Distinctive Features of the RIM Model of Russia

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RIM sectors 1-44

1 Agriculture
2 Petroleum extraction
3 Natural gas extraction
4 Coal mining
5 Other fuels, incl. nuclear
6 Ore and other mining
7 Food, beverages, tobacco
8 Textiles, apparel, leather
9 Wood and wood products
10 Paper and printing
11 Petroleum refining
12 Chemicals
13 Pharmaceuticals
14 Plastic products
15 Stone, clay and glass products
16 Ferrous metals
17 Non-ferrous metals
18 Fabricated metal products
19 Machinery
20 Computers, office machinery
21 Electrical apparatus
22 Radio, television, communication equipment
23 Medical, optical, and precision instruments
24 Automobiles, highway transport equipment
25 Ships and repair
26 Airplanes, rockets, and repair
27 Railroad equipment and its repair
28 Recycling
29 Electric, gas, and water utilities
30 Construction
31 Trade
32 Hotels and restaurants
33 Transport and storage
34 Communication
35 Finance and insurance
36 Real estate
37 Equipment rental
38 Computing service
39 Research and development
40 Other business services
41 Government, defense, social insurance
42 Education
43 Health services
44 Other social and personal services

RIM embodied technological progress

$$Q(t) = f(L(t),K(t),t)$$

$$(1) \qquad Q_t = Ae^{rt}L_t^{\alpha} K_t^{1-\alpha}$$

Q - output
L - employment
K - capital stock

e^{rt} - «disembodied» technical change

Divided both sides of (1) by K

$$Q_t/K_t = Ae^{rt}(L_t/K_t)^{\alpha}$$

solve for (L/K)

$$(L_t/K_t)^{\alpha} = (1/A)\, e^{-rt}\, (Q_t/K_t)$$

and take logarithms of both sides

$$\alpha \log(L_t/K_t) = - \log A - rt + \log(Q_t/K_t)$$

and divide both sides to α to get

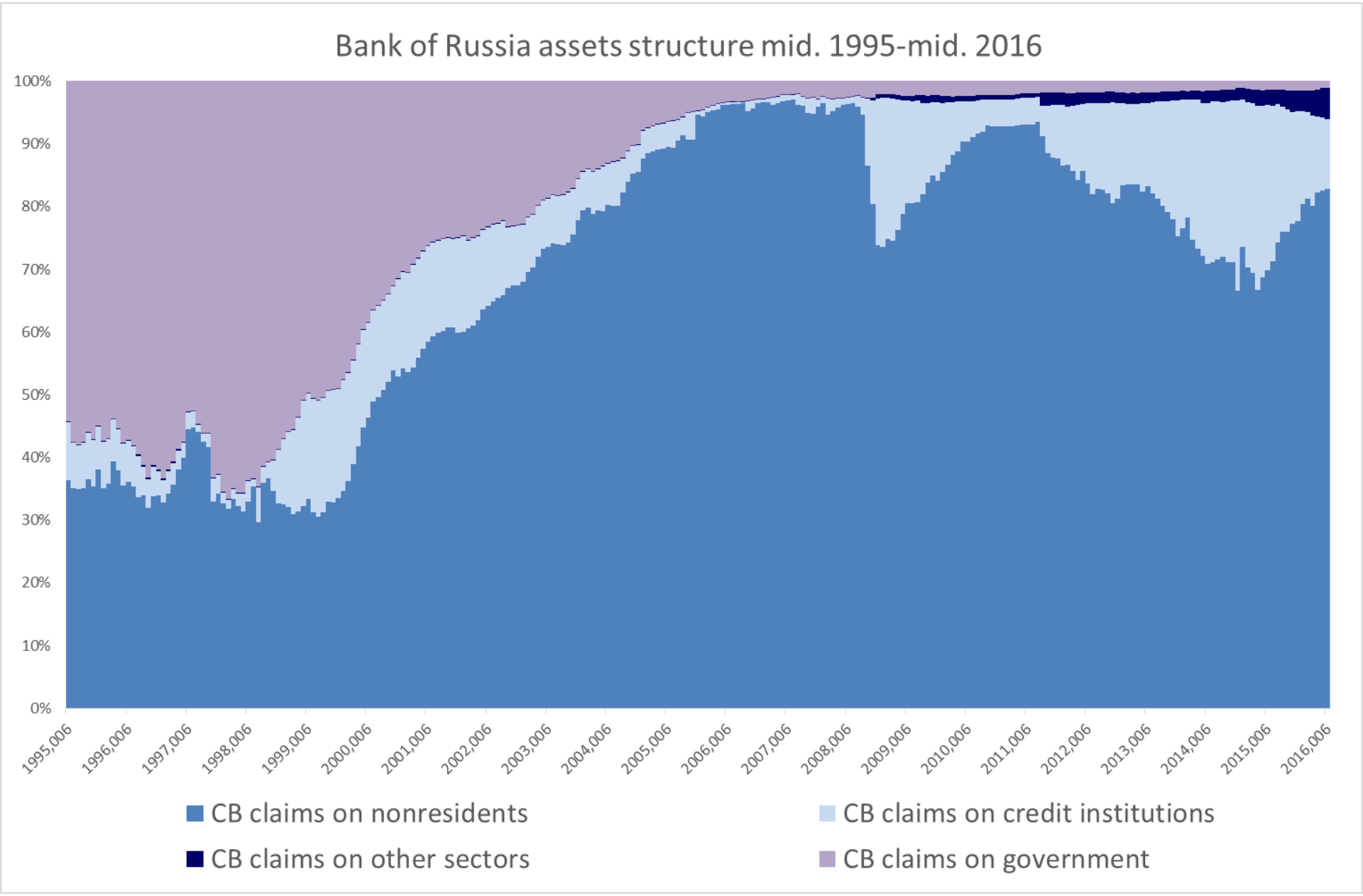
$$\log(L_t/K_t) = - \log A/\alpha - (r/\alpha)t + \log(Q_t/K_t)/\alpha$$

RIM embodied technological progress

The second column is the rate of change of embodied technical change

The third column is the rate of depreciation in each bucket of capital

1	.05	.15	Agriculture
2	.05	.15	Petroleum extraction
3	.00	.15	Natural gas extraction
4	.05	.15	Coal mining
5	.05	.15	Other Fuels, incl. nuclear
6	.00	.15	Ore and other mining
7	.05	.15	Food, beverages, tobacco
8	.05	.15	Textiles, apparel, leather
9	.05	.15	Wood and wood products
10	.00	.15	Paper and printing
11	.00	.15	Petroleum refining
12	.05	.15	Chemicals
13	.00	.15	Pharmaceuticals
14	.00	.15	Plastic products
15	.05	.15	Stone, Clay, and Glass products
16	.05	.15	Ferrous metals
17	.07	.15	Non-ferrous metals
18	.00	.15	Fabricated metal products
19	.07	.15	Machinery
20	.00	.15	Computers, office machinery
21	.00	.15	Electrical apparatus
22	.05	.15	Radio, television, communication equipment
23	.00	.15	Medical, optical, and precision instruments
24	.10	.15	Automobiles, highway transport equipment
25	.05	.15	Ships and repair
26	.05	.15	Airplanes, rockets, and repair
27	.00	.15	Railroad equipment and its repair
28	.00	.15	Recycling
29	.00	.15	Electric, gas, and water utilities
30	.05	.15	Construction
31	.05	.15	Trade
32	.07	.15	Hotels and restaurants
33	.00	.15	Transport and storage
34	.07	.15	Communication
35	.07	.15	Finance and insurance
36	.07	.15	Real estate
37	.08	.15	Equipment rental
38	.00	.15	Computing service
39	.00	.15	Research and development
40	.07	.15	Other business services
41	.05	.15	Government, defense, social insurance
42	.00	.15	Education
43	.00	.15	Health services
44	.05	.15	Other social and personal services


Bank of Russia assets structure mid. 1995-mid. 2016
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1995,006
1996,006
1997,006
1998,006
1999,006
2000,006
2001,006
2002,006
2003,006
2004,006
2005,006
2006,006
2007,006
2008,006
2009,006
2010,006
2011,006
2012,006
2013,006
2014,006
2015,006
2016,006
CB claims on nonresidents
CB claims on credit institutions
CB claims on other sectors
CB claims on government

RIM capital investments block

Capital investments of i-sector depends on

- *increases of the i-sector peak output in the current year and two preceding years*

  @pos(peakoutput - peakoutput[1]) * capital_output ratio

- *capital replacement in i-sector*

- *profit in i-sector deflated*

- *change in total outstanding long-term credit to organizations (for periods more than 3 years) deflated*

RIM capital investments block

Sector		fiR Mexval
1	Agriculture	18
2	Petroleum extraction	37
3	Natural gas extraction	12
4	Coal mining	17
5	Other fuels, incl. nuclear	38
6	Ore and other mining	9
7	Food, beverages, tobacco	53
8	Textiles, apparel, leather	49
9	Wood and wood products	10
10	Paper and printing	1
11	Petroleum refining	24
12	Chemicals	32
13	Pharmaceuticals	9
14	Plastic products	neg
15	Stone, Clay, and Glass products	23
16	Ferrous metals	6
17	Non-ferrous metals	neg
18	Fabricated metal products	3
19	Machinery	16
20	Computers, office machinery	neg
21	Electrical apparatus	99
22	Radio, television, communication equipment	29

Sector		fiR Mexval
23	Medical, optical, and precision instruments	26
24	Automobiles, highway transport equipment	13
25	Ships and repair	52
26	Airplanes, rockets, and repair	11
27	Railroad equipment and its repair	66
28	Recycling	neg
29	Electric, gas, and water utilities	37
30	Construction	57
31	Trade	16
32	Hotels and restaurants	78
33	Transport and storage	26
34	Communication	neg
35	Finance and insurance	21
36	Real estate	51
37	Equipment rental	21
38	Computing service	6
39	Research and development	13
40	Other business services	0
41	Government, defense, social insurance	91
42	Education	49
43	Health services	13
44	Other social and personal services	97

RIM personal consumption block

Personal consumption expenditures in real terms per-capita depends on

- + *wages (personal income for some sectors)*
- *- sector prices relative to PCE deflator*
- + *real exchange rate*
- + *personal credits*

- *Saturation variable*

  sat[i]= 1 - (pceR[i][1]/popT[1]) / pceRsaturation[i]

  pceRsaturation = level of consumption in USA in 2011 in real terms per-capita

Logistic function

$$C_i(y) = L_i \,/\, (1 + e^{(a_i - b_i y)})$$

where *y* is income per-capita

C_i is consumption per-capita of product *i*

L_i is precisely the saturation level we have already calculated

and a_i and b_i are positive constants to be estimated with non-linear regression

Thank you