SUPPLEMENTARY MATERIAL

EXPLAINING OUT-GROUP BIAS IN WEAK STATES
Religion and Legibility in the 1891/1892 Russian Famine

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Supplementary Material

Explaining Out-Group Bias in Weak States: Religion and Legibility in the 1891/1892 Russian Famine

Table of Contents

A Descriptive statistics

Table A.1: Descriptive statistics for main variables; data from provinces affected by the famine and receiving state aid.

Statistic	N	Mean	St. Dev.	Min	Max
Deaths per 1000 people	1,740	53.78	6.50	14.33	84.09
Births per 1000 people	1,740	41.42	8.76	11.76	76.85
Harvest (pud) per capita*	1,522	19.76	13.44	−5.77	143.28
Principal component 1	175	−0.00	1.00	−2.83	2.21
Mean food loan (pud)	190	0.42	0.22	0.00	1.33
Months on relief	190	7.76	3.28	0.00	13.00
Relief onset (month)	175	5.31	2.52	1.00	13.00
Harvest in 1891 (pud per capita)*	210	10.04	9.08	−6.60	75.75
State aid per capita	212	2.28	2.09	0	9
Local aid per capita	212	0.57	0.65	0.00	3.37
Average population on relief pc	190	0.25	0.17	0.00	0.72
Myers index	212	15.02	4.06	5.49	23.12
Taxes to land, 1888-1890	200	4.37	2.13	0.26	9.85
Share non-Orthodox (1870)	212	0.10	0.17	0.0002	0.86
Share Muslim (1870)	212	0.06	0.15	0	1
Share other non-Orthodox (1870)	212	0.03	0.06	0.0001	0.45
Share Turkic	212	0.08	0.18	0.00	0.91
Share other non-Russian	212	0.07	0.13	0.0003	0.73
Blacksoil	212	0.31	0.33	0.00	0.96
Serfdom (share)	212	0.32	0.25	0.00	0.85
Distance to railway (km)	212	99.77	124.61	0.38	821.45
Land captains per district area	212	0.53	0.34	0.00	1.32
Distance to St. Petersburg (km)	212	1,117.16	331.88	200.30	2,020.35
Population	212	167,319	86,791	11,292	458,629
Horses per household	212	0.76	0.10	0.31	0.93
Average yield 1888-87	212	3.25	1.20	0.83	6.67
Average recruit height (m)	212	1.64	0.01	1.62	1.68
Noble landowners per 1,000 people (1877)	212	1.40	1.33	0.00	7.25
Average land allotment	212	5.89	5.27	1.60	41.30

* Note that harvest is negative in a few districts because sown grain exceeds harvested grain. The variable (*chistyi ostatok* in Russian for wheat, rye, and oats) was divided by the district's population.

B Mortality and natality during the famine

Table A.2: Change in birth and death rates from 1891 to 1892 by religion for provinces that had a large Muslim population. All numbers are percentages.

Province	**Share Muslim**	**Change in death rate 1891–92**			**Change in birth rate 1891–92**		
		Orthodox	**Muslim**	**Difference**	**Orthodox**	**Muslim**	**Difference**
Simbirsk	8.25	23.74	73.13	−49.39	−13.75	−29.14	15.39
Samara	9.75	67.33	50.07	17.26	−14.80	−21.65	6.85
Orenburg	26.95	35.57	56.14	−20.57	−20.82	−22.97	2.15
Kazan'	26.08	22.46	67.21	−44.75	−14.90	−23.81	8.91
Astrakhan'	28.43	71.35	89.67	−18.32	−7.84	−5.17	−2.67
Taurida	18.03	7.87	22.88	−15.01	−6.12	−0.01	−6.11
Ufa	54.56	41.82	49.40	−7.58	−8.85	−19.74	10.89

Note that Muslim mortality is lower than Orthodox mortality only in Samara province. This is due to the uneven spread of cholera, which largely spared Bugul'minsky district, which contained 51% of all Muslims in Samara province. In this district, cholera deaths, at 583, accounted for just 2% of all deaths in 1892. The toll of cholera was highest (14% of all deaths in 1892) in Nikolaev and Samara districts, where the Muslim population accounted for 3% and 4%, respectively.

Table A.3: Religion, language, and district-level mortality and natality during the famine. The famine dummy was coded one for both 1892 and 1893.

	Deaths per 1000 people			**Births per 1000 people**		
	(1)	(2)	(3)	(4)	(5)	(6)
Famine X non-Orthodox	12.51***			−8.99***		
	(3.01)			(1.27)		
Famine X Muslims		11.92***			−9.75***	
		(3.47)			(1.52)	
Famine X Other non-Orthodox		15.55**			−5.02	
		(6.34)			(3.12)	
Famine X Turkic			8.99***			−6.57***
			(2.57)			(1.27)
Famine X Other non-Russian			8.32***			−3.88**
			(2.58)			(1.57)
Harvest per capita (lag)	−0.02	−0.02	−0.02	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Famine X Harvest per capita (lag)	−0.11***	−0.11***	−0.07**	0.10***	0.09***	0.07**
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Famine X Share Urban	−0.97	−1.43	1.85	5.97**	5.37**	3.71
	(3.96)	(4.07)	(3.79)	(2.62)	(2.55)	(2.47)
District FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Adj. R^2	0.65	0.65	0.65	0.69	0.69	0.69
Number of district-years	1736	1736	1736	1736	1736	1736

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Notes: All models are OLS with district and year fixed effects. Only the 22 provinces affected by the harvest failure and subsequent relief effort are included. These are baseline specifications without additional covariates. Standard errors are clustered at the district level.

Table A.4: Religion, language, and district-level mortality and natality during the famine. Standard errors account for temporal and spatial correlation. Famine dummy is equal to one for 1892.

	Deaths per 1000 people			**Births per 1000 people**		
	(1)	(2)	(3)	(4)	(5)	(6)
Famine X non-Orthodox	13.50**			−7.16***		
	(5.66)			(1.39)		
Famine X Share Muslims		11.83*			−7.01***	
		(6.33)			(1.82)	
Famine X Share other non-Orthodox		21.54**			−7.86**	
		(8.92)			(3.15)	
Famine X Share Turkic			8.44**			−5.84***
			(4.19)			(1.57)
Famine X Share other non-Russian			5.28			−0.70
			(3.41)			(1.76)
Harvest per capita (lag)	−0.01	−0.01	−0.02	0.06***	0.06***	0.06***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Famine X Harvest per capita (lag)	−0.14	−0.15	−0.11	0.20***	0.20***	0.18***
	(0.11)	(0.12)	(0.12)	(0.05)	(0.05)	(0.05)
Famine X Share urban	−3.63	−4.82	−0.12	9.99***	10.09***	7.91***
	(6.75)	(6.54)	(6.99)	(2.24)	(2.32)	(2.13)
Num. obs.	1736	1736	1736	1736	1736	1736
Adj. R^2	0.98	0.98	0.98	0.99	0.99	0.99
Spatial corr. kernel cutoff (km)	900	900	900	900	900	900
Num. groups: year	8	8	8	8	8	8
Num. groups: district	217	217	217	217	217	217

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

All models are OLS with district and year fixed effects. Data from 22 provinces affected by the harvest failure and receiving relief. These are baseline specifications without additional covariates. Conley standard errors in parentheses are calculated in Stata with the Bartlett kernel, which assumes that weights gradually diminish with distance. The distance at which spatial correlation is assumed to vanish is 900km, and the distance at which serial correlation is assumed to vanish is 8 periods.

Table A.5: Religion, language, and district-level mortality and natality during the famine. Models with additional covariates. Famine dummy is equal to one for 1892.

	Deaths per 1000 people			**Births per 1000 people**		
	(1)	(2)	(3)	(4)	(5)	(6)
Famine X Share non-Orthodox	11.30***			−4.11**		
	(4.38)			(1.82)		
Famine X Share Muslim		11.02**			−4.79**	
		(4.76)			(2.01)	
Famine X Share other non-Orthodox		12.52			−1.15	
		(8.51)			(3.78)	
Famine X Turkic			6.78*			−3.80**
			(3.89)			(1.74)
Famine X Other non-Russian			5.16			−1.36
			(4.63)			(2.47)
Harvest per capita (lag)	0.00	0.00	0.00	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Famine X Harvest per capita (lag)	−0.09	−0.09	−0.09	0.19***	0.19***	0.19***
	(0.09)	(0.09)	(0.09)	(0.04)	(0.04)	(0.04)
Famine X Share urban	1.34	1.15	3.67	10.48***	10.01***	9.50***
	(7.38)	(7.55)	(7.13)	(2.74)	(2.78)	(2.95)
Famine X Ln(Distance to railway)	−1.04**	−1.04**	−1.06**	−0.11	−0.10	−0.06
	(0.53)	(0.53)	(0.53)	(0.23)	(0.23)	(0.23)
Famine X Serfdom (share)	−0.96	−0.95	−0.77	1.43	1.45	1.21
	(2.84)	(2.84)	(2.87)	(1.31)	(1.31)	(1.30)
Famine X Avg. recruit heights	16.34	13.12	38.17	−45.96*	−53.76*	−62.55**
	(59.24)	(66.04)	(60.01)	(27.54)	(30.61)	(31.28)
Famine X Horses per household	0.54	0.52	0.31	−4.15	−4.21	−4.06
	(5.88)	(5.86)	(5.91)	(3.56)	(3.54)	(3.63)
Famine X Noble landowners	−0.64	−0.63	−0.29	0.05	0.07	−0.04
	(0.60)	(0.60)	(0.53)	(0.21)	(0.23)	(0.21)
Famine X Land captains	9.53***	9.48***	9.18***	−2.27***	−2.37***	−2.28**
	(1.92)	(1.94)	(1.99)	(0.87)	(0.91)	(0.90)
Famine X Ln(Distance to St. Petersburg)	5.45**	5.49**	6.89***	−4.11***	−4.01***	−4.28***
	(2.41)	(2.42)	(2.16)	(1.27)	(1.28)	(1.16)
Famine X Population density	−0.09**	−0.09**	−0.11***	−0.01	−0.01	0.00
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
District FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Adj. R^2	0.66	0.66	0.66	0.70	0.70	0.70
Number of district years	1728	1728	1728	1728	1728	1728

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Notes: All models are OLS with district and year fixed effects. Only the 22 provinces affected by the harvest failure and subsequent relief effort are included. Standard errors are clustered at the district level.

Table A.6: Religion, language, and district-level mortality and natality during the famine. Models add geographic covariates interacted with famine dummy (coded one for 1892).

	Deaths per 1000 people			**Births per 1000 people**		
	(1)	(2)	(3)	(4)	(5)	(6)
Famine X Muslims	10.72**	6.24*	9.48**	−6.59***	−3.78**	−5.37***
	(4.78)	(3.64)	(3.96)	(1.40)	(1.49)	(1.35)
Famine X other non-Orthodox	17.46*	21.88***	22.63**	−6.30*	−8.05**	−8.62***
	(9.86)	(8.40)	(9.11)	(3.34)	(3.21)	(3.30)
Harvest per capita (lag)	−0.00	−0.01	−0.02	0.06***	0.06***	0.06***
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Famine X Latitude	−0.43**			0.16*		
	(0.17)			(0.09)		
Famine X Harvest per capita (lag)	−0.19**	−0.09	−0.11	0.22***	0.17***	0.18***
	(0.09)	(0.09)	(0.09)	(0.04)	(0.04)	(0.04)
Famine X Share urban	−8.62	0.93	−1.21	11.55***	6.77***	7.57***
	(7.04)	(6.79)	(7.26)	(2.85)	(2.46)	(2.62)
Famine X Longitude		0.32***			−0.19***	
		(0.09)			(0.04)	
Latitude X Longitude X Famine			0.00**			−0.00***
			(0.00)			(0.00)
District FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Adj. R^2	0.65	0.65	0.65	0.69	0.69	0.69
Number of district years	1736	1736	1736	1736	1736	1736

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Notes: All models are OLS with district and year fixed effects. Only the 22 provinces affected by the harvest failure and subsequent relief effort are included. Standard errors are clustered at the district level.

Table A.7: Religion, language, and district-level mortality and natality during the famine. Famine dummy is equal to one for 1892.

	Deaths per 1000 people		**Births per 1000 people**	
	(1)	(2)	(3)	(4)
year 1890 X Share Muslim	−1.44		−1.87	
	(5.45)		(5.24)	
year 1891 X Share Muslim	−0.85		2.02	
	(2.10)		(3.34)	
year 1892 X Share Muslim	11.95*		−7.36*	
	(6.21)		(4.19)	
year 1893 X Share Muslim	7.88*		−8.03*	
	(4.72)		(4.86)	
year 1894 X Share Muslim	−5.30		2.42	
	(3.44)		(5.87)	
year 1895 X Share Muslim	−3.15		−0.02	
	(4.43)		(7.44)	
year 1896 X Share Muslim	3.72		3.07	
	(2.62)		(5.76)	
year 1890 X Share Turkic		−2.65		−0.89
		(2.94)		(2.73)
year 1891 X Share Turkic		−1.48		−0.96
		(1.58)		(2.10)
year 1892 X Share Turkic		8.31*		−5.85**
		(4.79)		(2.42)
year 1893 X Share Turkic		6.73**		−4.51*
		(2.73)		(2.69)
year 1894 X Share Turkic		−3.93*		3.84
		(2.29)		(2.85)
year 1895 X Share Turkic		−2.51		−1.10
		(2.57)		(3.27)
year 1896 X Share Turkic		2.97*		3.51
		(1.67)		(2.48)
Harvest per capita (lag)	−0.02	−0.02	0.07***	0.06***
	(0.01)	(0.01)	(0.02)	(0.02)
Famine X Harvest per capita (lag)	−0.15*	−0.11	0.20***	0.18***
	(0.09)	(0.09)	(0.04)	(0.04)
Famine X Share urban	−4.75	−0.09	10.01***	7.91***
	(6.90)	(6.53)	(2.67)	(2.65)
Famine X Share other non-Orthodox	21.37**		−7.66**	
	(9.70)		(3.31)	
Famine X Share other non-Russian		5.28		−0.70
		(4.23)		(1.80)
District FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Adj. R^2	0.65	0.64	0.70	0.69
Number of district years	1736	1736	1736	1736

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Notes: All models are OLS with district and year fixed effects. Only the 22 provinces affected by the harvest failure and subsequent relief effort are included. Standard errors are clustered at the district level.

Table A.8: Religion, language, and district-level mortality and natality during the famine. Famine dummy is coded one for 1892. Estimates are based on the double-selection method for including covariates proposed by Chernozhukov et al. (2018).

	Deaths per 1000 people			**Births per 1000 people**		
	(1)	(2)	(3)	(4)	(5)	(6)
Share non-Orthodox	11.15**			−3.71**		
	(4.32)			(1.86)		
Share Muslim		10.48**			−6.55***	
		(4.59)			(1.57)	
Share Turkic			9.21**			−2.21
			(3.73)			(1.67)
Famine X Share other non-Orthodox		13.99*			−5.05*	
		(7.71)			(3.01)	
Famine X Share other non-Russian			2.52			−0.82
			(4.02)			(2.46)
Harvest per capita (lag)	0.00	0.00		0.05***	0.06***	0.05***
	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Famine X Harvest per capita (lag)	−0.08	−0.09		0.18***	0.17***	0.17***
	(0.08)	(0.09)		(0.04)	(0.04)	(0.04)
Famine X Share urban	1.91	1.03	4.85	9.56***	10.05***	8.46***
	(7.26)	(7.46)	(7.25)	(2.66)	(2.53)	(2.91)
Famine X Ln(distance to railway)	−1.10**	−1.09**	−1.66***	0.04	0.34*	0.03
	(0.51)	(0.51)	(0.44)	(0.22)	(0.19)	(0.23)
Famine X Serfdom (share)	−1.16	−1.19	−3.57	1.78	2.47**	1.98
	(2.78)	(2.79)	(2.61)	(1.29)	(1.21)	(1.21)
Famine X Avg. recruit heights	−16.12	−16.85		14.48***		15.55***
	(11.16)	(11.19)		(5.52)		(4.99)
Famine X Horses per household	−0.63	−0.36		−1.87		
	(5.74)	(5.76)		(3.61)		
Famine X Noble landowners	−0.64	−0.61	−0.67	0.05	0.32	−0.06
	(0.59)	(0.59)	(0.47)	(0.21)	(0.20)	(0.21)
Famine X Land captains	9.46***	9.37***	9.50***	−1.87**	−2.27***	−1.93**
	(1.85)	(1.83)	(1.90)	(0.90)	(0.80)	(0.90)
Famine X Ln(distance to St. Petersburg)	5.47**	5.61**	2.11***	−4.20***	−1.24***	−4.69***
	(2.36)	(2.36)	(0.39)	(1.19)	(0.21)	(1.13)
Famine X Population density	−0.09**	−0.09**	−0.13***	−0.01		0.00
	(0.04)	(0.04)	(0.04)	(0.02)		(0.02)
District FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Adj. R^2	0.67	0.67	0.67	0.70	0.70	0.70
Number of district years	1728	1728	1728	1728	1728	1728

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Notes: All models are OLS with district and year fixed effects. Only the 22 provinces affected by the harvest failure and subsequent relief effort are included. All covariates were included in the first-stage analysis, but only some were selected as relevant by the double-selection method because they predict both treatment (religion) and mortality/natality. Standard errors are clustered at the district level.

C Legibility measured as age heaping

I compute the Myers index of age heaping as a proxy for legibility of the population. The 1897 Russian census records ages from under one year old to "110 and older." However, in most districts, the number of people of a specific age dwindles considerably already in the 40s (see Figure 4 in text). To construct the index, I limit the population to multiples of ten and use the cut-off of 15 to 74.[112] The Myers index calculates total population starting from each terminal digit. For ages between 15 and 74 this means calculating the population at each terminal digit for [15–64], [16–65], [17–66], [18-67], and so on up to [24–73], and aggregating the population in these ten sets into a blended total. In this blended total, people aged 15 are counted once, people aged 16 are counted twice, etc. The blended population at each terminal digit is then represented as a percentage of the blended total, and the deviation of each of these percentages from 10 is calculated. If there is no age heaping, the population at each digit should amount to 10% of the total. As a final step, all deviations from 10 are added up and divided by two.

An alternative indicator of age heaping is the Whipple index, which is more sensitive to scale and does not account for the fact that terminal digits at the end of each age bracket (e.g., 9 in [20-29] and [30-39]) will have less population than the terminal digit at the beginning of the bracket (e.g., 1 in [20-29] and [30-39]).[113] In the Russian data, the Whipple index and the Myers index are correlated at $\rho = 0.99$. Figure A.1 maps the Myers index at the district level for European Russia.

[112] An alternative index using all ages from 0 to 109 is correlated at $\rho = 0.98$ with the index that uses ages 15 to 74.

[113] M. M. Lee and Zhang 2017.

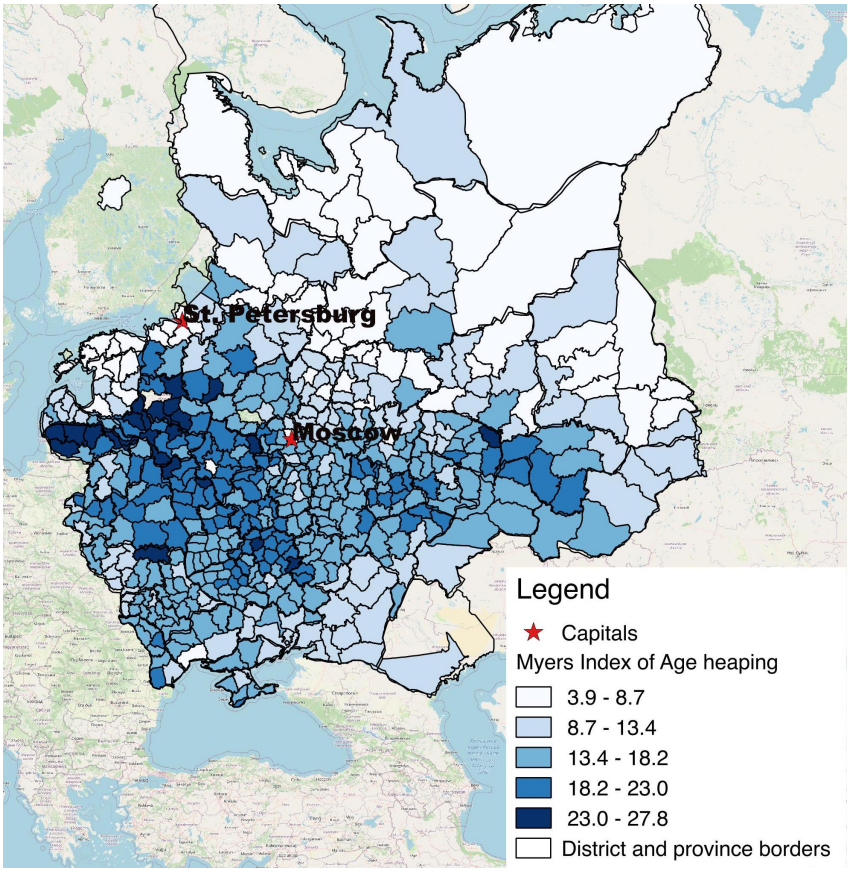

Figure A.1: Myers index at the district level for provinces receiving famine relief.

D Analysis of famine relief indicators

D.1 Principal component analysis

I aggregate the data on six different measures of relief (*months on relief, relief onset, mean size of bread loan, average population on relief, total state aid, total local aid*) using principal component analysis to reduce measurement error and avoid multiple comparisons. I then use the first principal component as the main outcome of interest, given that it explains more than twice as much variance (0.500 vs. 0.199) and captures aid from the central government, most relevant for my theory.[114] Table A.9 displays how the eigenvalues decrease with each additional component. The first component accounts for 50% of the total variance (eigenvalue = 2.39). The second component accounts for 20% of the total variance (eigenvalue = 1.18). Factor loadings by variable indicate that the first principal component captures variation in the generosity of relief from the central government (including the mean population on relief, total state aid, average size of bread loan, and the number of months on relief), while the second principal component is based primarily on the amount of local aid.

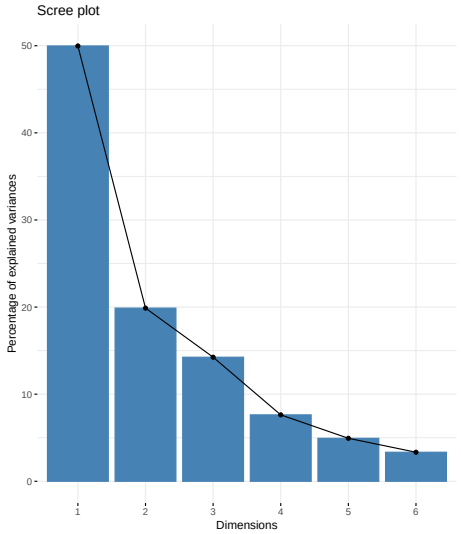

Table A.9: Eigenvalues for each component.

Table A.10: Factor loadings by variable.

	PC1	**PC2**
Mean pop. on relief	0.691	-0.490
Total local aid		0.777
Total state aid	0.723	-0.349
Average bread loan	0.725	0.436
Months on relief	0.875	0.163
Relief onset	-0.839	
SS loadings	2.998	1.193
Proportion Var	0.5	0.199
Cumulative Var	0.5	0.699

[114]Note *Local aid* was used for computing *Principal component 1*, but the component excludes it since *Local aid* loads exclusively on the second principal component.

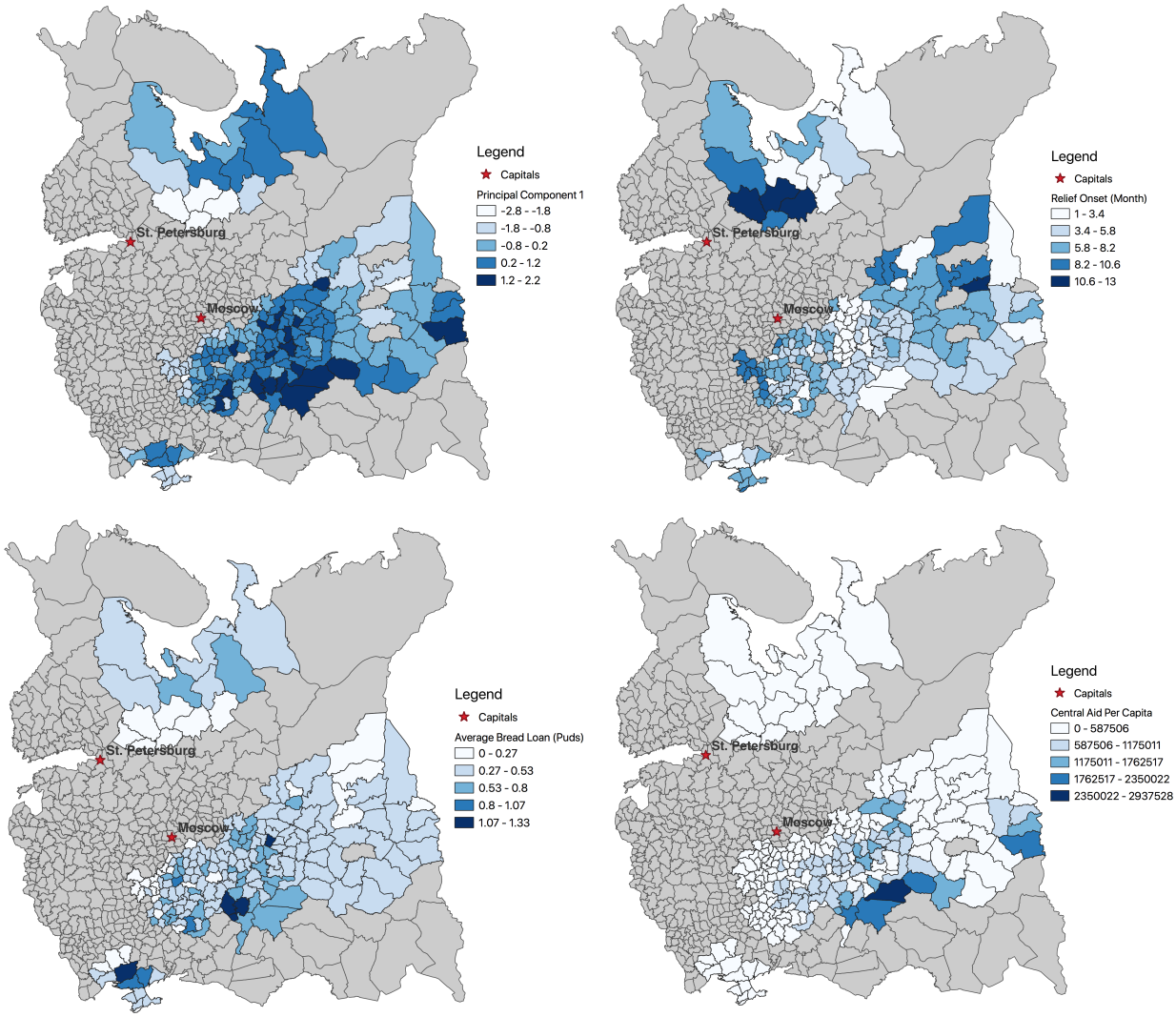

Figure A.2: Various indicators of famine relief at the district level.

Table A.11: Linguistic composition of the population and relief indicators.

Panel A	**PC 1**	**Months on relief**	**Relief onset**	**Avg. bread loan**	**Pop. on relief**	**Ln(state aid +1)**
	(1)	(2)	(3)	(4)	(5)	(6)
Harvest pc 1891	−0.04***	−0.09**	0.06***	−0.00	−0.58***	−0.14***
	(0.01)	(0.04)	(0.02)	(0.00)	(0.17)	(0.03)
Share Turkic	−0.90*	−2.00	3.03***	0.01	−12.55	−1.38
	(0.50)	(1.49)	(1.06)	(0.20)	(8.59)	(1.21)
Share non-Russian non-Turkic	−0.50	0.76	2.60	−0.12	18.73**	−1.08
	(0.57)	(1.91)	(1.70)	(0.15)	(9.25)	(1.41)
Harvest drop	0.08*	0.18	−0.18	0.02	1.87**	0.18
	(0.04)	(0.18)	(0.13)	(0.01)	(0.86)	(0.14)
Covariates	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓
Adj. R^2	0.65	0.49	0.54	0.30	0.51	0.68
Num. obs.	173	188	173	188	173	210

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

All models are OLS with province fixed effects. The first principal component Model 1 combines five relief measures: months on relief, average loan size, population on relief, and total state aid. Models also include the following covariates: *share urban*, *average land allotment*, *average recruit height*, *ln(railway distance)*, *land captains per area*, *ln(distance to St. Petersburg)*, *serfdom*, *horses per household*, *noble landowners per 1000*, *black soil*, *area*, *ln(population)*, *longitude*, *latitude*, and their interaction. Heteroskedasticity-robust standard errors in parentheses.

Table A.12: Models 1-2 present the relationship between relief and state capacity indicators (*Myers Index, Tax revenue*) in the subset of districts with no Muslims (defined as *Share Muslim* below the median of 0.0000948). Models 3-6 use the full dataset and examine the interaction between Share Muslim and state capacity indicators. Low legibility is defined as Myers Index below the mean. Low taxability is defined as tax revenue below the mean.

	Principal Component 1					
	(1)	(2)	(3)	(4)	(5)	(6)
Myers index (1897)	−0.13***		−0.01			
	(0.04)		(0.03)			
Myers index * Share Muslim			−0.06			
			(0.13)			
Tax to land * Share Muslim				0.46*		
				(0.26)		
High Myers index (low legibility)					0.11	
					(0.16)	
Low legibility*Share Muslim					−1.36*	
					(0.69)	
Low tax						−0.20
						(0.17)
Low tax*Share Muslim						−2.71*
						(1.54)
Harvest pc 1891	−0.01	−0.01	−0.03***	−0.04***	−0.04***	−0.05***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Harvest drop	0.13**	0.16***	0.09**	0.08*	0.09**	
	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)	
Tax revenue per unit land		0.08		0.09*		
		(0.07)		(0.05)		
Share Muslim			−0.47	−2.53***	−0.63	1.10
			(2.43)	(0.94)	(0.73)	(1.52)
Share other non-Orthodox			0.29	0.21	0.49	0.54
			(1.25)	(1.06)	(1.15)	(1.17)
Covariates	✓	✓	✓	✓	✓	✓
Province FE			✓	✓	✓	✓
Adj. R^2	0.55	0.51	0.66	0.70	0.66	0.69
Num. obs.	73	67	173	161	173	161

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

All models are OLS. Province fixed effects are included only in Models 3-4 due to sample size. Models also include the following covariates: *share urban*, *average land allotment*, *ln(railway distance)*, *ln(distance to St. Petersburg)*, *serfdom*, *horses per household*, *noble landowners per 1000*, *black soil*, *area*, *ln(population)*, *Longitude*, *Latitude*, and their interaction. Heteroskedasticity-robust standard errors in parentheses.

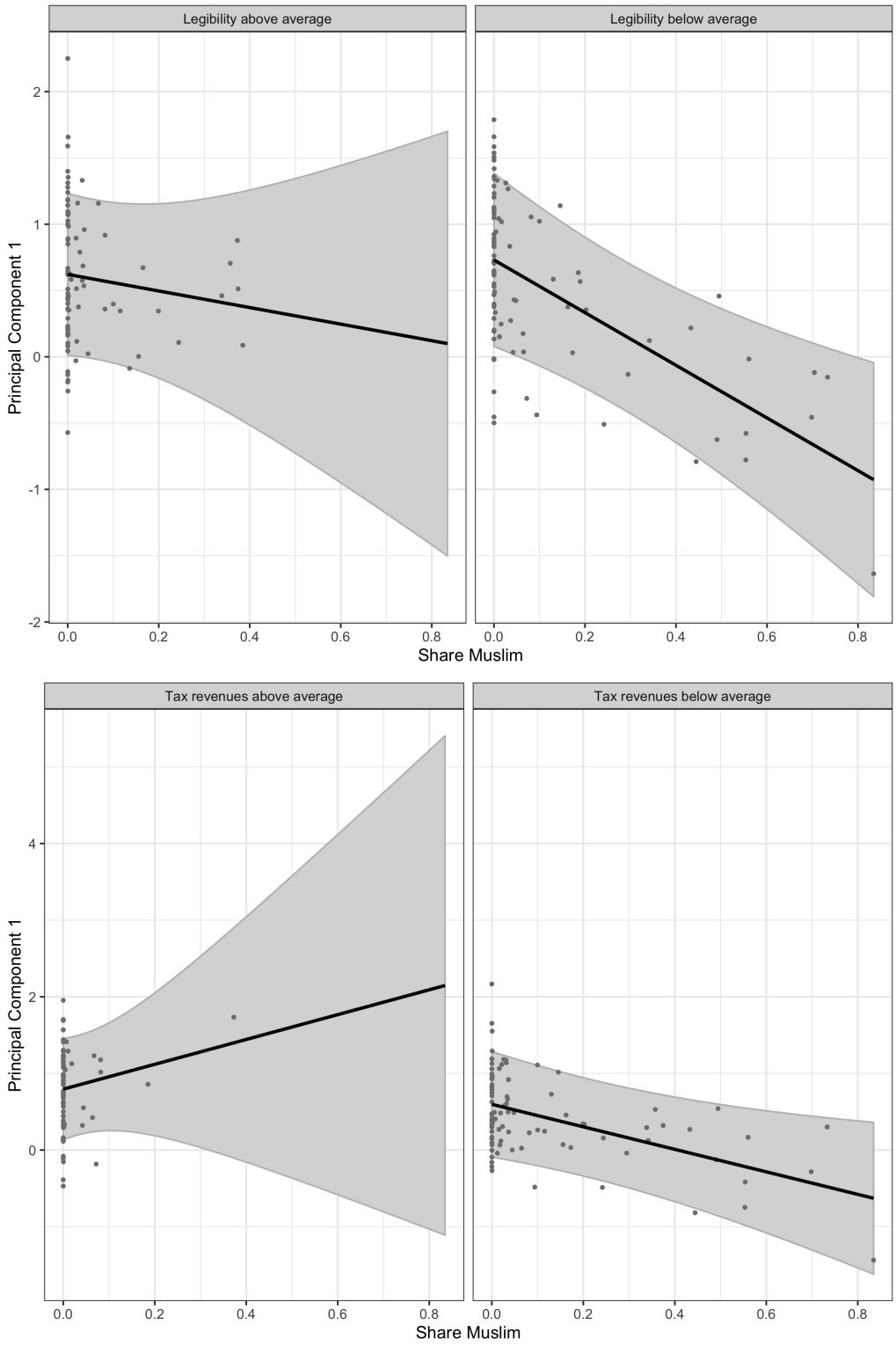

Figure A.3: Interaction effects from Models 5 and 6 in Table A.12

Social unrest as an alternative mechanism

To measure the threat of unrest, I use data on peasant protests published in *Krest'ianskoe dvizhenie v Rossii*.[115] The volumes were compiled by Soviet historians based on archival data and secondary historical literature on peasants and emancipation in Russia. All events in the decade before the famine (1880s) were coded and aggregated by district. Entries mentioning protests spanning multiple districts were counted separately. I also use data from Finkel, Gehlbach, and Olsen (2015) on protests in 1851–1863, the period with particularly high peasant unrest leading up to the creation of zemstvos.[116] It is important to acknowledge the limitations of these sources. In particular, they do not capture the disturbances among the Tatar population in 1878-79 provoked by imperial attempts to reform previous government arrangements, interpreted as forced conversion. Qualitative information accompanying each protest suggests that among Muslims and non-Muslims alike collective action during this period was aimed against state and zemstvo intervention and social upheaval caused by food shortages was virtually nonexistent. Thus, the conventional threat of unrest hypothesis, whereby the government provides aid to prevent food riots, is less applicable.

Furthermore, the presence of Muslims does not predict the incidence of rural arson, which can be viewed as a "weapon of the weak" in rural areas and was extremely frequent in the countryside as the peasants settled scores with the gentry and among themselves. The frequency of arsons increased during the famine years (1891-1892), but is uncorrelated with the presence of the Muslim population (ρ=-0.04) and (weakly) negatively correlated with the presence of non-Orthodox population (ρ=-0.28, p<0.10). Thus, arson was a tactic slightly more popular in Orthodox provinces and cannot explain the underprovision of famine relief to Muslim communes.[117]

[115]Druzhinin, N. (ed.). 1961. *Krest'ianskoe dvizhenie v Rossii v. 1796-1825 gg.: Sbornik dokumentov.* Moscow: Izdatel'stvo Sotsial'no-ekonomicheskoi literatury.

[116]Dower, Finkel, Gehlbach, and Nafziger (2017) use religious polarization as an instrument for unrest, arguing that religious intermediaries were unable to contain unrest in more heterogeneous districts.

[117]The data on arson comes from *Pozhary v Rossiiskoi Imperii 1888-1894.* 1897. St. Petersburg: Central Statistical Committee.

Table A.13: Relationships between religious composition and peasant unrest (Models 1-3) and between peasant unrest and legibility and taxation (Models 4-7).

	Peasant protest			**Myers Index**		**Taxes to land**	
	1880s	1880s	1851-63	1897		1888-90	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share Muslim	2.88	1.27	4.32				
	(2.17)	(1.47)	(2.68)				
Share other non-Orthodox	1.70	1.58	4.76				
	(1.69)	(2.39)	(5.16)				
Protests in the 1880s				0.10		−0.03	
				(0.08)		(0.05)	
Protests in 1851-63					0.07*		0.02
					(0.04)		(0.02)
Covariates		✓	✓	✓	✓	✓	✓
Province FE		✓	✓	✓	✓	✓	✓
Adj. R^2	0.07	0.28	0.51	0.77	0.77	0.82	0.82
Num. obs.	216	216	216	216	216	204	204

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

All models are OLS. Model 1 does not include covariates. Models 2-7 include province fixed effects and the following covariates: *share urban*, *average land allotment*, *average recruit height*, *ln(railway distance)*, *ln(distance to St. Petersburg)*, *serfdom*, *literacy* (for Myers index only), *average harvest* (for tax revenue only), *horses per household*, *noble landowners per 1000*, *black soil*, *area*, *ln(population)*, *longitude*, *latitude*, and their interaction. Heteroskedasticity-robust standard errors in parentheses.

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7. *Prilozhenie k Vsepoddanneishemu otchetu Samarskogo Gubernatora za 1892 g.* 1893. Samara: Gubernskaia Tipografiia.

8. *Otchet Samarskogo Uezdnogo Prodovolstvennogo Komiteta, s 1 ianvaria po 1 iulia 1892 g.* 1892. Samara: Zemskaia Tipografiia.

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14. Fortunatov, Aleksei. 1892. *Obschii Obzor Zemskoi Statistiki Krest'ianskogo khoziaistva. Itogi Ekonomicheskogo Issledovania Rossii po Dannym Zemskoi Statistiki.* Moscow: Tipografia Mamontova.

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2. "Urozhai 1889 goda v 60 Gubernii Evropejskoi Rossii." 1890. Statistika Rossiiskoi Imperii. IX. St. Peterburg: CSC MVD.

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6. (a) "Urozhai 1894 goda. I. Ozimye Khleba i Seno." 1894. Statistika Rossiiskoi Imperii. XXX. St. Peterburg: CSC MVD. (b) "Urozhai 1894 goda. II. Iarovye Khleba, Kartofel, Len, i Konoplia." 1895. Statistika Rossiiskoi Imperii. XXX. St. Peterburg: CSC MVD.

7. (a) "Urozhai 1895 goda. I. Ozimye Khleba i Seno." 1895. Statistika Rossiiskoi Imperii. XXXV. St. Peterburg: CSC MVD. (b) "Urozhai 1895 goda. II. Iarovye Khleba, Kartofel, Len, i Konoplia." 1896. Statistika Rossiiskoi Imperii. XXXV. St. Peterburg: CSC MVD.

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Sources for other variables:

1. Data on famine relief: "Statisticheskie dannye po vydache ssud na obsemenenie i prodovol'stvie naseleniu, postradavchemu ot neurozhaia v 1891-1892 gg." 1894. *Vremennik no. 28* St. Peterburg: CSC MVD.

2. Data on religious composition of the population in 1870: "Nalichnoe naselenie Rossiiskoi imperii za 1870 god." 1875. *Statisticheskii vremennik Rossiiskoi imperii.* Vol. 9. St. Peterburg: Bezobrazov and Co.

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6. Distance to the railway line was computed by the author.

7. Remaining control variables were obtained from replication files for Dower, Paul Castañeda, Evgeny Finkel, Scott Gehlbach, and Steven Nafziger. 2017. "Collective Action and Representation in Autocracies: Evidence from Russia's Great Reforms". *American Political Science Review* 112, no. 1: 125–147. doi: 10.1017/S0003055417000454.