



Munich Personal RePEc Archive

**Growth of human capital in the regions  
of the Russian Empire in 1897-1913: the  
role of local self-government bodies  
(zemstva) financing**

Popov, Vladimir and Konchakov, Roman and Didenko,  
Dmitry

CEMI, RAN, RANEPa

21 September 2024

Online at <https://mpra.ub.uni-muenchen.de/122162/>  
MPRA Paper No. 122162, posted 24 Sep 2024 14:32 UTC

# Growth of human capital in the regions of the Russian Empire in 1897-1913: the role of local self-government bodies (*zemstva*) financing

Vladimir Popov, Roman Konchakov, Dmitry Didenko<sup>1</sup>

## ABSTRACT

The previous research with incomplete data revealed that *zemstva* expenditure on education per capita were higher in regions with low level of education, but these spending did not make much of a difference – human capital in these regions remained relatively low (Popov, Konchakov, Didenko, 2024). The results reported in this paper provide additional and more rigorous proof that *zemstva* activities and the increase in their spending for education in 1897-1913 contributed to the spread of primary education and to the decline in the inequality of the distribution of human capital not only between the regions< but also within the regions (ratio of secondary to primary education enrollment).

But we also show that there were more powerful forces at play – education for tuition fees, central government and city/town administration financing – that were pushing the development in an opposite direction, increasing the secondary education enrollment in most regions faster than the primary education enrollment. The result was the widening gap between low and high educated individuals that could have contributed to the formation of the *intelligentsia* phenomenon – educated intellectuals that were not able to find the proper place in the national economy to apply their knowledge. *Intelligentsia* opposition to the tsarist regime, however, did not take violent forms – regions with fast growing educational disparities registered lower, not higher increases in peasants' unrest, industrial strikes and crimes against persons.

**Keywords:** educational attainment, school enrollment, inequality, land distribution, growth.

**JEL:** D63, I24, J24, N93, R11.

---

<sup>1</sup> RANEPA (Russian Presidential Academy of National Economy and Public Administration), corresponding author – Vladimir Popov, vpopov@nes.ru

The paper was prepared within the framework of a research grant funded by the Ministry of Science and Higher Education of the Russian Federation (Grant Agreement No.: 075-15-2022-326).

# Growth of human capital in the regions of the Russian Empire in 1897-1913: the role of local self-government bodies (*zemstva*) financing

Vladimir Popov, Roman Konchakov, Dmitry Didenko

## Introduction and literature review

One of the results of the previous research is that human capital (as measured by literacy rates and years of schooling), as well as evenness in the distribution of educational attainments among population, was higher in the relatively prosperous regions of the Russian Empire in 1897 with higher GRP per capita, harvest yields, and inequality in land distribution (Popov, Konchakov, Didenko, 2024).

The natural question, of course, is about the mechanism at work ensuring that these relatively well-off provinces (but also with higher inequality in land distribution) had higher and more evenly distributed human capital. Data on 14 regions seemed to suggest that it was not caused by the rural local government – *zemstva* – educational activity<sup>2</sup>. If the indicator of *zemstva* expenditure per capita in 1868-1903 is added into the right hand side of the equation explaining the level and evenness of distribution of human capital, it acquires the negative sign or is insignificant (Popov, Konchakov, Didenko, 2024, table 4)<sup>3</sup>.

---

<sup>2</sup> Educational activities of the *zemstva* were divided between rural (most) and urban areas. The former were district administrations (*uezdnye zemstva*), which dealt with rural primary schools, while provincial ones (*gubernskie zemstva*) dealt with secondary, vocational and higher schools which were mostly urban (Abramov, 1996, p. 110-126). Various *zemstva* actors were vocal supporters of proliferation of education for the masses. Similar views came from the government officials, for instance Nikolai Bogolepov, rector of Moscow University in 1893, subsequently curator of Moscow educational district and Minister of Education in 1898-1901 (Alston, 1969, p. 141).

<sup>3</sup> *Zemstva* expenditures are not linked to literacy levels, but depend positively on GRP per capita and negatively – on the share of serfs in rural population in 1858.

$ZEMSTVOexp35 = 1.3*** - .004* GRPcap - .009*SERFshare1858$ , robust standard errors, N=34,  $R^2 = 0.25$ . Here and later – standard notations: \*\*\* - significant at 1%, \*\* - 5%, \* - 10%.

*ZEMSTVOexp35* – average annual expenditures of local self-government bodies (*zemstva*) per capita in 1868-1903, rubles,  
*GRPcap* – GRP per capita in 1897, rubles,  
*SERFshare1858* – share of serfs in rural population in 1858, %.

But *zemstva* accounted for only part of the expenditure for education and this part formally was only auxiliary (Abramov, 1996, p. 26). Even though *zemstva* share was the largest part of the expenditure in the 1870s-80s, in the 1890s the share of the central government (including the Holy Synod) was increasing and exceeded that of the *zemstva* by the 1900s (Didenko, 2021a, p. 137-138).

The financing of education at the turn of the century came from several sources – Ministry of Public Education (literally: Ministry of Peoples’ Enlightenment), local rural authorities (*zemstva*), local urban authorities (*upravy*), fees for educational services, church authorities, charitable donation. In the regions of European part of the country the share of *zemstva* was about 1/3 of total financing with similar amounts coming from the Ministry, whereas in the Eastern regions the share of the financing from the Ministry was usually over 50%, and *zemstva* did not exist at all, even though there were *zemstva* taxes collected and managed by the central government (Didenko, 2021a; 2024).

Sample data on financing of education (only for 14 regions – 8 provinces in the European part of Russia and 6 provinces in Siberia and Far East) are presented in table 1. The data suggest that total expenditures for education per capita as a rule were several times higher in Siberia and Far East than in the European regions of the country (fig. 1), and this was true for two major components of these expenditures – central government financing (not only via the Ministry of Peoples’ Enlightenment<sup>4</sup>) and local city/town governments financing, but not the *zemstva*.

In the European provinces city/town authorities’ (*upravy*) share in total education expenditures did not change much over time, it was about 10% in 1870-1914 (Didenko 2021a, p. 138-139).

---

<sup>4</sup> The Holy Synod and the Ministry of War were the next large administering bodies providing funds for education (Johnson, 1969, p. 184, 293).

**Table 1. Expenditure on education per capita by major sources in 14 regions of the Russian Empire in 1897, rubles**

Region	Education expenditure per capita, total	Education expenditure per capita, <i>zemstva</i>	Education expenditure per capita, central government	Education expenditure per capita, cities	GRP per capita	Inequality index for all land
<i>European part of Russia</i>						
Voronezh governorate	0.29	0.08	0.09	0.04	42	0.36
Vologda governorate	0.48	0.18	0.15	0.02	49	0.49
Kaluga governorate	0.68	0.19	0.15	0.05	55	0.47
Kursk governorate	0.32	0.11	0.09	0.02	47	0.30
Perm' governorate	0.43	0.20	0.18	0.03	69	2.15
Ryazan governorate	0.38	0.13	0.03	0.03	49	0.44
Saratov governorate	0.50	0.11	0.17	0.15	70	0.85
Yaroslavl' governorate	0.48	0.16	0.20	0.07	119	0.39
<i>Siberia and Far East</i>						
Primorskiy region	1.57	0.01	1.27	0.17	294	
Amur region	1.36	0.05	0.69	0.36	148	
Yenisey governorate	0.82	0.06	0.26	0.06	86	
Tomsk governorate	0.57	0.04	0.42	0.03	66	
Irkutsk governorate	0.99	0.04	0.60	0.11	102	
Tobol'sk governorate	0.39	0.07	0.11	0.03	49	

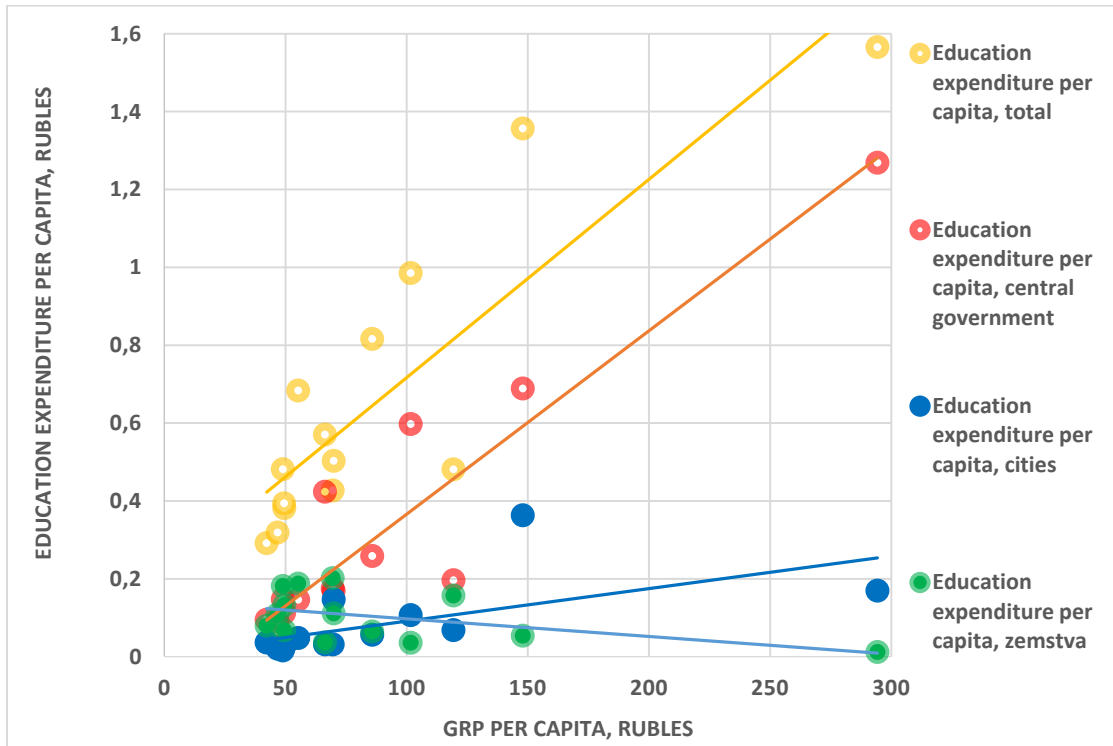
Source: Estimated in (Didenko, 2021a, 2024) based on Governors' annual reports; Kessler, Markevich (2014) based on Yasnopol'skii (1897), with model assumptions.

In the Far East and Siberia, the central government played a greater role in financing education than in the European provinces. Also, in most of the Far Eastern and some of the Siberian provinces institutional structure of financing education was shifted to city/town administrations.

They were more active in proliferation and financing of schooling (especially primary) than their counterparts in European Russia<sup>5</sup>. Their share in total education expenditures in the Far East increased from 11-15% in the 1880s to over 25% in the 1900s and in the Siberia was close to the level of the European Russia, i.e. about 10% (Didenko 2024, p. 20-26).

Unlike *zemstva*, central government and city/town administrations (*upravly*) were spending money in relatively well-off regions with high inequality in land distribution, and their spending resulted in relatively higher levels of human capital in these regions.

**Fig. 1. Educational expenditure per capita in selected regions and GRP per capita in 1897**



Source: Table 1.

Why the central government and the city/town authorities were spending more money per capita on education in relatively prosperous regions with already high levels of educational attainments?

<sup>5</sup> See e.g. Shilov (2008, p. 20, 418-420).

Galor (2012, p. 44) is citing Johnson (1969), claiming that large land owners were not interested in the education of the peasants (trying to keep them in the villages) unlike industrialists that were interested in educated labor force in the cities<sup>6</sup>. It could be true, but their interests did not determine the financing flows in any case. Neither the central government budget, nor city/town finances were dependent on land taxes. In 1897 only 3% of total tax revenues of the government budget came from land taxes, whereas over 1/3 of all tax revenues were collected from the excise tax on alcoholic beverages (Shatsillo, 2003, table 2).

In contrast, *zemstva* revenues came from taxation of real estate property (most) and entrepreneurial activities (a lot) with certain ceiling limits established by the central government (Abramov, 1996, p. 14-15, 20-21; Naftziger, 2011, p. 400).

To put it differently, there was a lack of *pro*-active education policy before the first Russian revolution. Even though the government succeeded in moderating spatial inequality in education finance in certain aspects (Didenko, 2021b), it was acting very much in line with the market demand.<sup>7</sup> Various levels of governments (except for *zemstva* that were created in 1864 in 30 regions of European Russia and by 1914 existed in rural areas of 43 regions of European Russia<sup>8</sup>) were going with the grain, spending money on education in relatively wealthy provinces, where the revenues of the budgets were higher. And, as was mentioned previously, these were exactly the periphery provinces with the high inequality in land distribution (Popov, Konchakov, Didenko, 2024).

---

<sup>6</sup> “Provincial councils dominated by wealthier landowners were responsible for their local school systems and were reluctant to favor the education of the peasants (Johnson, 1969)” (Galor, 2012, p. 44). Similar pattern for the period of the 1860s-80s is thoroughly documented in (Eklof, 1986, p. 72-83).

<sup>7</sup> Expenditure for education at the time in Russia was less than 2% of GDP versus 2.4-2.5% in Japan [Levine, Kawada, 1980, p. 82; Kaser, 1966, p. 142-173]. Japan had similar level of GDP per capita at the time (MPD, 2020) and basically won the Russo-Japanese War of 1904-05.

<sup>8</sup> In other regions of the Russian Empire the local bodies of the central government collected local taxes and spent them for the same purposes as the *zemstva*, acting as a substitutes for *zemstva*. Hereinafter we refer to the former local bodies as substitutes for *zemstva*. However, these central government local funds were not channeled through the State Treasury.

*Zemstva* were created to bridge the gap that emerged between the government and the rural areas after the abolition of serfdom and the loss of the gentry's control over the village. The rural elections were designed to ensure the pre-dominance of large rural landowners at the expense of the peasantry and towns. However, the *zemstva* staff was hired from gymnasium and university graduates, i.e. not from the gentry, but from the "third estate" (Alstom, 1969, p. 59; Eklof, 1986, p. 55-56, 61-62).

In the 20<sup>th</sup> century (and perhaps even since the 1890s<sup>9</sup>), especially after the first Russian revolution, the government stepped up its efforts in the formation of human capital – in 1908-12 the discussions in the State Duma (created during the first Revolution) resulted in the decision to introduce obligatory primary education in the European part of Russia by 1918, and in the whole Empire – by the end of the 1920s. The bill was finally voted down by the State Council<sup>10</sup>, but the number of primary schools and gymnasiums in 1897-1914 increased 1.6 times, the number of schoolchildren – 2.1 times<sup>11</sup>, the number of secondary schools and gymnasiums – 2.0 times, the number of schoolchildren in them – 2.5 times<sup>12</sup>. The share of the entire population that was actively attending schools increased threefold from 1.7% in 1897 to 5.7% in 1915 (Dennis, 1961).

Even so, by 1914 Russia was very much behind European countries in this respect – the number of school attendees was only 59 per 1000 inhabitants as compared to 143 in Austria, 152 in Great Britain, 175 in Germany, 213 in the US, 148 in France, 146 in Japan (Mironov, 2018, p. 759).

But in 1897, when the government was going largely with the flow, and its educational expenditure were determined by the relative incomes of the regions in question, human capital formation was proceeding slowly and mostly in rich regions with high inequality in land distribution.

---

<sup>9</sup> "A revolution in school finances occurred in the 1890s, the result of a joint government-*zemstva* endeavor— both had given low priority to popular education until 1890, but both moved rapidly after that date to bring about universal education." (Eklof, 1986, p. 88).

<sup>10</sup> About the discussion of the bill and its legislative track see Santa Maria (1990, p, 56-57).

<sup>11</sup> As it follows from the data in MNP (1898) and TsSK MVD (1916).

<sup>12</sup> As it follows from the data in Kessler and Markevich (2014) and TsSK MVD (1916).



Overall, the education expenditures of *zemstva* have grown significantly: their share in the total expenditures increased from 7.7% in 1871 to 28.1% in 1913 (Naftziger, 2011, p. 400). The level of representation of the peasant curia had a positive effect on the level of *zemstva* expenditures on education (Naftziger 2011, p. 415-431). But such an increase in the *zemstva* role occurred mostly before 1897: whereas in 1869-97 the educational expenditure of local administrations grew nearly 5 times faster than total expenditure for education (21.4 and 4.4 times respectively) and over 8 times faster than the expenditure of the central government (21.4 and 2.6 times respectively), later, in 1897-1913, the growth of education financing from different sources was more even (3-4 times – table 2).

Having collected data on enrollment ratios – number of students enrolled in primary and secondary education in 1897 and 1913, as well as data on the *zemstva* expenditure on education in these years, we try to explore the role of *zemstva* in the formation of the human capital. The hypotheses to test are that *zemstva* contributed to the formation of human capital in more/less rich and educated Russian regions and to the more/less even distribution of human capital in the Russian regions in the pre-revolutionary period.

**Table 2. Increase in total financing of education in 1869-1913 by source**

Increase in expenditure for education by source	Central government	Local administrations	Private and non-profit organizations	House holds	Other	TOTAL
Increase in 1869-97 (28 years), times	2.58	21.42	6.31	8.02	8.41	4.43
Increase in 1897-1913 (16 years), times	4.38	4.15	3.97	3.39	2.49	4.12

Source: Computed based on GK (1868-1916), MNP (1871-1903; 1904-1916), TsSK MVD (1886a; 1886b; 1888; 1897; 1911-1912), MinFin (1896-1915a; 1909), Sharyi V.I. (ed.) (1913, 1914), Johnson (1969, p. 291).

It appears that the gap in the distribution of human capital within regions (the ratio of secondary to primary school enrollment) increased despite the efforts of the *zemstva*, and this growing gap contributed to the formation of the *intelligentsia* phenomenon – well educated social group,

graduates of high schools (gymnasiums), colleges and universities, that were not able to find a proper application to their skills in the national economy and joined the social opposition to the tsarist regime.

Recent World Development Report (WDR, 2024) makes an argument in favor of the universal character of education. “The Republic of Korea adopted this approach. In the 1950s, it enforced compulsory education and devoted nearly 80 percent of its education budget to primary education, thereby increasing enrollment rates from about 40 percent to 90 percent in 10 years. Korea then shifted its efforts and spending to secondary education and attained equally rapid success. Only later did it invest substantially in tertiary education. .... An emphasis on foundational skills for all was key to the success of school reforms in other countries as well” (WDR, 2024, p. 191).

In pre-revolutionary Russia the educational policy was skewed in favor of secondary education, probably because it was mostly left to the market: high schools (gymnasiums), colleges and universities accepted the children of nobility and of relatively well-of commoners (*raznochyntsy*), whereas primary education was underfinanced. *Zemstva* were pushing in a different direction trying to encourage primary education to correct market failure, but their efforts were not enough.

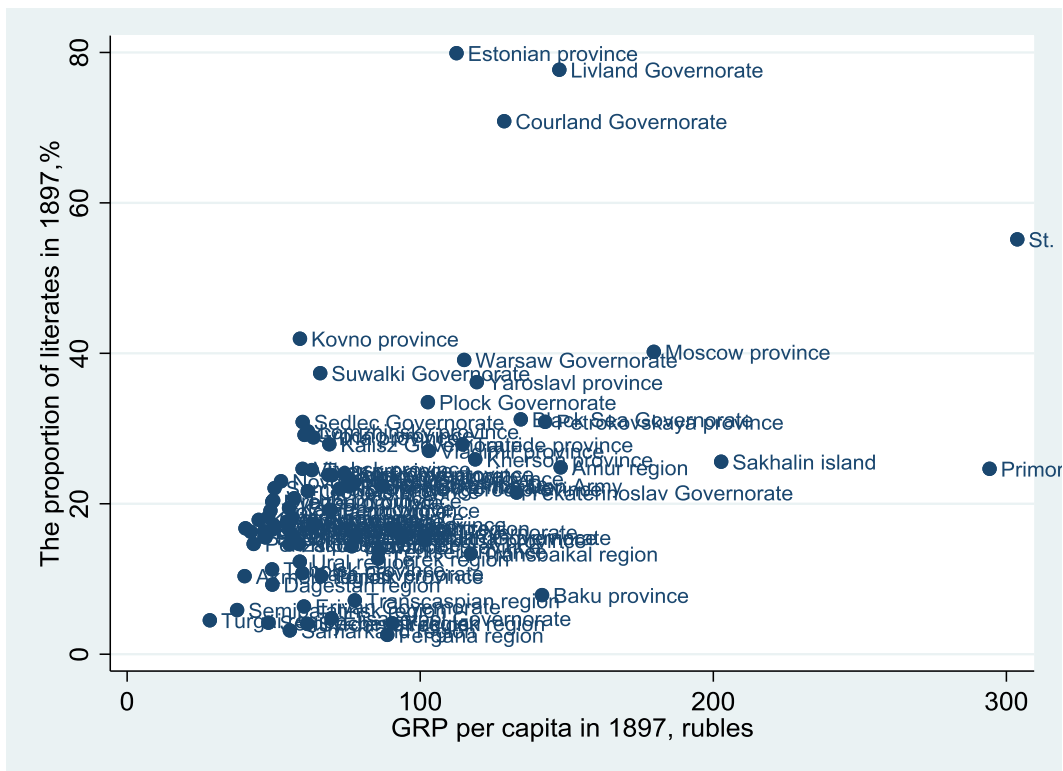
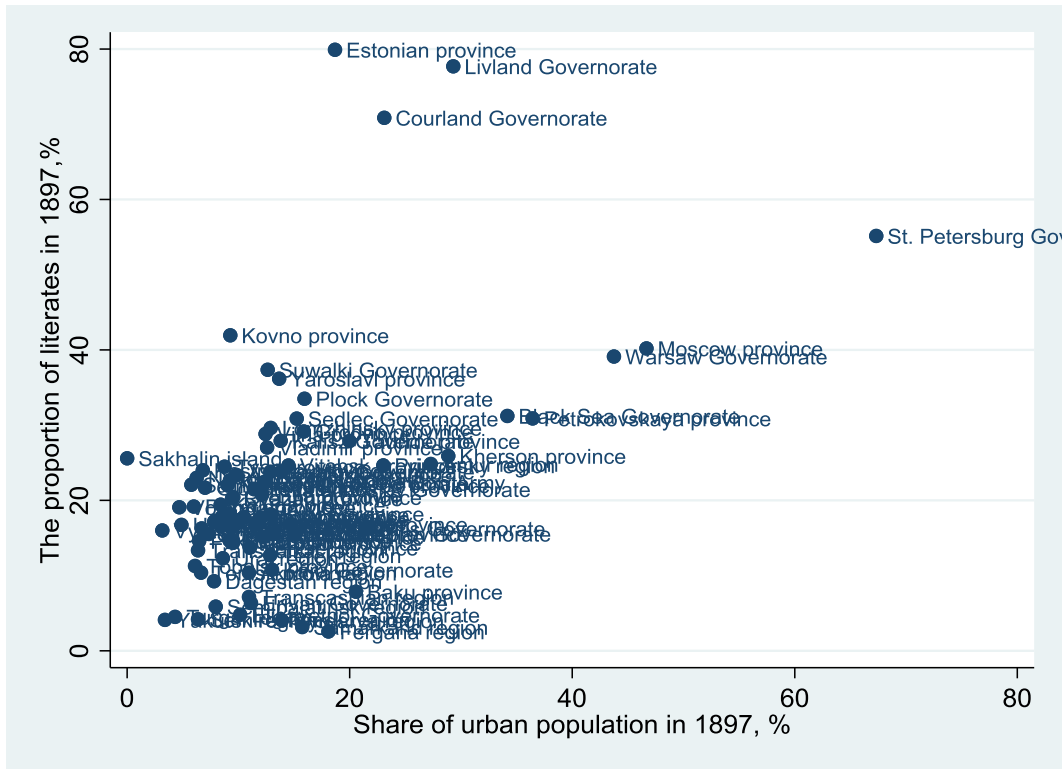
## Data

### Human capital stock

– The share of literate population in 1897.

This indicator is reported in the publications of the First General Census of the Russian Empire in 1897 (Troinitskii, ed., 1898-1905), and built into the data set in (Kessler and Markevich, 2020). It is highly correlated ( $R=0.95$ ) with another human capital proxy, namely average years of schooling, computed by the authors based on the data of the same census. There is no data reported for literacy and average years of schooling for other years during the period under study. Predictably, this share was higher in more urban and rich regions (higher GRP per capita) – fig. 2.

**Fig. 2. Literacy rate, urbanization and GRP per capita in 1897**



Source: Kessler and Markevich (2020), Markevich (2022).

### Education expenditure per capita

For 1897, the data on education expenditure are available at sub-national level by the following institutional sources<sup>13</sup>:

- central government,<sup>14</sup>
- *zemstva* or their substitutes,<sup>15</sup>
- city/town self-governance bodies (*upravy*),
- rural self-government (*mir, volost'*),
- corporate (charity),
- private (tuition fees).

To the best of our knowledge, for 1913, the last year of peaceful life in the Russian Empire, only expenditures made by *zemstva* and their substitutes are available at the sub-national level in MinFin (1915a) and MinFin (1915b) respectively. These per capita expenditures for education in 1897 and 1913 are plotted at fig. 3, they are quite correlated ( $R^2=83\%$  for 73 observations).

### Education facilities and enrollment ratios

These are reported in TsSK MVD (1915); population data – in TsSK MVD (1916), in particular:

- Number of primary and secondary schools per 100 000 inhabitants.
- Number of students in education facilities per 100 inhabitants (gross enrollment ratio).

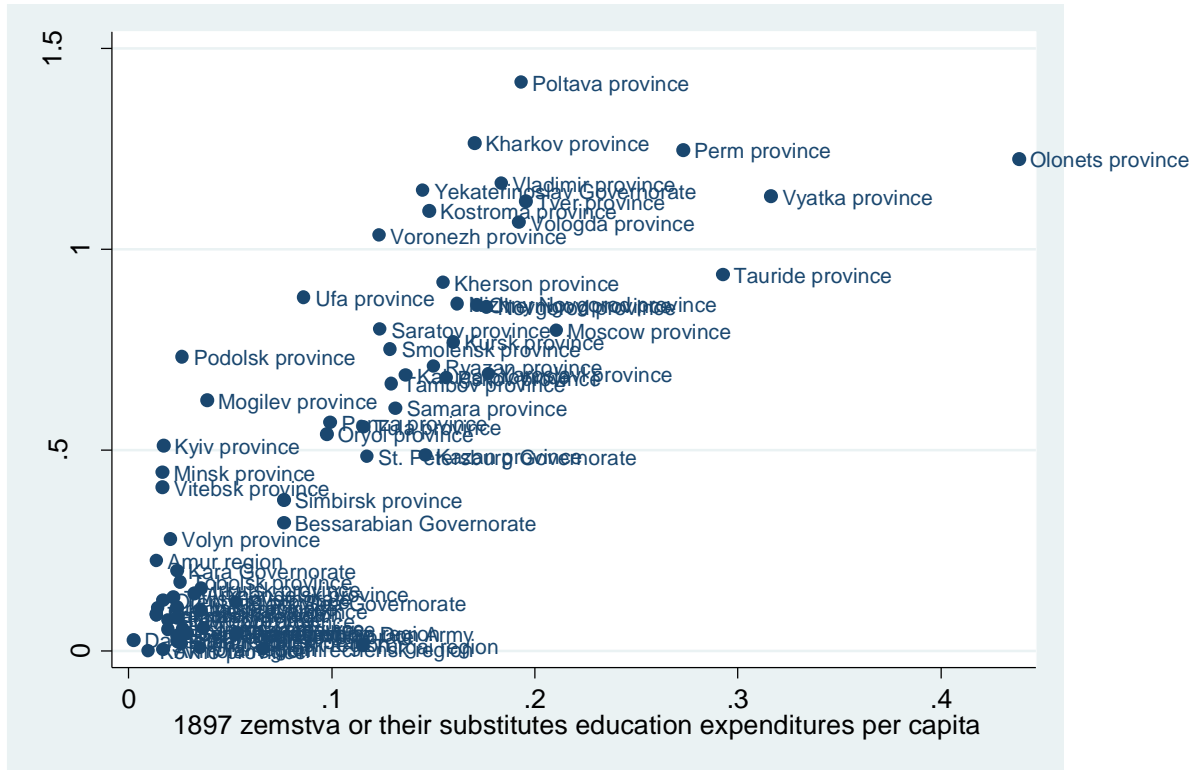
---

<sup>13</sup> Computed based on Kessler and Markevich (2014; 2020) for finance and population respectively.

<sup>14</sup> The total sum of education expenditures by the ministries of the central government, estimated in Kessler and Markevich (2014) based on Yasnopol'skii (1897), is 53 559 979 rubles. This is close to the figure obtained from the sources to the Table 2 (42 424 145.53 rubles).

<sup>15</sup> Central government local bodies (substitutes for *zemstva*), which collected similar taxes and made similar expenditures as *zemstva* in the provinces with rural self-governance. These funds of the local bodies, however, were not channeled through the State Treasury. The sum of education expenditures by the *zemstva* and their substitutes, estimated in Kessler and Markevich (2014), is 12 295 464 rubles versus 9 170 415 in our estimate based on the sources to the Table 2.

**Fig. 3. Zemstva and their substitutes education expenditures per capita: 1913 versus 1897, rubles**



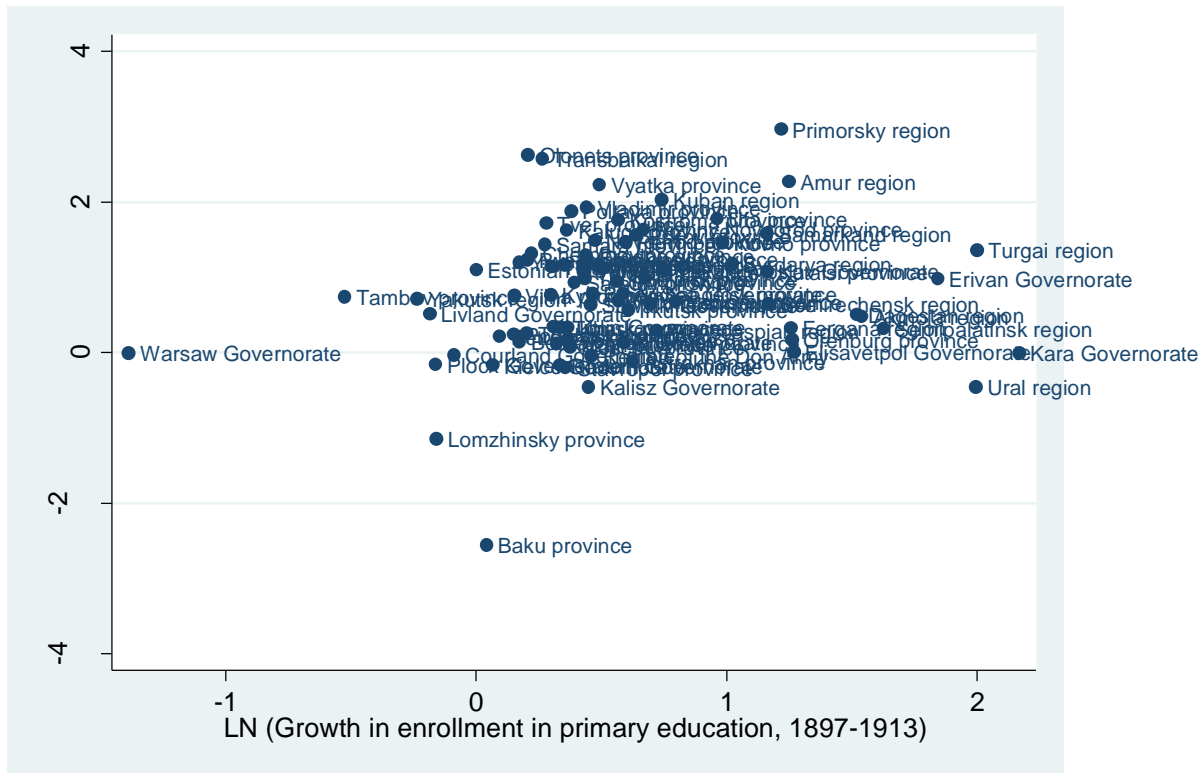
Source: Kessler and Markevich (2014; 2020), MinFin (1915a; 1915b), TsSK MVD (1916).

As fig. 4 shows, there is virtually no correlation between the increases in enrollments in secondary and primary education in 1897-1913.

Demographics

- Total number of people in the region.
- Population density.
- Share of urban population.

**Fig. 4. Primary versus secondary enrollment per capita: 1897-1913, relative change**



Source: Computed based on Kessler and Markevich (2014; 2020), MinFin (1912a; 1912b; 1915a; 1915b), TsSK MVD (1915; 1916).

These are reported in the publications of the First General Census of the Russian Empire in 1897 (Troinitiskii, 1898-1905), and structured into the data set in Kessler and Markevich (2020). The data on population in 1914 were directly extracted from the official statistics reported in TsSK MVD (1916). The data on provinces area was borrowed from the official data of the time and is based on processing of the original maps in Strel’bitskii, 1915; GSh, 1884, 1921, into digital GIS systems).

Level of development:

- Gross regional product per capita in 1897 (Markevich, 2019, 2022).

### Institutional environment:

- *Zemstva* dummy variable – equals to 1, if the local self-governments in rural regions existed in 1897, to 0 otherwise. *Zemstva* were created in 1864; by 1897 they existed in rural areas of 34 regions of European Russia, by 1914 – in 43 regions.
- The average annual expenditures of local self-government bodies per capita in 1868-1903, in rubles. The measure captures the level of development of local self-government institutions (*zemstva*) that moderated social tensions and promoted economic development (Markevich, Zhuravskaya, 2018). These expenditures are for all purposes (not only for education) and are in current rubles (without deflation), so should be interpreted with care.

### Social protest indicators and some of their determinants

All indicators of social protest and their determinants are described in (Popov, Konchakov, Didenko, 2023):

- Increase in peasants' unrest per 1 million rural inhabitants from 1890-99 (average) to 1900-04 (average).<sup>16</sup>
- Man-days lost due to strikes as a percentage of total man-days worked – increase from 1895-99 to 1900-04, times.<sup>17</sup>
- Increase in the rate (per 100,000 inhabitants) of crimes against persons from 1896 to 1912, times.<sup>18</sup>
- Share of serfs in rural population in 1858, %.<sup>19</sup>
- Index of inequality of private land distribution in 1877, times.<sup>20</sup>
- Average grain harvest yield for 10 years, c/ha (year 1907 - the middle of the period).<sup>21</sup>

---

<sup>16</sup> The data for 1890-99 were borrowed from (Zhukov et al., 2017), for 1900-04 from Anfimov, ed., 1998. In turn, these studies were based on processing multiple sources, including archival.

<sup>17</sup> The data was borrowed from the data set (Borodkin, Shilnikova, 2020), based on the Collection of Reports by Factory Supervisors.

<sup>18</sup> Based on the number of convicts for crimes against persons reported by the Ministry of Justice for 1896 and 1912 (Miniust, 1900, 1915).

<sup>19</sup> Borrowed from (Markevich and Zhuravskaya, 2018).

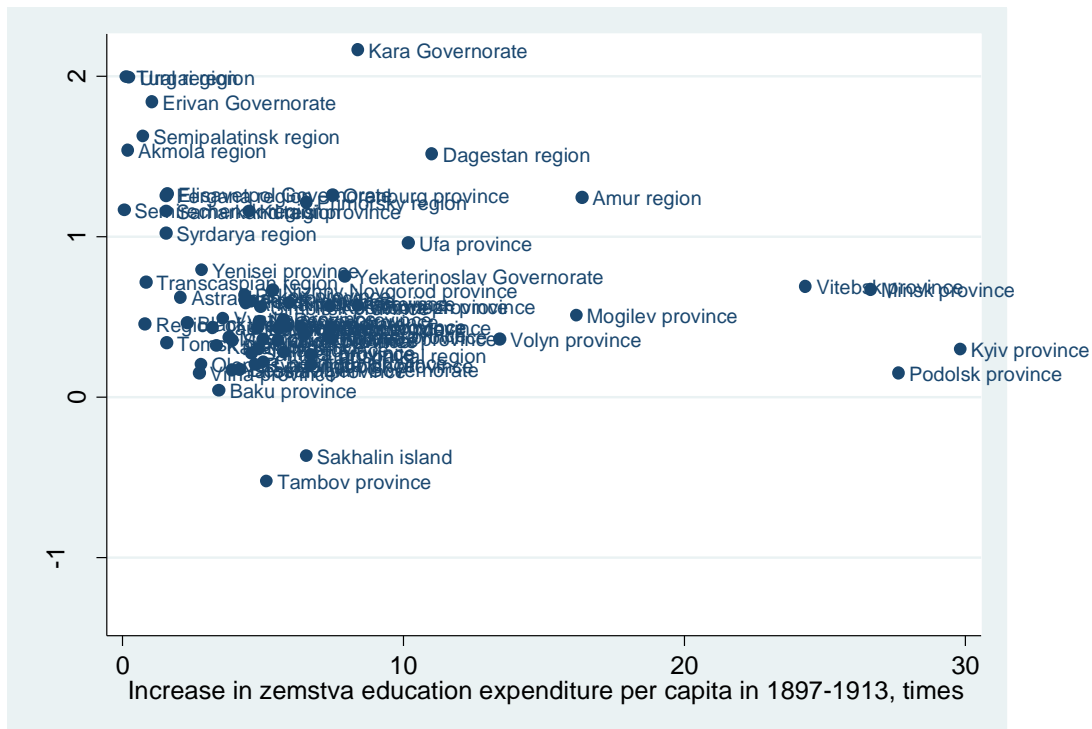
<sup>20</sup> Computed from Survey conducted in 1877 by the Central Statistical Committee of the Ministry of Internal Affairs published in (TsSK MVD, 1880-1885).

- Growth of alcohol consumption per capita from the 1870s to the 1890s, times.<sup>22</sup>

## Results

At a first glance it seems that *zemstva* expenditure for education in 1897-1913 did not contribute to the proliferation of primary and secondary education in Russian regions by 1914. The correlation between the growth of *zemstva* education expenditure and the increase in primary and secondary enrollment is very weak, if any, and negative, rather than positive (fig. 5).

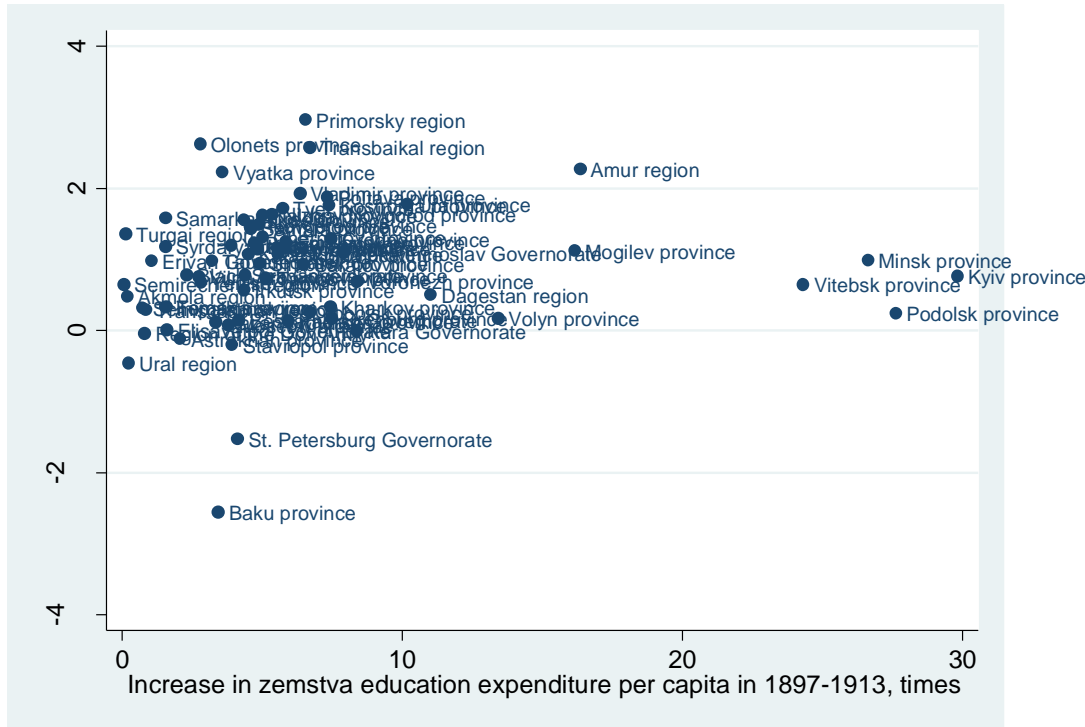
**Fig. 5. Increase in enrollment in primary and secondary education and in *zemstva* expenditure for education in 1897-1913**



<sup>21</sup> Reported by the Central Statistical Committee of the Ministry of Internal Affairs, processed in (Obukhov, 1927), from where we borrowed the annual data for the period of 1903-12.

<sup>22</sup> Reported in (Minfin, 1903).





Source: Computed based on Kessler and Markevich (2014; 2020), MinFin (1915a; 1915b), TsSK MVD (1915, 1916).

The straight forward comparison of primary enrollment ratios in 1897 and 1913 does not seem to suggest that *zemstva* financing of education did matter<sup>23</sup>. But once the control variables explaining the increase in the enrollment in primary and secondary education are added to the right hand side, the impact of the increase in *zemstva* educational spending becomes positive and significant.

$$^{23} \text{PRIMenr1913} = 1.1***\text{PRIMenr1897} + 0.03\text{ZEMedGR97\_13} + 1.3***$$

Robust standard errors, N = 70, R<sup>2</sup> = 0.63. Here and later – standard notations: \*\*\* - significant at 1%, \*\* - 5%, \* - 10%. (*ZEMedGR97\_13* is significant at 36%).

$$\text{SECONenr1913} = 0.4\text{SECONenr1897} + 0.004\text{ZEMedGR97\_13} + 0.2***$$

Robust standard errors, N = 70, R<sup>2</sup> = 0.16.

(*SECONenr1897* is significant at 12%, *ZEMedGR97\_13* – at 19%)

Where:

*PRIMenr1913* – number of students in primary education per 100 inhabitants in 1913,

*PRIMenr1897* – number of students in primary education per 100 inhabitants in 1897,

*SECONenr1913* – number of students in secondary education per 100 inhabitants in 1913,

*SECONenr1897* – number of students in secondary education per 100 inhabitants in 1897,

*ZEMedGR97\_13* – increase in *zemstva* education expenditure in 1897-1913, times.

### Primary education enrollment increase

In 1897-1913 the greatest growth of the number of students per capita in primary schools was observed in regions with:

- low population density in 1904,
- high literacy rates in 1897,
- high share of urban population in 1897,
- high *zemstva* educational expenditure per capita in 1897,
- existence of *zemstva* (dummy),
- increase in *zemstva* educational expenditure per capita from 1897 to 1913,
- low inequality in the distribution of human capital (as measured by the ratio of residents with secondary and higher education degrees to the residents with primary degrees in 1897).

The impact of share of urban population in 1897 and literacy rates in 1897 is somewhat unclear – if the indicators are included separately into the right hand side, both are significant and positive, if they are included together, literacy rate acquires a negative sign (strictly speaking, they cannot be included together due to multicollinearity problem –  $R^2 = 52\%$  – see fig. 2).

To put it differently, the largest increases in proliferation of primary education took place in regions with low population density, high share of urban population/high literacy, low inequality in the distribution of human capital, but also with the existence of *zemstva* administrations, high *zemstva* expenditure for education in 1897 and high growth of these expenditure in 1897-1913 (see table 3).

### Secondary education enrollment increase

As was already mentioned, *zemstva* were financing not only primary, but also secondary education. District administrations (*uezdnye zemstva*) dealt with rural primary schools, while provincial ones (*gubernskie zemstva*) financed secondary, vocational and higher schools which were mostly urban.

**Table 3. Regression of the primary enrollment rate (number of students in primary education per 100 inhabitants) in 1913 on *zemstva* expenditure for education in 1897-1913 and control variables, robust estimates** (standard notations: \*\*\*, \*\*, \* – significant at 1%, 5%, and 10% respectively)

Dependent variable	Number of students in primary education per 100 inhabitants primary education in 1913			
Equation, N // Indicator	1, N= 60	2, N=60	3, N = 54	4, N=54
Number of students in primary education facilities per 100 inhabitants in 1897	.9***	.8***	.7***	.9***
Share of urban population, 1897, %	.07***	.07***		.05***
Literacy rate in 1897, %	-.05***	-.04***	-.06***	
Population density in 1904, inhabitants per 1 sq. km	-.01**	-.01*	-.02***	-.03***
Education inequality (ratio of students enrolled in secondary and primary education in 1897)	-15.6***	-15.2***		
Existence of <i>zemstva</i> in the region dummy			.7***	.08***
<i>Zemstva</i> education expenditure per capita in 1897		2.5*		
Increase in <i>zemstva</i> education expenditure in 1897-1913, times			0.05***	.006***
Constant	3.3***	3.2***	1.2***	1.2***
R <sup>2</sup> , %	59	61	63	63

Regressions with few control variables show that *zemstva* per capita education expenditure in 1897 and the growth of this expenditure in 1897-1913 contributed to the increase in the enrollment ratios in secondary education in 1897-1913 (table 4). But once more controls are added, the coefficients with the *zemstva* education expenditure variables loose significance.

- In 1897-1913 the greatest growth of the number of students per capita in secondary schools was observed in regions with:
  - high GDP per capita in 1897,
  - high literacy rates in 1897,
  - low share of urban population in 1897.

**Table 4. Regression of the secondary enrollment rate (number of students in secondary education per 100 inhabitants) in 1913 and the increase in enrollment in 1897-1913 on *zemstva* expenditure for education in 1897-1913 and control variables, robust estimates**  
(standard notations: \*\*\*, \*\*, \* – significant at 1%, 5%, and 10% respectively)

Dependent variable	Number of students in secondary education per 100 inhabitants secondary education in 1913)			LN (Increase in the number of students in secondary education facilities per 100 inhabitants in 1897-1913)		
	1, N = 70	2, N = 70	3, N = 70	4, N= 70	5, N =61	6, N=45
Equation, N // Indicator						
Number of students in secondary education facilities per 100 inhabitants in 1897	.4 (11% significance)			-5.6***	-6.6***	-3.2***
Share of urban population, 1897, %			-.03***			
Literacy rate in 1897, %					.03**	
Share of serfs in rural population in 1858, %						.005**
GRP per capita in 1897, rubles		.002**		.006***		
<i>Zemstva</i> education expenditure per capita in 1897, rubles	.6***	.7***	4.0***	4.6***	2.5***	4.1***
<i>Upravy</i> education expenditure per capita in 1897, rubles						-.8***
Charity education expenditure per capita in 1897, rubles					4.5*	4.6***
Increase in <i>zemstva</i> education expenditure in 1897-1913, times	.006*	.007**	.02 (13% significance)	.02**	.005	-.004
Constant	.1***	.06	.7***	.5***	.5***	.6***
R <sup>2</sup> , %	25	34	28	58	69	89

To put it differently, the largest increases in proliferation of secondary education took place in rural, but relatively well-off regions (high GRP per capita and high literacy rates). There is the same multicollinearity problem, as in regression explaining the growth of enrollment ratios in primary education (strong correlation between the share urban population and literacy rates), so the relative contribution of urbanization and literacy rates to the growth of secondary enrollment is also uncertain. But the addition of these variables either separately or together undermines the significance of the growth of *zemstva* education expenditure variable (table 4). The absolute *zemstva* expenditure for education per capita in 1897 (as the absolute expenditure for education of charity organizations, but not that of *upravy* and central government) had always a positive and

significant impact on the growth of the enrollment in secondary education in 1897-1913, but neither the existence of *zemstva*, nor the growth of *zemstva* education expenditure in 1897-1913 had a stable and significant impact on the dynamics of secondary education enrollment (in a couple of regressions it is significant, but the significance disappears, once other control variables are added).

Share of serfs in 1858 variable turns out to be surprisingly significant (positive impact – probably because serfdom was concentrated in historical Russian proper, not in the outskirts of the Empire), but it limits the number of observations to only 46 (table 4).

Finally, other sources of the financing of education in 1897 had a varying impact on the growth of secondary education enrollment. Charity financing of education has a positive sign and is statistically significant, whereas financing by *upravy* (city/town self-governance bodies) has a negative sign, suggesting that increases in enrollment were greater from a low base – in regions where financing in 1897 was low. *Upravy* financing thus was contributing to the convergence of secondary education levels within regions and among regions, but it was not enough to reverse the general picture – greater increases in secondary enrollment education led to the increase in educational inequalities within regions (see next section on the widening gap between secondary and primary education enrollment).

Other variables characterizing sources of financing of education expenditure (central government, tuition fees) were not significant for explaining the growth of enrollment ratios.

#### Change in inequality of the distribution of human capital

In 1897 *zemstva* were spending money on education mostly in poor regions with low urban population, but high literacy rates (table 5).

The same is true for the **increase** in *zemstva* expenditure for education in 1897-1913: it also was the strongest mostly in poor regions with low share of urban population, but with relatively high literacy rates (table 6).

**Table 5. Correlation coefficients between the level of *zemstva* per capita expenditure for education in 1897 and literacy rate (1897), urbanization rate and GRP per capita in 1897, 86 observations**

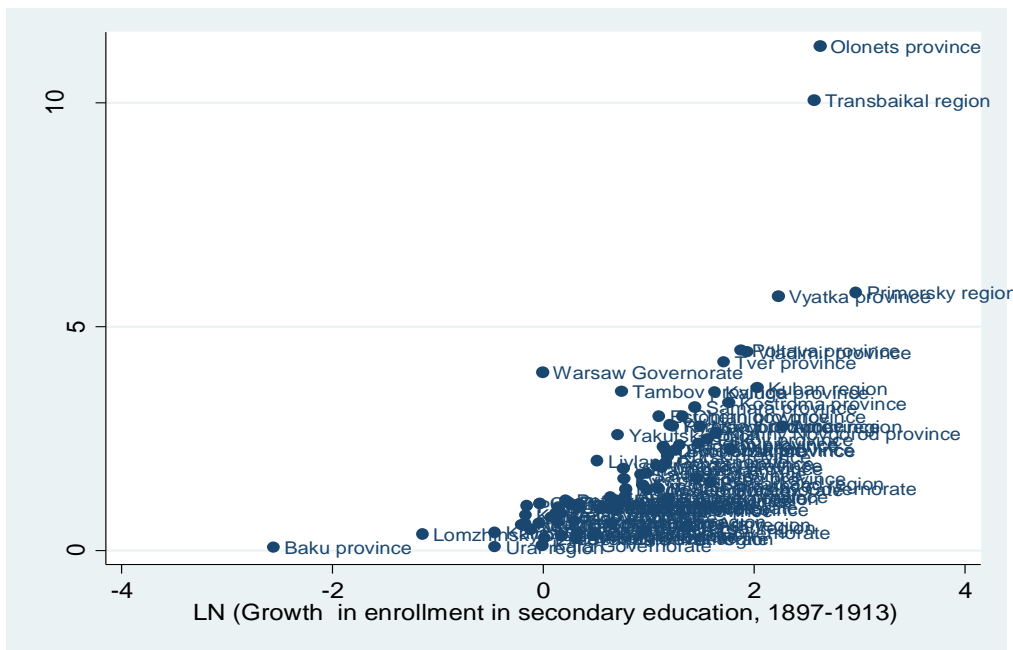
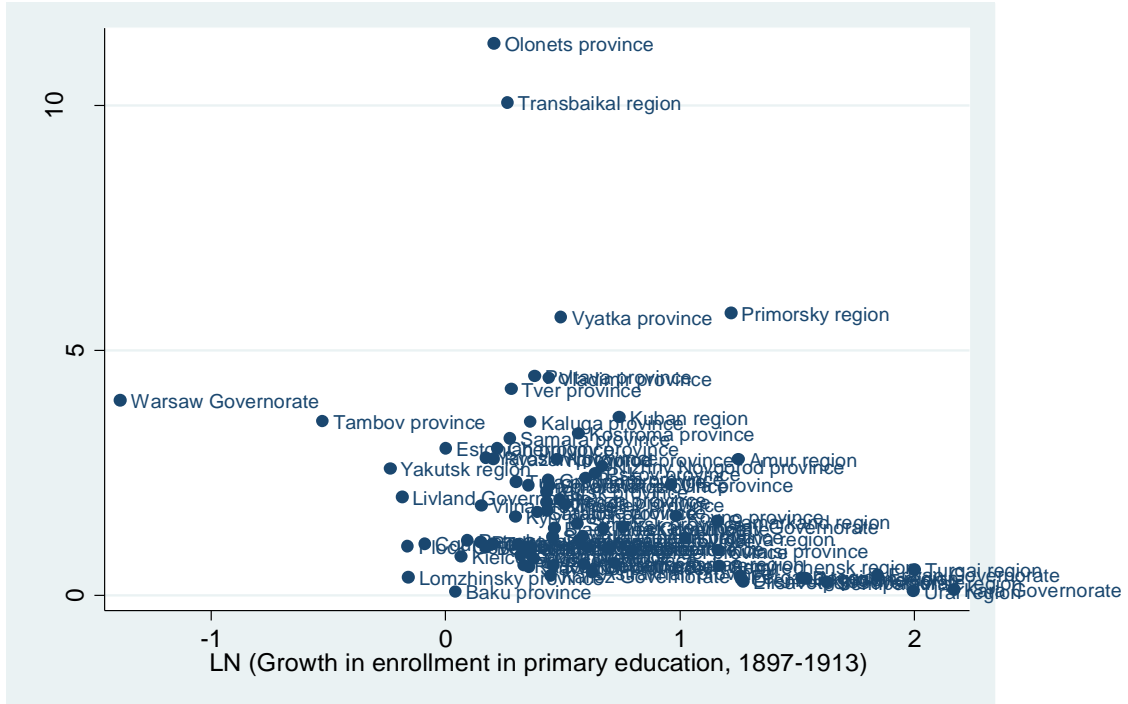
Indicator	<i>Zemstva</i> per capita expenditure for education in 1897	Literacy rate in 1897, %	GRP per capita in 1897, rubles	Share of urban population, 1897, %
<i>Zemstva</i> per capita expenditure for education in 1897, rubles	1			
Literacy rate in 1897, %	0.15	1		
GRP per capita in 1897, rubles	-0.06	0.5	1	
Share of urban population, 1897, %	-0.06	0.6	0.7	1

**Table 6. Correlation coefficients between the increase of *zemstva* per capita expenditure for education in 1897-1913 and literacy rate (1897), urbanization rate and GRP per capita in 1897, 72 observations**

Indicator	The increase in <i>zemstva</i> per capita expenditure for education in 1897-1913, times	Literacy rate in 1897, %	GRP per capita in 1897, rubles	Share of urban population, 1897, %
The increase in <i>zemstva</i> per capita expenditure for education in 1897-1913, times	1			
Literacy rate in 1897, %	.14	1		
GRP per capita in 1897, rubles	-.07	.6	1	
Share of urban population, 1897, %	-.03	.6	.7	1

Fig. 6 indicates that the growth of the enrollment ratios for primary education contributed to the decline in the inequalities in the distribution of human capital in 1897-1913 (as measured by the ratio of secondary to primary enrollment), whereas the growth of the enrollment ratios for secondary education contributed to the increase in these inequalities.

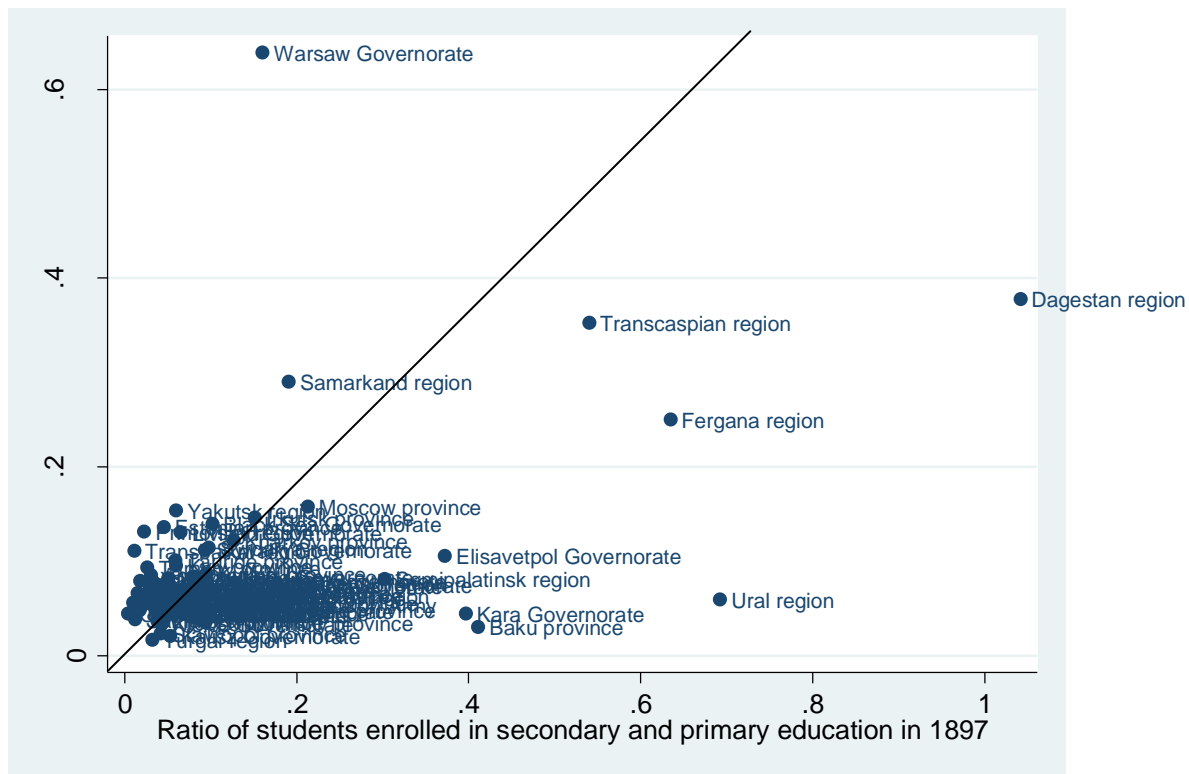
**Fig. 6. The growth of the enrollment ratios for primary education and the inequalities in the distribution of human capital in 1897-1913 (as measured by the ratio of secondary to primary enrollment)**



Source: Source: Computed based on Kessler and Markevich (2014; 2020), TsSK MVD (1915, 1916).

Overall, the inequality in the distribution of human capital within the regions increased. Out of 84 regions on which data are available, in 31 regions the ratio of students enrolled in secondary education to those enrolled in primary education fell, whereas in another 53 regions it increased (fig. 7). It may be not exactly obvious from fig. 7 below, which gives the impression that there were roughly as many regions with growing ratio of secondary to primary school enrollments, as there were regions with the falling ratio, but the national averages story is straightforward and definite: the number students enrolled in primary education in all Russian regions (unweighted average) increased from 2.47 in 1897 per 100/000 inhabitants to 3.75 in by 1913 (1.5 times), whereas the enrollment into the secondary education increased more rapidly – from 0.15 to 0.28 by 1914 (1.8 times). And the total enrollment in secondary education all over the Empire from 1897 to 1913 increased 2.5 times, whereas primary education enrollment – only 2.1 times.

**Fig. 7. Ratio of students enrolled in secondary education to the students enrolled in primary education in 1897 and in 1913 by regions**



Source: Computed based on Kessler and Markevich (2014; 2020), TsSK MVD (1915, 1916).



In most regions, to put it differently, the proliferation of secondary education was progressing noticeably faster than the spread of primary education, which contributed to the increase in inequalities in the distribution of human capital and allegedly created the class of intellectuals that became *intelligentsia* – educated individuals not being able to apply their knowledge and skills in the national economy and looking for the solution in various kinds of social activity.

As the table 7 suggests, the greatest increases in the gap between secondary and primary school enrollment in 1897-1913 took place mostly in the European part of the Empire (except for Transbaikal and Primorsky regions) and to a large extent in the historical proper (with the exceptions of Warsaw, Grodno, Estonia, Kuban, Poltava, Chernigov), whereas the smallest increases in the educational inequalities occurred in the remote regions.

### **Education and social protest**

The recent paper (Popov, Konchakov, Didenko, 2023) made an attempt to quantify the social protest on the eve of Russian revolutions: it established the relationship between three indicators of social protest (peasants' unrest, strikes at industrial enterprises, crimes against persons) and inequality of land distribution. It was also argued in the paper that the stock of human capital in 1897 (as measured by the literacy rate and the average number of the years of schooling) had significant positive impact on the increase in strikes at industrial enterprises, significant negative impact on the increase in violent crimes (crimes against persons), and no significant impact on the increase of peasants' unrest.

**Table 7. Increases in gross enrollment in primary and secondary education and Increase in human capital inequality in the regions of the Russian Empire in 1897-1913**

	Increase in gross enrollment in secondary education in 1897-1913 (1)	Increase in gross enrollment in primary education in 1897-1913 (2)	Increase in human capital inequality (growth of enrollment in secondary education to the growth of enrollment in primary education in 1897-1913), times (3) = (2) : (1)
<b>Regions with greatest increase in the inequality in HC (over 3 times faster increase in secondary than in primary education enrollment)</b>			
Warsaw Governorate	0.99	0.25	3.98
Vladimir province	6.90	1.55	4.44
Vyatka province	9.29	1.64	5.68
Grodno province	3.65	1.55	2.36
Transbaikal region	13.09	1.30	10.06
Kaluga province	5.08	1.44	3.54
Kostroma province	5.83	1.76	3.31
Kuban region	7.63	2.10	3.64
Olonets province	13.85	1.23	11.26
Poltava province	6.54	1.46	4.48
Primorsky region	19.49	3.38	5.77
Samara province	4.21	1.31	3.21
Tambov province	2.10	0.59	3.55
Tver province	5.56	1.32	4.21
Chernigov province	3.75	1.25	3.00
Estonian province	3.01	1.00	3.01
<b>Regions with smallest increase in the inequality in HC (over 2 times faster increase in secondary than in primary education enrollment)</b>			
Akmola region	1.61	4.67	0.34
Astrakhan province	0.89	1.87	0.48
Baku province	0.08	1.04	0.07
Dagestan region	1.66	4.57	0.36
Elisavetpol Governorate	1.01	3.55	0.28
Kalisz Governorate	0.63	1.57	0.40
Kara Governorate	0.99	8.73	0.11
Lomzhinsky province	0.32	0.85	0.37
Orenburg province	1.19	3.53	0.34
Semipalatinsk region	1.37	5.09	0.27
Ural region	0.63	7.35	0.09
Fergana region	1.39	3.51	0.39
Erivan Governorate	2.65	6.31	0.42

Source: Computed based on Kessler and Markevich (2014; 2020), TsSK MVD (1915, 1916).

As we show in this paper, adding variables characterizing the level and growth of human capital does not help much to explain the increase in the social protest. Variables, characterizing the growth in secondary education enrollment and inequality in the formation of human capital turn out to be insignificant in most cases, and, when significant, have a negative signs – in regions with the higher growth in enrollment in secondary and primary education and widening gap between secondary and primary education, increases in peasants' unrest and strikes activity were less pronounced (table 8). These results confirm the findings of another paper about the impact of education levels on social protest (Popov, Konchakov, Didenko, 2023). However, the evidence may be not very persuasive because the data on peasants' unrest limit the number of observations to only 19-26 regions.

Only increases in crimes against persons depended positively on the increases in enrollment in primary education in 1897-1913, even though negatively on the literacy rate. The reason is probably the multicollinearity – a rather strong negative correlation ( $R^2 = 46\%$ ) between the level of literacy in 1897 and the subsequent increase in primary education enrollment (these increases were higher in more illiterate regions).

Also, we do not have at a moment good indicators of the dynamics in the inequality in the distribution of human capital: only the flows indicators – enrollment into secondary and primary education, not the stocks of the individuals with different number of years of education. Reconstruction of the stock indicators of human capital by regions (number of years of education, number of individuals with primary, secondary and tertiary education within different social groups) would allow making a better comparison with the indicators of the social protest.

Besides, the growth of social protest in particular regions could have been driven by “oversupply” of *intelligentsia* (students with secondary education – potential revolutionaries) from the other regions.

**Table 8. Regression explaining the increase in social protest**

(standard notations: \*\*\*, \*\*, \* – significant at 1%, 5%, and 10% respectively)

Dependent variable	Increase in peasants' unrest per 1 million rural population from 1890-99 (average) to 1900-04 (average)			Man-days lost due to strikes as a percentage of total man-days worked – increase from 1895-99 to 1900-04, times	Increase in the rate (per 100,000 inhabitants) of crimes against persons from 1896 to 1912, times
Equation, N // Indicator	1, N= 25	2, N=26	3, N=25	4, N=19	5, N=43
Index of inequality of private land distribution in 1877, times	.4***	.4***	.5***		.1*
GRP per capita in 1897, rubles				.4**	
The average annual expenditures of local self-government bodies ( <i>zemstva</i> ) per capita in 1868-1903, rubles			-1.7*		
Average harvest yield for 10 years, c/ha (year 1907 - the middle of the period)				-32.7***	
Increase in peasants' unrest per 1 million rural population from 1890-99 (average) to 1900-04 (average)				16.2**	
Growth of alcohol consumption per capita from the 1870s to the 1890s, times					2.5***
Literacy rate, 1897, %					-.04**
Share of population with secondary and higher education to those with primary education in 1897				-1136.3**	
Increase in <i>zemstva</i> education expenditure in 1897-1913, times					-.04***
Number of students in secondary education facilities per 100 inhabitants in 1897			1.4 (significant at 11%)		
Increase in gross enrollment in primary education, 1897-1913, times				-43.4**	
Increase in gross enrollment in secondary education, 1897-1913, times		-.2**		-8.6*	
LN (increase in gross enrollment in secondary education, 1897-1913, times)					1.0**
Increase in human capital inequality (growth of enrollment in secondary education to the growth of enrollment in primary education in 1897-1913), times	-.3*				
Constant	.5	.5	1.3	342.7***	.08

Dependent variable	Increase in peasants' unrest per 1 million rural population from 1890-99 (average) to 1900-04 (average)			Man-days lost due to strikes as a percentage of total man-days worked – increase from 1895-99 to 1900-04, times	Increase in the rate (per 100,000 inhabitants) of crimes against persons from 1896 to 1912, times
R <sup>2</sup> , %	38	42	49	78	54

But it may well be that the *intelligentsia* opposition to the regime took mostly the form of non-violent and cooperative activities – working in *zemstva* as teachers and doctors, as *narodniks'* (one group of socialist reformers) populist movement of *khozheniye v narod* (“going to the people”) advocated. The more educated was the population, the less likely the social protests were to take more extreme forms of peasants' unrest, strikes and violence against persons.

The findings should be viewed in the framework of the major debate of that time – whether *zemstva* could transform Russian communal pre-capitalist village into the capitalist “American type” farming or whether the *zemstva* activities were just a palliative care that did not affect the root causes of inequality. *Narodniks* (“populists”) believed that transition to socialism was possible through the agricultural community and *zemstva* activities<sup>24</sup>, whereas Marxists (social democrats at the time) considered a revolution a *sine qua non* for social progress<sup>25</sup>. Our data, even though incomplete, suggest that Russian educated class was leaning towards reforms, not revolution. More violent forms of social protest – peasants' unrest, strikes at industrial enterprises and crimes

<sup>24</sup> In 1879 *narodnik's* “*Zemlya i Volya*” (Land and Liberty) organization split into two. One of the offspring – “*Narodnaya Volya*” (People's Will) – adopted terrorist methods, organizing many terrorist attacks on tsarist officials (including the murder of the tsar Alexander II in 1881).

<sup>25</sup> As the main character in Anton Chekhov's famous short story “The House with the Mezzanine” (1896) argues: “medical stations, schools, libraries, pharmacies, under existing conditions, only lead to slavery. The masses are caught in a vast chain: you do not cut it but only add new links to it”. Although the line of his argument did not lie in the realm of economic materialism, as Marxism was then commonly perceived, it borrowed much from thoughts and disputes of Marxist-influenced *intelligentsia* of the time. Later on, during the Russian Revolutions of 1917 and the Civil War, this debate transformed into the political struggle between *socialist revolutionaries* (*essers*, former *narodniks*), and *bolsheviks*.

against persons<sup>26</sup> – were driven mainly by the inequality in land distribution, whereas education levels and growth of these levels had mostly a negative impact, if any.

### **Conclusions and future research**

We find that the largest increases in proliferation of primary education took place in the remote regions with low population density, high share of urban population, low inequality in the distribution of human capital and low literacy rates. The *zemstva* and charity organizations financing was taking place mostly in regions where the increase in proliferation of primary education was low, so it should have contributed to the reduction of the inequality in human capital distribution within the regions. To a much lesser extent *zemstva* educational spending contributed to the growth of secondary education enrollment, but the other sources of financing (central government, urban *upravy*, tuition fees and charity) pushed secondary enrollment up, so it grew faster than the primary enrollment.

The previous research with incomplete data revealed that *zemstva* were spending more on education per capita in regions with low level of education, but these spending did not make much of a difference – human capital in these regions remained low (Popov, Konchakov, Didenko, 2024). The results reported in this paper provide additional and more rigorous proof that *zemstva* activities contributed to the spread of primary education and to the decline in the inequality of the distribution of human capital within the regions (ratio of secondary to primary education enrollment).

But there were more powerful forces at play – central government and city/town administration financing, education for tuition fees – that were pushing the development in an opposite direction, increasing the secondary education enrollment in most regions faster than the primary education enrollment. The result was the widening gap between low and high educated individuals that could have contributed to the formation of the *intelligentsia* phenomenon – educated intellectuals that were not able to find the proper place in the national economy to apply their knowledge. However,

---

<sup>26</sup> Increases in crimes against persons in 1896-1912 (controlling for land inequality and growth of alcohol consumption) were negatively related to the literacy levels and the growth of *zemstva* education expenditure, but positively linked to the growth of enrollment in primary education in 1897-1913 (table 8, model 5).

this widening gap between the secondary and primary education enrollment was not linked to the increase in the social unrest in the Russian provinces: in regions where this gap was growing, social protest increased less, not more.

We hope the future research could shed more light on the link between the educational patterns and disparities in the pre-revolutionary Russian regions and the magnitude of social protest.

## References

Abramov, V.F. (1996). Абрамов В.Ф. Российское земство: экономика, финансы, культура [*The Russian zemstvo: Economy, finance, and culture*]. Moscow: ФГ «Ника» [Nika Financial Group Publishing], 1996.

Alston, P.L. (1969). *Education and the State in Tsarist Russia*. Stanford, CA: Stanford University Press.

Anfimov A.M. (ed.) (1998). Крестьянское движение в России в 1901-1904 гг. Сборник документов [*The Peasant Movement in Russia in 1901-1904. A Collection of documents*]. Moscow: Наука [Science].

Borodkin L., Shilnikova I. (2020). Labour Conflicts: Russia 1895-1904. Version 1. <https://datasets.iisg.amsterdam/dataset.xhtml?persistentId=hdl:10622/LSCGBO>.

Dennis, G. (1961). Education, in M. T. Florinsky (ed.), *Encyclopedia of Russia and the Soviet Union*. New York, NY: McGraw-Hill.

Didenko, D.V. (2021a). Диденко Д.В. Динамика и институциональные источники накопления человеческого капитала в регионах России (вторая половина XIX в. - начало XX в.) [Dynamics and institutional sources of human capital accumulation in Russia's regions (19th — early 20th centuries)]. In Borodkin L.I., Petrov Yu.A. (Eds). *Экономическая история:*

ежегодник [Russian Economic History Yearbook]. 2020, Moscow: Российская политическая энциклопедия (РОССПЭН) [Russian Political Encyclopedia (ROSSPEN)], pp. 107-149.

Didenko, D.V. (2021b). Диденко Д.В. Пространственное неравенство и накопление человеческого капитала в Европейской России при переходе к «современному» типу экономического роста (конец XIX – начало XX в.) [Spatial Inequality and Human Capital Formation in the Transition of European Russia to the ‘Modern’ Type of Economic Growth (Late 19th to Early 20th Centuries)]. *Мир России = Universe of Russia*, Vol. 30. No 3, pp. 100-126.

Didenko, D.V. (2024). Диденко Д.В. Институциональные источники формирования человеческого капитала в регионах Европейской России, Сибири и Дальнего Востока (конец XIX – начало XX в.) [Institutional sources of human capital formation in the regions of European Russia, the Siberia, and the Far East (late 19th – early 20th centuries)]. *Вестник Томского государственного университета. История = Tomsk State University Journal of History*. No 90, pp. 17-29.

Eklof, B. (1986). Russian peasant schools. Officialdom, village culture and popular pedagogy, 1861 – 1914. Berkeley, CA: *University of California Press*.

Galor, Oded (2012). Inequality, Human Capital Formation and the Process of Development. *IZA Discussion Paper* No. 6328. January 2012.

ГК (1868-1916). Отчет Государственного контроля по исполнению Государственной росписи и финансовых смет [State Control Report on the Execution of the State Budget and Financial Statements]. St. Petersburg.

GSh (1884). Военно-топографический отдел Главного штаба [Military Topographic Department of the General Staff]. Карта Азиатской России с прилегающими к ней владениями [Map of Asian Russia with adjacent possessions]. St. Petersburg.



GSh (1921). Военно-топографический отдел Главного штаба [Military Topographic Department of the General Staff]. *Военно-дорожная карта Азиатской России. Составлена в 1895 г. Исправлена в 1908-19 гг.* [Military road map of Asian Russia. Compiled in 1895, corrected in 1908-19]. Moscow.

Johnson, W. (1969). *Russia's Educational Heritage*. 2<sup>nd</sup> ed., New York: Octagon Books.

Kaser, M.C. (1966). Education and Economic Progress: Experience in Industrialized Market Economies. In Robinson E.A.G., Vaizey J.E. (Eds). *The Economics of Education*. London: St Martin's Press; New York: Macmillan, pp. 142-173.

Kessler, H., A. Markevich. (2014). Electronic archive of Russian Historical Statistics, 18th – 21st centuries. Version 1. Datatype 5.01; 5.02 – Output of the service sector, benchmark year 1897 [ERRHS\_5.01\_data\_1897.xlsx; ERRHS\_5.02\_data\_1897.xlsx]. <http://ristat.org>.

Kessler, H., A. Markevich (2020). Electronic archive of Russian Historical Statistics, 18th – 21st centuries. Version 1. [Topic 1-Population]. <http://ristat.org>.

Levine, S., Kawada, H. (1980). *Human Resources and Japanese Industrial Development*. Princeton, NJ: Princeton University Press.

Markevich, A. (2019). A Regional Perspective on the Economic Development of the late Russian Empire (May 14, 2019). Available at SSRN: <https://ssrn.com/abstract=2555273> or <http://dx.doi.org/10.2139/ssrn.2555273>.

Markevich, A. (2022). "GRP estimates for the provinces of the Russian Empire in 1897", <https://hdl.handle.net/10622/ZNA2NP>, IISH Data Collection, V3; Markevich GRP estimates for the provinces of the Russian Empire in 1897.csv.

Markevich, A., E. Zhuravskaya (2018). The Economic Effects of the Abolition of Serfdom: Evidence from the Russian Empire. *American Economic Review*, Vol. 108, No. 4-5, pp. 1074-1117. <https://doi.org/10.1257/aer.20160144>.

MinFin (1896a-1915a). Министерство финансов. Департамент окладных сборов [Ministry of Finance. Department of Direct Taxes]. Доходы и расходы земств ... по сметам [*Incomes and expenditures of zemstvos ... according to the budget statements*]. St. Petersburg.

MinFin (1898-1915b). Ежегодник министерства финансов [*Ministry of Finance Yearbook*]. Petrograd. P. 542-545

Minfin (1903). Департамент окладных сборов Министерства финансов [*Department of Direct Taxes of the Ministry of Finance*]. Материалы высочайше учрежденной 16 ноября 1901 г. Комиссии по исследованию вопроса о движении с 1861 г. по 1900 г. благосостояния сельского населения среднеземледельческих губерний, сравнительно с другими местностями Европейской России [*Materials of the High Commission established on November 16, 1901 to investigate the welfare of the rural population of the central agricultural provinces from 1861 to 1900, compared with other areas of European Russia*]. Part 1. St. Petersburg.

MinFin (1909). Министерство финансов. Департамент окладных сборов [Ministry of Finance. Department of Direct Taxes]. Мирские доходы и расходы за 1905 год по 50 губерниям Европейской России [Communes' incomes and expenditures for 1905 in 50 provinces of European Russia]. St. Petersburg.

Miniust (1900). Министерство юстиции [Ministry of Justice]. Свод статистических сведений по делам уголовным, проводившимся в 1896 году в судебных учреждениях, действующих на основании уставов Императора Александра II [*A summary of statistical information on criminal cases conducted in 1896 in judicial institutions operating on the basis of the statutes by Emperor Alexander II*]. St. Petersburg.

Miniust (1915). Министерство юстиции [Ministry of Justice]. Свод статистических сведений о подсудимых, оправданных и осужденных по приговорам общих судебных мест, судебномировых установлений и учреждений, образованных по законоположениям 12 июля 1889 года за 1912 год [*A set of statistical information about the accused, acquitted and convicted by the verdicts of the common courts, peace-making judicial institutions and institutions formed according to the provisions of the law as of July 12, 1889 for 1912*]. Petrograd.

Mironov, V.N. (2018). Российская империя: от традиции к модерну. [*The Russian Empire: from Tradition to Modernity*]. Vol 3. 2nd ed. St. Petersburg: Дм. Буланин.

MNP (1871-1903). Министерство народного просвещения [Ministry of Public Education]. Извлечение из всеподданнейшего отчета министра [Extract from the Most Humble Report of the Minister]. St. Petersburg.

MNP (1898). Департамент [Министерство] народного просвещения [Department of Public Education]. *Статистические сведения по начальному образованию в Российской империи за 1896 год* [*Statistical data on primary education in the Russian Empire in 1896*]. St. Petersburg.

MNP (1904-1916). Министерство народного просвещения [Ministry of Public Education]. Всеподданнейший отчет министра [The Most Humble Report of the Minister]. St. Petersburg.

MPD (2020). Maddison Project Database, version 2020. Bolt J., Van Zanden J.L. Maddison style estimates of the evolution of the world economy. A new 2020 update. <https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2020?lang=en>.

Obukhov, V.M. (1927). Движение урожаев в Европейской России в период 1883 - 1915 гг. [*The movement of crops in European Russia in the period 1883 – 1915*]. In Groman V.G. (ed.). Влияние неурожаев на народное хозяйство России. [*The impact of crop failures on Russia's national economy*]. Part 1. Moscow. Prilozhenie 1 [Appendix 1], pp. 59-108.

Popov, V., R. Konchakov, D. Didenko (2023). Factors of social tension in the provinces of the Russian Empire in the late 19th and early 20th centuries. – *MPRA Paper No. 118464*, Sept. 2023 <https://mpra.ub.uni-muenchen.de/118464/>.

Popov, V., R. Konchakov, D. Didenko (2024). Human capital in the regions of the Russian Empire and inequality in land distribution at the turn of the 20th century," *MPRA Paper № 119796*, January 2024. <https://mpra.ub.uni-muenchen.de/id/eprint/119796/>

Santa Maria, P. (1990). Question of Elementary Education in the Third Russian State Duma (1907-1912). Lewiston, N.Y.: *The Edwin Mellen Press*.

Sharyi V.I. (ed.) (1913, 1914). Статистический ежегодник. [Statistical Yearbook]. St. Petersburg: Совет съездов представителей промышленности и торговли [Council of Congresses of Industry and Trade Representatives].

Shatsillo, M.K. (2003). Эволюция налоговой системы России в XIX веке [Evolution of Russia's taxation system in the 19<sup>th</sup> century]. In Borodkin L.I., Petrov Yu.A. (Eds). *Экономическая история. Ежегодник. [Russian Economic History Yearbook]. 2002. Moscow: Российская политическая энциклопедия (РОССПЭН) [Russian Political Encyclopedia (ROSSPEN)]*. P. 345—383).

Shilov, A. (2008). Шилов А.И. Начальная и средняя школа Восточной Сибири в конце XIX - начале XX вв. [Primary and secondary school in the late 19<sup>th</sup> – early 20<sup>th</sup> centuries] Krasnoyarsk: *Krasnoyarsk Astafiev State Pedagogical University Publishing*.

Strel'bitskii, I.A. (1915). Специальная карта Европейской России [*Special map of European Russia*] (1:420,000). 1865-1871. Petrograd: *Литография картографического заведения Военно-топографического отдела [Lithography of the Cartographic Establishment of the Military Topographic Department of the General Staff]*.

Troinitskii, N.A., ed. (1898-1905). Первая всеобщая перепись населения Российской империи 1897 г. [*The First General Census of the Population of the Russian Empire in 1897*. Vols. 1-50, 65, 67, 68, 70, 72-80 [in Russian] St. Petersburg: *Центральный статистический комитет Министерства внутренних дел* [*Central Statistical Committee of the Ministry of Internal Affairs*].

TsSK MVD (1880-1885). Центральный статистический комитет Министерства внутренних дел [*Central Statistical Committee of the Ministry of Internal Affairs*]. Статистика поземельной собственности и населенных мест Европейской России: по данным обследования, произведенного статистическими учреждениями Министерства внутренних дел, по поручению Статистического совета [*Statistics on land ownership and settlements in European Russia: according to a survey conducted by the statistical offices of the Ministry of Internal Affairs, commissioned by the Statistical Council*]. St. Petersburg.

TsSK MVD (1886a). Центральный статистический комитет Министерства внутренних дел [*Central Statistical Committee of the Ministry of Internal Affairs*]. Статистический временник Российской империи. Серия III. Вып. 13. Мирские расходы крестьян за 1881 год. [[*Statistical Annual Book of the Russian Empire. Series III. Issue 13. Peasant communes' expenses for 1881*]. St. Petersburg.

TsSK MVD (1886b). Центральный статистический комитет Министерства внутренних дел [*Central Statistical Committee of the Ministry of Internal Affairs*] Статистический временник Российской империи. Сер. III. Вып. 16. Доходы и расходы губернских и уездных земств за 1883 год [*Statistical Annual Book of the Russian Empire. Series III. Issue 16. Receipts and Expenditures of Regional and Local Self-governments in 1883*], St. Petersburg.

TsSK MVD (1888). Центральный статистический комитет Министерства внутренних дел [*Central Statistical Committee of the Ministry of Internal Affairs*]. Статистика Российской империи [*Statistics of the Russian Empire*]. Vol. III. Университеты и средние учебные заведения 50-ти губерний Европейской России и 10-ти Привислянских, по переписи 20-го

марта 1880 г. [Universities and secondary educational institutions of 50 provinces of European Russia and 10 Vistula provinces, according to the census of March 20, 1880]. St. Petersburg.

TsSK MVD (1897). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистика Российской империи [Statistics of the Russian Empire]. Vol. XXXIX. Мирские доходы и расходы за 1892-94 годы в 50 губерниях Европейской России [Communes' incomes and expenses for 1892-94 in 50 provinces of European Russia]. St. Petersburg.

TsSK MVD (1911-1912). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистический ежегодник России за 1910 г., 1911 г. Статистический ежегодник России [Statistical Yearbook of Russia for 1910, 1911]. St. Petersburg.

TsSK MVD (1915, 1916). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистический ежегодник России за 1914 г., 1915 г. [Statistical Yearbook of Russia for 1914, 1915]. Petrograd.

WDR (2024). The Middle-Income Trap. World Development Report. Wash., DC, 2024.

Yasnopol'skii N.P. (1897) Приложения к исследованию о географическом распределении государственных расходов в России: Статистические таблицы, картограммы и диаграммы [Appendices to the Study on the Geographical Distribution of the Government Expenditures in Russia: Statistical Tables, Maps and Charts]. Part 2, Kiev: *Типография Киевского Императорского университета* [Printing house of the Kiev Imperial University].

Zhukov D.S., Kanishchev V.V., Lyamin S.K. (2017). Исследование интенсивности крестьянских волнений в Европейской России во второй половине XIX в. средствами теории самоорганизованной критичности [A study of the intensity of peasant unrest in European Russia in the second half of the 19<sup>th</sup> century, by means of the theory of self-organized

*criticality*]. *Историческая информатика [Historical Informatics]*. No. 1. P. 38-51.  
<https://doi.org/10.7256/2306-0891.2017.1.22145>.

### **Acknowledgements**

This study was supported by the Ministry of Science and Higher Education of the Russian Federation (grant ID: 075-15-2022-325). The authors thank our colleagues Evgenii Grishin, Maria Karpenko, Igor Kuznetsov, Anna Nifontova, and Ruben Vartanian for their assistance in data processing. Special gratitude is to Maria Karpenko for her assistance in organizing the research.