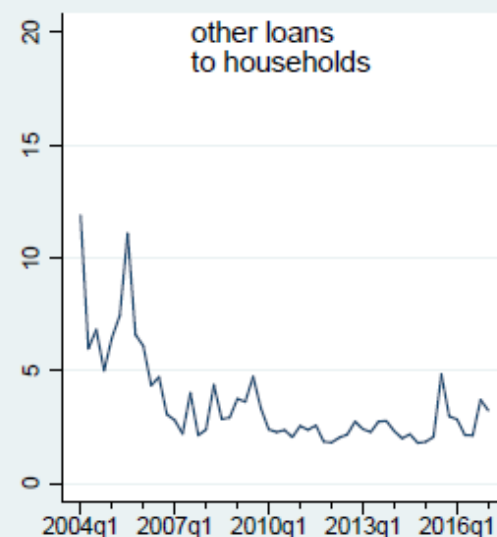
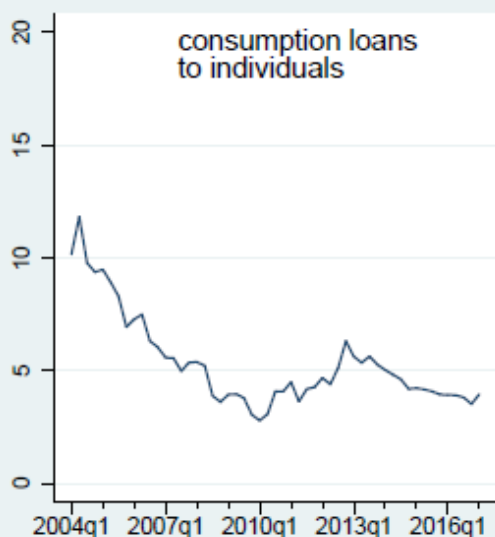
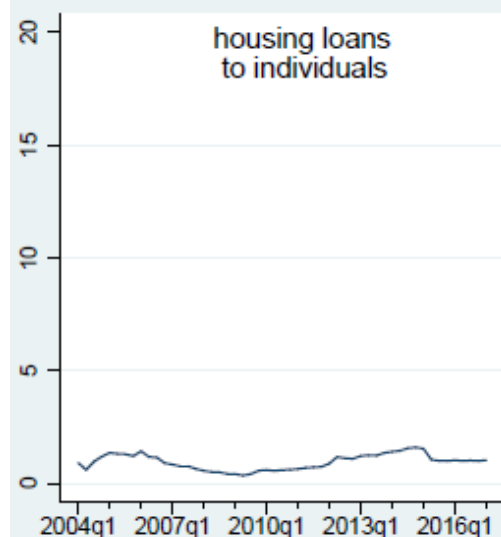
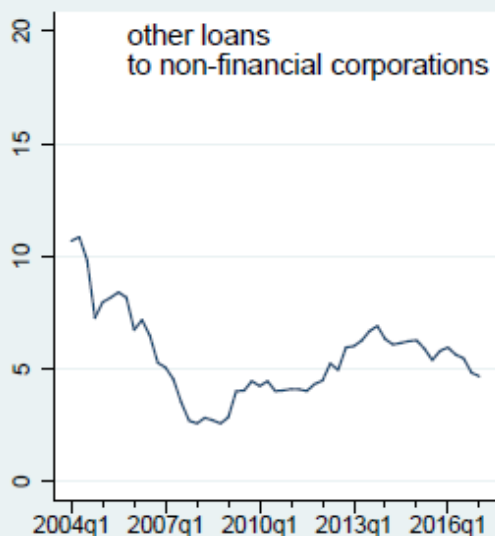
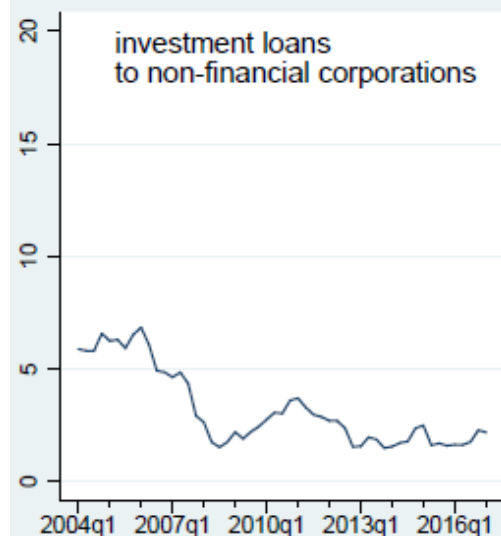


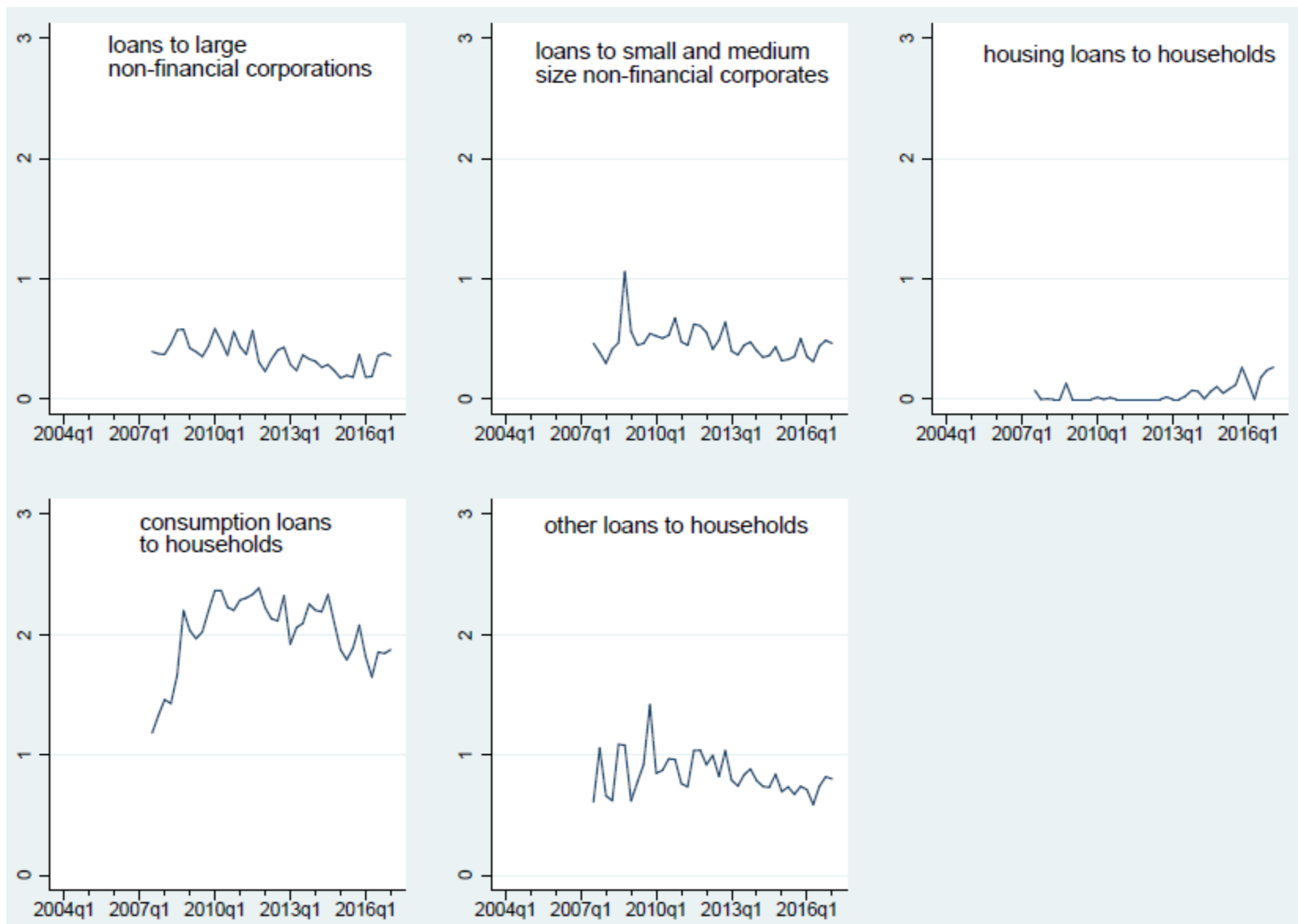
R: Arts, entertainment

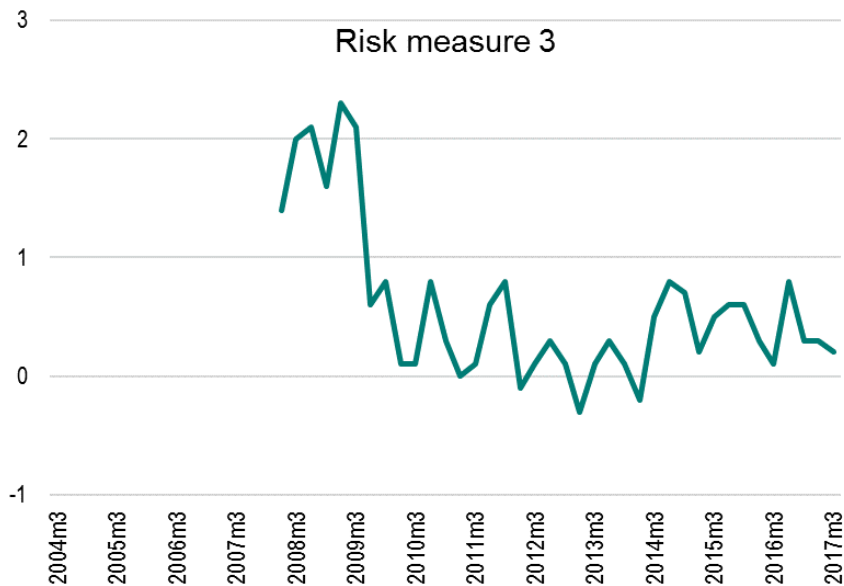
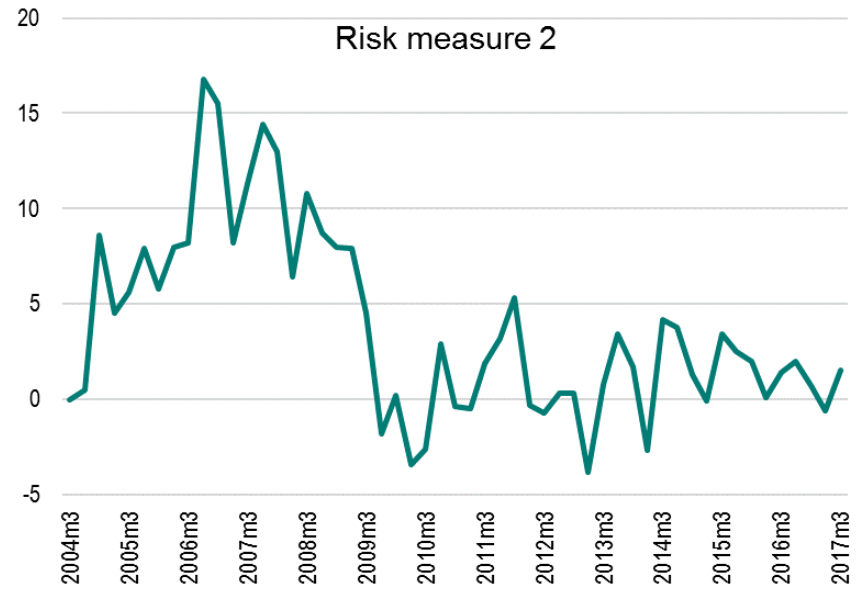
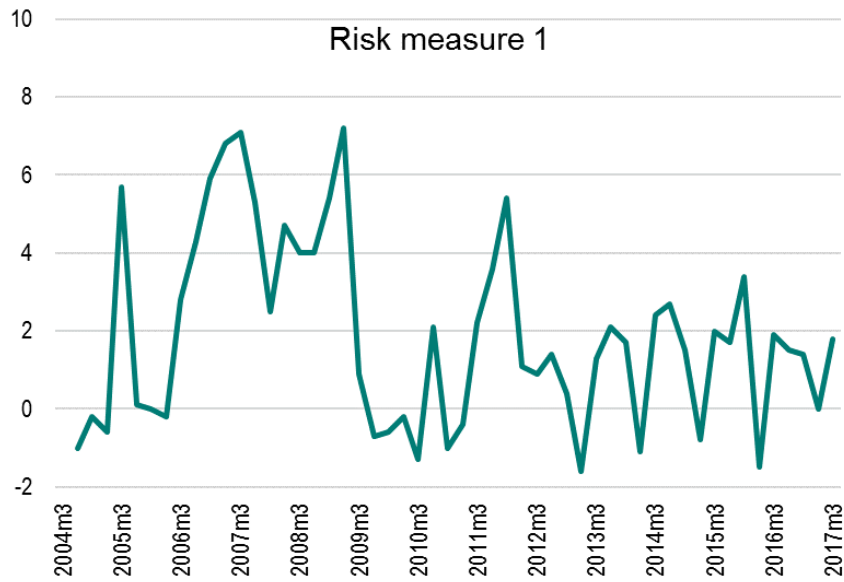


S: Other service









Note: Cross-sectional medians.

## Estimation

$$\Delta R_{i,t} = \alpha_i + \beta i_t + \sum_{j=1}^4 \lambda_j \Delta R_{i,t-j} + \sum_{j=1}^5 \gamma_j M_{t-1}^j + \sum_{j=1}^6 \delta_j B_{i,t-1}^j + \sum_{j=2}^4 \mu_j Q_t^j + \varepsilon_{i,t}$$

- $\Delta R_{i,t}$  – a measure of risk taken in a given quarter
- $i_t$  – monetary policy measure
- $M_{t-1}$  – macro control variables: output gap, change in nominal effective exchange rate, slope of the yield curve, volatility of 2-year Treasury bond yield and default probability of non-bank corporations
- $B_{t-1}$  – bank-specific control variables: assets (in log), liquidity ratio, capital buffer (the ratio of excess bank capital over regulatory requirement to assets), the total deposits to total liabilities ratio, the loans to assets ratio and the housing loans to total loans ratio
  - normalized with respect to median in a given period (assets) or median in the whole sample (other variables)
- $Q_t$  – quarterly dummies
- Estimation by bias-corrected fixed effect estimator, to benefit from relatively large time dimension of the sample (T=52, N=26)

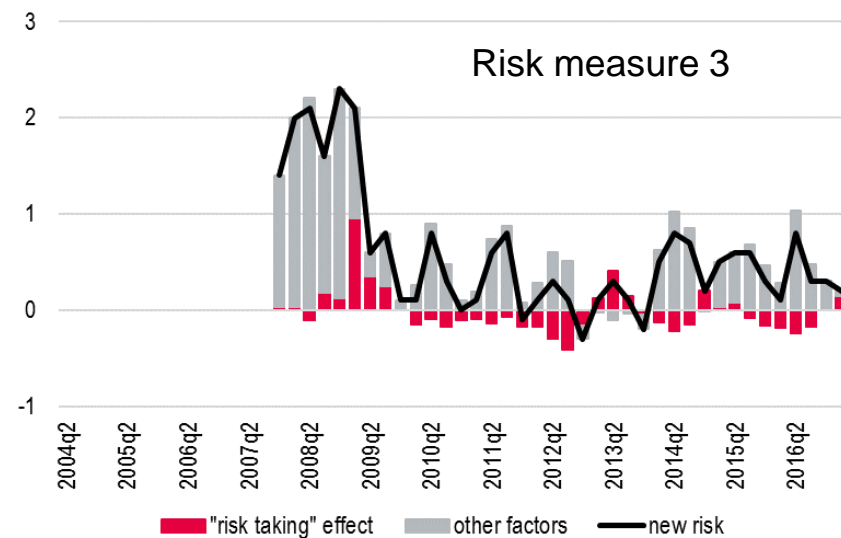
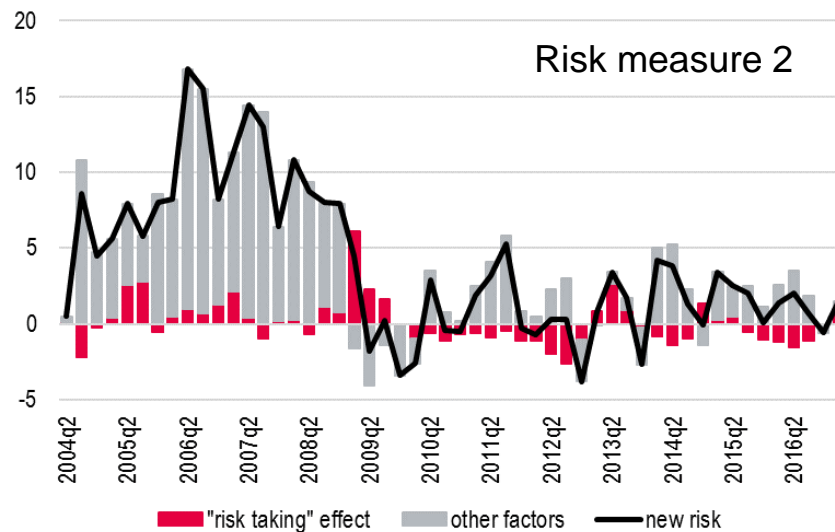
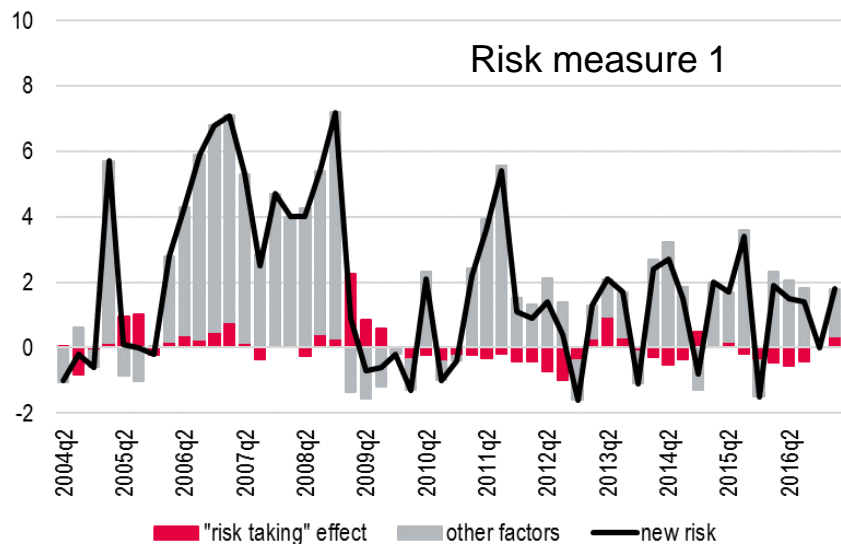
## Estimation results

	Taylor rule			Real interest rate			WIBOR3M		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
monetary policy measure	-1.75**	-4.75**	-0.74***	0.36	1.00**	0.15	0.53	0.43	0.10
output gap (t-1)	-0.004	0.30	0.32***	-0.11	0.18	0.23**	-0.35	-0.13	0.17
d NER (t-1)	0.17***	0.29**	0.09***	0.14***	0.18	0.08**	0.13***	0.25*	0.09***
yield slope (t-1)	1.23**	0.81	0.28**	1.38**	1.19	0.36***	1.23**	0.62	0.22
volatility of bond yields (t-1)	22.23	-6.99	13.00***	31.55**	16.22	18.24***	34.83**	28.23	20.61***
default prob. of corporations (t-1)	-17.43***	-23.00***	-1.17	-17.85***	-24.78***	-1.48	-19.19***	-23.44***	-1.53
assets (t-1)	-2.57	-1.45	-1.92	-2.51	-1.90	-2.34*	-2.29	-1.01	-1.86
liquidity ratio (t-1)	-0.08	0.11	0.00	-0.06	0.13	0.00	-0.05	0.13	0.00
capital buffer (t-1)	-0.09	0.14	-0.03	-0.13	0.01	-0.05	0.03	0.18	-0.00
deposits ratio (t-1)	0.09*	0.06	0.02	0.09*	0.06	0.02	0.10**	0.07	0.03
loans ratio (t-1)	-0.12**	-0.10	-0.10	-0.12**	-0.10	-0.10	-0.11**	-0.10	-0.10
housing loans ratio (t-1)	0.09**	0.09	0.03	0.09*	0.06	0.03	0.10**	0.08	0.03
risk (t-1)	0.29***	0.42***	0.34***	0.29***	0.41***	0.34***	0.29***	0.43***	0.34***
risk (t-2)	0.15***	0.16*	0.06**	0.15***	0.15*	0.06***	0.15***	0.17*	0.07***
risk (t-3)	0.09*	-0.08	0.05	0.10**	-0.07	0.05	0.10*	-0.07	0.05
risk (t-4)	0.15***	0.32***	0.01	0.15***	0.31***	0.00	0.16***	0.32***	0.01
N	820	820	519	820	820	519	820	820	519

\* p<0.10 \*\* p<0.05 \*\*\* p<0.01, based on bootstrapped standard errors, allowing for cross-sectional heteroscedasticity Taylor rule with interest rate smoothing. Real interest rate deflated with firms' inflation expectations.



# Bank risk taking explained by monetary policy



Note: Monetary policy measured by deviations from Taylor rule with interest rate smoothing.

## Conclusions

- Methodology of risk measurement
- No strong evidence in favour of the risk taking channel
  - Good news from point of view of possible interactions between monetary policy and financial stability
- Possible explanations and interpretations
  - Interest rate level not low enough to activate the risk taking channel
    - Bank managers feel comfortable with achieved profitability
    - Ongoing regulatory changes (capital requirements, bank levy) might drive bank profitability lower and activate the risk taking channel
    - Activation threshold not yet achieved?
  - High capital buffers as a sign of bank risk aversion (search for yield less likely)
  - Is bank management reacting to nominal interest rate levels?
- Further research
  - Extending the sample (more of low interest rate period)
  - Introducing interaction terms and asymmetric effects

*We protect the value of money*