

# Russian Interindustry Model

## Actual model version

Asiya Brusentseva

XXVII INFORUM Conference, Sochi 2019



Institute of  
Economic Forecasting  
RAS



## **Input-output flow tables for 1980-2015**

Input-output flows in current prices

In constant prices 2010

I-O taxes on products used

I-O trade margins

I-O transport margins

I-O imports in constant prices

## **Energy balances for 1990-2016, International Energy Agency**

## **Household Consumption Expenditures in COICOP classification for 24 items for 2011 – 2016**

## **Bridge matrix to transform 24 items in COICOP classification to 44 items based on NACE Rev. 1.1**

# PADS RIM Personal Consumption Block



- 1 Bread and cereals
- 2 Meat
- 3 Fish and seafood
- 4 Milk, cheese and eggs
- 5 Oils and fats
- 6 Fruit and vegetables
- 7 Food products n.e.c.
- 8 Non-alcoholic beverages
- 9 Alcoholic beverages
- 10 Tobacco
- 11 Clothing
- 12 Footwear
- 13 Housing, water, gas and other fuels
- 14 Furnishing, household equipment and routine household maintenance
- 15 Medical products, appliances and equipment
- 16 Outpatient and hospital services
- 17 Purchase of vehicles
- 18 Operation of personal transport equipment
- 19 Transport services
- 20 Communication
- 21 Recreation and culture
- 22 Education
- 23 Restaurants and hotels
- 24 Miscellaneous goods and services
- 25 Net purchases abroad

$$x_i = (b_i * \left(\frac{y}{P}\right) + c_i * \Delta\left(\frac{y}{P}\right)) * \left(\frac{p_i}{P}\right)^{-\lambda_i} \prod_{k=1}^n \left(\frac{p_i}{p_k}\right)^{-\lambda_k * s_k} \left(\frac{p_i}{P_G}\right)^{-\mu_G} \left(\frac{p_i}{P_g}\right)^{-\vartheta_g}$$

$$P = \prod_{k=1}^n p_k^{s_k}$$

$$P_G = \left(\prod_{k=1}^n p_k^{s_k}\right)^{1/\sum_{k \in G} s_k}$$

$$P_g = \left(\prod_{k=1}^n p_k^{s_k}\right)^{1/\sum_{k \in g} s_k}$$

$x_i$  – consumption per capita of item i in constant prices

$y$  – nominal total expenditures per capita

$P, P_G, P_g$  – overall, group and subgroup price indexes, respectively

$\Delta$  - difference between t and t-1 values

$p_k$  – price index for item i (in the base year  $p_k = 1$ )

$s_k$  – share of item i in the expenditures of the base year

$b_i, c_i, \lambda_k, \mu_G, \vartheta_g$  – parameters to be estimated

**Groups:**

1. Food
2. Clothing and footwear
3. Health
4. Transport

**Subgroups:**

1. Proteins
2. Personal Transport

# RIM Personal Consumption Block

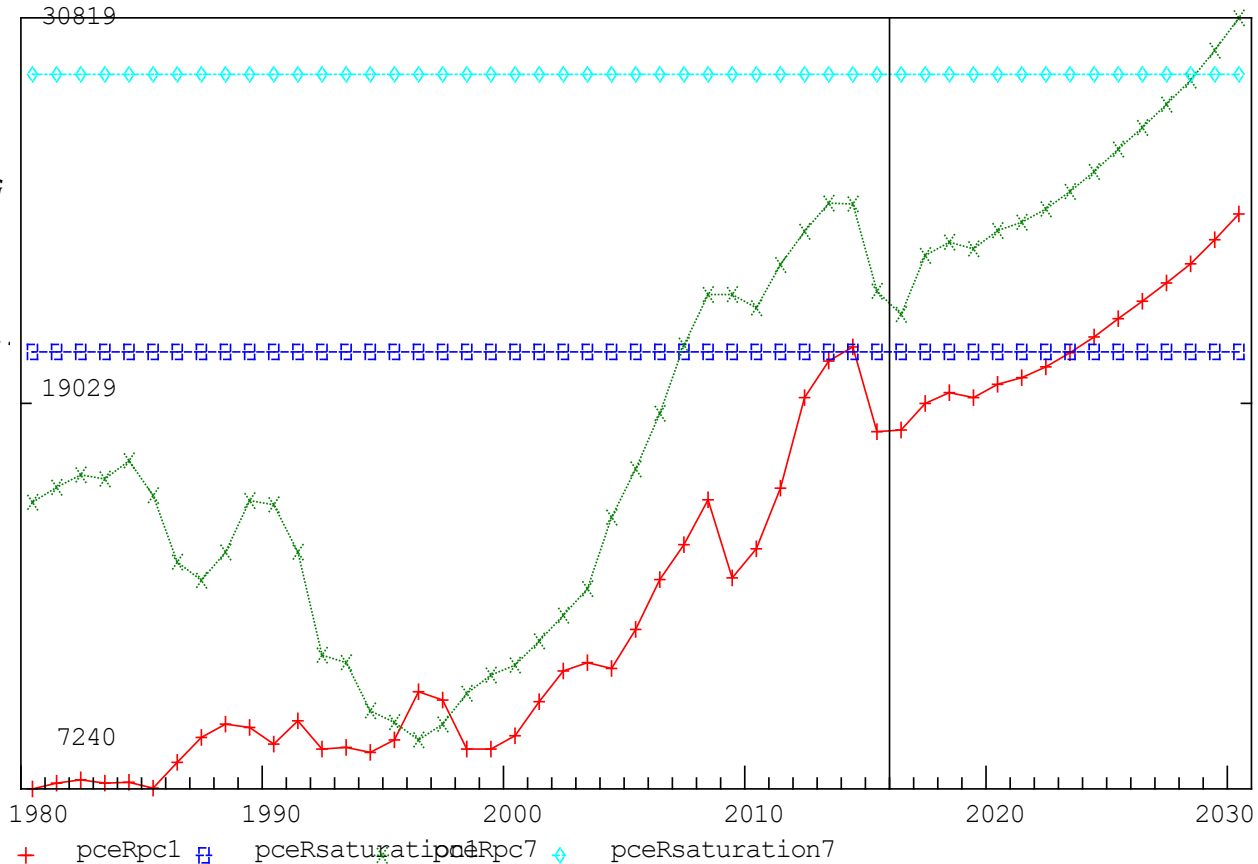
$$x_i = (b_i * \left(\frac{y}{P}\right) + c_i * \Delta\left(\frac{y}{P}\right)) * \left(\frac{p_i}{P}\right)^{-\lambda_i} \prod_{k=1}^n \left(\frac{p_i}{p_k}\right)^{-\lambda_k * s_k} \left(\frac{p_i}{P_G}\right)^{-\mu_G} \left(\frac{p_i}{P_g}\right)^{-\theta_g}$$

$$P = \prod_{k=1}^n p_k^{s_k}$$

$$P_G = \left(\prod_{k=1}^n p_k^{s_k}\right)^{1/\sum_{k \in G} s_k}$$

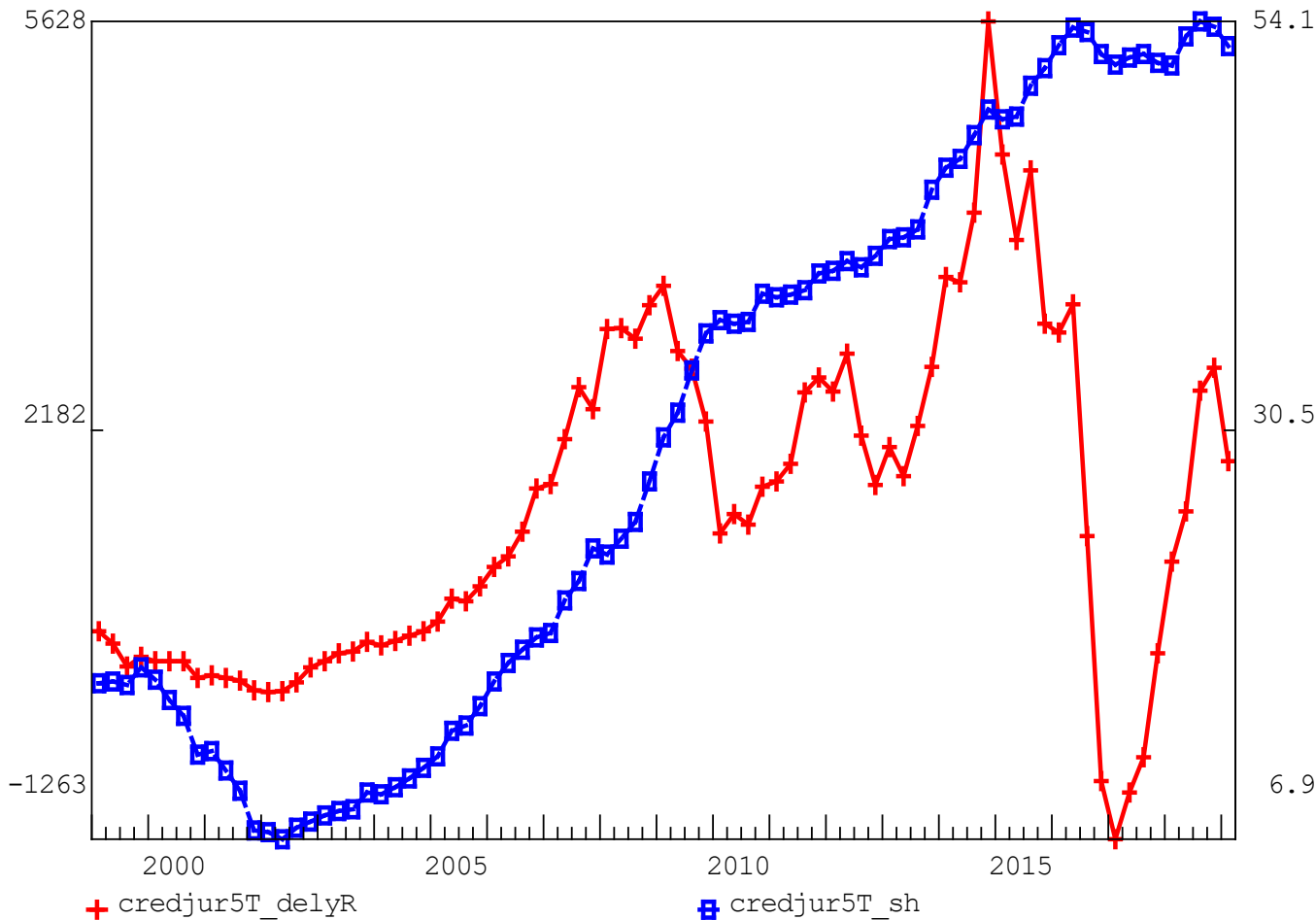
$$P_g = \left(\prod_{k=1}^n p_k^{s_k}\right)^{1/\sum_{k \in g} s_k}$$

Personal Consumption



**Food, beverages, tobacco**  
**Agriculture**

## Long-term Credit to Organizations



Capital investments of i-sector depend on

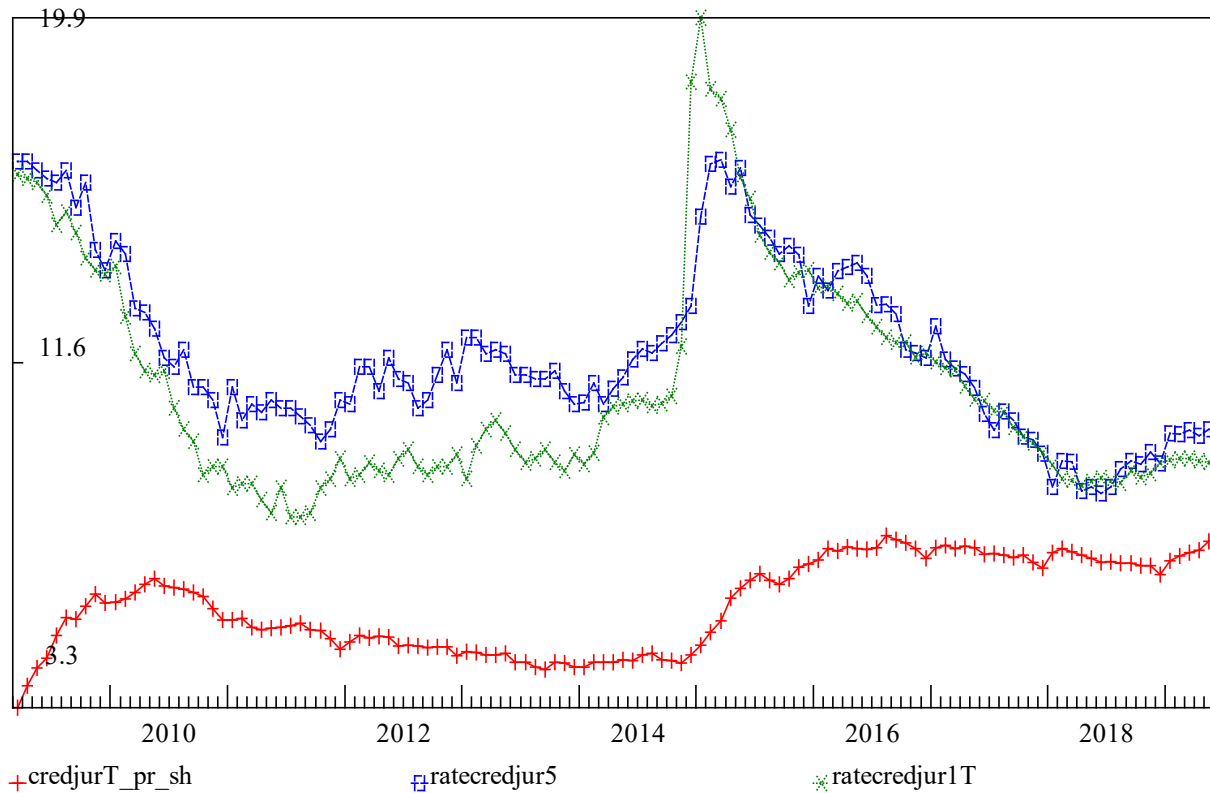
- *increases of the i-sector peak output in the current year and two preceding years*  

$$\text{@pos(peakoutput - peakoutput[1]) * capital\_output ratio}$$
- *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 fiR*

**Annual Change in Total Outstanding Long-term Credit to Organizations deflated**

**Share of Long-term Credit (for more than three years) in Total Credit to Organizations**

## Overdue Loans Level, Interest Rates Loans Granted to Organizations



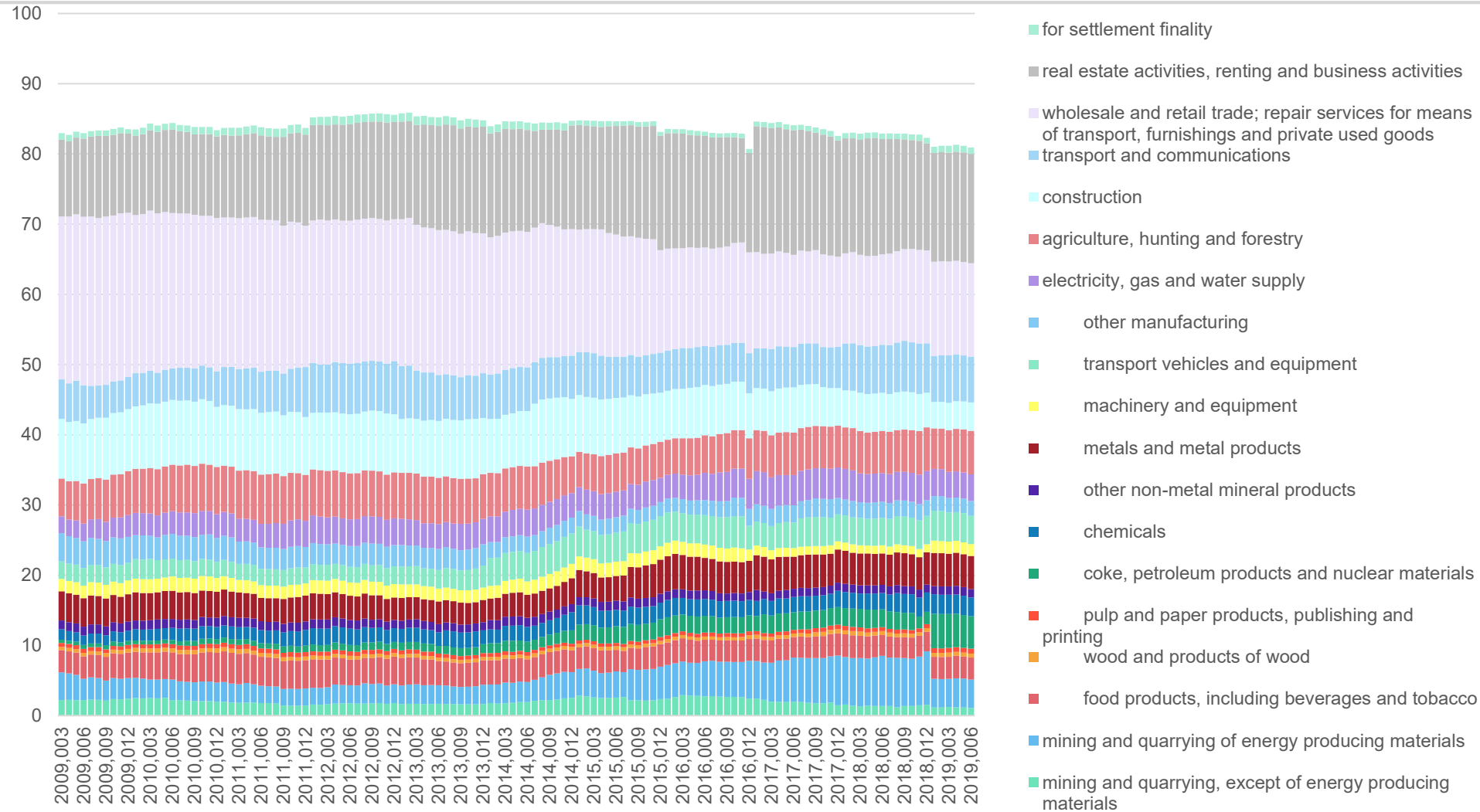
**Overdue Loans Granted to Resident Legal Entities and Individual Entrepreneurs level**

**Weighted Average Interest Rates**

**on Loans to Nonfinancial Organizations in Rubles over 1 year**

**on Loans to Nonfinancial Organizations in Rubles up to 1 year**

## Structure of Loans Granted to Resident Legal Entities and Individual Entrepreneurs, by Economic Activity and Use of Funds



# RIM Capital Investments Block



Sector	fiR Mexval	Sector	fiR Mexval
1 Agriculture	4.3	23 Medical, optical, and precision instruments	0.7
2 Petroleum extraction	19.2	24 <b>Automobiles, highway transport equipment</b>	<b>32.8</b>
3 Natural gas extraction		25 <b>Ships and repair</b>	<b>45</b>
4 Coal mining		26 <b>Airplanes, rockets, and repair</b>	<b>8.2</b>
5 Other fuels, incl. nuclear	6.4	27 <b>Railroad equipment and its repair</b>	<b>51.5</b>
6 Ore and other mining	3.9	28 Recycling	
7 <b>Food, beverages, tobacco</b>	<b>51.2</b>	29 Electric, gas, and water utilities	3.8
8 <b>Textiles, apparel, leather</b>	<b>68.7</b>	30 <b>Construction</b>	<b>51.5</b>
9 Wood and wood products	2.9	31 <b>Trade</b>	<b>16.3</b>
10 Paper and printing		32 <b>Hotels and restaurants</b>	<b>65.8</b>
11 Petroleum refining	8	33 Transport and storage	2.4
12 <b>Chemicals</b>	<b>44.5</b>	34 Communication	3.1
13 <b>Pharmaceuticals</b>	<b>37.9</b>	35 Finance and insurance	
14 Plastic products		36 Real estate	17.7
15 Stone, Clay, and Glass products	0.9	37 Equipment rental	2.7
16 <b>Ferrous metals</b>	<b>56.6</b>	38 Computing service	
17 Non-ferrous metals		39 Research and development	6.9
18 Fabricated metal products	0.7	40 Other business services	
19 <b>Machinery</b>	<b>17.6</b>	41 Government, defense, social insurance	10.7
20 Computers, office machinery	0.9	42 Education	27.6
21 Electrical apparatus	22	43 Health services	1.6
22 Radio, television, communication equipment	18.2	44 Other social and personal services	8.8



# RIM Forecast 2030 Results

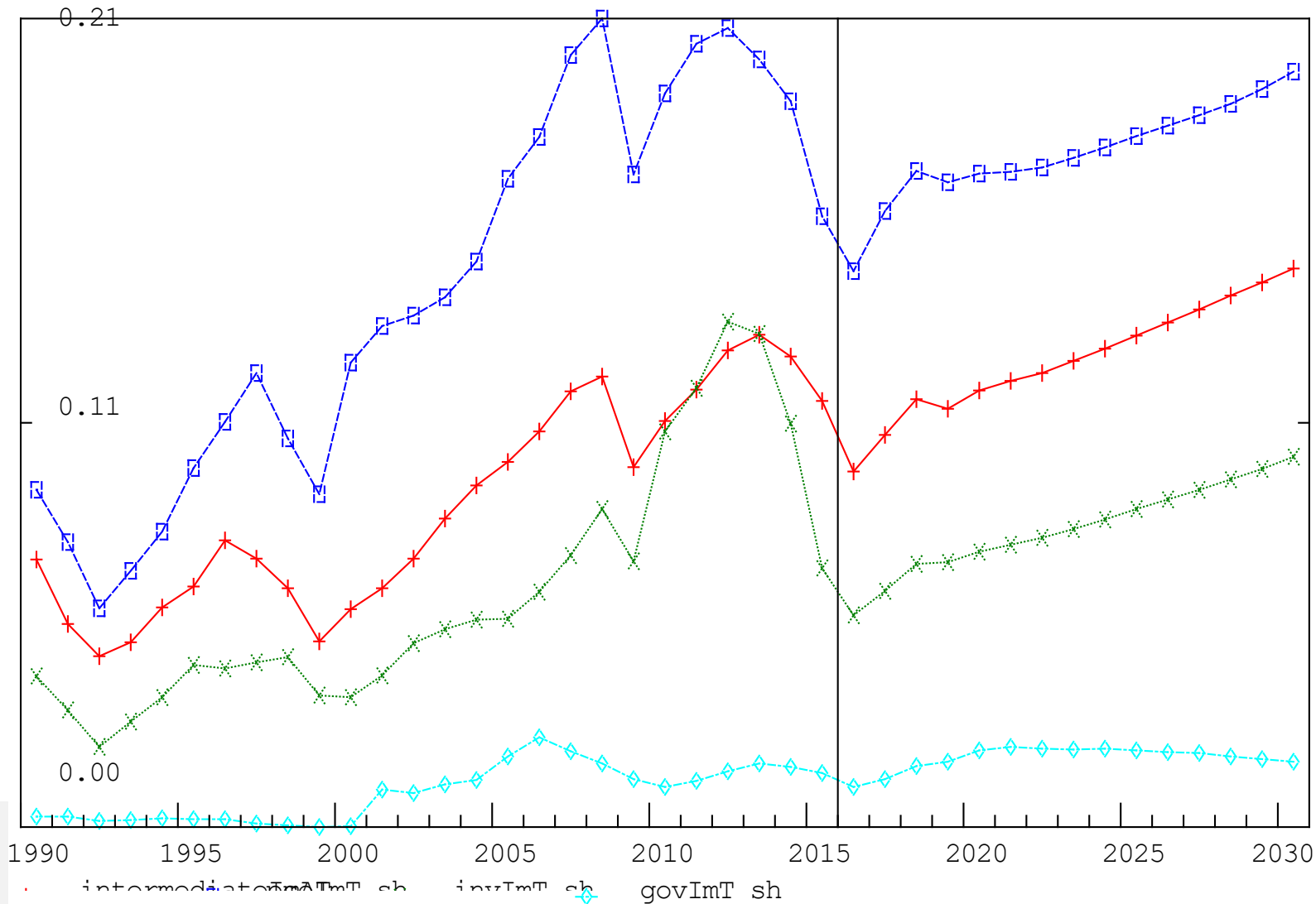


## Average Annual Growth Rates, Percent

	14-15	15-18	Forecast		
			18-22	22-26	26-30
GDP	-2.3	1.4	1.6	1.8	1.8
Gross investments in fixed capital	-10.7	3.0	2.8	2.5	1.9
Personal consumption	-9.4	1.2	1.3	2.4	2.7
Government consumption	-3.6	1.3	-0.8	-0.3	-0.4
Imports	-25.1	5.0	2.8	4.9	5.1
Exports	3.7	4.5	2.4	2.0	2.3
Personal disposable income per capita	-2.4	-1.7	1.4	2.3	2.8
GDP deflator	7.6	6.3	5.3	4.5	4.4
RUB/USD real exchange rate	-29.3	3.0	4.0	4.7	4.2

# RIM capital investments block

## Imports share



in Personal Consumption

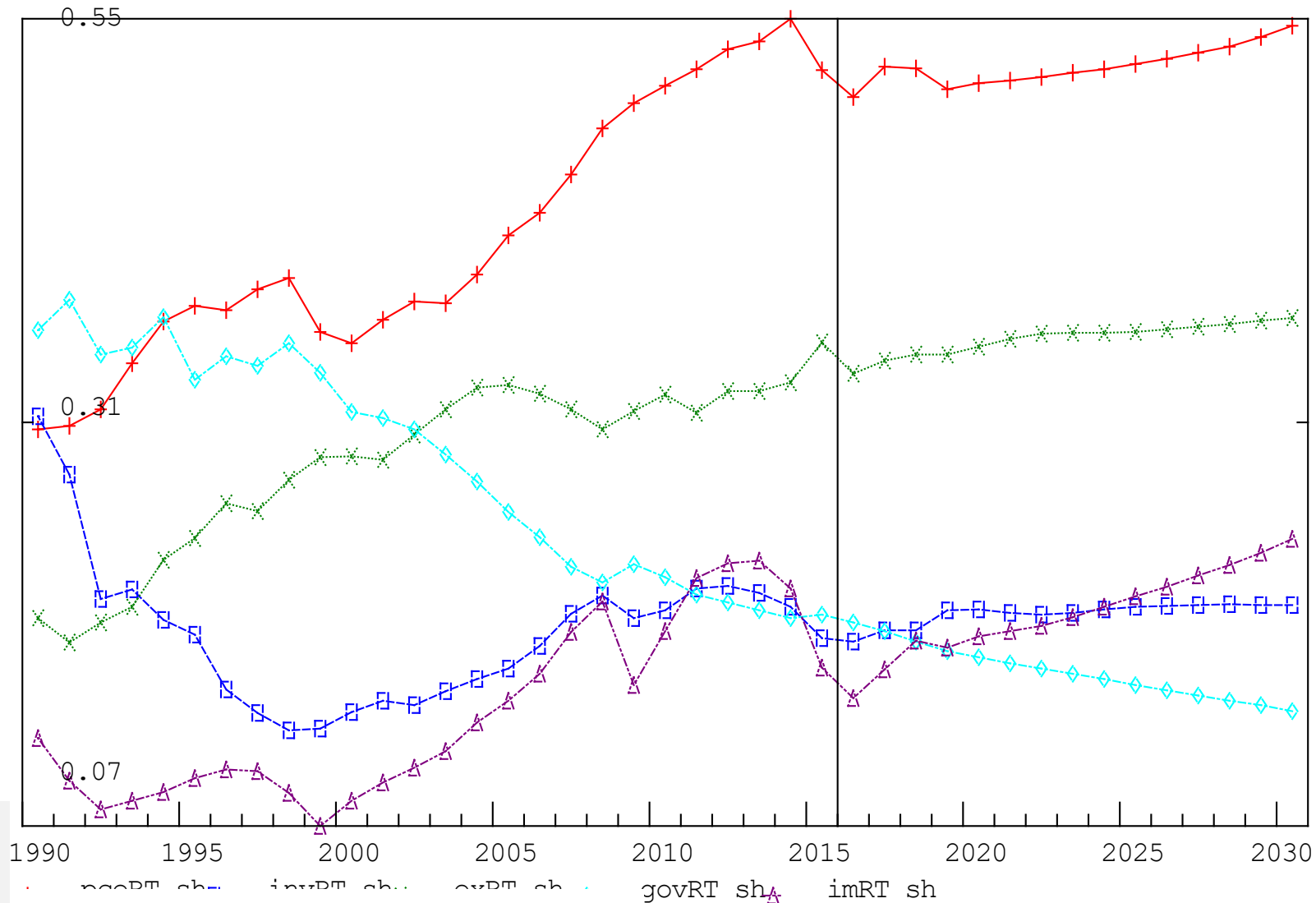
In Intermediate Consumption

In Investments

In Government Consumption

# RIM Forecast 2030 Results

## GDP structure



Thank you for your attention