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# The sensitivity of CESEE banks' net interest margins to market interest rates

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## Motivation

- Since the Global Financial Crisis many research papers focused on the nexus between low interest rates and bank profitability, in particular banks‘ net interest margins (NIM)
- Important topic as **bank profitability key for financial stability**
- Studies tend to find that **as interest rates decline, so does the NIM and the effect becomes stronger at lower rates**
- **No econometric studies on CESEE to our knowledge**; existing studies focused mostly on advanced economies and/ or large, international banks
- **Our research questions:**
    - Is the relationship between NIMs and market rates also concave for the CESEE banks?
    - Does it differ by (selected) country and bank characteristics?

## Data

- Bank level data stems from S&P Global Market Intelligence, macro data from Bloomberg, Macrobond and national central banks
- Study includes **15 CESEE countries** (8 CESEE-EU: BG, CZ, HR, HU, PL, RO, SI, SK + 5 Western Balkan: AL, BA, ME, MK, RS + RU + TR)
- Time period from **2006 to 2018** (few observations for the period 2006-2010)
- Statistically significant **fall of net interest margins over time**

## Summary statistics NIMs over all banks by year

| | mean | median | sd | n |
|---|---|---|---|---|
| 2006 | 5.1 | 4.7 | 4.2 | 65 |
| 2007 | 4.7 | 4.5 | 2.8 | 78 |
| 2008 | 4.6 | 4.3 | 2.3 | 100 |
| 2009 | 4.4 | 3.9 | 1.9 | 104 |
| 2010 | 4.1 | 3.8 | 1.7 | 108 |
| 2011 | 4.7 | 4.1 | 3.3 | 489 |
| 2012 | 4.6 | 4.0 | 3.2 | 505 |
| 2013 | 4.5 | 3.9 | 3.3 | 514 |
| 2014 | 4.5 | 3.9 | 2.9 | 517 |
| 2015 | 4.3 | 3.6 | 3.3 | 516 |
| 2016 | 4.4 | 3.7 | 3.0 | 512 |
| 2017 | 4.3 | 3.6 | 3.2 | 522 |
| 2018 | 4.0 | 3.4 | 2.9 | 467 |
| Total | 4.4 | 3.8 | 3.1 | 4,497 |

*Source: author's calculations.*

# Model

Model closely related to a study by Borio et al. (2015)[1]

$$nim_{i,k,t} = \alpha_1\, nim_{i,k,t-1} + \alpha_2\, nim_{i,k,t-2} + \beta_1\, r_{k,t} + \beta_2\, r^2{}_{k,t} + \gamma_1\, \sigma_{k,t} + \varphi' C_{k,t} + \omega' X_{i,k,t} + time\ dummies + \mu_i + \varepsilon_{i,k,t}$$

| | |
|---|---|
| $nim_{i,k,t}$ | net interest margins as reported |
| $r_{k,t}$ | weighted interest rate indicator (national, Euro Area, U.S. and Swiss 3-month market rates weighted with currency split of banking sector loans) |
| $\sigma_{k,t}$ | coefficient of variation of domestic interest rates |
| $C_{k,t}$ | macro controls |
| $X_{i,k,t}$ | bank level controls |
| $\mu_i$ | bank fixed effect |

1 **Borio, C., L. Gambacorta and B. Hofmann. 2015.** The influence of monetary policy on bank profitability. In: BIS Working Papers 514.

# Results of difference GMM estimations

- For CESEE banks the **relationship between NIMs and interest rates is concave**
- The effect is
  - **somewhat stronger for banks in EU-countries** compared to banks in non-EU countries
  - **somewhat stronger for banks located in countries with inflation targeting regimes** versus those with other exchange rate regimes
  - **roughly the same for banks below and above the median bank size** in the respective country
  - **only significant for banks with more traditional business models** (measured by share of loans in total assets and share of net interest income in total operating income)

**Table 2. Results - regression output**

| | (1) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|
| | Baseline | EU dummy[2] | Exchange rate regime[2] | Size dummy[2] | Loan share[2] | Deposit share[2] | Interest income share[2] |
| Dummy interactions with r | no | default = non-EU | default = non-inflation-targeting | default = below country median | default = below sample median | | |
| L.nim | 0.65 *** | 0.66 *** | 0.67 *** | 0.65 *** | 0.64 *** | 0.61 ** | 0.53 * |
| L2.nim | −0.05 | −0.05 | −0.05 | −0.06 | −0.05 | −0.05 | −0.05 |
| r (default) | 0.19 *** | 0.21 *** | 0.16 ** | 0.18 ** | 0.10 | 0.17 *** | 0.09 |
| r (alternative) | | 0.25 *** | 0.20 *** | 0.20 *** | 0.28 *** | 0.21 *** | 0.20 *** |
| $r^2$ (default) | −0.01 ** | −0.01 ** | −0.01 * | −0.00 | −0.00 | −0.01 * | −0.01 |
| $r^2$ (alternative) | | −0.02 * | −0.01 | −0.01 ** | −0.02 *** | −0.01 ** | −0.01 |
| Groups | 512 | 512 | 512 | 512 | 511 | 512 | 512 |
| Observations | 2699 | 2699 | 2699 | 2694 | 2698 | 2697 | 2696 |
| Hansen p-value | 0.39 | 0.39 | 0.28 | 0.41 | 0.42 | 0.37 | 0.41 |
| Autocorrelation 2 | 0.35 | 0.35 | 0.37 | 0.56 | 0.36 | 0.32 | 0.44 |

*1 Controls and columns (2) and (3) omitted due to space limitations*

*2 Columns (4) to (9) use interactions of a dummy variable with r and $r^2$, where the dummy values are reported as*

*Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, estimated with Arellano-Bond two-step estimator, using forward orthogonal deviations, collapse option and lag restrictions. Windmejer-corrected standard errors.*

*Source: authors' estimations.*

## Robustness and further research

**The results on our main coefficients of interest are robust to a large range of modifications of our sample and model**, e.g.

- Using an alternative measure for NIMs from the ECB
- Excluding from the sample (1) individual countries, (2) the smallest banks, (3) pre-2011 observations
- Adding additional control variables and the term spread
- Using a specification as close as possible to Borio et al. (2015)

**Caveats and further research**

- Market interest rate indicator modification
- Estimating the effects on other profitability components and overall profitability
- Trying different estimation methods (e.g. Panel VAR)

## Conclusions

- Ours is – to our knowledge – the only study which uses econometric techniques **to estimate the effect of the (low) interest rate environment on banks‘ NIMs in CESEE.**
- Similar to the existing literature on other regions we find **that NIMs fall as interest rates fall and the effect is larger the lower interest rates**; e.g. if our weighted interest indicator falls from 5% to 4% NIMs decrease by roughly 10 basis points, while for a drop from 2% to 1% the effect is 15 basis points.
- As Net Interest Income makes up roughly 70% of banks‘ operating income in CESEE, **pressure from falling interest rates should be monitored closely**. This applies **in particular for banks, which are more vulnerable**, e.g. banks with a very traditional business model.
- In so far as banks engage in actions to mitigate falling NIMs with adverse behaviour, e.g. increased risk taking, these actions should also be monitored closely.

# Danke für Ihre Aufmerksamkeit

# Thank you for your attention


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# Annex I – Robustness checks

**Table 2. Robustness checks - regression output**

| | (1) Baseline | (3) Term spread plus r | (4) Term spread plus r (EU countries only) | (2) Alternative variable[1] instead of NIM | (5) Excluding small banks[2] | (6) Excluding Russia[3] | (7) EU only[3] | (8) Only post-2010 observations |
|---|---|---|---|---|---|---|---|---|
| L.nim | 0.65 *** | 0.69 *** | 0.60 *** | | 0.64 *** | 0.59 *** | 0.58 *** | 0.61 ** |
| L2.nim | −0.05 | −0.04 | | | −0.02 | −0.09 ** | | −0.07 |
| L3.nim | | | | | | 0.06 | | |
| L.spread | | | | 0.73 *** | | | | |
| r | 0.19 *** | 0.19 ** | 0.19 * | 0.16 *** | 0.15 *** | 0.16 ** | 0.18 ** | 0.25 *** |
| $r^2$ | −0.01 ** | −0.01 ** | 0.01 | −0.01 *** | −0.01 *** | −0.00 | −0.00 | −0.01 *** |
| term spread | | −0.07 | 0.27 * | | | | | |
| term spread$^2$ | | 0.03 | −0.05 | | | | | |
| Groups | 512 | 426 | 162 | 523 | 288 | 270 | 162 | 512 |
| Observations | 2699 | 2248 | 1101 | 3211 | 1688 | 1338 | 1101 | 2471 |
| hansenp | 0.39 | 0.42 | 0.26 | 0.73 | 0.46 | 0.31 | 0.23 | 0.32 |
| ar2p | 0.35 | 0.33 | 0.72 | 0.31 | 0.04 | 0.71 | 0.77 | 0.48 |

*1 The spread variable is calculated according to an ECB methodology. For details see Ebner at al. (2016).*

*2 National market share smaller than 0.3%*

*3 Lags of dependent variable and instrument options modified*

*Notes: * p < 0.1, ** p < 0.05, *** p < 0.01, estimated with Arellano-Bond two-step estimator, using forward orthogonal deviations, collapse option and lag restrictions. Windmejer-corrected standard errors.*

*Source: authors' estimations.*

# Annex II – Choice of specification

## Table 2A. Choice of estimation method - regression output

| | (1) POLS | (2) Fixed Effects | (3) Arellano Bond (fod[1]) | (4) Arellano Bond (fd[1]) | (5) Blundell-Bond (fod[1]) | (6) Blundell-Bond (fd[1]) |
|---|---|---|---|---|---|---|
| L.nim | 0.77*** | 0.42*** | 0.65*** | 0.64*** | 0.61*** | 0.56*** |
| L2.nim | 0.07 | −0.07 | −0.05 | −0.08* | −0.08 | −0.10* |
| r | 0.09** | 0.17*** | 0.19*** | 0.38*** | 0.22*** | 0.29*** |
| $r^2$ | −0.00 | −0.01** | −0.01** | −0.02*** | −0.01** | −0.02*** |
| coefficient of variati | 0.05 | 0.04 | 0.03 | 0.02 | 0.07 | 0.08* |
| ngdp_growth | −0.00 | 0.00 | −0.00 | −0.01 | 0.00 | 0.00 |
| fin_dev | −0.00 | −0.02*** | −0.01*** | −0.04*** | −0.01*** | −0.01*** |
| size | −0.07*** | −0.44*** | −0.40*** | −0.47* | −0.16*** | −0.19*** |
| equity_ratio | 0.01** | 0.02 | 0.01 | 0.01 | 0.03*** | 0.03*** |
| liquidity | −0.01*** | −0.02*** | −0.02*** | −0.02* | −0.02*** | −0.03*** |
| cir | −0.01*** | −0.01*** | −0.01*** | −0.01*** | −0.01*** | −0.01*** |
| time dummies | included | included | included | included | included | included |
| _cons | 2.70*** | 13.14*** | | | 6.14*** | 7.20*** |
| Groups | | 526 | 512 | 511 | 526 | 526 |
| Observations | 3225 | 3225 | 2699 | 2667 | 3225 | 3225 |
| Hansen p-value | | | 0.39 | 0.84 | 0.66 | 0.73 |
| Autocorrelation 2 | | | 0.35 | 0.64 | 0.62 | 0.95 |

*1 fod = forward orthogonal deviations option, fd = first difference option*

*Notes: * p < 0.1, ** p < 0.05, *** p < 0.01*

*Source: OeNB.*