# The Impact of ICT on the Inclusiveness of Russian Regions

*Demidova Olga, NRU HSE, Moscow, Russia, demidova@hse.ru*

*Kazakova Svetlana, NRU HSE, Moscow, Russia, kazakovas2003@mail.ru*

**Abstract**

The identification of factors influencing inclusive economic growth is gaining prominence. This concept implies that the benefits of economic development are distributed more evenly among all segments of the population, reducing inequality and poverty. Information and communication technologies (ICT) are among such factors and are currently among the most rapidly developing ones. The aim of this study is to determine the impact of ICT on the inclusiveness of Russian regions. We used data from 2014 to 2023 for 80 Russian regions. According to the results of global panel data models with fixed effects, the more developed a region's ICT is, the higher its level of inclusiveness; however, the proportion of households with a personal computer does not affect the level of inclusiveness. Because the influence of factors affecting inclusiveness may vary across regions, we also estimated a geographically weighted panel data regression.

The coefficients for all variables characterizing ICT, except for the percentage of households with a personal computer, were significant and positive. However, the estimates of local coefficients varied; thus, ICT increases the degree of inclusiveness of Russian regions, but not equally. At the same time, the proportion of households with a personal computer can have both a positive and negative impact on the degree of inclusiveness. Perhaps personal computers are concentrated in the hands of the wealthy and educated, while socially vulnerable groups remain digital outsiders. In this case, despite a formally "high share," actual inclusivity does not increase and may even decline due to the widening gap between groups. A positive impact of increasing the percentage of households with a personal computer was found for the regions located in the Urals and adjacent regions.

## 1. Introduction

The identification of determinants of inclusive economic growth has become increasingly relevant in contemporary research. Inclusive growth implies a more equitable distribution of the benefits of economic development across population groups, thereby reducing inequality and poverty. Among the potential drivers of inclusive growth, information and communication technologies (ICT) occupy a prominent position due to their rapid development (Sardar et al., 2024; Wang, 2023).

The influence of these factors occurs, among other channels, through the following:

- ICTs provide opportunities for access to information, education, labor markets, etc., and can reduce the digital divide between different population groups (between the rich and the poor, residents of large and small cities, urban and rural populations, etc.).
- ICTs help socially vulnerable groups (people with disabilities, women on maternity leave, the ederly, etc.) integrate into the economic and social life of society.
- ICTs can increase the transparency of services provided by public authorities and government bodies.

However, there are also certain risks to inclusive economic development associated with the advancement of ICTs, as not all segments of the population have equal access to ICTs or possess the necessary digital skills. Those without internet access or lacking the required skills may find themselves excluded from new opportunities, leading to a widening digital inequality.

The objective of this study is to assess the impact of ICT development on the inclusiveness of Russian regions.

## 2. Literature review

In recent years, according to various scientific publication databases, the number of studies devoted to inclusive development and inclusive economic growth has been steadily increasing, growing by several hundred each year, which indicates the relevance of this research area. A review of such studies is presented, for example, in the article (Saher et al., 2024). Most of these studies propose an indicator characterizing inclusive growth or inclusive development either for a group of countries (Mkrtchyan et al., 2025; Bashir et al., 2025; Safdar et al., 2024) or for a single country (Duygulu, Keskin, 2024; Bal-Domanska et al., 2025).

There are few studies devoted to identifying factors influencing the inclusive development of Russian regions (Barinova & Zemtsov, 2019; Mikheeva, 2022; Popodko, 2021; Fridman et al., 2022). The article by Barinova and Zemtsov (2019) proposed two composite indices of inclusive growth and several sub-indices and compared their values for different regions over the period 1998–2016. The article by Mikheeva (2022) presents the results of an analysis of inclusiveness indicators for the EAEU member states (including Russia) in 2015, 2019, and 2020 and concludes that in none of these countries during the years under consideration was economic growth inclusive. The article by Popodko (2021) examines the inclusive development of a resource-based region using the example of Krasnoyarsk Krai and concludes that “economic growth in a resource-based region does not lead to an adequate increase in the standard of living of the population.” The article by Fridman et al. (2022) investigates the inclusive development of Kuzbass in 2005–2020 and concludes that “the region's economic growth does not ensure an adequate improvement in the standard of living of its population."

In many articles (focused on foreign regions), linear regression models, panel data models, or time-series models are used to identify factors influencing the inclusive development of the territorial units under consideration. Factors affecting these indicators are also examined. As shown by (Sardar et al., 2024; Wang, 2023), ICT are among such factors. However, we are not aware of similar studies conducted for Russia.

Based on the literature review, the following hypotheses were put forward.

**Hypothesis 1.** The development of ICT has a positive impact on the inclusiveness of Russian regions.

**Hypothesis 2.** The impact of ICT development on the inclusiveness of Russian regions is characterized by regional heterogeneity.

## 3. Data, Variables and global model (panel data model)

To test the hypotheses, data for 2014–2023 for 80 Russian regions were used (the remaining regions were excluded due to missing data). Following the approach of Barinova and Zemtsov (2019), the inclusivity index for Russian regions was calculated based on the following indicators: median household income, the income Gini index, and the poverty rate. As these variables were measured in different units, they were firstly transformed using the following formulas:

$$\widetilde{Gini} = \frac{Gini_{max} - Gini}{Gini_{max} - Gini_{min}},$$

$$\widetilde{Poverty} = \frac{Poverty_{max} - Poverty}{Poverty_{max} - Poverty_{min}},$$

$$\widetilde{Median} = \frac{Median - Median_{min}}{Median_{max} - Median_{min}}.$$

The inclusivity index was calculated using the following formula:

$$\text{Inclusiveness} = \frac{1}{3}\left(\widetilde{Gini} + \widetilde{Poverty} + \widetilde{Median}\right)$$

Table 1 provides descriptive statistics for this variable for each year.

**Table 1. Descriptive statistics for the inclusion index for 2014-2023**

| Year | Mean | Sd | Min | Max |
|---|---|---|---|---|
| 2014 | 0.482426 | 0.064646 | 0.237936 | 0.59505 |
| 2015 | 0.49222 | 0.068919 | 0.223797 | 0.605656 |
| 2016 | 0.490033 | 0.066009 | 0.260452 | 0.605045 |
| 2017 | 0.505572 | 0.069105 | 0.278514 | 0.643471 |

| | | | | |
|---|---|---|---|---|
| 2018 | 0.509912 | 0.068723 | 0.319246 | 0.62749 |
| 2019 | 0.524791 | 0.068587 | 0.329591 | 0.690763 |
| 2020 | 0.542913 | 0.071851 | 0.310428 | 0.705367 |
| 2021 | 0.544668 | 0.070125 | 0.317264 | 0.708691 |
| 2022 | 0.576619 | 0.069699 | 0.350982 | 0.748613 |
| 2023 | 0.570298 | 0.073569 | 0.330059 | 0.768063 |

The results presented in Table 1 indicate that in the years under review the degree of inclusiveness of Russian regions increased.

To identify factors influencing the inclusiveness of Russian regions, we estimated a panel data model with fixed effects (according to the Hausman test, this model was better than the random effects model):

$$Inclusiveness_{it} = \alpha_i + \sum_{j=1}^{k} \beta_j X_{jit} + \varepsilon_{it} \tag{1}$$

where $i$ is the region number, t = 2014,…,2023, $X_j$ are factors under consideration, $\alpha_i$ are individual effects, $\beta_j$ are estimated parameters, $\varepsilon_{it}$ are errors.

The model incorporated variables representing the development of ICT in the region:

*Computer* - the percentage of households with a personal computer;

*Internet* - the percentage of households with internet access,

*BroadInternet* - the percentage of households with broadband internet access;

*PopulInternet* - the percentage of the population using the internet;

*EverydayInternet* - the percentage of the population using the internet daily or almost daily.

**Table 2. Descriptive statistics for variables characterizing ICT**

| Variable | | Mean | Std. dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| | | | | | | |
| Internet | overall | 77.319 | 8.61315 | 52.2 | 99.1 | N = 800 |
| | between | | 5.08551 | 68.69 | 91.49 | n = 80 |
| | within | | 6.97246 | 51.259 | 94.259 | T = 10 |
| | | | | | | |
| Broad_Internet_ | overall | 72.8788 | 11.513 | 25.4 | 98.5 | N = 800 |
| | between | | 5.35447 | 54.94 | 85.48 | n = 80 |
| | within | | 10.2079 | 32.0488 | 109.939 | T = 10 |
| | | | | | | |
| Popul_Internet | overall | 81.5016 | 9.18786 | 55.1 | 99.7 | N = 800 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | between | | 3.82194 | 73.19 | 89.9 | n = 80 |
| | within | | 8.36506 | 55.1216 | 99.8416 | T = 10 |
| | | | | | | |
| Everyday_Internet | overall | 67.9694 | 13.9014 | 29.3 | 97.3 | N = 800 |
| | between | | 5.11505 | 58.1 | 80.44 | n = 80 |
| | within | | 12.9375 | 28.6994 | 97.8994 | T = 10 |
| | | | | | | |
| Computer | overall | 69.0759 | 8.43893 | 18.9 | 95.7 | N = 800 |
| | between | | 6.81091 | 53.95 | 86.8 | n = 80 |
| | within | | 5.03484 | 34.0259 | 93.0259 | T = 10 |

It should be noted that for all variables characterizing the Internet, the between-group variance, which reflects time-invariant differences across regions, is smaller than the within-group variance, which reflects temporal fluctuations around the time mean. For the variable *Computer*, by contrast, the between-group variance is larger.

To avoid the problem of multicollinearity, we included these variables into the models one at a time.

The models also included control variables characterizing the socio-economic status of the regions:

*Invest* – ratio of investments to gross regional product (with an annual lag),
*Urban* – share of urban population in the region,
*Employ* – employment rate of the region,
*Young* – share of population younger than working age,
*Old* – share of population older than working age,
*Dependency* - dependency ratio (number of working-age people per 1000 non-working-age people)
*Transfers* – share of transfers in the regional budget.

## 4. Results of panel data models interpretation

The results of estimation for panel data models with fixed effects are presented in Table 3.

**Table 3. Results of panel data models**

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| *Invest* | -0.083*** | -0.083*** | -0.068*** | -0.061*** | -0.111*** |
| *Urban* | 0.008*** | 0.007*** | 0.006*** | 0.004*** | 0.014*** |

| | | | | | |
|---|---|---|---|---|---|
| *Employ* | -0.003*** | -0.003*** | -0.002*** | -0.001*** | -0.006*** |
| *Young* | 0.011** | 0.015*** | 0.008* | 0.007* | 0.015*** |
| *Old* | -0.010** | -0.010** | -0.010*** | -0.009** | -0.016*** |
| *Dependency* | 0 | 0 | 0 | 0 | 0 |
| *Transfers* | 0.059*** | 0.076*** | 0.056*** | 0.031 | 0.080*** |
| *Internet* | 0.002*** | | | | |
| *Broad Internet* | | 0.001*** | | | |
| *Popul Internet* | | | 0.002*** | | |
| *Everyday Internet* | | | | 0.002*** | |
| *Computer* | | | | | 0 |
| _cons | 0.081 | 0.201 | 0.189 | 0.267* | 0.097 |

According to these results, the more developed ICT is in a region, the higher the level of inclusiveness in that region; however, the share of households owning a personal computer does not affect the level of inclusiveness.

## 5. Geographically weighted regression models and interpretation of estimation results

The use of linear regression models implies homogeneous effects of explanatory variables across the regions considered over the specified period. Because the influence of factors affecting inclusiveness may vary across regions, this is a strong assumption. Local regression models (GWR – geographically weighted regression) are more appropriate, as they estimate factor effects separately for each region, allowing these effects to vary spatially.

Most studies apply this technique to cross-sectional data. However, recent developments extend the local approach to panel data. These include geographically and temporally weighted regression (GTWR) (Fotheringham et al., 2015; Hu et al., 2022; Huang et al., 2010) and geographically weighted panel regression (GWPT) (Chotimah, 2019; Budiantara, Mardianto, 2024; Renta et al., 2024).

For Russian data, GWR has been used to analyze real estate prices in Saratov (Balash et al., 2011) and attitudes toward immigrants in Russia (Demidova, 2021). However, to our knowledge, the promising GWPR models have not yet been applied to Russian regional data. Because the influence of factors affecting inclusiveness may vary across regions, we also estimated a geographically weighted panel data regression.

$$Inclusiveness_{it}^{*} = \sum_{j=1}^{k} \beta_j^{*}(u_i, v_i) X_{jit}^{*} + \varepsilon_{it}^{*}, \quad (2)$$

where $u_i, v_i$ denote the coordinates of the capital of the $i$ – th region,

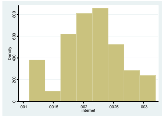
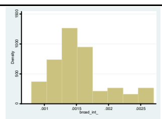
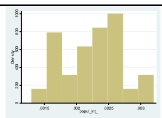
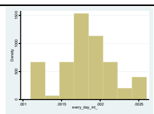
$Inclusiveness_{it}^{*} = Inclusiveness_{it} - \overline{Inclusiveness_{\iota}}$, $X_{jit}^{*} = X_{jit} - \overline{X_{j\iota}}$, $\varepsilon_{it}^{*} = \varepsilon_{it} - \overline{\varepsilon_{\iota}}$.

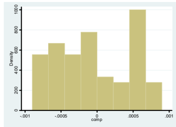
The estimation procedure for such models is described, for example, in (Budiantara, Mardianto, 2024).

Table 6 (in Appendix) presents the estimates of the local coefficients of the ICT variables in Model 2. Table 4 provides descriptive statistics for these estimates.

It should be noted that when testing the significance of local coefficients, their mutual dependence of Russian regions must be taken into account. The corresponding testing algorithm for cross-sectional data is described in the article (Da Silva, Fotheringham, 2016). However, we were unaware of similar results for panel data models, so we calculated the local t-statistic in each case using the traditional formula $t = \frac{\hat{\beta}_j}{s.e.(\hat{\beta}_j)}$ and calculated the p-value for them using N(0.1) distribution. For the variables *Internet*, *Broad_Internet*, *Population_Internet*, and *Everyday_Internet*, all p-values were less than $10^{-6}$, so we considered these local coefficients significant. For the *Computer* variable, we added a column with the p-value in Table 6.

**Table 4. Descriptive statistics of the estimates of local coefficients for ICT variables in geographically weighted panel data regression models**

| Variable | Mean | Std. Dev. | Min | Max | Histogram | Estimate in global model |
|---|---|---|---|---|---|---|
| *Internet* | 0.00213 | 0.00051 | 0.0011 | 0.0032 |  | 0.002*** |
| *Broad_Iternet* | 0.00155 | 0.00044 | 0.0008 | 0.0027 |  | 0.001*** |
| *Population_Internet* | 0.00225 | 0.00046 | 0.0013 | 0.0032 |  | 0.002*** |
| *Everyday_Internet* | 0.00182 | 0.00037 | 0.0011 | 0.0026 |  | 0.002*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Computer* | -5.37E-05 | 0.00051 | -0.0009 | 0.0009 |  | 0 |

The coefficients for all variables characterizing ICT, except for the *Computer* variable (the share of households owning a personal computer), were positive and statistically significant. However, the estimates of the local coefficients varied substantially. Thus, ICT contributes to increasing the level of inclusiveness across Russian regions, but to different extents.

The corresponding estimates are more conveniently analyzed through visualization. Figures 1–4 present the relevant maps.


**Figure 1. Estimates of local coefficients for the variable *Internet***

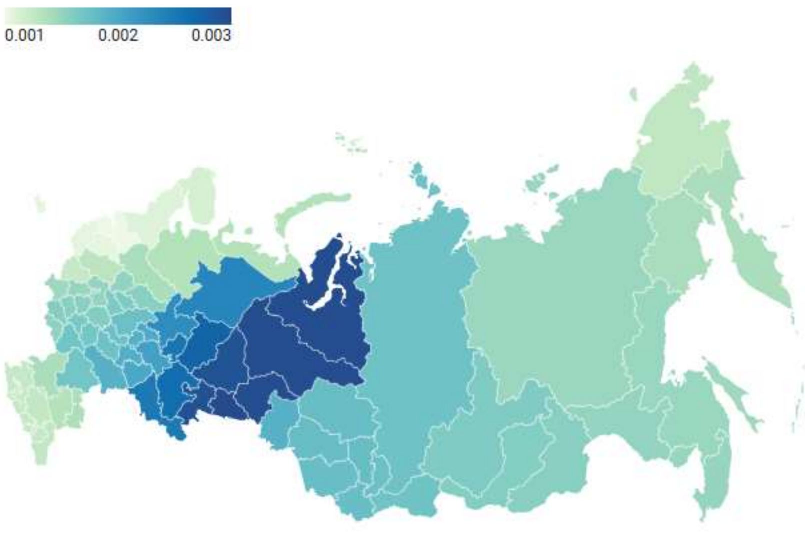



**Figure 2. Estimates of local coefficients for the variable *Broad_Internet***


**Figure 3. Estimates of local coefficients for the variable *Popul_Internet***


**Figure 4. Estimates of local coefficients for the variable *Everyday_Internet***

Table 5 presents a list of regions experiencing the greatest impact of ICT development on inclusive development.

**Table 5. Regions experiencing the greatest impact from ICT development**

| Internet | Broadband Internet | Population Internet | Everyday Internet |
|---|---|---|---|
| Kurgan Oblast | Kurgan Oblast | Tyumen Oblast | Tyumen Oblast |
| Tyumen Oblast | Tyumen Oblast | Kurgan Oblast | Kurgan Oblast |

| | | | |
|---|---|---|---|
| Sverdlovsk Oblast | Chelyabinsk Oblast | Sverdlovsk Oblast | Sverdlovsk Oblast |
| Chelyabinsk Oblast | Sverdlovsk Oblast | Chelyabinsk Oblast | Komi Republic |
| Perm Krai | Perm Krai | Perm Krai | Chelyabinsk Oblast |
| Republic of Bashkortostan | Republic of Bashkortostan | Komi Republic | Perm Krai |
| Udmurt Republic | Udmurt Republic | Kirov Oblast | Kirov Oblast |
| Komi Republic | Orenburg Oblast | Udmurt Republic | Udmurt Republic |
| Kirov Oblast | Komi Republic | Republic of Bashkortostan | Republic of Bashkortostan |
| Orenburg Oblast | Kirov Oblast | Omsk Oblast | Mari El Republic |

Thus, wider Internet penetration in regions such as Kurgan Oblast, Tyumen Oblast, Chelyabinsk Oblast, and others may significantly increase the level of inclusiveness in these regions.

At the same time, the share of households owning a personal computer may have either a positive or a negative impact on the degree of inclusiveness of Russian regions (the corresponding estimates are presented in the last two columns of Table 6).

The visualization of the obtained results is presented in Figure 5 and Figure 6 in the form of a map.

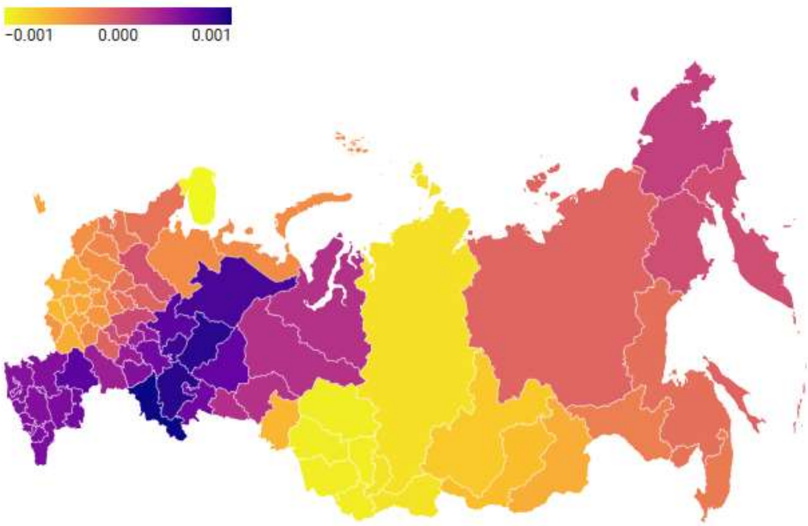



**Figure 5. Estimates of local coefficients for the variable *Computer***

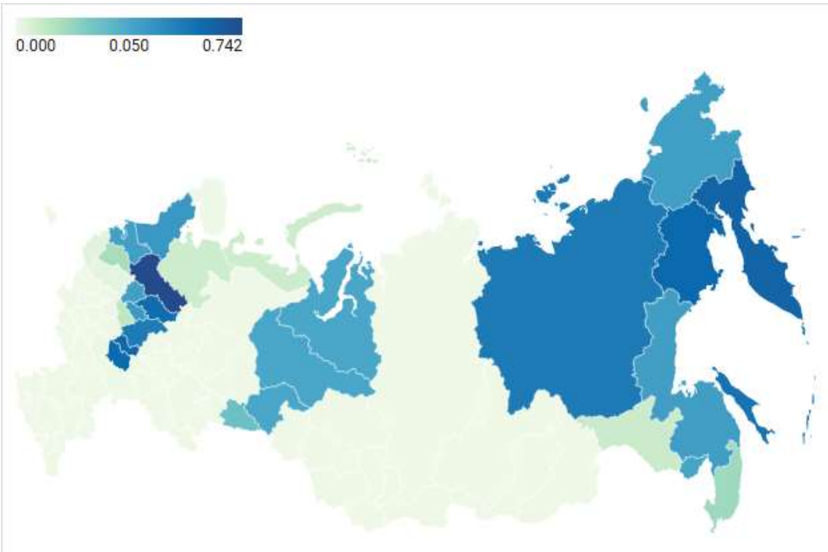



**Figure 6. p-values of local coefficients for the variable *Computer***

The impact of the number of computers on regional inclusivity requires further research. According to the obtained results, increasing the percentage of households with a personal computer will improve the inclusivity of the Ural economic region and adjacent regions of the Cis-Urals and the North (Orenburg Krai, Bashkortostan, Perm Krai, Udmurtia, Komi Republic, Kirov Oblast, Sverdlovsk Oblast, and Chelyabinsk Oblast). However, increasing the percentage of households with a personal computer in some regions located across Russia reduces their inclusivity. It is possible that personal computers are concentrated in the hands of wealthier and more educated groups, while socially vulnerable populations (rural residents, people with disabilities, and the elderly) remain digitally excluded. In this case, despite a formally "high share" of households owning computers, actual inclusiveness does not increase and may even decline due to the widening gap between social groups.

Thus, only partial empirical confirmation of the proposed hypotheses has been obtained.

## 6. Conclusions and Policy Implications

Using the case of ICT impact on the inclusiveness of Russian regions, it is shown that GWPRs provide more detailed results than global panel data models. In the global model, the share of households owning a computer has no significant effect on inclusiveness. In contrast, the GWPR reveals spatial heterogeneity: the effect is insignificant in some regions, positive in others, and negative in part of the regions.

Based on these findings, the following economic policy recommendations are proposed:

1. Priority should be given to infrastructure investment in regions lagging behind in broadband Internet access, especially in rural and remote areas. This includes government subsidies for network expansion, incentives for private sector investment, and exploration of alternative technologies such as satellite Internet.
2. Broadband Internet access should be made more affordable for low-income households. This may include subsidies, discounts, or partnerships with Internet service providers to offer affordable service packages.
3. Infrastructure expansion should be accompanied by digital literacy programs to ensure that residents can effectively use Internet access. Such training should target different demographic groups, including the elderly, people with disabilities, and rural residents.
4. Investment in and promotion of online learning platforms providing access to educational resources, vocational training programs, and professional development opportunities is advisable.
5. The availability of public services in an online format should be expanded, making them more accessible and convenient for citizens. This includes online applications, payment systems, and information resources.

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## Appendix

**Table 6. Results of estimating local coefficients for ICT variables in GWPRs**

| Number | Region | *Internet* | *Broad Internet* | *Popul Internet* | *Everyday Internet* | *Computer* | *p-value Computer* |
|---|---|---|---|---|---|---|---|
| 1 | Belgorod Oblast | 0.0019 | 0.0015 | 0.0022 | 0.0018 | -0.0004 | 0.00049 |
| 2 | Bryansk Oblast | 0.0016 | 0.0014 | 0.0019 | 0.0017 | -0.0005 | 3.3E-07 |
| 3 | Vladimir Oblast | 0.0021 | 0.0016 | 0.0024 | 0.002 | -0.0003 | 0.01403 |
| 4 | Voronezh Oblast | 0.002 | 0.0016 | 0.0022 | 0.0018 | -0.0005 | 3.7E-07 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Ivanovo Oblast | 0.0022 | 0.0016 | 0.0024 | 0.002 | -0.0001 | 0.16348 |
| 6 | Kaluga Oblast | 0.0017 | 0.0014 | 0.002 | 0.0017 | -0.0005 | 8.2E-06 |
| 7 | Kostroma Oblast | 0.0022 | 0.0015 | 0.0024 | 0.002 | -0.0001 | 0.48535 |
| 8 | Kursk Oblast | 0.0018 | 0.0015 | 0.0021 | 0.0017 | -0.0006 | 1.4E-08 |
| 9 | Lipetsk Oblast | 0.002 | 0.0016 | 0.0022 | 0.0018 | -0.0005 | 1E-05 |
| 10 | Moscow Oblast | 0.0018 | 0.0014 | 0.0021 | 0.0018 | -0.0004 | 0.00054 |
| 11 | Oryol Oblast | 0.0018 | 0.0015 | 0.0021 | 0.0017 | -0.0005 | 2.5E-07 |
| 12 | Ryazan Oblast | 0.002 | 0.0015 | 0.0023 | 0.0019 | -0.0004 | 0.00023 |
| 13 | Smolensk Oblast | 0.0013 | 0.0011 | 0.0017 | 0.0016 | -0.0005 | 1.3E-05 |
| 14 | Tambov Oblast | 0.002 | 0.0016 | 0.0022 | 0.0019 | -0.0003 | 0.0013 |
| 15 | Tver Oblast | 0.0015 | 0.0012 | 0.0019 | 0.0017 | -0.0003 | 0.00279 |
| 16 | Tula Oblast | 0.0019 | 0.0015 | 0.0022 | 0.0018 | -0.0005 | 3.3E-06 |
| 17 | Yaroslavl Oblast | 0.0021 | 0.0014 | 0.0023 | 0.002 | -0.0002 | 0.11522 |
| 18 | City of Moscow | 0.0019 | 0.0015 | 0.0022 | 0.0018 | -0.0004 | 0.00049 |
| 19 | Republic of Karelia | 0.0013 | 0.0009 | 0.0016 | 0.0017 | -0.0002 | 0.17223 |
| 20 | Komi Republic | 0.0029 | 0.0022 | 0.003 | 0.0025 | 0.0007 | 1.1E-10 |
| 21 | Arkhangelsk Region | 0.0017 | 0.0012 | 0.0018 | 0.0019 | -0.0003 | 0.00974 |
| 22 | Vologda Region | 0.0019 | 0.0013 | 0.0021 | 0.0019 | 0 | 0.74217 |
| 23 | Kaliningrad Region | 0.0011 | 0.0009 | 0.0015 | 0.0016 | -0.0005 | 5E-05 |
| 24 | Leningrad Region | 0.0011 | 0.0008 | 0.0016 | 0.0016 | -0.0002 | 0.10377 |

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| 25 | Murmansk Region | 0.0013 | 0.001 | 0.0013 | 0.0016 | -0.0009 | 1.5E-11 |
| 26 | Novgorod Region | 0.0012 | 0.0009 | 0.0016 | 0.0016 | -0.0003 | 0.02031 |
| 27 | Pskov Region | 0.0012 | 0.0009 | 0.0016 | 0.0016 | -0.0003 | 0.00377 |
| 28 | City of St. Petersburg | 0.0011 | 0.0008 | 0.0015 | 0.0017 | -0.0002 | 0.16023 |
| 29 | Republic of Adygea | 0.0019 | 0.0011 | 0.0017 | 0.0012 | 0.0005 | 5E-09 |
| 30 | Republic of Kalmykia | 0.0019 | 0.0012 | 0.0018 | 0.0012 | 0.0005 | 5.5E-10 |
| 31 | Krasnodar Krai | 0.0019 | 0.0011 | 0.0017 | 0.0013 | 0.0005 | 1.5E-08 |
| 32 | Astrakhan Region | 0.0019 | 0.0013 | 0.0017 | 0.0012 | 0.0005 | 1.4E-11 |
| 33 | Volgograd Region | 0.0025 | 0.0016 | 0.0023 | 0.0016 | 0.0006 | 4.8E-11 |
| 34 | Rostov Region | 0.0023 | 0.0013 | 0.002 | 0.0015 | 0.0005 | 1.3E-07 |
| 35 | Republic of Dagestan | 0.0017 | 0.0011 | 0.0016 | 0.0011 | 0.0005 | 1.8E-11 |
| 36 | Republic of Ingushetia | 0.0017 | 0.0011 | 0.0016 | 0.0011 | 0.0005 | 1.3E-10 |
| 37 | Kabardino-Balkarian Republic | 0.0017 | 0.0011 | 0.0016 | 0.0011 | 0.0005 | 3.1E-10 |

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|---|---|---|---|---|---|---|---|
| 38 | Karachay-Cherkess Republic | 0.0018 | 0.0011 | 0.0016 | 0.0012 | 0.0005 | 1.2E-09 |
| 39 | Republic of North Ossetia-Alania | 0.0017 | 0.0011 | 0.0016 | 0.0011 | 0.0005 | 1.3E-10 |
| 40 | Chechen Republic | 0.0017 | 0.0011 | 0.0016 | 0.0011 | 0.0005 | 6.9E-11 |
| 41 | Stavropol Krai | 0.0018 | 0.0011 | 0.0017 | 0.0012 | 0.0005 | 2.1E-09 |
| 42 | Republic of Bashkortostan | 0.0029 | 0.0024 | 0.0028 | 0.0023 | 0.0008 | 1.5E-13 |
| 43 | Republic of Mari El | 0.0026 | 0.002 | 0.0027 | 0.0022 | 0.0004 | 3.2E-05 |
| 44 | Republic of Mordovia | 0.0022 | 0.0017 | 0.0024 | 0.002 | 0.0001 | 0.53509 |
| 45 | Republic of Tatarstan | 0.0026 | 0.0021 | 0.0027 | 0.0022 | 0.0005 | 8.7E-08 |
| 46 | Udmurt Republic | 0.0029 | 0.0023 | 0.0029 | 0.0024 | 0.0007 | 7.3E-12 |
| 47 | Chuvash Republic | 0.0025 | 0.0019 | 0.0026 | 0.0022 | 0.0004 | 0.00034 |
| 48 | Perm Krai | 0.003 | 0.0025 | 0.0031 | 0.0025 | 0.0008 | 9.3E-13 |
| 49 | Kirov Oblast | 0.0028 | 0.0022 | 0.0029 | 0.0024 | 0.0006 | 2.2E-09 |
| 50 | Nizhny Novgorod Oblast | 0.0024 | 0.0017 | 0.0025 | 0.0021 | 0.0001 | 0.37429 |
| 51 | Orenburg Oblast | 0.0028 | 0.0023 | 0.0026 | 0.0021 | 0.0009 | 2.2E-16 |
| 52 | Penza Oblast | 0.0021 | 0.0017 | 0.0023 | 0.0019 | -0.0001 | 0.50678 |

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|---|---|---|---|---|---|---|---|
| 53 | Samara Oblast | 0.0024 | 0.002 | 0.0024 | 0.002 | 0.0005 | 1.7E-06 |
| 54 | Saratov Oblast | 0.0023 | 0.0019 | 0.0022 | 0.0019 | 0.0004 | 0.00026 |
| 55 | Ulyanovsk Oblast | 0.0024 | 0.0019 | 0.0024 | 0.0021 | 0.0004 | 9.4E-05 |
| 56 | Kurgan Oblast | 0.0032 | 0.0027 | 0.0032 | 0.0026 | 0.0003 | 0.03726 |
| 57 | Sverdlovsk Oblast | 0.0032 | 0.0026 | 0.0032 | 0.0026 | 0.0006 | 5.3E-07 |
| 58 | Tyumen Oblast | 0.0032 | 0.0026 | 0.0032 | 0.0026 | 0.0002 | 0.054 |
| 59 | Chelyabinsk Oblast | 0.0031 | 0.0026 | 0.0031 | 0.0025 | 0.0006 | 2.7E-06 |
| 60 | Altai Republic | 0.0025 | 0.0017 | 0.0026 | 0.002 | -0.0009 | 0 |
| 61 | Tuva Republic | 0.0024 | 0.0017 | 0.0025 | 0.0019 | -0.0008 | 0 |
| 62 | Republic of Khakassia | 0.0025 | 0.0017 | 0.0025 | 0.0019 | -0.0008 | 2.2E-16 |
| 63 | Altai Krai | 0.0026 | 0.0017 | 0.0026 | 0.0021 | -0.0009 | 0 |
| 64 | Krasnoyarsk Krai | 0.0025 | 0.0017 | 0.0025 | 0.0019 | -0.0008 | 6.7E-16 |
| 65 | Irkutsk Oblast | 0.0024 | 0.0016 | 0.0024 | 0.0018 | -0.0007 | 1.5E-12 |
| 66 | Kemerovo Oblast | 0.0025 | 0.0017 | 0.0026 | 0.002 | -0.0009 | 0 |
| 67 | Novosibirsk Oblast | 0.0026 | 0.0017 | 0.0026 | 0.0021 | -0.0009 | 0 |
| 68 | Omsk Oblast | 0.0027 | 0.0019 | 0.0027 | 0.0022 | -0.0006 | 3.4E-07 |
| 69 | Tomsk Oblast | 0.0026 | 0.0017 | 0.0026 | 0.0021 | -0.0009 | 0 |

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| 70 | Republic of Buryatia | 0.0023 | 0.0015 | 0.0024 | 0.0018 | -0.0006 | 9.3E-11 |
| 71 | Republic of Sakha (Yakutia) | 0.0022 | 0.0014 | 0.0024 | 0.0017 | -0.0001 | 0.38675 |
| 72 | Zabaykalsky Krai | 0.0023 | 0.0015 | 0.0024 | 0.0018 | -0.0005 | 3.5E-08 |
| 73 | Kamchatka Krai | 0.0021 | 0.0013 | 0.0024 | 0.0016 | 0.0001 | 0.54706 |
| 74 | Primorsky Krai | 0.0023 | 0.0014 | 0.0025 | 0.0018 | -0.0002 | 0.02307 |
| 75 | Khabarovsk Krai | 0.0022 | 0.0014 | 0.0025 | 0.0017 | -0.0001 | 0.12213 |
| 76 | Amur Oblast | 0.0023 | 0.0014 | 0.0025 | 0.0018 | -0.0002 | 0.01046 |
| 77 | Magadan Oblast | 0.0021 | 0.0013 | 0.0024 | 0.0017 | 0.0001 | 0.51238 |
| 78 | Sakhalin Oblast | 0.0022 | 0.0014 | 0.0025 | 0.0017 | -0.0001 | 0.44141 |
| 79 | Jewish Autonomous Oblast | 0.0023 | 0.0014 | 0.0025 | 0.0017 | -0.0002 | 0.06903 |
| 80 | Chukotka Autonomous Okrug | 0.0018 | 0.0012 | 0.0022 | 0.0015 | 0.0001 | 0.11843 |