Municipal elections in Russia: spatial analysis for 2021-2022

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Motivation

- Most election research has been conducted on Western democracies. For Russia there are few such works.
- The distribution of votes in municipal elections often reflects the economic interests of various territorial groups. It is possible to analyze what factors influence elections in specific districts or cities and how this is related to economic processes in these regions.
- The results of municipal elections may affect budget priorities and the allocation of funds in various districts.

Literature

- Siegfried André (1949). Géographie électorale de l'Ardèche: sous la IIIe République, the author of the term “electoral geography” and the founder of the corresponding discipline.
- Electoral-geographical analysis was carried out for many countries of the world, but most of all for the USA (Wu, 2023), Great Britain (Hearne, 2020), France (Fernández et al., 2022).
- There are few such studies for Russia.
  - Demidova O., Kuletskaya L. (Kuletskaya et al., 2023; 2022) show that in order to identify factors influencing the results of presidential elections, it is necessary to take into account spatial effects.
  - Yu. Gaivoronsky (Gaivoronsky, 2018) using linear regression models, concluded that “in Russia the factor of economic development is difficult to recognize as systematically significant”.

Hypotheses

Russia is a very large and heterogeneous country, so the dependence on economic factors may be heterogeneous.

Hypothesis 1. The location of Russian municipalities based on the results of the electoral choice is not random; there is a clustering of regions with similar voting results.

Hypothesis 2. Economic factors have a significant impact on the results of municipal elections in Russia.

Data

- As data source we have used information about municipal elections in 2272 Russian municipalities in 2021 and 2022 years.
- We excluded from consideration the municipalities of Moscow (the modern capital of Russia) and St. Petersburg (the former capital), since the capital's residents are quite different from residents of other regions.

Data sources:

- Central Election Commission of the Russian Federation http://www.vybory.izbirkom.ru/region
- Database of municipal indicators, Rosstat https://rosstat.gov.ru/storage/mediabank/Munst.htm

Dependent variables

- UR (United Russia) is the share of votes for candidates of the United Russia party (which supports the Russian President),
- CPRF is the share of votes for candidates of the Communist Party of the Russian Federation (left-wing party),
- LDPR is the share of votes for the candidates of the Liberal Democratic Party of Russia (the name of this party may be misleading, it is actually a right-wing populist nationalist party),
- JR (Just Russia) is the share of votes for the candidates of the Just Russia party (a party created on the initiative of the Russian presidential administration in order to take away votes from left-wing parties and parties with a strong nationalist bias),
- SN (Self-nominated) is the share of votes for self-nominated candidates.

Table 1. Descriptive statistics for the share of votes for the candidates of different parties

stats	UR	CPRF	LDPR	JR	SN
mean	68.43	9.42	4.68	4.44	11.78
median	72.00	7.00	3.00	2.00	7.00
min	0.00	0.00	0.00	0.00	0.00
max	100.00	89.00	97.00	80.00	100.00

Moran, Geary and Getis-Ord indices

Table 2. Descriptive Results of Moran, Geary and Getis-Ord tests

Party	Moran's I	z-statistics	Geary's C	z-statistics	Getis-Ord's G	z-statistics
United Russia	0.312	21.787	0.693	-18.675	0.002	8.531
Communist Party	0.237	16.587	0.755	-11.903	0.003	11.012
LDPR	0.256	18.031	0.677	-7.672	0.003	11.263
Just Russia	0.147	10.35	0.812	-5.568	0.003	6.175
Self-nominated	0.204	14.725	0.76	-10.162	0.003	9.572

The location of the regions is not random, there is a positive autocorrelation (which corresponds to the clustering of regions according to the indicators under consideration).

Map 1. The share of votes for the candidates of the United Russia party, %

Explanatory variables

Economic Factors

- *SME* is the number of small and medium-sized businesses per 10,000 people,
- *BUDGET* is the budget surplus/deficit, thousand rubles,
- *INVESTMENT* is the share of investments in fixed assets at the expense of the municipal budget relative to the expenditures of the municipal budget

Factors characterizing the effectiveness of local government, and amenities

- ROAD_Q is the proportion of the length of local public roads that do not meet regulatory requirements in the total length of local public roads,
- TRANSP_LINKS is the proportion of the population living in settlements that do not have regular bus and (or) railway connections with the administrative center of the mountain district (municipal district) in the total population of the mountain district (municipal district),
- PRESCHOOL is the proportion of children aged 1-6 years receiving preschool educational services and (or) services for their maintenance in municipal educational institutions in the total number of children aged 1-6 years (unfortunately, no other variables related to education are provided for the municipality level),
- HOUSE_IMPROV is the share of the population that received housing and improved living conditions in the reporting year in the total population registered as needing housing,
- SOC_SUPPORT is the share of citizens who use social support to pay for housing and utilities at the end of the reporting period,
- LIGHT is the proportion of illuminated parts of streets, driveways, embankments at the end of the year,
- ENVIRONMENT is the share of environmental protection costs, including payment for environmental services, relative to municipal budget expenditures,
- URBAN is the percentage of the urban population as of January 1 of the current year.

Explanatory variables

Table 1. Descriptive statistics for the explanatory variables

Variable	Mean	Std. Dev.	Min	Max
SME	238.41	162.85	0.00	2646.10
BUDGET	14627.38	116470.30	-664356.00	2032052.00
INVESTMENT	3.47	7.43	0.00	99.88
ROAD_Q	41.50	30.37	0.00	100.00
TRANSP_LINKS	7.19	18.45	0.00	100.00
PRESCHOOL	58.92	19.33	0.00	100.00
HOUSE_IMPROV	9.37	13.09	0.00	100.00
SOC_SUPPORT	24.81	11.20	0.00	95.31
LIGHT	62.16	28.28	0.00	100.00
ENVIRONMENT	5.35	11.10	0.00	97.98
URBAN	50.31	39.43	0.00	100.00

Models

Linear regression models: $Y_i^p = \beta_0 + \sum_{j=1}^{K} \beta_j X_{ji} + \varepsilon_i$

and geographically weighted regressions (GWR): $Y_i^p = \beta_{0i} + \sum_{j=1}^{K} \beta_{ji}(u_i, v_i) X_{ji} + \varepsilon_i$,

where $i = 1, \ldots, n, n = 2272$ is a number of municipality, p = 1,…,5,

Y_i^p is the share of votes for candidates of the United Russia, Communist Party, LDPR, Just Russia, Self-Nominated in *i*-th municipality, $X_1, \ldots, X_K$ $(K = 11)$ are explanatory variables, ε_i are errors, u_i, v_i are the coordinates of the *i*-th municipality.

In GWR (Wheeler, 2021) we used Gaussian kernel function and cross-validation for the choice of the bandwidth. To estimate linear regression and GWR we have used packages *spgwr* written by Roger Bivand and Danlin Yu in R.

Results of votes for candidates of the United Russia party

Dep.variable UR	LR	MIN	1st Quantile	Median	3rd Quantile	MAX	N(t >1.96)	N(t <- 1.96)
C	75.789***	34.488	76.500	76.993	77.686	79.456	2270	0
SME	-0.018***	-0.037	-0.020	-0.014	-0.013	-0.001	0	1988
BUDGET	0.000**	0.000	0.000	0.000	0.000	0.000	2270	0
INVESTMENT	-0.005	-0.019	-0.018	-0.017	-0.008	0.160	0	0
ROAD_Q	-0.068***	-0.120	-0.091	-0.078	-0.071	0.206	0	2117
TRANSP_LINKS	-0.030	-1.440	-0.020	-0.016	-0.004	0.034	0	0
PRESCHOOL	-0.002*	-0.029	-0.005	-0.004	-0.002	0.577	0	1745
HOUSE_IMPROV	0.051	0.024	0.062	0.065	0.074	1.393	636	0
SOC_SUPPORT	0.004	-0.320	-0.003	0.007	0.008	0.017	0	135
LIGHT	0.001***	0.000	0.000	0.000	0.000	0.001	2247	0
ENVIRONMENT	-0.052**	-0.396	-0.048	-0.038	-0.038	-0.037	0	416
URBAN	-0.010	-0.138	-0.018	-0.015	-0.002	0.019	0	0
AIC	20238	20105.45						

Results of votes for candidates of the Communist party

Dep.variable CPRF	LR	MIN	1st Quantile	Median	3rd Quantile	MAX	N(t >1.96)	N(t <-1.96)
C	7.0407***	5.62	6.18	6.44	6.66	11.3	2270	0
SME	0.0053*	-7.83E-03	5.70E-03	6.70E-03	7.17E-03	7.58E-03	1503	0
BUDGET	0	-8.57E-06	-1.18E-07	-7.93E-08	-7.65E-08	-7.20E-08	0	246
INVESTMENT	0.0002	-3.68E-02	1.14E-03	1.19E-03	1.32E-03	7.62E-03	0	0
ROAD_Q	0.0316***	-1.86E-02	3.39E-02	3.67E-02	4.14E-02	5.07E-02	2115	0
TRANSP_LINKS	-0.038***	-1.40E-01	-4.46E-02	-4.43E-02	-4.36E-02	-2.37E-02	0	2069
PRESCHOOL	0.0004	9.76E-05	4.67E-04	2.31E-03	4.53E-03	9.86E-02	1385	0
HOUSE_IMPROV	-0.0129	-8.37E-02	-7.16E-03	-3.85E-03	-2.93E-03	-9.79E-04	0	0
SOC_SUPPORT	-0.0035	-8.73E-03	-5.86E-03	-5.48E-03	-1.59E-03	1.86E-01	0	0
LIGHT	-0.0002***	-3.66E-04	-2.60E-04	-2.58E-04	-2.54E-04	1.85E-02	0	2152
ENVIRONMENT	0.0268**	1.61E-02	2.98E-02	3.16E-02	3.19E-02	1.91E-01	1724	0
URBAN	0.0041	-1.02E-01	-3.07E-03	-1.38E-03	-3.68E-04	1.47E-02	0	0
AIC	17175	17155.1						

Results of votes for candidates of the LDPR

Dep.variable LDPR	LR	MIN	1st Quantile	Median	3rd Quantile	MAX	N(t >1.96)	N(t <- 1.96)
C	3.3772***	3.29780	3.36040	3.36280	3.37040	3.40520	2272	0
SME	0.0029*	0.00291	0.00292	0.00293	0.00293	0.00295	0	0
BUDGET	0	0.00000	0.00000	0.00000	0.00000	0.00000	0	0
INVESTMENT	-0.0071	-0.00707	-0.00704	-0.00704	-0.00703	-0.00699	0	0
ROAD_Q	0.0046	0.00426	0.00464	0.00472	0.00475	0.00547	0	0
TRANSP_LINKS	0.0164**	0.01605	0.01633	0.01634	0.01637	0.01649	2272	0
PRESCHOOL	0.0008**	0.00076	0.00076	0.00076	0.00076	0.00077	2272	0
HOUSE_IMPROV	0.0047	0.00418	0.00484	0.00486	0.00492	0.00517	0	0
SOC_SUPPORT	-0.002	-0.00205	-0.00203	-0.00202	-0.00202	-0.00201	0	0
LIGHT	0	0.00003	0.00003	0.00003	0.00003	0.00003	0	0
ENVIRONMENT	0.0079	0.00766	0.00783	0.00783	0.00785	0.00795	0	0
URBAN	0.0057*	0.00547	0.00562	0.00562	0.00564	0.00571	0	0
AIC	14972							14957

Results of votes for candidates of the Just Russia Party

Dep.variable JR	LR	MIN	1st Quantile	Median	3rd Quantile	MAX	N(t >1.96)	N(t <- 1.96)
C	2.68200***	Min.	2.4012	2.4187	2.4423	2.6967	2270	0
SME	0.00357**	2.1698	0.0019	0.002083	0.002735	0.0153	328	0
BUDGET	0.00000	-0.06537	-1E-07	-1.1E-07	-1.1E-07	-1E-07	0	0
INVESTMENT	-0.00218	-0.00866	-0.0019	-0.00102	-0.0008	-0.00036	0	0
ROAD_Q	0.02268***	-0.00032	0.0276	0.027862	0.028235	0.02889	2220	0
TRANSP_LINKS	0.01050	0.00236	0.0107	0.014122	0.015063	0.01852	1	0
PRESCHOOL	0.00026	-0.01725	0.0002	0.000217	0.000239	0.0182	0	0
HOUSE_IMPROV	-0.02084*	0.00017	-0.0164	-0.01245	-0.01158	-0.00958	0	263
SOC_SUPPORT	-0.00386	-3.5E-07	-0.0039	-0.00387	-0.00379	0.0111	0	0
LIGHT	0.00000	-0.0041	1E-05	1.85E-05	2.02E-05	2.3E-05	0	0
ENVIRONMENT	-0.00298	-0.0001	-0.0072	-0.00658	-0.00367	0.01374	0	0
URBAN	0.00429	-0.00772	0.0063	0.00861	0.009188	0.01094	1594	0
AIC	15307	15278.3						

Results of votes for candidates of the self-nominated candidates

Dep.variable SN	LR	MIN	1st Quantile	Median	3rd Quantile	MAX	N(t >1.96)	N(t <- 1.96)
C	10.4253***	9.47	10.41	1.08E+01	1.10E+01	1.67E+01	2272	0
SME	0.002	-0.01	0.00	-5.88E-04	2.19E-03	1.17E-02	209	0
BUDGET	0.000*	0.00	0.00	-4.11E-07	-4.03E-07	-3.12E-07	0	2020
INVESTMENT	0.0089	-0.01	0.01	1.18E-02	1.23E-02	1.38E-02	0	0
ROAD_Q	0.0111	-0.06	0.01	9.39E-03	1.54E-02	2.43E-02	350	0
TRANSP_LINKS	0.0531***	0.02	0.03	3.35E-02	3.44E-02	1.06E-01	2110	0
PRESCHOOL	0.0004	-0.06	0.00	5.22E-04	5.66E-04	8.27E-04	0	0
HOUSE_IMPROV	-0.0053	-0.04	-0.04	-3.47E-02	-3.27E-02	6.03E-02	0	0
SOC_SUPPORT	0.0079	0.00	0.01	7.18E-03	8.97E-03	6.43E-02	114	0
LIGHT	-0.0003**	0.00	0.00	-2.48E-04	-2.41E-04	-1.23E-04	0	2269
ENVIRONMENT	0.0209	0.01	0.02	1.93E-02	2.09E-02	3.59E-02	0	0
URBAN	-0.0063	-0.02	-0.01	-4.92E-03	-4.40E-03	2.66E-02	0	0
AIC	18479	18416.4						

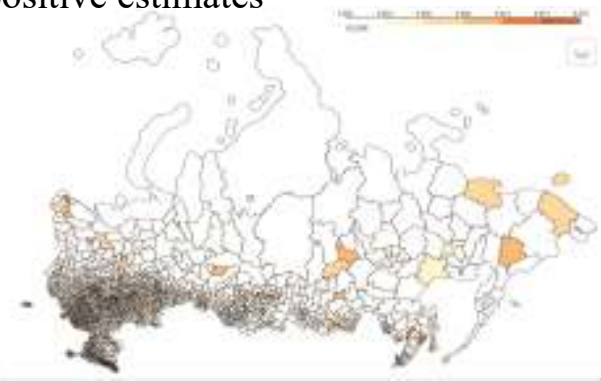
Influence of economic factors

Influence of SME (number of small and medium-sized businesses per 10,000 people)

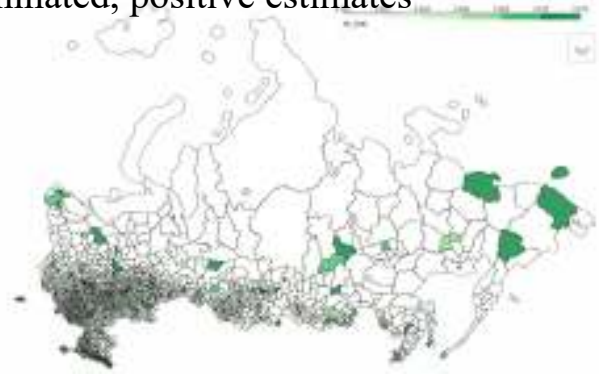
United Russia, negative estimates

Communist Party, positive estimates

JR, positive estimates



Self nominated, positive estimates

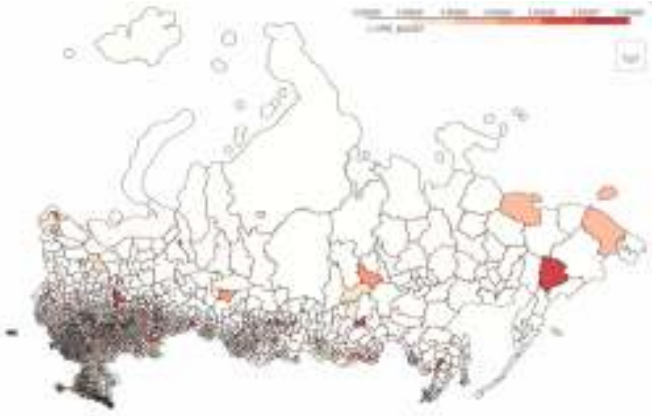


Influence of economic factors

Influence of Budget (budget surplus/deficit, thousand rubles)

United Russia, positive estimates

Communist Party, negative estimates

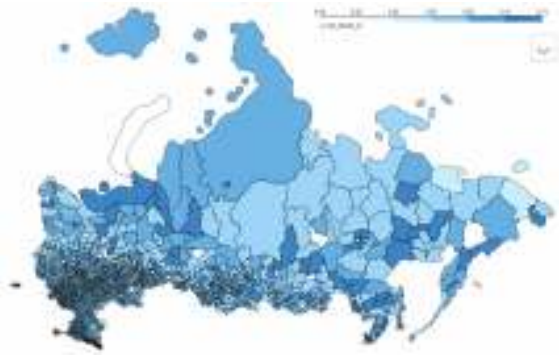


Self nominated, negative estimates

Influence of non-economic factors

Influence of Road_Q (proportion of the length of local public roads that do not meet regulatory requirements)

United Russia, negative estimates



Communist Party, positive estimates

JR, positive estimates

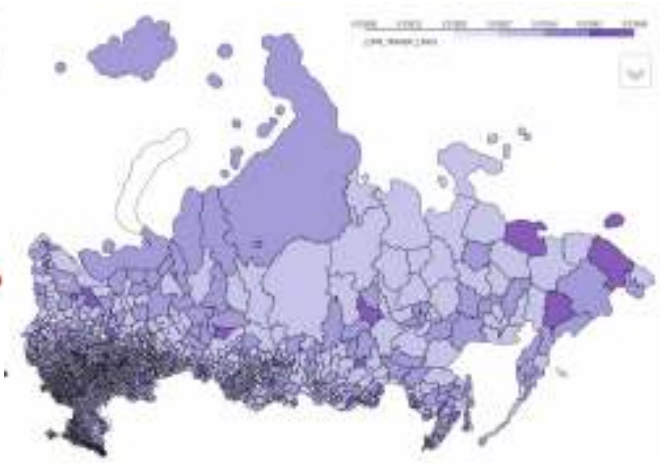
Self nominated, positive estimates

Influence of non-economic factors

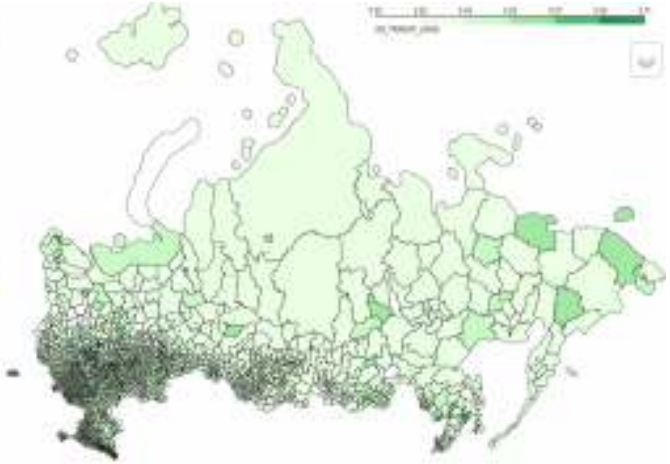
Influence of TRANSP_LINKS is the proportion of the population living in settlements that do not have regular bus and (or) railway connections with the administrative center

Communist Party, negative estimates

LDPR, positive estimates



Self nominated, positive estimates

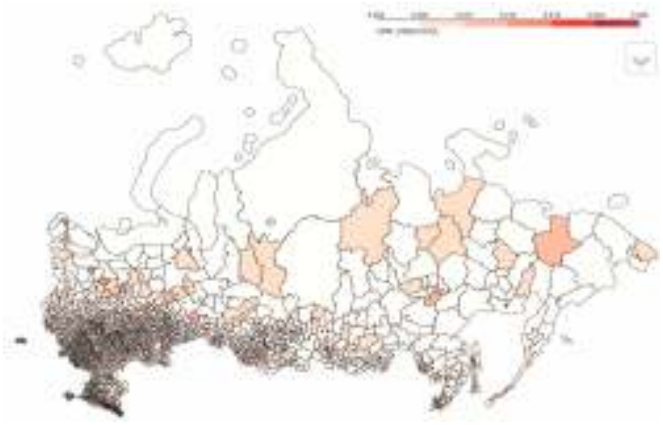


Influence of non-economic factors

Influence of PRESCHOOL (the proportion of children aged 1-6 years receiving preschool educational services)

United Russia, negative estimates

Communist Party, positive estimates

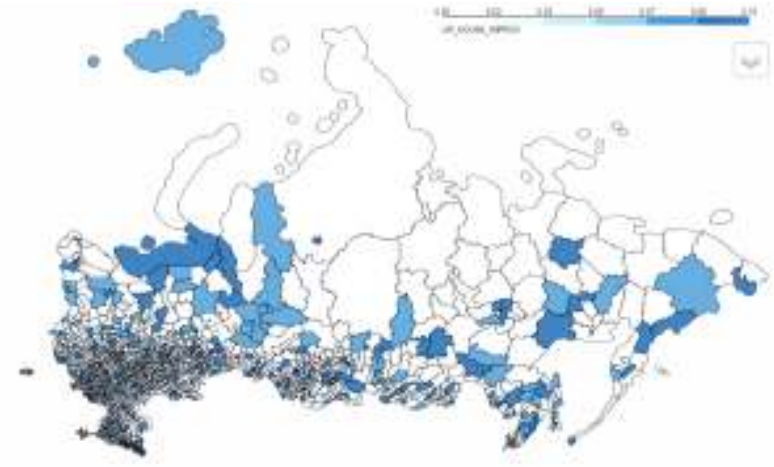


LDPR, positive estimates

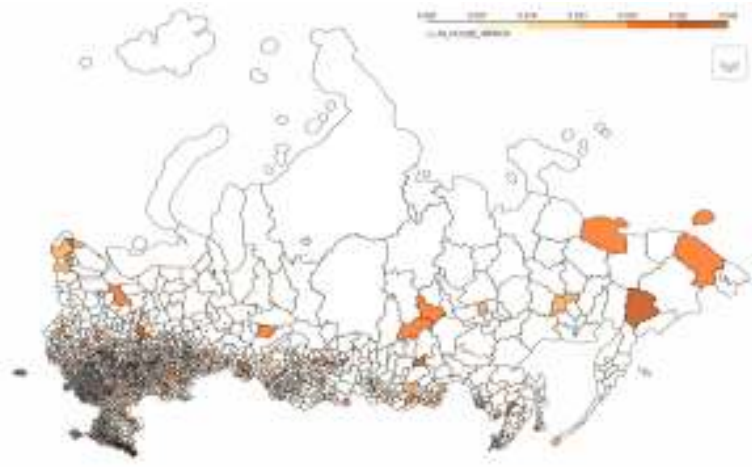
Influence of non-economic factors

Influence of HOUSE_IMPROV (share of the population that received housing and improved living conditions in the reporting year)
The corresponding coefficient is not significant in linear regression.

United Russia, positive estimates



JR, negative estimates

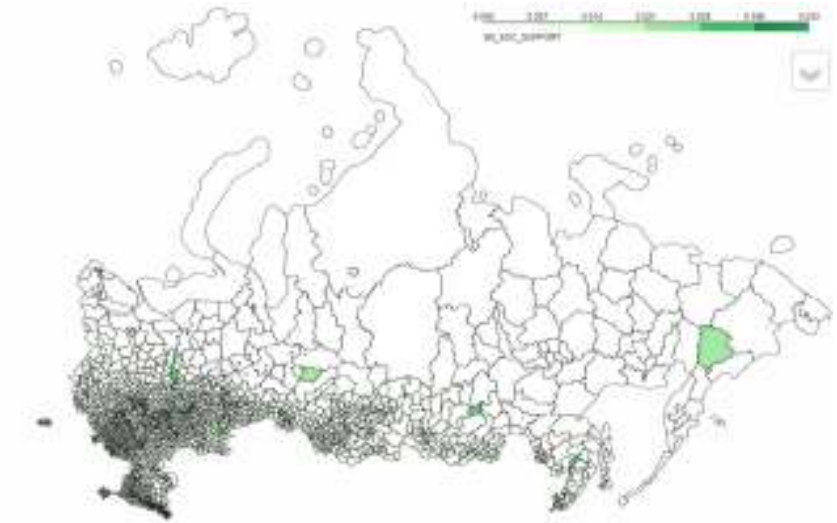


Influence of non-economic factors

Influence of *SOC_SUPPORT* is the share of citizens who use social support to pay for housing and utilities at the end of the reporting period.

United Russia, negative estimates

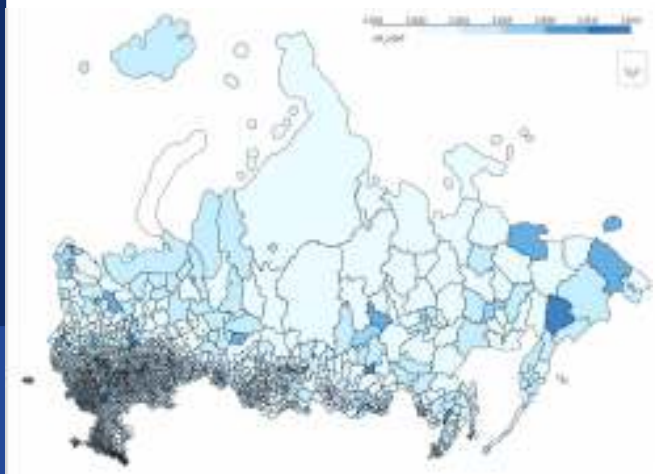
Self nominated, positive estimates



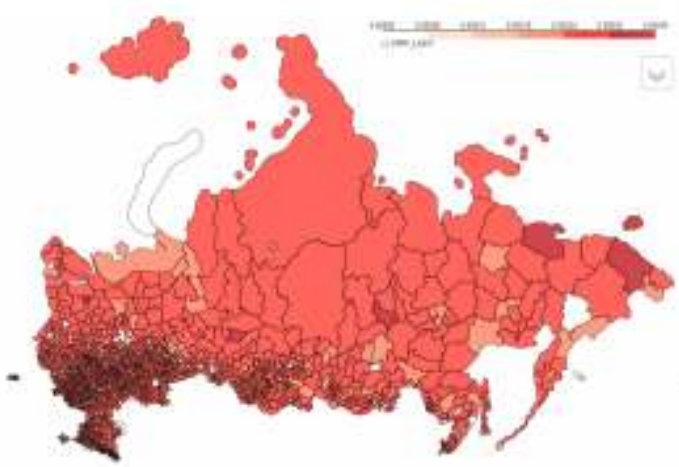
Influence of non-economic factors

Influence of LIGHT (proportion of illuminated parts of streets, driveways, embankments)

United Russia, positive estimates



Communist Party, negative estimates

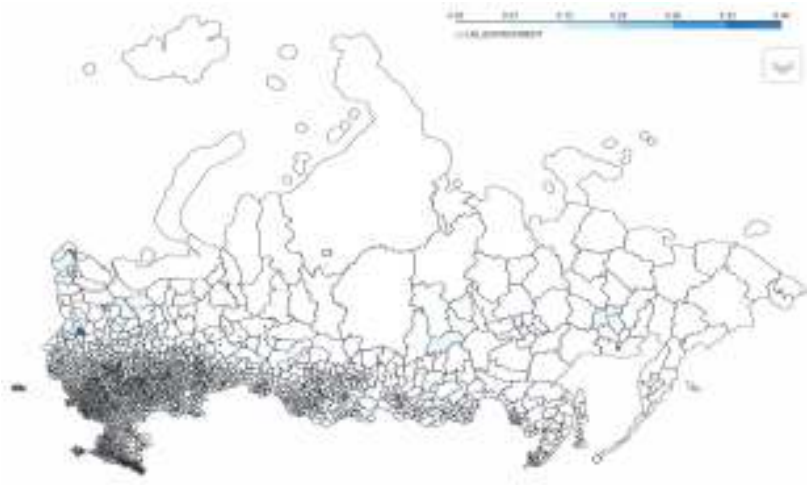


Self nominated, negative estimates

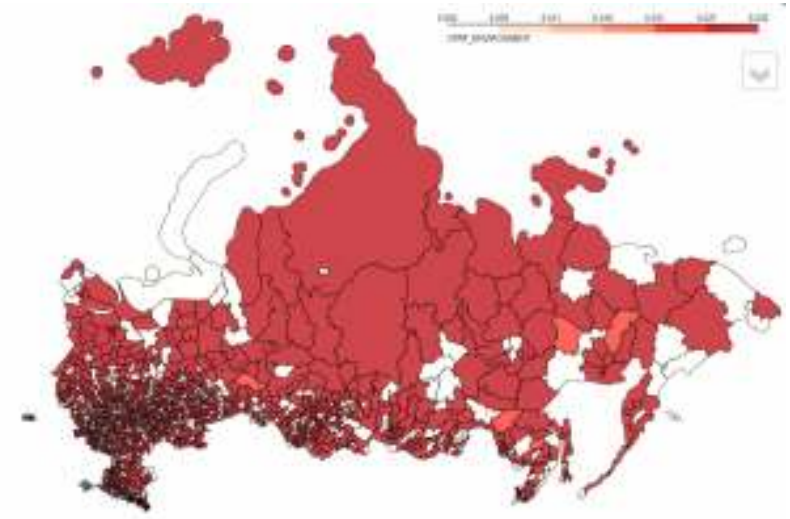
Influence of non-economic factors

Influence of ENVIRONMENT (share of environmental protection costs, including payment for environmental services, relative to municipal budget expenditures)

United Russia, negative estimates



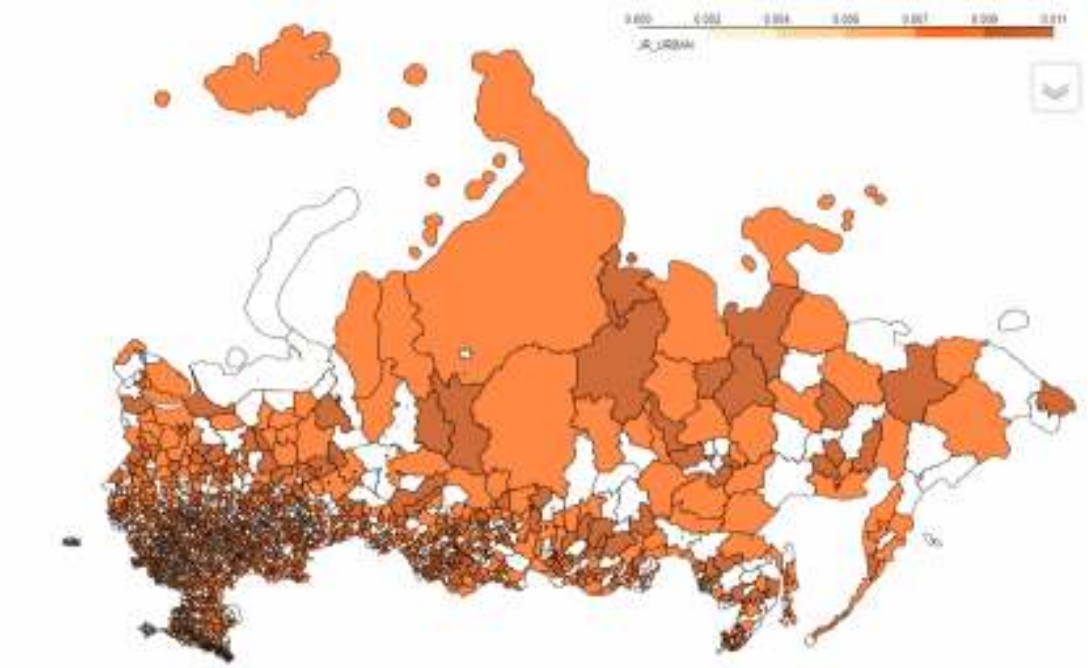
Communist Party, positive estimates



Influence of non-economic factors

Influence of URBAN (percentage of the urban population)
The corresponding coefficient is not significant in linear regression.

JR, positive estimates



Conclusions

- Hypothesis 1 **(**The location of Russian municipalities based on the results of the electoral choice is not random; there is a clustering of regions with similar voting results) received empirical confirmation.
- Global spatial autocorrelation indices confirm the presence of positive autocorrelation and clustering of high values. This means that municipalities do tend to cluster.
- Hypothesis 2 (Economic factors have a significant impact on the results of municipal elections in Russia) also received empirical confirmation.
- The higher the budget surplus (deficit), the higher (lower) the share of votes for United Russia representatives. And according to the GWR assessment, this result holds for almost all municipalities.
- The better small and medium-sized businesses are developed in a region, the lower the share of voters supporting UR and the higher the share of voters supporting independent candidates (in a small number of regions) and opposition parties (for most regions this is the Communist Party, but in a small number of regions also the Just Russia Party).

Thank you!

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