Bank of Russia

MACROPRUDENTIAL RISK-WEIGHT ADD-ONS FOR CONSUMER LOANS IN RUSSIA: EFFICIENCY ASSESSMENT

Henry PENIKAS
Research and Forecasting Department

BIS approach research team:
I.Kozlovtceva, E.Petreneva, Yu.Ushakova

DFM research team:
D.Gornostaev, S.Seleznev

We acknowledge T.Grishina, P.Gorkov for assistance!

June 03, 2021

Key Findings' Preview

1. We use confidential supervisory data on the amount of consumer loans in Russia (form 0409-**115**)

2. We benchmark three approaches to evaluating **effect** of mpru measures
    1. BIS approach
    2. Dynamic factor model
    3. Difference-in-differences

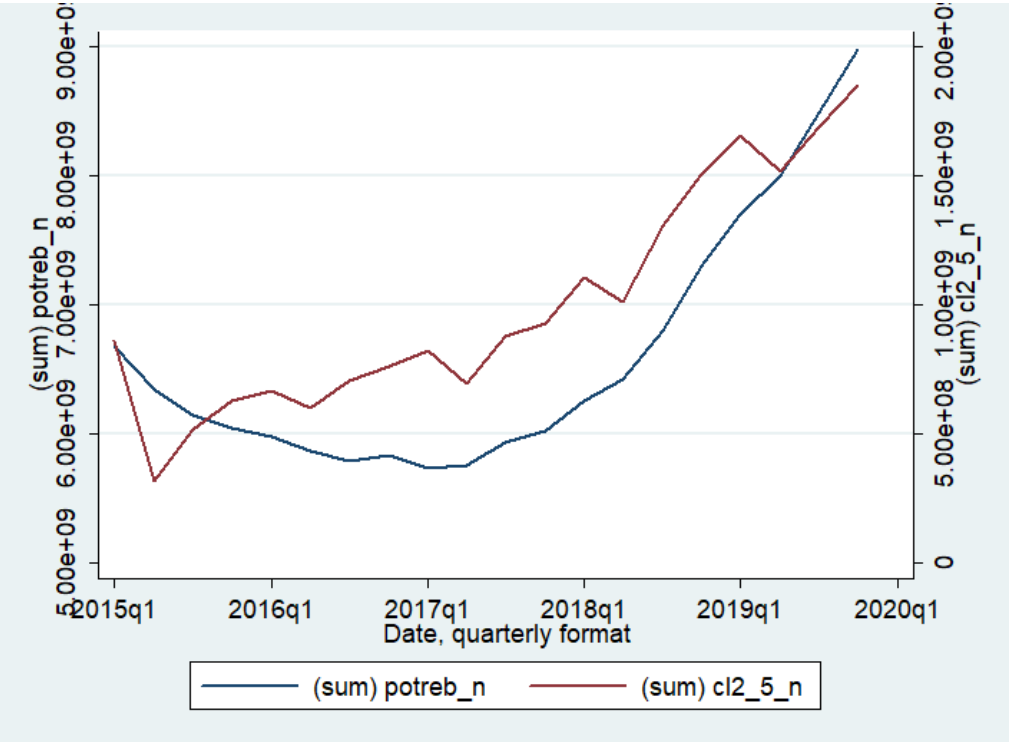
3. Measures to tighten consumer lending impact the top niche market players, though slightly.

4. Banks having consumer lending books prefer to preserve it when restrictions augment by cutting the rest.

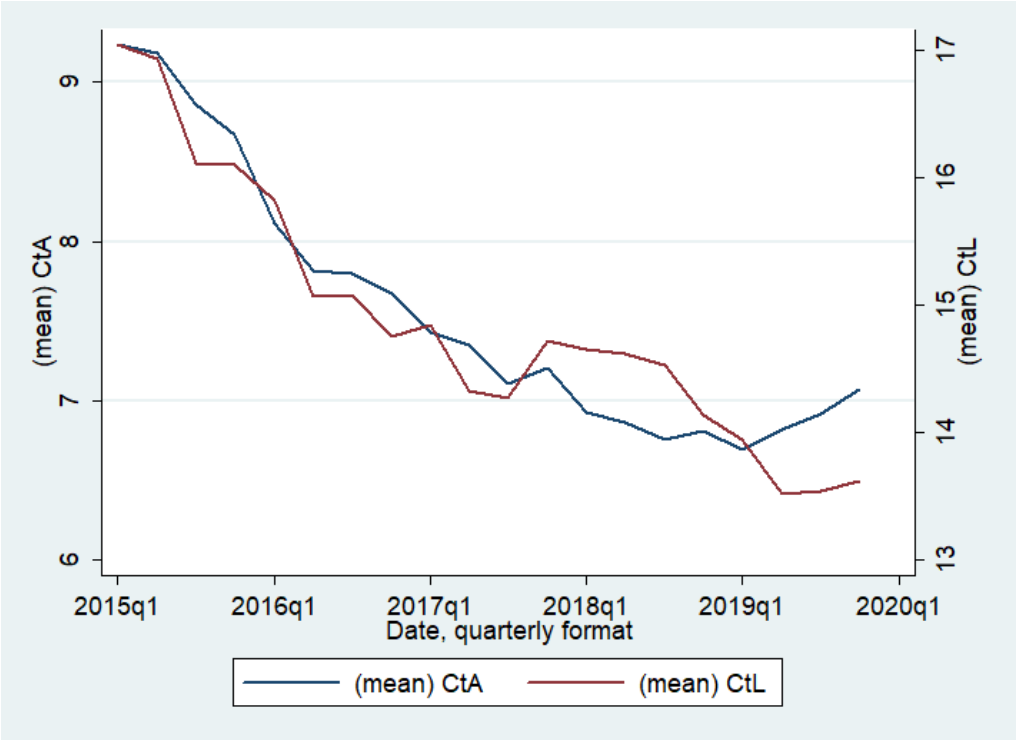
5. We predict the announced consumer lending tightening may result in **RUB 130-220 bn reduction (1-2%)**
    - For comparison: **RUB 400 bn** was the amount of capital buffers dispersed in Russia during pandemics (announced by the First Deputy Kseniya Yudaeva on May 27, 2021)

We observe controversial dynamics in consumer lending

Absolute volumes rise



Relative volumes decline (vs. total assets)

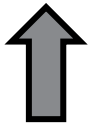


Macroprudential Risk-Weight Add-On Mechanics | Effects

$$CAR_T = \frac{K_T}{RWA_T} \geq MIN$$

$$CAR_T = \frac{K_0 + Margin_L \cdot Loans_{LOW\_RISK} + Margin_H \cdot Loans_{HIGH\_RISK}}{RW \cdot Loans_{LOW\_RISK} + \left(RW + \mathbf{add\text{-}on}\right) \cdot Loans_{HIGH\_RISK}} \geq MIN$$

UNwelcomed



Mpru

Welcomed

When restricting consumer lending by imposing RW add-ons,
A regulator wishes such loans to be cut in volume.

We wish to account for both the mpru event and its sensitivity

Total loan interest rate

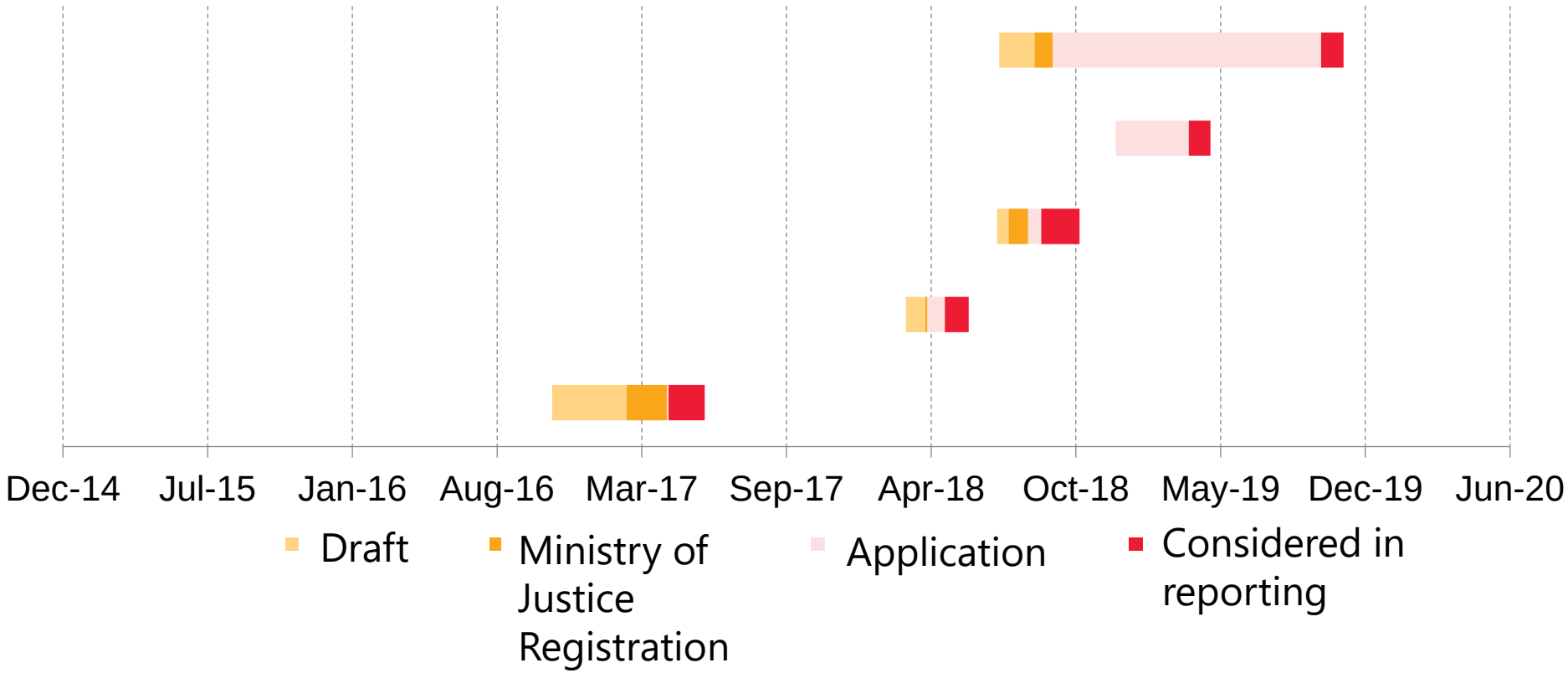
Application Date	Type	10–15%	15–20%	20–25%	25–30%	30–35%	35-45%	45-60%	60%+
Jul. 2013	RW	100	100	100	100	100	140	170	200
Jan. 2014	RW	100	100	100	100	100	140	300	600
Aug. 2016	RW	100	100	100	110	110	140	300	600
Mar. 2017	RW	100	100	**110***	140	300	600	*600*	*600*
May 2018	RW add-on	0	10	**10**					
Sep. 2018	RW add-on	20	30	**50**	60				
Apr. 2019	RW add-on	30	30	**30**	30				
Oct. 2019	RW add-on because of debt service ratio (PDN)			**50**					

Our MaP sensitivity proxy;

* Median value for all categories.

We acknowledge colleagues from the CBR Financial Stability Department for their recommendations!

We wish to differentiate draft and application mpru dates



BIS Approach

Most popular approach (Bruno, Shimb, & Shin, 2017), (Cerutti, Claessens, & Laeven, 2017), (BIS, 2020), (Gambacorta & Murcia, 2020), (Kim & Oh, 2020):

Y is the loan growth rate (d_log_loans)

Idea is to trace average changes in Y after mpru intro (MaP – index dummy)

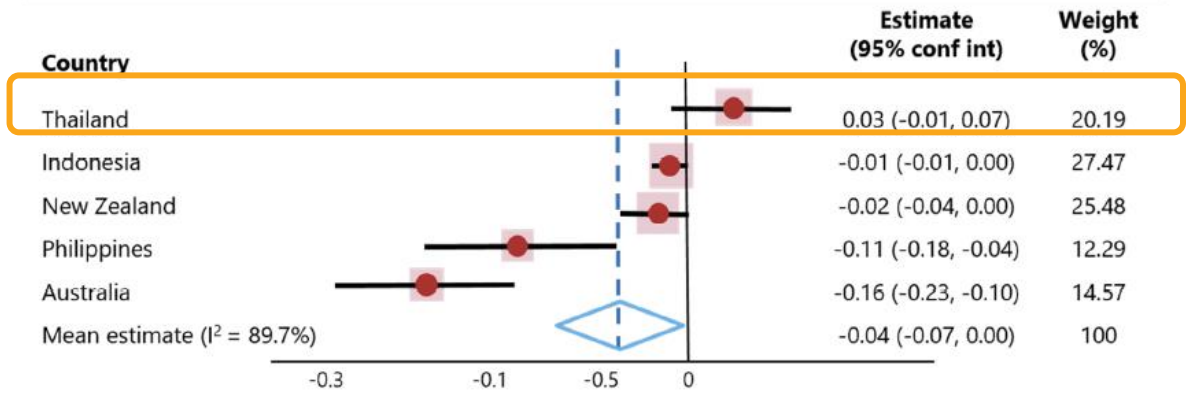
$$Y_{it} = \alpha \cdot Y_{it-1} + \sum_{k=0}^{K} \theta_k \cdot MaP_{t-k} + X_{i,t-1}\mathrm{B}_i + \varepsilon_{it}$$

Major shortcomings:

1) Do NOT benchmark to the objective;
2) Do NOT benchmark to alternative;
3) Do NOT account for:
    1) Announcement dates
    2) Sensitivities
        - Mpru index seems methodologically incorrect when summing up events of various measures
4) Impact assessment is subject to the instruments (IV) chosen

Developed countries mostly demonstrate post-measures decrease; the developing ones – on the opposite - increase

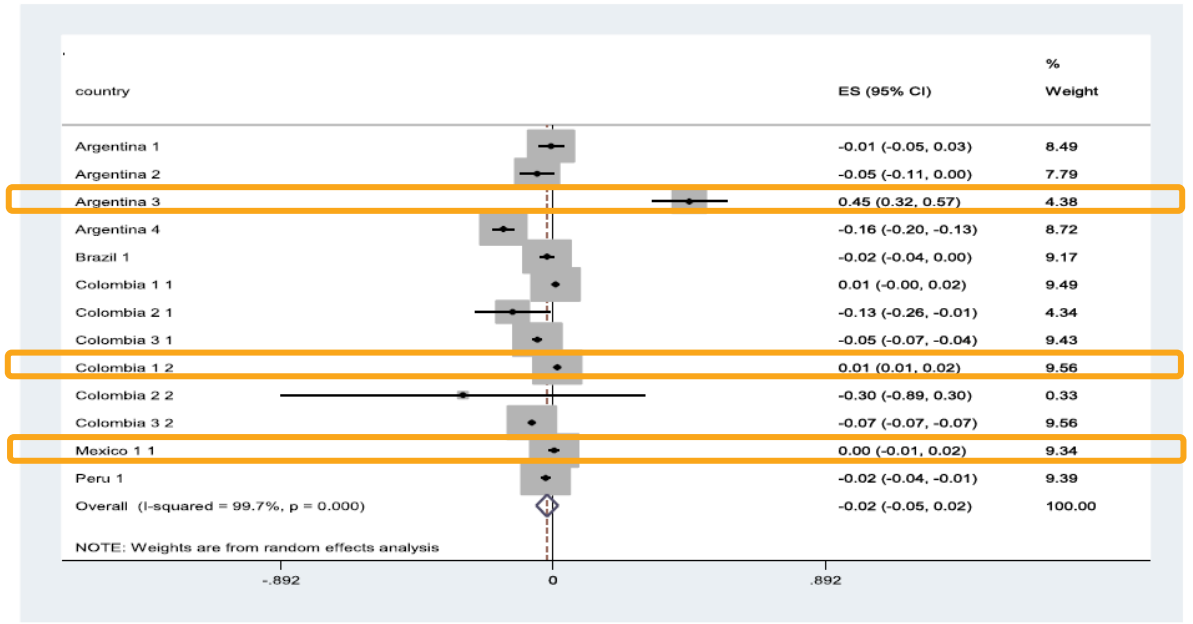
Macroprudential policies are effective in reducing household credit growth Graph 3



Results from a random-effects meta-analysis. The rows correspond to the coefficient obtained by each country (red dots). The size of the squares represents their weights in the estimated mean effect. The weight is calculated as the inverse of the estimate's standard error, as reported in the underlying study, plus the estimated between-study variance. The blue diamond represents the estimated 95% confidence interval of the estimated mean effect (dashed blue line).

(BIS, 2020, p. 13)

(a) Effect after three months



(Gambacorta, Murcia, 2020, p. 11)

Overall lending increases after the mpru are in place

Loan growth rate (d_log_loans)

Table 2: Cumulative effect of macroprudential measures

Table	Model	Effect	
		Cumulative	Summary
Baseline regression			
Table 7	without interactions	-1,889	-1,688
Table 7	with interactions	5,429	5,258
Regressions by clusters on credit to assets			
Table 9	Cluster 1	-2,771	-2,814
Table 9	Cluster 2	6,272	5,665
Table 9	Cluster 3	7,057	5,747
Regressions by clusters on capital buffer			
Table 10	Cluster 1	-2,684	-2,344
Table 10	Cluster 2	0,339	0,247
Table 10	Cluster 3	-11,058	-10,81
Regressions with different macroprudential measures without interactions			
Table 11	Fact, Applied	-1,889	-1,688
Table 11	Sensitivity, Applied	0,0992	0,885
Table 11	Fact, Draft	-4,460	0,693
Table 11	Sensitivity, Draft	-0,037	0,741

CtA – share of consumer loans in assets

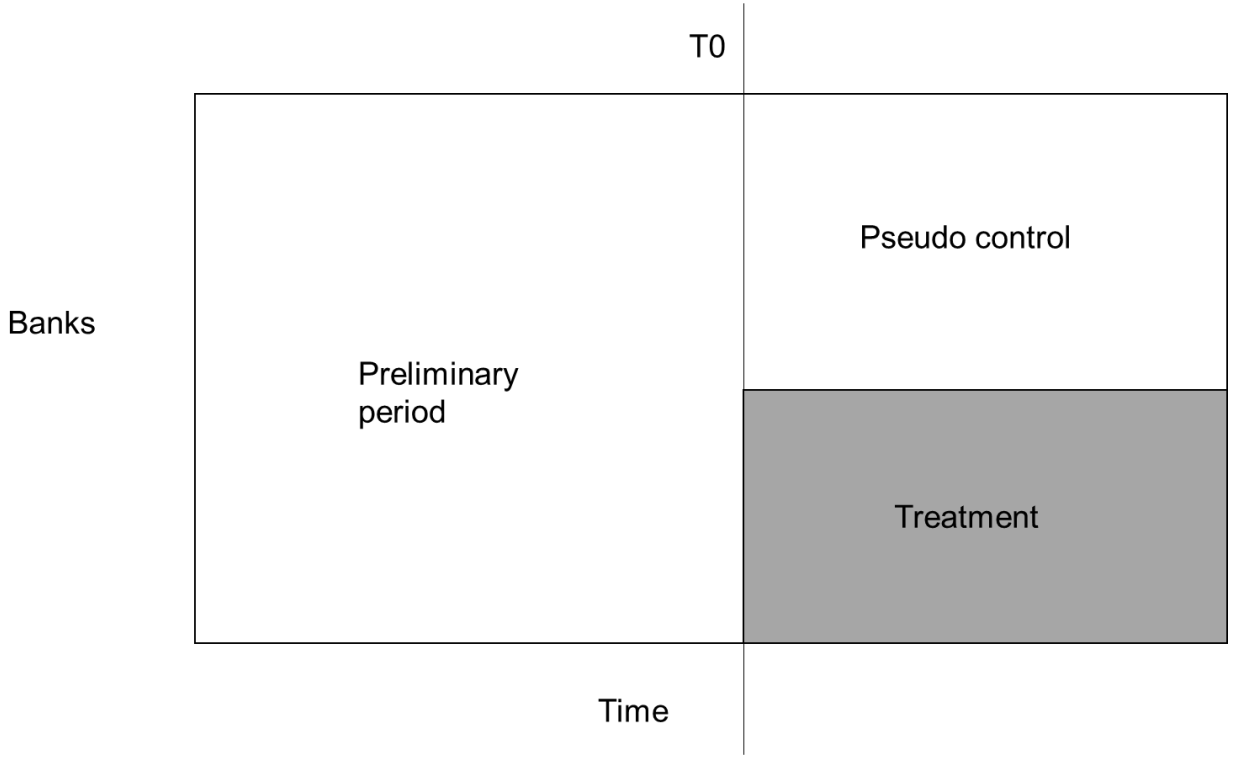
Table 9: Clusters on CtA

VARIABLES	(1) GMM_ni_Cl_1	(2) GMM_ni_Cl_2	(3) GMM_ni_Cl_3
$\Sigma_{i=0}^{3}\beta_i \Delta MaP_{t-i}$	-2.814	5.665*	5.747
MaP_t	-3.035	1.819	-0.642
MaP_{t-1}	-2.863	1.538	1.380
MaP_{t-2}	0.356	0.691	4.249*
MaP_{t-3}	2.727	1.617	0.761
$SIZE_{t-1}$	10.244*	2.366	-0.427
LIQ_{t-1}	0.104	-0.030	0.188
CAP_{t-1}	0.033	-0.003	-0.102
DEP_{t-1}	-0.081	0.265	-0.106
CtA_{t-1}	1.806**	0.277	0.259
Observations	4546	2512	953
Groups	367	199	82
Sargan p-value	0	0	0
Hansen p-value	0.380	0.831	0.338
N of instrument	55	55	55
AR(1)	1.57e-09	1.66e-07	0.0279
AR(2)	0.335	0.294	0.306
Mean	2.470	13.341	38.964
SD	2.304	4.003	22.107
min	0	7.928	22.308
max	7.790	21.695	90.490

CtA

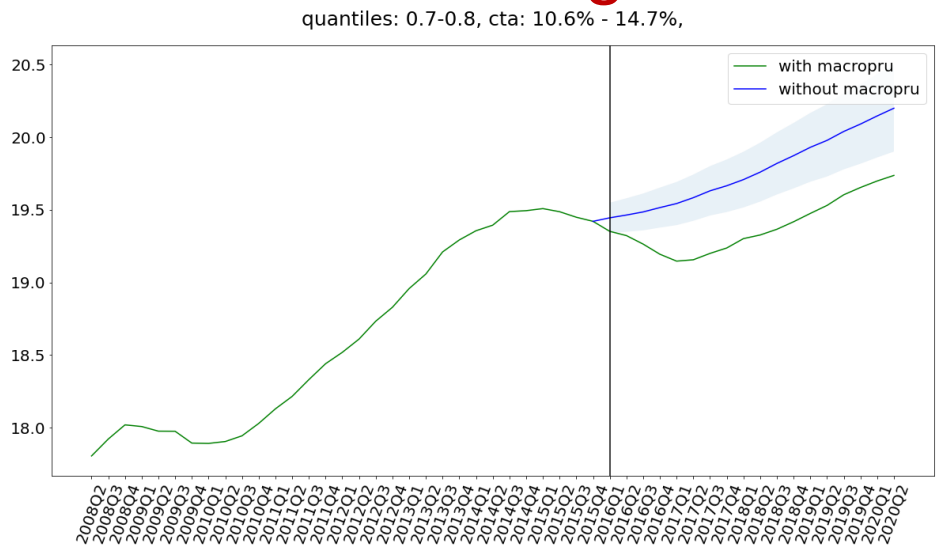
*** p<0.01, ** p<0.05, * p<0.1

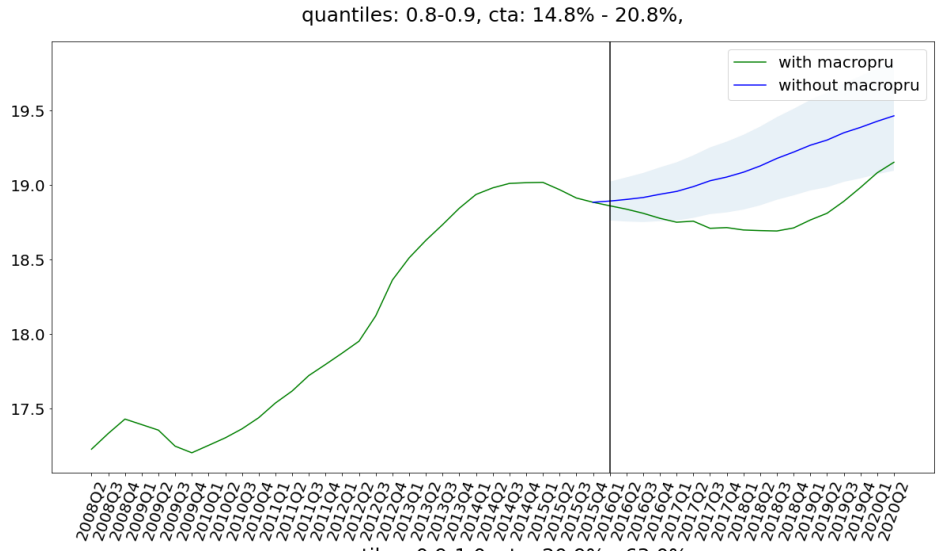
Dynamic Factor Model (DFM)

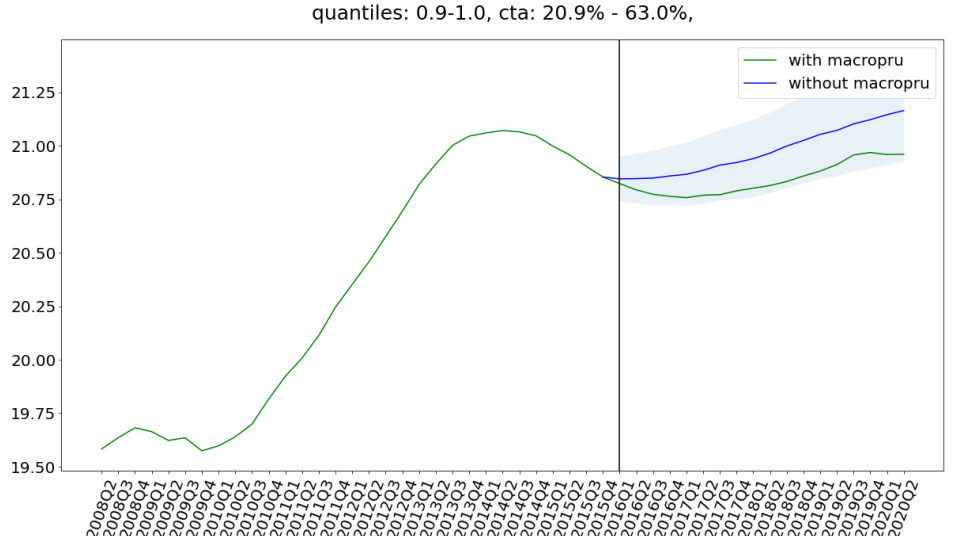


DFM | TOP-3 deciles of banks by share of consumer loans in assets as of 1Q16 reduced lending

d_log_loans, pp.







BIS, DFM comparison

	BIS	DFM	?
Multi-step measures	+	—	+
Account for sensitivity	+	—	+
Small data window	+	—	+
Welcomed outcome	—	+	+ ?
NO bias in estimates	?	n/a	+
Can be used for management by CBR?	+	?	+

Difference-in-differences solves most of BIS shortcomings

Consumer loans share
BEFORE the mpru

		Sub-sample (D_treat)	
		Control (0)	**Treatment (1)**
Time (D_time)	**BEFORE (0)**	0%	100%
	AFTER (1)	0%	0% (**D_TT**)

Exposed to mpru

Impact = - 100%

$$Y_{it} = \theta_1 \cdot D\_time + \theta_2 \cdot \left(D\_treat \cdot S\right) + \theta_3 \cdot D\_TT + X_{i,t-1}\mathrm{B}_i + \varepsilon_{it}$$

$$D\_TT = D\_time \cdot D\_treat \cdot S, \text{ where } S - sensitivity$$

The only paper on DiD for mpru:

Behncke S. Effects of Macroprudential Policies on Bank Lending and Credit Risks // Swiss National Bank (SNB) Working Papers. 2020. https://www.snb.ch/n/mmr/reference/working_paper_2020_06/source/working_paper_2020_06.n.pdf

BIS Approach

$$Y_{it} = \theta_1 \cdot D\_time_t + \theta_2 \cdot D\_treat_{it} + \theta_3 \cdot D\_TT_{it} + X_{i,t-1}\mathrm{B}_i + \varepsilon_{it}$$

Difference-in-differences (DiD)

$$Y_{it} = \theta_1 \cdot D\_time_t + \theta_2 \cdot D\_treat_{i} + \theta_3 \cdot D\_TT_{it} + X_{i,t-1}\mathrm{B}_i + \varepsilon_{it}$$

Key difference is that BIS does not preserve the treatment indicator like DiD does. As we show next, this may produce incorrect (biased) impact assessment.

DiD outperforms BIS econometrically

{X = CtA}		Time	D_treat	
			Control (0) Bank 1	Pilot (1) Bank 2
D_time		1	0%	0%
	Before (0)	2	0%	100%
	After (1)	3	0%	0% (D_TT)

True control indicator value

MaP Impact
OLS regression

3x set	BIS	DiD
Intercept	0.5	0.0
MaP*X	0.0	-1.0
MaP	-0.5	0.0
X	0.0	1.0

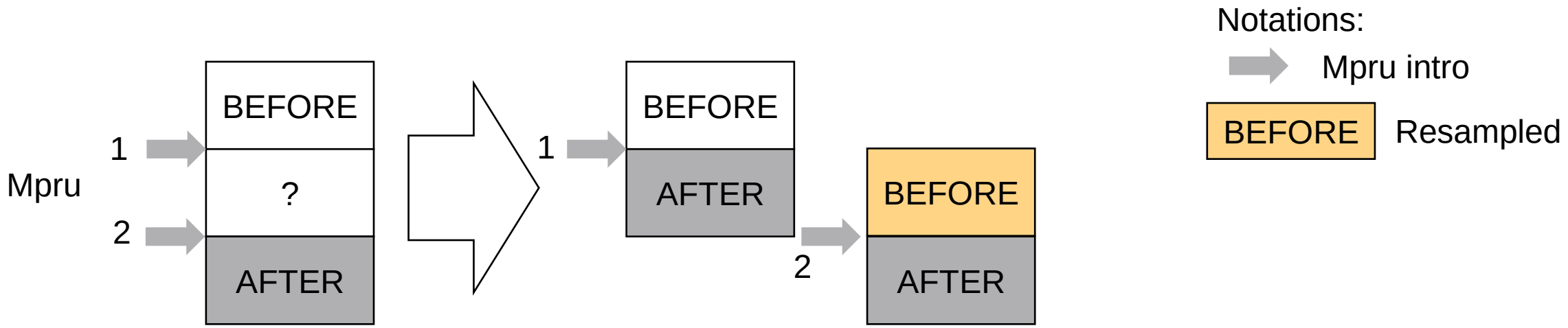
BIS takes lagged values of X

Time	MaP	Bank	Y	MaP * X	MaP	X
2	0	1	0	0	0	0
3	1	1	0	0	1	0
2	0	2	1	0	0	0
3	1	2	0	1	1	1

Difference-in-difference preserves X values unchanged

Time	MaP	Bank	Y	MaP * X	MaP	X
2	0	1	0	0	0	0
3	1	1	0	0	1	0
2	0	2	1	0	0	1
3	1	2	0	1	1	1

We have to resample data to account for multi-step measures



Actually, the period between step 1 and step 2 is the same time

- An AFTER period for step 1 and
- A BEFORE period for step 2

To properly apply difference-in-differences approach we need to create BEFORE-AFTER pairs of observations by resampling data for time span 1-2.

Example of data resampling

T	M	B1	B2
1	**0**	**0%**	**100%**
2	1	0%	100%
3	2	0%	0%

Avg	C (1x)	T (1x)
Before	0%	100%
After	0%	0%

Impact = **- 100%**

T	M	B1	B2
1	0	0%	100%
2	1	0%	100%

+

T	M	B1	B2
2	1	0%	100%
3	2	0%	0%

Avg	C (2x)	T (2x)
Before	0%	100%
After	0%	50%

Impact = **- 50%**

Notations:

Treated bank

AFTER period

Resampled data

IMPLICATION:

NOT accounting for multi-step intro produces a biased estimate.

Impact from the MaP sensitivity (per 1pp RW eq.)

Dep var (Y): **Number of deciles in treatment group**

CtA – share of consumer loans as of total assets

		1	2	3	4	5	6	7	8	9
D_TT	CtA_D	-0.003	-0.001	0	0	0	0	0	0	
D_TT	CtA_Ap	-0.003	-0.002	-0.001	-0.001	-0.001	-0.001	0	0	
D_TT	dKb_D	0.003	0.001	0	0	0	0.001	0	0	0
D_TT	dKb_Ap	0.001	0	0	0	0.001	0.001	0.001	0	0

d_log_cl – NEW consumer loans granted

		1	2	3	4	5	6	7	8	9
D_TT	CtA_D	0.01	0.014	0.024	-0.002	-0.003	0.017	0.017	0.104	
D_TT	CtA_Ap	0.016	-0.001	-0.02	0.003	0.027	0.054	-0.012	0	
D_TT	dKb_D	0.029	0.003	0.02	-0.002	0.009	0.003	-0.035	-0.009	0.009
D_TT	dKb_Ap	-0.116	0.004	-0.004	-0.009	0.01	0.014	0.052	0.024	0.102

d_log_loans – TOTAL loans growth rate

		1	2	3	4	5	6	7	8	9
D_TT	CtA_D	-0.024	-0.019	-0.019	-0.026	-0.03	-0.031	-0.037	-0.013	
D_TT	CtA_Ap	-0.014	-0.019	-0.026	-0.027	-0.036	-0.04	-0.047	-0.026	
D_TT	dKb_D	0.011	0.001	-0.006	-0.011	-0.004	-0.002	-0.01	-0.023	-0.028
D_TT	dKb_Ap	-0.008	-0.016	-0.015	-0.013	-0.014	-0.012	-0.013	-0.032	-0.045

Stat.sign. at least at 10%

CtA – share of consumer loans as of total assets;
Kb – capital buffer.

Decile	CtA	Kb
FROM	93.9	-401.0
1	**19.0**	0.3
2	**11.6**	1.6
3	**7.9**	2.9
4	5.3	4.9
5	3.6	7.9
6	2.4	11.7
7	1.4	17.2
8	0.4	26.2
9	0.0	41.7
TO	0.0	467.7

Overall banks tend to preserve risky consumer lending disregarding mpru

#	Indicator	BIS	DFM	DiD
1	Share of consumer loans on the book	n/a	n/a	Banks with the largest consumer loan portfolios (10-30%) **decrease** their portfolios
2	New consumer loans given	All banks **decrease** new loans given in short-run	n/a	**NO changes**
3	Total loans growth rate	All banks **decrease** lending in short-run and **increase** lending in the long-run; mid-sized players tend to gain market share	Banks with high share of consumer loans (30% of banks) **decrease** total lending	All banks with consumer loans **decrease** lending (70% of banks with consumer loans in excess of 1.4% of the assets)
		Banks with high capital buffers **decrease** lending	n/a	Banks with high capital buffers **decrease** lending

BIS, DFM, DiD comparison

	BIS	DFM	DiD
Multi-step measures	+	—	+
Account for sensitivity	+	—	+
Small data window	+	—	+
Welcomed outcome	—	+	+
NO bias in estimates	—	n/a	+
Can be used for management by CBR?	—	—	+

Apr'21 Mpru Reactivation by year end

TA – total assets, as of April 1, 2021
CL – consumer loans, as of March 01, 2021

Scenarios – reductions based on:
1 - the consumer portfolio share in total assets;
2 – the deciles in such a share distribution;

Assumptions:
3Q under impact from the announcement
+50 bp – mean RW hike (MaP tightening)
Total assets do NOT change

Predictions as of 4Q21 eop:
RUB 126 bn – scenario 1 (1.2% of CL)
RUB 218 bn – scenario 2 (2.1% of CL)

Thank you for your attention!

All the BoR research papers are available here:
http://www.cbr.ru/ec_research/
https://ideas.repec.org/s/bkr/wpaper.html