Forecast of Russian Interregional Migration Flows

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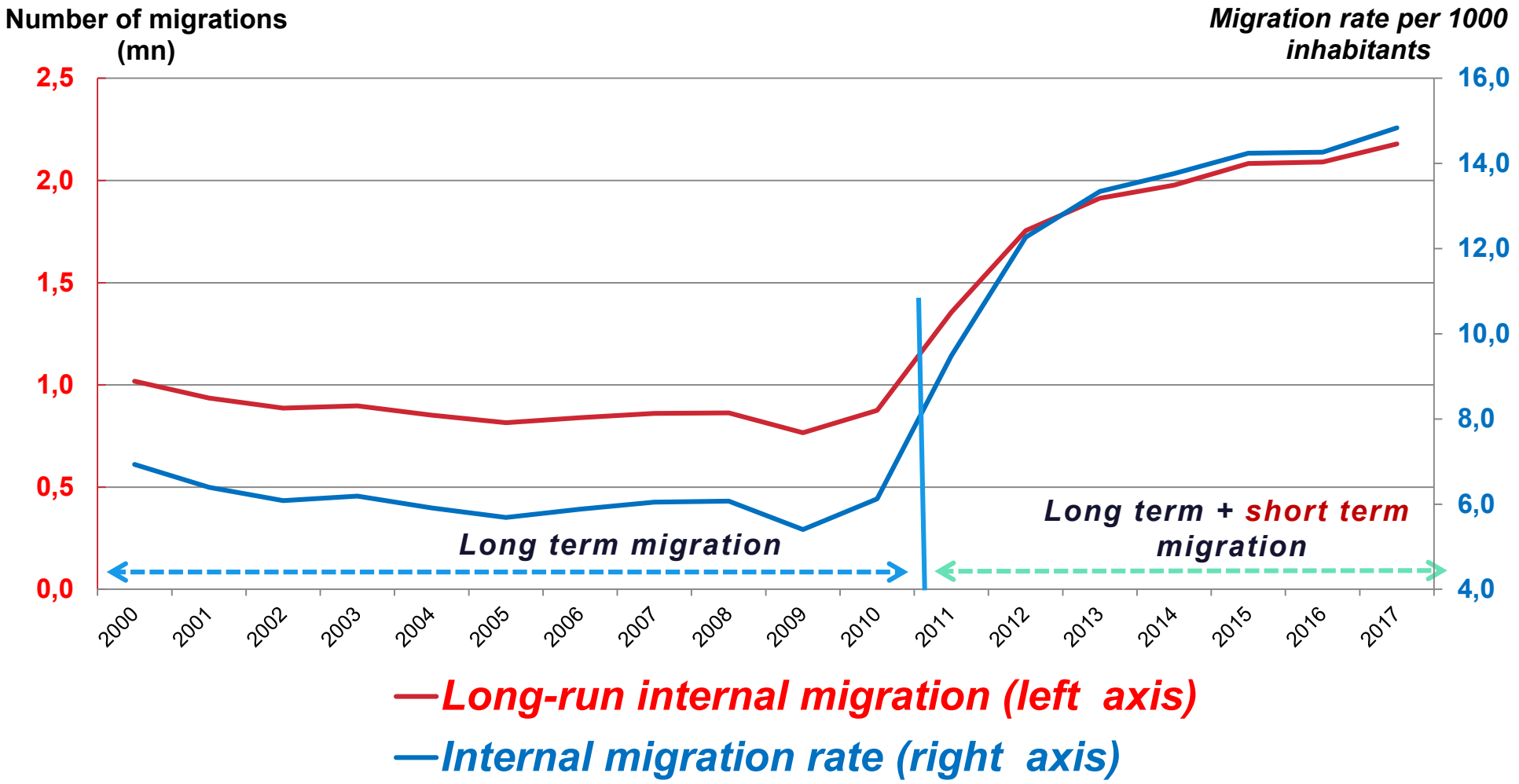
RAS

1.

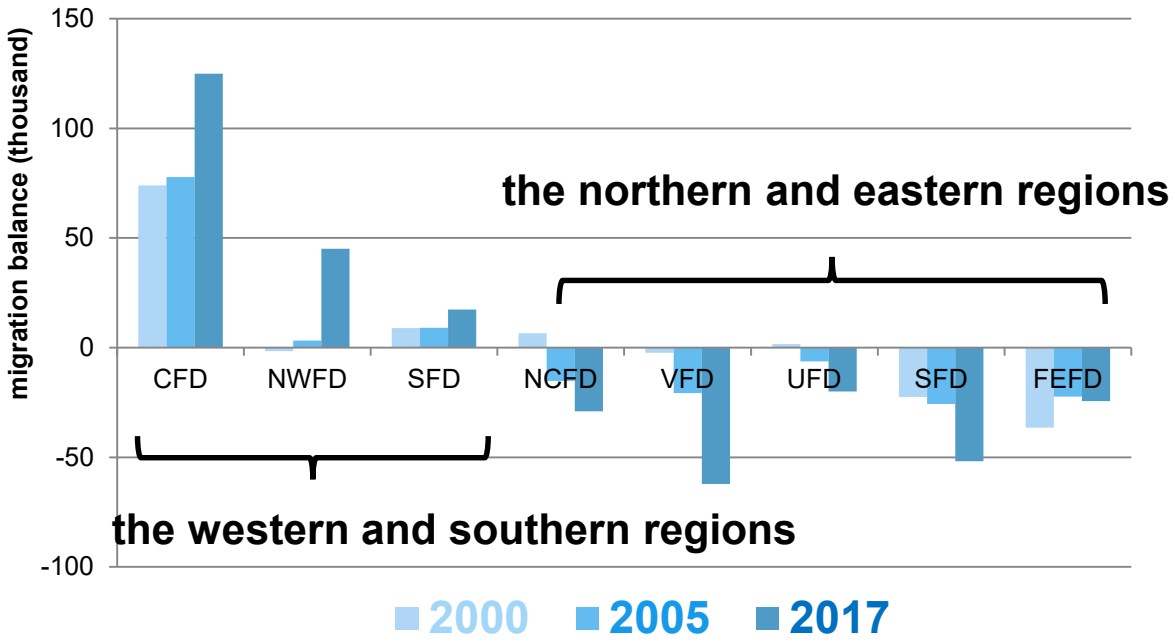
Some key features of interregional migration in Russia

The dynamics of internal population migration in RF



Source: Federal State Statistics Service of RF

The regional structure of population internal migration



Used notation: CFD – Central Federal Districts, NWFD – Northwestern Federal District, SFD - South Federal District, NCFD - North Caucasus Federal District, VFD – Volga Federal District, UFD – Ural Federal District, SFD - Siberian Federal District, FEFD - Far Eastern Federal District.

Russian Federal Districts

Source: Federal State Statistics Service of RF

Why do we need the forecast of migration flows between regions?

1) Migration affects the demographic situation in the regions;
2) migration influences the parameters of regional labor markets;

   in particular, migration contributes to the growth of regional inequality in terms of population and labor
3) migration affects regional infrastructure load;
4) migration redistributes population incomes from one region to another;
5) and much more…

2.

Modeling of interregional migration flows in Russia

Primary data of migration flows in Russia

	Region 1	Region 2	…	Region n
Region 1	*b11*	*b12*	…	*b1n*
Region 2	*b21*	*b22*	…	*b2n*
…	…	…	…	…
Region n	*bn1*	*bn2*	…	*bnn*

The modeling of interregional migration flows in Russia

I. Factor trend models (class of gravitational models):

$$b_{ij}(t) = F\left(f_1^i,\ldots,f_n^i,f_1^j,\ldots,f_k^j,t\right) \text{ or } b_{ij}(t) = F\left(f_1^i/f_1^j,\ldots,f_n^i/f_n^j,t\right) \text{ or } b_{ij}(t) = F\left(f_1^i - f_1^j,\ldots,f_n^i - f_n^j,t\right)$$

where $b_{ij}(t)$ - the number of migrants from region i to region j;

$f_1^i,\ldots,f_n^i,f_1^j,\ldots,f_n^j$ - attracting and pushing factors in the regions i and j;

n, k **– the number of factors;**

t **– trend;**

F - form of dependence (mostly linear).

Positive aspect of the models

•taking into account factors of both the territory of arrival and the territory of disposal

Negative aspects of the models

•in the case of working with time series, it is not possible to take into account many migration factors

•a large number of regression equations
•(if *i*=*j*=82 then the number of equations = 6724)

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The modeling of interregional migration flows in Russia

II. Migration models evaluated on a panel-structured database (class of gravitational models):

$$b_{ij} = G\frac{P^{\alpha}{}_i \times P^{\beta}{}_j}{d^{b}{}_{ij}} \times \left(\frac{Y_j}{Y_i}\right)^{\gamma} \quad \text{or} \quad b_{ijt} = \alpha + \beta M_{ijt-1} + \gamma M_{jit-1} + \rho Dist_{ij} + \delta X_{it-1} + \chi X_{jt-1} + \mu Macro_t + \eta_{ij} + \varepsilon_{ijt}$$

where $b_{ij}(t)$ - the number of migrants from region i to region j;

P_i, P_j - the number of population of regions i and j, respectively;

d_{ij} - physical distance between regions i and j;

Y_j, Y_i - socio-economic factors of the territory of departure and arrival;

α, β, b, γ - constants

Positive aspects of the models

•taking into account a lot of factors of both the territory of arrival and the territory of disposal: economic, social, demographic, infrastructural, climatic, geographical;

•a small number of regression equations: one (for all flows) or two (for counter migration flows).

Negative aspects of the models

• it is hard to forecast migration based on such models: it is necessary to have predicted values of all explanatory variables

The modeling of migration on the base of PADS:

$$x_i = (ai + bi * Migr) * (\frac{y_i}{Y})^{-\lambda_i} \prod_{k=1}^{n} (\frac{y_i}{y_k})^{-\lambda_k * s_k}$$

where x_i - incoming migration flow for region *i*, $i = \overline{1...n}$

Migr – total migration flow (sum by regions);

y_k – income per capita for region *i* (base year's = 1);

Y – overall income per capita index (base year's *Y* = 1);

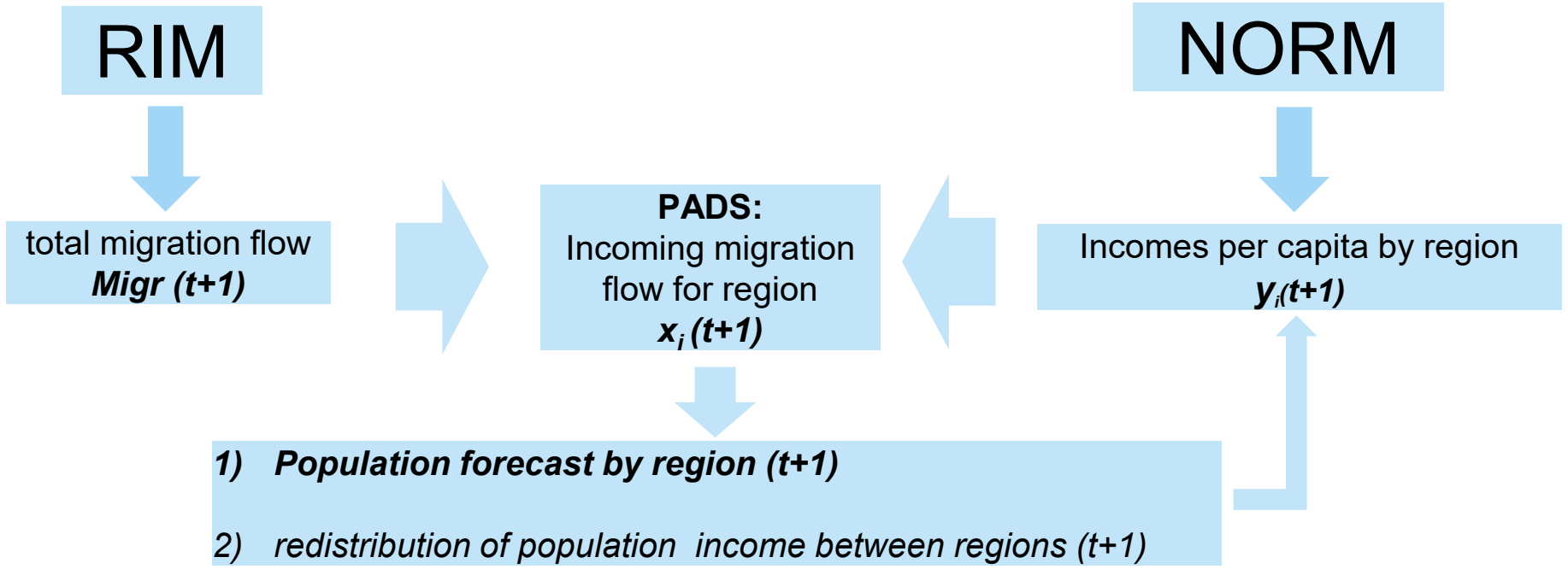
s_k – share of region *i* in total migration flow of the base year;

a_i, b_i, λ_k – parameters to be estimated.

The equations connect the distribution of migrants by region and the income per capita by region

The advantages of PADS for modeling of internal migration

I. **Such an approach is embedded in the model system of IEF RAS. For forecast period *t+1*:**



II. **The number of equations being evaluated is equal to the number of regions (82)**

Some difficulties of modeling

1. Changing the methodology of accounting for internal migrants, breaking the time series.
2. The variety of types of internal migration: educational, labor, etc.
3. In this regard, there are many factors affecting the structure of migration: social, demographic, infrastructural, climatic, geographical.

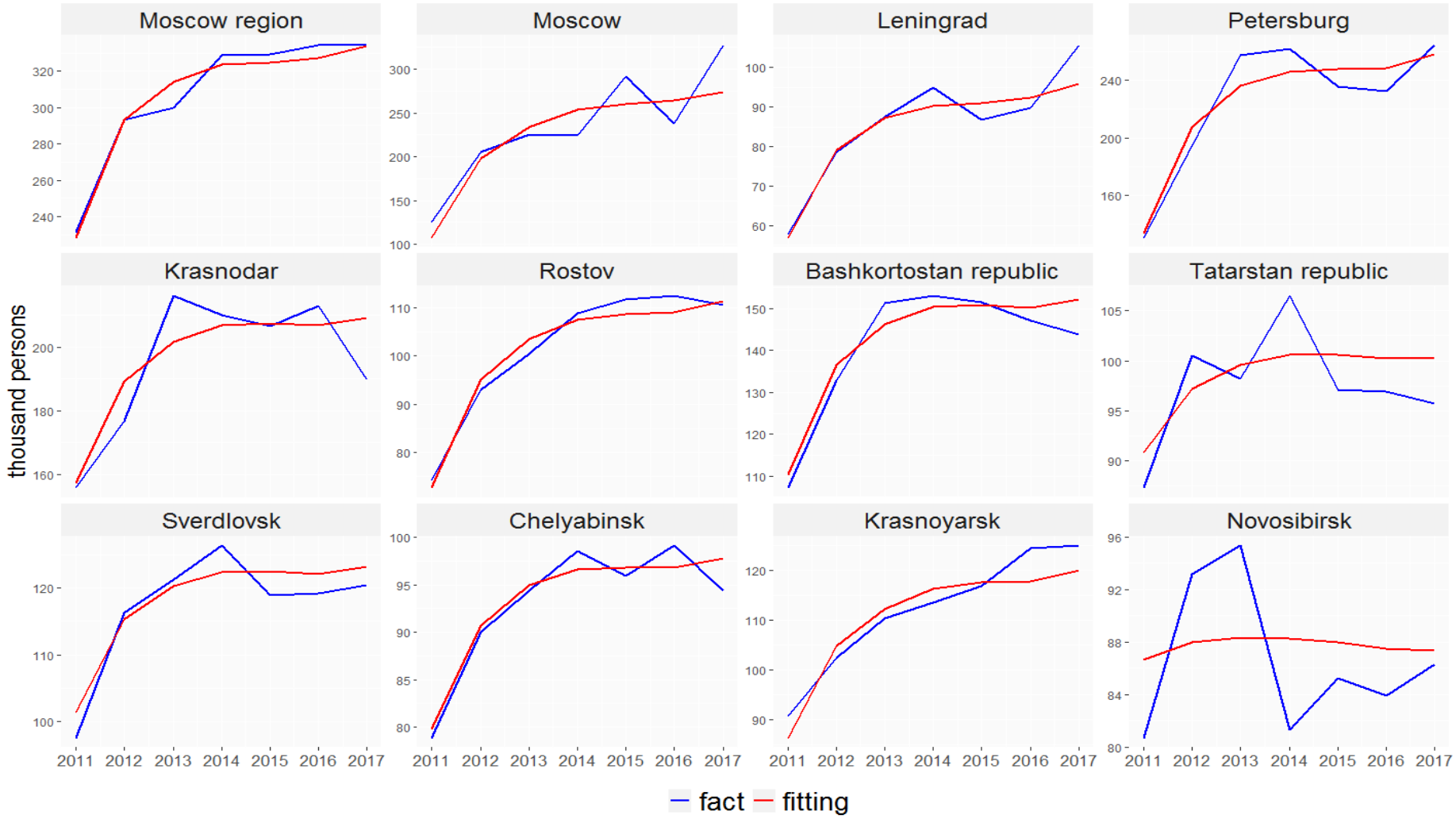
Database for modeling

1. The dynamic series of the arrived population by region (x_i), 2011-2017.
2. The dynamic series of **income per capita by region** (y_i), 2007-2017. Estimates of income per capita over the past 5 years have been explanatory variables.
3. The number of regions is 82.

3.

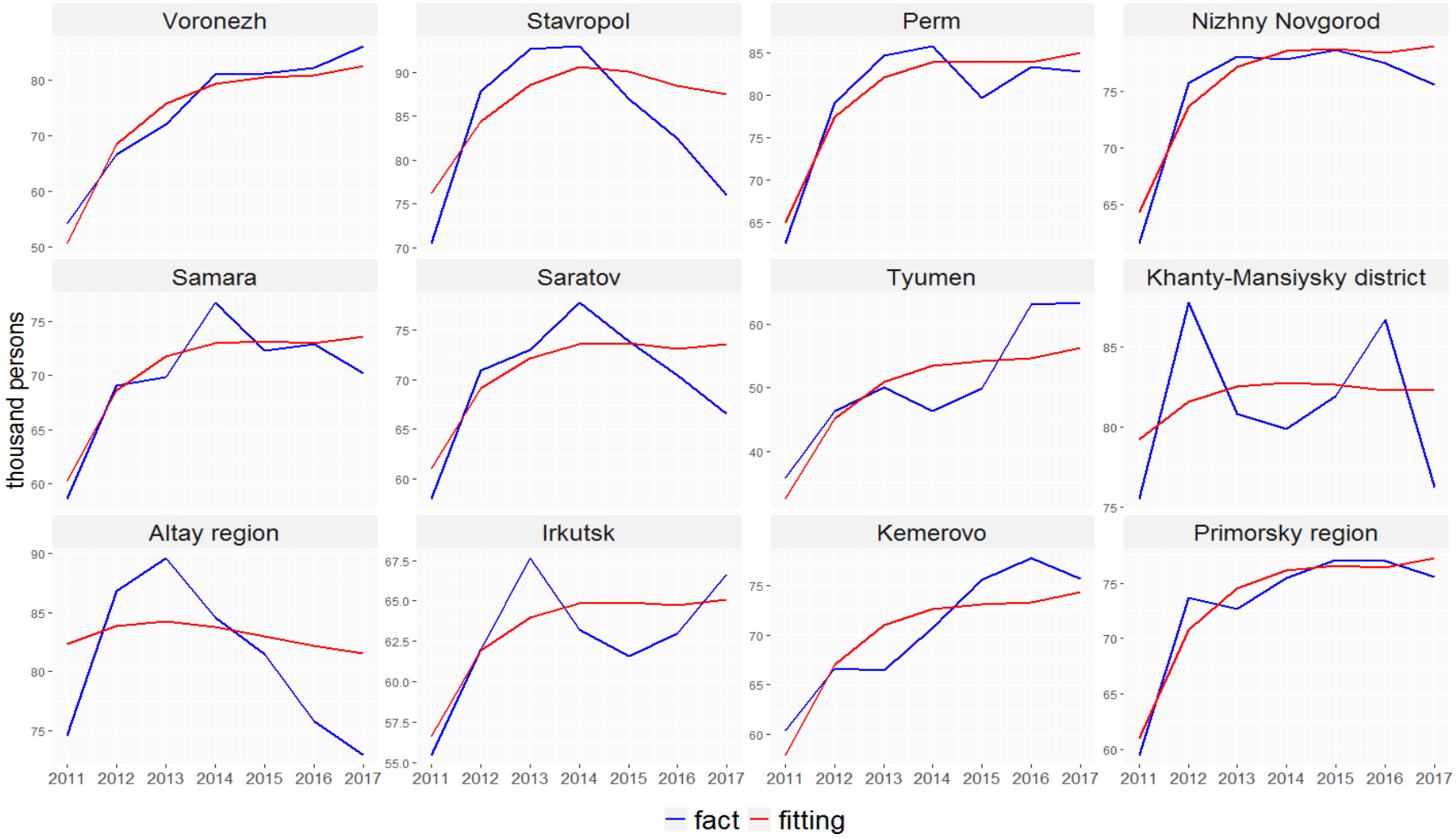
Some results of interregional migration modeling on the base of “PADS”

Some results. How close are the estimates to the actual data? (part 1)



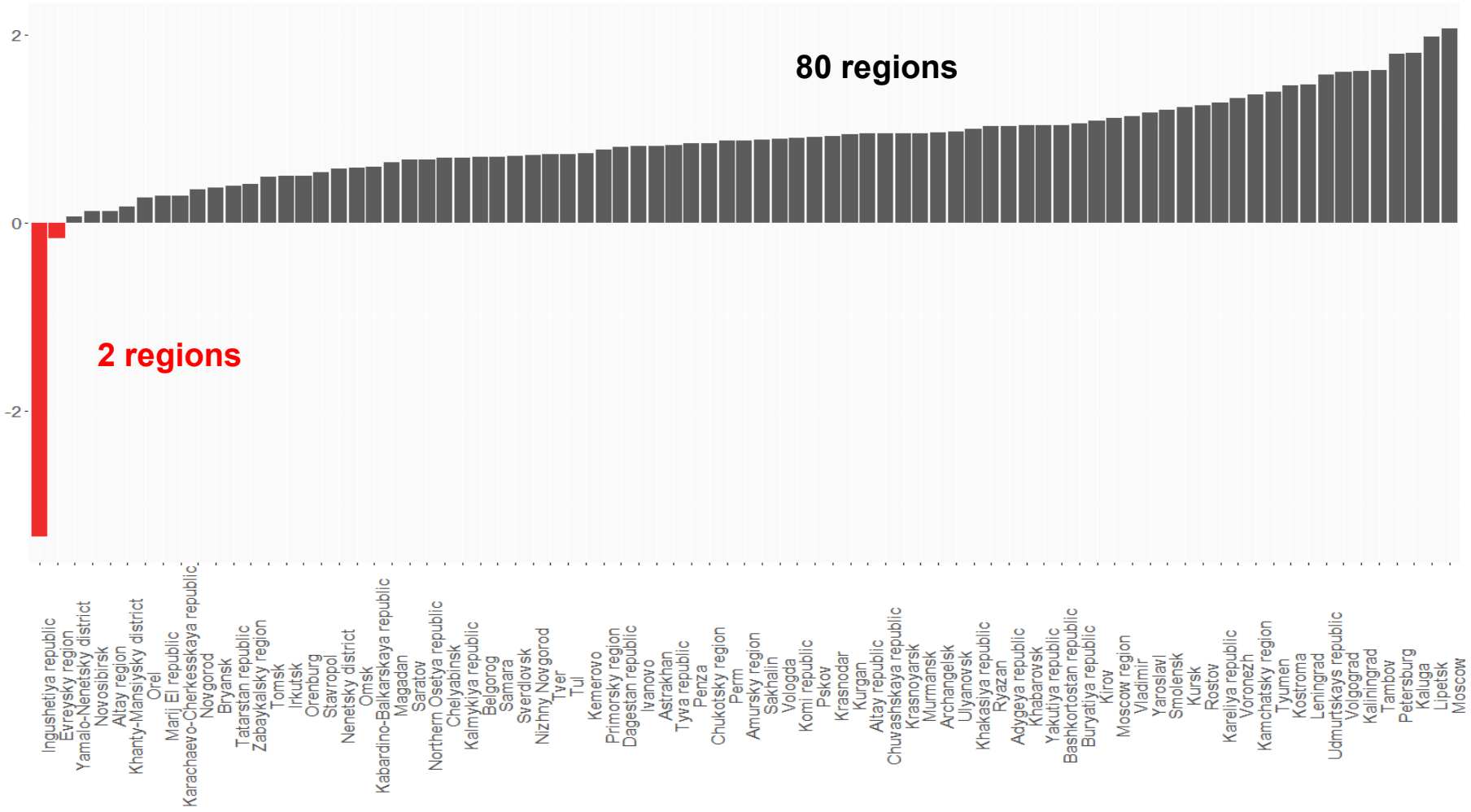
The first 12 regions with the largest number of migrants arrived

Some results. How close are the estimates to the actual data? (part 1)

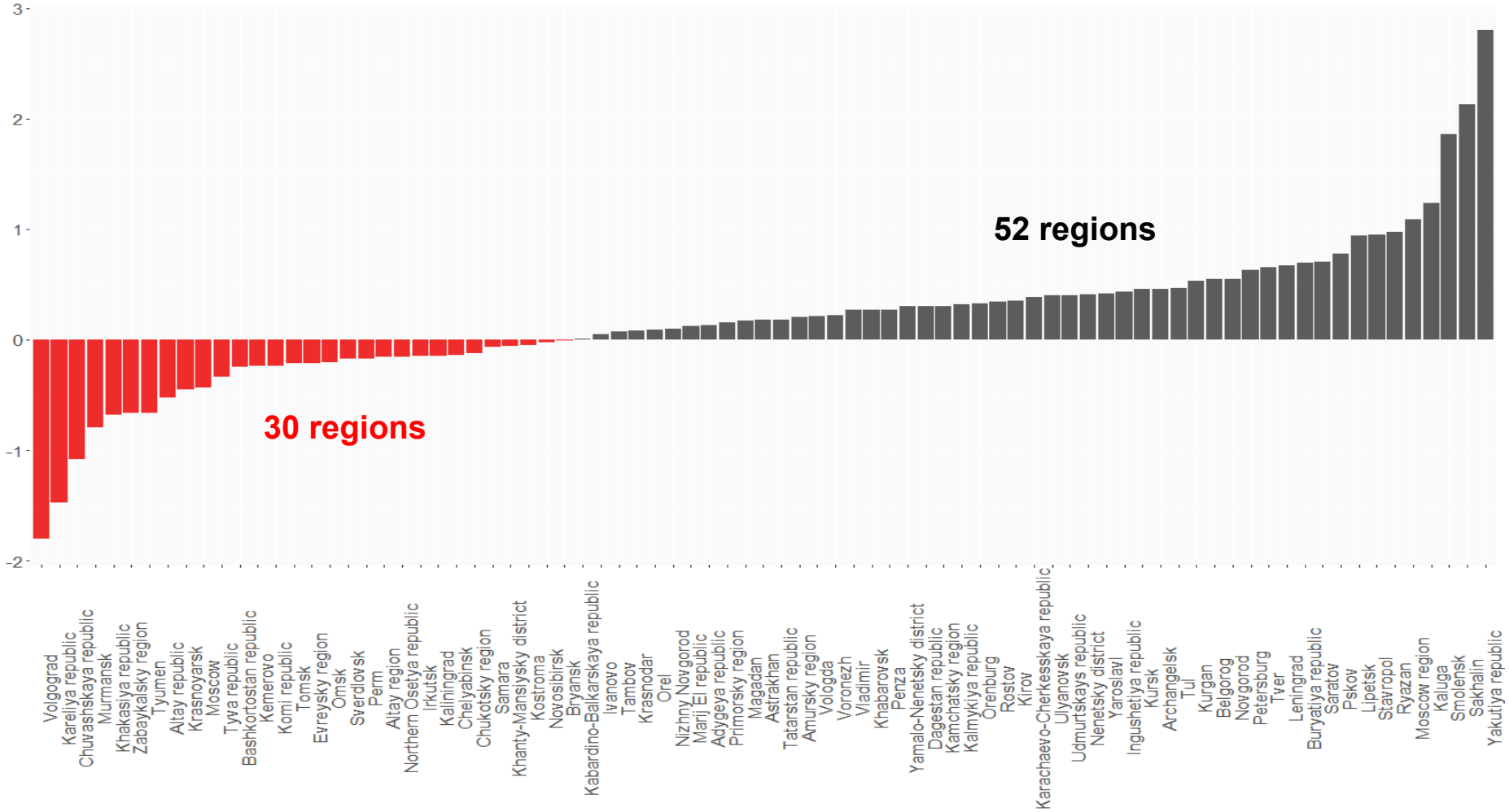


The second 13-24 regions with the largest number of migrants arrived

Some results: total migration elasticity of the incoming migration flow by region (the base year = 2017)



Some results: income per capita elasticity of the incoming migration flow by region



Conclusions

- **The shown settlement system on the base of “PADS” was developed primarily for *forecasting* internal migration.**
- **The number of regions with negative income elasticity of migration less than 50%.**
- **For regions with the negative income elasticities of migration, only the additive part of the equation can be used to forecast the incoming flow**

Further research need

- ❑ **Forecast of the incoming migration and the outgoing migration by region.**
- ❑ **Embed this forecast in a regional demographic forecasting model.**
- ❑ **Modeling separate flows of labor migrants.**
- ❑ **Assessment of the scale of redistribution of population income due to internal migration.**

Thank you for attention!

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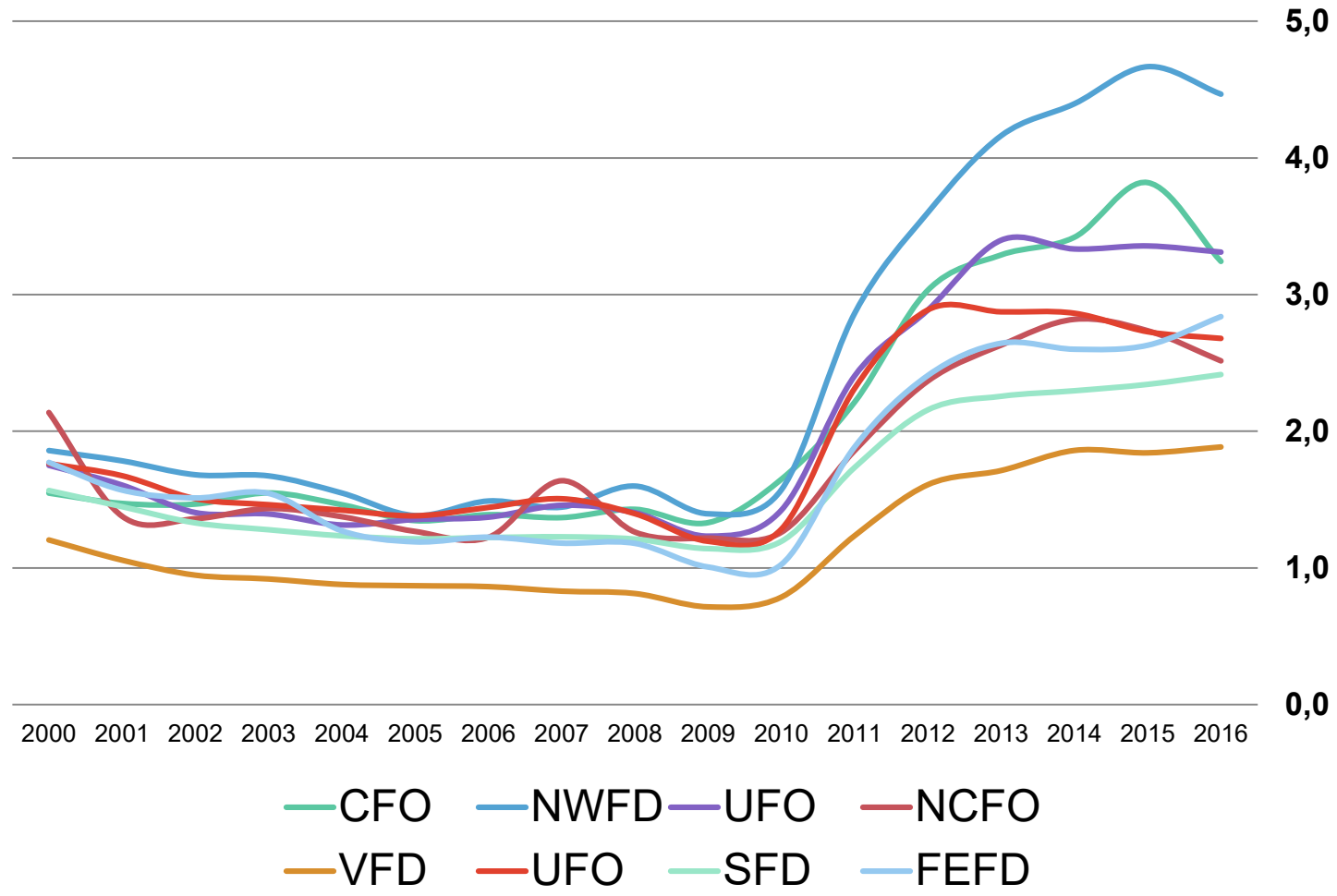
Attractive regions for migrants

Central Federal District

Southern Federal District

2000-2009

The share of internal migrants in the number of employed population by Federal Districts, %



- **Federal Districts vary in the proportion of migrants in the employed population;**
- **By 2017 the largest share of internal migrants was observed in the Northwestern Federal District.**