

SECTION I. ECONOMIC THEORY

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***THE ROLE OF INSTITUTIONAL SECTORS OF REGIONAL ECONOMY IN
HUMAN CAPITAL FORMATION IN EUROPEAN RUSSIA
(LATE 19TH – EARLY 20TH CENTURIES)****

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The issue of national and historical features of human capital was broadly discussed by public thought and academic discourse. It is vitally important in the sense to be the key to perceiving perspectives of the development of Russia's economic and social institutions. Moreover, high degree of spatial differentiation is a persistent characteristic of both the Russian Empire, and the USSR, and the modern Russian Federation, primarily as a result from multinational and multicultural composition of the population of their territories. The article presents our preliminary results of the project for reconstruction of macroeconomic dynamics in selected regions of the late Russian Empire, as regards their human capital accumulation. The purpose of this study is to demonstrate the cases of selected regions of European Russia as regards the role which various institutional sectors of their economies played in financing of education and health care as basic branches of human capital formation. To implement this purpose annual governors' reports are introduced to the literature as the main source for the reconstruction of long series of the indicators of human capital industries, the reliability of which is discussed in the article. The author used cross-check of the sources quantitative evidence, employed methods of long series reconstruction of the indicators in question (inter-, retro-, and extrapolation) and their statistical analysis (descriptive, comparative). When offering his own explanation of the evidence the author applied to categories and concepts of institutional economic history in the context of modernization paradigm. The first results demonstrate which institutional sectors to what extent were the sources and the recipients of financial resources for human capital formation, and how institutional differences between the provinces could affect the accumulation rate of this factor of production. In particular, it is documented that local self-governments retained their leading role in healthcare financing while the share of the central government was increasing gradually to become the major source of education financing. These results are important in the context of addressing the inquiries of the period's place in the long run processes of capital accumulation (both physical and human); of their role in Russia's economic development; as well as of persistence of specific regional characteristics over time, that determined the existence of various institutional paths within the country-wide processes of modernization and formation of the common economic space.

Keywords: socio-economic development, regional economy, industrialization, institutions, annual governors' reports, long time series, human capital, education, healthcare.

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РОЛЬ ИНСТИТУЦИОНАЛЬНЫХ СЕКТОРОВ РЕГИОНАЛЬНОЙ ЭКОНОМИКИ В ФОРМИРОВАНИИ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА ЕВРОПЕЙСКОЙ РОССИИ (КОНЕЦ XIX В. – НАЧАЛО XX В.)*

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Актуальность вопроса о национальных и исторических особенностях человеческого капитала, обсуждавшегося в общественной мысли и научной литературе, состоит в том, что он является ключевым к пониманию перспектив развития экономических и социальных институтов России. При этом высокая степень пространственной дифференциации является устойчивой характеристикой и Российской империи, и СССР, и современной Российской Федерации, прежде всего вследствие многонационального и мультикультурного состава населения их территорий. В настоящей статье представлены предварительные результаты реализации проекта по реконструкции макроэкономической динамики в отдельных регионах поздней Российской империи в части накопления человеческого капитала. Цель работы – на примерах отдельных регионов Европейской России (Архангельская, Вятская, Екатеринославская, Новгородская, Пермская губернии) продемонстрировать, какую роль играли институциональные сектора экономики в финансировании образования и здравоохранения как основных сфер формирования человеческого капитала. В качестве основного источника для реализации поставленной цели впервые использованы ежегодные губернаторские отчеты за период 1870–1915 гг., достоверность информации которых обсуждается в настоящей статье. Автор использовал перекрестную проверку количественных данных источников, применил методы реконструкции длинных рядов соответствующих показателей (интер-, ретро- и экстраполяции) и их статистического анализа (дескриптивный, сравнительный). В их содержательной интерпретации автор обращался к категориальному аппарату институциональной экономической истории в контексте модернизационной парадигмы. Полученные результаты показывают, какие институциональные сектора региональной экономики являлись источниками и реципиентами финансовых ресурсов для формирования человеческого капитала и как институциональные различия между губерниями могли влиять на темпы накопления этого фактора производства. В частности, в Пермской, Вятской и Екатеринославской губерниях на протяжении всего рассматриваемого периода основными источниками финансирования в накоплении человеческого капитала в сфере образования были средства центрального правительства и органов местного самоуправления, представленных губернскими и уездными земствами. Органы местного самоуправления сохранили ведущую роль в финансировании сферы здравоохранения. Напротив, в Архангельской губернии, где в ходе земской реформы 1860-х гг. не было введено местное самоуправление и аналогичные земские сборы играли значительно меньшую роль, отмечаются отдельные признаки отставания в накоплении человеческого капитала. В целом, для всех рассматриваемых регионов установлено, что по мере увеличения доли средств центрального правительства, оно становилось основным источником финансирования образования. Эти результаты важны в контексте поиска ответа на вопросы о том, каково место данного периода в долгосрочном процессе накопления капиталов (и физического, и человеческого); об их роли в экономическом развитии России; а также об устойчивости специфических региональных характеристик во времени, определивших наличие различных институциональных траекторий в рамках процессов модернизации и формирования единого экономического пространства страны.

Ключевые слова: социально-экономическое развитие, региональная экономика, индустриализация, институты, губернаторские годовые отчеты, длинные ряды данных, человеческий капитал, образование, здравоохранение.

* В статье представлены результаты исследования, выполненного в рамках государственных заданий ФГБОУ ВО «Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации» на научно-исследовательские работы по темам: «Региональные модели социально-экономического развития в Европейской России в XIX – начале XX вв.» (2018 г.) и «Жизненные стандарты и социально-экономическое развитие регионов Европейской России во второй половине XVIII – начале XX вв.» (2019 г.).

Introduction

The accumulation of both human and physical capital is considered in the scientific literature to be one of the most important determinants of economic development. Correspondingly, understanding the current state and prospects for the development of key economic and social institutions of Russia is impossible without a fundamental development of the issue of national and historical features of human capital. The issue was discussed by various public thinkers and scholars in Russia (I.I. Yanzhul, A.I. Chuprov, E.N. Yanzhul, D.I. Mendeleev) at the start of industrialization process. At the same time, an important characteristic is the high degree of spatial differentiation, which is relevant for the Russian Empire, for the USSR, and for the modern Russian Federation. Different representatives of Russian historical thought paid attention to the role of spatial differentiation in the history of Russia. However, except some particular cases (I.D. Koval'chenko, L.V. Milov, B.N. Mironov, S.A. Nefedov) it is mainly referred to observations and suggestions that have not been confirmed by the statistical analysis of regional data.

The theory of human capital developed in the late 1950s – early 1960s by T. Schultz, G. Becker, J. Mincer [1, p. 49–155; 2; 3] initially focused on the problems of economic efficiency of education¹. Healthcare is conventionally considered to be another industry, where the human capital of society is formed. However, healthcare being one of the determinants of economic development has not been studied enough [5; 6]. It is known that in modern society there is a positive correlation between education and health: more educated individuals live longer (as in countries with higher levels of education). However, in the scientific literature, a question whether this regularity took place in historical retrospect [7, p. 84] remains.

From the view point of macroeconomics the problem of human capital

was considered in the scientific literature mainly at the level of the national economy of certain foreign countries. Since the early 1990s, there has been a growing interest in regional economic growth research stimulated by the accumulation of relevant quantitative data and the development of methods for their analysis. In this regard the purpose of the study is to reveal the role that various institutional sectors of the regional economy (central government, local governments, enterprises, households) played in the financing of education and healthcare as the main areas of human capital formation in the case study of particular regions of European Russia. Herewith, the data of the governor's annual reports have been used for the first time for the quantitative analysis of the processes of human capital accumulation in the regions of Russia of the pre-revolutionary period.

Analysis of international and Russian experience in the studying the role of human capital in regional economic development

Among the regional studies characterizing the industries of human capital formation, we will focus on two main groups: foreign countries and Russia more closely.

1. Comparative studies of economic dynamics at the level of regional economy of foreign countries

A project that forms a database of economic development of Prussia in the XIX century² can be used as an example of the reconstruction of indicators relating to human capital in chronologically distant periods. Using her data, S. Becker et al. analyzed the impact of changes in the educational level of the population on the catching up industrial development of the regions of Prussia [9]. In particular, the hypothesis of M. Weber about the causal relationship between the prevalence of Protestantism and capitalist entrepreneurship was corrected in the sense that religious practices of the former (reading sacred texts in

¹ For more information on the history of the emergence and various areas of research in the framework of the theory of human capital, see [4, p. 7-56].

² *Prussian Economic History Database*. Available at: <https://www.ifo.de/en/iPEHD>. The description of databases is presented in [8].

congregations' native language) stimulated the development of literacy, and only to a limited extent can be attributed to a special work ethic [10].

Alongside with the project an internet-platform that thoroughly documented databases of historical data, including the development of education in Germany over the past 200 years in changing borders [11]. The emphasis in the construction of this platform was made on the creation of a long historical series of comparable in time indicators of education as a branch of the economy and a social institution.

The indicator of numeracy has been recently applied by J. Baten et al. [12; 13]. It helps to explain the differences in development factors between different regions of Europe and particular countries. They established a negative relationship between the concentration of land ownership and the accumulation of human capital [12], confirming the predictions of the "unified growth theory" suggested by O. Galor [14].

Italy is considered to be an example of a country characterized by lagging behind the major Western European countries in the field of education. G. Bertola and P.A. Sestito measured human capital using indicators of literacy, the level of primary education enrolment, and the average duration of education (years of schooling) [15].

In his works E. Felice raised the issue about the convergence of Italian regions in terms of human capital, which occurred mainly in the period 1910–1960s. In the conditions of poor availability of data for calculating the volume of human capital for the purposes of long-term analysis, he developed a human capital index, which included data on literacy and the number of students at different levels of education [16, p. 275–277].

C. Diebolt and R. Hippe have stressed the preservation for more than a century and a half of a stable picture of inequality in human capital between the regions of Europe, despite the convergence of indicators of human capital, measured by literacy and numeracy, as well as the average duration of education [17].

The problem of spatial inequality (convergence / divergence) is considered in

the works by B. Van Leeuwen et al. devoted to China (to the level of provinces) and the USSR (to the level of republics) [18; 19]. The results have revealed that in China, despite the strong dynamics of the overall level of technological development (significantly better compared to the former Soviet Union and the newly independent States on its territory), the effective spread of new technologies is strongly hindered by the strengthening of spatial differentiation in the use of factors of production (which was observed in the USSR in the 1970s, and in the post-Soviet space).

But even on the material of foreign countries, the regional aspect of human capital dynamics is studied to a lesser extent than the country aspect. This pattern is even stronger in the studies carried out on Russian data.

2. Investigation of Russian regions

First studies of human capital of pre-revolutionary Russia in the regional context, with the use of original methods, belong to J. Baten et al., who used household tax census data (since 1640) carried out in Tula and Vyatka provinces as a source base [20].

Due to the weak representativeness of the samples and their bias (mainly towards respondents who potentially had a higher level of literacy than the population on average), the assessment of numeracy for Russia at the end of the XIX century obtained by J. Baten et al. seem to be significantly exaggerated (95–95% vs. 79.4% according to the comprehensive population census of 1897, calculated by D. Didenko et al. [20, p. 57; 21, p. 130]).

A. Cheremukhin et al. also used regional literacy rates (in the Moscow and Vladimir provinces) to assess the difference in salaries of literate and illiterate workers (closer to 13%), a priori taking this premium as zero in the agricultural sector [22, Online Appendix, p. 23].

Among reference studies particular natural indicators of human capital (as well as financial flows to its formation) at the regional level are presented in the electronic data set on Russian economic history, created by the research team under the leadership of G. Kessler–

A. Markevich¹. In the last set of data for the pre-revolutionary period there are 2 data cross-sections (about 1795 and 1897). Moreover, in the section concerning 1795 the data on financing of branches of formation of the human capital are incomplete and are missing for many provinces. As a result, the total expenditures for all regions of the Russian Empire (234.018 thousand rubles) appear to be significantly underestimated in comparison with the data on public expenditures for these purposes at the time². The data for the time period of the late XIX century, which were used for preliminary estimates of Russian GDP in the regional context (GRP of particular provinces) are presented more comprehensively [24].

Other well-known Russian historians and economists, who studied the pre-revolutionary period of the Russian history, do not directly consider the problem of human capital and the institutions of its formation in the regional aspect. So, their works do not have a significant impact on the choice of sources, methodology and interpretation of the results of our study.

The main part of the research on the Russian regions, which choose either education or health sectors as their research object, is concentrated on the sectoral theme – the spread of education (the number of teachers, students, schools) and the development of its institutions, the role of individual organizations in the dissemination of best health practices. At the same time, researchers of the pre-revolutionary period often avoid discussing the problem of spatial inequality of the main socio-economic indicators.

On the one hand, in conditions when national-territorial formations make a unified country (e. g. the Russian Empire), it is logical to assume that differentiation of social and economic indicators tend to decrease. But on the other hand, there is convincing historical evidence that in the conditions of systemic

transformations (especially in the initial phase of the relevant processes) indicators of economic inequality tend to increase [25, p. 98–120, 148–149, 181–184].

Based on investigation of the sets of studies available in Russian and foreign literature we have come to the conclusions:

- in the world scientific literature, the main aspects of the dynamics of human capital indicators and its role in economic development are developed, historical data are reconstructed and methods of their analysis are tested, mainly on the material of foreign countries. And central position in these studies does not belong to Russia;

- in relation to Russia, there is a certain lack of information concerning the quantitative characteristics of human capital, especially in the pre-revolutionary period and in the regional context.

Data representation in the sources and their reliability

Governors' annual reports have been chosen as the main source for studying the processes of formation and functioning of human capital in certain regional economies of the European part of the Russian Empire. Since they were required to be submitted annually, they are the most suitable for creating long time series with the minimum possible (in this case, annual) interval.

Since the 1870s, the data have become of relatively high quality: the number of students, as a rule, corresponds to the amount of funding (often, but not fully, in the context of the state, zemstvo, town administration, and public organizations). However, the use of these evidences presents the following challenges:

- the completeness of the students amount, as well as financing source, is called into question. In the absence of a direct interest in the distortion of data in one direction or another, a disciplinary factor (inattention and/or forgetfulness on the part of primary registrars) could act in this direction;

- incomplete correspondence of the structure of the number of students at different

¹ Kessler G., Markevich A. *Elektronnyi arkhiv Rossiiskoi istoricheskoi statistiki, XVIII–XXI vv.* [Electronic archive of Russian historical statistics, XVIII–XXI centuries]. 2014. Available at: <http://ristat.org/> (accessed 15.11.2019).

² In 1800 the amount of public expenses on “training schools, educational houses and hospitals” was 1.171 mln. rubles [23, p. 152, table B.].

levels of education to the structure of financing of educational institutions.

The data from the governor's reports were selectively compared with the published data (based on the central government departmental statistics for some years) on state financing in the regional context¹ and the statistics from zemstvo (regional and local community governments) supplementing them². Tentatively, the comparison results have revealed that the compilers of the governors' reports have slightly overestimated the volume of zemstvo funding (by 20–25%). The latter has become the most important source of human capital accumulation in Russia during the case study period. And it has partially compensated for a significant underestimation of the volume of state funding (due to underreporting of funding from other central government departments, in addition to the prominent Ministry of Public Education in charge of the field). At the same time, the authors of the governors' reports were also inclined to underestimate the data on funding from the lower levels of local self-government (rural and volost' communities).

People who compiled the data set on economic indicators of Russian regions for 1897³ did not directly use information from the governors' reports as sources; accordingly, the

¹ Data mentioned in [26] concern only education, healthcare data are not present.

² *Statisticheskii vremennik Rossiiskoi imperii. Seriya III. Vyp. 16: Dokhody i raskhody gubernskikh i uездnykh zemstv za 1883 god* [Statistical timeline of the Russian Empire. Series III, vol. 16: Revenues and expenditures of provincial and county zemstva for 1883]. Tsentral'nyi statisticheskii komitet Ministerstva vnutrennikh del [Central statistical committee of the Ministry of Internal Affairs]. St. Petersburg, 1886. pp. 56–57 (Vrachebnaya chast', Narodnoe obrazovanie, Obshchestvennoe prizrenie) [(Medical part, Public education, Public charity)]; *Statisticheskii ezhegodnik na 1914 g. God izdaniya tretii. Pod red. V.I. Sharago* [Statistical Yearbook for 1914. The third year of publication. Ed. by V.I. Sharago]. St. Petersburg, Sovet s"ezdov predstavitelei promyshlennosti i trgovli, 1914. pp. 398–411 (expenditures of the Ministry of public education in the provinces), pp. 432–433 (expenditures of zemstva), pp. 458–459 (expenditures of cities and towns). (In Russian).

³ Kessler G., Markevich A. *Elektronnyi arkhiv Rossiiskoi istoricheskoi statistiki, XVIII–XXI vv.* [Electronic archive of Russian historical statistics, XVIII–XXI centuries]. 2014. Available at: <http://ristat.org/> (accessed. 15.11.2019). (In Russian).

data contained in it can also be used to cross-check their information. Its results demonstrate that the authors of the governors' reports were tend to underestimate the amount of state funding by 2–3 times due to incomplete reflection of its sources. The amounts of funding by zemstva mentioned in the data set and in the governors' reports generally did not coincide, and even were overestimated in the governors' reports.

In the light of the foregoing and the above mentioned assumptions from the reference literature focused on source studies [27, p. 83–89; 28, p. 238, 243; 29, p. 17, 20, 24] concerning the informational value of the governors' reports for the study of certain territories of the Russian Empire, it can be assumed that the data contained in them on education and health are unlikely to have been deliberately distorted and their reliability can be assessed at an acceptable level.

Institutional structure of investment sources in human capital and its dynamics: In the case study of Vyatka, Ekaterinoslav and Perm provinces

We have studied the governors' annual reports of several provinces of the European part of Russia, and have revealed that the most detailed, structurally homogeneous and unbroken data on the sources of financing investments in education are presented in Vyatka province (Table 2), Ekaterinoslav province is characterized with sufficient data on healthcare (Table 4), and Perm province is presented by data on the sources of financing investments in both branches (Tables 1 and 3).

The growth of investments in these two main areas of human capital formation at the end of the XIX century is associated with the reforms of the 1860s, which created zemstvo institutions of local self-government in most provinces of the European part of the country (beginning in 1864), and the subsequent strengthening of the financial position of the zemstva. At the end of the period under consideration (1912) expenditures on education and healthcare were the largest in a total of 34 provinces, where zemstvo institutions operated in the 1860s and 1870s. The expenditures were 30.2% and 26.3% of

the total amount of zemstvo spending respectively¹.

These three examples are typical of zemstvo provinces. However, at the beginning of the XX century the central government of the Russian Empire significantly increased their own education expenditures. As a result, the share of zemstvo's expenditures slightly decreased. On the other hand, the central government continued spending less money on healthcare, since it had previously been less important in comparison with the sphere

of education. The financial support of healthcare from the central government was decreasing in relative terms to other sources if not in absolute values.

Private sources, both entrepreneurs charity and direct payments of households for receiving educational services, were significantly smaller in the provinces under consideration than in the average in the Russian Empire². However, it might be due to their insufficient reflection in the governors' reports, especially in Perm province.

Table 1

**Institutional structure of the sources of funding of education in Perm province,
% from the total amount per a year*²**

Year	Central government	The Holy Synod and church fraternities	Zemstva	Rural communities	Urban funds	Private sources (charity)	Education fee
1915	48.1	n/a	23.4	n/a	n/a	n/a	n/a
1914	65.6	n/a	31.7	n/a	n/a	n/a	n/a
1913	57.1	n/a	39.7	0.1	n/a	n/a	n/a
1912	57.4	...	42.5	0.1	...	...	...
1911	48.2	n/a	45.9	0.2	n/a	n/a	n/a
1910	49.8	...	49.7	0.5	...	...	...
1909	37.7	...	61.0	1.3	...	...	...
1908	22.4	...	75.0	2.6	...	...	...
1907	n/a	n/a	7.7	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1905	n/a	n/a	n/a	3.9	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1900	n/a	n/a	64.3	6.1	4.2	4.4	n/a
1899	12.9	...	73.1	7.7	4.6	1.6	...
1898	n/a	n/a	45.8	0.5	0.7	0.1	n/a
1897	41.0	...	47.2	4.3	7.4	...	...
1896	n/a	n/a	54.2	4.1	n/a	n/a	n/a
1895	n/a	n/a	37.9	3.0	n/a	n/a	n/a
1894	n/a	0.3	51.3	5.0	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1891	n/a	n/a	50.0	n/a	6.9	n/a	n/a
1890	n/a	n/a	0.5	n/a	6.7	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1887	26.3	0.9	64.1	...	8.4	0.3	...
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1885	6.7	0.1	75.6	...	1.7	4.0	...
1884	0.8	...	73.0	...	2.3	0.9	...
1883	6.1	...	79.2	2.4	9.9	1.8	0.5
1882	7.3	...	82.5	3.6	3.6	2.5	0.5
1881	n/a	n/a	72.7	n/a	n/a	n/a	n/a
1880	6.8	n/a	74.2	4.5	8.4	5.8	0.4
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1878	n/a	n/a	66.5	n/a	n/a	n/a	n/a

¹ *Statisticheskii ezhegodnik na 1913 g.* Pod red. V.I. Sharago [Statistical Yearbook for 1913. V.I. Sharago (ed.)]. St. Petersburg, Sovet s"ezdov predstavitelei promyshlennosti i trgovli [Council of Congresses of Representatives of Industry and Trade], 1913, p. 385. (In Russian).

² According to our calculations about 25% from households and 9% from businesses [25, p. 248] based on *Narodnoe khozyaistvo Soyuzo SSR v tsifrah*: Kratkii spravochnik [The national economy of the USSR in numbers. Brief guide], 1924, pp. 36–37 [30, pp. 291–293]. (In Russian).

The End of Table 1

Year	Central government	The Holy Synod and church fraternities	Zemstva	Rural communities	Urban funds	Private sources (charity)	Education fee
1877	n/a	n/a	61.5	n/a	n/a	n/a	n/a
1876	n/a	n/a	67.5	n/a	n/a	n/a	n/a
1875	n/a	n/a	54.7	n/a	n/a	n/a	n/aa
1874	n/a	n/a	45.5	n/a	n/a	n/a	n/a
1873	n/a	n/a	45.0	n/a	n/a	n/a	n/a
1872	n/a	n/a	44.1	n/a	n/a	n/a	n/a

Note: In the tables of the article the following markings are used: ... – insignificant amount; n/a – not available.

* Calculated by the author on the following source: *Review of Perm province...*[by years]. Perm, Tipolithography prov. government, 1873–1916. For a number of years it is an Appendix to the most comprehensive report of a Perm governor.

A clearly defined dynamics was observed in Perm province during the whole period under consideration. Zemstva were very important as they bore more than a half of all costs since the mid-1870s to the end of the 1910s. At the same time, the role of central government significantly increased (that was corrected at the end of the XIX century) and by the end of the period exceeded the share of zemstva bearing 50% of the costs. The role of religious department

(Holy Synod), which kept parochial schools, as well as educational institutions for the training of priests, is poorly marked in Perm province, and it declined in Vyatka in 1898–1913, where it had previously grown in the 1870s – early 1880s (Table 2). In the latter province, as in Perm, the role of the central government also increased by the end of the period, and the zemstva lost their dominant position.

Table 2

Institutional structure of the sources of funding of education in Vyatka province, % from the total amount per a year*

Year	Central government	The Holy Synod and church fraternities	Zemstva	Rural communities	Urban funds	Private sources (charity)	Education fee
1913	53.8	3.8	30.7	0.1	1.3	2.9	7.4
1912	52.5	5.3	29.9	0.1	1.4	3.5	2.3
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1903	22.2	12.7	48.4	0.5	2.3	6.8	7.1
1902	19.3	11.9	47.1	5.1	3.5	6.3	6.7
1901	18.3	12.7	51.3	0.6	2.3	7.2	7.5
1900	9.7	15.5	49.4	0.6	2.5	5.8	16.7
1899	16.9	13.8	50.8	0.7	2.6	6.8	8.5
1898	16.2	13.5	51.1	1.0	2.6	7.5	8.1
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1892	n/a	n/a	49.8	n/a	n/a	n/a	n/a
1891	n/a	n/a	48.0	n/a	n/a	n/a	n/a
1890	n/a	n/a	47.7	n/a	4.1	8.1	n/a
1889	n/a	n/a	44.1	n/a	0.3	10.2	n/a
1888	n/a	n/a	47.9	n/a	3.2	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1886	n/a	n/a	54.4	n/a	4.1	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1884	n/a	n/a	n/a	n/a	3.9	n/a	n/a
1883	n/a	n/a	50.2	n/a	3.9	n/a	n/a
1882	n/a	n/a	55.6	n/a	6.9	n/a	n/a
1881	16.2	20.7	50.8	0.4	3.1	3.4	5.4
1880	n/a	19.1	65.3	n/a	3.5	n/a	n/a
1879	16.7	22.0	50.3	1.6	3.1	2.9	3.4
1878	18.0	20.7	56.2	0.4	2.8	1.9	...
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

The End of Table 2

Year	Central government	The Holy Synod and church fraternities	Zemstva	Rural communities	Urban funds	Private sources (charity)	Education fee
1875	21.4	20.9	57.5	0.3	...	...	...
1874	20.4	21.3	51.1	n/a	n/a	5.1	n/a
1873	20.6	20.9	55.5	...	2.3	0.8	...
1872	18.1	n/a	65.7	0.1	3.1	0.5	n/a
1871	18.0	n/a	48.9	0.1	2.5	6.5	n/a
1870	14.1	n/a	47.4	0.1	2.9	0.5	n/a

* Calculated by the author on the following source: *Review of Vyatka province...[by years]*. Vyatka, 1871–1914. For a number of years it is an Appendix to the most comprehensive report of a Vyatka governor.

In comparison to education, the role of the central government in financing healthcare was much lower. Zemstva relatively but not absolutely prevailed in education, whereas in

healthcare the role of zemstva (in particular of a county scale) had an absolute value in Ekaterinoslav province (Table 4), and dominated in Perm province (Table 3).

Table 3

Institutional structure of the sources of healthcare funding in Perm province, % from the total amount per a year*

Year	Central government	Province zemstva	County zemstva	City funds	Rural communities	Private funds, etc.
1915	2.9	22.5	60.7	4.5	4.4	5.0
1914	3.0	18.1	65.4	3.9	4.4	5.2
1913	3.5	17.6	65.6	4.0	4.4	5.0
1912	4.9	17.9	60.5	3.9	4.1	8.8
1911	5.0	19.3	59.4	3.8	4.1	8.3
1910	5.3	17.8	60.8	3.8	4.1	8.2
1909	5.2	19.8	56.0	4.7	4.0	10.3
1908	5.6	16.2	58.4	3.5	3.9	12.4
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1905	n/a	n/a	n/a	n/a	3.0	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1900	5.9	10.7	55.0	1.9	3.4	23.1
1899	5.8	11.8	52.5	4.6	3.5	21.8
1898	5.9	11.5	53.1	3.6	3.4	22.5
1897	5.5	11.1	52.5	2.3	3.3	25.3
1896	7.2	12.2	47.2	0.4	3.0	30.0
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1894	6.5	11.2	n/a	0.8	0.4	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1891	n/a	60.7	n/a	n/a	n/a	n/a
1890	n/a	68.3	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1887	3.0	9.3	59.9	4.2	5.2	18.5
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1885	7.8	7.7	55.0	0.0	3.1	26.4
1884	7.2	7.7	49.1	3.2	3.0	29.7
1883	7.7	10.1	44.6	3.5	2.9	31.1
1882	8.1	10.8	41.6	3.7	2.8	32.9
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1880	8.5	10.3	41.1	2.1	2.7	35.3

* Calculated by the author on the following source: *Review of Perm province...[by years]*. Perm, Tipo-Lithography prov. government, 1813–1916. For a number of years it is an Appendix to the most comprehensive report of a Perm governor.

Urban local governments played a significant role in healthcare financing in Ekaterinoslav province, in comparison to Perm one. Private funds, that are documented in a

significant amount in the governors' reports on the Perm province (with a tendency to reduce their share), were significantly lower in Ekaterinoslav province (Table 4).

**Institutional structure of the sources of healthcare funding in Ekaterinoslav province,
% from the total amount per a year***

Year	Central governmnt	Province zemstva	County zemstva	City funds	Rural communities	Public funds, etc.
1913	1.5	9.5	57.0	31.5	n/a	0.4
1912	1.7	8.6	57.3	31.9	n/a	0.4
1911	1.3	12.9	56.6	28.7	n/a	0.4
1910	0.9	25.4	53.9	19.5	n/a	0.2
1909	0.8	29.6	51.9	15.6	n/a	2.1
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1907	1.0	27.9	54.5	16.3	n/a	0.3
1906	1.1	27.2	54.1	15.9	1.3	0.3
1905	n/a	n/a	n/a	n/a	1.9	n/a
1904	1.7	33.8	50.2	14.1	n/a	0.2
1903	2.1	26.3	57.1	14.2	n/a	0.4
1902	2.6	27.0	56.6	13.2	n/a	0.5
1901	2.5	30.1	53.4	13.6	n/a	0.4
1900	3.1	29.2	55.0	12.1	n/a	0.5
1899	3.5	32.2	53.2	10.6	n/a	0.5
1898	4.0	33.6	52.4	9.4	n/a	0.6
1897	7.3	36.4	48.7	6.9	n/a	0.7
1896	5.1	35.4	51.8	7.1	n/a	0.6
1895	n/a	74.1		12.6	3.9	n/a
1894	n/a	77.4		13.2	4.1	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
1892	5.6	21.3	64.1	7.8	n/a	1.2
1891	11.4	1.6	71.4	14.0	n/a	1.7
1890	7.5	16.7	62.2	12.2	n/a	1.4
1889	8.1	15.4	62.8	12.2	n/a	1.5
1888	7.8	21.1	58.9	10.8	n/a	1.5
1887	3.3	16.4	64.6	14.8	n/a	0.9
1886	7.8	12.5	58.5	20.2	n/a	1.0
n/a	n/a	n/a	n/a	17.6	n/a	n/a
1884	5.6	13.7	64.3	15.5	n/a	0.8
1883	6.2	13.7	64.2	15.0	n/a	0.9
1882	8.6	13.7	64.3	12.4	n/a	1.1
1881	5.4	11.3	67.3	14.8	n/a	1.1
1880	4.6	12.1	67.2	15.1	n/a	1.0
1879	16.7	5.0	66.3	9.5	n/a	2.5
1878	13.2	15.6	41.6	27.5	n/a	2.0

* Calculated by the author on the following source: *Review of Ekaterinoslav province...[by years]*. Ekaterinoslav, Tip. prov. government, 1879–1914. For a number of years it is an Appendix to the most comprehensive report of an Ekaterinoslav governor.

Thus, zemstva took the first place in the share of financing of both branches of human capital. Central government sustained the second place on financing of education and since the end of XIX century expanded the share slightly. But it showed little activity in financing healthcare and in some periods could reduce its share of financing of this field.

Role of local self-government bodies (zemstva) in ensuring investment activity in the main areas of human capital formation: In the case study of the Arkhangelsk province

Arkhangelsk province did not have zemstva as local governments, but it collected taxes (fees), similar to those that were introduced in zemstvo provinces. Their managers were administrators responsible to the central government. In the case study of

the province we can demonstrate whether the difference in the legal status of managers of local budgetary system influenced the financial indicators of accumulation of the regional human capital.

Dynamics of education financing (Fig. 1) shows that for almost 20 years (from

the late 1870s to the early 1900s) it stagnated in Arkhangelsk province. Nevertheless, it did not remain aside from the country-wide trend, and the growth rate in education financing at the beginning of the XX century increased significantly.

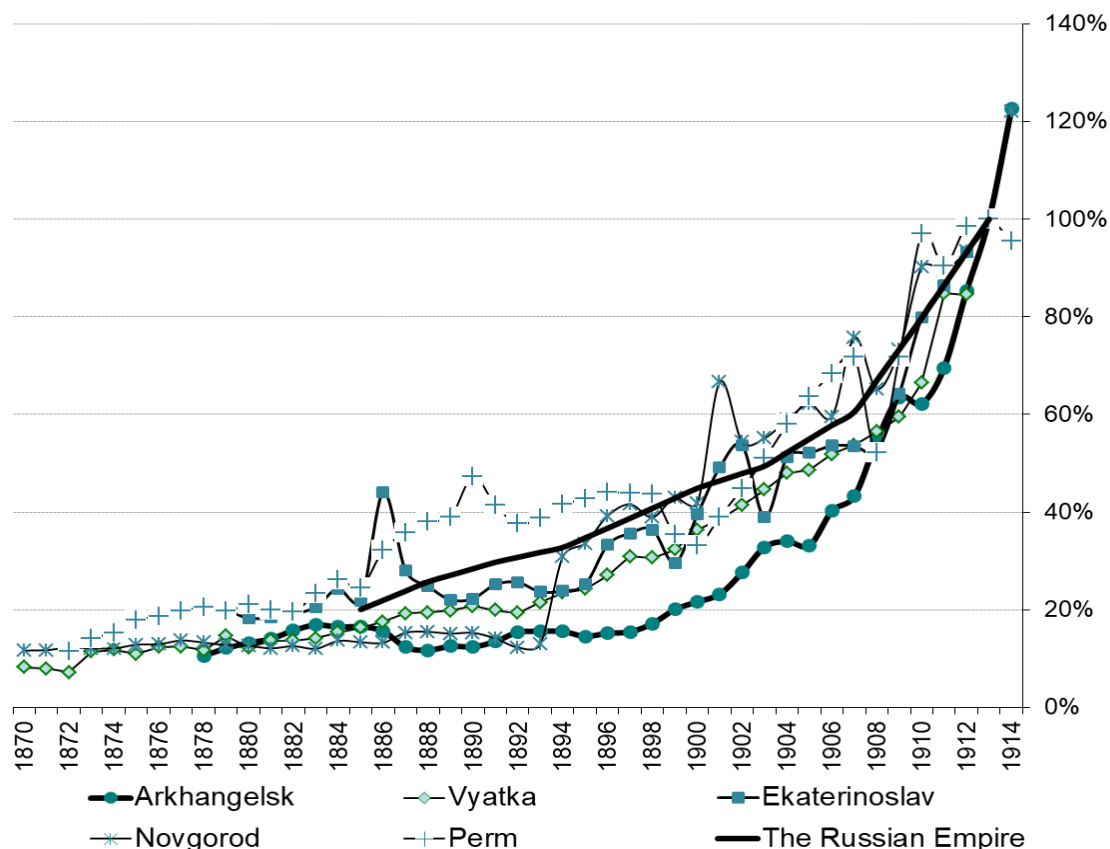


Fig. 1. Dynamics of education financing in Arkhangelsk province in comparison to others (In constant prices, 1913 – 100%)*

* Calculated by the author on the following sources: Data of the annual governors' reports, P. Gregory [31], M. Kaser [32]; deflated by Budget index as calculated in: Strumilin S.G. *Istoriya chernoi metallurgii v SSSR* [History of ferrous metallurgy in the USSR], Moscow, 1954, vol. 1, pp. 514 – 515 (Cited by: *Proekt "Dinamika ekonomicheskogo i sotsial'nogo razvitiya Rossii v XIX – nachale XX vv."* [Project "Dynamics of economic and social development of Russia in the XIX – the beginning of the XX century"]. Available at: <http://www.hist.msu.ru/Dynamics/index.html> (accessed 06.09.2019)).

The data presented in Table 5 reveals that zemstvo taxes (fees) played a much smaller role in the financing of education compared to Perm (Table 1) and Vyatka provinces (Table 2), where the local authorities were the managers of the relevant funds. On the contrary, sources from the expanded

central government (including the spiritual department) naturally occupied a greater place. Although the role of expenditures of rural societies (secular and volost' scales) was higher than in the zemstvo provinces, but it was not so significant to compensate for the reduced role of zemstvo funds.

**Institutional structure of the sources of healthcare funding in Arkhangelsk province,
% from the total amount per a year***

Year	Central government	The Holy Synod and church fraternities	Zemstva fees	Rural communities	Urban funds	Private sources (charity)	Education fee
1914	61.5	13.9	15.7	...	4.1	4.3	0.5
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1912	54.9	17.4	12.1	5.0	4.1	5.9	0.5
1911	55.8	12.9	10.5	3.6	4.0	6.8	0.5
1910	53.7	23.7	10.8	4.4	4.0	5.9	0.5
1909	47.7	23.5	14.4	4.3	4.0	5.8	0.4
1908	53.4	20.4	10.7	4.9	4.5	5.6	0.4
1907	47.1	25.3	12.7	5.4	5.3	4.8	0.5
1906	45.6	27.3	13.3	5.5	4.5	4.4	0.5
1905	44.3	30.2	8.6	6.6	4.3	5.6	0.5
1904	40.1	35.3	8.9	6.3	3.9	5.0	0.5
1903	39.3	35.0	10.2	6.4	3.9	4.6	0.5
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1901	37.9	34.5	7.7	7.9	6.0	5.2	0.7
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1898	43.8	36.6	...	8.8	4.1	6.0	0.6
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1896	40.3	35.4	2.3	11.9	4.1	5.6	0.6
1895	42.3	36.1	n/a	7.7	7.6	5.7	0.6
1894	37.8	34.5	...	11.1	5.4	10.7	0.5
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1892	38.9	34.9	n/a	9.0	5.4	9.5	0.6
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1888	n/a	21.4	n/a	12.8	5.5	19.6	0.7
1887	41.0	35.6	n/a	12.0	4.2	2.8	0.6
1886	38.1	34.6	n/a	6.3	4.4	10.2	2.8
1885	8.5	21.3	...	10.0	4.5	53.0	2.6
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1883	39.4	35.1	...	11.0	4.7	7.0	2.8
1882	41.9	35.9	...	11.4	3.7	4.0	3.0
1881	37.7	34.5	...	13.0	4.0	7.5	3.3
1880	16.8	n/a	n/a	n/a	n/a	n/a	n/a
1879	40.2	35.3	n/a	12.0	n/a	7.2	3.5
1878	44.6	36.8	...	13.1		1.7	3.8

* Calculated by the author on the following source: *Review of Arkhangelsk province...[by years]. Arkhangelsk, Tip. prov. government, 1879–1915. For a number of years it is an Appendix to the most comprehensive report of an Arkhangelsk governor.*

Dynamics of healthcare financing (Fig. 2) shows a similar pattern with education: since the beginning of the XX century funding increases, approximately in accordance with trends in other provinces. Since the data for earlier period is not available in the governor's reports on Arkhangelsk region, the stagnation period

typical for the sphere of education (from the late 1870s to late 1890s) in the health sector is poorly represented only by the late 1890s. In addition, it should be noted a more significant backlog of Arkhangelsk province in the field of healthcare (in which the role of zemstva was particularly high) than in the field of education.

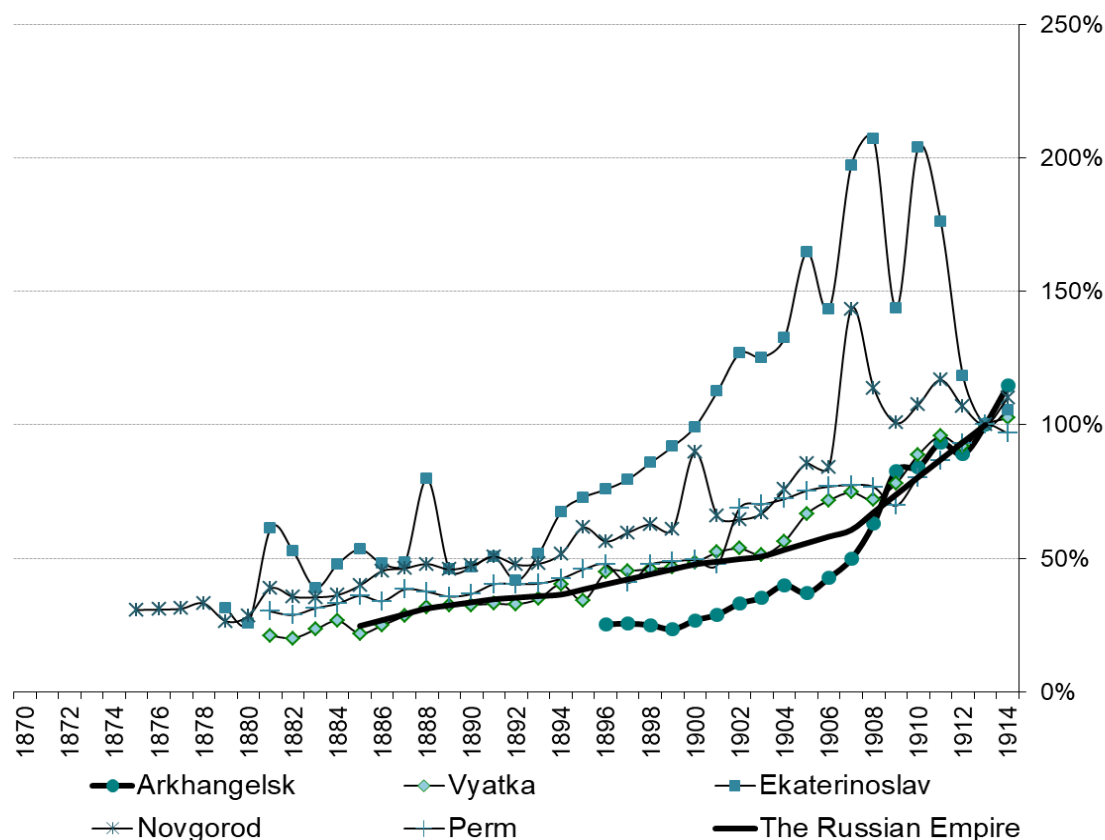


Fig. 2. Dynamics of healthcare financing in Arkhangelsk province in comparison to others
(In constant prices, 1913 – 100%)*

* Calculated by the author on the following sources: Data of the annual governors' reports, P. Gregory [31], M. Kaser [32]; deflated by Budget index as calculated in: Strumilin S.G. *Istoriya chernoj metallurgii v SSSR* [History of ferrous metallurgy in the USSR], Moscow, 1954, vol. 1, pp. 514–515 (Cited by: *Proekt "Dinamika ekonomicheskogo i sotsial'nogo razvitiya Rossii v XIX – nachale XX vv."* [Project "Dynamics of economic and social development of Russia in the XIX – the beginning of the XX century"]. Available at: <http://www.hist.msu.ru/Dynamics/index.html> (accessed 06.09.2019)).

Institutional structure of educational establishment financing: In the case study of Novgorod province

Data about the financing of various types of educational institutions and the number of students studying in them during the last twenty years of the period under consideration are presented in governors' reports about Novgorod province in the best possible way. It allows us to determine the level of funding for each of them (in per capita terms) and, accordingly, the degree of differentiation in this respect between different types of educational institutions (Table 6).

Relatively high level of financing of gymnasiums is confirmed in the case study of Novgorod province, even with a tendency to its decline in its absolute size. Progymnasiums

were financed slightly less than gymnasiums, whereas practical training schools were financed much higher. Professional, technical and commercial schools had an even higher level of per capita funding. The highest level of per capita funding was typical for specialized educational institutions for the clergy. Probably, this is due to the fact that in these educational institutions of the boarding type certain costs associated with educational (food, clothing, etc.) were also taken into account. The minimum level of funding was typical for literacy schools, which, however, were not massive.

An important trend was the increase in the average level of per capita financing of the educational sphere and especially its mass segment: zemstvo schools, which corresponded to the level of primary training schools of the

Ministry of Public Education, exceeded the level of parochial schools and colleges and became comparable to the level of progymnasium.

The difference in the level of per capita financing was quite high, but demonstrated the tendency to the decrease: from about 200 times in the mid-1890s to about 50 times in 1913.

Table 6

Level of financing of various types of educational establishments in Novgorod province (RUB 1913 per 1 student)*

Year	Total	Gymnasiums	Progymnasiums	Religious seminaries	Teachers' seminaries	Practicable training schools	City training schools	Religious training schools
1913	29	77.6	48.7	216.8	288.8	201.8	n/a	210.7
1912	28	n/a	47.9	199.2	287.9	164.7	69.8	184.2
1911	27	n/a	27.4	188.6	271.3	146.0	49.7	n/a
1910	28	n/a	n/a	203.3	292.7	147.6	49.8	175.5
1909	25	69.2	n/a	204.9	273.5	142.4	46.5	161.6
1908	24	67.9	31.9	186.8	316.0	134.5	44.5	163.1
1907	28	70.7	33.5	181.0	456.9	124.6	44.7	165.4
1906	22	77.2	31.2	181.6	395.9	117.8	n/a	314.6
1905	23	84.5	29.1	182.0	400.4	133.6	41.0	328.8
1904	23	85.5	33.0	189.1	324.4	127.1	n/a	226.6
1903	22	77.3	27.2	257.5	275.2	132.3	n/a	333.5
1902	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1901	29	89.7	27.8	184.2	187.7	n/a	n/a	133.2
1900	20	92.5	25.1	182.0	241.8	129.3	n/a	140.0
1899	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1898	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1897	22	112.4	23.9	212.3	216.5	147.0	36.8	185.2
1896	23	128.9	24.2	197.2	280.4	165.2	40.5	193.2
1895	21	n/a	n/a	n/a	255.5	n/a	36.1	n/a
1894	21	123.3	21.9	n/a	229.0	181.4	45.1	135.2
1913	n/a	177.2	n/a	n/a	n/a	18.0	n/a	5.9
1912	30.2	265.2	20.9	n/a	18.8	15.5	n/a	n/a
1911	25.9	196.1	26.9	n/a	18.0	13.7	n/a	n/a
1910	n/a	192.7	24.5	n/a	16.8	13.1	n/a	n/a
1909	26.3	204.9	25.9	n/a	22.4	11.1	18.7	5.9
1908	22.2	198.8	32.0	n/a	17.6	n/a	17.0	5.5
1907	20.2	n/a	n/a	n/a	n/a	n/a	21.7	5.4
1906	24.1	n/a	n/a	n/a	n/a	n/a	19.6	4.9
1905	18.8	n/a	n/a	n/a	n/a	n/a	13.2	4.8
1904	n/a	n/a	70.9	n/a	39.4	n/a	13.1	n/a
1903	n/a	n/a	n/a	n/a	10.6	n/a	n/a	n/a
1902	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1901	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.1
1900	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1899	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1898	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.7
1897	n/a	n/a	19.7	n/a	n/a	n/a	n/a	2.0
1896	n/a	n/a	32.7	n/a	n/a	n/a	n/a	1.2
1895	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1894	n/a	n/a	12.8	n/a	n/a	n/a	n/a	1.3

* Calculated by the author on the following source: *Review of Novgorod province...[by years]*. Novgorod, Tip. prov. government, 1895–1914. For a number of years: it is an Appendix to the most comprehensive report; deflated by Budget index as calculated in: Strumilin S.G. *Istoriya chernoi metallurgii v SSSR* [History of ferrous metallurgy in the USSR], Moscow, 1954, vol. 1, pp. 514–515 (Cited by: *Proekt "Dinamika ekonomicheskogo i sotsial'nogo razvitiya Rossii v XIX – nachale XX vv."* [Project "Dynamics of economic and social development of Russia in the XIX – the beginning of the XX century"]. Available at: <http://www.hist.msu.ru/Dynamics/index.html> (accessed 06.09.2019)).

Conclusion

Various institutional structures of financing of education and healthcare systems – the main branches of human capital formation have been observed in the case study of Perm, Vyatka and Ekaterinoslav provinces. We can see that the institutional structure of financing in the zemstvo provinces in the period preceding industrialization (until the 1880s) was characterized by a moderate decrease in the funds of the central government and an increase in the share of local governments represented by provincial and county zemstva. Since the late 1890s responding to the needs of industrialization the central government has increased attention to education in the regions allocating much more funds for its development. At the same time, both sources were the main ones in the accumulation of human capital in the field of education throughout the period under consideration. In the field of healthcare, the funds of local self-government clearly

prevailed, significantly exceeding the funds of the state.

And on the contrary, in Arkhangelsk province, in which during the zemstvo reform of the 1860s local self-government was not introduced, and similar zemstvo fees played a much smaller role, there are some (but not very pronounced) signs of consolidation of the backlog in the accumulation of human capital.

The first results of the analysis of the processes of human capital formation in regions are considered to be important in the context of addressing the inquiries about the place of this period in a longer-term process of capital accumulation (both physical and human); about their role in the economic development of Russia; and about the sustainability of specific regional characteristics in time, determined to follow their institutional trajectories in the framework of country-wide processes of modernization and the development of a unified national economy.

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