Economic Development of the late Russian Empire in Regional Perspective[1][2]

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Abstract.
This paper documents regional variation in economic development of the late Russian empire, reconstructing gross regional products and labor productivity by sector for all provinces of the country in the late 19th century for the first time. My estimations of provincial GRPs in 1897 show that industrialization and structural change was an important but not the only engine of economic development. While wealthier provinces had larger industrial sector, substantial service sector or highly productive agriculture were alternative ways to prosperity. Agriculture was particular advanced in the South and the West Siberia where labor productivity was higher than in industry as well as in absolute terms. This finding contributes to the debate on 'agrarian crises' and backwardness of imperial economy. If the crises took place, it was limited to the black earth region.

1. Introduction.

There is long lasting debate on economic development of the late Russian empire in historical literature driven by explorations of causes of Russian revolutions. Pessimists following Vladimir Lenin (1899) and Alexander Gershenkron (1966) argue that relative backwardness of Russian economy and especially agrarian sector transferred into political unrest. Optimists base their judgments on quantitative reconstruction of Russian national income between 1883-1913 by Paul Gregory (1983) pointing out that Russian economic development looks rather favorable in international comparisons. Recent studies (Allen 2003, Grinin et al. 2010, Mironov 2010) concentrate on the analysis of national trend, disputing mechanisms and prospects of Russian model of development. Within country variation remains unknown and unexplored (Gregory 2001).

This paper fills this gap and produces a more nuance picture of Russian economic development. It documents regional variation in economic development of the late Russian empire, for the first time reconstructing gross regional products and labor productivity by sector for all provinces of the country in the late XIXth century (excluding Grand duchy Finland but including Vyborg province which belongs to modern Russian Federation). I estimate 1897 ninety provincial GRPs from production side, calculating value added for 24 subsectors; I use 1897 census data on occupations to calculate labor productivity by sector. The closest study is a recent paper by Peter Lindert and Steven Nafziger (2013) who explore inequality in the Russian empire before the revolution and estimate income distribution in 1904 for fifty European provinces. However, their calculations do not cover Polish, Caucasian, Siberian and Central Asian provinces as well as do not present distribution of national income by sectors in contrast to this work.

A full snapshot of national income and labor productivity by provinces and sectors allows addressing old debate on economic development of the late Russian empire. Sectorial structure of provinces presents a clear picture on spread of modern industry. My estimations of provincial GRPs in 1897 show that industrialization and structural change was an important but not the only engine of economic development. While wealthier provinces had larger industrial sector, substantial service sector or highly productive agriculture were alternative ways to prosperity. Agriculture was particular advanced in the South and the West Siberia where labor productivity was higher than in

industry as well as in absolute terms. If 'agrarian crises' took place, it was limited to the black earth region.

Exploring within country variation in a relatively poor country, I also contribute to rapidly growing literature on industrialization of poor periphery versus rich core (Benetrix, O'Rourke and Williamson 2013). I found highly unequal distribution of modern (large) industry over space in Russian empire and absence of a 'core' but presence of 'periphery' within the empire itself.

Finally, my study sheds lights on regional long-run economic growth in the North Eurasia, convergence/divergence in their development in the XX century. This has an important implication for our understanding of Soviet industrial policy and operation command economies in general.

The paper proceeds as following. The next section briefly describes my reconstruction procedure. In section 3 I present and discuss results of my estimations. Section 4 pays special attention to agrarian crises debate in regional perspective. Section 5 explores GRPs correlates. Section 6 concludes.

2. Reconstructing 1897 provincial gross regional products.

I reconstruct gross regional product for ninety provinces of the Russian empire (50 European provinces; 10 Polish provinces; 11 Caucasian provinces; 9 Siberian provinces; 9 Central Asian provinces and Vyborg) in 1897 from production side by 24 subsectors[4]. I chose 1897 for the reconstruction because it was a year of the only imperial census that contains very detailed data on occupational structure of the population. Highly detailed data on industrial and agricultural output are available for this year as well. In this section I briefly present only main building blocks of the chosen methodology. Appendix describes the methodology in full details.

1897 population census.

There was only one population census in the Russian empire conducted on January, 28

[4] Agriculture – 6 subsectors: planting; husbandry; other agriculture (gardening, vinery and beekeeping); forestry; fishing; hunting;
Industry – 4 subsectors: large industry, cottage small industry; construction; road construction;
Services – 14 subsectors: public education, private education, health, defence, governing, other public goods, railroads, water transport, other transport, communication, banking, trade, servants, housing;

1897. Historical literature views census results as high quality data (Anfimov and Korelin 1995). Table 20 of the census results contains detailed data on 390 occupations by province (Trojnitskii 1905). I rely on occupational figures to estimate labor productivity by sectors[5]. I also use occupation figures to estimate value added in some secondary subsectors (other agriculture, construction, other transport, servants) for which there are no output statistics by province (labor productivity figures for these subsectors are obviously meaningless).

Agriculture.

I estimate value added in planting, husbandry, other agriculture (gardening, vinery and beekeeping), forestry, fishing and hunting. I reconstruct value in planting from output of 23 agricultural goods from Central statistical agency (1898b), multiplying them by market prices from Gregory (1983) and "Svod tovarnikh …" (1898). I apply correction for grain production because of under-registration as discussed in Markevich and Harrison (2011). For husbandry I use data on heads of 10 different types of livestock from Ministry of internal affairs (1900), apply Vaisnshtein corrections as discussed in Markevich and Harrison (2011) and estimate total value following Prokopovich (1918). I spread Prokopovich (1918) national level estimates of total value produced in other agriculture in 1900 across provinces using area of gardens and census figures on occupations in gardening and beekeeping as weights. Following Prokopovich (1918), I assume value added in poultery equaled to zero. For forestry I use data on area of forests in provinces in 1897 from Ministry of Finance (1900) and profits from state forest desyatina from Forest department (1898). I estimate total value of output produced in fishing and hunting using census data on workers in these sectors and production per fisher and hunter form Ministry of finance (1902) and Silantiev (1898).

Industry.

I reconstruct output for large industry, cottage (small) industry, construction and road construction. I extract data on large industry output on more than six hundreds items by province from "Svod dannikh o fabrichno-zavodskoj …" (1900), sum up them by 14 branches and apply value added coefficients from the 1918 industrial census (Central

[5] Because of data limitation I cannot distinguish between labor productivity in fishing and hunting, large and cottage industry, public and private education.

statistical agency 1923) to avoid double counting. I estimate cottage industry production from the materials of the 1900 Commission (1901) on peasants' welfare. Unfortunately, the commission data are available only for 50 European provinces; for the rest I have to rely on population census occupation figures and average output per cottage industry worker in European Russia. There is no statistics of construction. I assume that value added per worker in industry and construction was the same in average and estimate total value in construction from population census occupation figures, correcting for difference in regional productivity using wages in constructions from Groman (1912). I reconstruct expenditures on road construction from state budget expenditures on that activity, as well as expenditures of provinces, cities and local communities.

Services.

To account for services I estimate value added in 14 subsectors; private education, public education, health, defence, governing, other public goods, railroads, water transport, other transport, communication, banking, trade, servants, housing.

For public goods subsectors like public education, health, defence, governing and 'other' public goods I sum up expenditures of the imperial government (Ministry of state control 1898), provinces (Ministry of finance 1900), cities (Ministry of finance 1902) and local communities (Central statistical agency 1898a). Imperial expenditures by province are available only by ministry and not by type of expenditures. I estimate corresponding coefficients from Yasnopol'skii (1897) who published data on expenditures by ministry and type of expenditures for 1887 to reconstruct 1897 figures. Expenditures of local communities are known only for 1894 and only for European provinces. I do not apply any corrections for 1894 European provinces figures, assuming that they were the same in 1897. I estimate expenditures in non-European provinces using population as weights.

I estimate private expenditures on education from Ministry of education (1900), and population census data on occupations. I assume that private expenditures on health were neglectable.

For railroads, water transport and communications I estimate value added in these sectors as a sum of wages and profits in these sectors and then spread them across regions using length of railroads and water ways in a province (Ministry of transport 1899) and population figures as weights. I use population census data to estimate value added in the

sector of 'other' transport, banking and value added by servants.

I use population data to estimate total expenditures on housing. For urban housing I take Gregory (1983) estimate of urban renting and spread it across regions using urban population as weights. For rural renting I take population figures and average expenditures on housing from Commission on peasants' welfare (1901). I also account for cities' expenditures on water pipes and electricity, using Ministry of finance (1902).

Finally, for trade I first estimate provincial trade turnover from "Statisticheskie…" (1900), applying corrections as discussed in Strumilin (1924), and then assume that value added was fixed at 15 percent level of turnover in all provinces.

Missing provinces. Vyborg.

If data required for estimations are missed for particular provinces in corresponding volumes, I first try to fill the gap relying on 1897 governors' reposts of corresponding provinces (governors of all Russian provinces were supposed to submit such reports to the emperor annually and they are available either in pubslihed forms or in the archives) or estimate missed figures under various assumptions. In particular, almost all data for Vyborg are missed in corresponding volumes because Vyborg was a part of Grand duchy Finland that had separate statistical agency and practice of publications. The main reason to include Vyborg into estimations is that larger part of the province belongs to the Russian Federation in modern borders. I rely on Vyborg governor 1897 report extracted from National archive of Finland to get necessary figures.

3. Economic development of the late Russian empire: a 1897 snapshot.

Table 1 presents summary statistics of reconstructed data.[6] A million and four hundred thousand people inhabited an average province in 1897. About eighty six percent of them lived in the countryside in a typical province (with an exception of Saint-Petersburg where urban share was about two thirds). Urban residents composed only about a hundred and eighty seven thousand people. An average province produced goods and services of a hundred and two million rubles value or about 75 rubles per capita and 258 rubles per worker.

Agriculture produced a bulk of value added – more than fifty percent of provincial output – but labor productivity in this sector was the lowest, only two hundred

[6] Table 1 of on-line appendix presents data for each and every province.

and thirteen rubles per worker. Service sector was the second large in terms of valued added (thirty percent of output in an average province) and the first one in terms of labor productivity (three hundred and seventy one rubles). Industry produced eighteen percent of provincial output; labor productivity in industry was three hundred and forty one rubles per worker, i.e. more than a half higher than in agriculture but a bit lower than in the service sector. Provinces vary substantially in terms of size of output, productivity and sectorial structure.

Two comparisons validate this reconstruction. First, summing up reconstructed GRPs and deducting Vyborg province that belonged to the Grand Duchy of Finland we get national income of Russian empire without Finland in 1897 in current rubles reconstructed from production side – 9134 mln rubbles. This is figure is very close to Gregory (1983) estimation of 9172 mln rubles that he reconstructed from the income side. The difference is less than a half percent and estimation procedures are completely independent.

Second, I compare my estimations for fifty European provinces with Lindert and Nafziger (2013) calculations of 1904 provincial mean household income reconstructed from the income side. While my estimations are a bit lower in average,[7] the two variables are highly correlated (correlation coefficient is 0.83 and statistically significant at one per cent level side). Figure 1 plots my estimations against Lindert and Nafziger (2013) figures. Again the estimation procedures are completely independent.

Figure 1 somewhere here.

Core and periphery in the Russian empire.

Which provinces produced the bulk of national income in the Russian empire in the late XIXth century? How unequal over the space the country was? Did a single economic core exist? Figure 2 answers these questions. Output per province varied

[7] I estimate GRP per capita in European provinces as 73.52 roubles. Multiplying this figure by size of an average household (5.81), I get 427.15 1897 roubles of GRP per household. I apply Podtyagin index (Gregory 1983) to shift from 1897 roubles to 1904 roubles and get 473.89 1904 roubles of GRP per household in 1897. According to Gregory (1983), national income increased by 22.23 per cent between 1897 and 1904. Multiplying 473.89 by 122.23 I get 579.25 roubles that is only 7.6 per cent lower than Linder and Nafziger (2013) estimation of mean household income in 1904 (623.24 1904 roubles).

remarkably across the empire. Not surprisingly, 50 European provinces of the country produced much more output than the rest. European share was three quarters of total national income; the second largest region in terms of output was Poland with only 8 percent of output closely followed by Caucasus, Siberia and the Far East, Central Asia and step provinces (table 2). However, European part of the empire was heterogeneous and there was no a single economic core. Gross regional products were the highest in Saint-Petersburg, Moscow and Kherson provinces where the first two and the forth largest cities of the empire were located, Saint-Petersburg, Moscow and Odessa, accordingly. These three provinces produced more than 300 million rubles of goods and services each and constituted three centers of the most developed regions in the empire: the North-west, the Central Industrial region (CIR) and the South. The North-West except Saint-Petersburg, included three Baltic provinces. Provinces to the north and east of Moscow were a part of CIR. The south composed step' black-earth provinces from the South-West of the empire to mid-Volga. In addition, Polish provinces around Warsaw – the third city of the empire in terms of population – Ural provinces and Tomsk province in Western Siberia represented other three regions that produced substantial part of national income. The Eastern Siberia, Far East, Central Asia, the Caucasus and European North were clear periphery of the empire. The picture followed from the GRPs reconstruction fits well to historical narrative of Russian economic geography. In particular, the North-West, CIR, Poland and Urals are well known important economic regions of the empire. But large output in the South and in particular West Siberia is a kind of surprise.

Table 2 somewhere here.

Figure 2 somewhere here.

In terms of output per capita, the most advanced regions were roughly the same. Saint-Petersburg province was an absolute leader with an average GRP per capita of 414.24 rubles, almost twice more than the second one in the list. As figure 3 demonstrates, Baltic provinces in the North-West region were also relatively rich with income more than a hundred rubles per person. CIR provinces, South provinces, some Polish provinces were almost equally wealthy – more than seventy five rubles per capita. In addition Baku, Chernomorsk and Fergana provinces, Siberian provinces and the Far

East provinces were quite rich as well. Location of imperial oil industry could easily explain the wealth of Baku. Siberian and the Far East provinces presented a combination of huge natural resources, dense population and substantial government spending (especially in the Far East) that could explain high output per capita. The presence of the Fergana province in this list is a surprise, however. Yakutia, provinces of modern Kazakstan, the Caucasus (except Baku), and north and central black earth provinces in European Russia were among the poorest with income less than fifty rubles per capita. Surprisingly, in contrast to a wide spread belief that all Polish provinces were among the wealthiest, income per capita in several of them was less or around 50 rubles only. In average Poland was eight percent richer than average province in European Russia, but a bit poorer than a province in Siberia and Far East.

Figure 3 somewhere here.

The main factor that determines GRP per capita in a region was labor productivity. Figure 3 demonstrates that provinces of high per capita output were also regions of high labor productivity. Column 1 of panel A table 2 shows this more formally. The coefficient on the labor productivity variable in pair OLS regression is positive and highly significant. One additional ruble in output per worker transferred onto 47 kopeks of income per capita in average.

Figure 4 somewhere here.

A conventional narrative points to structural change from agriculture to industry, known as industrialization, as a road to economic development, high labor productivity and wealth. The next subsection explores whether this was true for the late Russian empire.

Spread of industry.

Figure 5 reveals location of the most industrialized provinces in the empire. The share of value added in industry was relatively high (more than thirty percent) in four well-known industrial centers: CIR, Donbass (Ekaterinoslav province in the South) and Polish provinces. These regions fit the most productive economic provinces revealed by figure 2. In addition Amur, Baku, Chernomorsk and Fergana provinces that were rich in terms of GRP per capita had industrial sectors that produced more than thirty percent of provincial value added. However, not all provinces that produced high output or were

rich in per capita terms had large shares of industry. In particular, Saint-Petersburg, Tomsk and many south provinces did not. Figure 4 demonstrates how agrarian the country was. In the majority of regions the share of industry did not exceed ten percent of gross provincial product.

Figure 5 somewhere here.

High industry share normally paralleled high labor productivity in this sector as figure 6 shows. Consider CIR provinces, Donbass, Polish provinces around Warsaw, Amur, Baku or Chernomorsk provinces where labor productivity was higher than six hundred rubles per worker. Labor productivity in industry was also high in Saint-Petersburg. However, labor productivity in industry was also high in provinces with relatively small industrial sectors such as Central Asian provinces, Orenburg or Archangelsk. Finally, there were rich provinces where industrial share and labor productivity in industry was low, namely Tomsk province and many provinces in the South.

Figure 6 somewhere here.

In other words, evidences on modern industry as the main engine of economic development are mixed. Industry was an engine in some regions but it was not the only road to prosperity. An alternative way could be small cottage industry and market-oriented craft production. If we consider share of value added only in this industrial subsector (figure 7), we can see that this was the choice of Central Asia. In general, however, this sector was small (less than seven percent for the majority of provinces) that undermines historical literature on the importance of craft production and proto-industrialization in Russia (Rudolph 1985; Naumova 1998). Cottage production was about a quarter of total industrial output in average.

Figure 7 somewhere here.

Service sector and governmental expenditures.

Large service sector was another alternative for prosperity. This sector was very large (output in this sector composed more than fifty percent of value added) in the capitals and border regions (Warsaw provinces and the Far East). Services composed more than forty percent of valued added in Kherson, Chernomorsk, Irkutsk and some Caucasus provinces (figure 8).

Figure 8 somewhere here.

As figure 9 demonstrates trade produced the bulk of services in provinces with four largest cities (Saint-Petersburg, Moscow, Warsaw and Odessa) that were also among the richest. This hints onto importance of specialization and agglomeration effect in their success. Huge defense expenditures in border regions caused large service sector in border regions and outskirts of the empire (figure 10) that shows how important within country income redistribution was. Border regions and outskirts of the empire were relatively poor and would be even poorer without governmental expenditures financed on expense the inner-land European provinces. Defense expenditures were the main source of such redistribution. Expenditures on other public goods were not high and did not vary a lot. Expenditures on education (both public and private) did not exceed two percent on average. They exceeded this figure only in provinces where main universities were located – Saint-Petersburg, Kazan, Kiev, Kharkov and Vyborg in addition (figure 11) – that might be interpreted as another evidence of capture of education expenditures by local elites that had preferences to higher education against primary one (Chaudhary 2012). Public expenditures on health did not exceed half percent of average GRP; they were slightly larger in provinces with local self-governance , so called zemstvo provinces (figure 12).

Figure 9 somewhere here.

Figure 10 somewhere here.

Figure 11 somewhere here.

Figure 12 somewhere here.

4. Agrarian crises debate.

Agriculture was the largest sector of Russian economy (more than fifty percent on average) with the largest labor share employed (about seventy percent on average) and lowest labor productivity, accordingly. Because of that many contemporaries (including Lenin 1898) and scholars viewed agriculture as the most problematic sector suffering from permanent crises during the post-emancipation epoch. Gershenkron (1966) pointed to constraints that the institution of the commune implied as a main reason of low productivity, slow economic development and finally as an explanation of relative poverty and backwardness of the empire. This interpretation raised a lot of debate (Allen

2003; Gregory 1980, 1983; Grinin 2010; Mironov 2010; Sanders 1984; Simms 1974; Wilbur 1983). Gregory (1983) challenged Gershenkron's view estimating that agricultural output and peasants' consumption grew in parallel with industrial production. He speculates that the commune was a flexible institution that was able to ease at least some formal constraints implied by imperial laws and doubts that there was agrarian crises in the outskirts of the empire full of virgin land and dense population. Indeed, recent research (Chernina et al. 2013; Dower and Markevich 2013a,b; Nafziger 2008, 2010) demonstrates that the commune was a complicated institution. It limited peasant initiative and decisions but at the same time provided more choice than scholars previously believed. Gregory's second hypothesis on geography of the crises remained unexplored so far.

My reconstruction reveals that agriculture was developed highly unequally across space. In particular, labor productivity in agriculture varies substantially over regions (figure 13). There were a number of regions with low labor productivity, less than two hundred rubles per worker, namely Central Asia provinces, the Russian North and the Black earth region. Backward husbandry of local nomads and tough climate could probably explain the found phenomena for the first two groups of provinces, correspondingly. Low productivity in the Black earth provinces leaves some space for agrarian crises interpretation. However, there was two regions in the outskirts of the empire with very high labor productivity in agriculture, more than three hundred rubles per worker, - the South (Astrakhan, Don, Ekaterinoslav, Kuban, Kherson, Stavropol', Tavricheskaya, Terek proviunces) and West Siberia (Tomsk province). Both regions were advanced in terms of per capita income as well, but had little industry (except Ekaterinoslav). In other words, it is difficult to talk about agrarian crises there.

Figure 13 somewhere here.

Figure 14 presents labor productivity in industry relative to productivity in agriculture, giving a hint on the scope of potential structural change in economy of the late Russian empire. There was few such potential in the regions of highly developed agriculture (the South and West Siberia) where labor productivity in agriculture was even higher than in industry. In opposite productivity in industry was higher in the larger part of the empire. The highest potential was in the most industrial regions - CIR, Baku,

Ekaterinoslav, Saint-Petersburg and Warsaw provinces where productivity in industry was twice higher than in agriculture, suggesting that Russian industrialization was far from completed. Surprisingly, the gap in labor productivity between industry and agriculture was also high in regions with developed cottage industry (Central Asian provinces and Archangelsk).

Figure 14 somewhere here.

5. Correlates of Russian GRPs.

This section presents some simple correlates of Russian provincial GRPs. I regress provincial GRP per capita on available measures usually used in economic growth literature. Table 3 panels A and B present the results.

Table 3 somewhere here.

Panel A explores correlates between labor productivity and sectorial structure. Results suggest that higher labor productivity in all sectors transformed into higher income per capita (columns 1 and 2). The larger share of a sector was, the larger the effect of an increase in labor productivity in this sector in GRP per capita was. Column 3 of the table points to potential benefits of structural change. The larger shares of industry or service sector in provincial value added were, the larger income per person was. Interestingly, however, the effect of one percent increase of service sector share onto GRP per capita was larger than similar increase in industry.

In panel B I regress GRP per capita on proxies for agglomeration (urban share), human capital (literacy), culture (shares of varicose religious minorities and religious diversity index) and income inequality (Gini index). I find some support for the presence of agglomeration effect. The coefficient on urban share is always positive and highly significant.[8] In contrast, human capital did not transfer into high level of development. The coefficient on literacy is statistically insignificant and changes its sign (column 2 and 5). That could explain limited demand for education (Chaudhary et al. 2012).

GRP per capita was correlated with difference along cultural lines to some extent (column 4). The coefficients on Muslim and Jewish shares are negative and significant. I

[8] This result is interesting also in the light of discussion how well Russian imperial statistics measured urban population. Officials determined settlement as urban if it has legal urban status, excluding all new industrial centres.

do not view these results as causal. Muslims lived in the periphery of the empire that was relatively poor. Again, Jewish share in a province was too small in average (about 4 per cent) to interpret this link as negative effect of Jewish culture onto economic development; while one could speculate on negative effect of constraints implied by imperial legislation on Jews in the Pale. Finally, the exercise does not support a wide spread view in the historical literature on old believers as bearer of entrepreneur spirit and ethic (by analogy with Weber's hypothesis on the role of protestants in Europe) (Blackwell 1965; Gershenkron 1966). While the coefficient on old believers is positive, it is not significant once controls on Muslim and Jewish shares are included. Moreover, share of old believers is positively associated with value added per worker in agriculture but not in industry or service (not reported). The correlation could be explained by high share of old believers in the outskirts of the empire where they run in XVII and XVIII centuries because of religious pressure. There was a lot of virgin land there that caused high income per capita.

Finally, I do not find any effect of religious diversity or income inequality onto provincial GRP per capita (columns 3 and 5).

6. Conclusions.

This paper documents and discusses regional variation in economic development of the late Russian empire. I reconstruct 1897 gross regional products and labour productivity by sector for all provinces of the country from the production side for the first time. I find that labour productivity drove welfare. However, structural change from traditional agriculture to modern industry where labour productivity was higher was an important but not the only engine of economic development, as classical development narrative would predict. Large industrial sector was present in many wealthier provinces, but substantial service sector or highly productive agriculture were alternative ways to prosperity. Agriculture was particular advanced in the South and the West Siberia abundant in land and relatively dense in population. Labour productivity in agriculture was higher than in industry there as well as in absolute terms. This finding contributes to the debate on 'agrarian crises' and backwardness of imperial economy. There was clearly no crises at least in these regions. This finding has also an interesting implication for the

Russian imperial political history. Both relatively wealthy agrarian regions (the South and Siberia) provided support to the Whites during the Civil war.

In 1897 Russia looked relatively poor in international comparison. Russian GRP per capita was only about a quarter of the UK – the most wealthy country in that time; about a third of the US and about 40 per cent of Germany and France. It was very similar to GDP per capita in Japan (table 3). National income within empire was distributed quite unequally, with the capital being substantially richer than the other provinces, like Moscow in modern Russian Federation. GRP per capita in Saint-Petersburg province was higher than average GDP per capita in any other country in 1897. At the same time, the poorest province – Yakutia - looked like China or Peru, i.e. the country that belonged to the world economy periphery in the late XIX century. National income per capita was only one time and a half larger than four hundred – an absolute poverty line, behind which starvation and famine were highly likely. Defence and governace sectors in Saint-Petersburg province composed more than a quarter of provincial GRP. Such large share partially explains outstanding wealth of the capital and points to substantial redistribution of wealth from provinces to the capital. However, my reconstruction did not reveal a clear economic core of the empire.

Finally, comparing distribution of national income a hundred years ago in Russian empire and in modern Russian Federation one could note a shift of both population and wealth to the East. Siberia and the Far East were rich during the imperial time but relatively under populated. They produced about 5 per cent of national income in 1897, and their share is 16 per cent (2011) today. The country became also more unequal in terms of income distribution over space. Mean to standard deviation ratio of GRPs was 0.67 a hundred years ago and 2.06 today. Both phenomena are arguably results of Soviet industrial policy.

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Table 1. Regional profile of Russian Economic Development.

A. Main indicators.

Variable	Obs	Mean	Std. Dev.	Min	Max
Population, 000	90	1400	828,2	28	3559
Urban population, 000	90	187	217	9	1422
Urban share	90	0,14	0,10	0,03	0,67
GRP, 000000 rubles	90	102	110	5,9	875
GRP per capita, rubles	90	74,84	50,43	35,32	414,24
GRP per worker, rubles	89	257,86	93,35	115,16	781,81
VA in agriculture per worker, rubles	89	213,47	74,64	79,82	530,57
VA in industry per worker, rubles	89	340,62	237,59	35,61	1636,10
VA in service sector per worker, rubles	89	371,46	177,49	153,54	1286,17
VA in industry pw to VA in agriculture pw	89	1,85	2,00	0,37	16,50
Agriculture as a share of GRP	90	52,18	16,37	3,13	78,75
Industry as a share of GRP	90	17,81	12,80	2,44	63,94
Services as a share of GRP	90	30,01	10,37	13,88	76,97
L&N household mean income (rubles)	50	623,24	159,13	434,89	1316,69

B. Subsectors: value added.

Variable	Obs	Mean	Std, Dev,	Min	Max
VA in planting as a share of GRP	90	28,29	13,26	0,60	52,25
VA in husbandry as a share of GRP	90	17,24	11,30	0,59	53,99
VA in gardening, vinery and beekeeping as a share of GRP	90	3,54	4,26	0,28	29,40
VA in forest sector as a share of GRP	90	2,16	2,03	0,05	9,81
VA in fishing as a share of GRP	90	0,94	2,69	0,00	16,35
VA in hunting as a share of GRP	90	0,01	0,03	0,00	0,18
VA in Large industry as a share of GRP	90	10,47	11,49	0,02	57,35
VA in Small industry as a share of GRP	90	3,68	5,55	0,02	44,68
VA in construction as a share of GRP	90	2,65	3,01	0,04	25,79
VA in road construction as a share of GRP	90	1,01	1,26	0,02	6,96
VA in defense as a share of GRP	90	4,18	5,42	0,24	33,50
VA in governance as a share of GRP	90	3,47	1,41	0,74	9,13
VA in education as a share of GRP	90	1,11	0,51	0,23	2,97
VA in health sector as a share of GRP	90	0,33	0,23	0,05	1,10
VA in railways as a share of GRP	90	3,21	3,02	0,00	19,33
VA in water transportation as a share of GRP	90	0,48	0,78	0,00	3,80
VA in tracking as a share of GRP	90	0,39	0,21	0,04	1,30
VA in communications as a share of GRP	90	0,20	0,25	0,02	1,08
VA in banking as a share of GRP	90	0,07	0,09	0,00	0,71
VA in trade as a share of GRP	90	9,78	5,61	2,45	36,03
VA produced by servants as a share of GRP	90	0,18	0,15	0,02	1,05

C. Subsectors: labor productivity.

	Obs.	Mean	St. dev.	Min	Max
Labor productivity in planting	89	137,94	59,69	9,77	379,11
Labor productivity in husbandry	89	4393,28	11824,28	88,12	90304,01
Labor productivity in gardening, vinery and beekeeping	86	52192,49	90031,71	1420,48	714614,00
Labor productivity in forest sector	89	1983,65	1857,97	2,23	11222,39
Labor productivity in fishing and hunting	89	314,04	159,71	7,20	1036,36
Labor productivity in industry	89	306,12	255,13	0,42	1895,42
Labor productivity in construction	89	506,93	640,85	37,86	5424,62
Labor productivity in defense	89	380,81	508,63	22,68	3238,58
Labor productivity in governance	89	542,54	351,81	111,78	2096,85
Labor productivity in education	89	679,81	912,96	176,34	8405,00
Labor productivity in health sector	89	279,42	164,78	46,64	649,64
Labor productivity in tracking	89	108,24	11,37	63,71	120,00
Labor productivity in communications	89	455,89	586,00	27,64	2674,55
Labor productivity in trade as a share	84	520,71	333,66	111,78	2096,85

D. Summary statistics of GRP correlates.

Variable	Obs	Mean	Std. Dev.	Min	Max
Literacy rate	89	0,22	0,17	0,01	0,83
Jewish share	90	0,04	0,06	0,00	0,18
Protestants share	90	0,05	0,17	0,00	0,91
Muslims share	90	0,16	0,30	0,00	0,99
Orthodox share	90	0,59	0,38	0,01	0,99
Catholic share	90	0,12	0,25	0,00	0,87
Old belivers share	90	0,02	0,02	0,00	0,12
Religious diversity index	90	0,27	0,19	0,01	0,66
Lindert&Nafziger Gini index	50	0,33	0,07	0,17	0,61

Table 2. GRP and population by region.

	GRP share	Population share	GRP per capita
Europe	0,75	0,74	72,96
Poland	0,08	0,07	79,01
Caucasus	0,07	0,07	71,33
Siberia and the Far East	0,05	0,05	81,93
Cental Asia and step' provinces	0,05	0,06	56,70
Vyborg (Finland)	0,004	0,003	92,77

Table 3. Russian GDP and selected GRPs in international comparison (in 1990 international dollars).

Country	GRP per capita
Russia	1198
SPb province (the richest)	6630
Yakutia province (the poorest)	576
UK	4428
US	3780
Germany	2848
France	2760
Japan	1062
China	630
Peru	602

Sources: Russia and Russian provinces – currents studies; other countries – Angus Maddison dataset (http://www.ggdc.net/maddison/oriindex.htm).
1897 ruble/ international 1990 US dollar convertion rate estimated as 16.00542 from Maddison dataset and Gregory (1983).

Table 3. Russian regional gross products: correlates.

A.

Variable	(1)	(2)	(3)
GRP per worker	0.47***		
	[0.029]		
VA in agriculture per worker		0.17***	
		[0.054]	
VA in industry per worker		0.06***	
		[0.018]	
VA in service per worker		0.14***	
		[0.024]	
Share of service in GRP			3.11***
			[0.349]
Share of industry in GRP			1.51***
			[0.283]
Constant	-46.16***	-35.04**	-45.58***
	[8.061]	[15.130]	[12.222]
Observations	89	89	90
R-squared	0.745	0.481	0.552

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

B.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Urban share	417.89***	417.57***	429.45***	431.04***	531.72***	535.55***
	[25.815]	[26.439]	[26.542]	[23.477]	[61.328]	[66.467]
Literacy		2.09				-1.55
		[4.508]				[6.696]
Religious diversity			-24.04			-21.82
			[14.758]			[18.096]
Jewish share				-185.66***		
				[65.303]		
Muslim share				-19.51**		
				[8.545]		
Old believers share				74.28		
				[118.549]		
Catholic share				-12.63		
				[13.788]		
Protestant share				10.12		
				[14.229]		
Gini					-65.17	-57.48
					[91.223]	[95.027]
Constant	17.21***	13.31*	22.09***	24.98***	26.15	31.07
	[4.456]	[7.985]	[5.335]	[5.373]	[23.471]	[29.605]
Observations	90	89	90	90	50	50
R-squared	0.749	0.757	0.756	0.817	0.853	0.858

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Figure 1. Validity check: Markevich 1897 GRPs per capita reconstructed from production size vs Lindert&Nafziger 1904 mean household income reconstructed from income side.

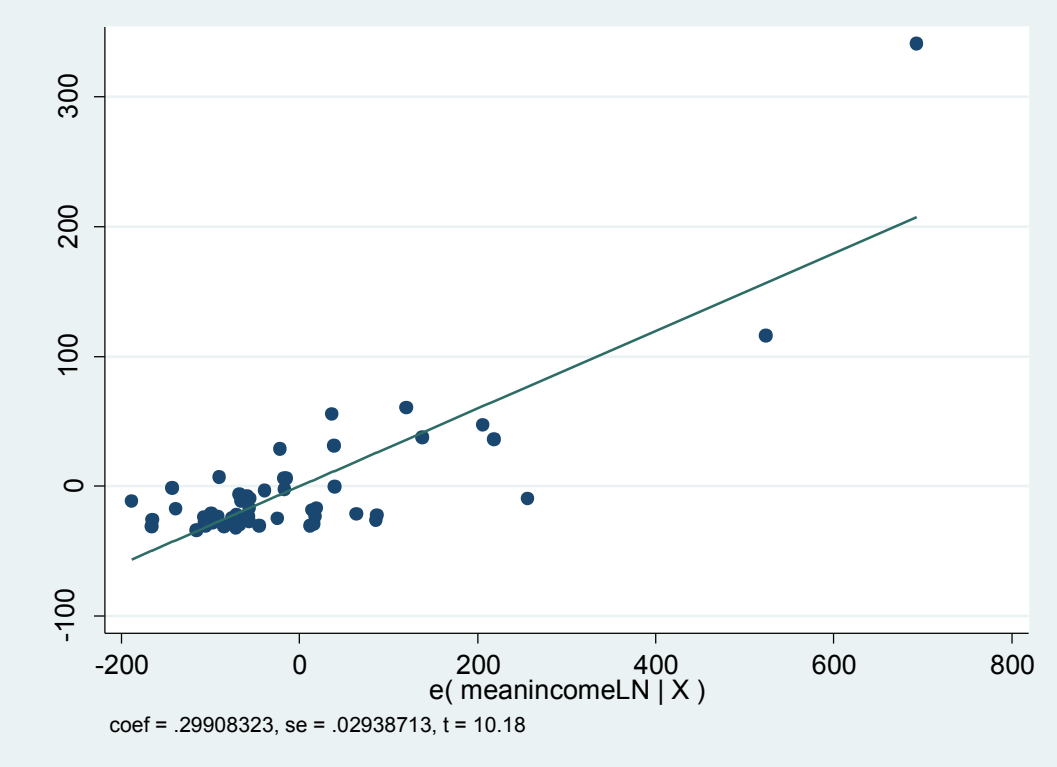


Figure 2. Gross regional products in 1897 (in million 1897 rubles).

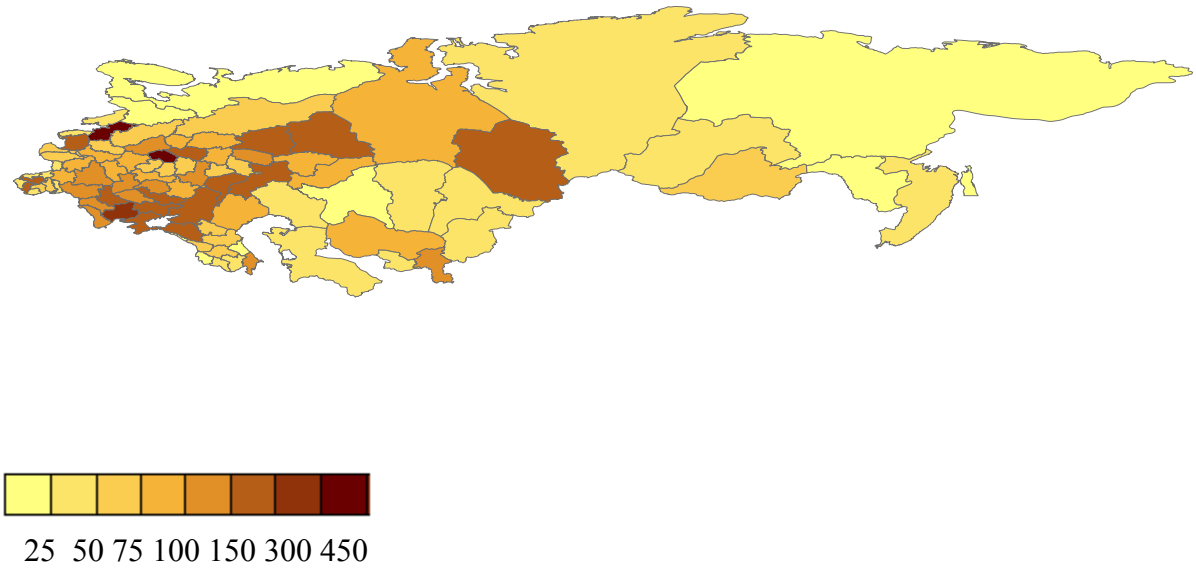


Figure 3. Gross regional products per capita in 1897 (1897 rubles).

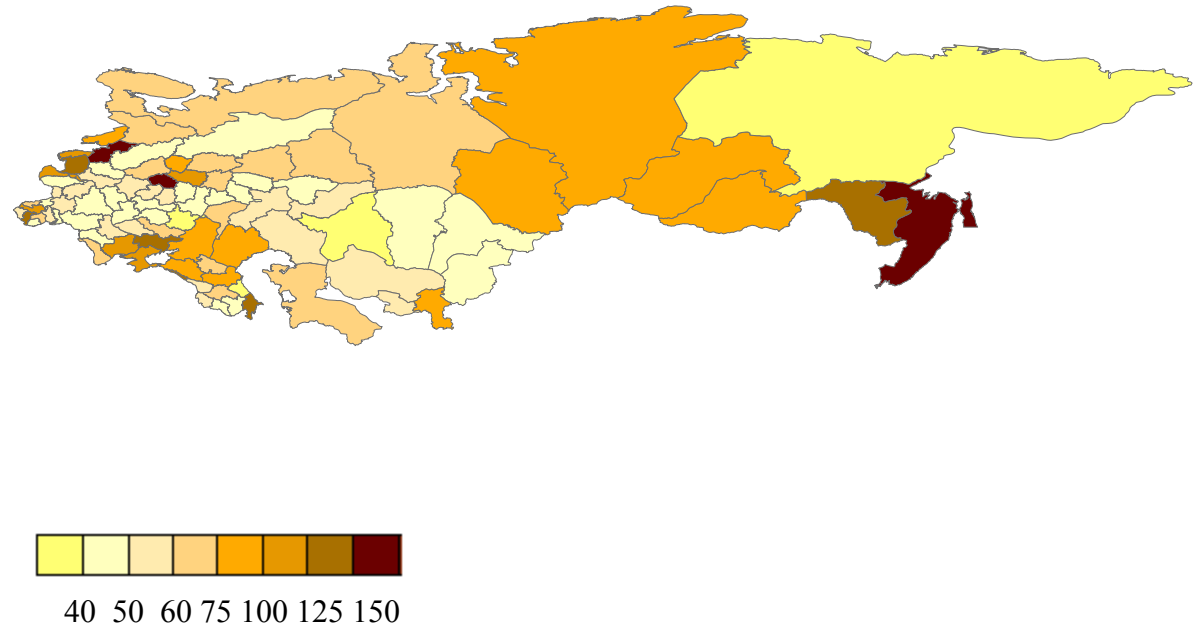


Figure 4. Gross regional product per worker in 1897 (1897 rubles).

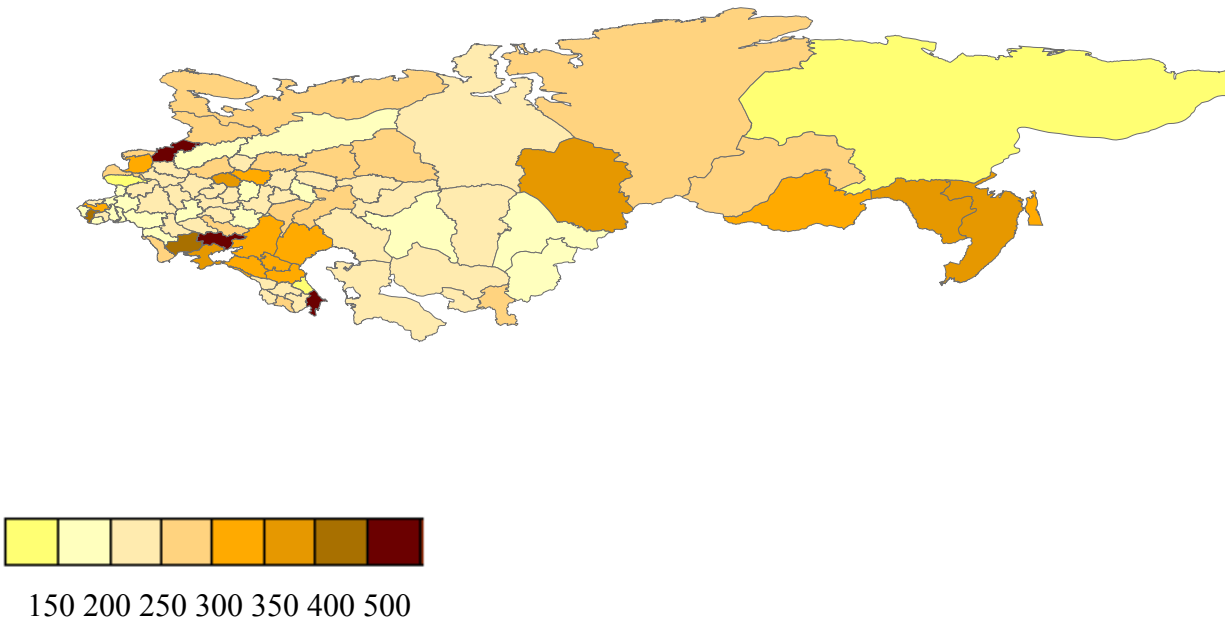


Figure 5. Shares of value added in industry (large industry, small industry, constructions and expenditures on roads) in GRPs in 1897.

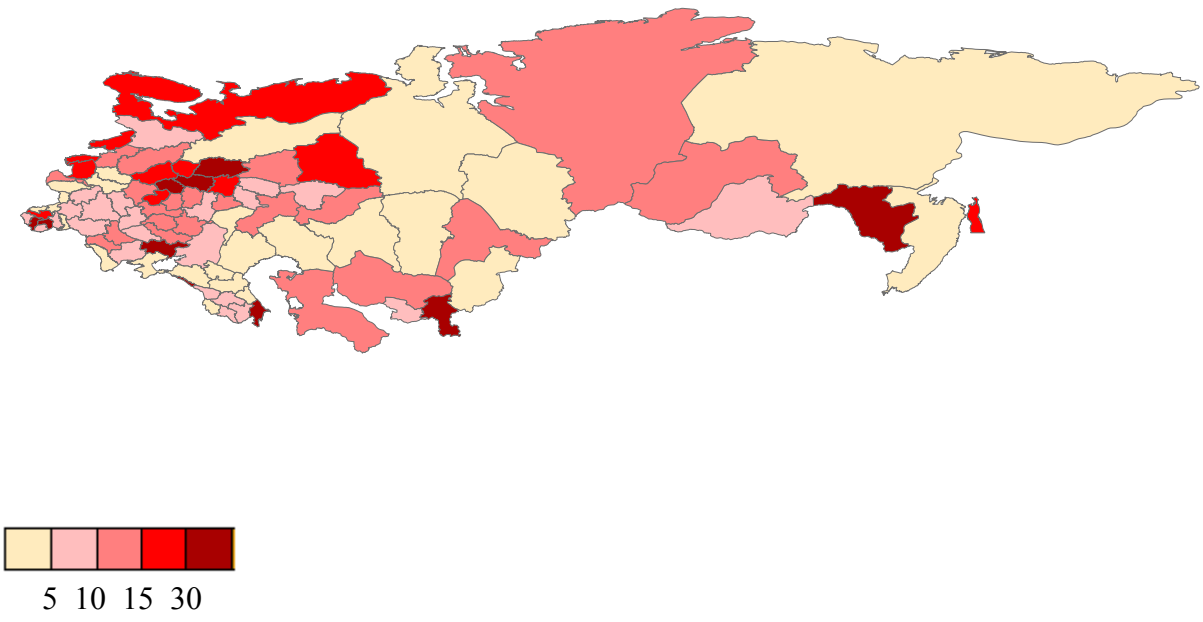
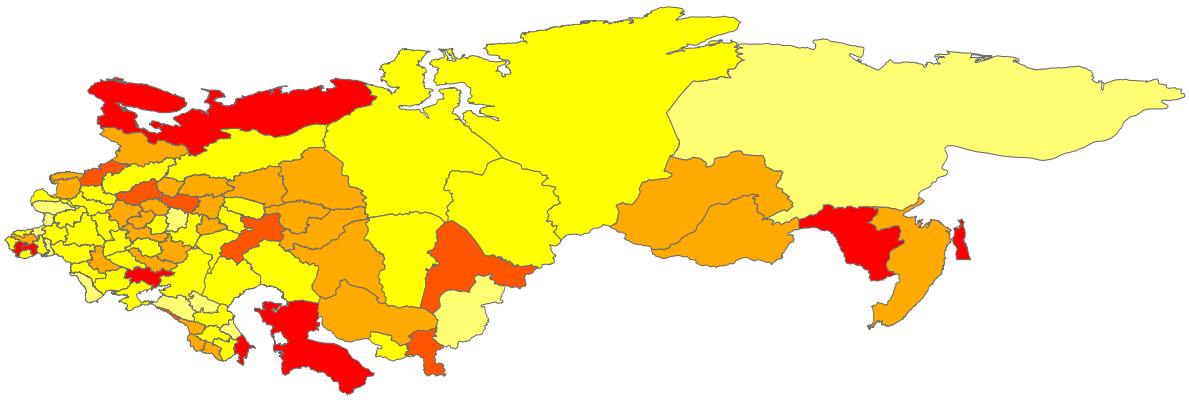
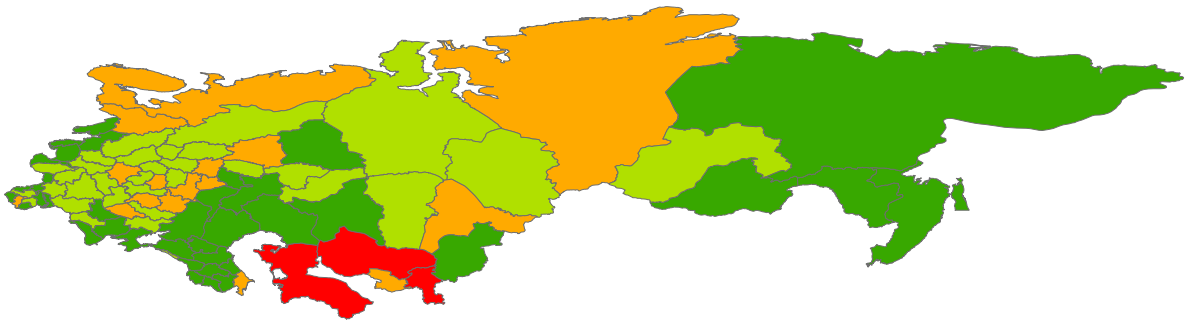


Figure 5 Value added per worker in industry in 1897 (1897 rubles).



150 300 450 600

Figure 6. Share of value added in small industry in 1897.



2 7 15

Figure 6. Share of value added in service sector in 1897.

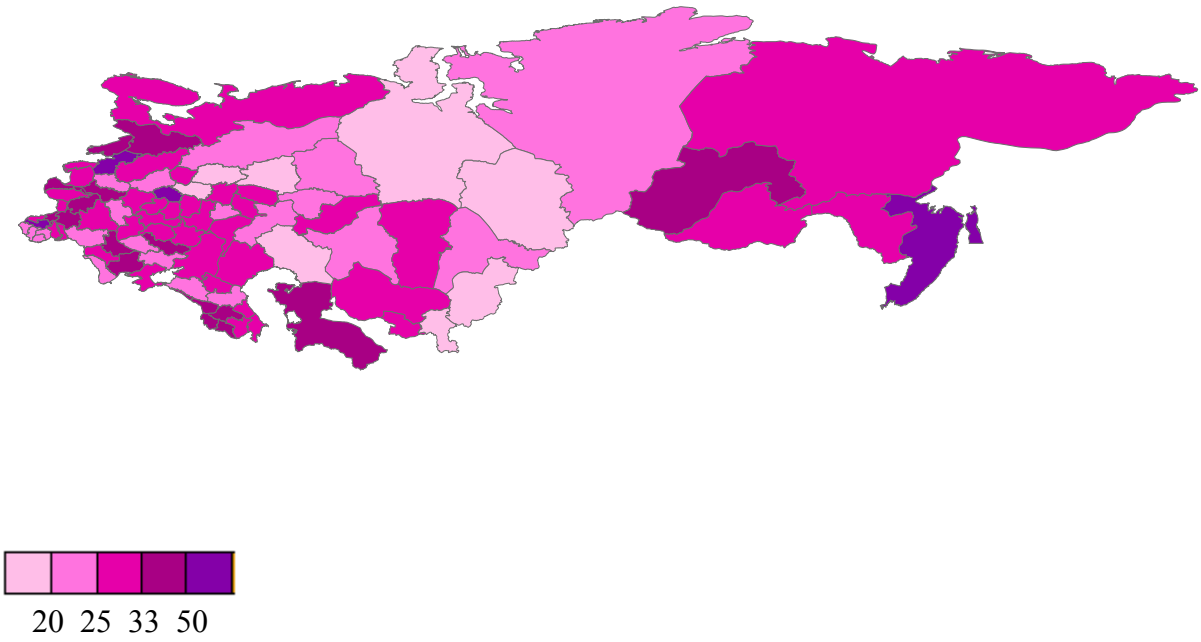


Figure 9. Share of value added in trade in 1897.

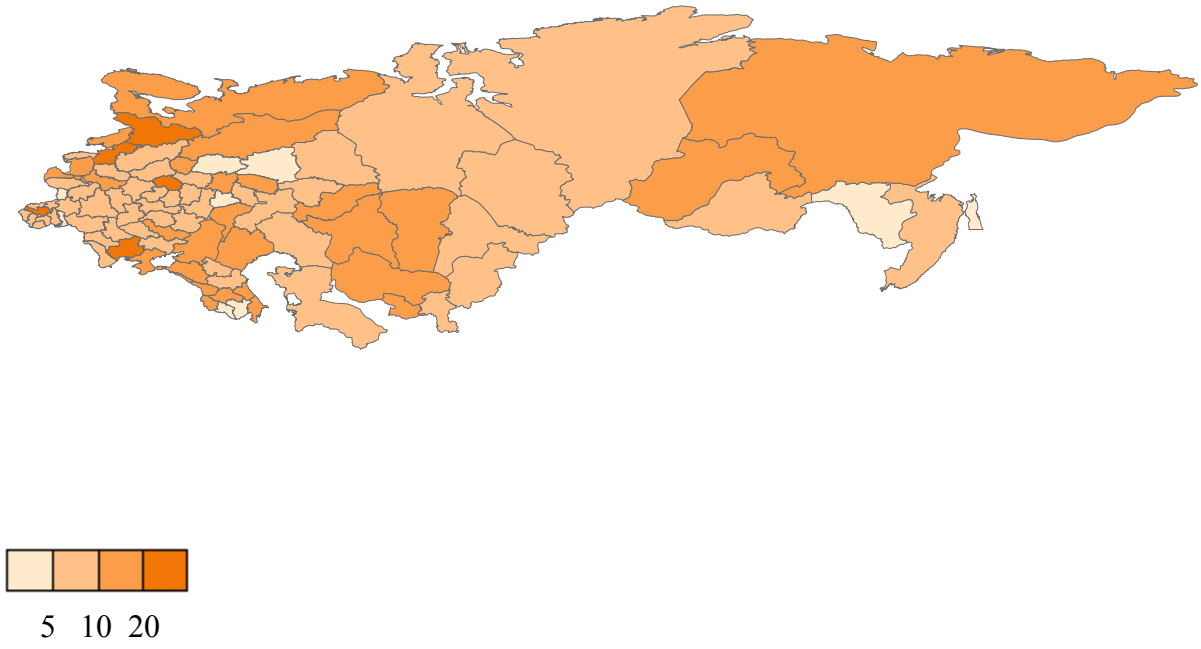


Figure 10. Share of defense sector in GRP in 1897.

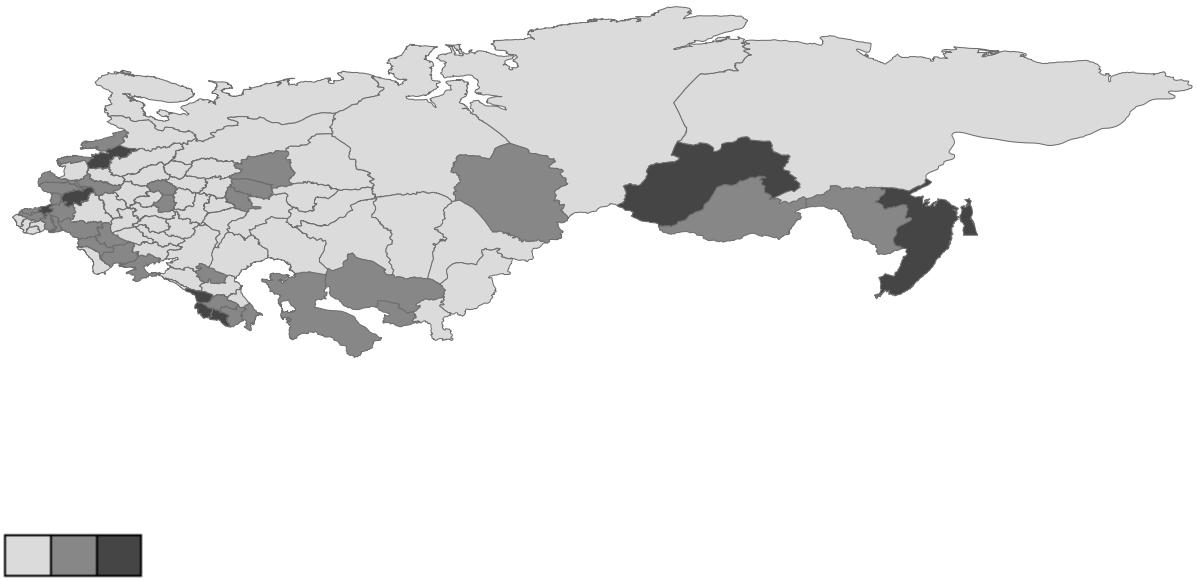


Figure 11. Share of expenditures on education in GRP in 1897.

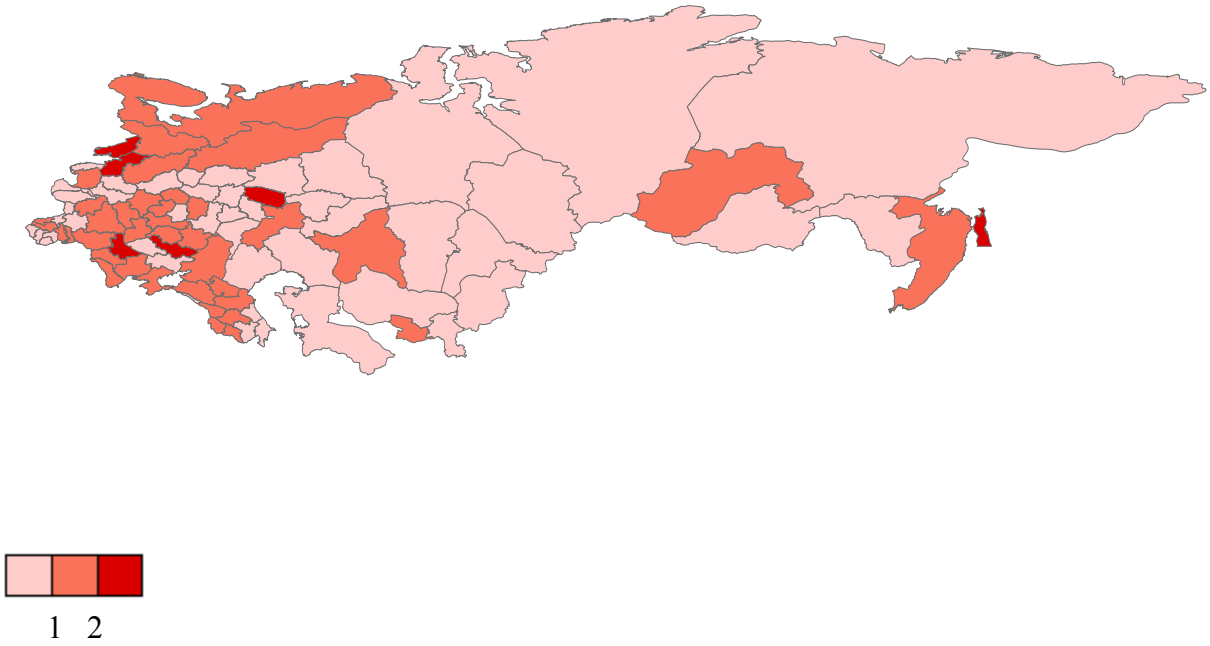
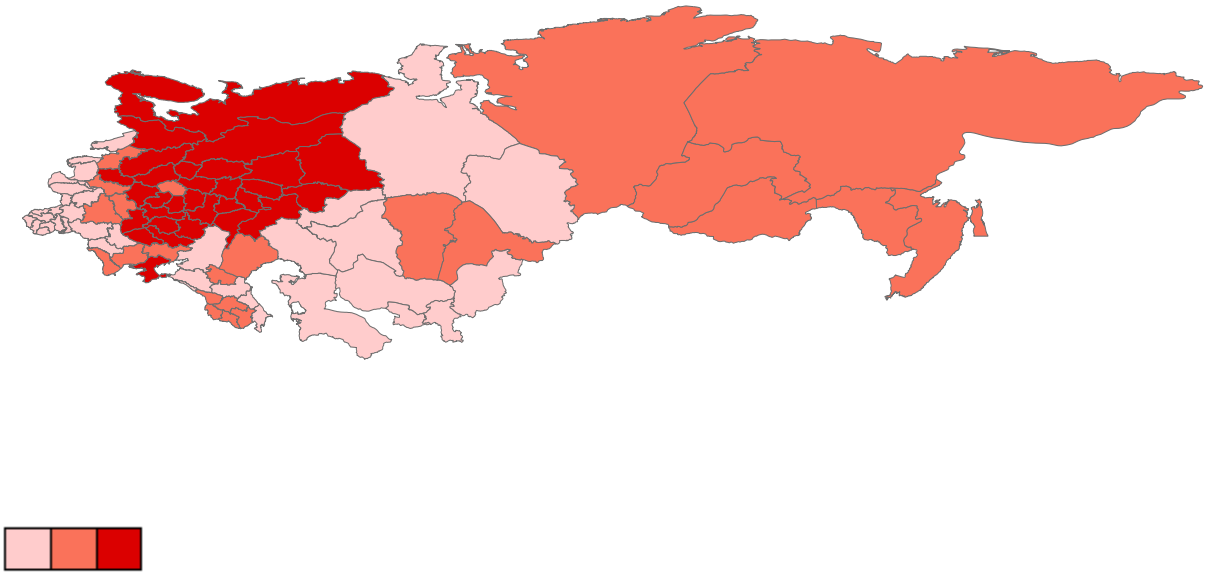
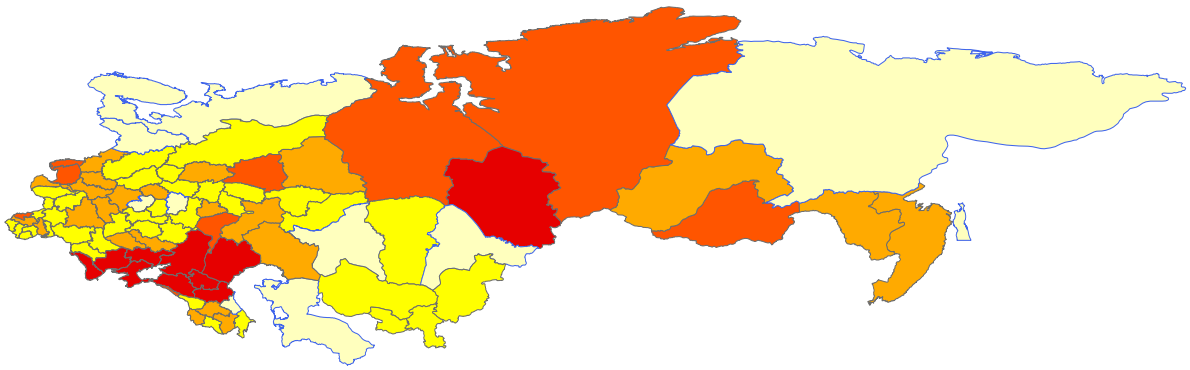


Figure 12. Share of expenditure on health sector in GRP in 1897.



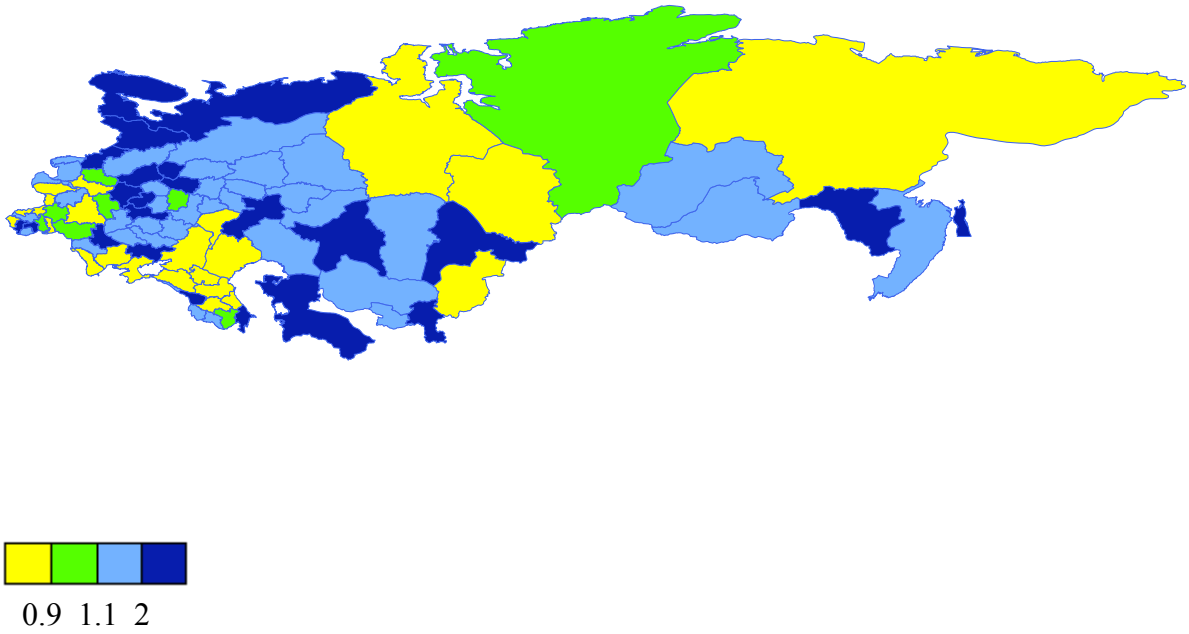
0.2 0.4

Figure 13. Valued added per worker in agriculture in 1897 (1897 rubles).



150 200 250 300

Figure 14. Value added per worker in industry relative to value added per worker in agriculture in 1897.



Appendix.
To be written.