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Comparative Analysis and Stress-Testing Corporate and Retail Segments of Russian Credit Market

Oleg Kozlov

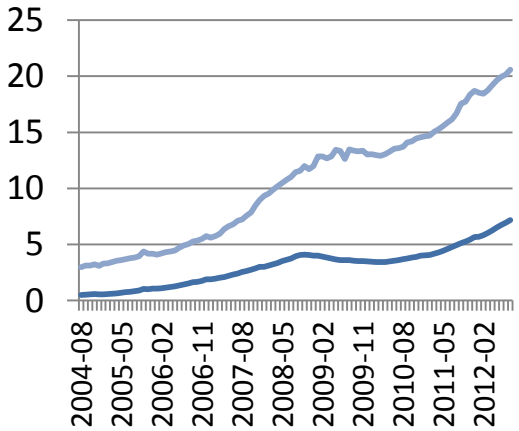
National Research University – Higher School of Economics,
London School of Economics and Political Science

Motivation and objective

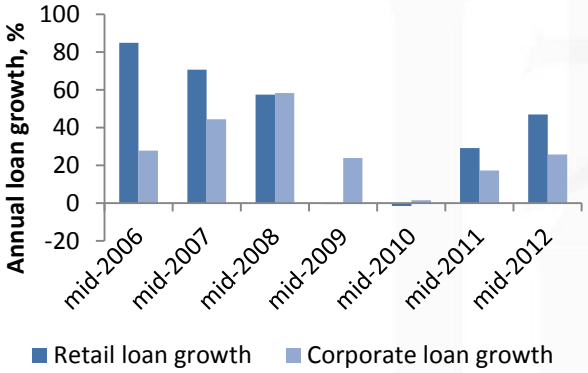
Many experts were concerned that since 2011 Russian credit market has grown promptly while average ratio of non-performing loans (NPL) remained rather high and capital adequacy of major banks decreased

The objective of the paper is to investigate and compare risk patterns in retail and corporate segments and assess the potential impact of macroeconomic shocks on loan quality

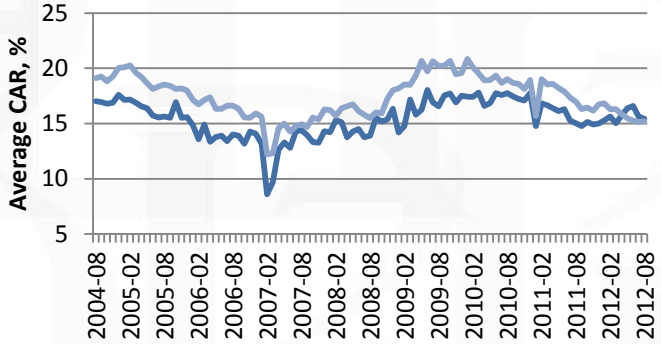
Size of segments, trln Rub



Annual growth rates in retail and corporate loans



Average capital adequacy ratio across banks by segment



Literature overview

Recent IMF recommendation papers (IMF, 2012) call for comprehensive framework, paying special attention to systemically important institutions and treating feedback effects

Stress-testing using VAR approach allows to analyse interconnection between financial and real sector variables, assess effects of shocks

Examples: UK (Hoggarth et al., 2005), Italy (Marcucci, Quagliariello, 2005), Czech Republic (Simeckova, 2011)

Stress-testing Russian banking system:

CBR	Foreign studies	CMASF
CBR (2011, 2012) Financial stability Reports	Fungcova Z. and Jakubík P. (2012)	Pestova (2010), Solntsev, Pestova, Mamonov (2010, 2012)
Sample ~1000 banks – reduced efficiency Out-of-date methods (system OLS) subject to technical issues e.g. omitted variable bias and auto-correlated errors	Too strong assumptions to apply Basel formulas and average estimators for Russia	Use cross-country data, do not distinguish between different sectors of credit market

Data and sampling

Data:

Micro data on banks: Mobile's "Banks and Finance" (2004-2012, monthly)

Macro data: CBR, Rosstat, Joint Economic and Social Data Archive (HSE)

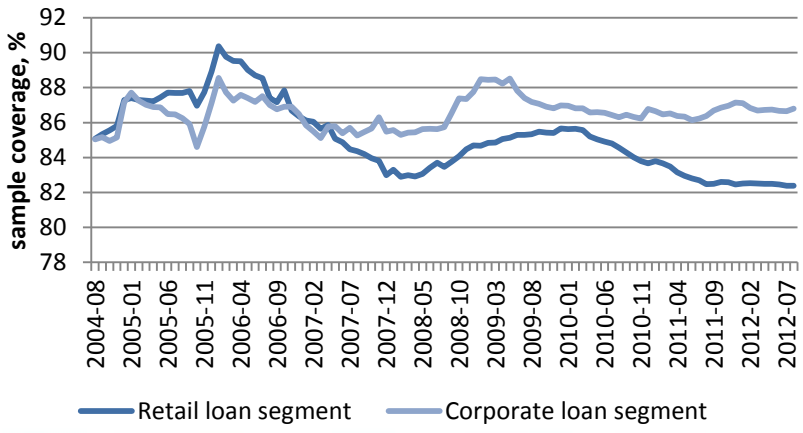
Sampling:

1) For retail and corporate sector list all credit organizations as of 01.09.2004 by the amount of loans they provided in descending order

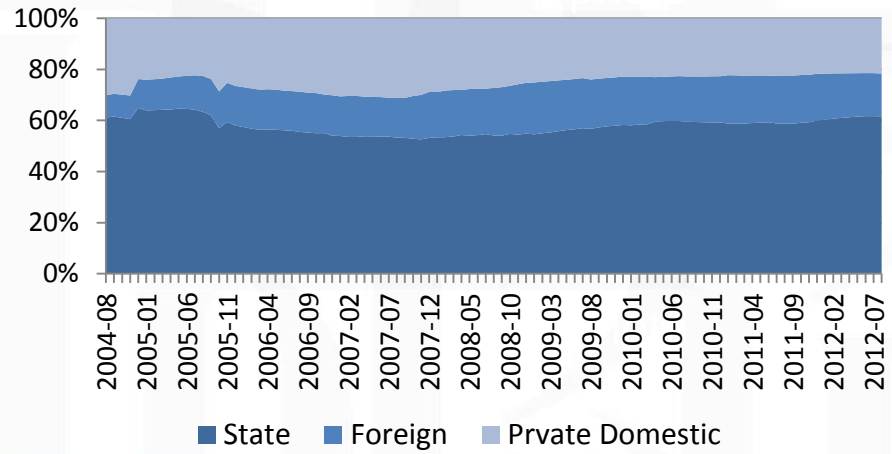
2) First N banks which cumulatively account for 85% of the market are included in the samples (allow each bank to enter both segments samples) get 97 banks in retail, 104 banks in corporate sector

4) Distinguish between State banks (Vernikov, 2011), foreign (>50% capital) and private domestic (rest)

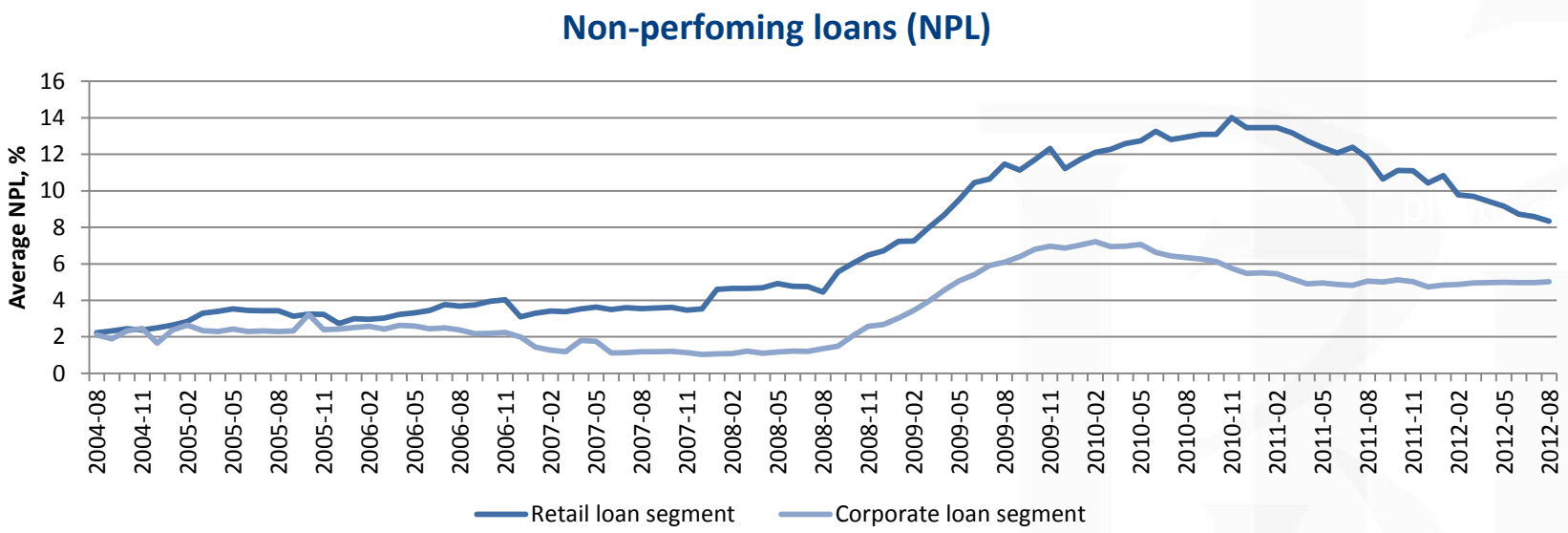
Sample coverage by segments

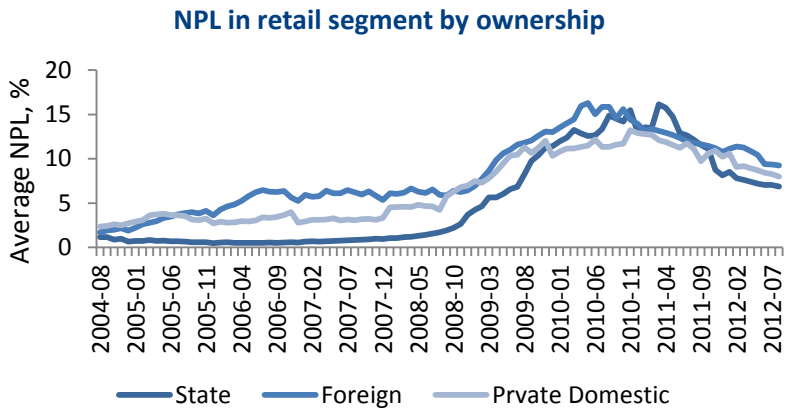


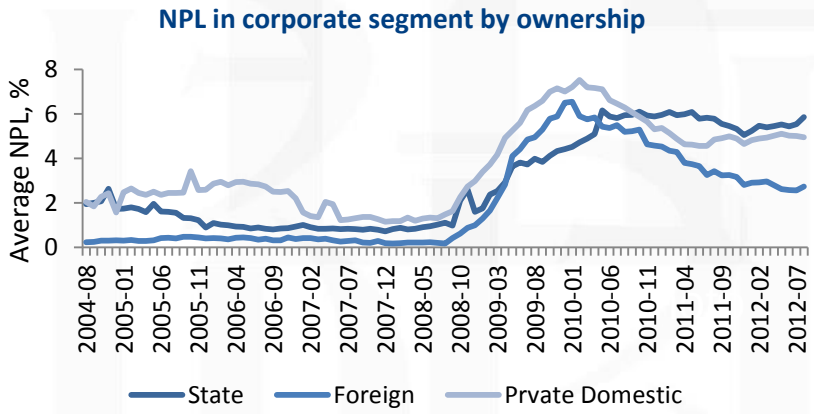
Market share of sampled banks by ownership



NPL trends in Russian banking







Credit Risk – Return Stability: derivation

- Cihak, (2007, p.26): back-testing (EWS): take NPL and CAR of a sample of banks and plot the on the plane
- The framework is modified: instead of CAR take Roy's (1952) Z-score and instead of NPL an indicator to measure institution's credit risk is developed
- Advantage: captures NPL dynamics and reserve buffer
- Enables to track bank's position over time in credit risk – return stability trade-off

Chebyshev theorem (inequality):

$$P\{|x - E(x)| > \mu\} \leq \frac{Var(x)}{\mu^2}$$

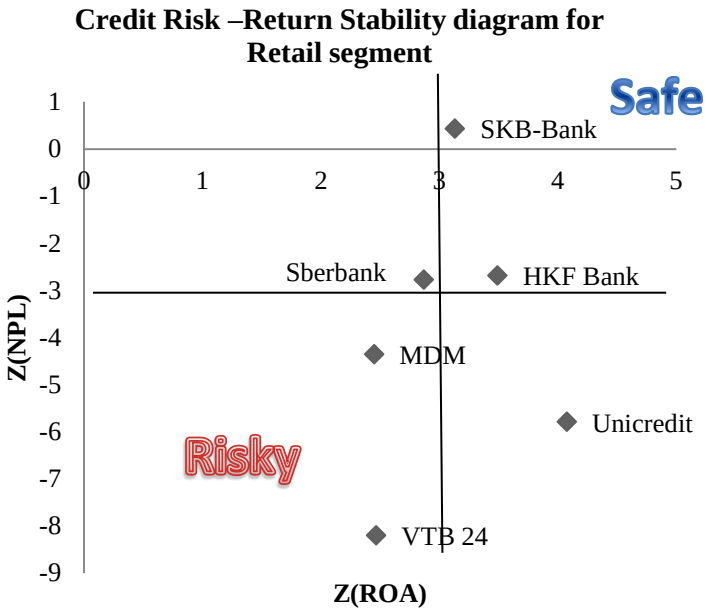
Z(NPL)-score: new measure of credit risk

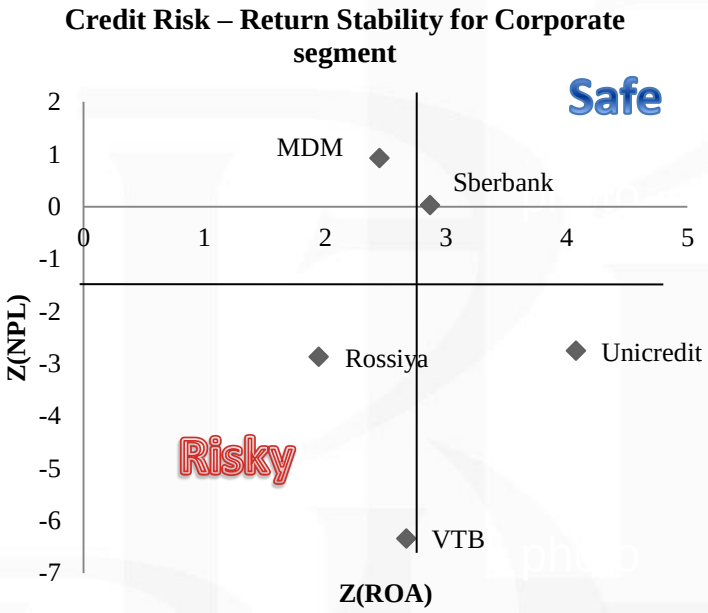
$$x = NPL,\ \mu = LLR - E(NPL)$$

$$P(NPL > LLR) \leq \frac{Var(NPL)}{\left(LLR - E(NPL)\right)^2}$$

$$Z(NPL) = \frac{LLR - E(NPL)}{\sqrt{Var(NPL)}}$$

Credit Risk – Return Stability: results





- Median Z(NPL) is two times lower in retail segment, meaning banks are exposed to higher credit risk there
- Same banks tend to exhibit similar but not exactly the same patterns in retail and corporate sectors
- VTB group banks have high credit risk exposure

VAR analysis: model specification

Estimate reduced-form VAR for each segment:

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + A_3 X_{t-3} + e_t \,,$$

where $X_t = \begin{pmatrix} GDP\ growth_t \\ M0\ growth_t \\ Investment\ growth_t \\ Loans\ growth_t \\ NPL\ growth_t \end{pmatrix}$

Goodness of Fit					
Equation	Y	M0	INV	Loans	NPL
R^2, corporate model	0.95	0.42	0.54	0.65	0.31
R^2, retail model	0.95	0.43	0.56	0.63	0.40

Granger causality tests results:

Corporate Segment

Y growth ⇔ NPL_c growth

NPL_c growth ⇨ CL growth

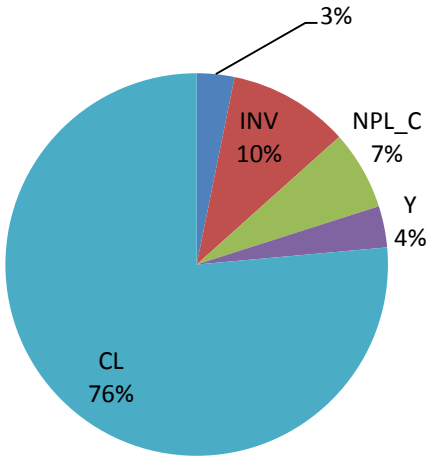
Retail Segment

Y, M0, RL growth ⇨ NPL_R growth

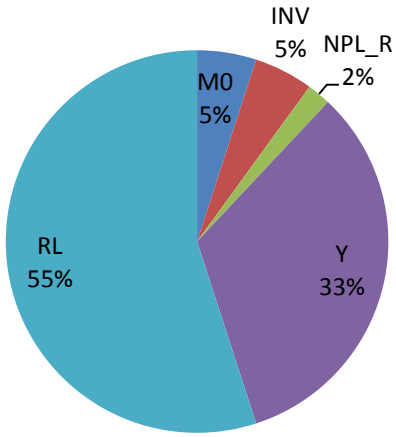
Y, M0 growth ⇨ RL growth

VAR analysis: FEVD analysis

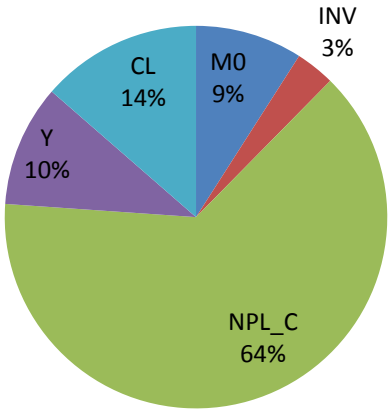
FEVD of CL



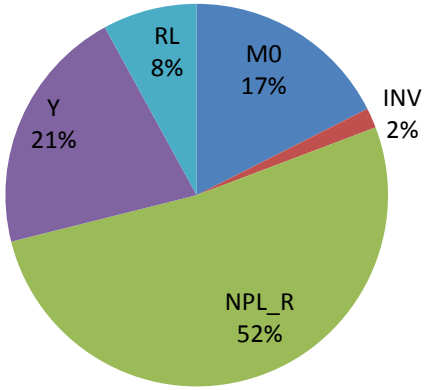
FEVD of RL



FEVD of NPL_C



FEVD of NPL_R



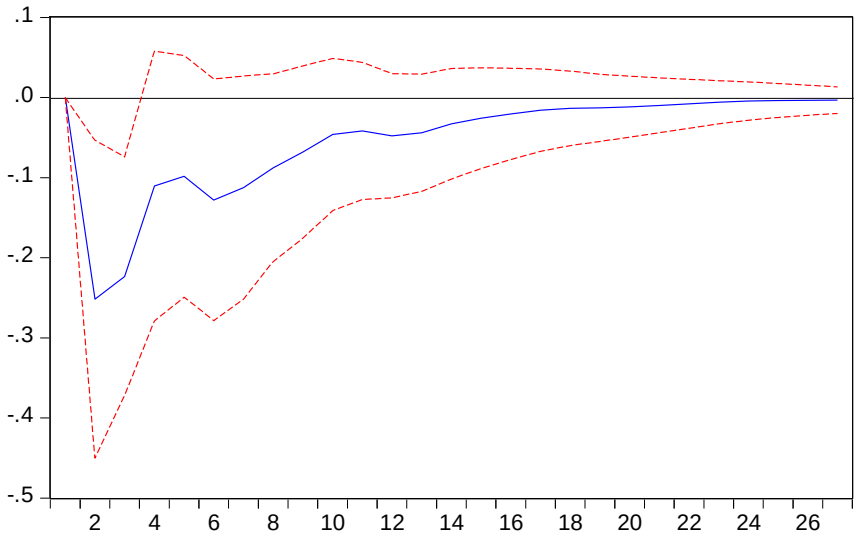
Forecast Error Variance Decomposition (FEVD) indicates how much variation in one variable can be attributable to changes in other variables

Variation attributable to macro factors in	Corporate segment	Retail segment
Loan growth	17%	43%
NPL growth	23%	40%

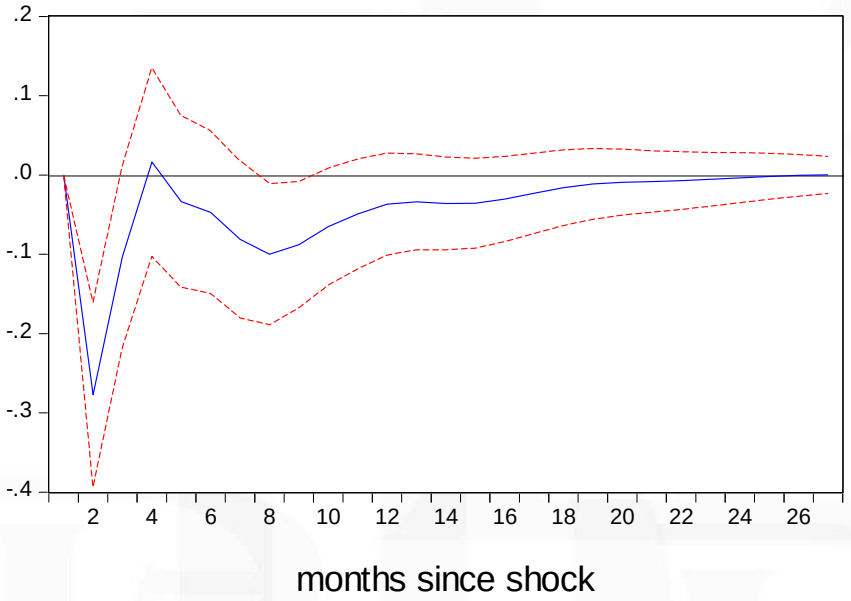
Retail segment is more sensitive to macroeconomic conditions

VAR analysis: output growth shock

Response of NPL_C to Y shock



Response of NPL_R to Y shock

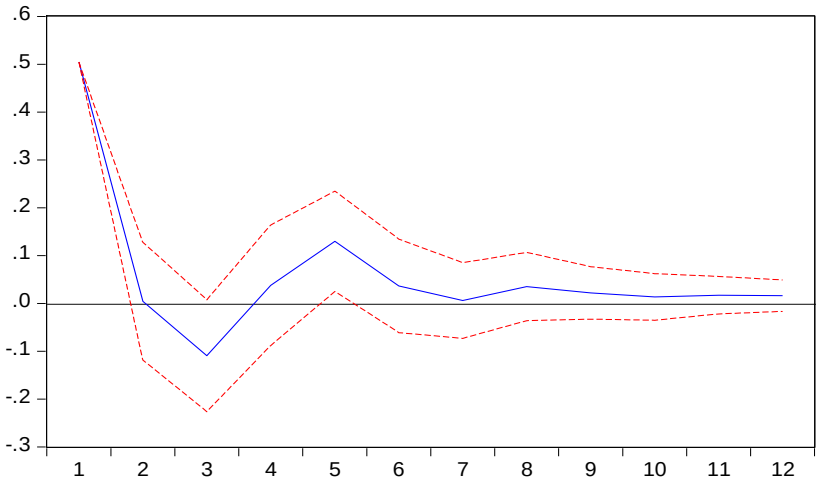


- Output growth shock (1 quarter SD) results in prolonged negative response of NPL in both segments (pro-cyclicality of credit risks)
- For similar studies of the UK, Italy, Czech banking systems the effect fades within 3-4 quarters, in Russia – 2 years

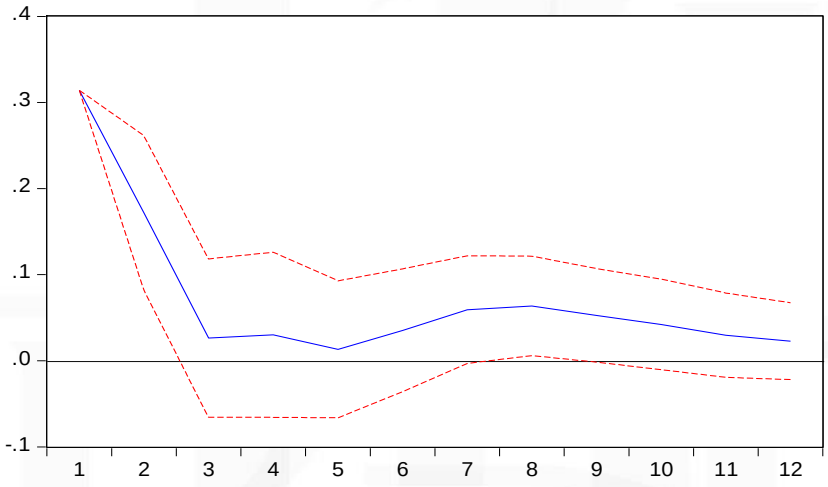
VAR analysis: stress-testing

Variable	M0	INV	Y	CL	RL	NPL_C	NPL_R
August 2008 shock, p.p.	-0,103	14,199	-0,554	1,658		50,457	
September 2008 shock, p.p.	-1,67	2,38	-1,220		-2,102		31,401

Response of NPL_C to shock



Response of NPL_R to shock



- Generally, banking system is prone to shocks (recovers within a year)
- Magnitude of shock to NPL_R is less but adaptation period is longer and it is associated with higher uncertainty

Concluding remarks

Average level and sensitivity of credit risk to macroeconomic shocks is higher in *retail* segment

- Average NPL in retail segment has been twice as high as in corporate
- Variation in NPL explained by macroeconomic shock: 23% in corporate, 40% in retail
- On bank-specific level VTB group banks were identified as ‘risky’
- The effect of repetition of 2008 scenario on NPL fades within a year, hence the system is generally prone to shocks
- Policy implications: focus supervisory control on retail segment, expand and implement Credit Risk – Return Stability framework for systematic distant risk-based monitoring

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Thank you for your attention!

Oleg Kozlov
NRU – HSE, LSE
kozlovos@mail.ru