NATIONAL RESEARCH UNIVERSITY

Spatial aspects of unemployment in Russia: what is more important, sectoral proximity or geographical proximity?

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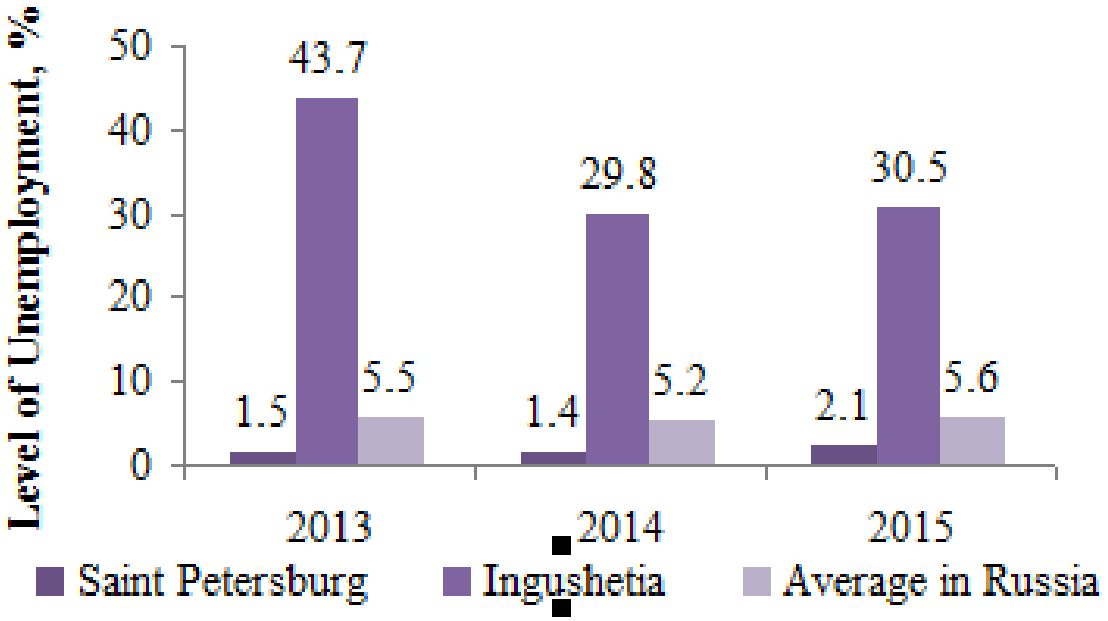
Special features of Russian regional labour markets

- Huber (2007) and Bah and Brada (2014), A review of the papers devoted to the regional labour market in transition countries
- Pastore and Missuda (2015, introduction), "the Russian case seems to be specific and interesting not only among other transition countries but also in the European perspective"
- Kapelyushnikov et al. (2012): "the current model of labour relations in Russia is a combination of very formal rules embodied in the Labour Code and a great variety of informal arrangements that make it feasible to relax those rules
- Vakulenko and Gurvich (2016): "high wage flexibility is an important salient feature of the Russian labour market"

Special features of Russian regional labour markets

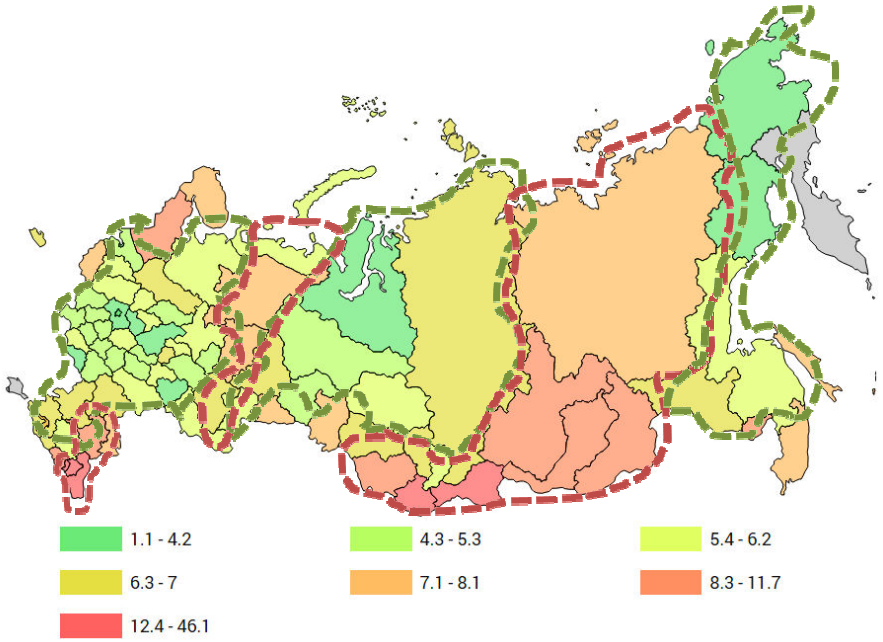
•Oschepkov and Kapelyushnikov , (2015) “the ratio between the minimum (1.4% in St. Petersburg) and the maximum (about 30% in Ingushetia) regional unemployment levels is over twenty” .



Special features of Russian regional labour markets

- Oschepkov and Kapelyushnikov (2015): “there is no single labour market in Russia, only a system of local labour markets”
- Russian regions are prone to clustering

Fig. Unemployment level in Russia in 2013



Spatial Models with Russian Regional Data

- **Economic Growth**

  Lugovoy et al. (2007), Solanko (2008), Ledyaeva et al. (2008), Kholodilin et al. (2012), Akhmedjonov et al. (2013), Lehmann and Silvagni (2013), Dolinskaya (2002), Kolomak (2011)

- **Migration**

  Sardadvar, Vakulenko (2016, 2017), Vakulenko (2015)

- **Unemployment rate**

  Demidova and Signorelli (2012), Demidova et al. (2013), Demidova et al. (2015), Blinova et al. (2015), Blinova et al. (2016), Rusanovskiy and Markov (2016)

Spatial effects could not be neglected!

Choice of weighting matrix

Anselin (2002), Corrado and Fingleton (2012), Gibbons and Overman (2012), Partridge et al. (2012)

Two opinions:

1) Spatial econometric models are very sensitivity to the weighting matrix specification (Bell and Bockstael (2000), Stakhovych and Bijmolt (2009), Plümper et al. (2010)

2) Sensitivity of spatial models to the choice of weighting matrix is “the biggest myth in spatial econometrics”, LeSage and Pace (2014)

Weighting matrices

Conley, T. G., & Topa, G. (2002). Socio-economic distance and spatial patterns in unemployment

Two types of weighting matrices:

Based on the geographic proximity of regions

- Boundary
- Inverted distance

- Based on the proximity of the sectoral structures of gross value added (the Euclidean distance between 15-dimensional vectors reflecting the sectoral structure was used)

Weighting matrix based on the proximity of the gross value added by economic activity

$$\rho(\overrightarrow{x_i}, \overrightarrow{x_j}) = \|x_i - x_j\|_e = \sqrt{(x_{1i} - x_{1j})^2 + (x_{2i} - x_{2j})^2 + \cdots + (x_{15i} - x_{15j})^2}$$

	x_1	x_2	x_3	x_4	x_5	x_6			...						x_{15}
Белгородская область	100	11,6	0,0	21,8	23,1	3,3	6,6	13,6	0,6	6,5	0,0	3,9	2,9	2,7	2,5	0,9
Брянская область	100	14,3	0,0	0,1	21,7	4,8	3,8	15,7	1,4	15,3	0,0	6,4	5,9	4,5	5,1	1,0
Владимирская область	100	10,9	0,0	0,3	34,3	5,7	4,4	10,7	1,1	10,3	2,2	5,6	5,2	3,6	4,0	1,7

Gross value added by economic activity	
agriculture, forestry	information and communication
fishing	financial and insurance activities
mining and quarrying	real estate, rent and services activities
manufacturing	public administration and defense; compulsory social security
production and distribution of electricity, gas and water	education
construction	human health and social work activities
wholesale and retail trade; repair of motor vehicles and motorcycles	provision of other communal, social and personal services
accommodation and food service activities	

Convex combination of weighting matrices

Pace and LeSage (2002),

Hazir et al. (2014),

Debarsy and LeSage (2017),

LeSage and Fischer (2017).

Convex combinations of different types of exogenous weighting matrices are used in these articles.

The novelty of this work consists in mixing an exogenous geographical weighting matrix and an endogenous economic one.

Descriptive statistics for unemployment rate

	Mean	Std. Dev.	Min	Max
2005	9.09	7.18	1.72	63.10
2006	8.56	6.92	2.14	58.65
2007	7.43	5.76	1.26	47.43
2008	8.07	6.20	1.61	54.89
2009	9.68	5.66	3.13	53.07
2010	8.66	5.37	2.37	49.70
2011	7.79	5.16	1.96	48.17
2012	6.77	5.25	1.10	47.70
2013	6.66	4.90	1.50	43.70
2014	6.25	3.69	1.40	29.80
2015	6.67	3.70	2.10	30.50

Moran's Index

$$I(X) = \frac{N}{\sum_{i,j} w_{ij}} \frac{\sum_{i,j} w_{ij}(X_i - \bar{X})(X_j - \bar{X})}{\sum_{i} (X_i - \bar{X})^2}$$

Moran's Index

	Binary contiguity weighting matrix	Inverted distance weighting matrix
2005	0.076	0.096**
2006	0.119**	0.109**
2007	0.19***	0.152***
2008	0.145***	0.114**
2009	0.101**	0.055
2010	0.096**	0.06
2011	0.085*	0.053
2012	0.119**	0.068
2013	0.146***	0.088*
2014	0.259***	0.143***
2015	0.258***	0.148***

Data

Data source: Federal State Statistics Service of the Russian Federation, www.gks.ru

80 Russian regions; period 2005 – 2015;
The dependent variable is regional unemployment rate

Data and Model

$$UNEM_{it} = \sigma UNEM_{it-1} + \rho_{W_j}(W_{jt}UNEM)_{it} + \sum_{k=7}^{15}\gamma_k d_{200k} + (X\beta)_{it} + \alpha_i + \varepsilon_{it},$$

$$i = 1,...,80,\ t = 2005,...,2015,\ j = b\_end, id\_end$$

$$W_{b\_endt}(a) = aW_b + (1-a)W_{endt}$$

$$W_{id\_endt}(a) = aW_{id} + (1-a)W_{endt}$$

$$a = 0, 0.1,...,1,$$

Independent Variables

- Log of GRP per capita
- share of urban population
- ratio of invertments and gdp
- share of people with higher education in labour force
- openness of the regional economy to exports and imports
- the density of highways
- index of investment risk
- the level of federal subsidies
- the Herfindahl-Hirschman diversification index

Methodology

Kelejian, H. H., & Piras, G. (2014). Estimation of spatial models with endogenous weighting matrices, and an application to a demand model for cigarettes. Regional Science and Urban Economics, 46, 140-149.

All nonzero elements of weighting matrices were instrumented

Instruments for wij: distances between capitals of regions i and j, ratio of populations in regions i and j and their second and third powers.

Kelejian & Piras approach

1) Arellano-Bond approach, GMM

2) As a criterion for choosing the optimal parameter a, maximum correlation coefficient between the estimated and real values of the dependent variable was used.

$$W_{b\_endt}(a) = aW_b + (1-a)W_{endt}$$

$$W_{id\_endt}(a) = aW_{id} + (1-a)W_{endt}$$

Results of estimation with convex combination of boundary and economic weighting matrices

a	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
L1	0.707 ***	0.758 ***	0.749 ***	0.745 ***	0.746 ***	0.748 ***	0.749 ***	0.75 ***	0.751 ***	0.751 ***	0.751 ***
WY	-0.212 **	-0.465 ***	-0.433 ***	-0.123	0.137	0.237 *	0.255 **	0.244 **	0.227 **	0.209 ***	0.193 ***
lngdp	-0.047	0.022	0.026	-0.013	-0.043	-0.059	-0.067	-0.073	-0.076	-0.079	-0.081
Urbansh	-16.198 **	-14.81 **	-12.65 *	-9.383	-8.516	-9.002	-9.593	-10.04	-10.36	-10.58	-10.76 *
inv/gdp	0.165	0.071	0.004	-0.034	-0.018	-0.004	-0.003	-0.007	-0.012	-0.018	-0.023
Highed	1.354	2.048	2.776 *	3.263 *	3.468 **	3.466 **	3.425 ***	3.381 **	3.343 **	3.311 **	3.283 **
Open	-0.368 ***	-0.275	-0.225	-0.247	-0.275	-0.301*	-0.323 *	-0.34 **	-0.353 **	-0.363 **	-0.371 **
Road	-0.002 **	-0.003 ***	-0.004 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.002 ***	-0.002 ***	-0.002 ***
risk	-0.162	-0.164	-0.228	-0.236	-0.243	-0.237	-0.22	-0.201	-0.185	-0.173	-0.164
hh	0.475	0.834	0.188	-0.41	-0.449	-0.407	-0.378	-0.361	-0.351	-0.347	-0.346
dot	-0.013	-0.013	-0.014	-0.014	-0.015 *	-0.016 *	-0.017 *	-0.018 *	-0.018 **	-0.019 **	-0.019 **
Time eff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Results of estimation with convex combination of inverted distance and economic weighting matrices

a	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
L1	0.767 ***	0.762 ***	0.760 ***	0.759 ***	0.757 ***	0.755 ***	0.756 ***	0.757 ***	0.758 ***	0.759 ***	0.759 ***
WY	-0.212 **	-0.473 ***	-0.694 ***	-0.693 ***	0.454 ***	0.243 ***	-0.123 **	-0.063	-0.032	-0.016	-0.007
lngdp	-0.047	-0.027	-0.017	-0.031	-0.066	-0.087	-0.098	-0.106	-0.115	-0.123	-0.129
Urbansh	-16.198 **	-13.53 *	-11.27	-9.224	-8.432	-9.43	-11.22 *	-13.08 **	-14.78 **	-16.24 ***	-17.367 ***
inv/gdp	0.165	0.094	0.004	-0.132	-0.261	-0.303	-0.318	-0.35	-0.402	-0.461	-0.511
Highed	1.354	1.45	2.021	2.699	3.199 ***	3.493 **	3.617 ***	3.633 ***	3.595 ***	3.538 ***	3.487 ***
Open	-0.368 ***	-0.349 **	-0.33 *	-0.327 *	-0.334 **	-0.339 **	-0.346 **	-0.351 **	-0.355 **	-0.357 **	-0.358 **
Road	-0.002 **	-0.003 ***	-0.003 ***	-0.003 ***	-0.004 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.003 ***	-0.003 ***
risk	-0.162	-0.215	-0.307	-0.318	-0.296	-0.283	-0.262	-0.241	-0.225	-0.215	-0.209
hh	0.475	0.957	1.009	0.233	-0.523	-0.828	-0.939	-0.955	-0.92	-0.869	-0.831
Dot	-0.013	-0.013	-0.013	-0.013	-0.012	-0.012	-0.012	-0.013	-0.014 **	-0.015 **	-0.016 **
Time eff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Conclusions

For the Russian regions, it is necessary to take into account the geographical proximity and proximity of the sectoral structure equally.

Thank you!

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