

A Regional Perspective on the Economic Development of the late Russian Empire

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Motivation

- The Russian Empire – huge emerging market economy. Little is known, however, on its spatial variation (Gregory 2001) in contrast to historical development of other European countries (e.g. Roses and Wolf 2018) or the US (Mitchner and McLean 1999, 2003, Crafts and Klein 2011, Klein 2013).
 - The only noticeable exception limited to the European part of the empire : Lindert and Nafziger (2014)
- Reconstruct and study regional variation to explore which factors explain economic development of this part of the world around 1900
 - Could ‘fundamental’ causes such as geography and institutions account for relative economic backwardness of this part of the world in the early industrialization epoch?
 - Appeal to the Imperial times allows to exclude the effect of massive policy interventions under the state socialism

Related Literature

- Frame this study into a broader debate on the fundamental factors of economic growth (e.g. Gallup et al. 1999; Sachs 2003; Dollar and Kraay 2003; Rodrick et al. 2004; Redding and Venables 2004, Acemoglu 2009, Acemoglu and Robinson 2012 among many others)
 - One of the first study with subnational analysis of middle-income country at the early stage of industrialization (for modern period see Mitton 2016, Ketterer and Rodriguez-Pose 2016)
- Focus on “first-nature” geography, “second-nature” geography and some Russia-specific institutions such as serfdom
 - A large (but partially landlocked) country with diverse geography and natural endowment
 - Relatively economic backward because of institutional factors (e.g. Gerschenkron 1962, 1965)

Preview of Findings

- Reconstruction of GRPs and labor productivity for 97 provinces around 1900
 - Middle-size income country (1215 1990 USD), i.e. one of the poorest countries in Europe
 - Huge variation in income and productivity within the empire, much higher than in Europe or in China but comparable to spatial inequality within countries of the New world
- All three group of factors (first and second nature geography and institutions) mattered
 - In terms of magnitude, the difference in market potential accounts for almost half of the gap between W. Europe and Russia around 1900
 - The legacy of serfdom explains about twenty percent of the difference as maximum
 - Taken together the considered factors eliminate the gap completely

Reconstructing Regional Indicators of Economic Development of the Russian Empire

- 1897 as the year of the only imperial population census
- (1) Nominal gross regional products reconstructed from the production side: 44 sub-sectors (14 in industry, 18 in agriculture and 12 services)
- (2) Construct relative regional price index of consumption goods and services to switch to real income
- (3) Labor productivity measured as output per working age citizen (because census under-enumerated employment in family firms)
 - Working age population fitted almost one-to-one to the number of workers (Svavitskij and Svavitskij 1926)

Reconstruction of Nominal Regional Incomes

- Data-demanding reconstruction from the production side
 - Novel and unique dataset: 4268=97*44 subsector-province-specific estimates based on more than 20K original figures on output and local prices extracted from several dozens various historical sources (the bulk of the data are also available on-line in Kessler and Markevich ristat.org dataset)
 - Mostly from official statistical volumes published by the imperial government: statistical agency of European quality
 - But also local statistical reports, various surveys and reviews
- A short-cut method (Geary and Stark 2002, Roses and Wolf 2018) is inapplicable for the Russian case
 - No systematic data on sectoral wages for the outskirts of the empire
 - Low level of integration of markets makes the assumption that wages reflect productivity questionable

GRPs Reconstruction Methodology

- Sergei Prokopovich (1918) pioneered estimates of output of the Russian economy
- Later adjustments by various authors as discussed in Markevich and Harrison (2011). Mostly replicate their reconstruction methodology at sub-national level
- Apply corrections to the original figures as discussed in the related literature -> might produced an upward bias
 - Regression results are robust to no-corrections estimates

Summary statistics

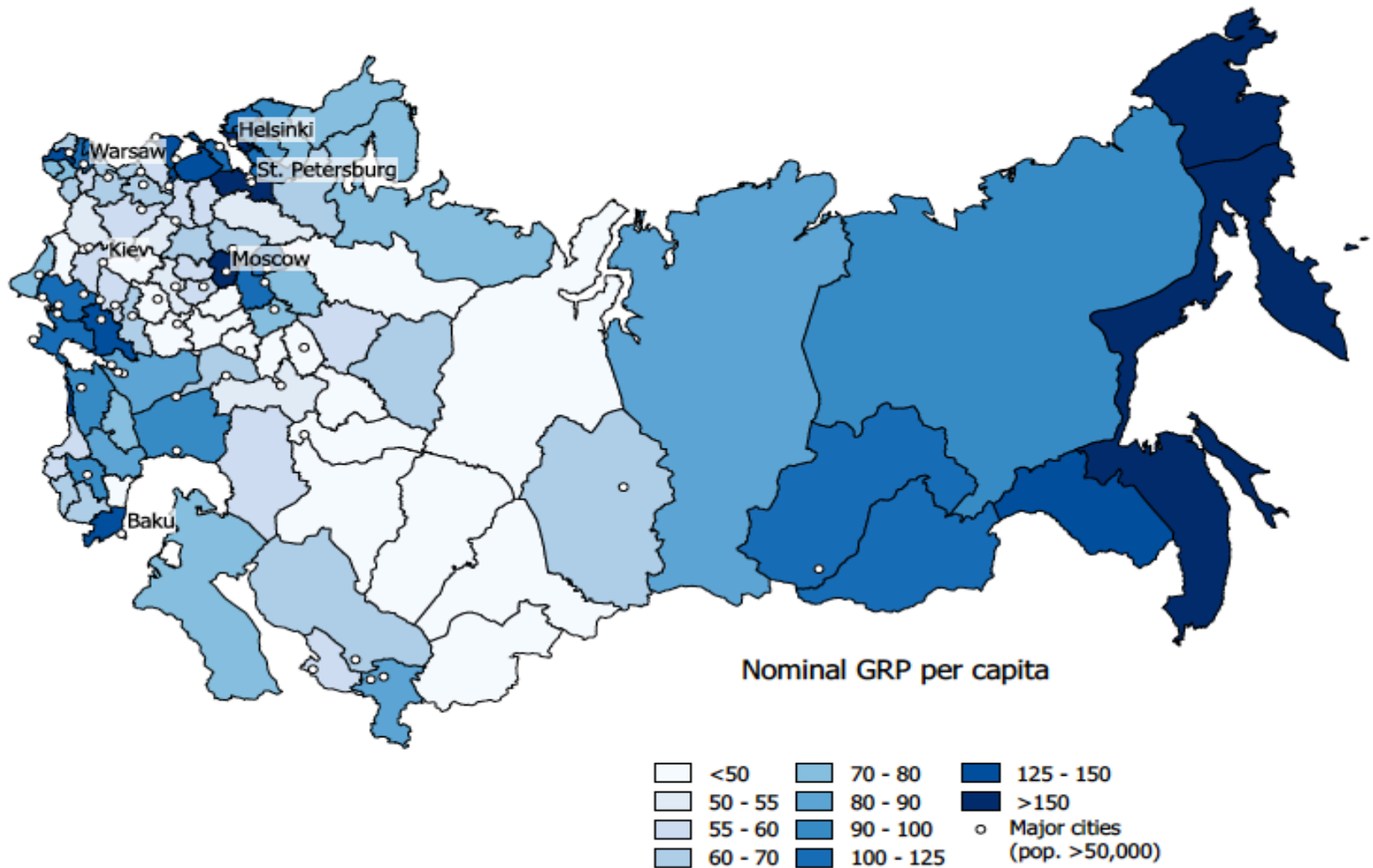
Baseline and alternative estimates

External Validity Tests

- The reconstructed GRPs over all provinces except Finland:
 - Markevich (2019), from the production side: 9448 million rubles
 - Gregory (1982), from the income side: 9172 million rubles
 - I.e. 3 percent difference but the reconstruction procedures, data and original sources are independent
- Fifty European provinces of the empire:
 - 0.84: correlation between the current study estimates and the mean household incomes in 1904 from Lindert and Nafziger (2014)
- Eight Finnish provinces and ten Polish provinces:
 - Broadly consistent with Enflo (2018) and Bukowski et al. (2019)

Scatter plot

Nominal GRP per capita (1897 rubles)



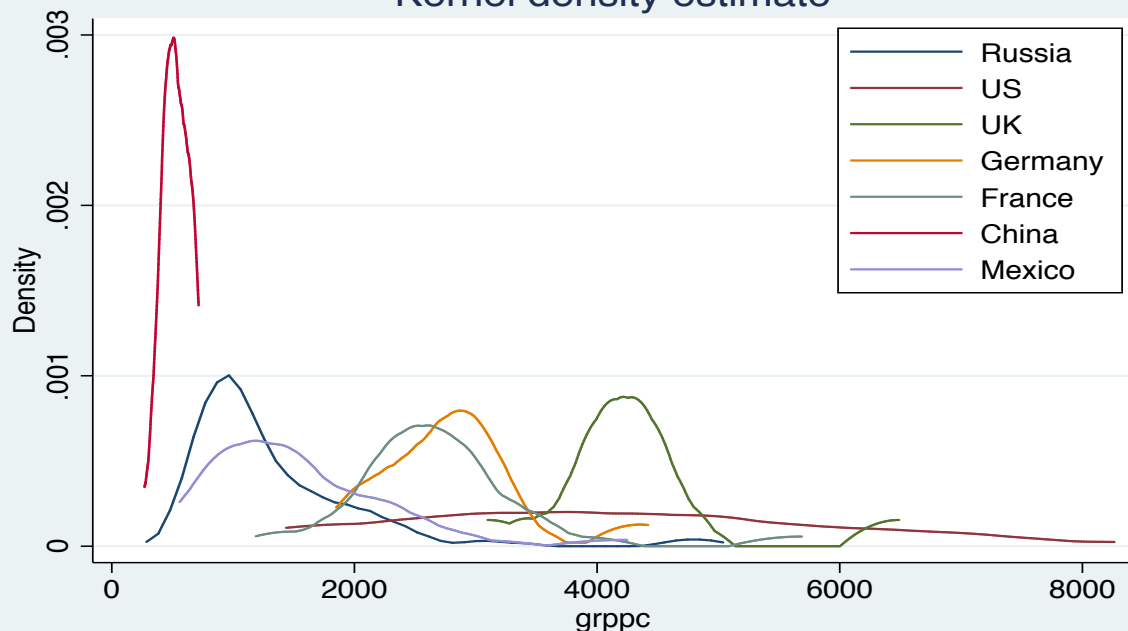
Economic Geography of the Russian Empire

- What did we suspect?
 - Eclectic economic geography both in the European core and in the outskirts of the country. No single center
 - Major centers: the Northwest (with Saint Petersburg, the Baltic provinces and the South of Finland), the Central Industrial Region (with Moscow), the Polish provinces (with Warsaw), the Southern provinces around the Black Sea, the Baku province (with its oil fields)
- What is new?
 - Rich regions without much recognition in the previous literature: the Fergana province in Central Asia and several provinces in Eastern Siberia and the Far East
 - The least developed: steppe region and the Black Earth provinces to the South of Moscow
 - Huge variation within the empire!

GRP per capita Distributions in Selected Countries Around 1900 (1990 USD)

Country	N of regions	Mean	Coefficient of variation	Max/min ratio	Spatial Gini
Russia (1897)	97	1325	0.56	10.76	0.25
US (1900)	48	4113	0.43	4.67	0.22
UK (1900)	10	4333	0.20	2.09	0.09
Germany (1900)	36	2822	0.22	1.57	0.11
France (1900)	22	2726	0.31	2.09	0.16
Mexico (1900)	29	1557	0.50	7.59	0.26
China (1893)	24	531	0.22	2.65	n.a.

Kernel density estimate



kernel = epanechnikov, bandwidth = 166.0544

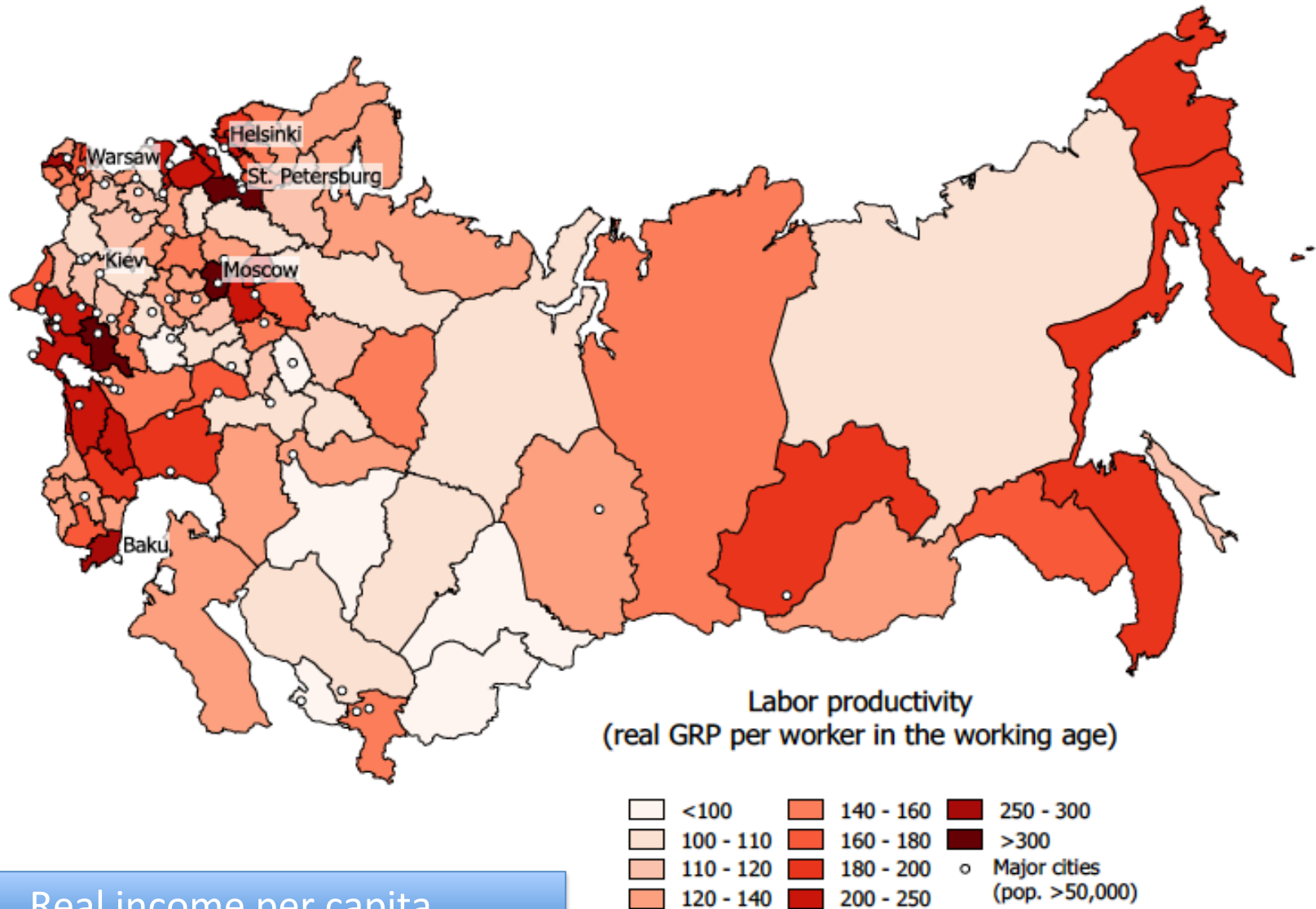
Sources: Russia and Russian provinces (1897) – the current study; US regions (1900) - Klein, Alexander (2013); UK, Germany, France, Portugal (1900) - Rosés Joan R. and Nikolaus Wolf. (2018); China (1893) - Caruana-Galizia and Ye Ma (2016); Mexico (1900) - José Aguilar-Retureta (2015).

Coefficients of variation of economic development indicators in the Russian empire and the US

	Standard variation divided by the mean	
	Russian empire, 1897	USA, 1900 (Mitchener and McLean 1999)
Nominal income	0.56	0.43
Real income	0.40	0.39
Labor productivity	0.36	0.33

- Like in the US case, accounting for local prices and age-gender structure decreases the variation in economic development of the empire (mainly because of exclusivity of the Far East)
- Overall, the spatial picture is broadly the same

Labor Productivity (1897 rubles)



Real income per capita

Implications for Russian Economic history: Industrialization and 'Agrarian Crises' Debate

- Industrialization and the level of development of agriculture are endogenous to economic growth, so NO causal claims here
- Results fit the conventional story of industrialization as the main determinant of economic development in the late 19th century
 - correlation between industrial output and productivity: 0.73
- A relatively highly productive agricultural sector offered an alternative route to prosperity
 - E.g. the southern provinces around the Black sea, or the Low Volga and the North Caucasus regions, which benefited from growing world grain prices (consistent with Allen 2003)
 - Poor fit to the 'agrarian crises' story. No crises in periphery (consistent with Gatrell 1986 and Gregory 1994)

Industrial output per capita

Labor productivity in agriculture

Geography, Institutions and Labor Productivity

- In the absence of clear guidance from theory, start with Mitchener and McLean (2003) specification for the US
 - But not exactly the same specification, because of data limitations and peculiarities of the Russian case
 - Sea dummy rather than an ocean and Great Lakes dummy
 - Share of employment in mining (Trojnitskij 1905)
 - Share of serfs in 1858 (Troijnitskij 1861) rather than share of slaves
 - Plus a control of the distance to Moscow due to Buggle and Nafziger (2019), Markevich and Zhuravskaya (2018), Nafziger (2013)
 - No cooling degree days because of lack of data (but do robustness checks for temperature and other geo measures)
- Also include market potential (estimated as distance-weighted sum of the nominal incomes) as a summary measure for second-nature geography (Redding and Venables 2004)

Determinants of Labor Productivity in the Russian Empire: Geography and Institutions

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	OLS
Sea dummy	0.45***				0.39***
	[0.102]				[0.103]
Share of employment in mining		13.93**			14.80***
		[5.804]			[4.377]
Share of serfs in 1858			-0.59***		-0.48***
			[0.144]		[0.122]
Log distance to Moscow			-0.18***		-0.20***
			[0.045]		[0.047]
Log market potential				0.18*	0.21**
				[0.103]	[0.095]
Constant	4.87***	4.91***	6.34***	3.01***	4.11***
	[0.038]	[0.045]	[0.344]	[1.084]	[1.129]
Observations	97	97	97	97	97
R-squared	0.262	0.080	0.152	0.023	0.491

Conditional scatter plot for sea
Conditional scatter plot for serfs

Conditional scatter plot for employment in mining

Conditional scatter plot for MP

Determinants of Labor Productivity in the Russian Empire: Other Controls

- Geography indicators discussed in the literature but not relevant in the Russian case: ruggedness, length of rivers, historical climate (temperature, precipitation, humidity vapor pressure), land suitability, longitude and latitude
 - No test for tropical climate or malaria because of the lack of within-county variation
- Institutional and cultural characteristics varying at subnational level – local experience with self-governance (share of cities with 1892 city charters and presence of zemstvos), orthodox religion, religious diversity, exposure to the Russian state – no effect
 - Take advantage of a study of within-country variation to control for national intuitions
- Employ IVs (discussed in the literature) to overcome other potential endogeneity and measureable issues

More tests on geography

More tests on institutions

IV for Employment in Mining

- Minerals endowment measured as employment in mining might be endogenous but this is likely not the case at subnational level. Capital and technologies could flow between provinces (argument similar to Mitchener and McLean 2003 for the US case)
 - But measurement problem is possible due to under-registration of partially employed
- IV for mining: the number of major deposit fields per unit of area discovered by 1920 (the earliest year with data)
 - Assume that geological surveys were not correlated with the regional level of economic development due to practice of centrally planned scientific expeditions to exploit regions all over the empire
- In progress: use geology strata characteristics to predict location of coal (a la Fernihough and O'Rourke 2014 and Pleijt et al. 2019) and gold mines

IV for Market Potential

- Market potential obviously endogenous. Can not use MP in the previous period because of no data
- Literature (e.g. Crafts and Klein 2011, Schulze 2015) either use sum of inverse distances to major centers of activities (like NY, London and Tokyo), or sum of inverse distances between the units of observations
 - Employ the second approach to avoid explicit exposition of centers
 - In progress: IVs based on inverse distances to main centers of economic activity in 1900

IV for Serfdom Legacy

- Considering fifty European provinces only, Markevich and Zhuravskaya (2018) use the nationalization of church lands (with monasterial serfs) in the 18th century as a negative shock for the share of serfs
 - Based on individual donations to the church driven by religious believes (wills); few difference between in the status of monasterial serfs and other serfs
- Problem – weak instrument for the whole empire due to lack of monasteries and correspondingly monasterial serfs in the non-orthodox areas in the outskirts of the empire
- Solution: two instruments to account for the size and the probability of the emergence of monasteries' serfs ownership
 - The share of former monasterial serfs in a province around 1800 (as in Markevich and Zhuravskaya 2018)
 - A dummy for the presence of monasteries by the moment of nationalization (Zverinskij 1890-1897)

Geography measures

- Sea location advantage is externally determined but could be correlated with unobservables -> driven by the Black Sea, the Baltic Sea and the Pacific Ocean but not the arctic seas, i.e. likely because of better exposure to international trade and contacts
 - Note that the sea effect robust to control for MP while decrease in magnitude. This is likely because my MP measure does not reflect trade costs. Marine transport was much cheaper around 1900.
- Similar distance to Moscow might be correlated with many things. Consider as an important control for serfdom (as discussed in Markevich and Zhuravskaya 2018) rather than a clearly interpret fundamental cause

Effect varying by sea

IV approach: First-stages

	(1)	(2)	(3)
	Share of employment in mining	Share of serfs in 1858	Log market potential
Number of deposit fields per sq km	120.33*** [24.130]		
Share of (former) monasterial serfs before nationalization of church land		-0.23 [0.326]	
Dummy for the presence of monasteries in 1764		0.21*** [0.058]	
Log sum of inverted distances			0.88*** [0.063]
Other variables	YES	YES	YES
F-statistic	24.87	6.534	195.6
Observations	97	97	97
R-squared	0.318	0.506	0.836

Determinants of Labor Productivity in the Russian Empire: First-stages and IV estimates

	(1)	(2)	(3)	(4)
	IV, 2nd stage			
Sea dummy	0.36***	0.34***	0.39***	0.32**
	[0.118]	[0.115]	[0.099]	[0.125]
Share of employment in mining	22.99***	15.87***	14.83***	21.75***
	[6.329]	[4.210]	[4.243]	[7.097]
Share of serfs in 1858	-0.50***	-1.02***	-0.48***	-1.03***
	[0.114]	[0.357]	[0.118]	[0.349]
Log distance to Moscow	-0.21***	-0.28***	-0.20***	-0.29***
	[0.041]	[0.055]	[0.046]	[0.050]
Log market potential	0.25***	0.26***	0.21*	0.33***
	[0.089]	[0.102]	[0.112]	[0.121]
Instrumented variable	Share of employment in mining	Share of serfs in 1858	Log market potential	All three
LC_2sls 95 percent confidence interval based on <i>twostepweakivtest</i> (Sun 2018)	[9.83, 34.89]	[-2.04,-0.35]	[0.27, 0.68]	
F-statistic	24.87	6.534	195.6	
Observations	97	97	97	97
R-squared	0.302	0.481	0.447	0.331

Magnitudes of OLS and IV estimates

- Coefficient in IV regressions are large in absolute magnitude than in OLS
 - Minerals endowment: likely because of mis-measurement
 - Market potential: OLS underestimates effect because of endogeneity. More developed regions tend have larger market potential
 - Legacy of serfdom: three things are possible – potential mis-measurement of historical serfdom, reverse causality when there were more serfs in provinces with better economic prospects due to stronger incentives for landowners to privatize rents, or difference between ATE and LATE.

Magnitudes: Russian Empire vs Other Cases

		Magnitude		References
		RE 1897	Other	
“First-order” Geography	Maritime border	0.32	0.2 0.7	US 1900 (Mitchener&McLean 2003); Europe 20C. (Caurana-Galizia&Okubo&Wolf 2018)
	Employment in mining	21.75	0.8	US 1900 (Mitchener&McLean 2003)
“Second-order” Geography	Market potential	0.33	0.3 0.45 0.7	Europe 20C. (Caurana-Galizia&Okubo&Wolf 2018), A-H late 19C. Schulz (2015) X-country 20C. (Jacks&Novy2018)
Institutions	Share of serfs	-1.03	-0.64 -2.1	Modern Russia (Buggle&Nafziger 2018) US 1900 (Mitchener & McLean 2003)

Naïve Counterfactuals: Discussion

		Magnitude	Contrafactual %	Benchmark
“First-order” Geography	Maritime border	0.32	+0.96= $0.32 \cdot (0.54 - 0.24)$	W.Europe 1900 (Roses&Wolf 2018)
	Employment in mining	21.75	+0.261=21.75* (0.016-0.004)	Modern Russia (Rosstat 2018)
“Second-order” Geography	Market potential	0.33	+0.467= $0.33 \cdot (\ln(40983/0.26) - \ln(40983))$	W.Europe 1910 (Jacks&Novy 2018)
Institutions	Share of serfs	-1.03	+0.2= $-1.03(0 - 0.194)$	W.Europe 1900 (Roses&Wolf 2018)

- Overall + 102.4% or an increase of GRP per capita in an average province from 1325 to 2682 1990USD, i.e. to European average in 1900 (2609)

Labor Productivity, Market Potential, Specialization and Economy of Scale

	(1)	(2)	(3)
Sea dummy	0.30***	0.36***	0.25***
Share in mining	6.99**	14.52***	13.92***
Share of serfs	-0.17	-0.50***	-0.19**
Log distance to Moscow	-0.03	-0.16***	-0.11***
Log MP	0.18***	0.21**	0.05
Specialization index for agriculture	0.67*		
	[0.368]		
Specialization index for industry	1.03***		
	[0.198]		
Specialization index for services	-0.36**		
	[0.163]		
Log Mean industrial firm revenue		0.15***	
		[0.044]	
Share of urban population			1.55***
			[0.203]
Constant	2.86***	2.20**	4.94***
	[0.782]	[0.994]	[0.766]
Observations	97	79	97
R-squared	0.691	0.587	0.685

Labor Productivity, Market Potential, Specialization and Economy of Scale

- Both measures of specialization and economy of scale were correlated with labor productivity
- Market potential robust to available controls on the level of region specialization and economy of scale effect (while magnitude decreases)
- Most likely MP operated via agglomeration effect

Legacy of Serfdom: Channels

	(1)	(2)	(3)	(4)
Sea dummy	0.40***	0.43***	0.29***	0.31***
	[0.104]	[0.109]	[0.083]	[0.093]
Share of employment in mining	15.05***	20.45***	12.69***	13.81***
	[4.493]	[4.659]	[4.224]	[4.675]
Share of serfs in 1858	-0.28	-0.58***	-0.34***	-0.31**
	[0.170]	[0.151]	[0.103]	[0.133]
Log distance to Moscow	-0.22***	-0.27***	-0.21***	-0.12**
	[0.042]	[0.035]	[0.025]	[0.048]
Log market potential	0.15	0.14	0.30***	0.07
	[0.095]	[0.176]	[0.084]	[0.106]
Share of large estates in 1858	-0.17			
	[0.101]			
Share of land with state tenure		-0.49		
		[0.311]		
Share of land with commune tenure		-0.91**		
		[0.407]		
Share of in-migrants			2.34***	
			[0.722]	
Share of out-migrants			-1.54**	
			[0.590]	
Literacy				0.81**
				[0.325]
Constant	4.86***	5.76***	3.20***	4.80***
	[1.129]	[2.066]	[0.881]	[1.096]
Observations	97	60	89	89
R-squared	0.508	0.674	0.617	0.556

Legacy of Serfdom: Channels

- The legacy of serfdom was more pronounced in large estates (consistent with Galor and Moav 2009)
 - Or the emancipation reform disorganized production specifically in large estates (unlikely because of more than thirty years lag)
- Communal land ownership was negatively correlated with productivity (in line with Gerschenkron 1965).
 - Or the land reform transferred too few lands to peasant farmers
- Negative legacy of serfdom was partially driven by post-emancipation constraints on peasant resettlement
- Human capital (and urbanization) channels were also in operation (in line with by Bugle and Nafziger 2019)

Sensitivity tests

- Results are broadly stable to
 - Alternative measures of labor productivity based on alternative estimates of nominal incomes
- Potential spatial correlation of standard errors (robust to estimation of standard errors a la Conley (1999) Colella et al. 2018).
 - Labor productivity measured in levels rather than in logs

Concluding Remarks

- Russian empire around 1900: relatively poor country with huge spatial variation in economic development
- All three group of factors – “first-nature” geography,” second-nature” geography and institutions account for this variation
- But geography, especially the ” second-nature” geography, matters most of all
 - Limited space for policy: consistent with relatively stable ratio of economic development indicators in E. to W. Europe (Morris 2019) over the last two centuries despite many policy attempts to close the gap

Provinces of the Russian Empire: Summary Statistics

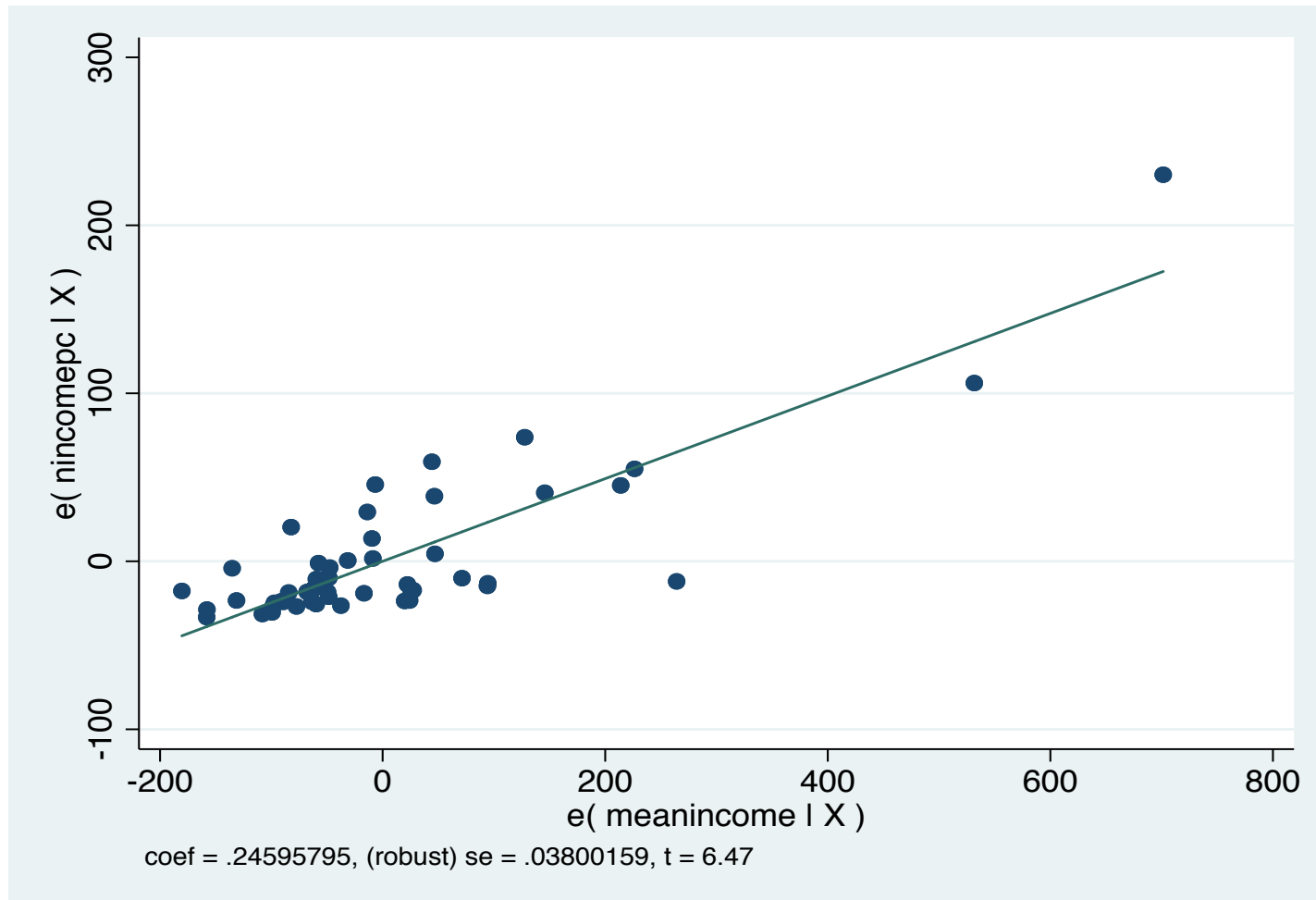
Variable	Obs	Mean	Std. Dev.	Min	Max
Gross regional products in thousand roubles (nominal)	97	100141.8	89506.2	5697.9	641476.7
Gross regional product per capita in roubles, nominal	97	82.6	45.9	28.2	303.7
Gross regional product per capita in roubles, real	97	78.9	31.5	35.5	226.3
Labor productivity (output per working age citizen), roubles	97	150.7	53.8	68.98	356.7
Share of value added in agriculture (nominal)	97	0.57	0.16	0.05	0.82
Share of value added in industry (nominal)	97	0.19	0.13	0.03	0.62
Share of value added in services (nominal)	97	0.25	0.09	0.08	0.67
Population	97	1321843	846421.6	28113	3559229
Share of working age population	97	0.53	0.05	0.47	0.74
Relative price index of consumption goods	97	1.02	0.26	0.76	2.35
Urban share	97	0.13	0.099	0	0.67

Summary Statistics of Alternative Estimates of GRPs

Variable	Obs	Mean	Std. Dev.	Min	Max
Gross regional product per capita in roubles (nominal), baseline estimate	97	82.61	45.86	28.21	303.72
Gross regional product per capita in roubles (nominal), no upward cereals correction	97	80.35	45.89	27.51	302.85
Gross regional product per capita in roubles (nominal), no public infrastructure	97	81.59	45.24	27.82	297.11
Gross regional product per capita in roubles (nominal), no revenues from sales of horses	97	82.56	45.87	28.08	303.70
Gross regional product per capita in roubles (nominal), no revenues from sales of hay and straw	97	82.33	45.68	28.16	301.87
Gross regional product per capita in roubles (nominal), 1900 value added to output industrial ratio	97	79.15	43.30	28.13	289.18
Gross regional product per capita in roubles (nominal), correction for fodder consumption	97	76.05	45.87	18.70	301.98
Variable	Obs	Mean	Std. Dev.	Min	Max
Gross regional product per capita in roubles (nominal), baseline estimate	97	82.61	45.86	28.21	303.72
Gross regional product per capita in roubles (nominal), no upward cereals correction	97	80.35	45.89	27.51	302.85
Gross regional product per capita in roubles (nominal), no public infrastructure	97	81.59	45.24	27.82	297.11

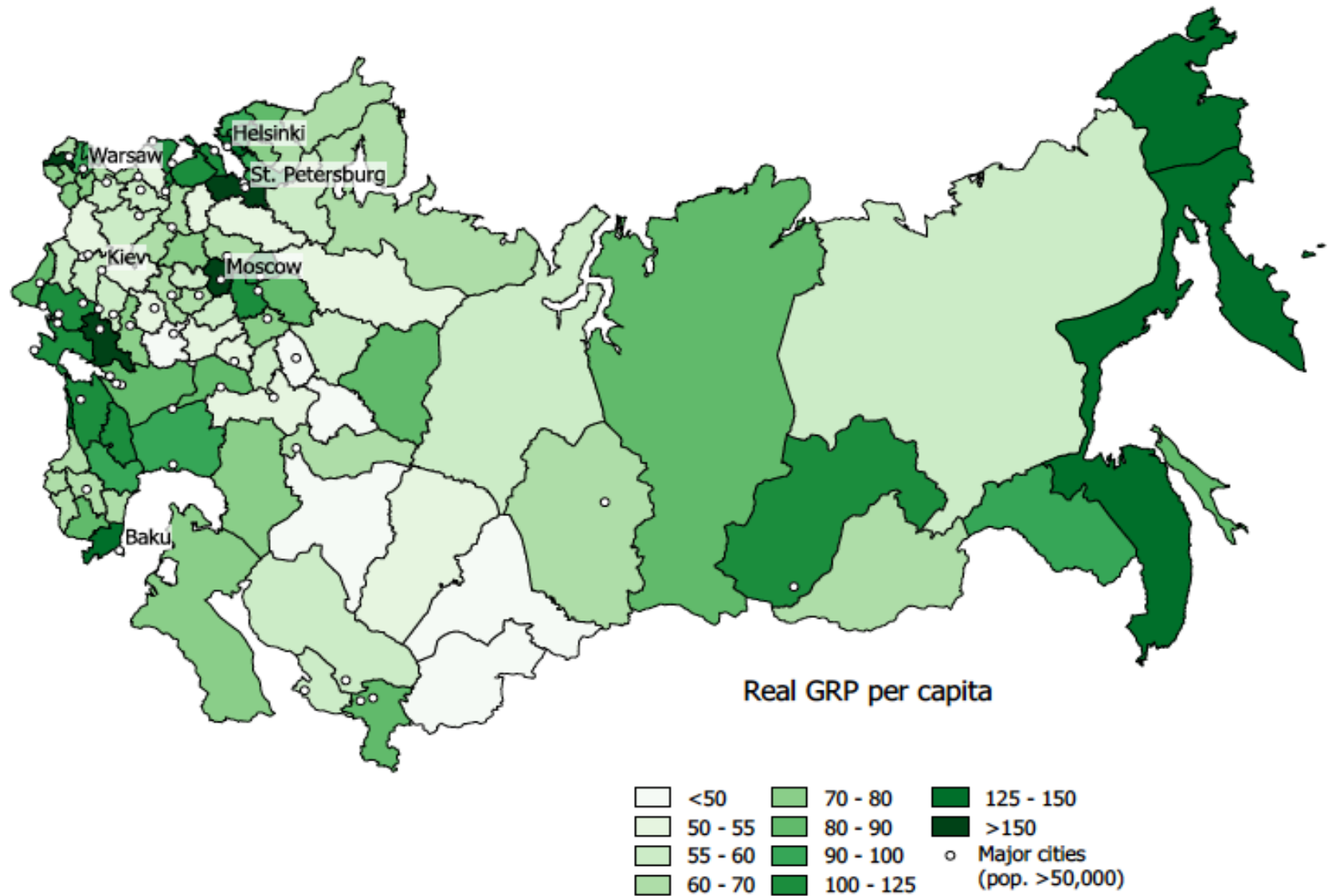
Validity check:

Markevich (2019) vs Lindert and Nafziger (2014)

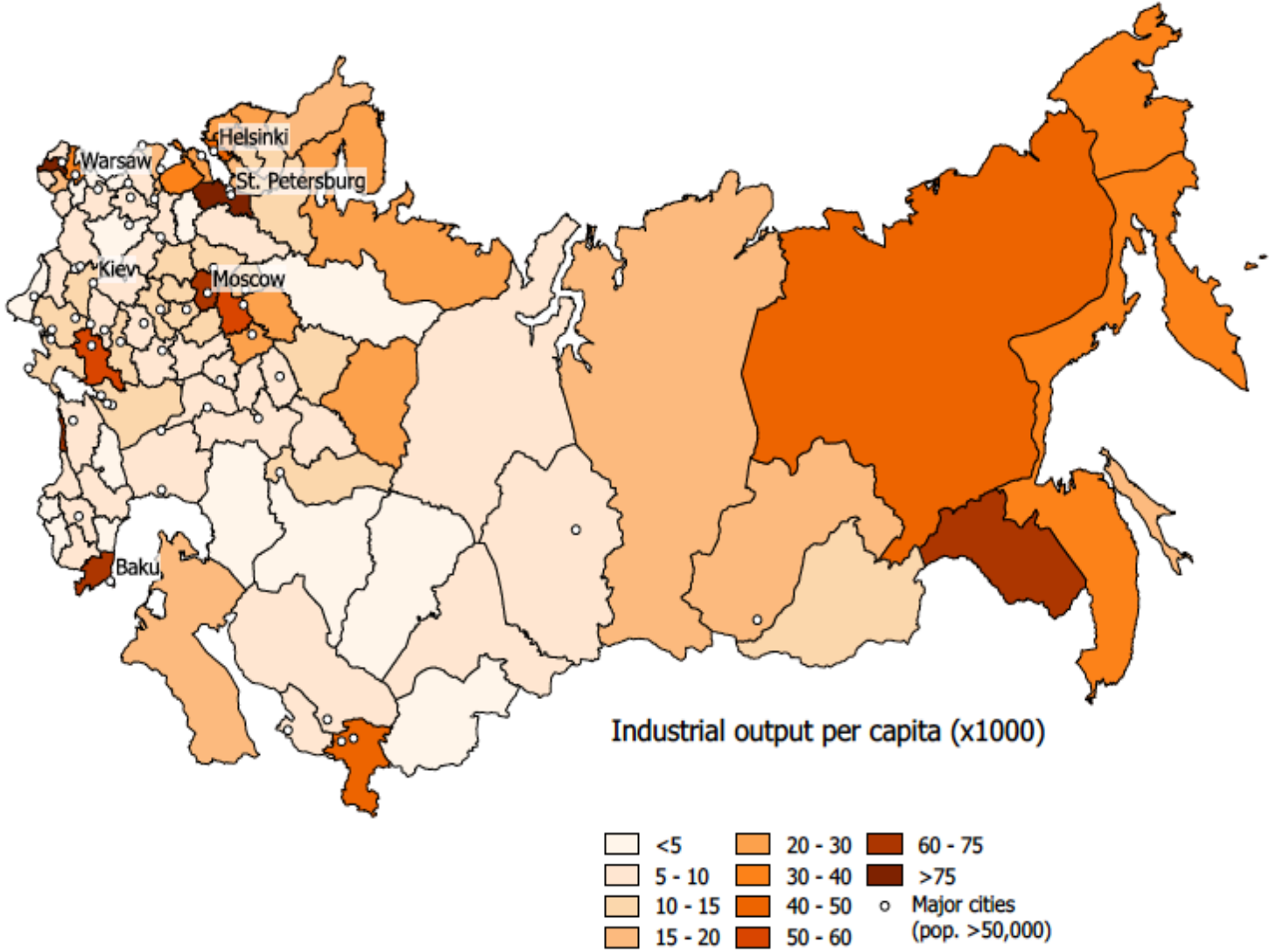


Notes: Markevich 1897 GRPs per capita reconstructed from the production size (Y-axis) vs. Lindert and Nafziger 1904 mean household income reconstructed from the income side (X-axis).

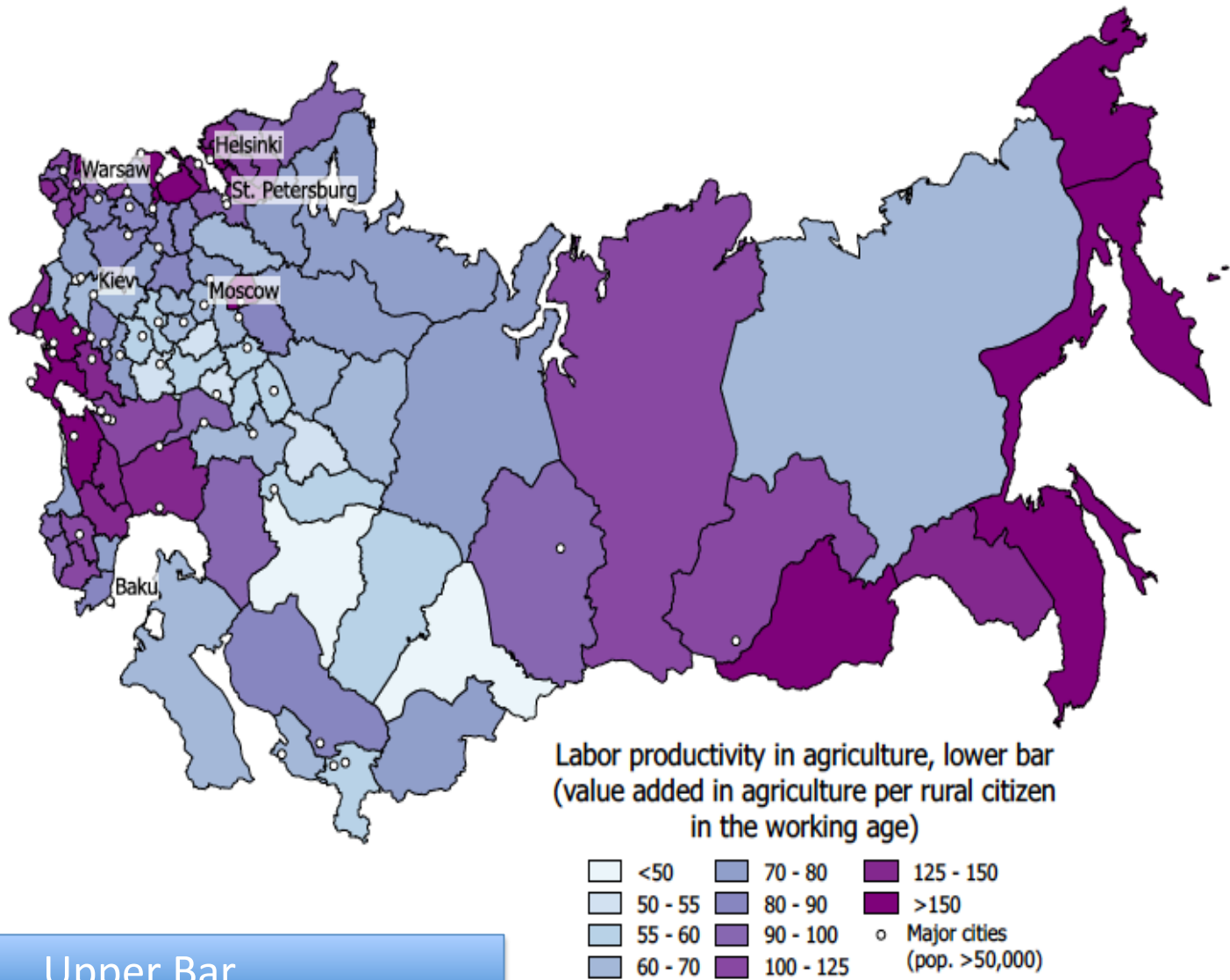
Real GRP per capita (1897 rubles)



Industrial Gross Value Added per capita (1897 rubles)

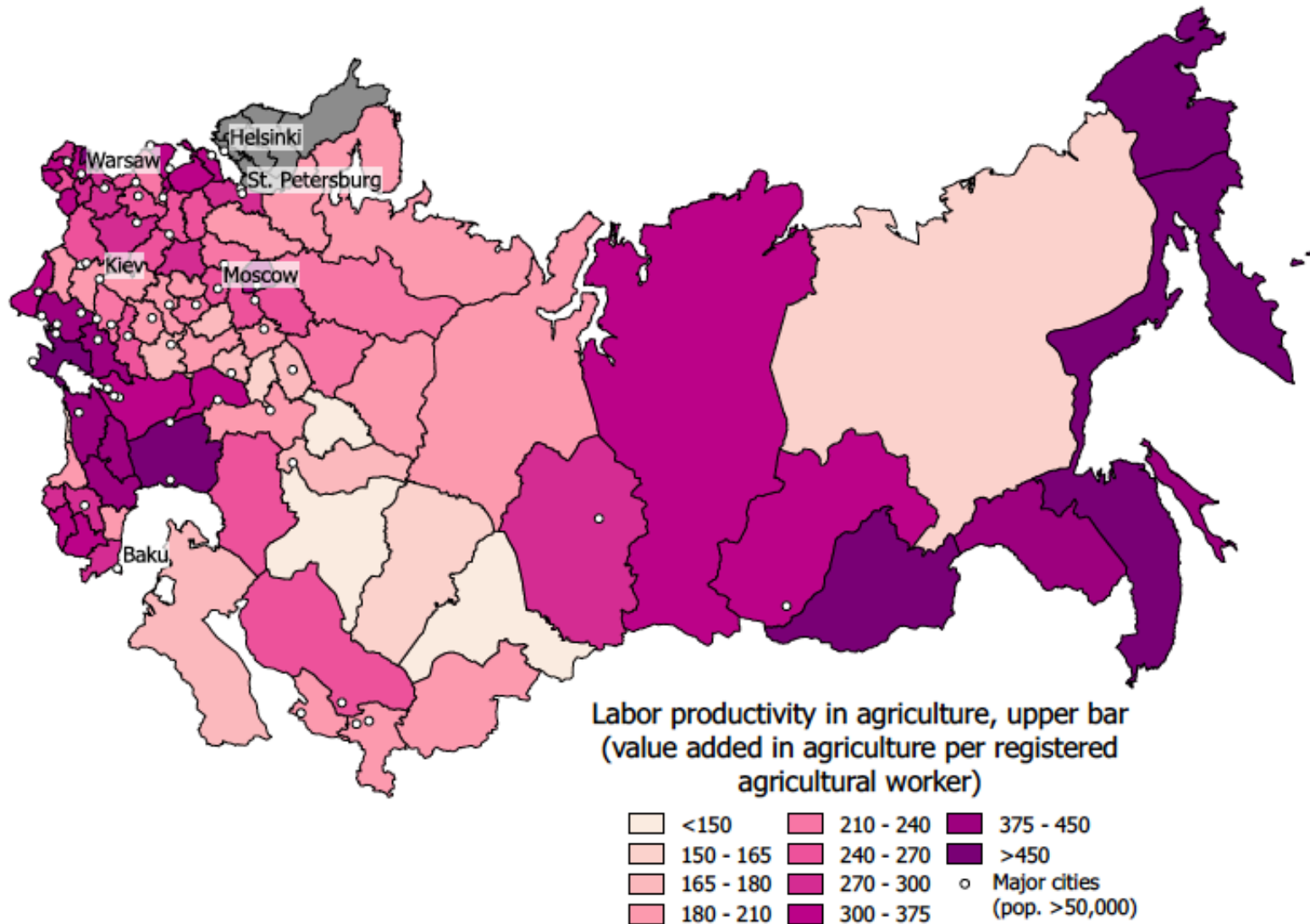


Labor Productivity in Agriculture, Lower Bar (1897 rubles)



Upper Bar

Labor Productivity in Agriculture, Upper Bar (1897 rubles)



Labor Productivity and Geography: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ruggedness (log)	-0.02									0.13
Log length of rivers	[0.044]									[0.091]
		0.06								0.02
Log temperature in 1901-1910 (mean)		[0.065]								[0.105]
Log precipitation in 1901-1910 (mean)			0.16							-0.17
			[0.103]							[0.533]
Log relative humidity in 1901-1910 (mean)				0.16						-0.029
				[0.128]						[0.327]
					0.24					-0.74
Log vapor pressure in 1901-1910 (mean)					[0.206]					[0.811]
						0.33*				[0.924]
						[0.173]				[0.651]
Land suitability for cereals (log)							0.00			-0.017
							[0.015]			[0.0497]
Longitude (log)								-0.20**		[-0.148]
								[0.081]		[0.218]
Latitude (log)									-0.01	1.29
									[0.378]	[1.030]
Constant	4.92***	5.07***	4.46***	4.36***	3.92***	4.29***	4.95***	5.66***	5.00***	2.61
	[0.050]	[0.158]	[0.300]	[0.473]	[0.885]	[0.343]	[0.064]	[0.315]	[1.486]	[4.915]
Observations	97	97	97	97	97	97	97	97	97	97
R-squared	0.003	0.007	0.013	0.014	0.012	0.042	0.000	0.045	0.000	0.082

Labor Productivity and Institutions: Robustness

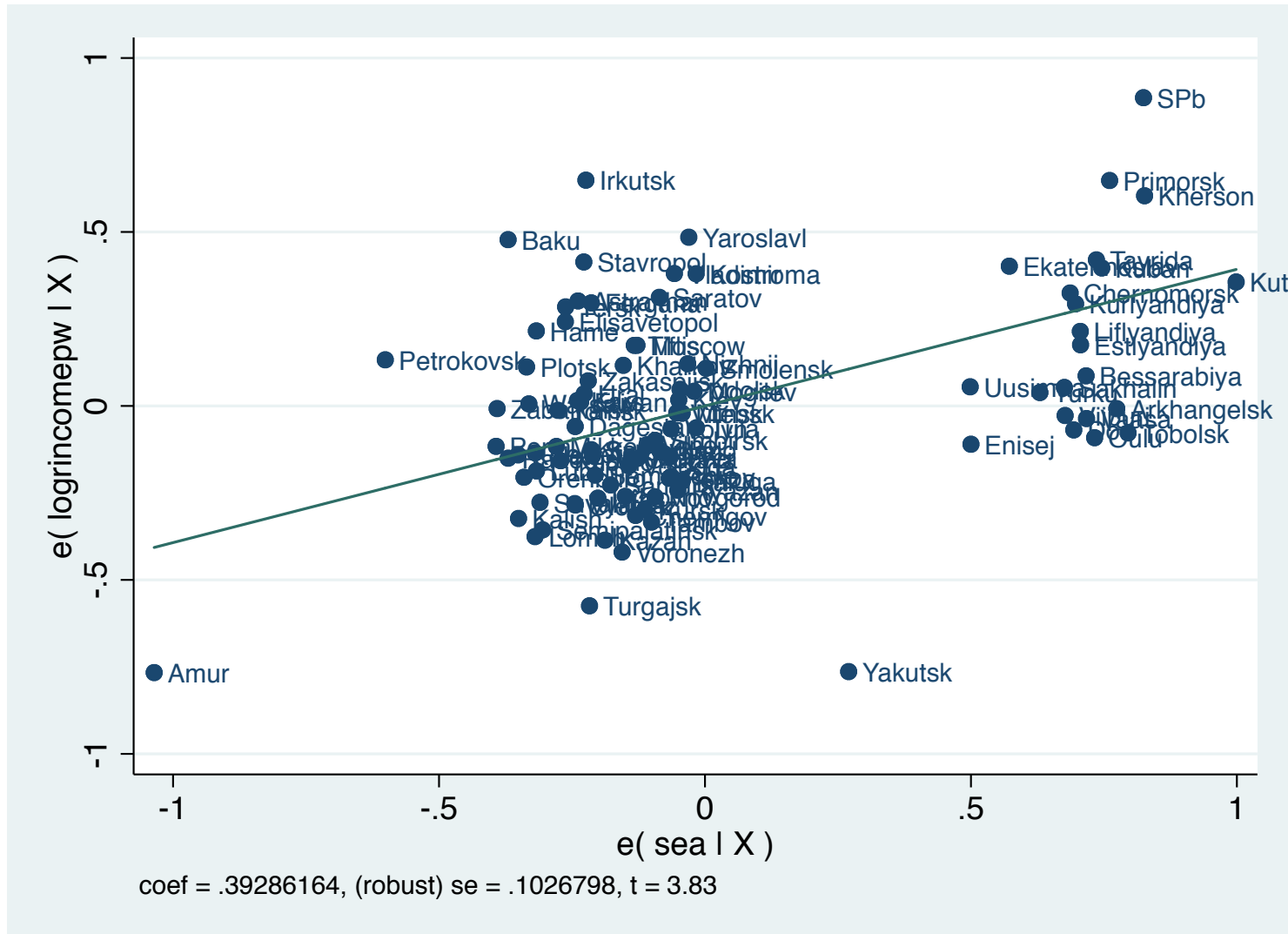
	(1)	(2)	(3)	(4)	(5)	(6)
Zemstvo dummy	0.05					
	[0.084]					
Oblast dummy		-0.08				
		[0.097]				
Share of cities with 1892 city charters			-0.13			
			[0.090]			
Number of years in the Russian empire (log)				0.01		
				[0.050]		
Share of orthodox					-0.02	
					[0.100]	
Religious diversity						0.13
						[0.195]
Constant	4.92***	4.96***	5.05***	4.91***	4.96***	4.91***
	[0.040]	[0.048]	[0.080]	[0.250]	[0.067]	[0.066]
Observations	97	97	96	97	97	89
R-squared	0.006	0.006	0.017	0.000	0.000	0.005

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Determinants of Labor Productivity in the Russian Empire: an Extension

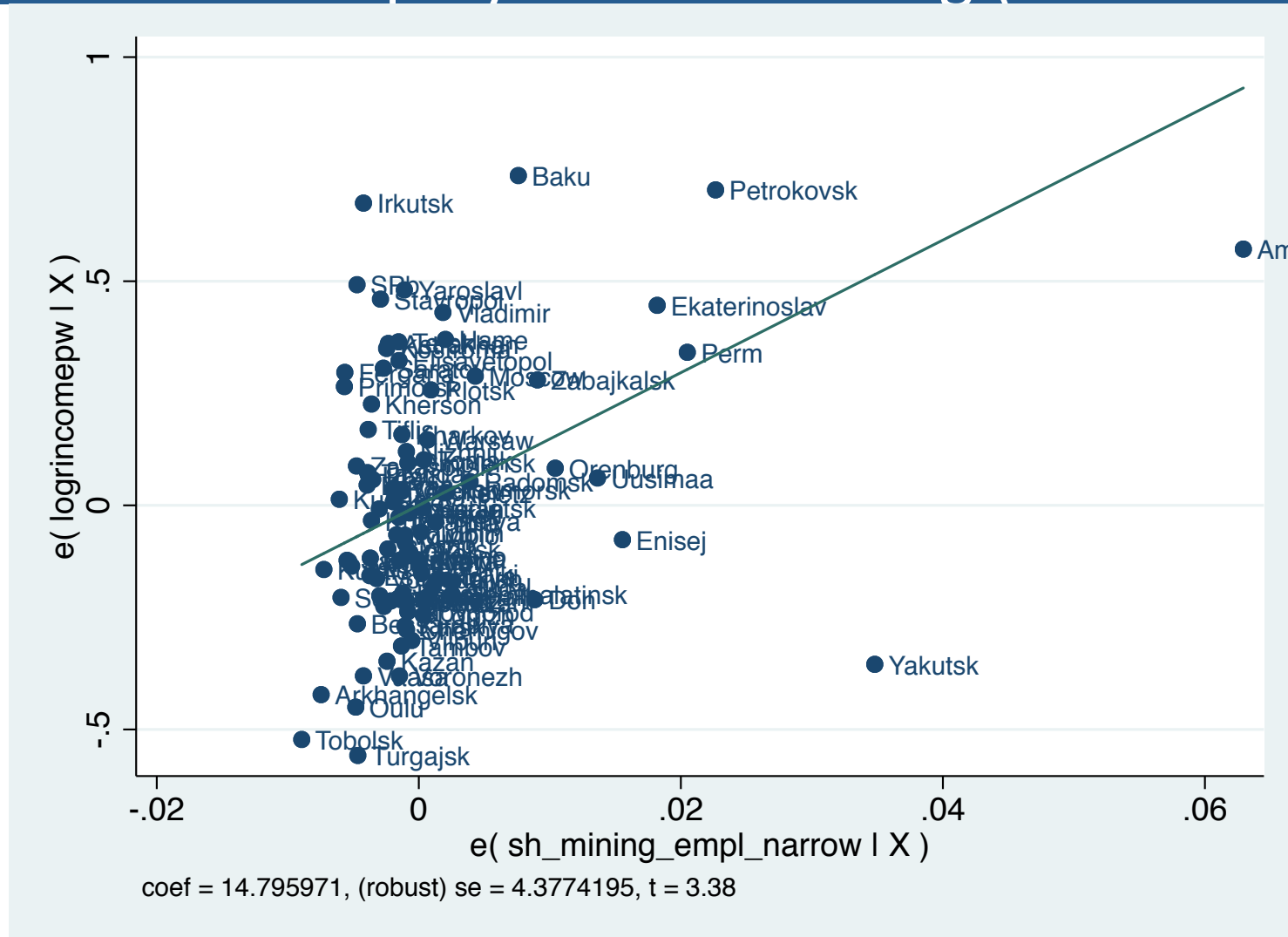
	(1)	(2)	(3)
	OLS	OLS	OLS
Black sea dummy	0.44***		
	[0.108]		
Baltic sea dummy	0.74***		
	[0.198]		
North seas dummy	-0,07		
	[0.096]		
Pacific ocean dummy	0.65***		
	[0.104]		
Minimum distance to ports (log)		-0.18***	
		[0.053]	
Share of employment in mining relative to registered workers			6.64**
			[2.976]
Constant	4.19***	5.40***	4.24***
	[0.042]	[0.344]	[0.052]
Observations	97	97	89
R-squared	0,335	0,189	0,06
	OLS	OLS	OLS

Conditional Scatter Plot for Labor Productivity in 1897 and Sea Dummy



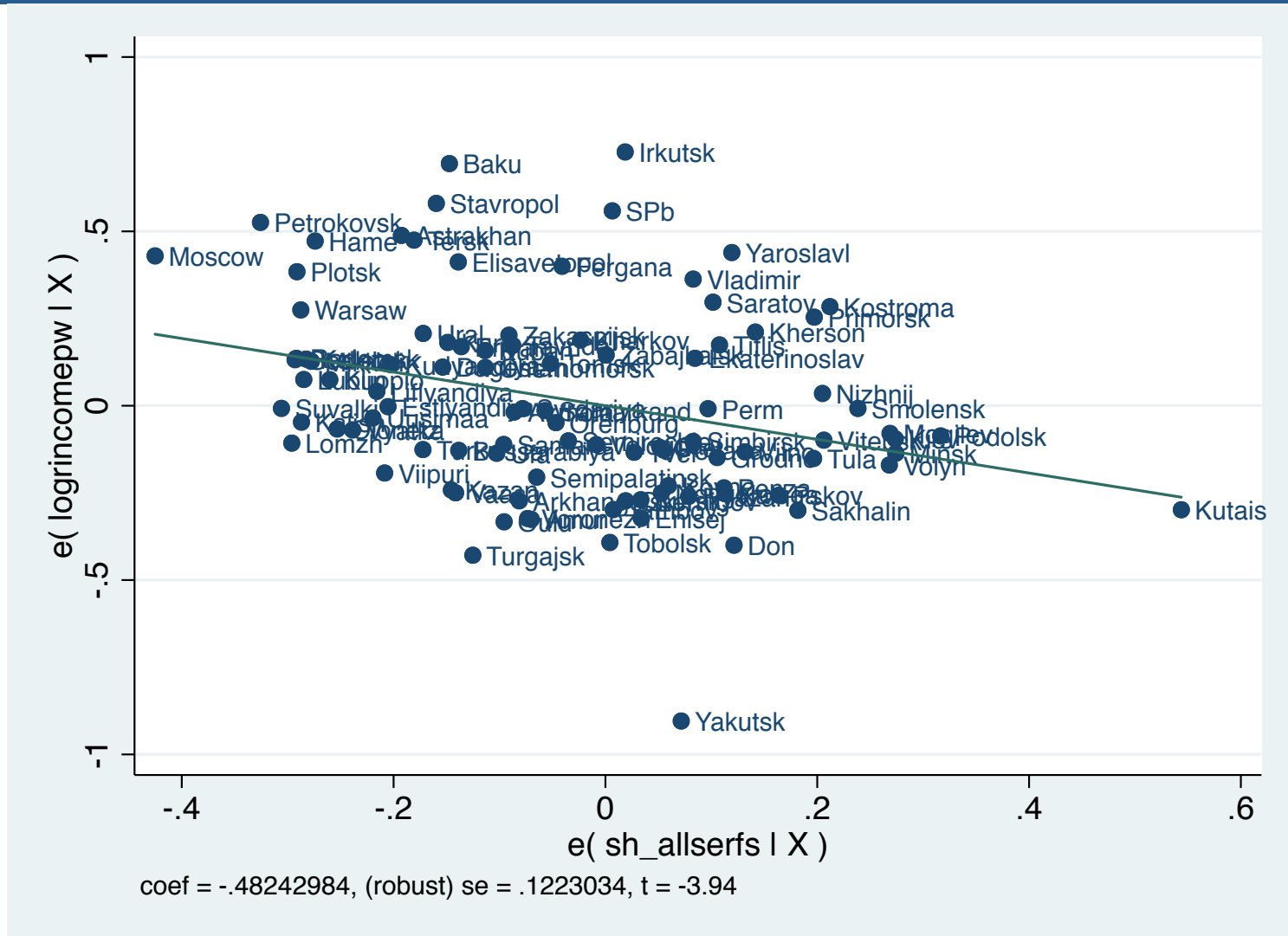
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Conditional Scatter Plot for Labor Productivity and the Share of Employment in Mining (both in 1897)



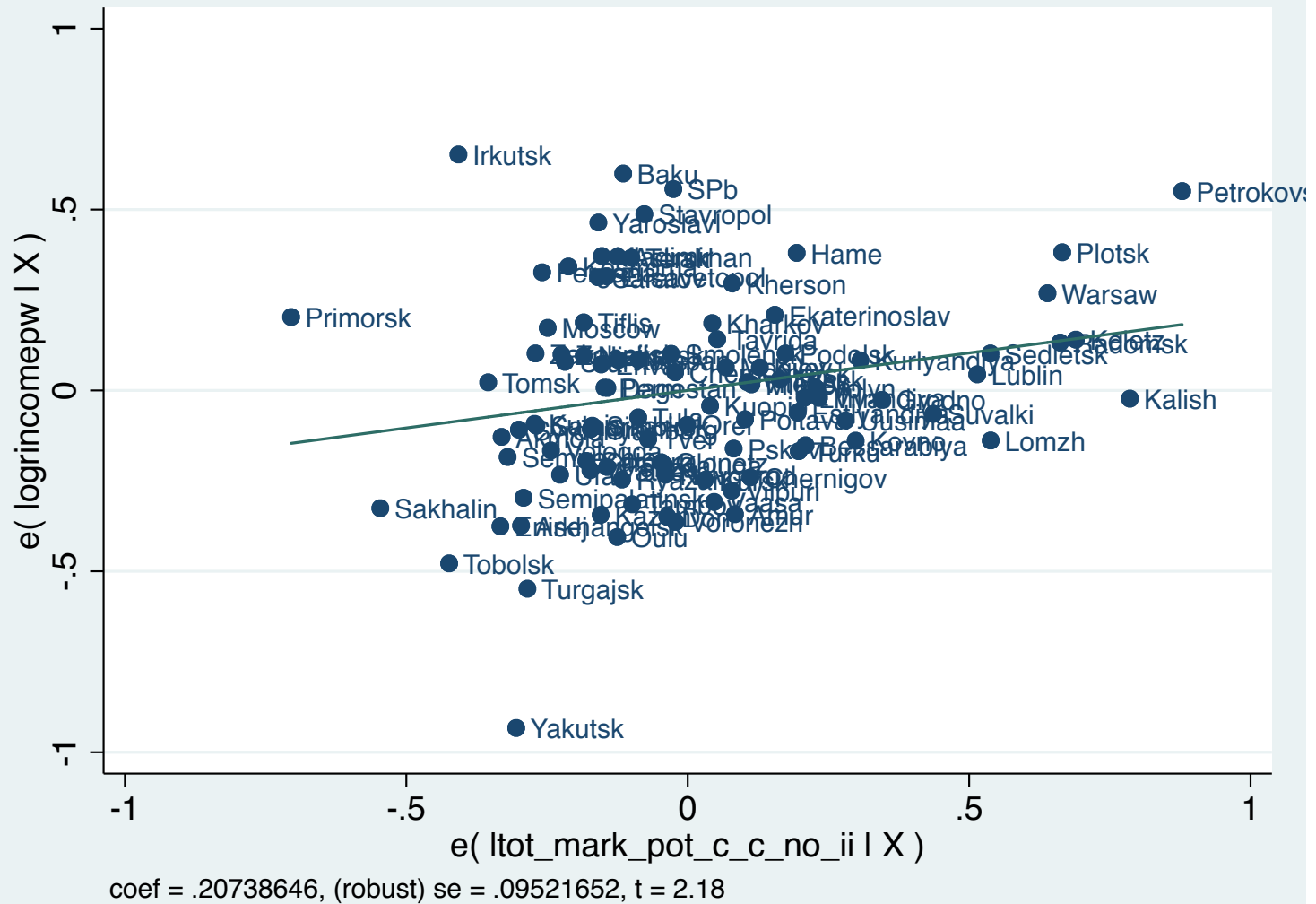
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Conditional Scatter Plot for Labor Productivity in 1897 and the Share of Serfs in 1858



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Conditional Scatter Plot for Labor Productivity in 1897 and Market Potential



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