CENTER FOR MACROECONOMIC ANALYSIS AND SHORT-TERM FORECASTING

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Modeling Interest Rate Risk in the Russian Banking System: Prospects and Challenges in the Short-Run

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Presentation plan

I. Current situation

II. Interest rate risk assessment system for the Russian banking sector

a) Structure

b) Econometric models

c) Leading indicators

III. Short-term forecast (2013)

IV. Conclusions

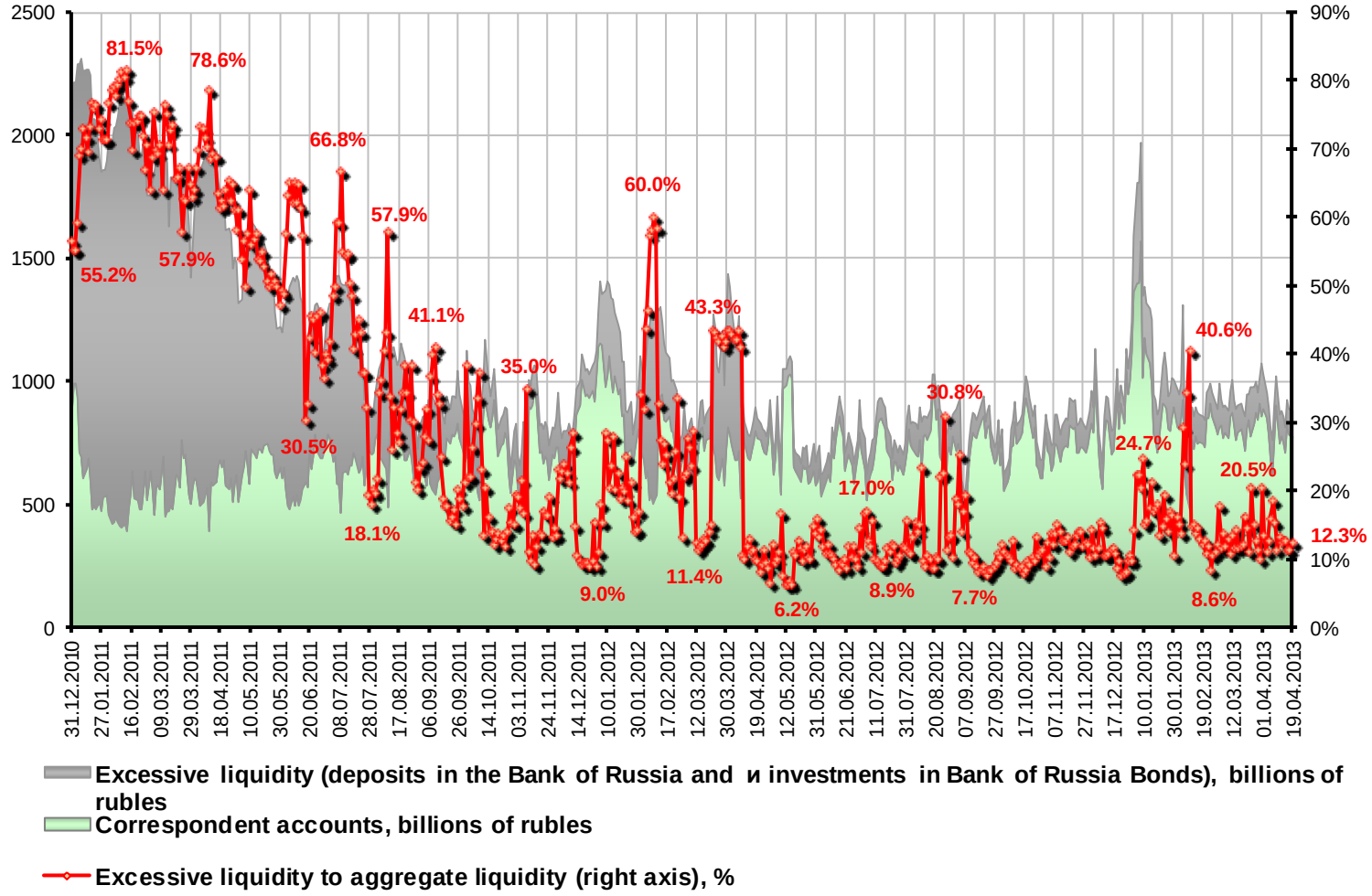
I. Current situation

Current situation

Key interest rates in Russia

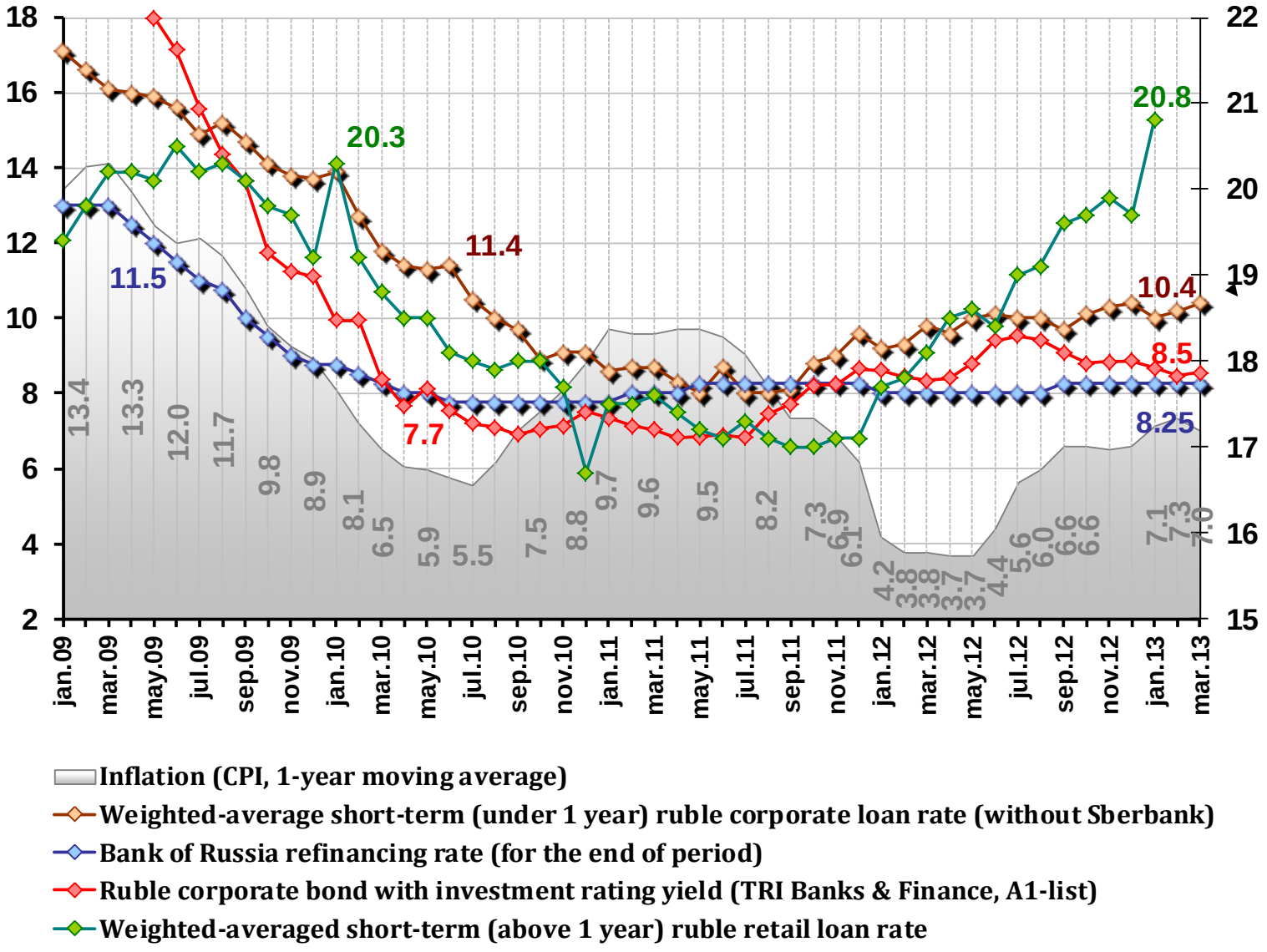
- ***Long-standing tendency to growth of corporate and retail loan rates*** since the end of 2011, beginning of 2012 at the same time with banking system transition to new reality in the area of liquidity adequacy (from abundance to scarcity)
- ***Deposit rates stabilization*** (8.1% for household deposits in march) as a result of banks' policy to increase interest margins because of capital requirements toughening
- ***Refinancing rate stabilization*** at the level 8.25% since september 2012. Despite of relatively sustainable situation with exchange rate risks inflation pressure doesn't allow the Bank of Russia to stimulate economic growth through cutting the refinancing rate
- ***Sideways trend in ruble bond yield of banks and financial companies with investment grade*** since the beginning of 2012. Principal factor – absence of significant negative signals for Russia from global economic conditions

Banks liquid ruble assets (investments in OBR[1], correspondent accounts and deposits in the Bank of Russia, billions of rubles)



[1] *Bank of Russia Bonds*

Key interest rates and inflation dynamics in the Russian banking sector, %



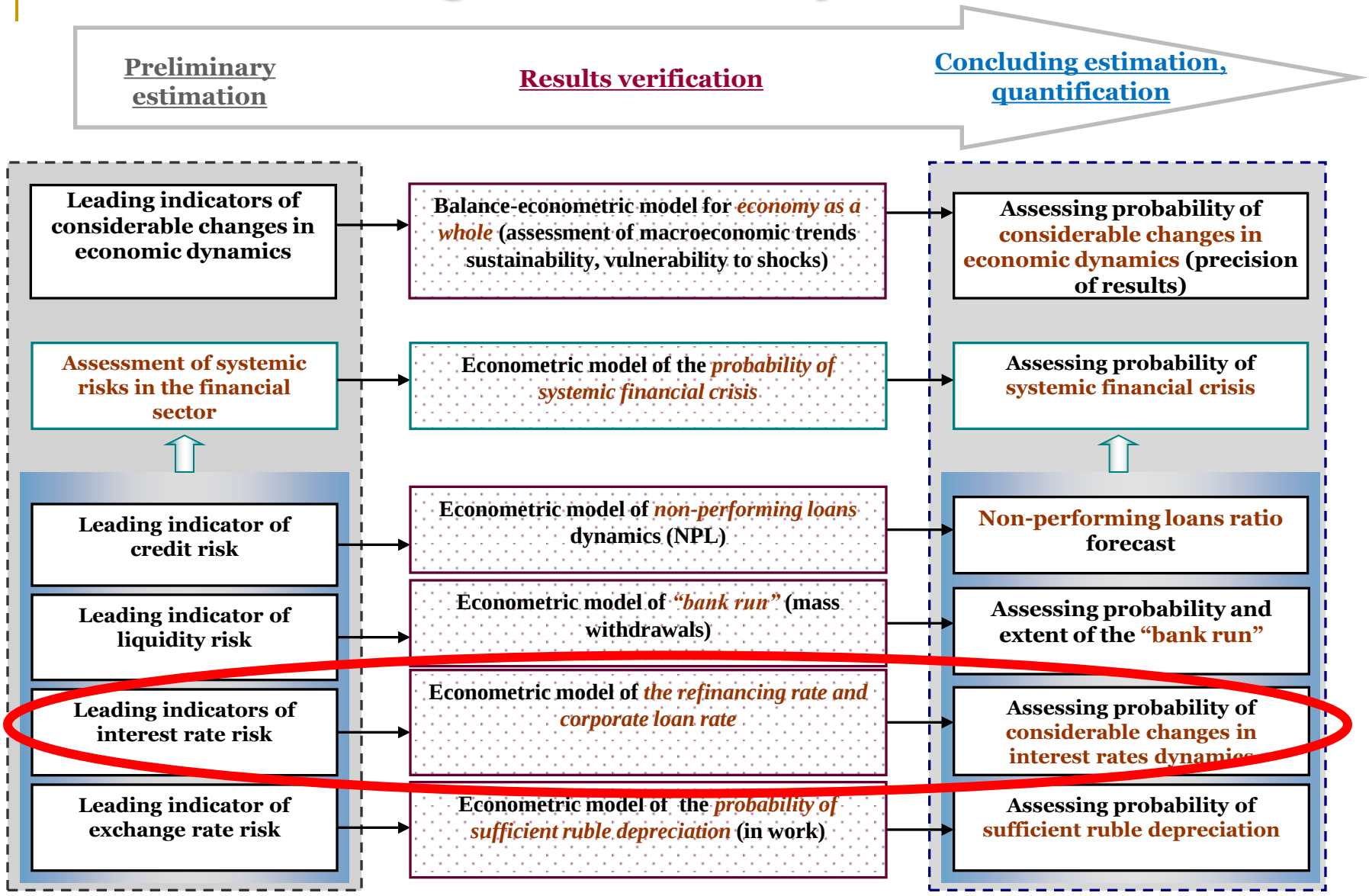
Current situation

Principal questions

- **What are the principal risk sources** for the future interest rates dynamics?
- **Downward correction of interest rates**: is it possible in 2013?
- What **changes in monetary rule** should we expect?
- What impact will worsening of **global economic conditions** have on interest rates dynamics in Russia?

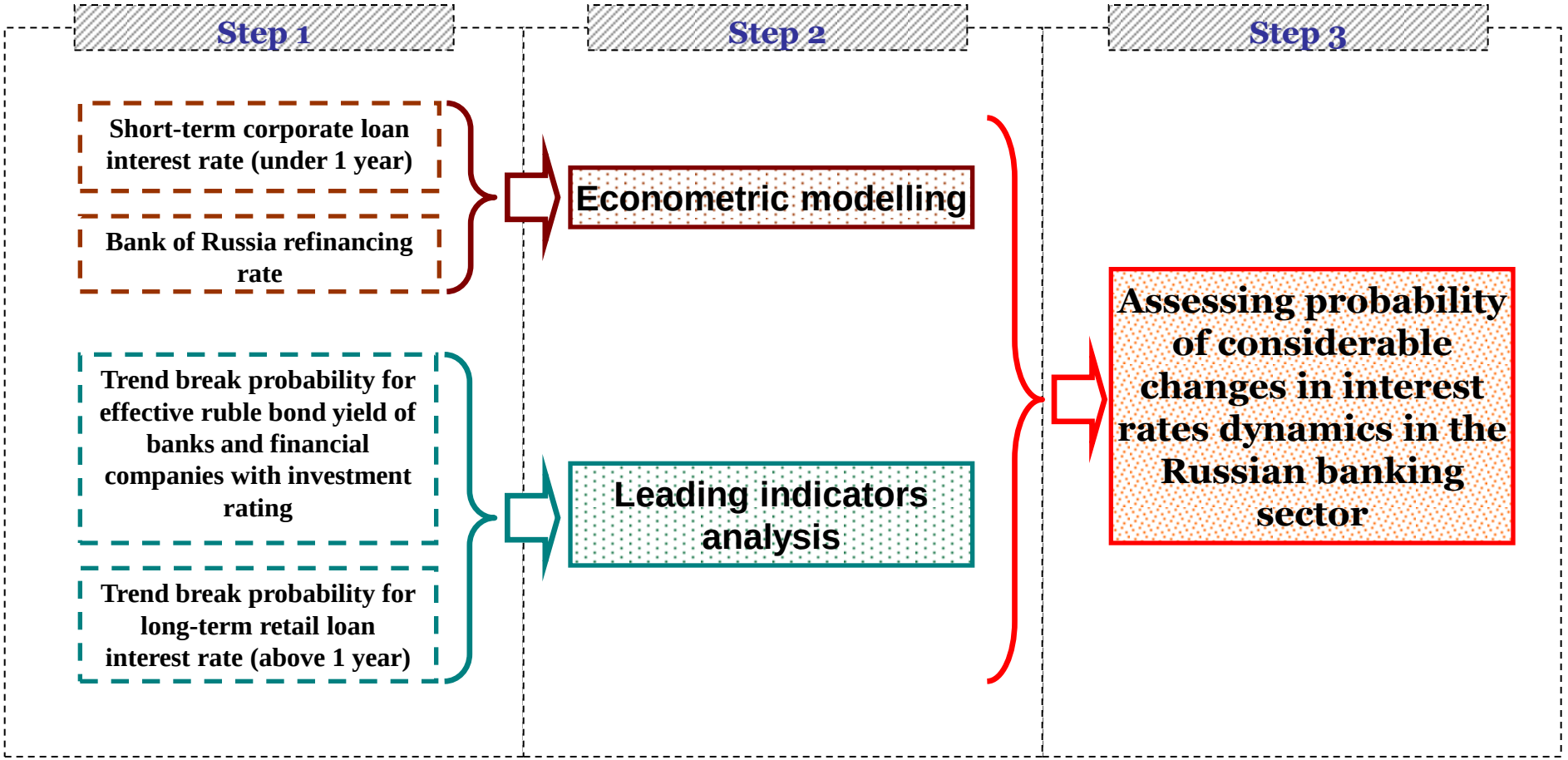
II. Interest rate risk assessment system for the Russian banking sector

CMASF Leading Indicators System



System of interest rate risk assessment for the Russian banking sector

Structure



Bank of Russia refinancing rate modeling

Taylor rule

$$R_t = \bar{r} + \Delta p_t^a + \alpha_1(\Delta p_t^a - \pi^*) + \alpha_2 \bar{y}_t$$

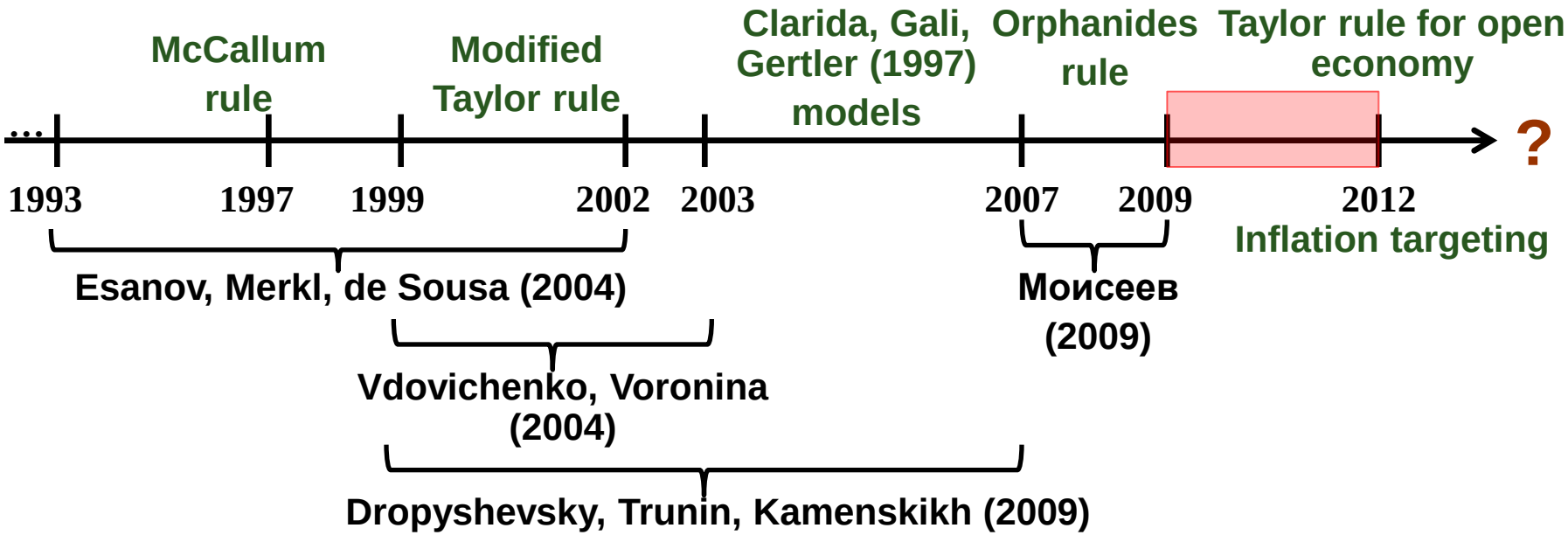
- R_t – short-term nominal interest rate
- $\bar{r}$ – average real long-term interest rate
- Δp_t^a – average or current inflation value (or expected values)
- π^* – central bank target inflation rate
- $\bar{y}_t$ – difference between actual values of output and its potential values (or long-term trends)

Bank of Russia refinancing rate modeling
Special features

- **Decision-making on the base of expected values of target variables** – Generalized Method of Moments (GMM) estimation
- **Adjustment of expectations to changes in time and policy regime** – differences between actual values of explanatory variables and its long-term trends
- **Various economic situation developments** – scenario modeling
- **Harmonized time series** – the same monetary policy conditions
- **Verification of the model specification stability for the considered time period** – bootstrap resample procedure and estimated coefficients correction
- **Inertia factor**– including lagged dependent variable in the list of explanatory variables

Bank of Russia refinancing rate modeling

Monetary rule assessment for the Russian economy



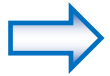
2009-2012-?

- **Refinancing rate values estimation on the basis of two econometric models with regard to expert opinion**
- **Taylor rule for open economy:** target variables – inflation and exchange rate
- **Inflation targeting:** target variable – inflation
- *None of the model specifications with GDP as target variable is significant*

Bank of Russia refinancing rate modeling

Monetary rule assessment for the Russian economy

Calculating elasticity of the refinancing rate to dynamics of target factors

Factors	1995-1998	1999-2004	2005-2008	2009-2012	*2012-present*
Inflation	11.0	15.0	22.7	17.4	
Exchange rate	-	3.83	1.02	0.90	
GDP	2.00	0.67	0.14	0.07	?
Lagged refinancing rate	0.90	0.90	0.80	0.80	

Instrumented variables: lagged refinancing rate, GDP

Bank of Russia refinancing rate modeling

Model 1, inflation targeting

- **Dependent variable** – current Bank of Russia refinancing rate

Explanatory variables		*OLS-1*	*OLS-2*	*OLS-3*
Refinancing rate	Lag -1	0.885*** (0.024)		
	Lag -3		0.648*** (0.039)	
	Lag -6			0.369*** (0.035)
Basic consumer price index (to the same month of the previous year)		0.287*** (0.145)	0.778*** (0.265)	1.033*** (0.279)
Constant		-2.176*** (1.396)	-5.539*** (2.627)	-6.023** (2.867)
Number of observations		50	48	45
R-squared		$R^2 = 0.99$	$R^2 = 0.94$	$R^2 = 0.83$
F-stat (P-value)		1923.1 (0.00)	324.39 (0.00)	99.00 (0.00)

*Note: *** P<0.01, significance level equals 1%*

Bank of Russia refinancing rate modeling

Model 2, with taking into account exchange rate dynamics

Explanatory variables		*2OLS-1*	*2OLS-2*	*2OLS-3*
Refinancing rate	Lag -1	0.724*** (0.097)	0.756*** (0.127)	
	Lag -3			0.353** (0.163)
Difference between actual exchange rate of the bi-currency basket against the Russian ruble and long-term exchange rate trend forecast for a month		0.210** (0.111)	0.140* (0.095)	0.571** (0.261)
Difference between real inflation rate and target inflation rate	Lag -1	0.534*** (0.211)		1.144*** (0.440)
	Lag -3		0.406* (0.205)	
Constant		2.290*** (0.831)	2.018* (1.089)	5.415*** (1.415)
Number of observations		49	47	47
R-squared		$R^2 = 0.98$	$R^2 = 0.98$	$R^2 = 0.83$
F-stat (P-value)		576.3 (0.00)	772.57 (0.00)	81.83 (0.00)
Instrumented variables		Difference between actual exchange rate of the bi-currency basket against the Russian ruble and long-term exchange rate trend forecast for a month		
Number of instruments		3	3	3
Hansen test, instruments relevance, P-value		0.22	0.28	0.38

*Note: *** P<0.01, significance level equals 1%, * P<0.10, significance level equals 10%.*

Weighted-averaged short-term ruble corporate loan rate modeling

Factors

Factor	*Assumed sign of the factor impact on corporate loan rates*
Lagged dependent variable (factor of inertia)	+
Loan demand (rate of increase)	+
Internal financial markets	
Refinancing rate	+
Money supply (rate of increase)	-
Excessive liquidity to total liquidity of banks	-
Internal macroeconomic situation	
Consumer price index	+
Exchange rate dynamics	+
World markets	
Oil price	-

Weighted-average short-term ruble corporate loan rate modeling

Explanatory variables		*2OLS-1*	*2OLS-2*	*2OLS-3*
Lagged weighted-average short-term ruble corporate loan rate		0.906*** (0.024)	0.901*** (0.025)	0.897*** (0.026)
Oil price (growth rate over 3 months)	Current value	-0.978*** (0.250)	-0.935*** (0.26)	
	Lag -1			-0.714*** (0.270)
Basic consumer price index (to the same month of the previous year)	Lag -1	0.443** (0.173)		
	Lag -2		0.457*** (0.175)	0.517*** (0.186)
Loan demand indicator (excess or scarce of loan demand)		0.774*** (0.268)	0.815*** (0.263)	0.705** (0.282)
Constant		-3.837** (1.810)	-3.948** (1.814)	-4.565** (1.929)
Number of observations		95		
R-squared		$R^2 = 0.95$		
F-stat (P-value)		581.22 (0.00)	584.85 (0.00)	537.22 (0.00)
Instrumented variables		Loan demand indicator (excess or scarce of loan demand)		
Number of instruments		4		
Hansen test, instruments relevance , P-value		0.43	0.47	0.65

*Note: *** P<0.01, significance level equals 1%, * * P<0.05, significance level equals 5%, * P<0.10, significance level equals 10%*

Leading indicators construction methodology
Signals approach

- **Identifiable event** – a switch to a positive / negative rate of growth of interest rates for 6 months observed for 6 consecutive months
- Composite leading indicators of **retail loan rate and effective ruble bond yield of banks and financial companies with investment rating**
- Selected leading indicators groups as **components of composite leading indicators**

Values distribution of each leading indicator

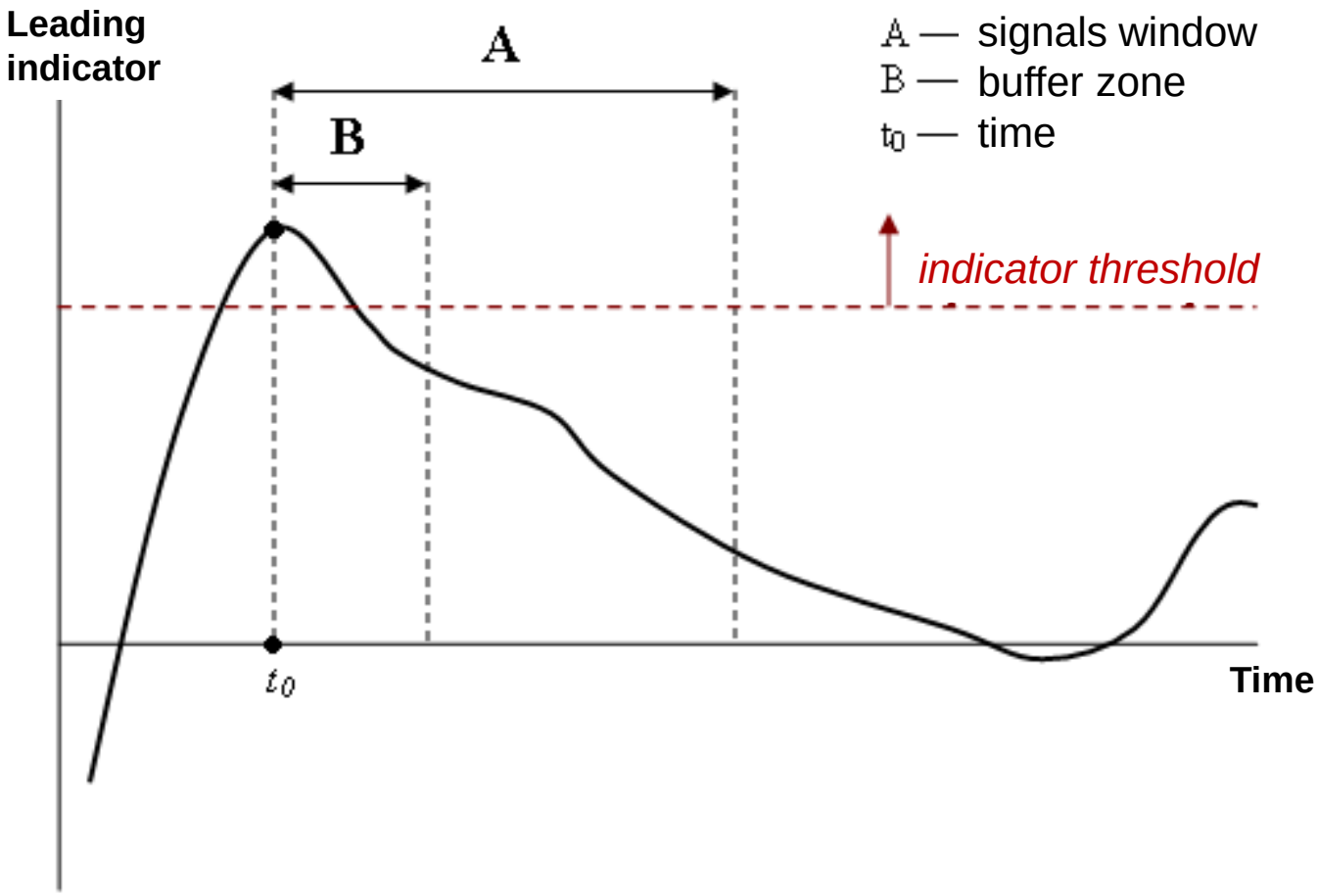
Signal	crisis realized during the signal window*	crisis didn't realized during the signal window
signal exists	A	B
signal does not exist	C	D

** Signals window – time lag of leading (specified by expert)*

Leading indicator noisiness:

$$\frac{Noise}{Signal} = \frac{B/(B+D)}{A/(A+C)} \rightarrow \min$$

Leading indicators construction methodology
Signals approach



Leading indicators construction methodology
Signals approach

Composite leading indicator

$$I_t^{(r)} = \sum_{j=1}^{k} Signal_{j,t}^{(r)} \cdot \underbrace{\left(\Pr ob_j^{(r)}\left(Crisis \mid Signal\right) - \Pr ob_j^{(r)}\left(Crisis\right)\right)}_{\text{Leading indicator j weight}}$$

Unconditional crisis probability:

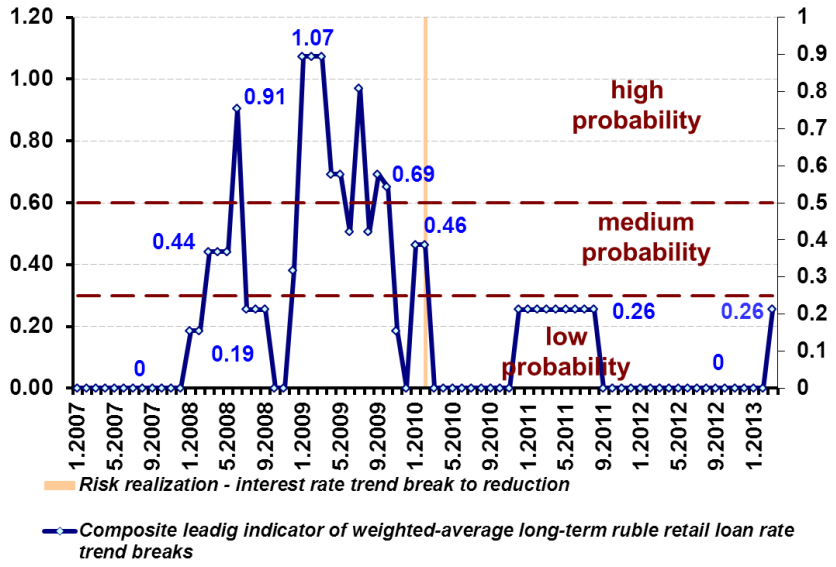
$$\Pr ob\left(Crisis\right) = \frac{A + C}{A + B + C + D}$$

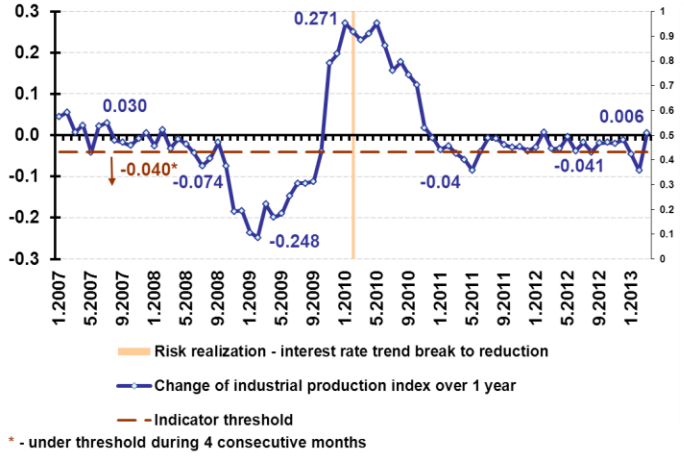
Conditional crisis probability (signal exists – crisis occurs):

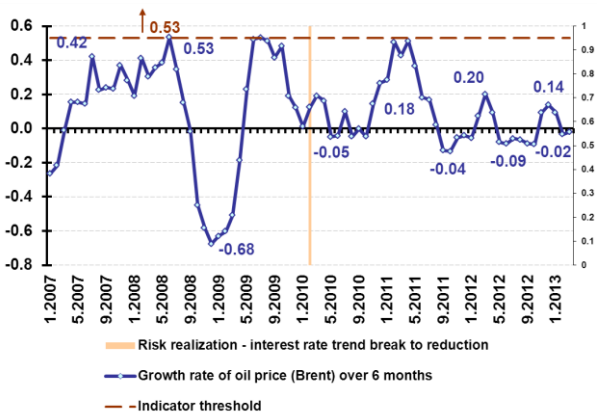
$$\Pr ob\left(Crisis \mid Signal\right) = \frac{A}{A + B}$$

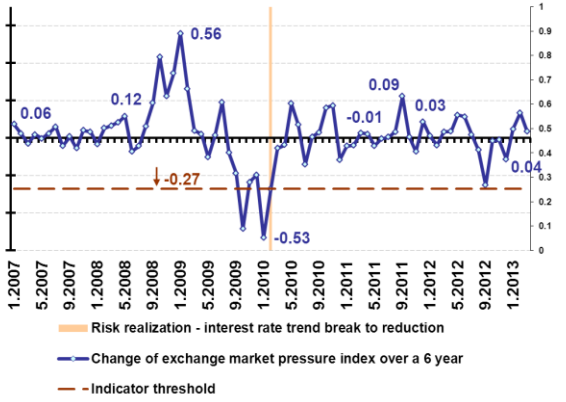
Composite leading indicator of trend breaks for long-term ruble retail loan rate - a switch to reduction

Leading indicators	Threshold	Weight	Noise/ Signal
Change of industrial production index over 1 year	< -4.0 p.p.	0.51	8%
Growth rate of oil price (Brent) over 6 months	> 55%	0.46	12%
Change of exchange market pressure index over a 6 year	< 0.27	0.46	12%
Change of LIBOR 6 month over 6 months	< -1 p.p.	0.19	47%



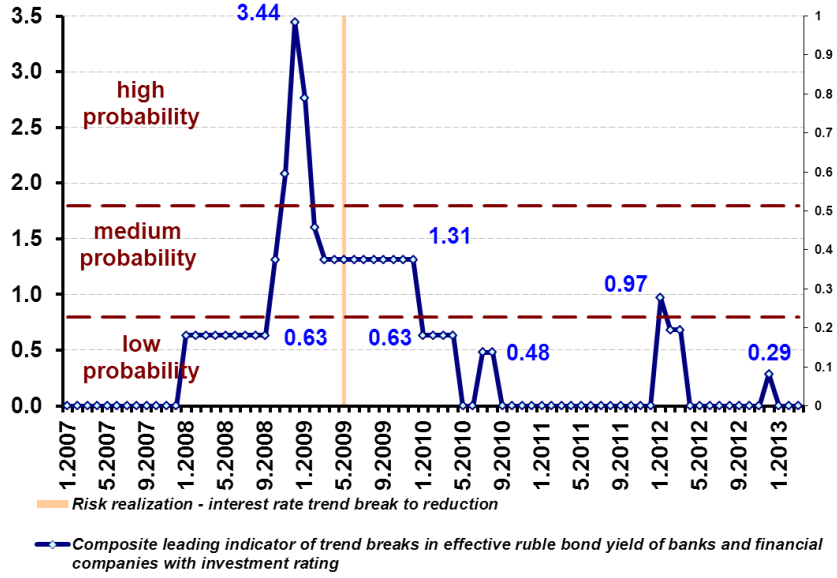


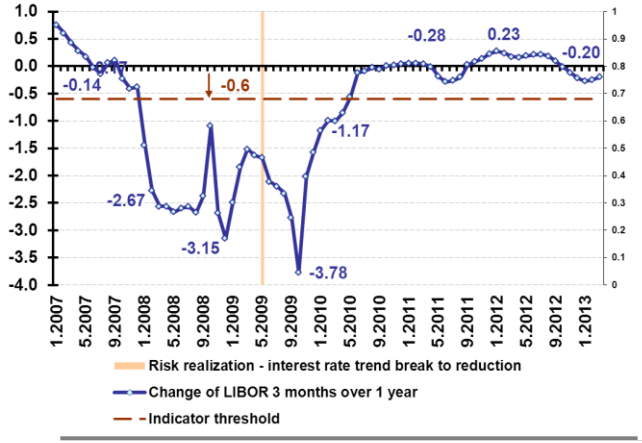


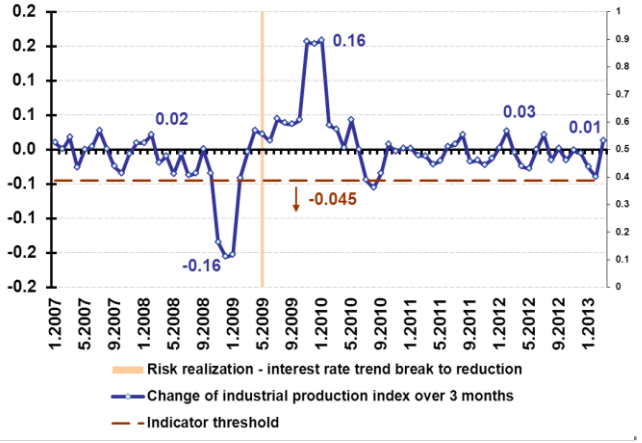


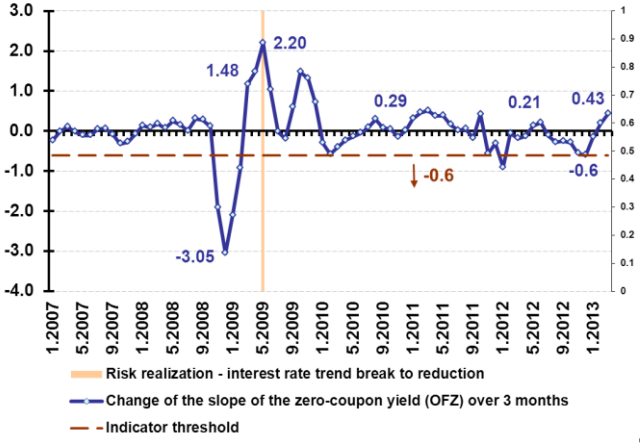
Composite leading indicator of trend breaks for effective ruble bond yield of banks and financial companies with investment rating - a switch to reduction

Leading indicators	Threshold	Weight	Noise/ Signal
Change of LIBOR 3 months over 1 year	< -0.6 p.p.	0.63	2%
Change of industrial production index over 3 months	< -4.5 p.p.	0.48	12%
Expected world GDP growth in the next 12 months – IMF forecast	< 3.5%	0.68	0%
Change of the slope of the zero-coupon yield (OFZ, federal loan obligations) over 3 months	> -0.6 p.p.	0.29	30%









III. Short-term forecast (2013)

Scenario modeling and expected interest rates dynamics

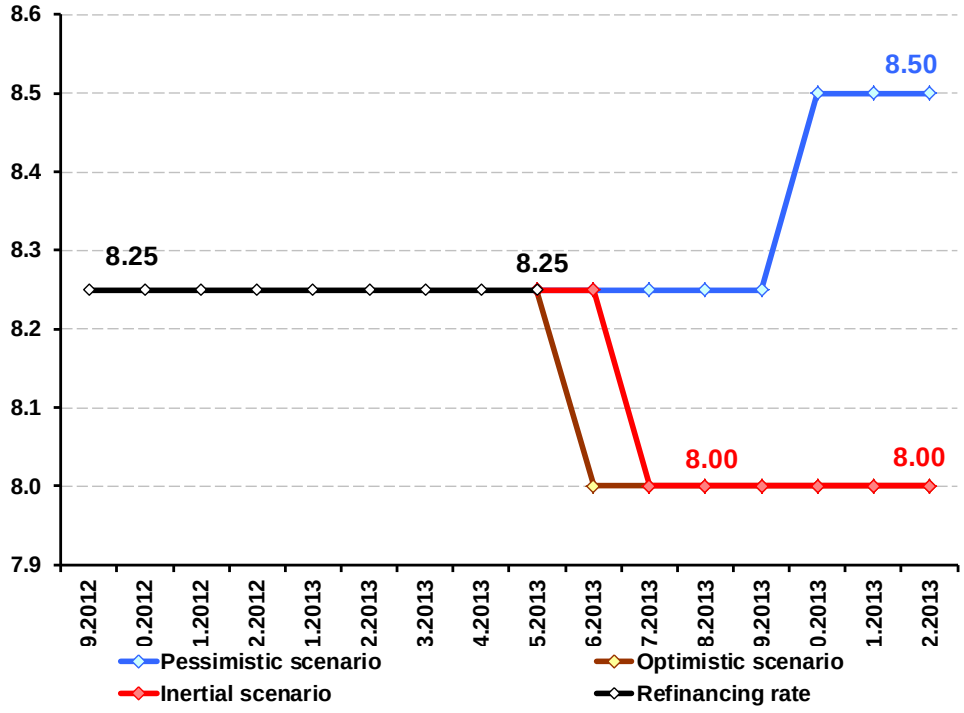
Scenario modeling - 2013

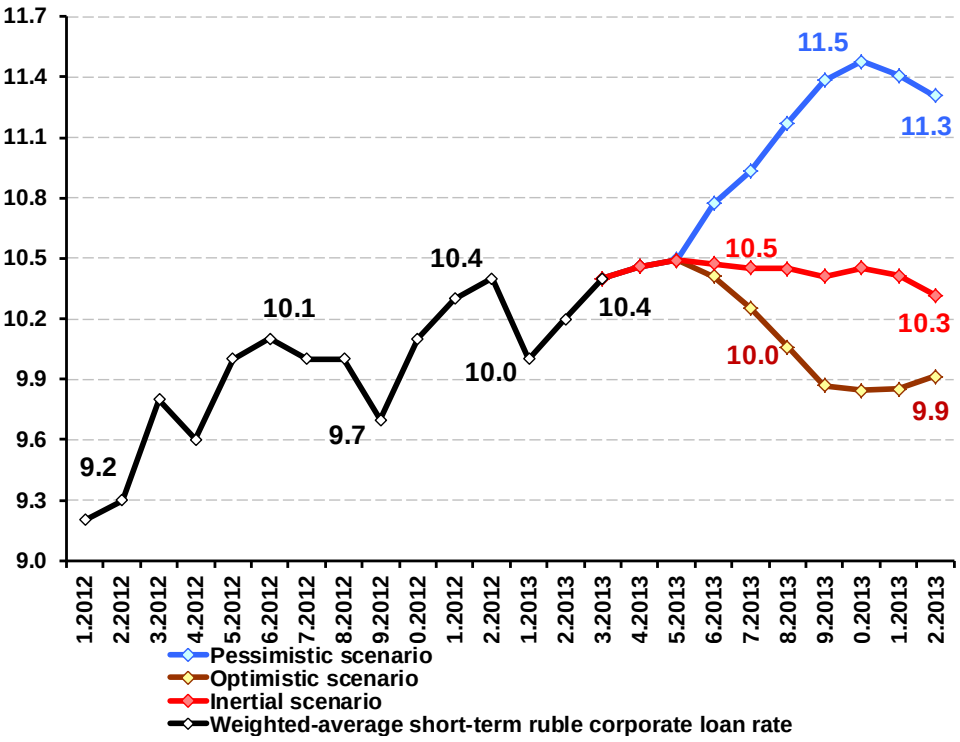
Scenarios	GDP	Oil prices	Inflation	Exchange rate*
Inertial	2.3	97	7.0	39.2
Optimistic	2.9	106	6.4	36.8
Pessimistic	1.5	91	7.9	41.2

**Bi-currency basket to ruble*

Short-term forecast (2013): econometric modeling

Refinancing rate and corporate loan rate





IV. Conclusions

Conclusions

What are the principal risk sources of future interest rates dynamics?

- *Upward trend:*
  - liquidity adequacy problems
  - inflation pressure
  - the accumulation of credit risks in the sector of consumer lending
  - global economic conditions
- *Downward trend:*
  - loan demand slowdown (departure point – corporate sector)
  - slump in production
  - adaptation to permanent liquidity scarcity
  - expectations of downward correction

Conclusions

Downward correction of interest rates: is it possible in 2013?

- *Refinancing rate* – **upper-medium probability** (60-70%)
- *Corporate loan rate* – **upper-medium probability** (60-70%)
- *Retail loan rate* – **medium probability** (higher than 50%)
- *Effective ruble bond yield of banks and financial companies with investment rating* – **medium probability** (higher than 50%)

Conclusions

What changes in monetary rule should we expect in 2013?

- **Gradual cushioning of monetary policy** – refinancing rate decrease to 8.0%
- **First steps to flexible inflation targeting regime** – more "weight" to economic growth with inflation as a principal factor for monetary instruments dynamics
- **Preservation of significant exchange rate effect on refinancing rate dynamics**

Conclusions

What impact will worsening of global economic conditions have on interest rates dynamics in Russia?

- **Pessimistic scenario**: adverse global economic conditions

Interest rates	Tendency	Quantitative estimation	Factors
Refinancing rate	growth	by 0.25 p.p./ to 8.5%	inflation pressure/ exchange rate weakening
Corporate loan rate	growth with stabilization at the end of period	by 0.5-1 p.p./to 11-11.5%	oil prices decline /credit risks realization
Retail loan rate	growth	-	consumer loan bubble blowing out
Effective bond yield in the financial sector	stabilization	-	devaluation expectations increase/world interest rates upward correction

Thank you for your attention!



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