Child mortality in late Imperial Russia

Patterns and Explanations

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Motivation: the living standards debate

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- The view was widespread not only in the Soviet historiography (for obvious ideological reasons), but also among many Western scholars (Robinson, 1967; Gatrell, 1986; Allen, 2003).
- It was a convenient way to explain three Russian revolutions in the beginning of the 20^{th} century.

The living standards debate: the ”revisionist” view

- The ”traditional” view has been challenged recently by a series of high-quality empirical studies:
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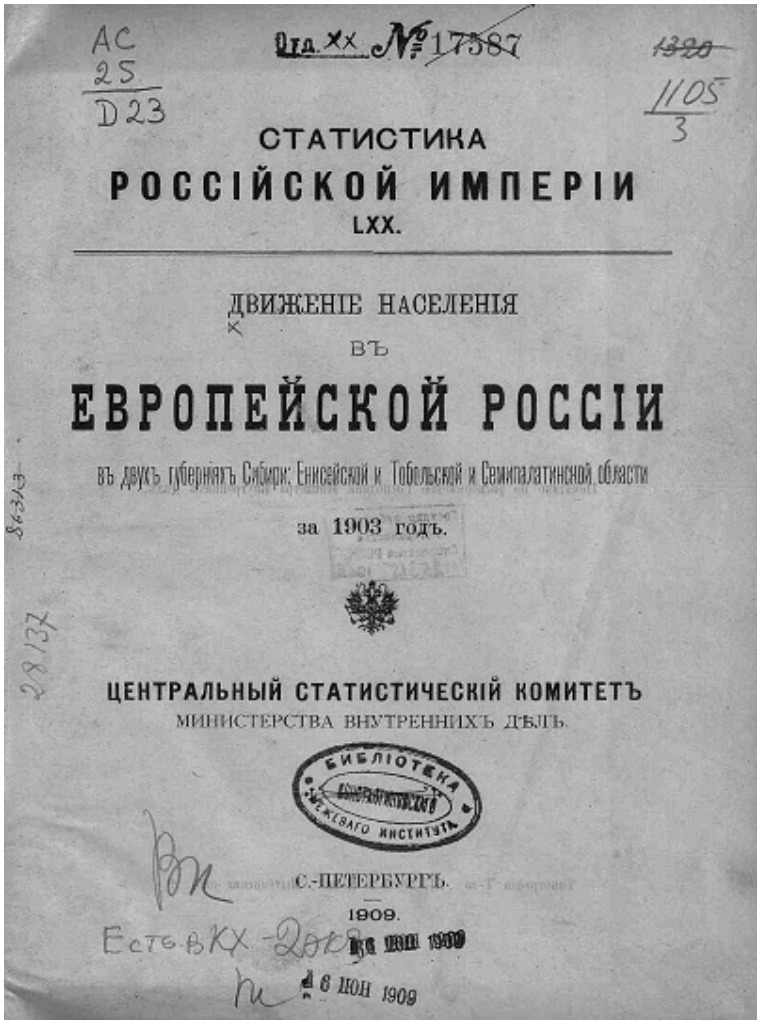
- *"The optimism of this revisionist view, however, is* ***difficult to reconcile with persistently high infant and child mortality****, and high levels of income inequality even within rural societies."* (Dennison and Nafziger, 2012)

Data: official medical and demographic records, 1867-1911.



СТАТИСТИКА
РОССІЙСКОЙ ИМПЕРІИ
LXX.

ДВИЖЕНІЕ НАСЕЛЕНІЯ
ВЪ
ЕВРОПЕЙСКОЙ РОССІИ
въ двухъ губерніяхъ Сибири: Енисейской и Тобольской и Семипалатинской области
за 1903 годъ.

ЦЕНТРАЛЬНЫЙ СТАТИСТИЧЕСКІЙ КОМИТЕТЪ
МИНИСТЕРСТВА ВНУТРЕННИХЪ ДѢЛЪ.

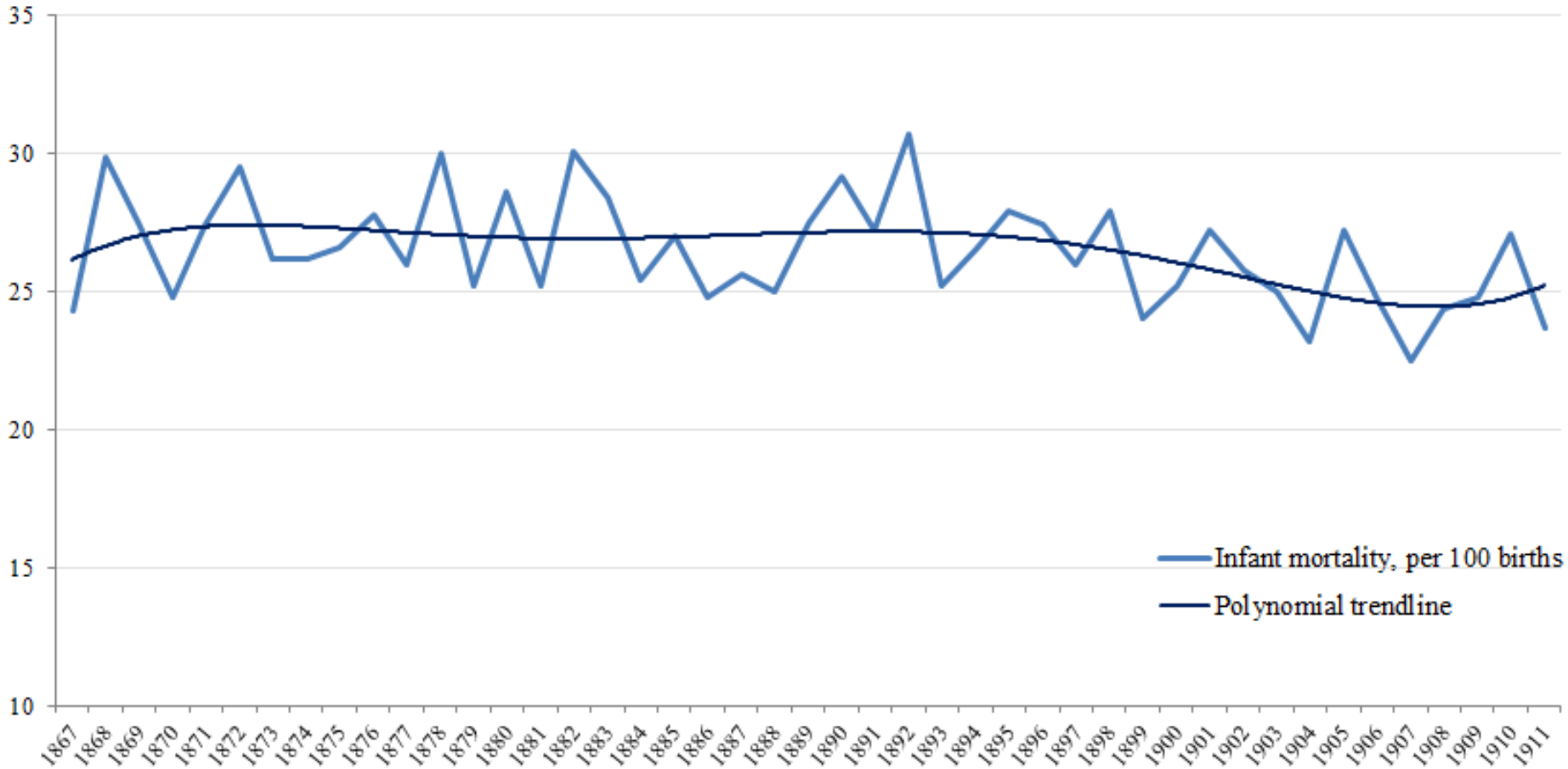
С.-ПЕТЕРБУРГЪ.
1909.

УПРАВЛЕНІЕ ГЛАВНАГО ВРАЧЕБНАГО ИНСПЕКТОРА М. В. Д.

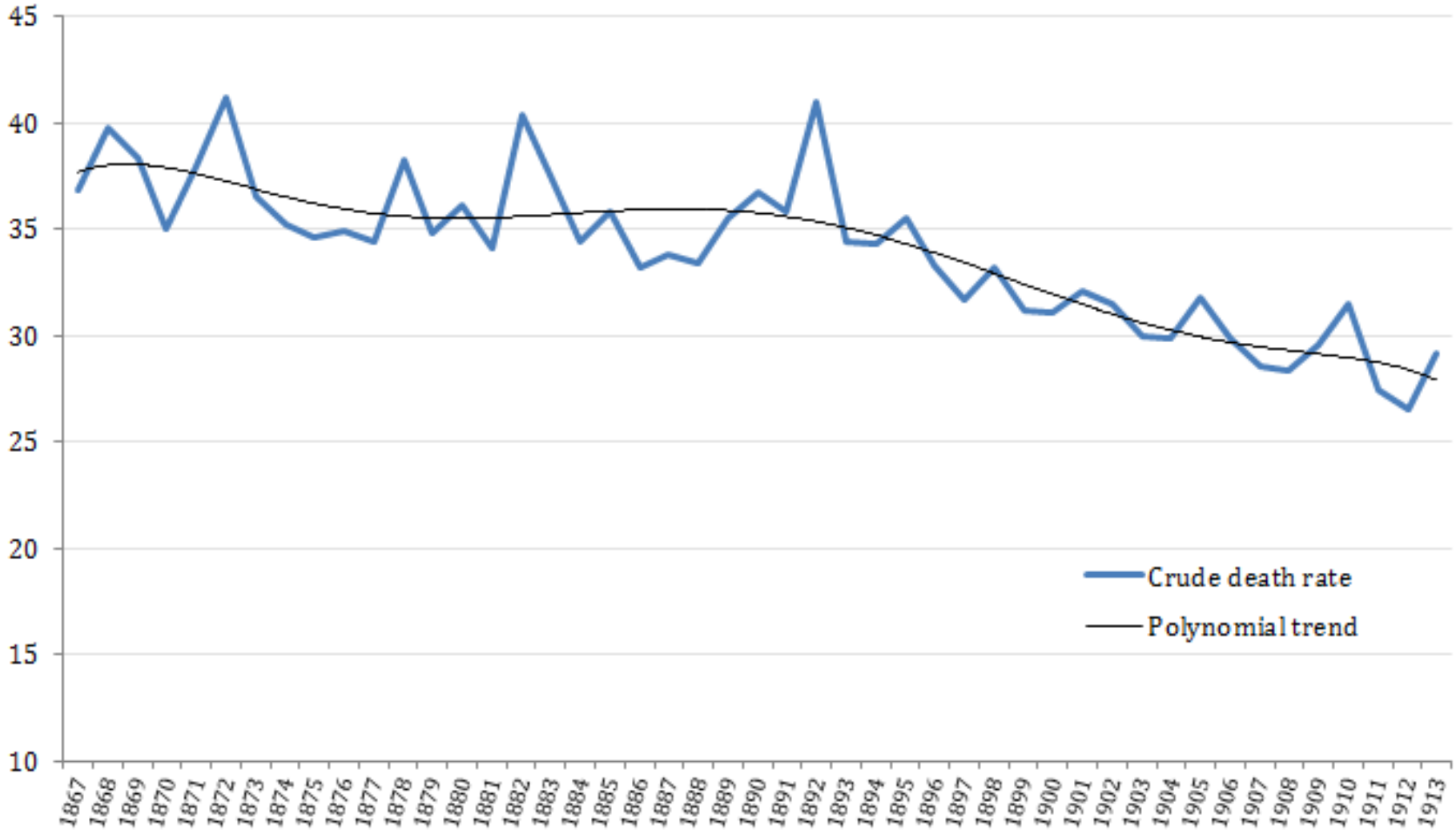
ОТЧЕТЪ
О СОСТОЯНІИ
НАРОДНАГО ЗДРАВІЯ
И
ОРГАНИЗАЦІИ ВРАЧЕБНОЙ ПОМОЩИ ВЪ РОССІИ
за 1903 годъ.

С.-ПЕТЕРБУРГЪ.
Типографія Министерства Внутреннихъ Дѣлъ.
1905.

Infant mortality rate (per 100 births)



Crude death rate (per 1000 population)



A puzzle

- Infant mortality in Russia in the late 19^{th}- early 20^{th} century was among the highest in Europe.
- Infant mortality rates were very stable in time despite sustained growth in agricultural productivity and improvements in nutrition.
  - GDP per capita increased by 44% from 1885 to 1911
  - Crude death rate decreased by 27.5% from 1867 to 1911

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- Infant mortality rates were very stable in time despite sustained growth in agricultural productivity and improvements in nutrition.
  - GDP per capita increased by 44% from 1885 to 1911
  - Crude death rate decreased by 27.5% from 1867 to 1911
- Meanwhile, infant mortality rate decraces only by 2.5% for the same period.

A puzzle continued: crop productivity and mortality

$$Mortality_{it} = \beta_0 + \beta_1 GrainProductivity_{it} + \gamma_t + \alpha_i + \varepsilon$$

	(1)	(2)	(3)	(4)	(5)	(6)
	Infant mortality, per 100 births			Child mortality 1-2	Child mortality 2-5	Crude death rate
Grain productivity (lagged)	-0.088***	-0.096**	-0.048	-0.290***	-0.269***	-0.136*
	(-2.81)	(-2.01)	(-1.01)	(-3.46)	(-3.27)	(-1.97)
Year fixed effects	no	yes	yes	yes	yes	yes
Province fixed effects	no	no	yes	yes	yes	yes
R^2 (within)	0.054	0.059	0.059	0.150	0.369	0.384
Observations	195	195	195	196	196	196

Standardized beta coefficients; t statistics in parentheses

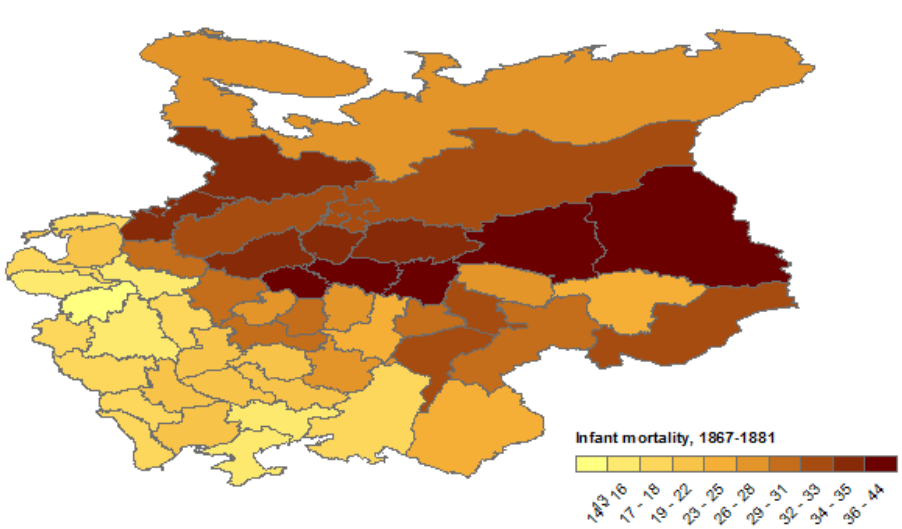
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

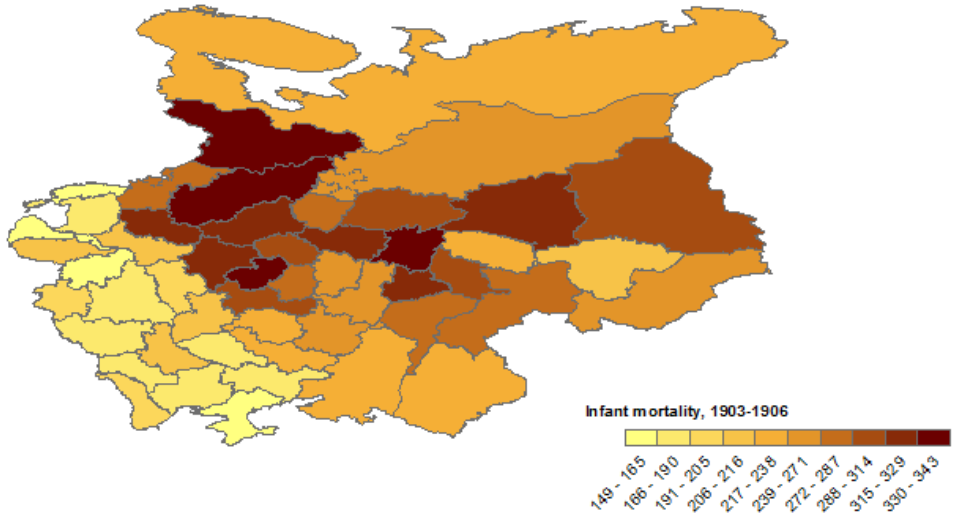
Contemporaries on the problem of high infant mortality

"До возраста 1 года в Европейской части Империи не доживает 1 196 000 ежегодно. Ни одна из заразных болезней не дает такой цифры смертности. Так, в 1887-92 число умерших от азиатской холеры было всего 385 000. Смертность грудных детей представляет, таким образом, громадную эпидемию, из года в год уносящую сотни тысяч жертв."

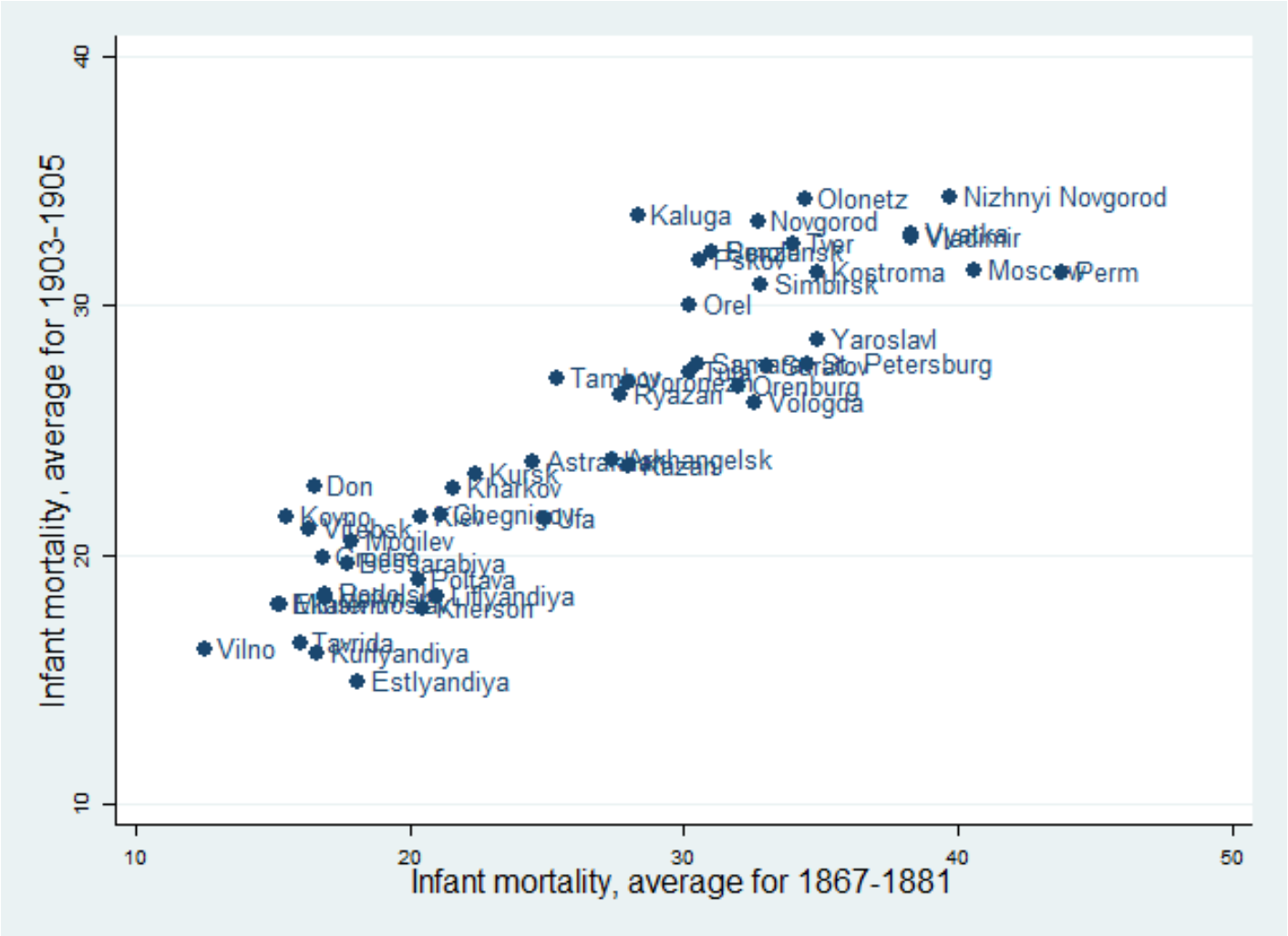
Гундобин Н.П. "Детская смертность в России и меры борьбы с нею" (1906).

Spatial distribution in 1870s and 1900s

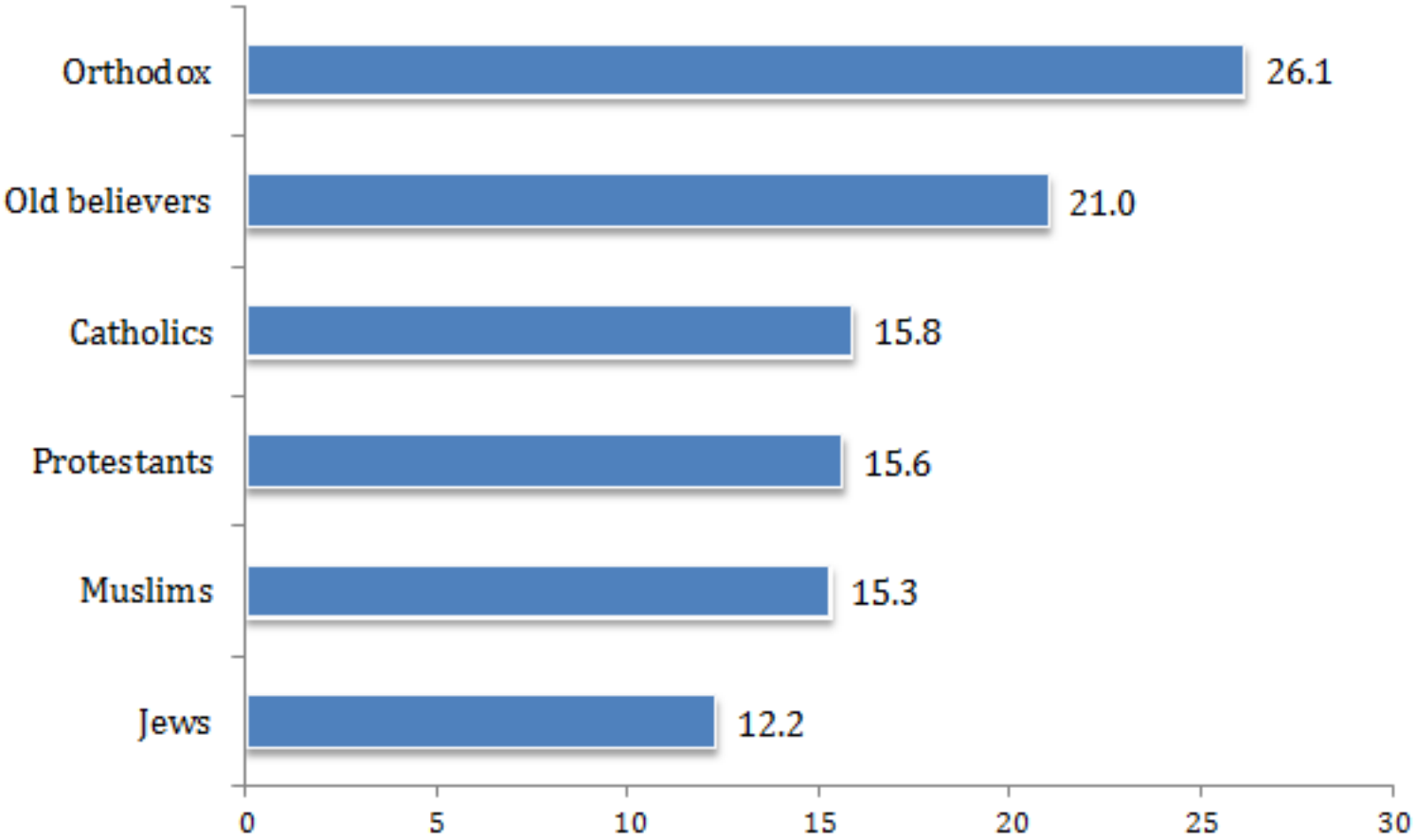




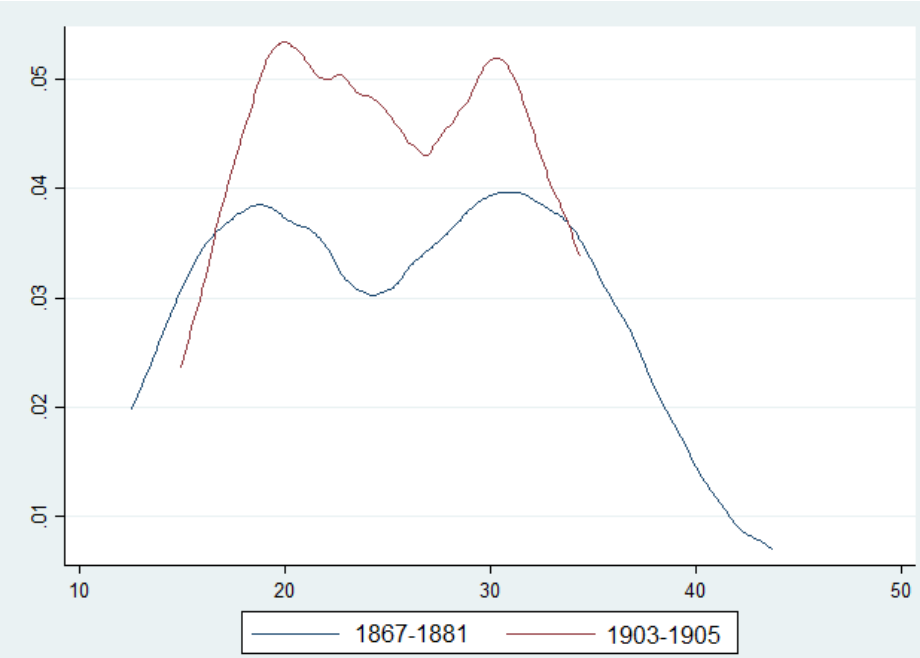
Persistence in spatial distribution of infant mortality

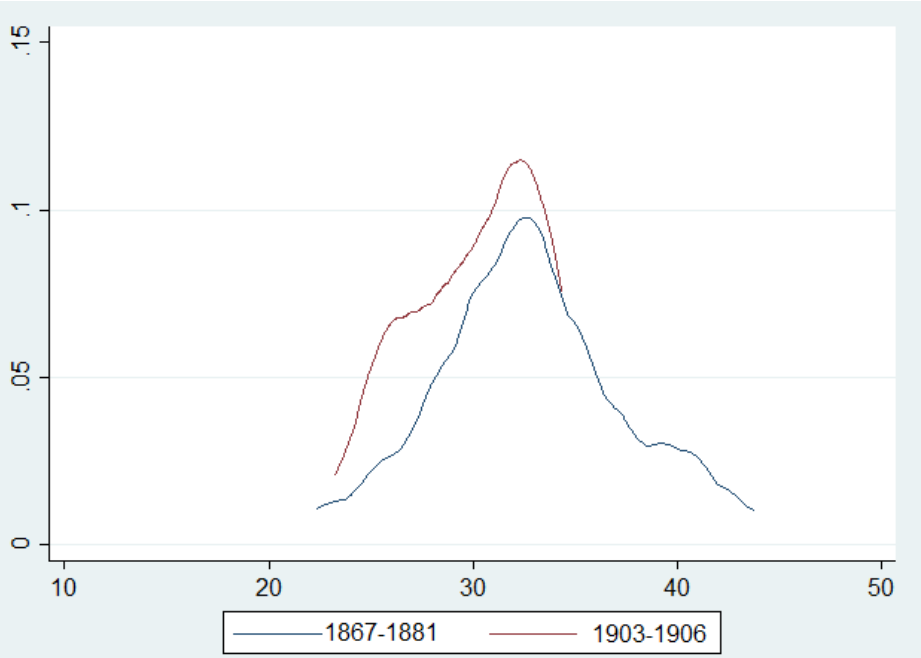


Variation among religious groups



Distributions of infant mortality in 1870s and 1900s



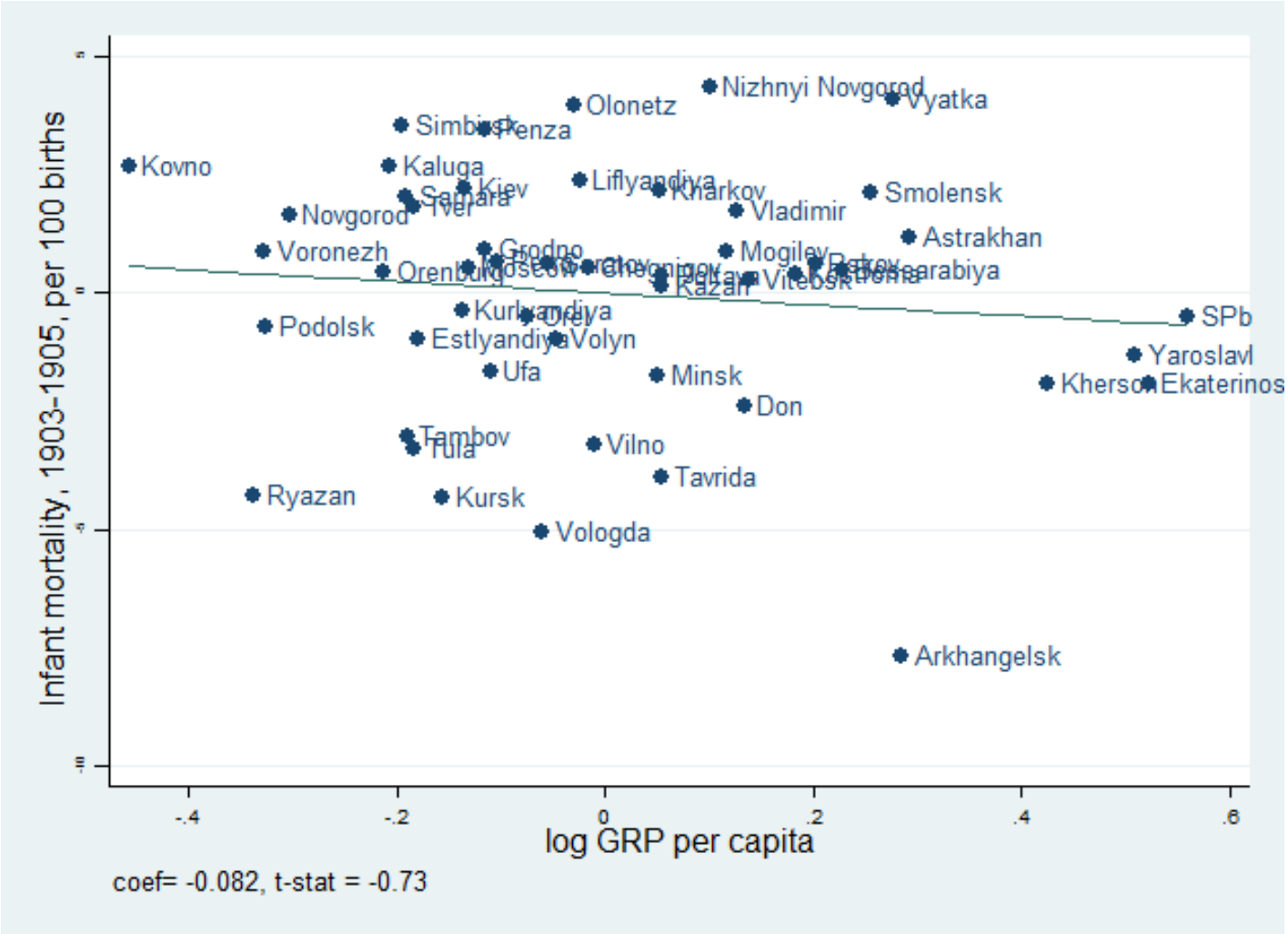


Determinants of infant mortality

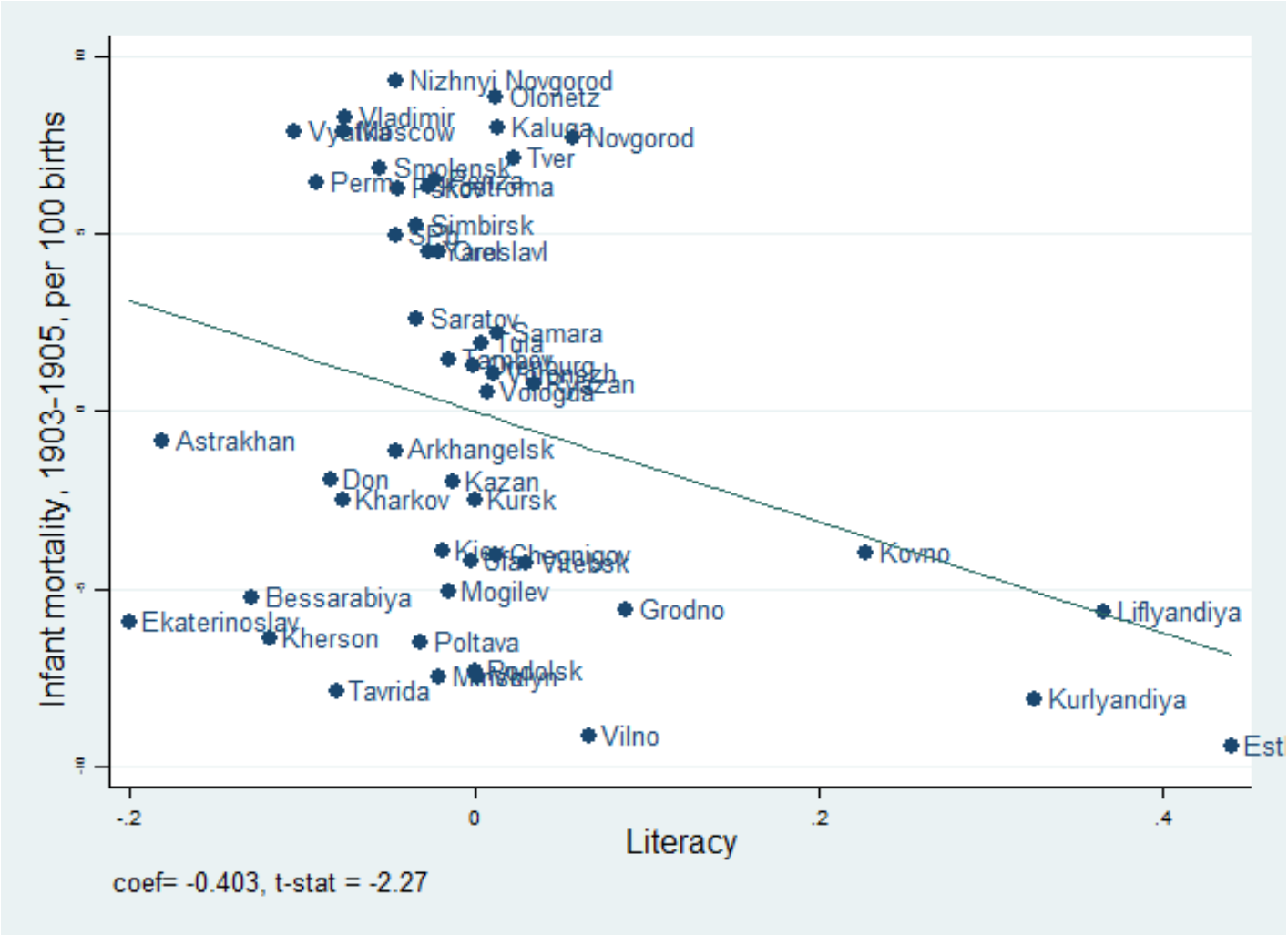
	(1)	(2)	(3)	(4)	(5)
	Infant mortality, average for 1903-1905				
log GRP per capita	-0.114	0.141	0.076	0.071	-0.082
	(-0.79)	(0.79)	(0.36)	(0.40)	(-0.73)
Literacy, %		-0.403**	-0.418**	-0.531***	-0.183
		(-2.27)	(-2.32)	(-3.03)	(-1.56)
Doctors, per 1000			0.110	0.205	0.109
			(0.59)	(1.33)	(1.12)
Latitude				0.537***	0.146
				(4.28)	(1.60)
Longitude				0.261*	-0.014
				(1.89)	(-0.15)
Russians (Velikorus), %					**0.787*****
					(8.34)
R^2	0.01	0.11	0.12	0.51	0.81
Observations	50	50	50	50	50

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

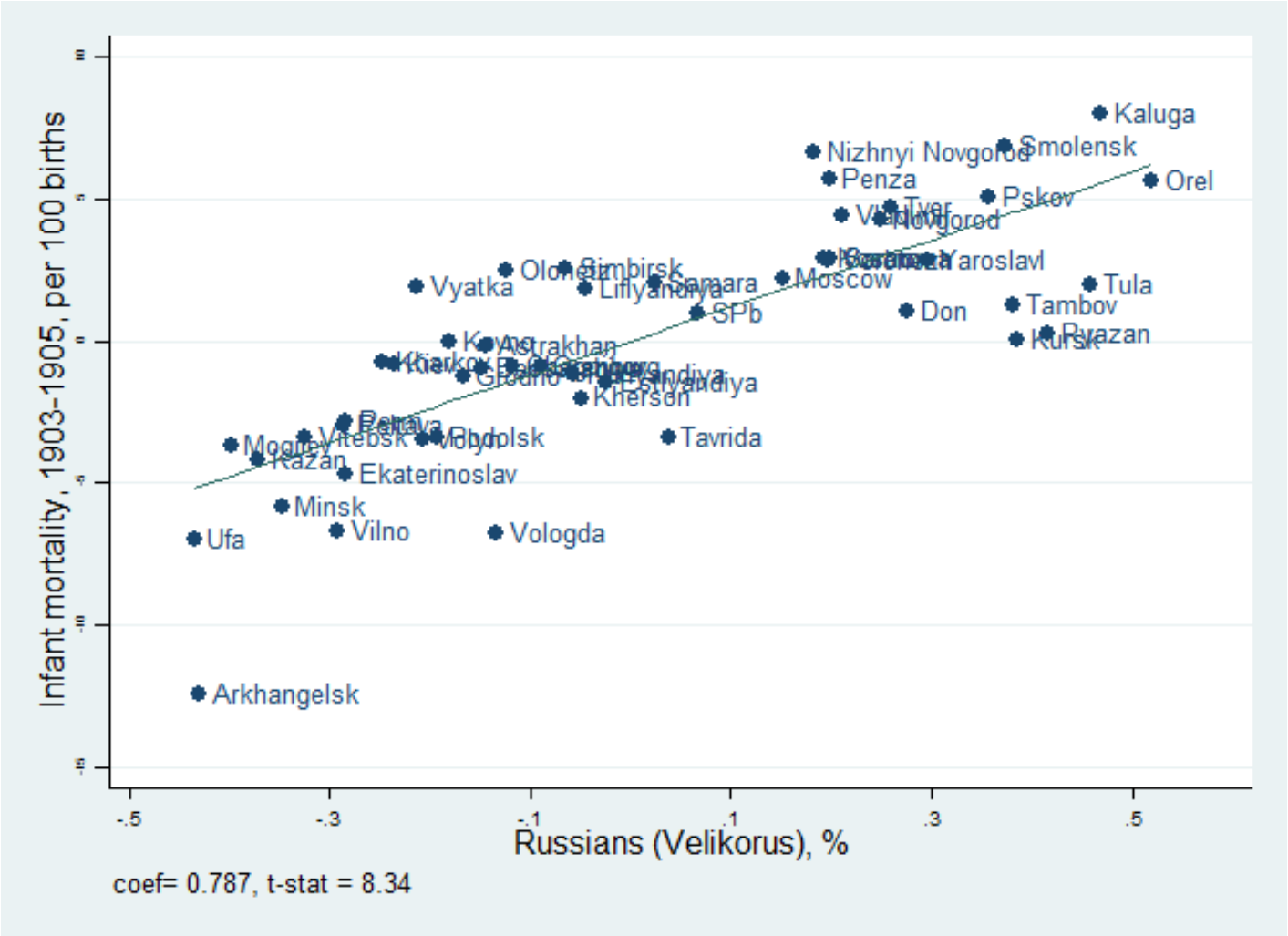
Income and infant mortality



Literacy and infant mortality



Ethnicity and infant mortality

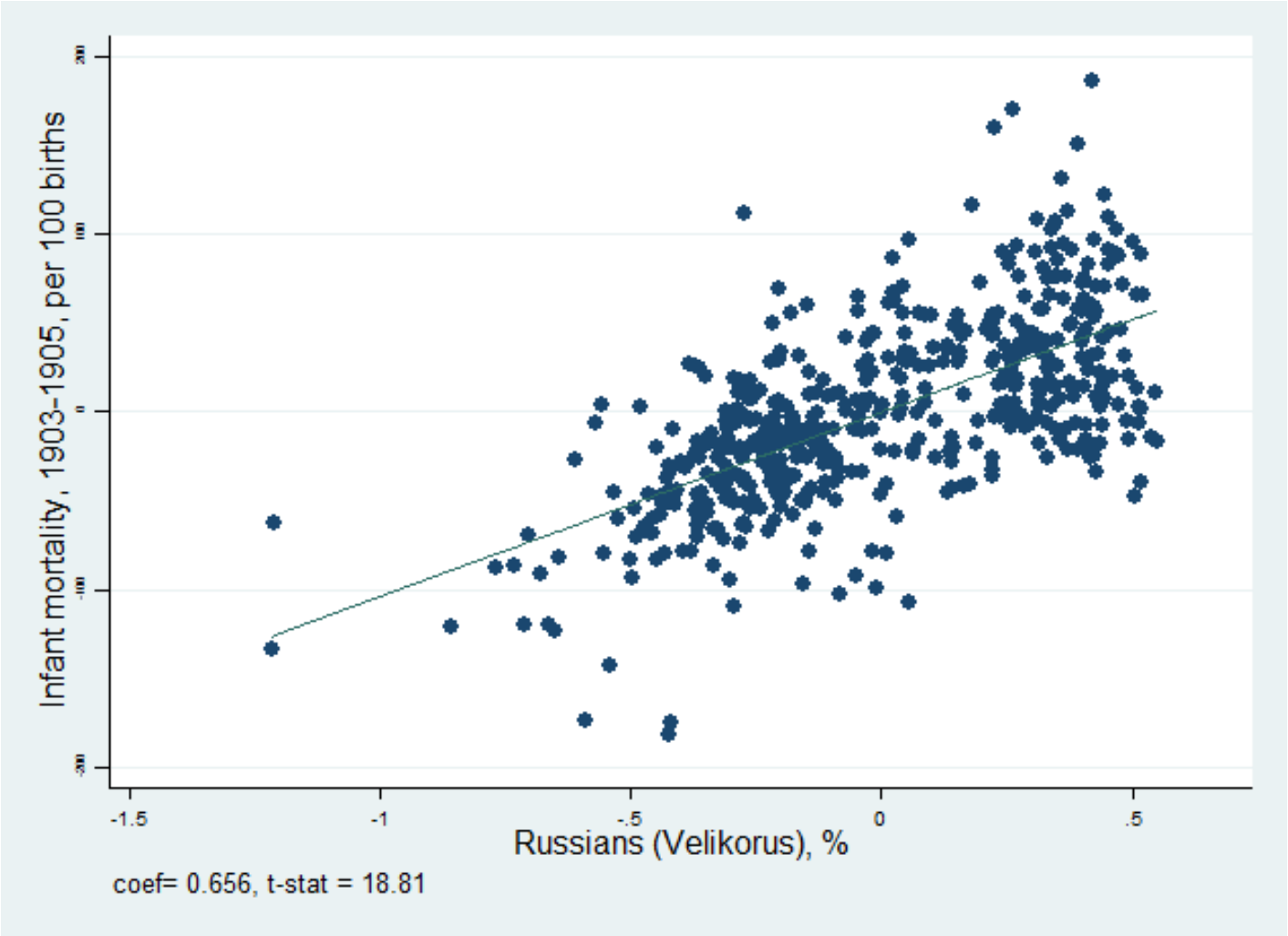


Determinants of infant mortality (district level)

	(1)	(2)	(3)	(4)	(5)
	Infant mortality, average for 1903-1905				
Urbanization, %	0.036	0.007	-0.118	0.149**	0.044
	(0.74)	(0.13)	(-1.54)	(2.27)	(0.86)
Literacy, %	-0.265***	-0.285***	-0.277***	-0.375***	-0.219***
	(-5.54)	(-5.82)	(-5.64)	(-7.98)	(-5.96)
Doctors, per 1000		0.088*	0.086*	0.080**	0.023
		(1.80)	(1.76)	(1.98)	(0.76)
Province capital			0.127**	0.006	0.021
			(2.25)	(0.13)	(0.58)
Major city			0.074	0.008	0.019
			(1.26)	(0.17)	(0.51)
Latitude				0.454***	0.183***
				(11.03)	(5.29)
Longitude				0.274***	0.019
				(6.85)	(0.57)
Russians (Velikorus), %					**0.656*****
					(18.81)
R^2	0.064	0.070	0.080	0.384	0.642
Observations	503	503	503	503	503

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Ethnicity and infant mortality (district level)



Determinants of child mortality over 1 years old

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Infant mortality	Child mortality, 1-2 years old			Child mortality, 2-5 years old		
log GRP per capita	-0.082	0.193	0.278	0.165	0.021	-0.083	-0.031
	(-0.73)	(0.95)	(1.23)	(0.80)	(0.10)	(-0.41)	(-0.15)
Literacy, %	-0.183	-0.530***	-0.622***	-0.365*	-0.302*	-0.073	-0.192
	(-1.56)	(-3.03)	(-2.79)	(-1.70)	(-1.69)	(-0.36)	(-0.91)
Doctors, per 1000	0.109	0.202	0.127	0.056	-0.129	-0.124	-0.091
	(1.12)	(1.11)	(0.65)	(0.32)	(-0.69)	(-0.70)	(-0.52)
Latitude	0.146		-0.014	-0.302*		-0.502***	-0.368**
	(1.60)		(-0.09)	(-1.80)		(-3.49)	(-2.23)
Longitude	-0.014		-0.193	-0.396**		-0.003	0.092
	(-0.15)		(-1.10)	(-2.33)		(-0.02)	(0.55)
Russians (Velikorus), %	**0.787*****			**0.580*****			**-0.270**
	(8.34)			(3.35)			(-1.59)
R^2	0.812	0.174	0.202	0.368	0.136	0.355	0.390
Observations	50	50	50	50	50	50	50

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Determinants of child mortality over 1 years old (districts)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Infant mortality	Child mortality 1-2 years old			Child mortality 2-5 years old		
Urbanization, %	0.044	0.053	0.021	-0.056	0.082	-0.121	-0.088
	(0.86)	(0.69)	(0.26)	(-0.77)	(1.06)	(-1.63)	(-1.19)
Literacy, %	-0.219***	-0.322***	-0.366***	-0.253***	-0.268***	-0.160***	-0.209***
	(-5.96)	(-6.62)	(-6.51)	(-4.76)	(-5.44)	(-3.02)	(-3.91)
Doctors, per 1000	0.023	0.204***	0.204***	0.163***	-0.008	0.004	0.022
	(0.76)	(4.20)	(4.22)	(3.64)	(-0.16)	(0.10)	(0.49)
Province capital	0.021	-0.001	0.022	0.033	-0.009	0.074	0.069
	(0.58)	(-0.02)	(0.40)	(0.64)	(-0.16)	(1.41)	(1.34)
Major city	0.019	-0.036	-0.022	-0.014	-0.085	-0.040	-0.043
	(0.51)	(-0.62)	(-0.38)	(-0.26)	(-1.44)	(-0.73)	(-0.81)
Latitude	0.183***		-0.013	-0.211***		-0.364***	-0.278***
	(5.29)		(-0.27)	(-4.22)		(-7.85)	(-5.53)
Longitude	0.019		-0.150***	-0.336***		-0.123***	-0.043
	(0.57)		(-3.12)	(-6.95)		(-2.73)	(-0.87)
Russians (Velikorus), %	**0.656*****			**0.478*****			**-0.208*****
	(18.81)			(9.49)			(-4.10)
R^2	0.642	0.094	0.116	0.253	0.071	0.218	0.244
Observations	502	503	502	502	503	502	502

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Contemporaries on the causes of high infant mortality

Medical doctors and demographers were well aware of the main causes:

> *"Что касается причин детской смертности, то здесь все исследователи на первом месте ставят бедность русского народа и низкую его культурность. Малая культурность населения ясно выражается в неумении ухаживать за грудными детьми и, главным образом в варварском обычае давать младенцам соску из жеваного хлеба чуть не с первых дней жизни."*

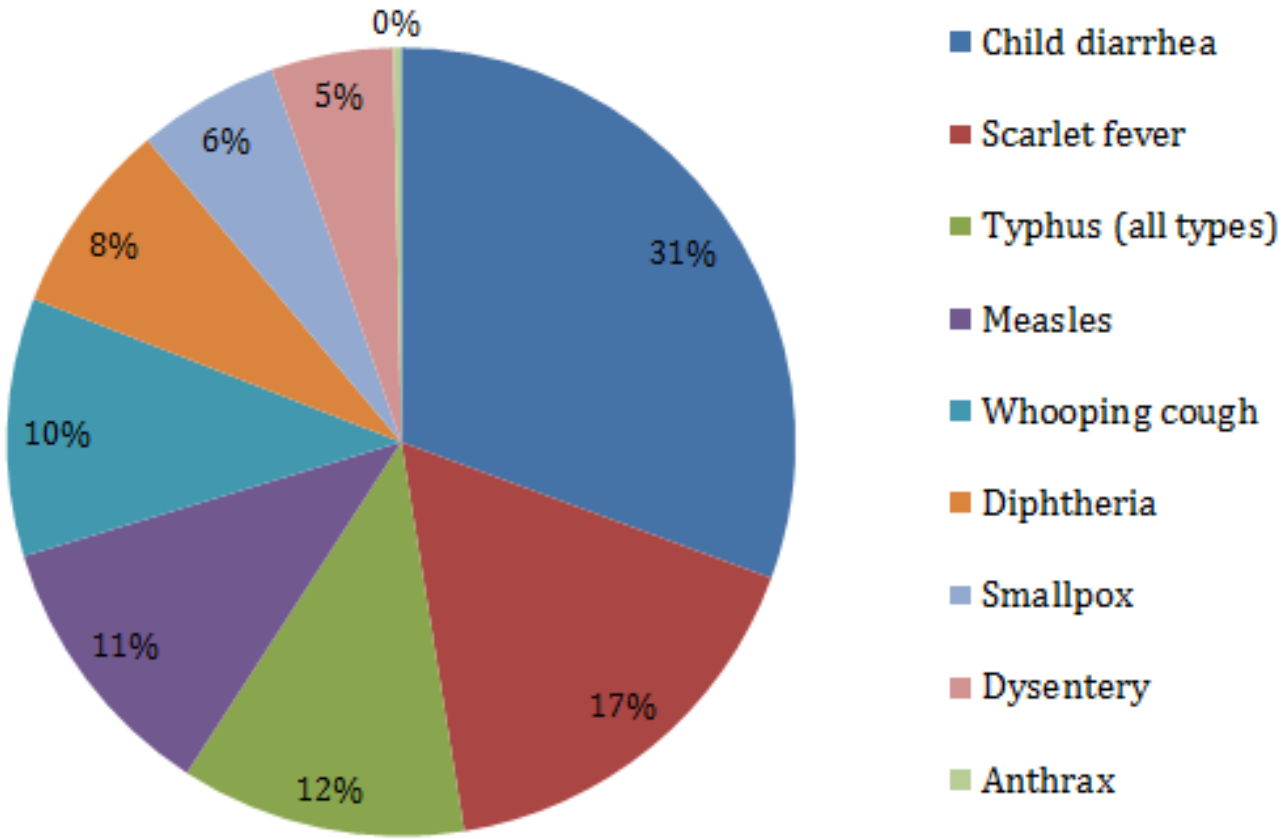
Гундобин Н.П. "Детская смертность в России и меры борьбы с нею" (1906).

Contemporaries on the causes of high infant mortality

"Помимо тяжелых экономических условий весьма существенное значение имет также весь быт населения. Под этим мы разумеем те предрассудки, то невежество народа, благодаря коим ребенок деревенской России с первых же дней своей жизни поставлен в самые невыгодные условия ухода вообще и питания в частности... В способе вскармливания, убийственном для детей, в невежественном уходе за ним [...] объясняется почему эти бытовые условия особенно невыгодны для известного района России и для русского населения ее."

Глебовский С.А., Гребенщиков В.И. "Детская смертность в России. Общественное и частное призрение", (1907).

Death causes from infections



Infectious diseases as a mechanism

	(1)	(2)	(3)	(4)	(5)	(6)
	Infant mortality		Child mortality, 1-2		Child mortality, 2-5	
Child diarrhea deaths, %	0.317**	0.088				
	(2.57)	(1.00)				
Measles deaths, %			0.309**	0.107		
			(2.20)	(0.68)		
Typhus deaths, %					0.381***	0.359**
					(3.20)	(2.70)
Russians (Velikorus), %		0.752***		0.507**		-0.067
		(7.46)		(2.48)		(-0.38)
Full set of controls	yes	yes	yes	yes	yes	yes
R^2	0.573	0.817	0.283	0.374	0.479	0.480
Observations	50	50	50	50	50	50

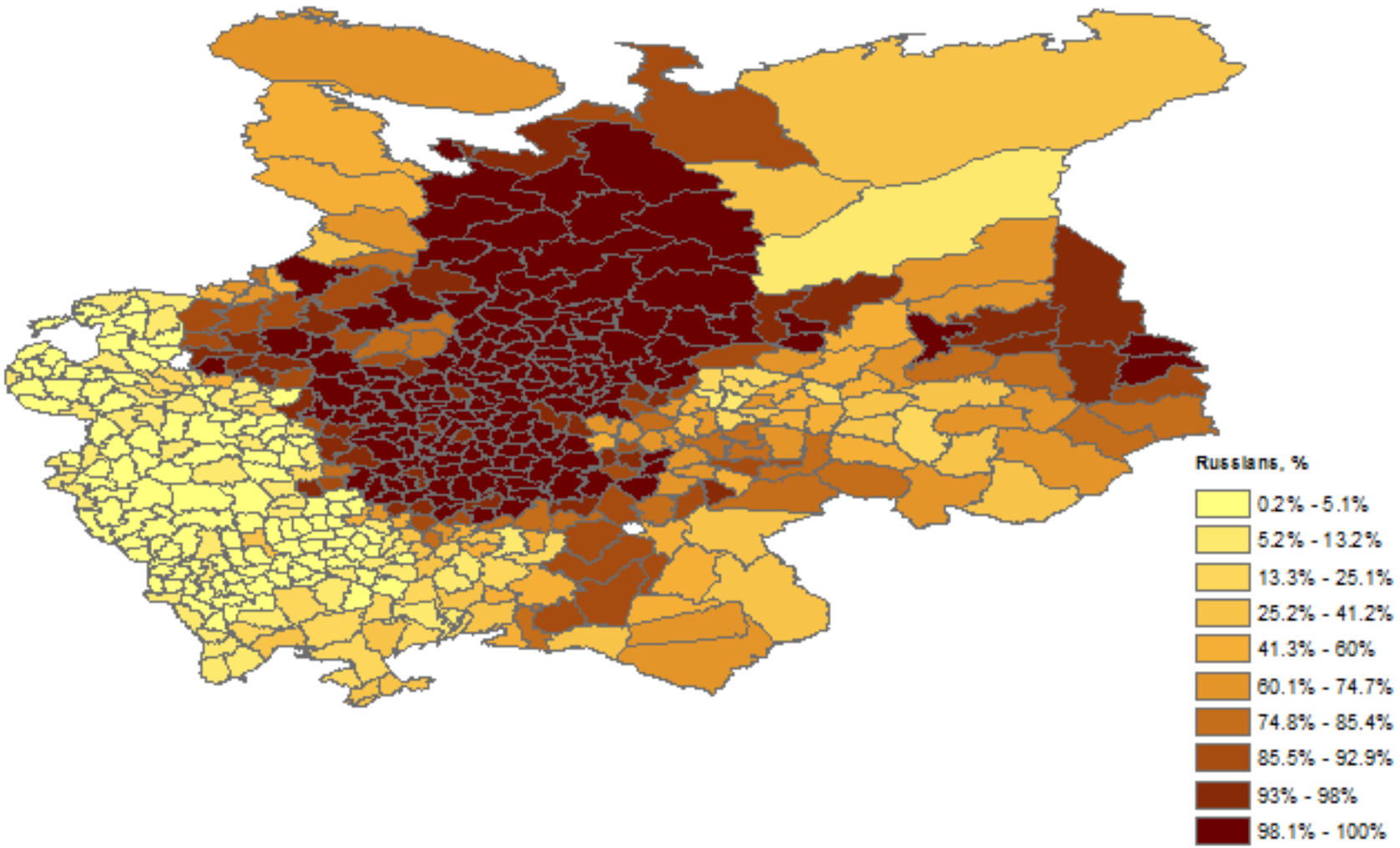
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Contemporaries on the causes of high infant mortality

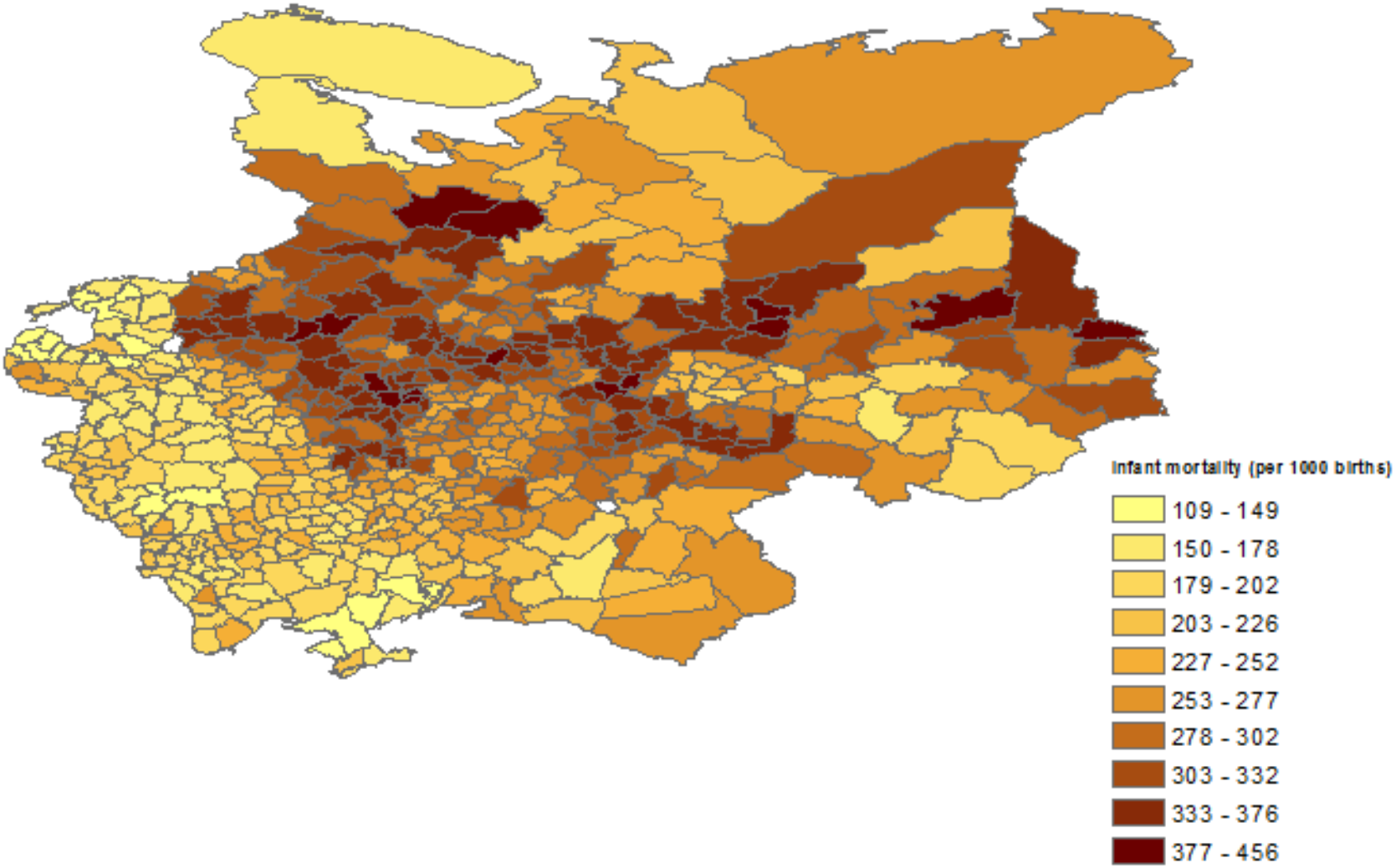
"Высокая младенческая смертность среди православных, особенно русских, происходит из крестьянского обычая чрезвычайно ранней практики, почти с первых дней жизни младенца, кормить его жевательным хлебом, кашей и т. д. Относительно низкий уровень смертности мусульман, живущих, как правило, в худших экономических условиях, является результатом грудного вскармливание детей согласно религиозным предписаниям Корана"

Новосельский С.А. "Обзор главнейших данных по демографии и санитарной статистике", (1916).

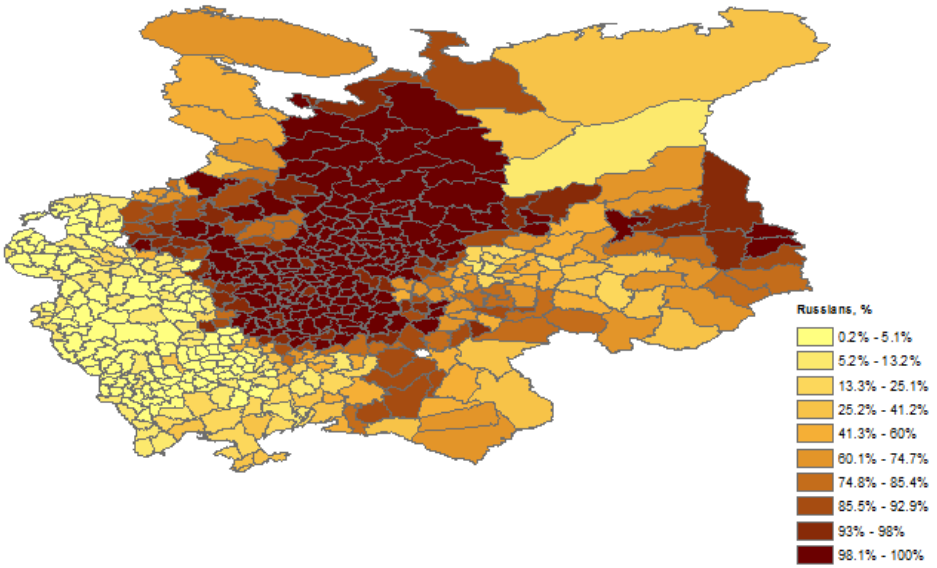
Spatial distribution of Russians (district level)

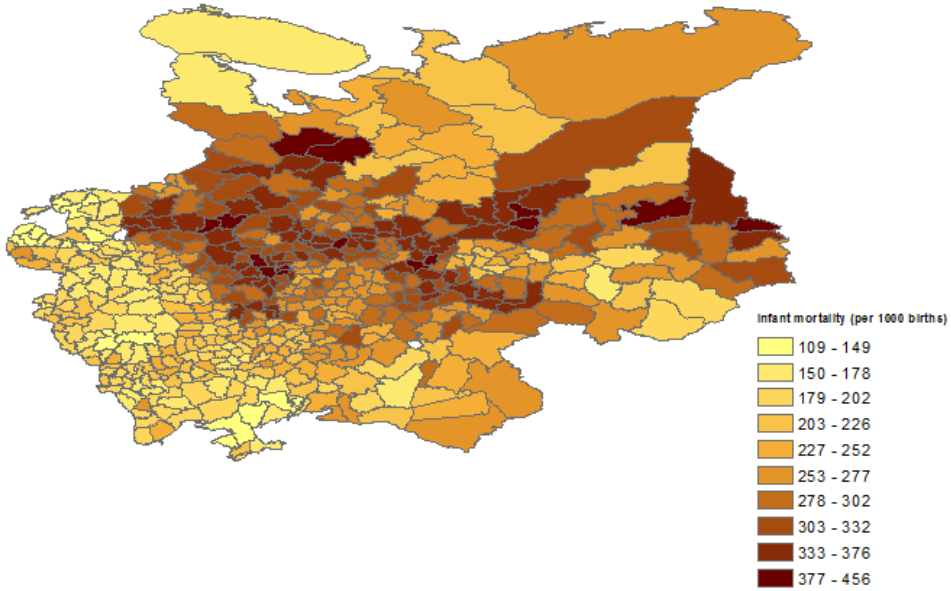


Infant mortality rates (district level)

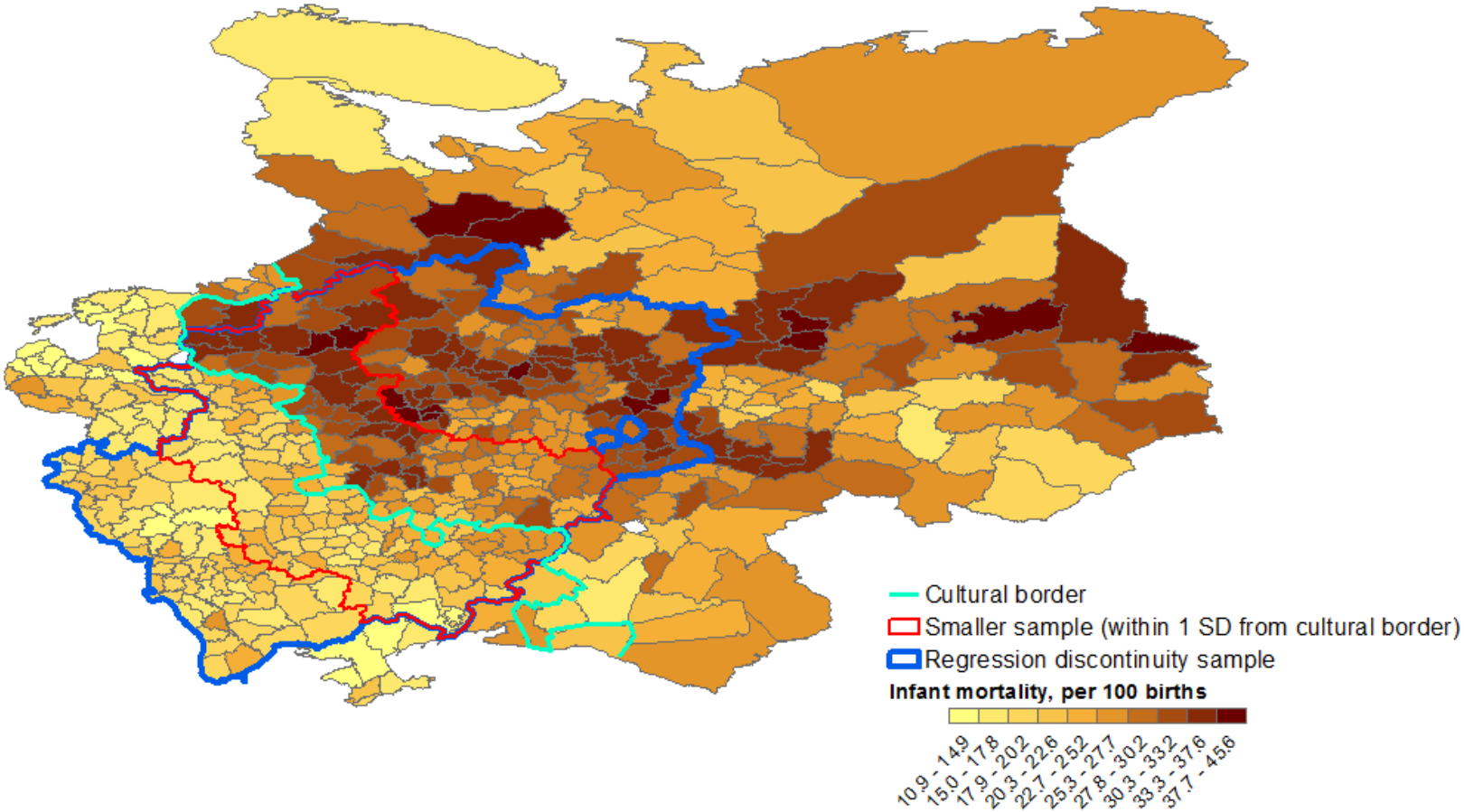


Share of Russians and infant mortality rates (districts)

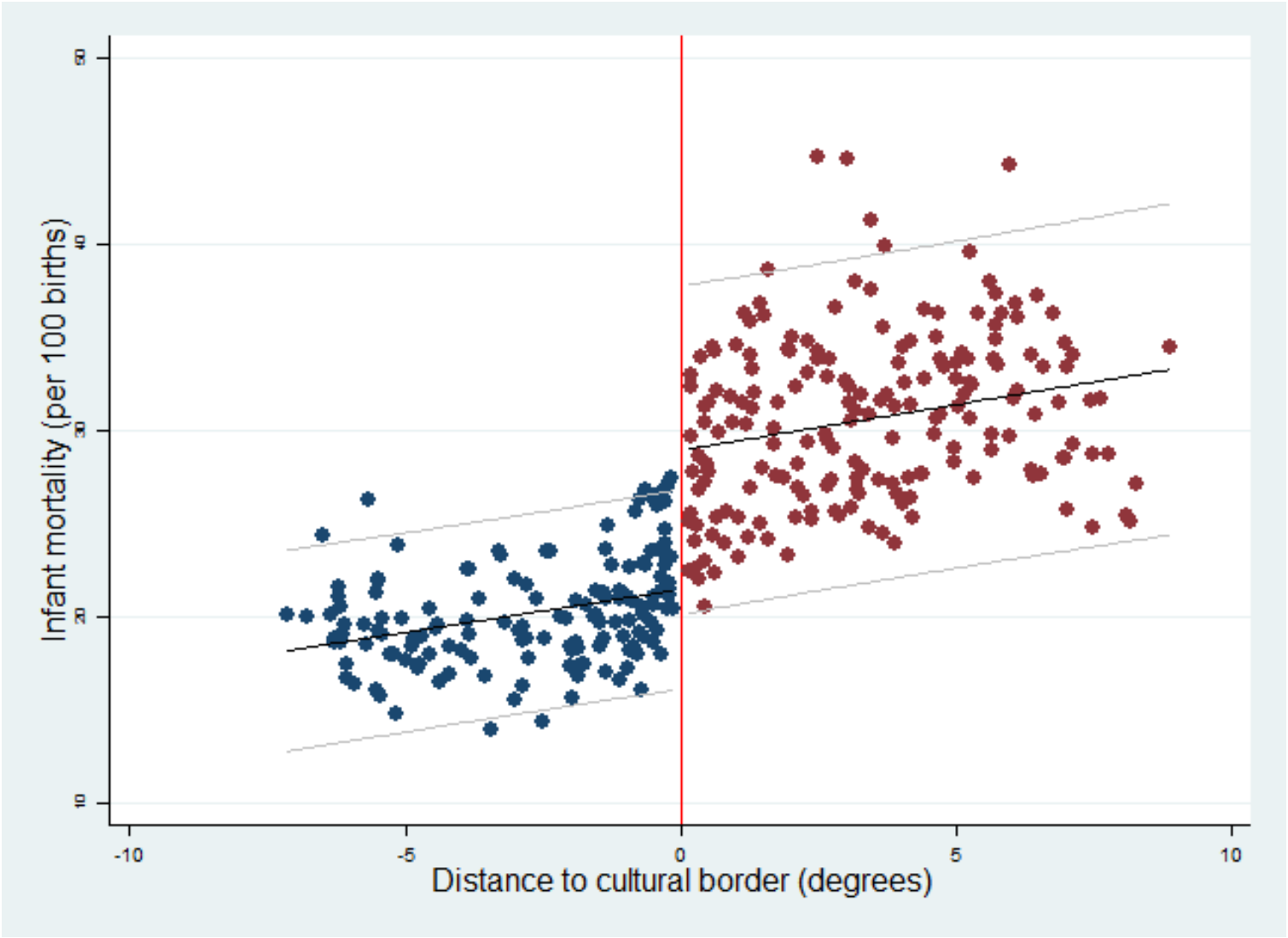




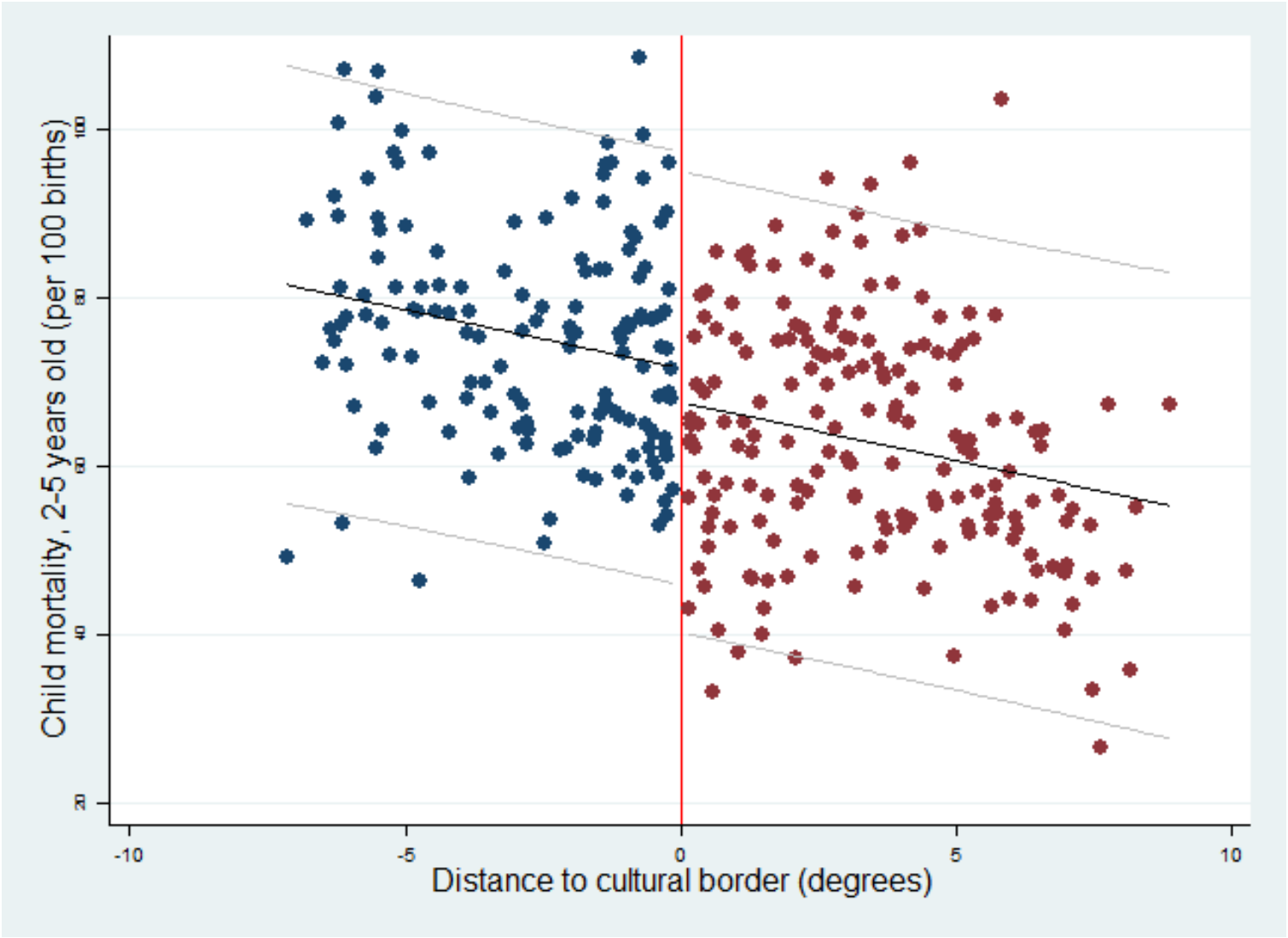
RD design


Cultural border
Smaller sample (within 1 SD from cultural border)
Regression discontinuity sample
Infant mortality, per 100 births
10.9 - 14.9
15.0 - 17.8
17.9 - 20.2
20.3 - 22.6
22.7 - 25.2
25.3 - 27.7
27.8 - 30.2
30.3 - 33.2
33.3 - 37.6
37.7 - 45.6

RD design results: infant mortality



RD design results: child mortality, 2-5 years old



RD design results: infant mortality

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample			Within 1 SD of distance		
	Panel A: Infant mortality, per 100 births					
Russian districts dummy	0.536***	0.525***	0.525***	0.450***	0.313***	0.313***
	(9.67)	(9.39)	(9.38)	(5.98)	(3.71)	(3.70)
Distance to cultural border		0.253	0.210		0.440***	0.447***
		(1.52)	(1.21)		(3.29)	(2.67)
Russians*Distance (interaction)			0.065			-0.006
			(0.85)			(-0.06)
R^2	0.681	0.683	0.683	0.650	0.672	0.672
Full set of controls	yes	yes	yes	yes	yes	yes
Observations	335	335	335	175	175	175

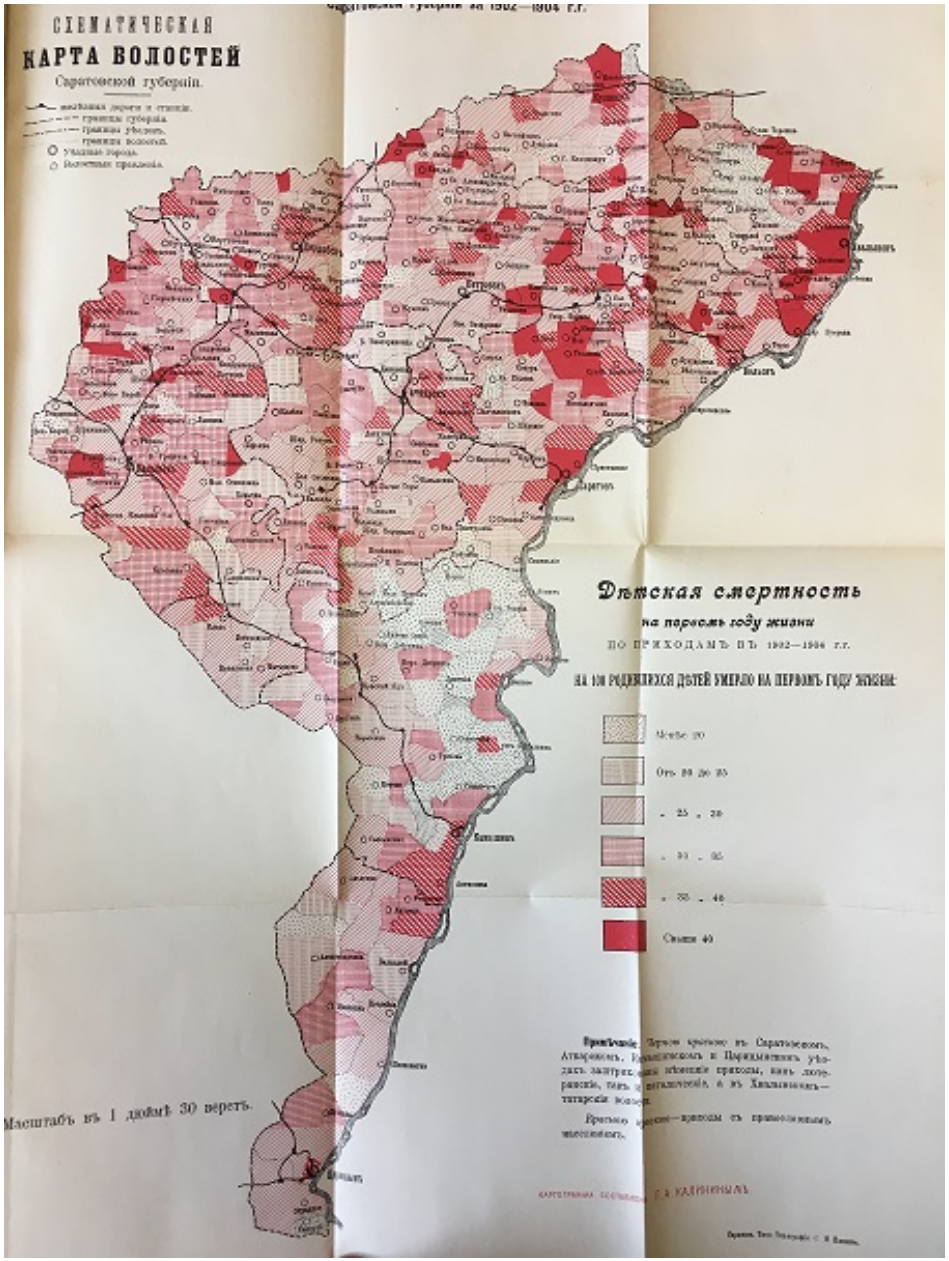
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

RD design results: child mortality, 2-5 years old

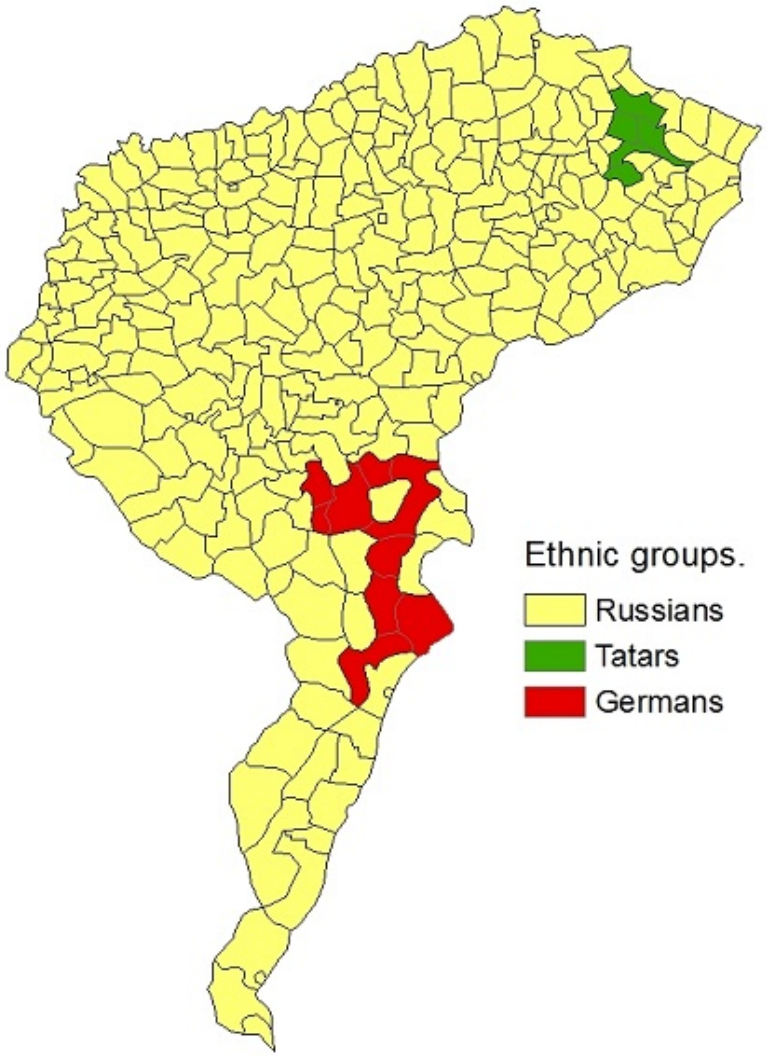
	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample			Within 1 SD of distance		
	Panel B: Child mortality, 2-5 years old (per 100 births)					
Russian districts dummy	-0.058	-0.074	-0.074	-0.134	-0.439***	-0.447***
	(-0.68)	(-0.86)	(-0.86)	(-1.14)	(-3.47)	(-3.52)
Distance to cultural border		0.341	0.371		0.978***	0.822***
		(1.34)	(1.39)		(4.86)	(3.27)
Russians*Distance (interaction)			-0.046			0.158
			(-0.39)			(1.04)
R^2	0.248	0.253	0.253	0.153	0.259	0.264
Full set of controls	yes	yes	yes	yes	yes	yes
Observations	335	335	335	175	175	175

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

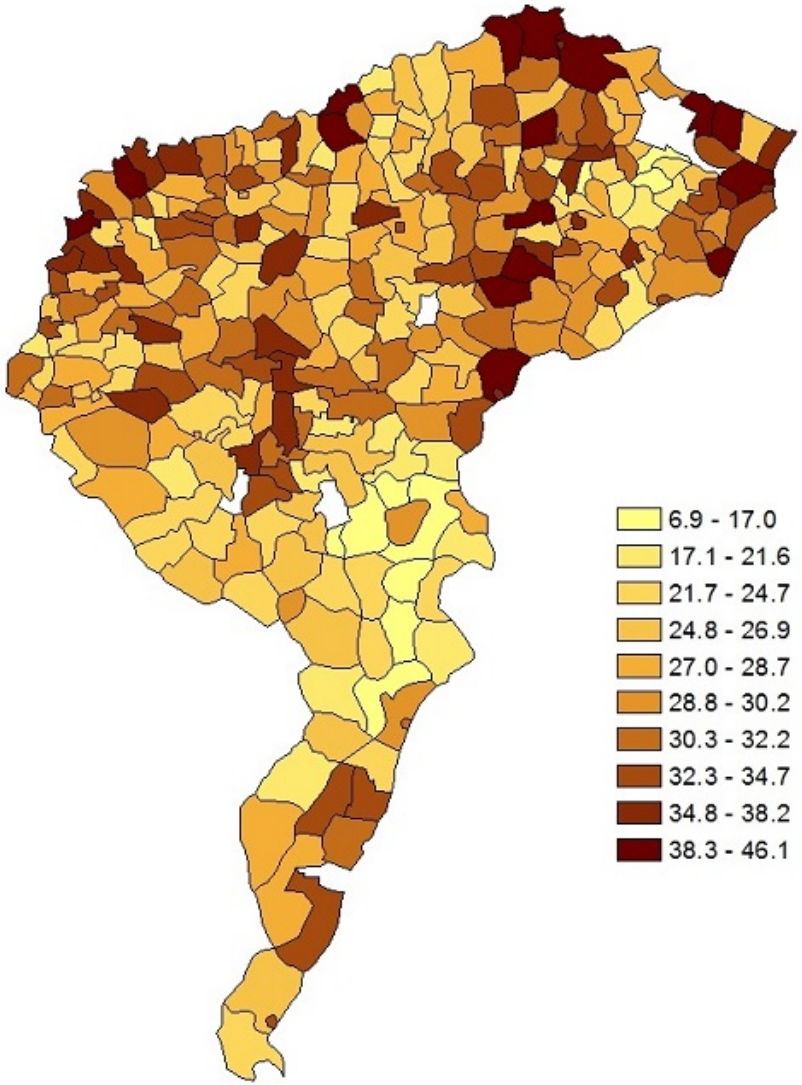
Case-study: Saratov province



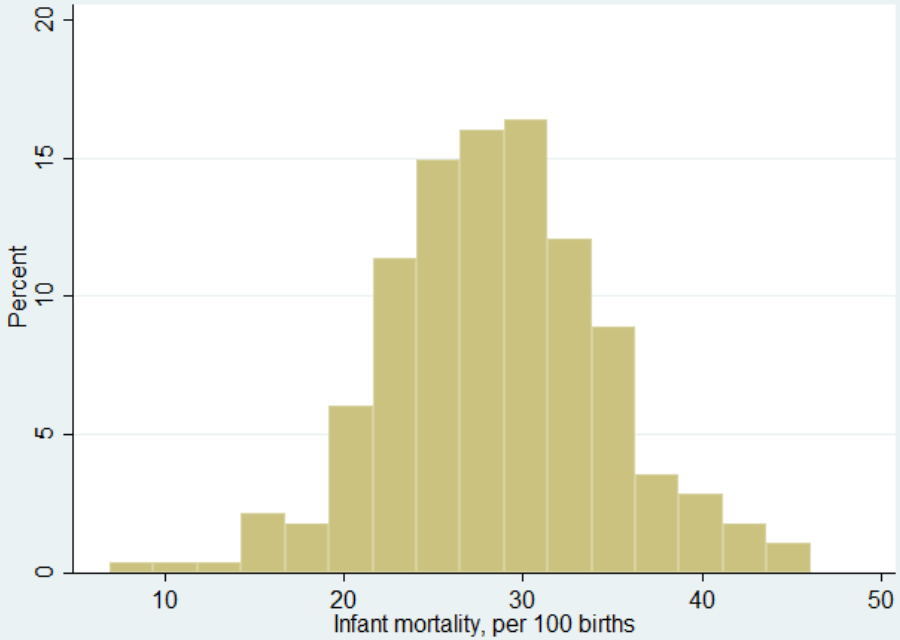
Ethnic composition of Saratov province

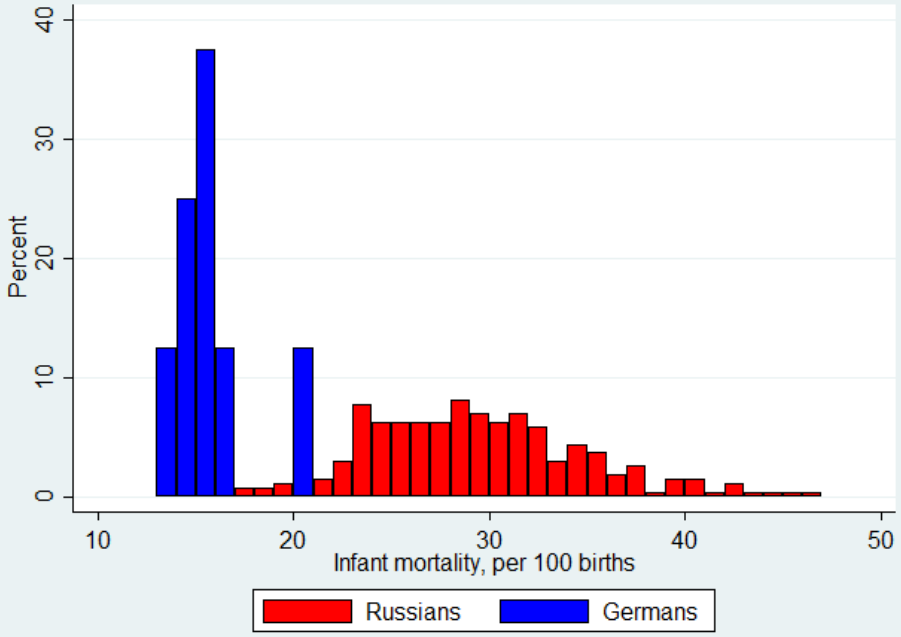


Infant mortality in Saratov province

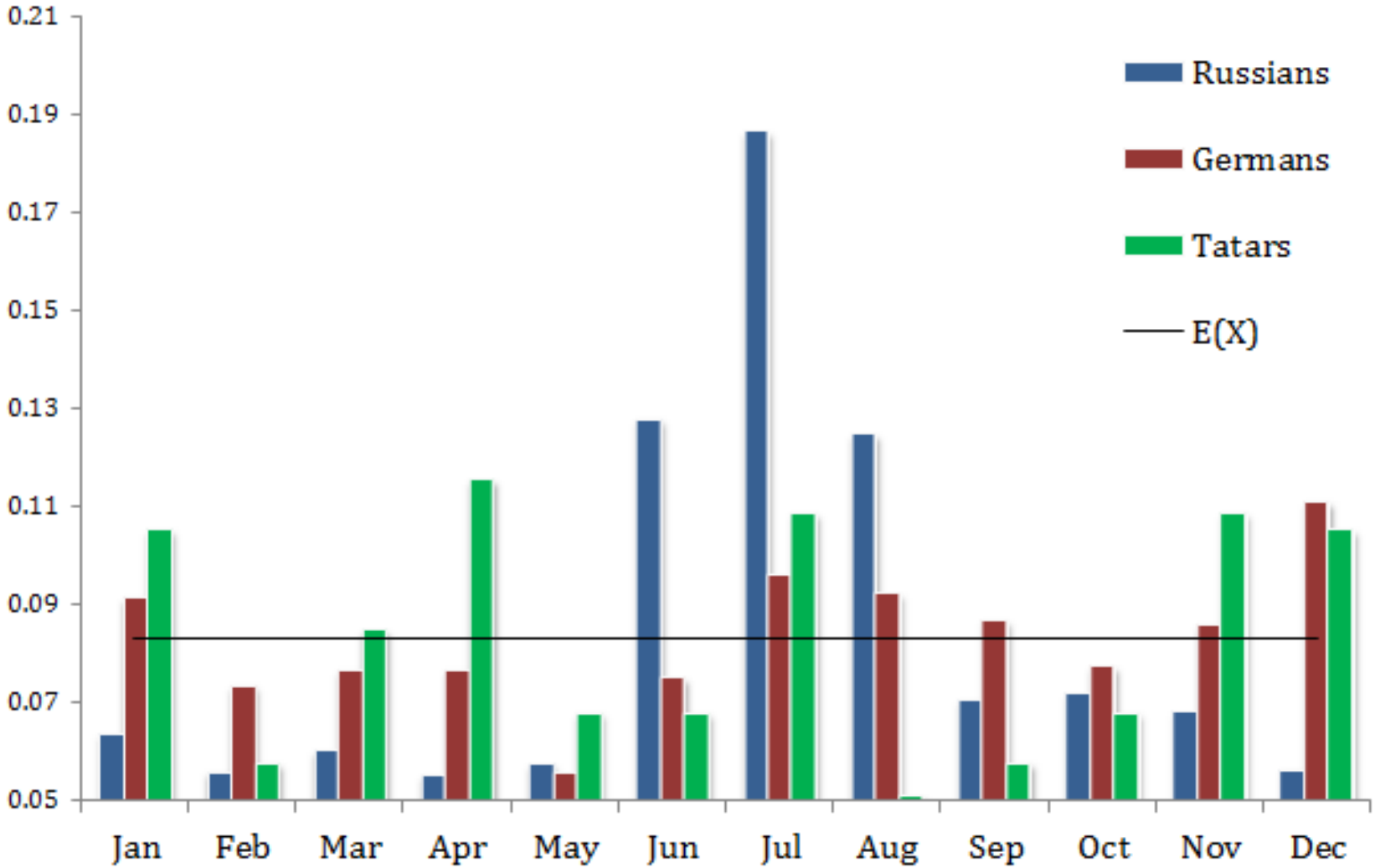


Distributions of infant mortality in Saratov province





Monthly distributions of infant mortality



Ethnic differentials in infant mortality

	(1)	(2)	(3)	(4)	(5)
	Infant mortality, per 100 births				
German counties dummy	-0.360***	-0.358***	-0.357***	-0.327***	-0.366***
	(-16.52)	(-16.44)	(-16.29)	(-14.91)	(-13.19)
Tatar counties dummy	-0.277***	-0.276***	-0.276***	-0.231***	-0.223***
	(-13.53)	(-13.43)	(-13.38)	(-12.35)	(-13.63)
Population density, per sq. km		0.099***	0.065***	0.069***	0.055***
		(6.19)	(2.77)	(2.80)	(2.51)
District (uezd) capital dummy			0.050	0.045	0.042
			(1.17)	(1.15)	(1.11)
Distance to river				0.12	0.15
				(1.15)	(1.23)
Railroad dummy					0.87
					(0.91)
R^2	0.203	0.213	0.215	0.217	0.220
Observations	281	281	281	281	281

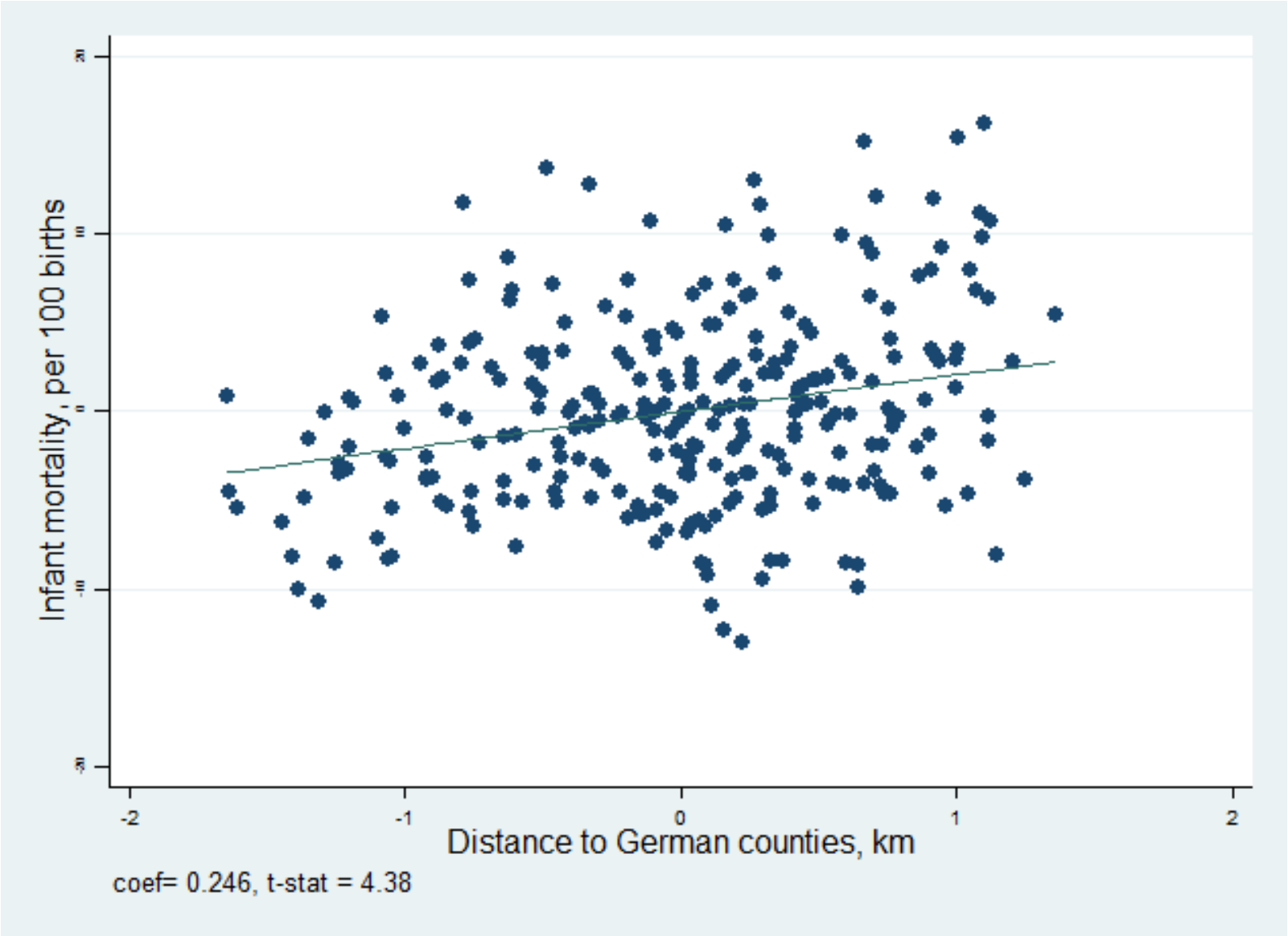
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Geographical proximity and infant mortality

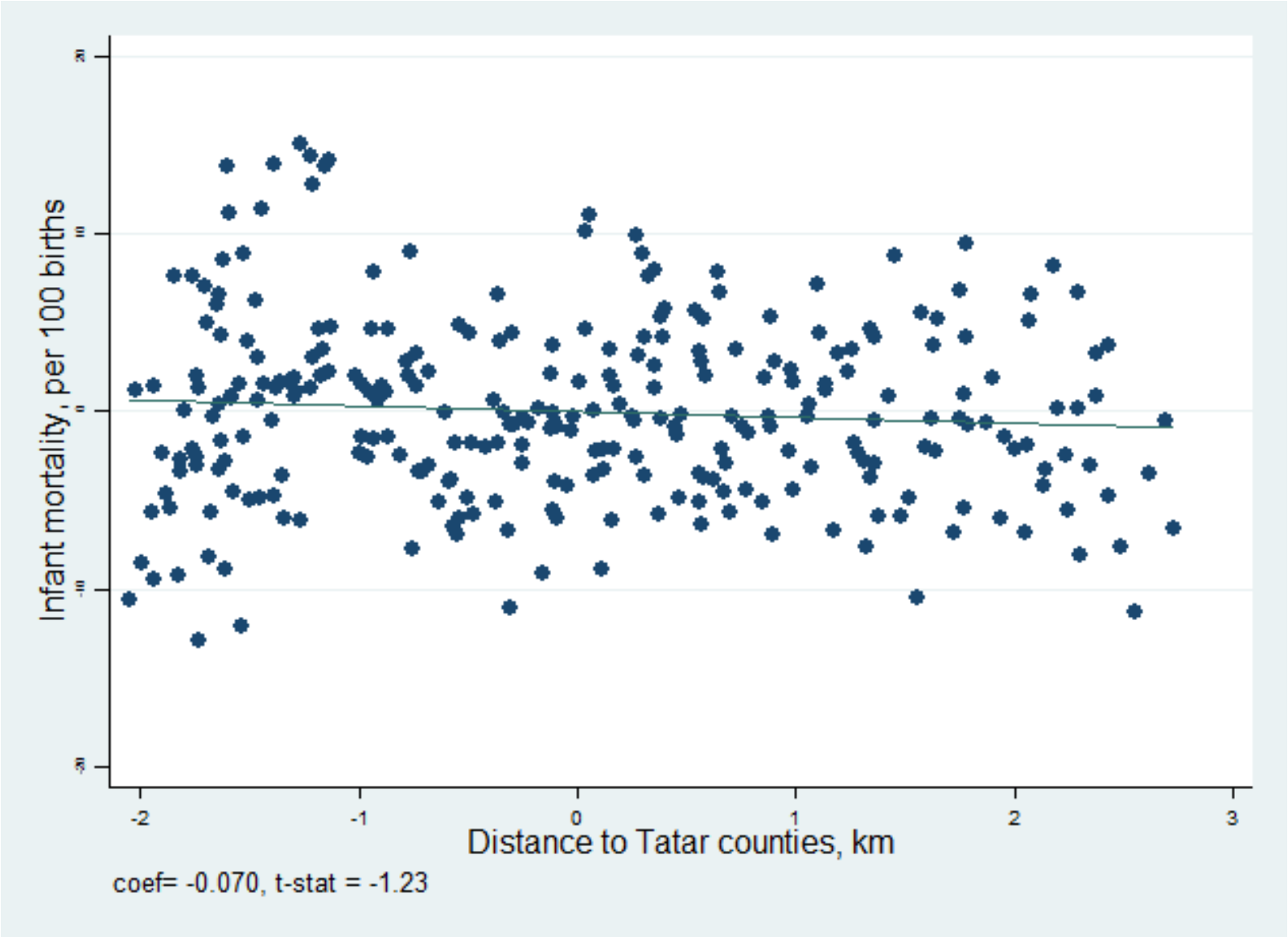
	(1)	(2)	(3)	(4)
	Infant mortality, per 100 births			
Distance to German counties centroid, km	0.258***	0.246***	0.245***	0.256***
	(4.57)	(4.38)	(4.37)	(4.38)
Distance to Tatar counties centroid, km		-0.070	-0.075	-0.077
		(-1.23)	(-1.23)	(-1.23)
German counties dummy	-0.266***	-0.267***		
	(-9.64)	(-9.74)		
Tatar counties dummy	-0.299***	-0.307***	-0.329***	
	(-13.29)	(-12.94)	(-12.96)	
Population density, per sq. km	0.085***	0.084***	0.090***	0.095***
	(3.28)	(3.47)	(3.47)	(3.47)
District (uezd) capital dummy	0.028	0.030	0.032	0.034
	(0.66)	(0.72)	(0.73)	(0.73)
R^2	0.272	0.277	0.172	0.092
Observations	281	281	273	271

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Distance to Germans and infant mortality of Russians



Distance to Tatars and infant mortality of Russians



Robustness checks

	(1)	(2)	(3)	(4)
	Infant mortality, per 100 births			
Distance to German counties centroid, km	0.245***	0.316***	0.383***	0.419***
	(4.19)	(3.07)	(3.36)	(3.58)
German counties dummy	-0.264***	-0.263***	-0.264***	-0.271***
	(-9.42)	(-9.42)	(-9.97)	(-10.40)
Tatar counties dummy	-0.299***	-0.293***	-0.309***	-0.308***
	(-13.24)	(-12.10)	(-11.36)	(-11.26)
District (uezd) capital dummy	0.031	0.029	0.035	0.027
	(0.74)	(0.68)	(0.87)	(0.74)
Population density, per sq. km	0.089***	0.091***	0.080***	0.088***
	(3.44)	(3.44)	(2.83)	(2.89)
Temperature	-0.040	-0.099	-0.159	-0.213**
	(-0.77)	(-1.17)	(-1.62)	(-2.06)
Precipitation		-0.119	-0.214	-0.153
		(-0.90)	(-1.42)	(-0.99)
Ruggedness			0.098	0.068
			(1.38)	(0.90)
Average calories				-0.166*
				(-1.72)
R^2	0.273	0.276	0.283	0.291
Observations	281	281	281	281

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Placebo regressions

	(1)	(2)	(3)	(4)
	Child mortality, per 100 births			
	aged 1-2	aged 2-5	aged 5-10	aged 10-15
Distance to German counties centroid, km	0.176**	0.161**	-0.012	-0.094
	(2.57)	(2.47)	(-0.16)	(-1.30)
German counties dummy	0.080*	0.049	-0.042	0.033
	(1.80)	(1.38)	(-1.20)	(0.60)
Tatar counties dummy	-0.121***	-0.042	-0.021	0.037
	(-3.21)	(-0.70)	(-0.24)	(0.28)
District (uezd) capital dummy	-0.014	-0.023	0.061	0.034
	(-0.32)	(-0.64)	(1.42)	(0.86)
Population density, per sq. km	0.009	-0.021	-0.048*	-0.037*
	(0.38)	(-1.05)	(-1.73)	(-1.77)
R^2	0.038	0.025	0.004	0.013
Observations	280	280	280	280

Conclusions

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- Infant feeding practices and attitudes towards proper child rearing (the Russian "child care culture") was at the heart of high and persistent infant mortality rates in late Imperial Russia.
- The findings are consistent with both historical and modern studies, which highlight the importance of cultural practices for infants' survival (Schofield and Reher, 1991; Bhalotra et al., 2010).

Implications for the living standards debate

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Implications for the living standards debate

- One should be very cautious in using infant mortality rates as a proxy for standards of living in pre-industrial societies.
- Hence, the argument of the "traditional" view, which uses stability of infant mortality rates as evidence of stagnation in Russian living standards, is problematic at best.
- In order to truly test the "traditional" view one should focus on the dynamics of mortality of older cohorts, and also various groups of population (peasants, workers, citizens, etc.).

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