# All Along the Watchtower: Defense Lines and the Origins of Russian Serfdom

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# Motivation

- Standard economic models of the labor market assume that transactions between employer and employee are voluntary or "free".
- However, for most of human history labor was coercive.
  - *"In the context of universal history, free labor, wage labor, is the peculiar institution."* (Finley, 1976).
- Slavery, serfdom and forced labor were most common labor regulating institutions in the world up until the beginning of the $20^{\text{th}}$ century.

# Motivation

- Huge literature on the effects of labor institutions on productivity and economic development.
- In a nutshell, "extractive" institutions suppress incentives for investment and innovation, and reduce growth rates (North, 1990; Acemoglu and Robinson, 2012)
- But how do "extractive" institutions emerge in a first place?
- Russian serfdom is an example of "extractive" institution which
  - suppressed agricultural productivity and peasants' living standards (Markevich and Zhuravskaya, 2018)
  - had long lasting effects on modern development (Buggle and Nafziger, 2017).

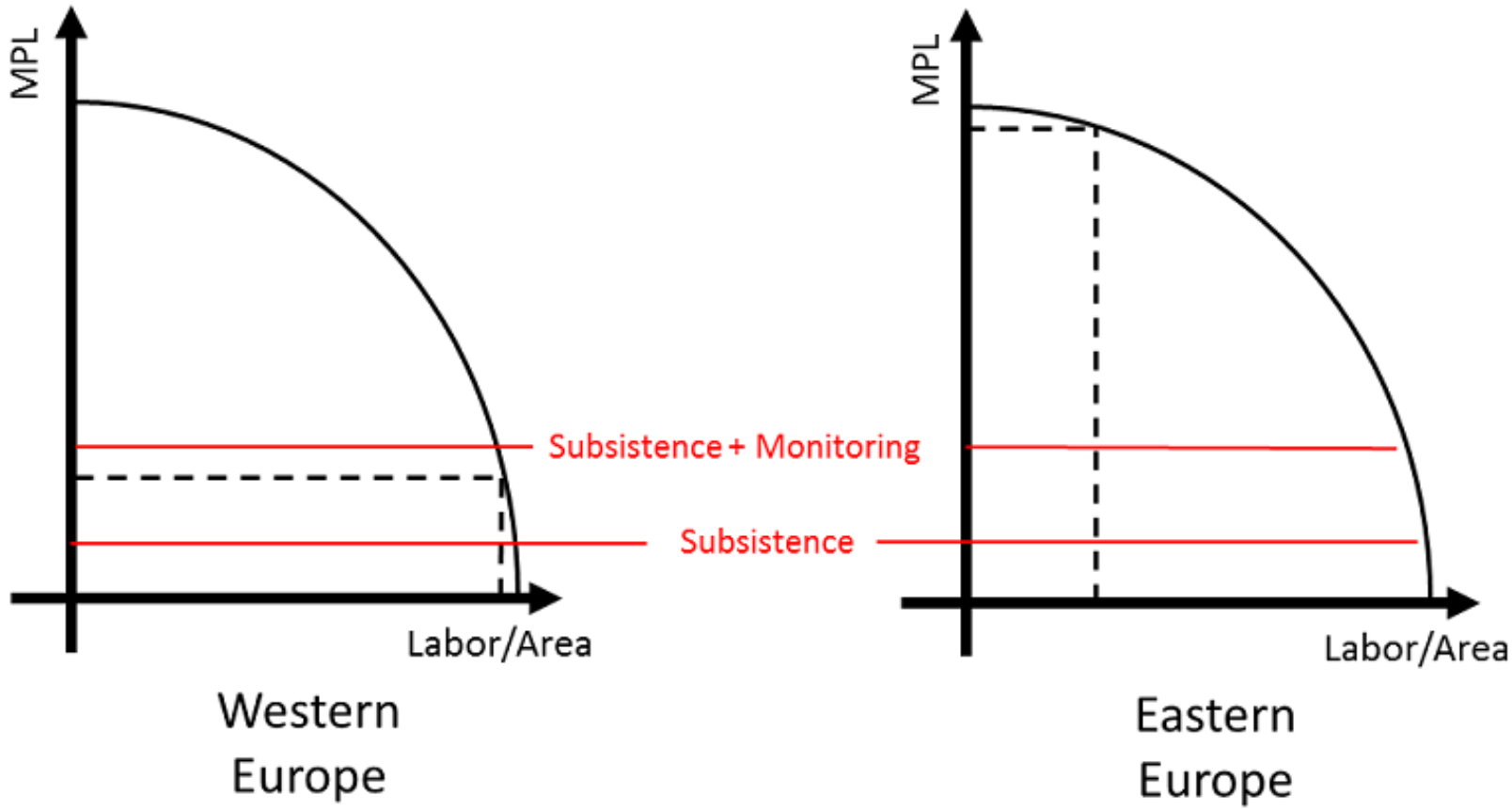
# Research question

- In 1100 most Western European peasants were serfs. By 1300 many had become tenants, and by 1500 almost all of them were free farmers (North and Thomas, 1973).
- In Russia most peasants were free tenants in 1450. But by 1650 virtually all of them had been enserfed (Kluchevsky, 1911).
- Russian case was a part of the larger trend – "The Second Serfdom in Eastern Europe" (Blum, 1957).
- Why did Western and Eastern Europe exchanged land tenure systems?

# Theories of serfdom

- Historians' theories of "Second serfdom" focus mainly on internal factors:
  - Blum (1957) explains it by the rise of power of nobility
  - Schoffel (1959) by the decline of cities and internal markets
  - Kaminski (1975) by the rise of grain trade between Poland and Western Europe
- Domar (1970) famously argued that labor scarcity in Eastern Europe created incentives for landowners to limit peasants' mobility.
  - while the theory explains the cross-sectional pattern, it does not address the timing of enserfment.
  - why serfdom was not reintroduced in Western Europe after the Black Death?

# Domar's model



# Europe in 1500

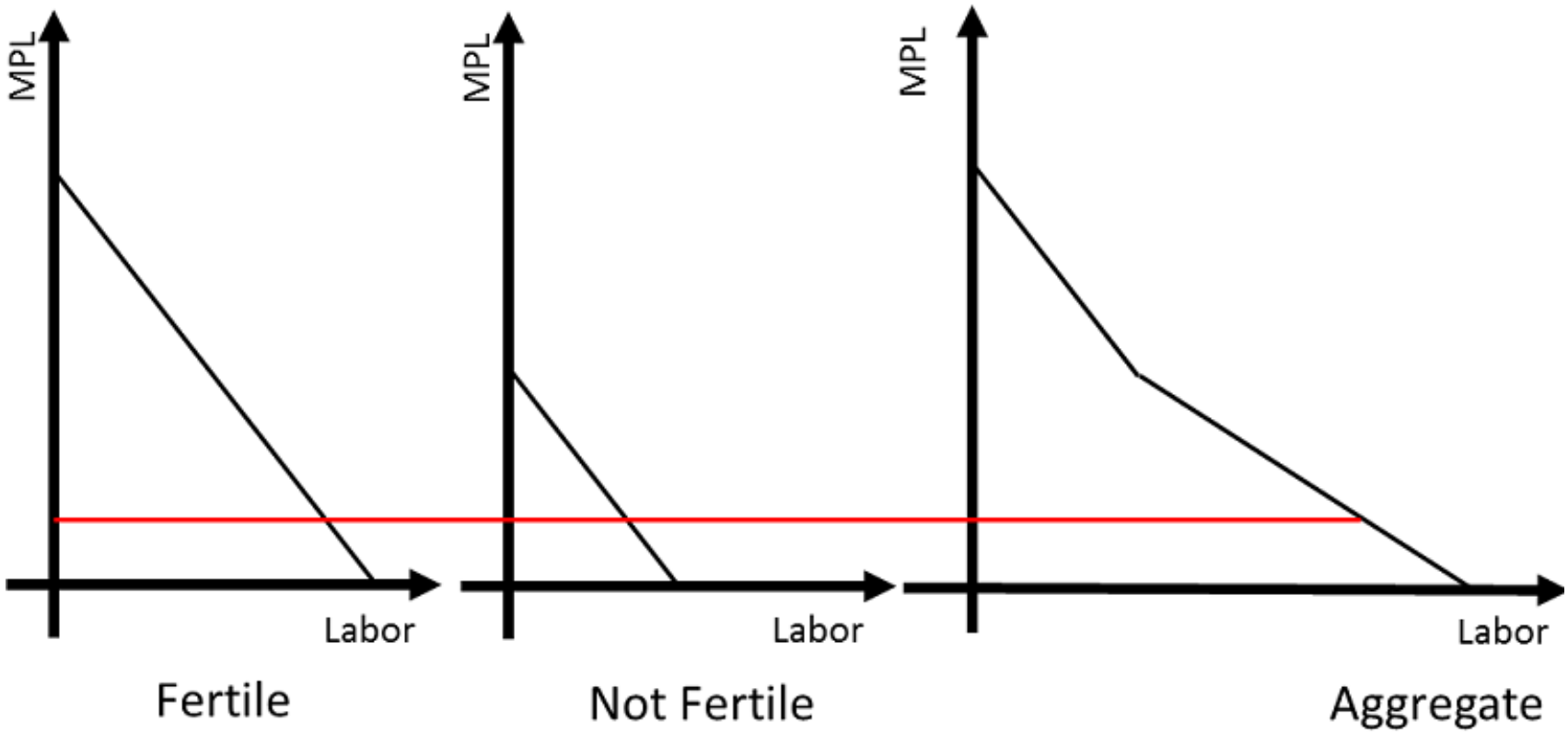
# New theory

- External military threat from the rising powers on the Europe's steppe frontier – the Crimean Khanat and the Ottoman Empire – created a need for new social organization.

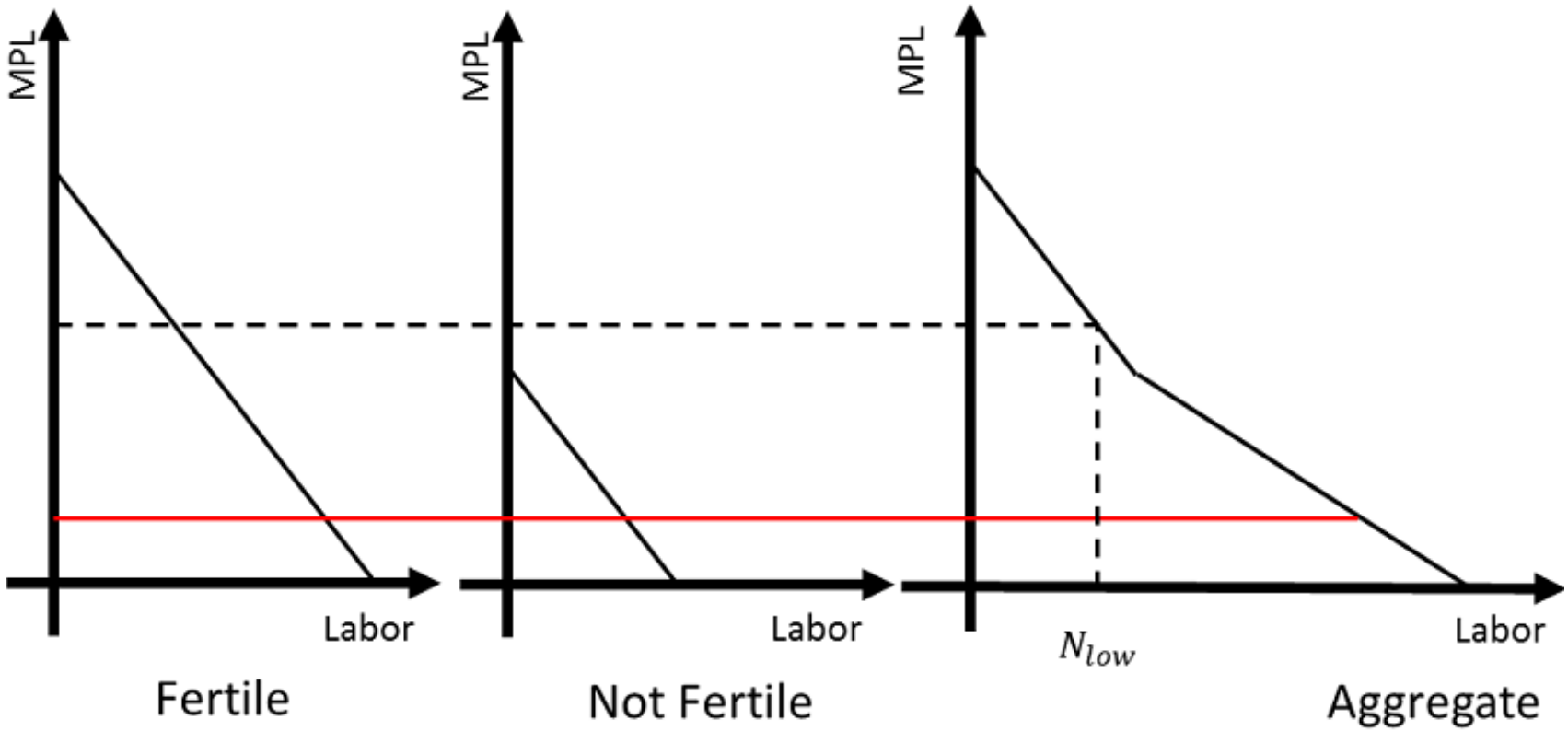
- Our theory: in the presence of land which is
  - economically unattractive, but
  - military essential

  the state has an incentive to enforce a specific population distribution to enhance its defence potential at the cost of economic efficiency.

# The model: heterogeneous land quality



# The model: effect of population density



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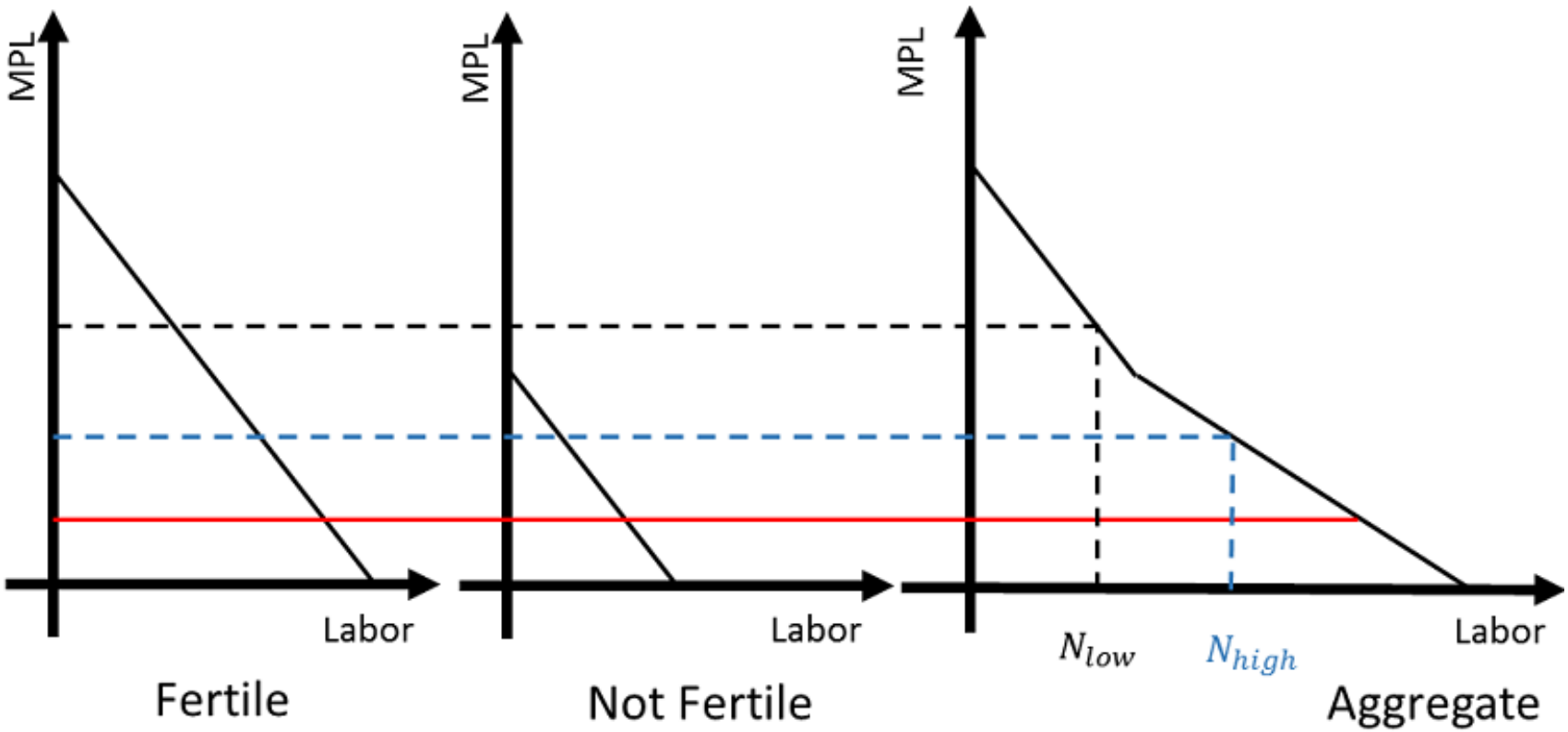


# The model: results

- If free movement of labor is allowed, peasants will move to highest wage region (most fertile).
- Nomads will attack in undefended region, successfully raid and capture slaves.
- Serfdom allows the central agent to redistribute population according to defence needs at the cost of economic efficiency.

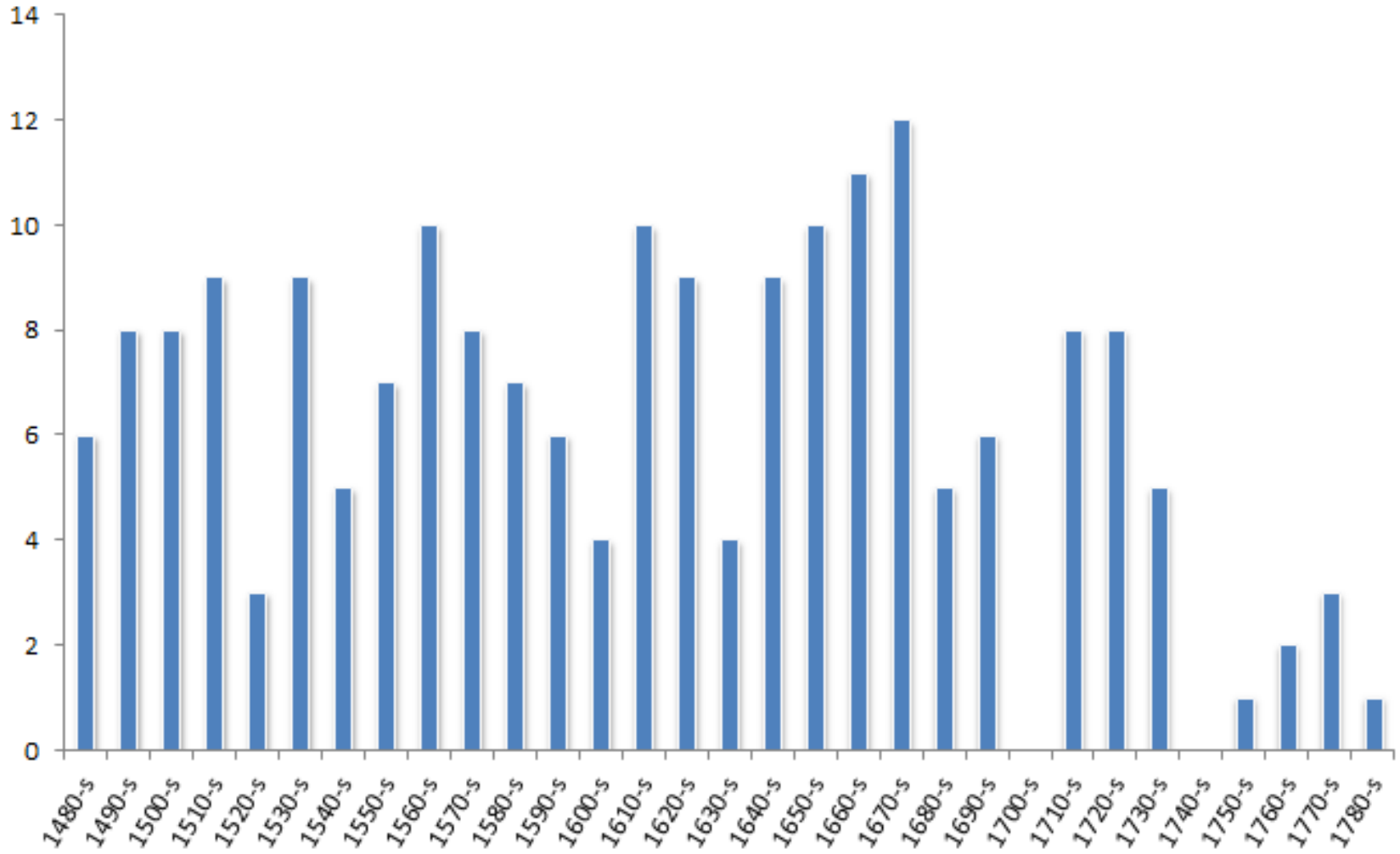
# Why was Western Europe different?

- In Western Europe the nature of military conflicts were different.
- Attackers had artillery and supplies, which need roads (in contrast to nomads who were very mobile).
- Roads can be blocked by defending cities.
- People already had incentives to move to cities.
- Thus, no need for enforced spatial distribution of labor.

# Historical background

- The Crimean Khanate – one of the successors of the Golden Horde – became the vassal of the Ottoman Empire in 1479.
- Slave trade was one of the main sources of income for Crimean nobility. The Crimean port of Caffa (former Genoese colony) was the center of the Black sea slave trade.
- The process was known as *"harvesting the steppe"* – groups of raiding nomads would go out and capture peasants living on the Russian, Ukrainian and Polish frontiers.
- In first half of the $17^{\text{th}}$ century up to 200 thousand people were abducted from Russia *(Novoselskiy, 1948; Khodarkovsky, 2002)*.

# Frequency of nomads' slave raids by decade *(Novoselskiy, 1948)*



# Slave raids as an existential threat

*"Had Moscow not taken effective countermeasures, virtually all of its population would have been sold through the Crimea into the slave markets of the Middle East and the Mediterranean. Those who were not yet enslaved were forced to pay tribute to the Crimeans, which cost the Russian government a million rubles between 1613 and 1650"*

Hellie R. "Russia" in The Oxford Encyclopedia of Economic History (2003).

- The word "slave" comes from the Latin "sclavus", which, in turn, comes from the ethnonym "Slav" (Slavic people). *(Oxford English Dictionary, 1989)*

# Defence against the slave raids

- A series of fortification lines were build along the southern frontier starting from the mid-16$^{\text{th}}$ century.
- The lines were built from the felled trees arranged as a barricade, fortified by ditches, earth mounds and watchtowers.
- The lines were analogous to the Great Wall of China and the Roman Limes, except that they did not last to modern times.
- Peasants were forbidden to cut wood in the area, and were obliged to maintain the fortifications.
- In the autumn large areas of steppe grass beyond the line were burnt to deny raiders fodder.

# Taming the "Wild Field"

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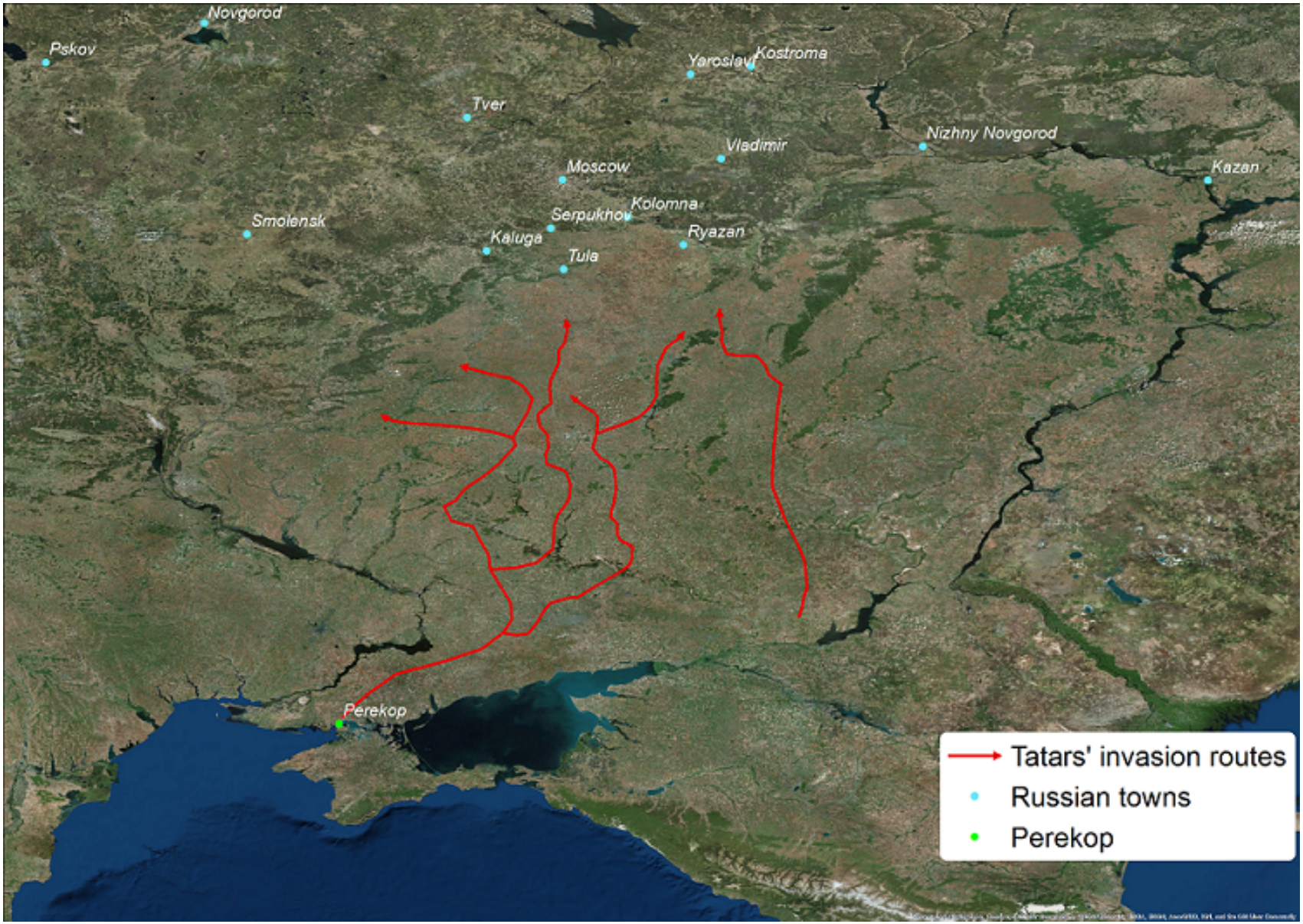

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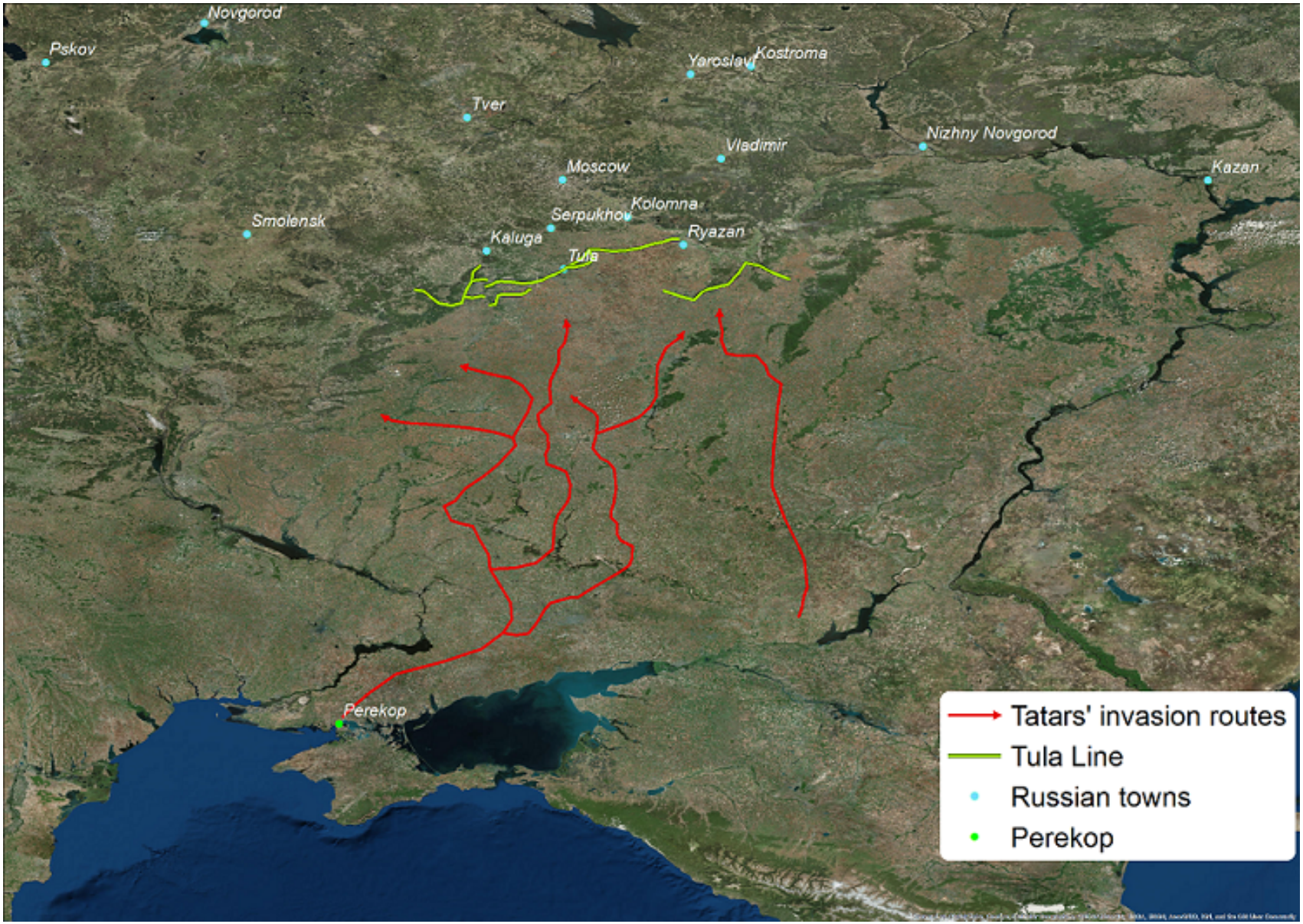

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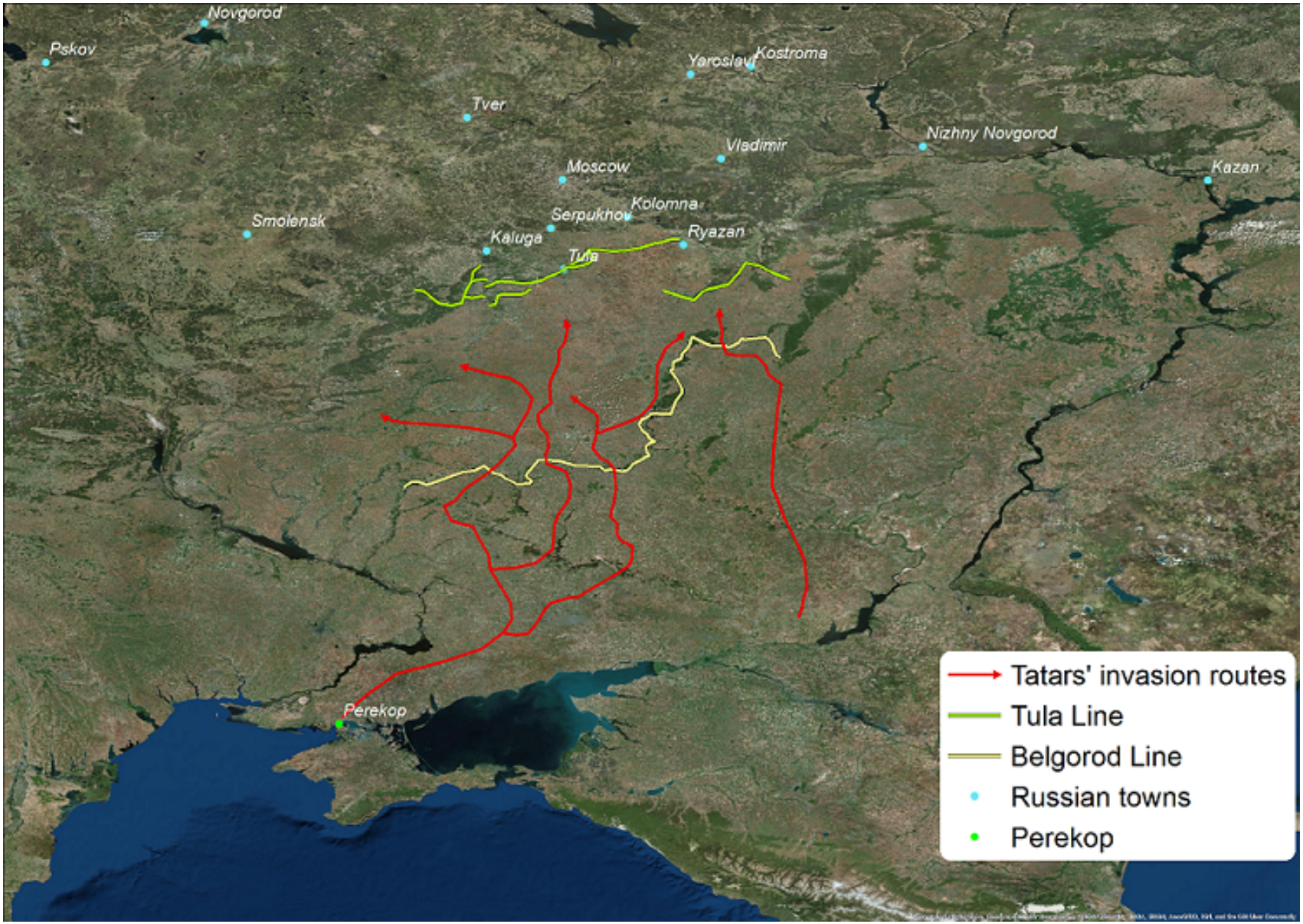

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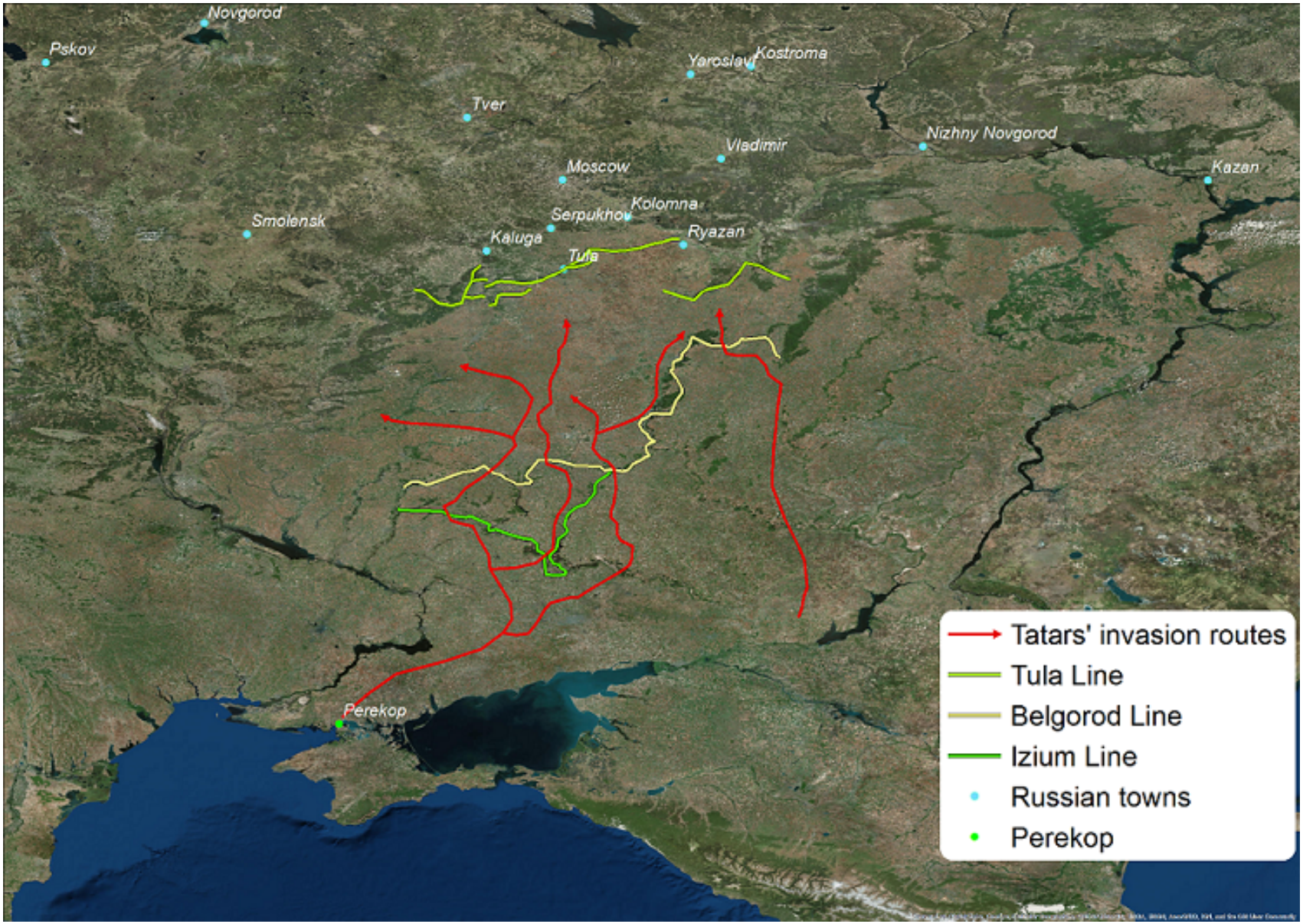

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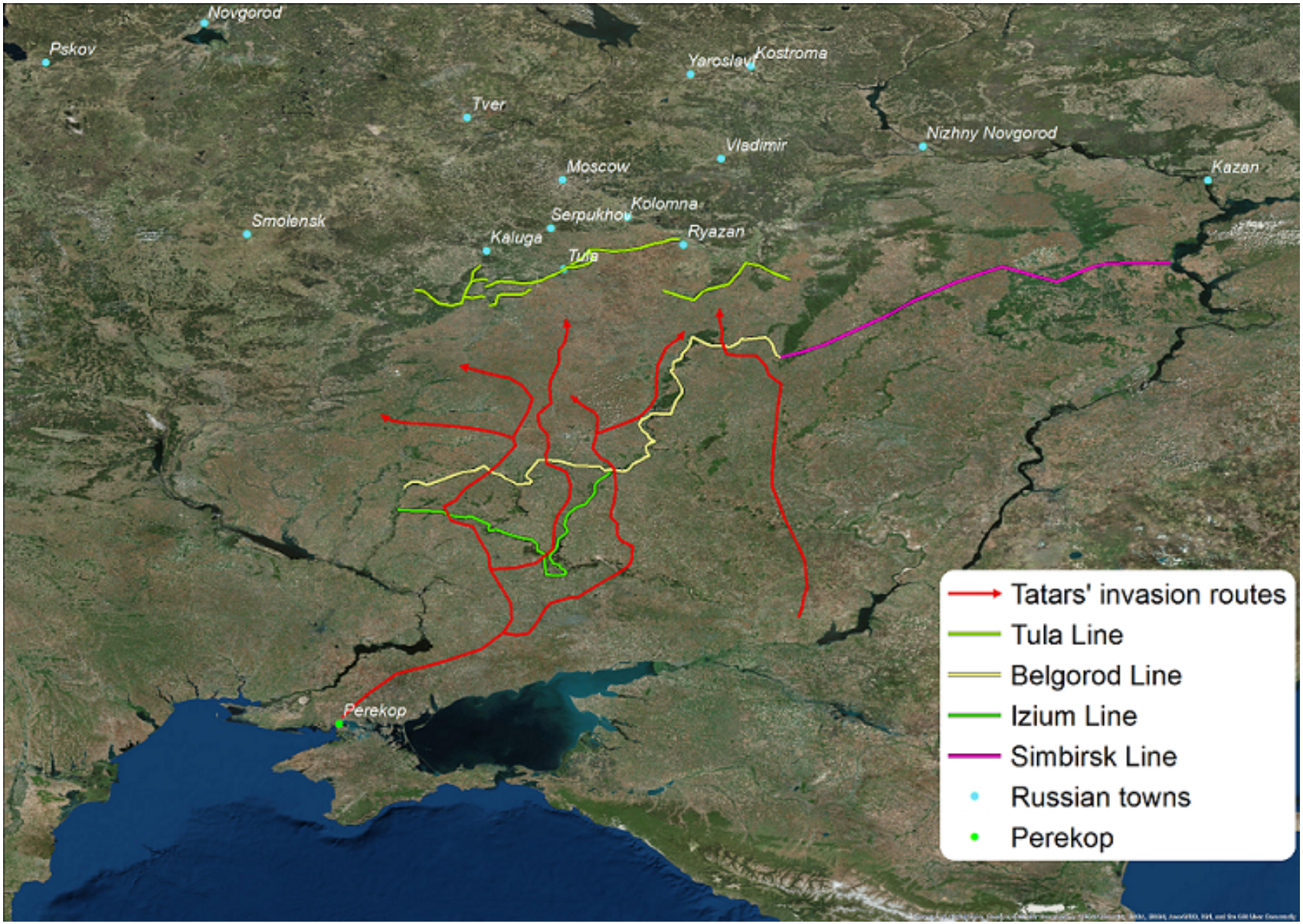

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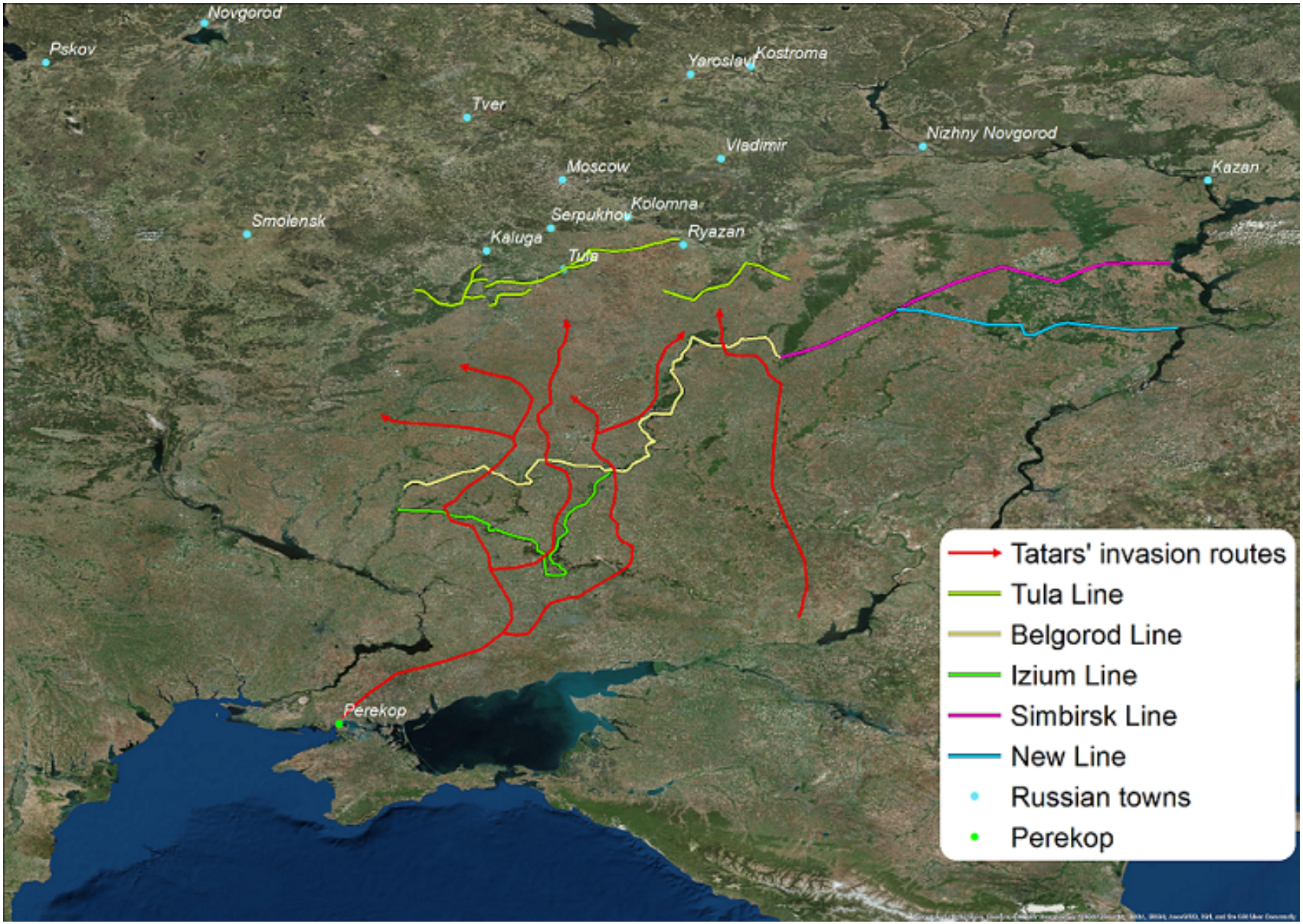
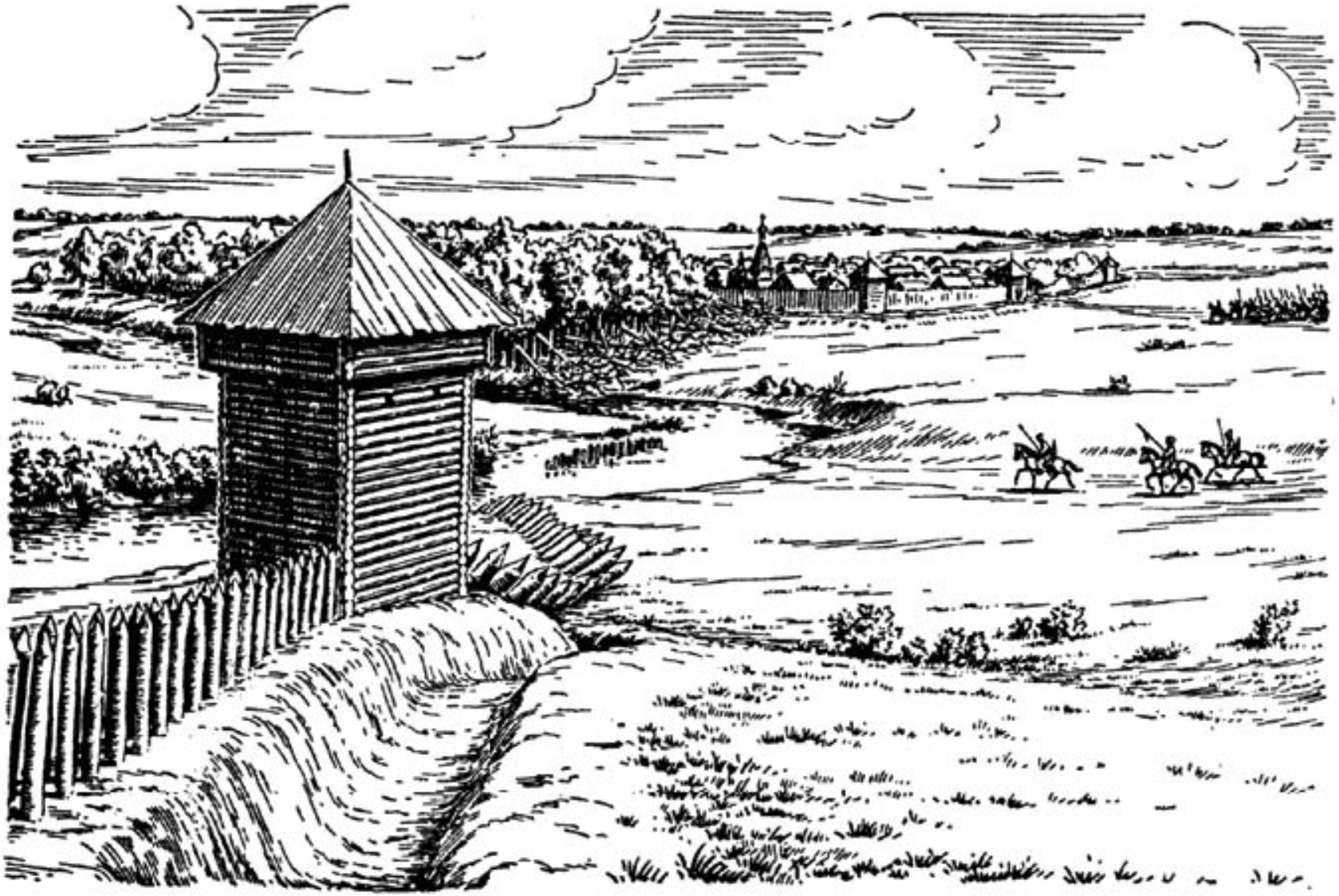




Оборонительные сооружения „Черты"

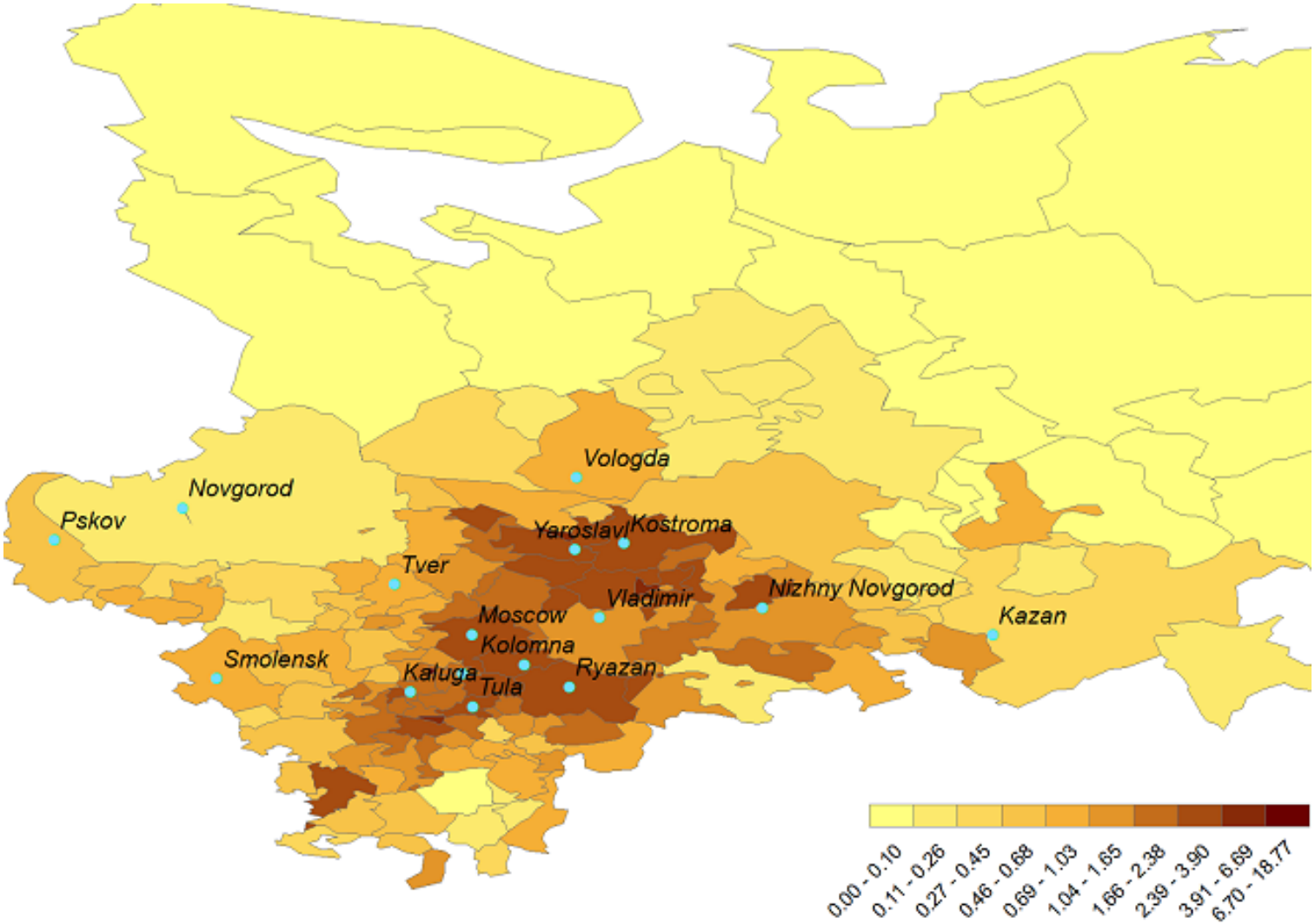
# *The Ulozhenie* of 1649 and the rise of new military class

- *Sobornoe Ulozhenie* of 1649 – the main legal code of the Muscovy (25 chapters, 968 articles).
  - completed the ensefment of Russian peasantry
  - affirmed class hereditary as unchangeable
  - prohibited travel between towns without permission of the state
  - 47% of articles mention the southern frontier in one or the other way *(Hellie, 1992)*
- To meet the threat of nomads the new class – middle service class cavalry – was consolidated, and given land plots with assigned peasants on the southern frontier.
  - "No one could own land in Muscovy without rendering service. Failure to render satisfactory service led to the confiscation of the estate, regardless of whether it was registered as *votchina* or as *pomest'e*." *(Pipes, 1964)*.

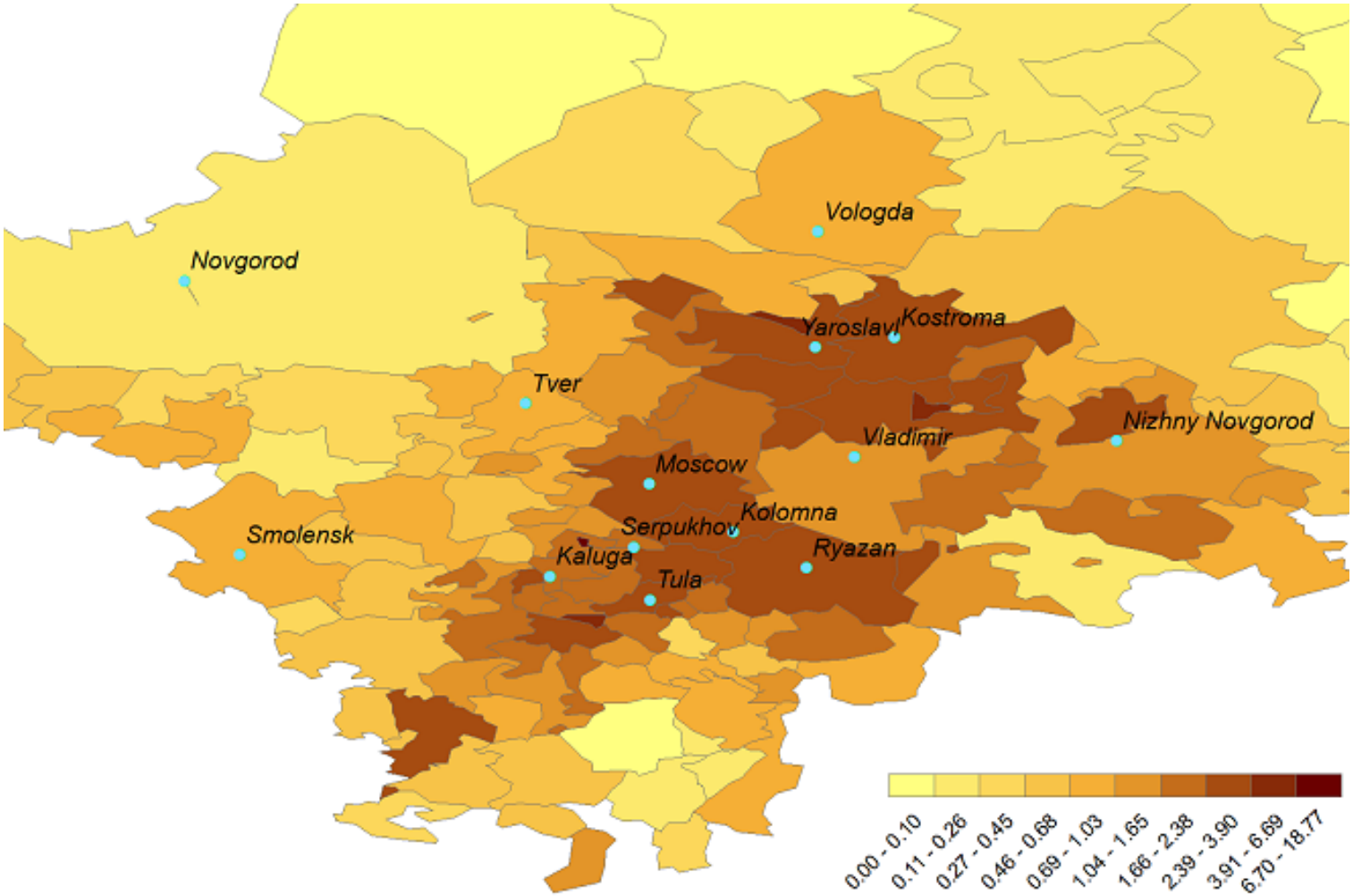
# Data sources

- Population data from 1678 household census (digitized for the very first time from *Beskrovnii et al. (1972); Vodarskii (1977)*).
- Location of the defense lines and nomads' invasion routes *(Yakovlev, 1916; Novoselsky, 1948)*.
- Climatic, soil and terrain data (FAO-GAEZ; *Galor, Ozak (2016)*).
- Population data from 1859 poll census (early stage).
- Coming next: 1719 poll census.

# Spatial distribution of Russian population in 1678



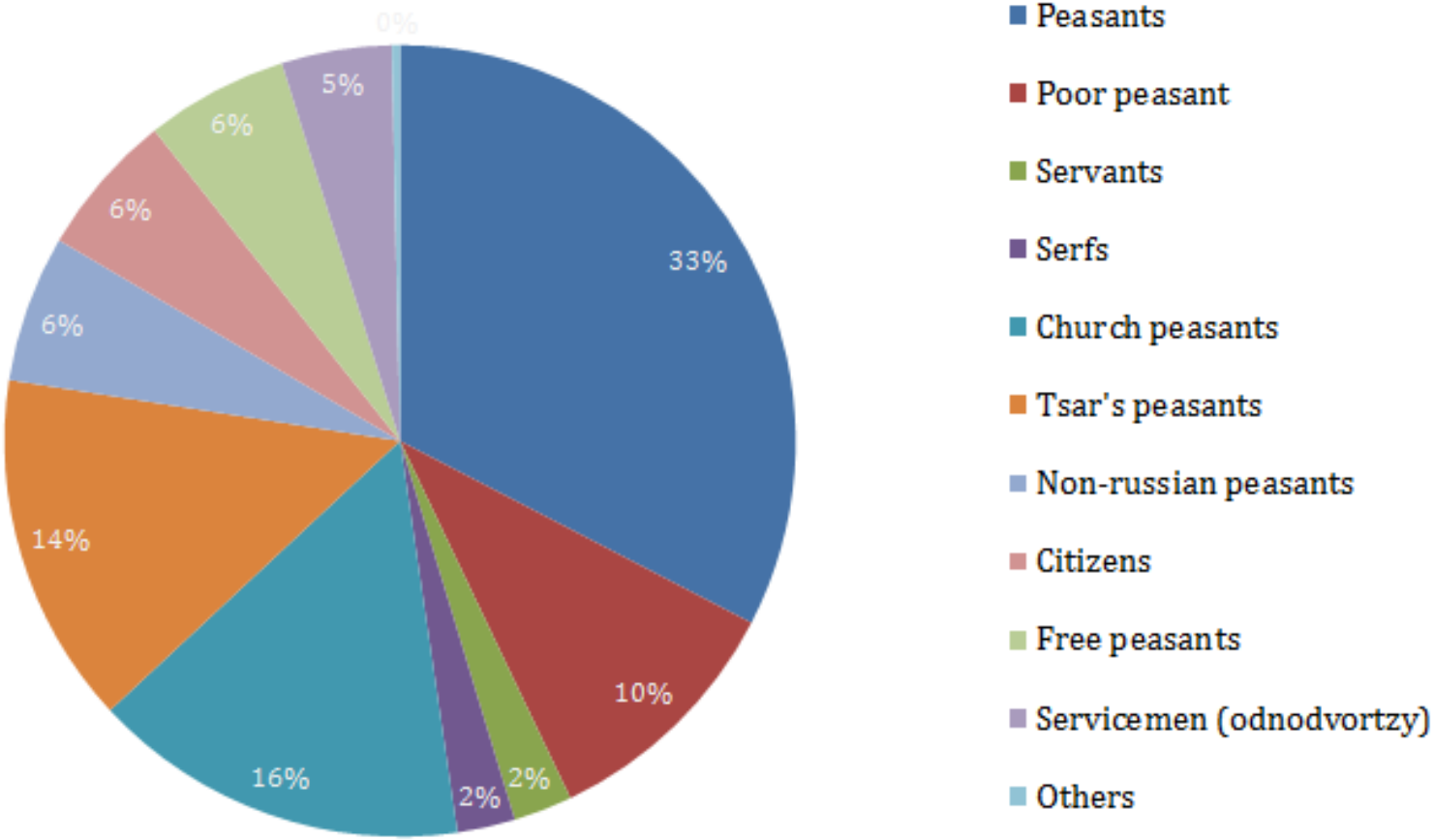
# Spatial distribution of Russian population in 1678 (without North)



# Population structure in 1678

| **Social Group** | **Description** | **%** |
|---|---|---|
| Feudal peasants | | 47.9 |
| peasants *(krest'yane)* | Own their house and agricultural tools. Work some days for landowner, some on "private" lands. | 32.6 |
| poor peasants *(bobyli)* | Own no tools. Work for the landlord of his land. | 10.3 |
| servants *(dvorovye)* | Live in landlord's estate. Mostly do house-work. | 2.4 |
| serfs *(zadvornye)* | Live close to the estate. Work mainly in food production for the landlord. | 2.4 |
| Church peasants | Tied to church and monasteries' lands. | 15.4 |
| Tsar's peasants | Owned by the Tsar, work to supply his court. | 14.4 |
| Citizens *(posadskie)* | Merchants, artisans, state officials. | 5.9 |

# Population structure in 1678

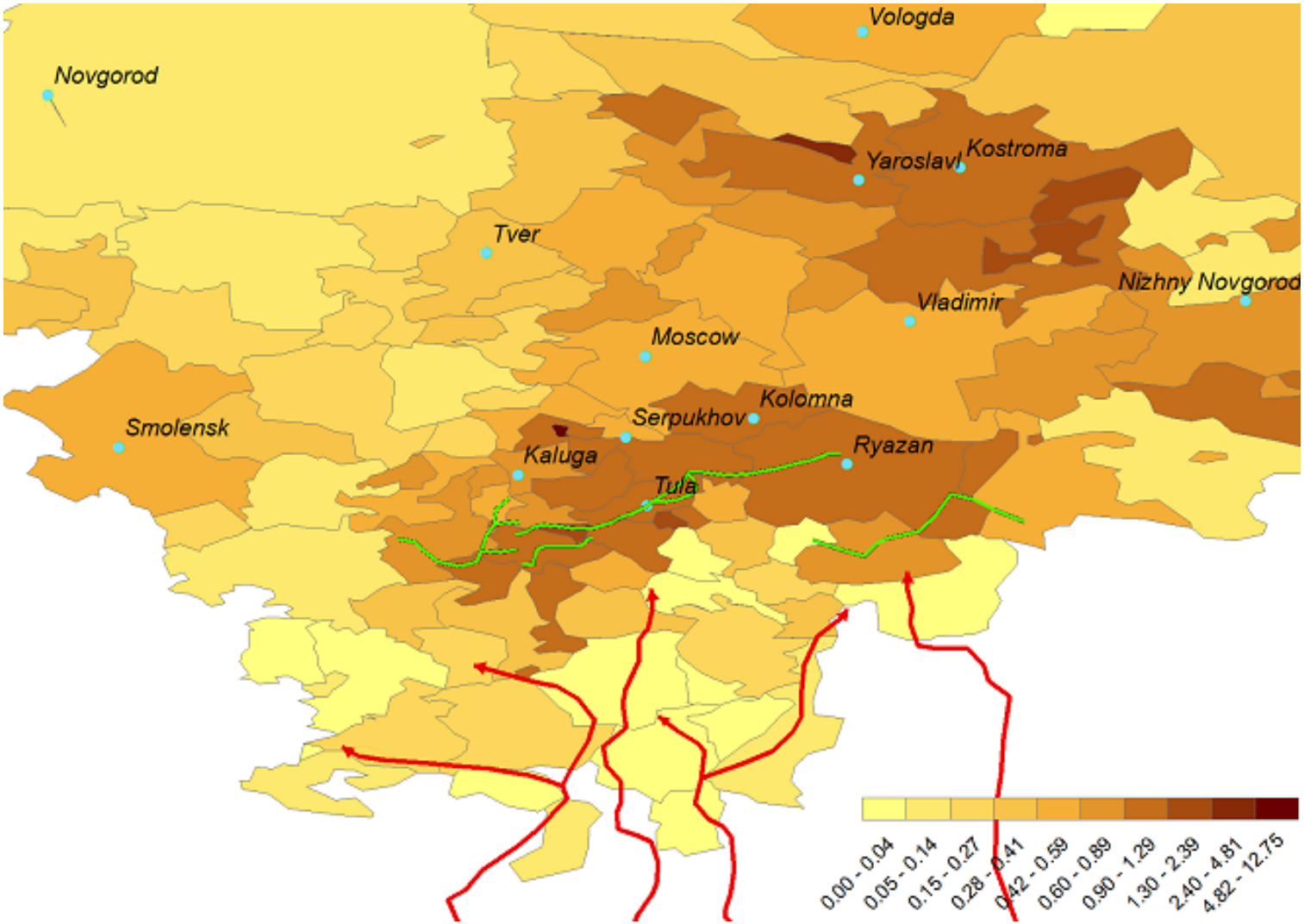


# Determinants of population density in 1678

| | (1) | (2) |
|---|---|---|
| | Population density in 1678, males per sq. km | |
| Potential crop yield (calories, mean) | 0.279*** | |
| | (7.56) | |
| Potential crop yield (calories, std) | -0.116** | |
| | (-2.33) | |
| Temperature (mean) | | 0.311*** |
| | | (6.52) |
| Precipitation (mean) | | 0.092* |
| | | (1.74) |
| Ruggedness (mean) | -0.023 | -0.016 |
| | (-0.35) | (-0.23) |
| District on Volga | 0.228*** | 0.261*** |
| | (2.76) | (3.17) |
| District on Tula line | 0.450*** | 0.441*** |
| | (6.88) | (6.85) |
| $R^2$ | 0.421 | 0.421 |
| Observations | 131 | 131 |

Standardized beta coefficients; $t$ statistics in parentheses

# Spatial distribution of feudal peasants



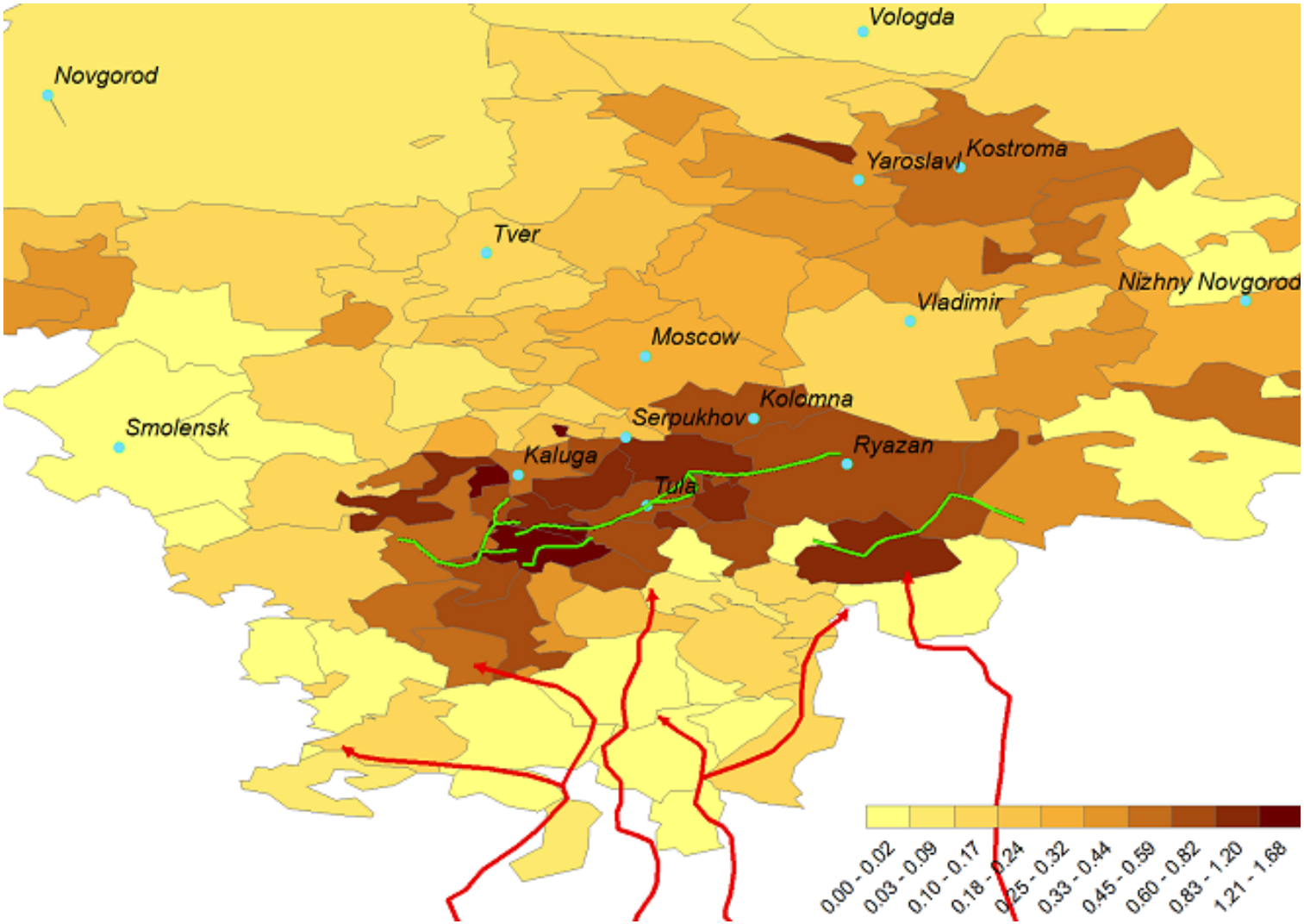
# Determinants of serfdom

| | (1) Feudal peasants, total | (2) Peasants | (3) Poor peasants | (4) Servants and serfs | (5) Servants, serfs, and poor peasants |
|---|---|---|---|---|---|
| District on Tula line | 0.621*** | 0.458*** | 0.673*** | 0.744*** | 0.740*** |
| | (10.48) | (6.92) | (8.01) | (8.07) | (9.51) |
| Potential crop yield (mean) | 0.179*** | 0.181*** | 0.141*** | 0.128*** | 0.143*** |
| | (5.63) | (5.18) | (4.98) | (4.47) | (5.21) |
| Potential crop yield (std) | -0.142*** | -0.135** | -0.128*** | -0.115*** | -0.129*** |
| | (-3.00) | (-2.35) | (-3.77) | (-4.18) | (-4.22) |
| Ruggedness (mean) | -0.031 | -0.048 | -0.041 | 0.041 | -0.007 |
| | (-0.50) | (-0.66) | (-0.72) | (0.90) | (-0.15) |
| District on Volga river | 0.127 | 0.184* | 0.050 | 0.005 | 0.033 |
| | (1.52) | (1.81) | (0.77) | (0.16) | (0.70) |
| $R^2$ | 0.523 | 0.350 | 0.550 | 0.659 | 0.655 |
| Observations | 131 | 131 | 131 | 131 | 131 |

Standardized beta coefficients; $t$ statistics in parentheses

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

# Spatial distribution of servants, serfs and poor peasants



# Determinants of serfdom (other controls)

| | (1) Feudal peasants, total | (2) Peasants | (3) Poor peasants | (4) Servants and serfs | (5) Servants, serfs, and poor peasants |
|---|---|---|---|---|---|
| District on Tula line | 0.616*** | 0.457*** | 0.665*** | 0.733*** | 0.730*** |
| | (10.72) | (6.86) | (8.26) | (7.92) | (9.73) |
| Temperature (mean) | 0.198*** | 0.191*** | 0.167*** | 0.149*** | 0.168*** |
| | (3.98) | (3.76) | (3.70) | (3.26) | (3.68) |
| Precipitation (mean) | 0.117** | 0.095* | 0.118** | 0.135*** | 0.132*** |
| | (2.46) | (1.67) | (2.49) | (2.81) | (2.90) |
| Ruggedness (mean) | -0.018 | -0.039 | -0.027 | 0.058 | 0.008 |
| | (-0.27) | (-0.51) | (-0.45) | (1.16) | (0.16) |
| District on Volga river | 0.158* | 0.214** | 0.078 | 0.031 | 0.062 |
| | (1.94) | (2.13) | (1.22) | (0.97) | (1.35) |
| $R^2$ | 0.519 | 0.339 | 0.554 | 0.670 | 0.663 |
| Observations | 131 | 131 | 131 | 131 | 131 |

Standardized beta coefficients; $t$ statistics in parentheses

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

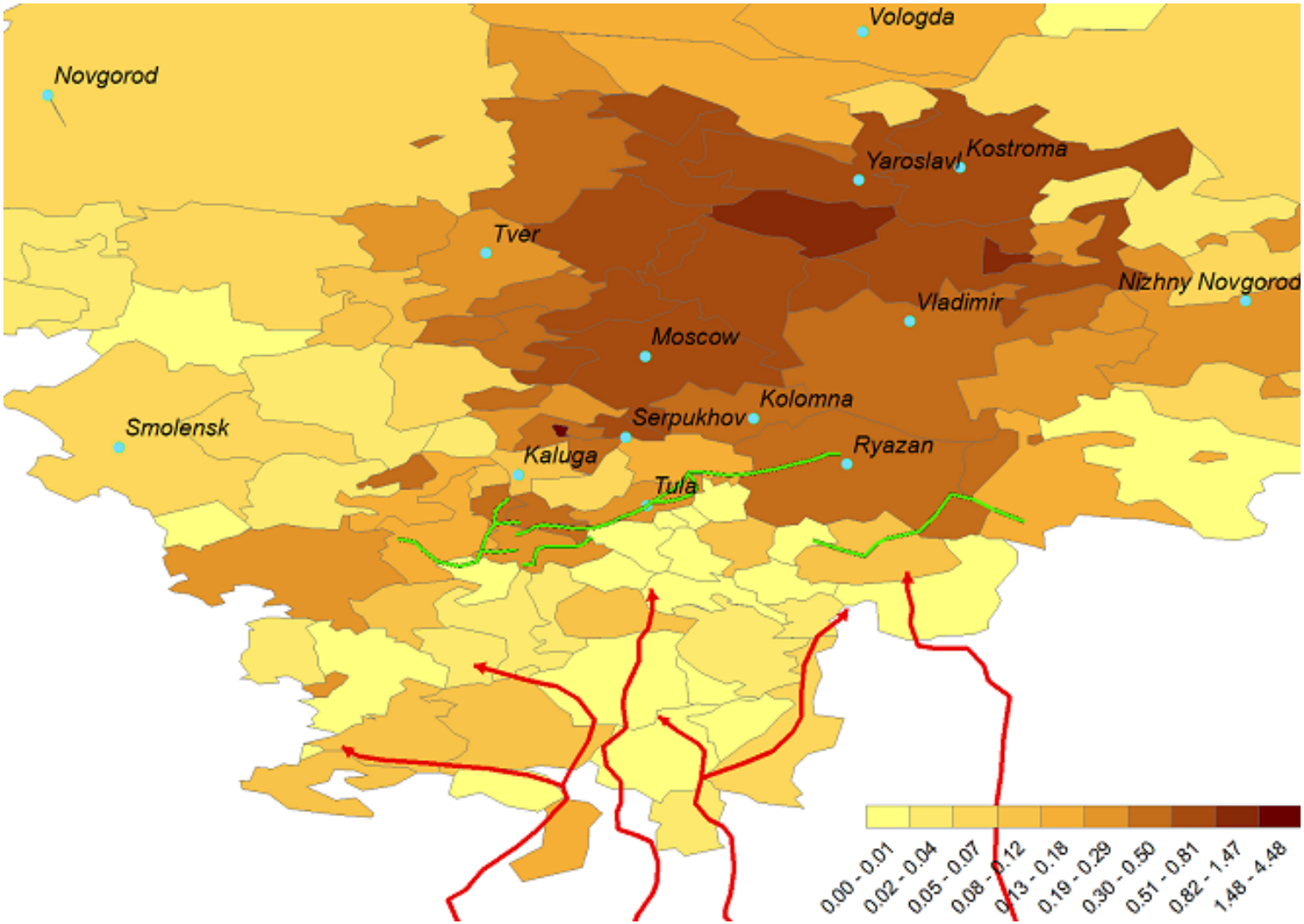
# Placebo regressions: other peasant types

| | (1) Church peasants | (2) Tsar's peasants | (3) Free peasants | (4) Servicemen *(odnodvortzy)* |
|---|---|---|---|---|
| District on Tula line | 0.022 | -0.068 | 0.002 | 0.027 |
| | (0.35) | (-1.60) | (0.11) | (0.25) |
| Potential crop yield (mean) | 0.135*** | 0.117** | -0.127 | 0.328*** |
| | (3.66) | (2.27) | (-1.52) | (3.91) |
| Potential crop yield (std) | -0.114** | -0.033 | 0.391 | 0.041 |
| | (-2.00) | (-0.65) | (1.45) | (0.54) |
| Ruggedness (mean) | -0.197*** | -0.100*** | -0.058 | 0.401*** |
| | (-2.95) | (-2.86) | (-1.05) | (3.57) |
| District on Volga | 0.115 | 0.284 | -0.008 | -0.016 |
| | (1.16) | (1.25) | (-0.64) | (-0.56) |
| $R^2$ | 0.118 | 0.137 | 0.197 | 0.269 |
| Observations | 131 | 131 | 131 | 131 |

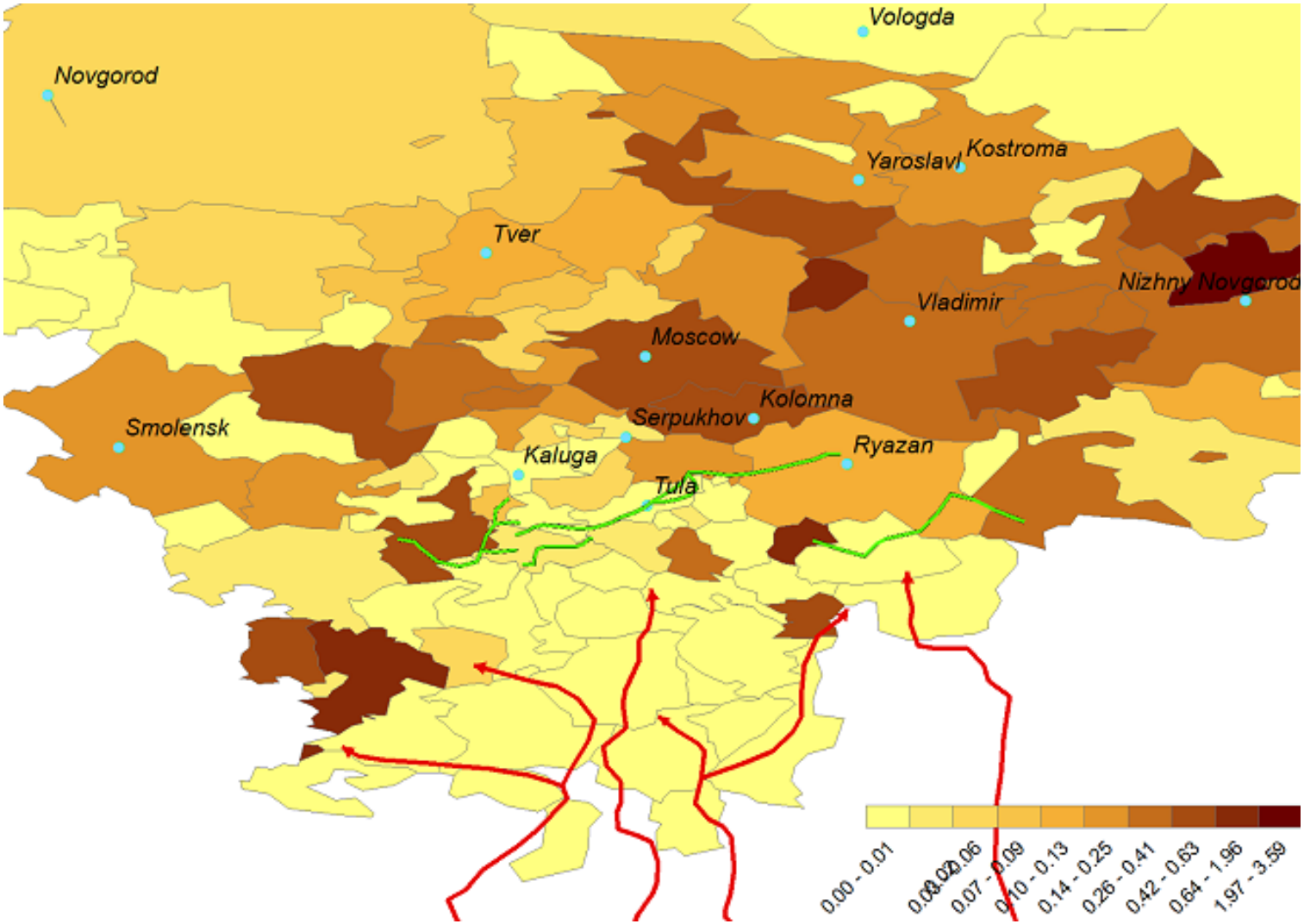
Standardized beta coefficients; $t$ statistics in parentheses

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

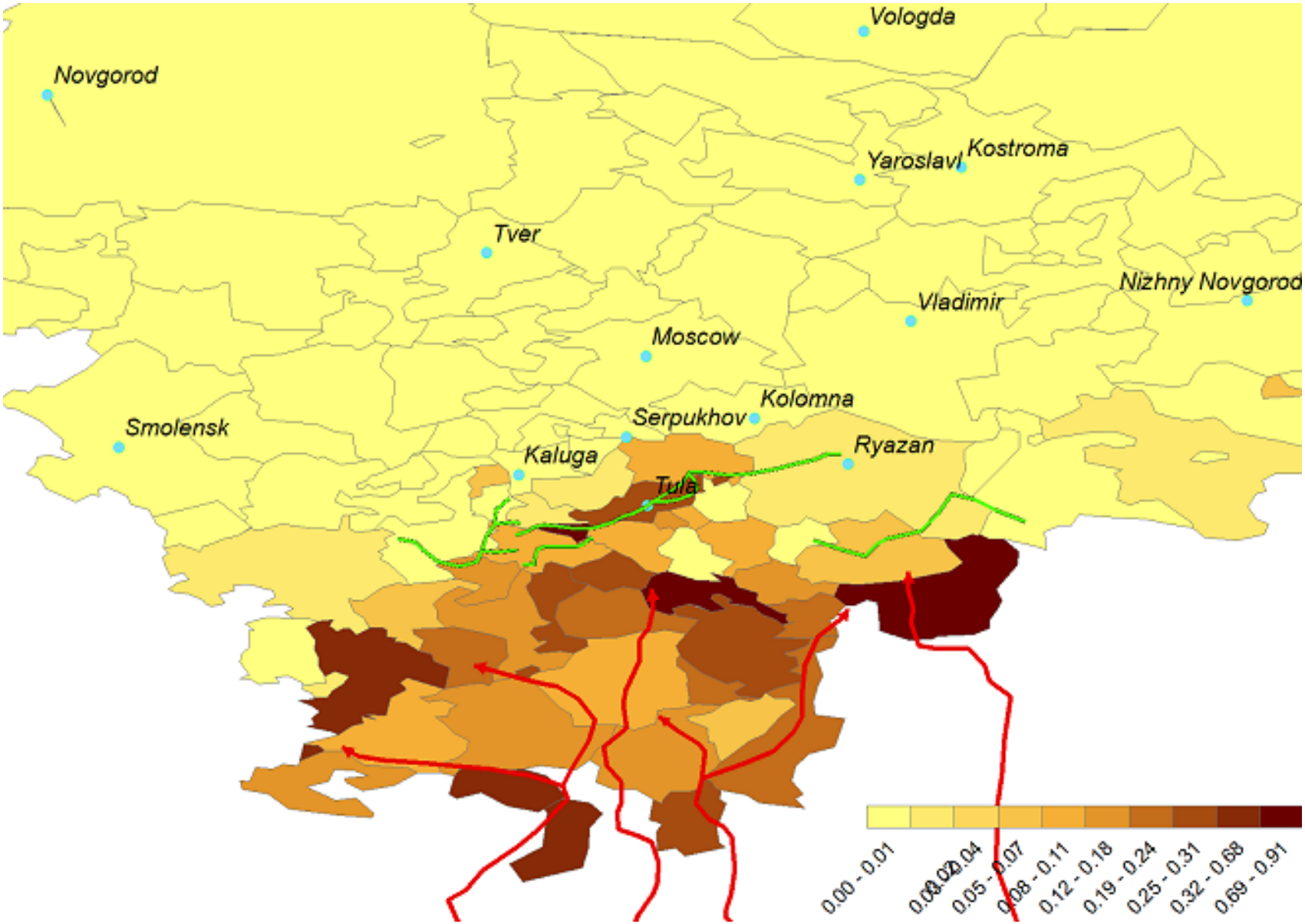
# Spatial distribution of church peasants



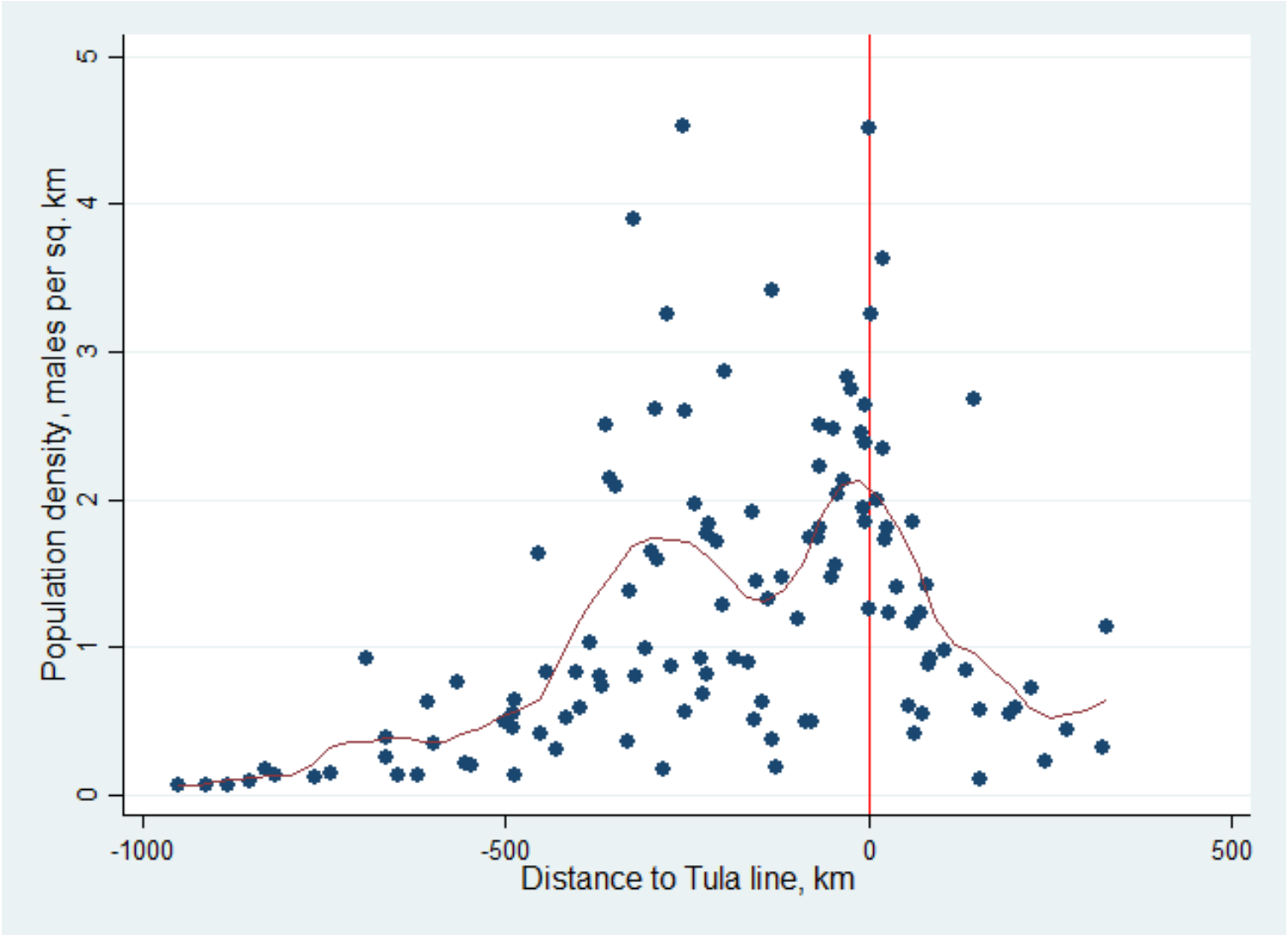
# Spatial distribution of Tsar's peasants



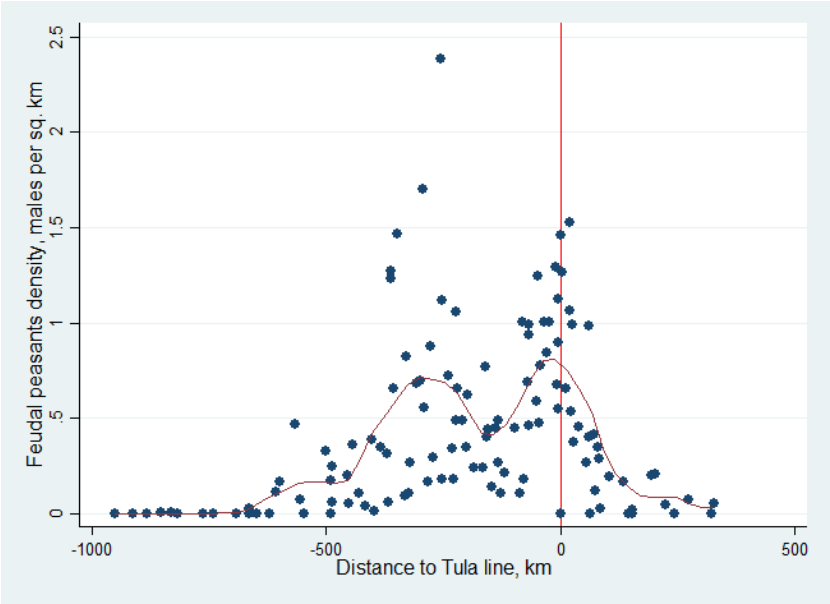
# Spatial distribution of servicemen *(odnodvortzy)*

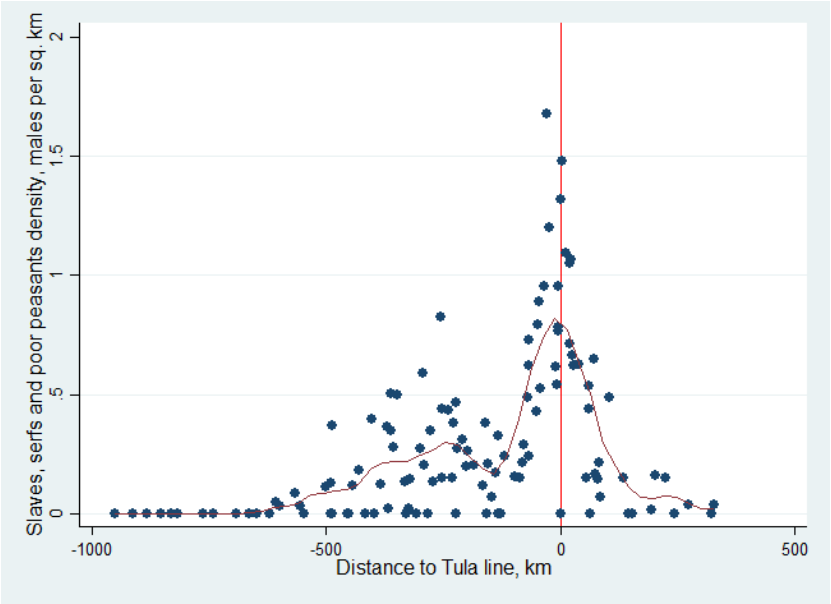


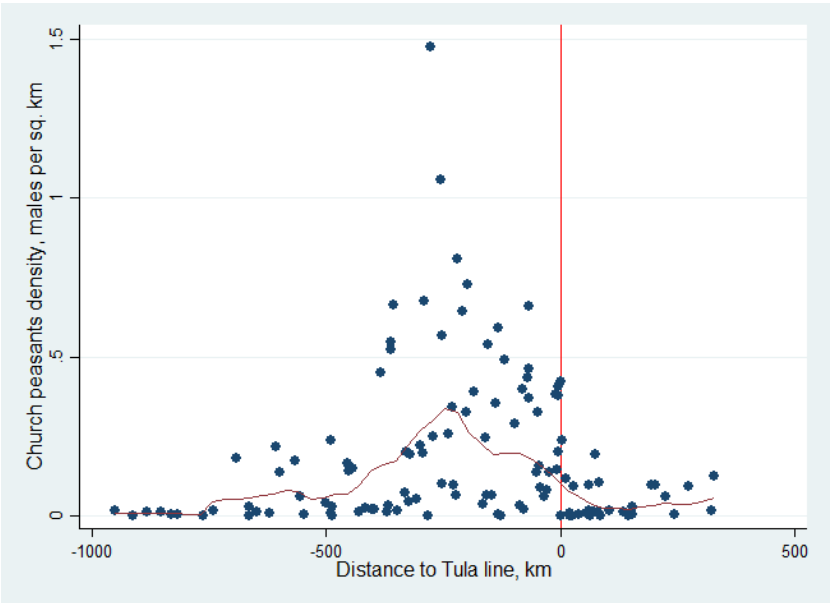
# Population density and distance to Tula line

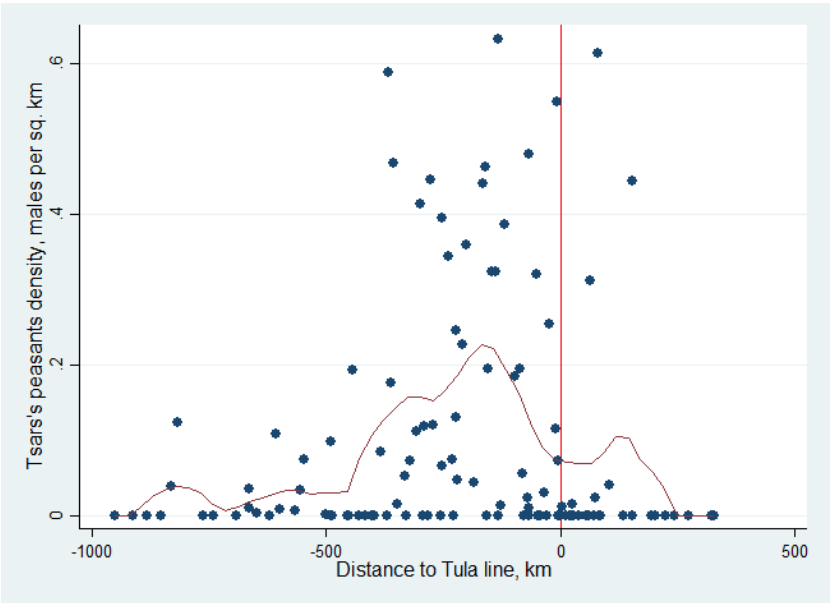


# Peasant types and distance to Tula line

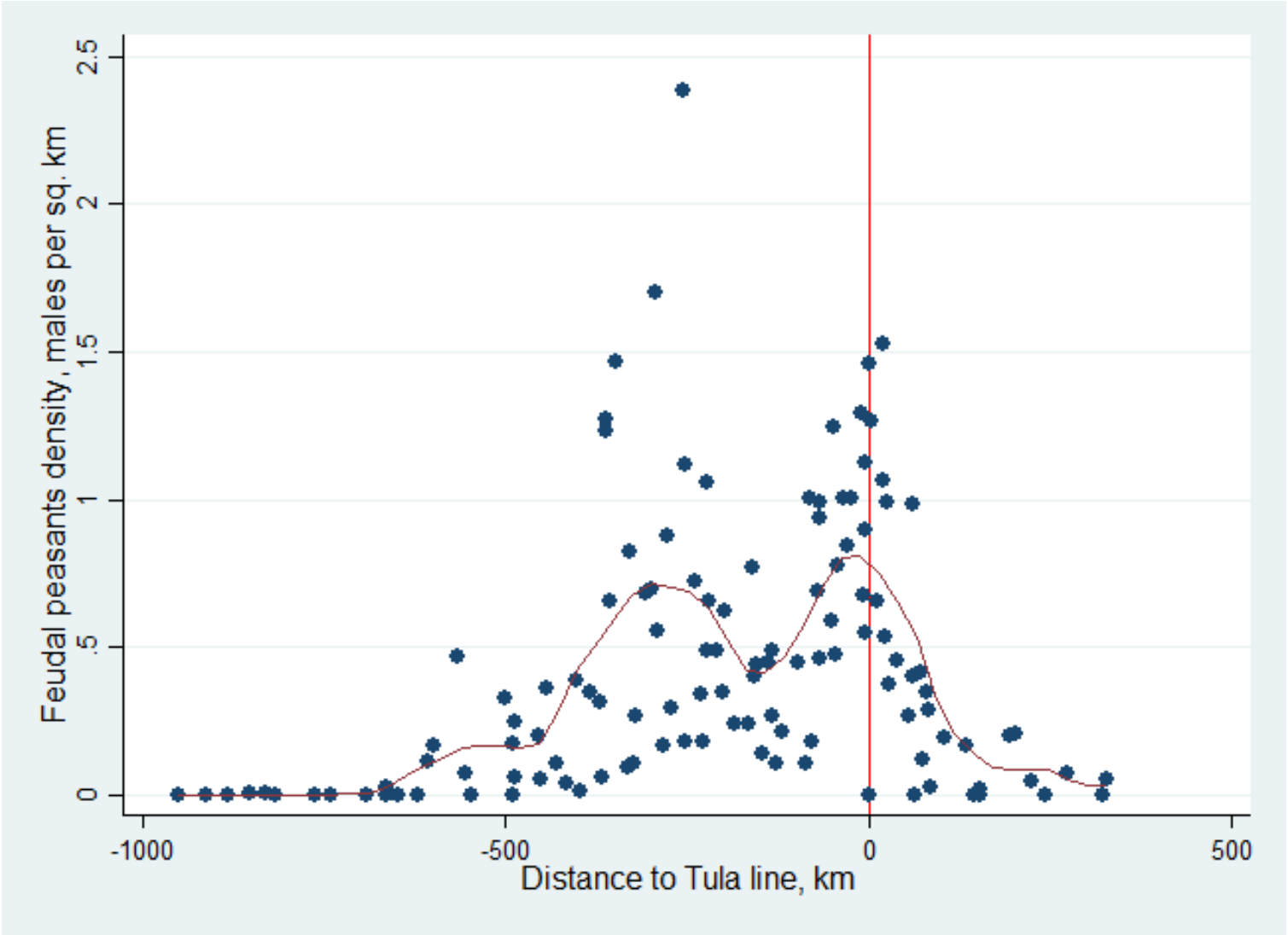


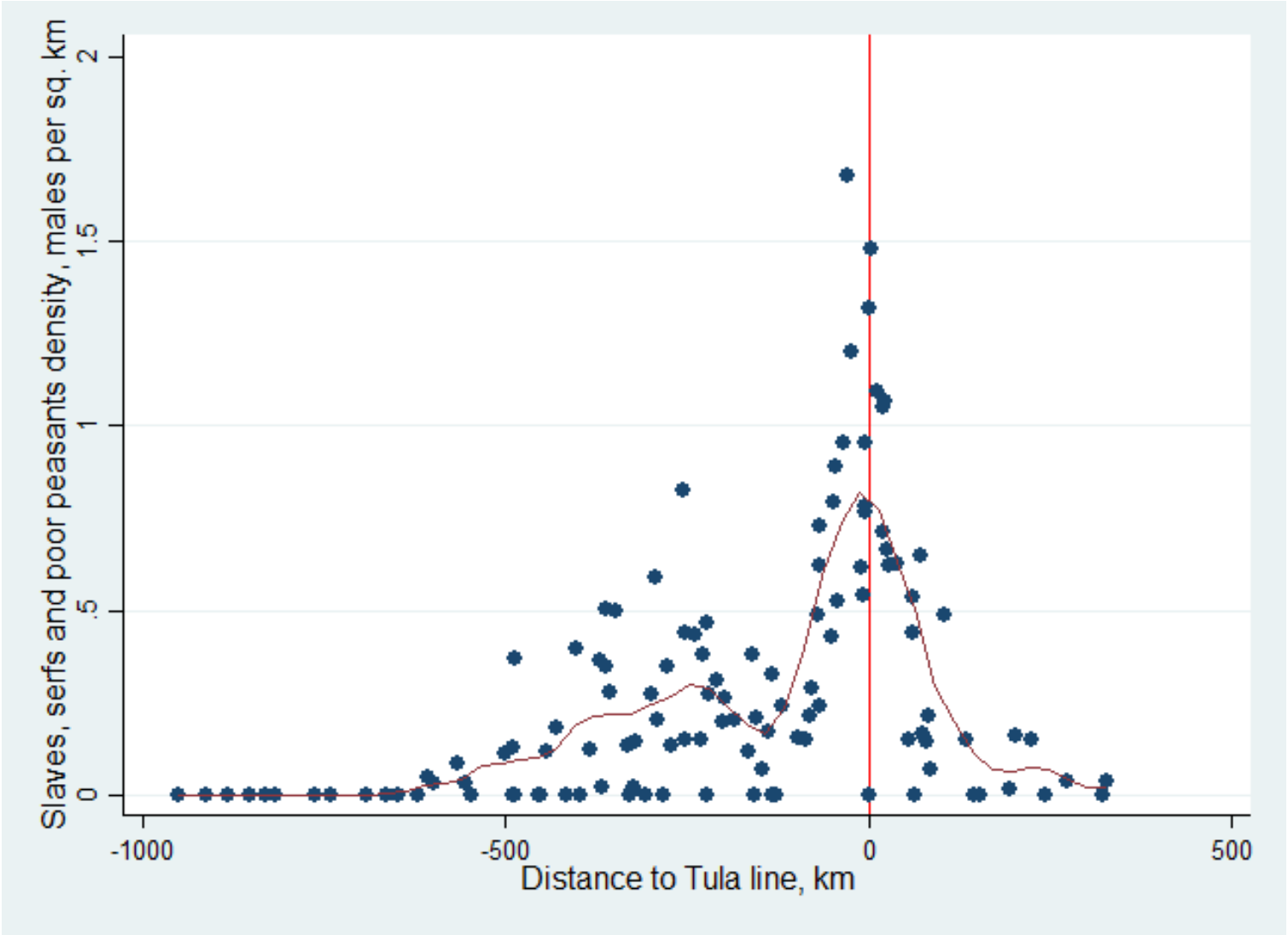



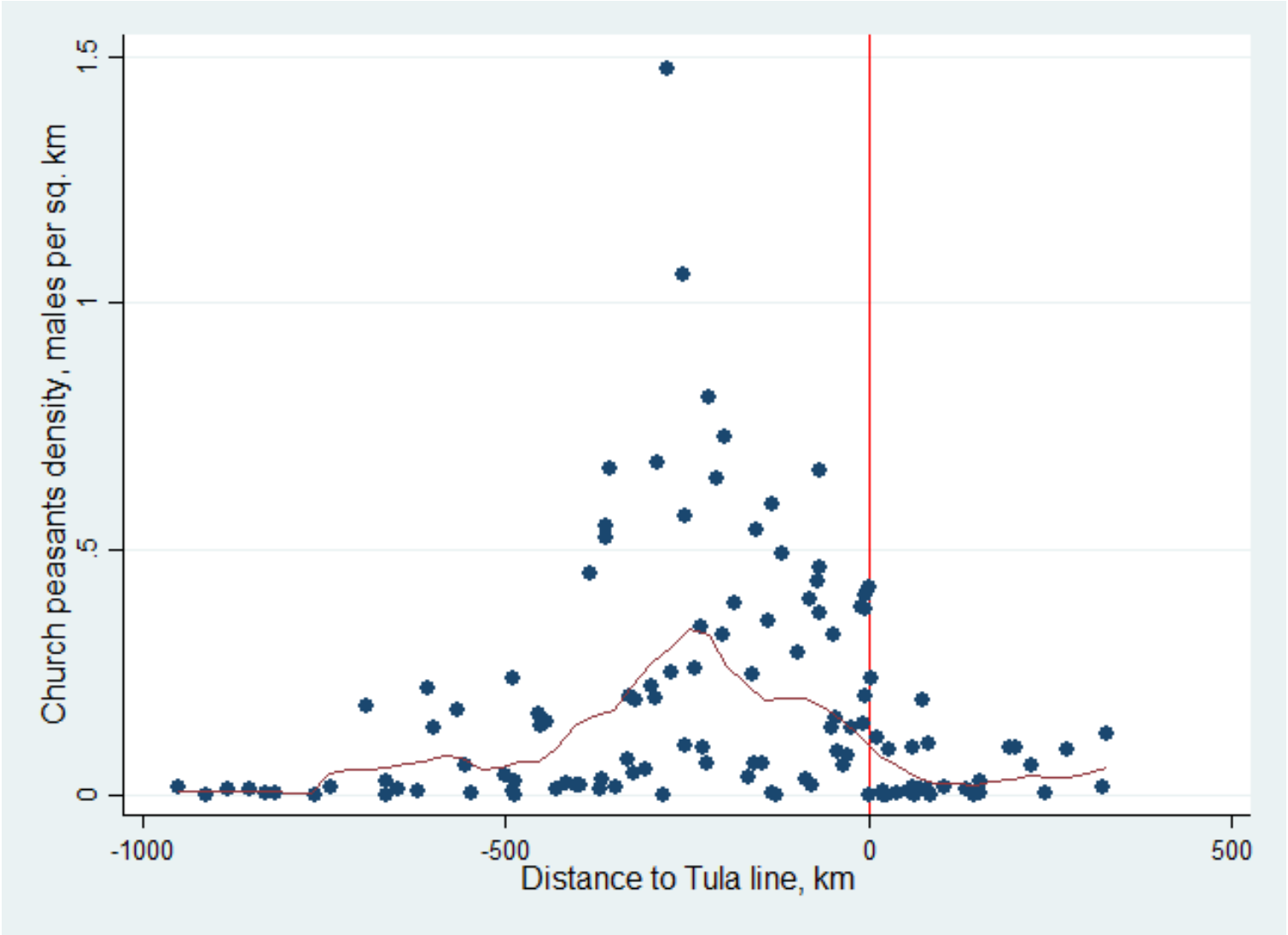
# Feudal peasants



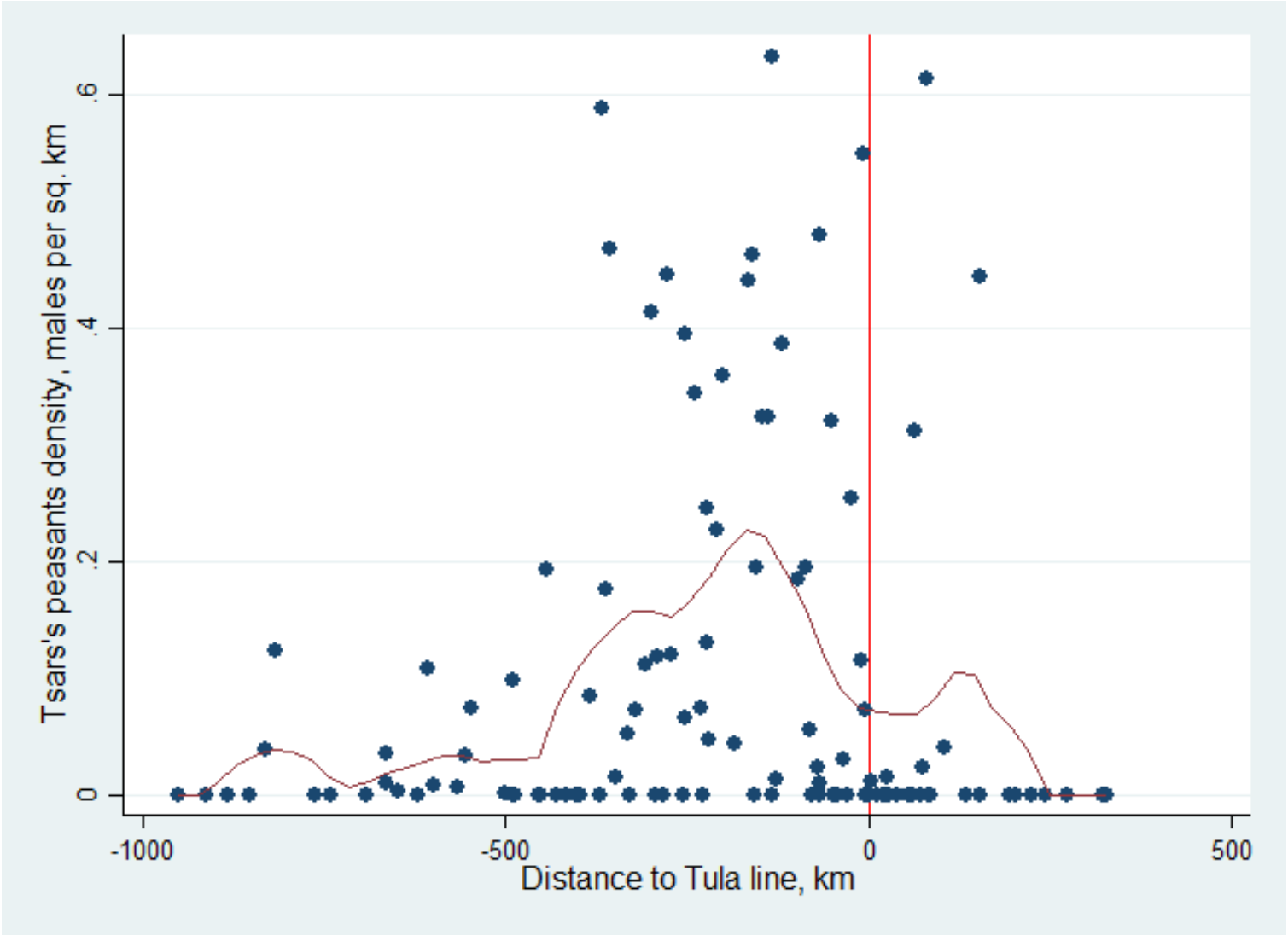
# Servants, serfs and poor peasants



# Church peasants



# Tsar's peasants



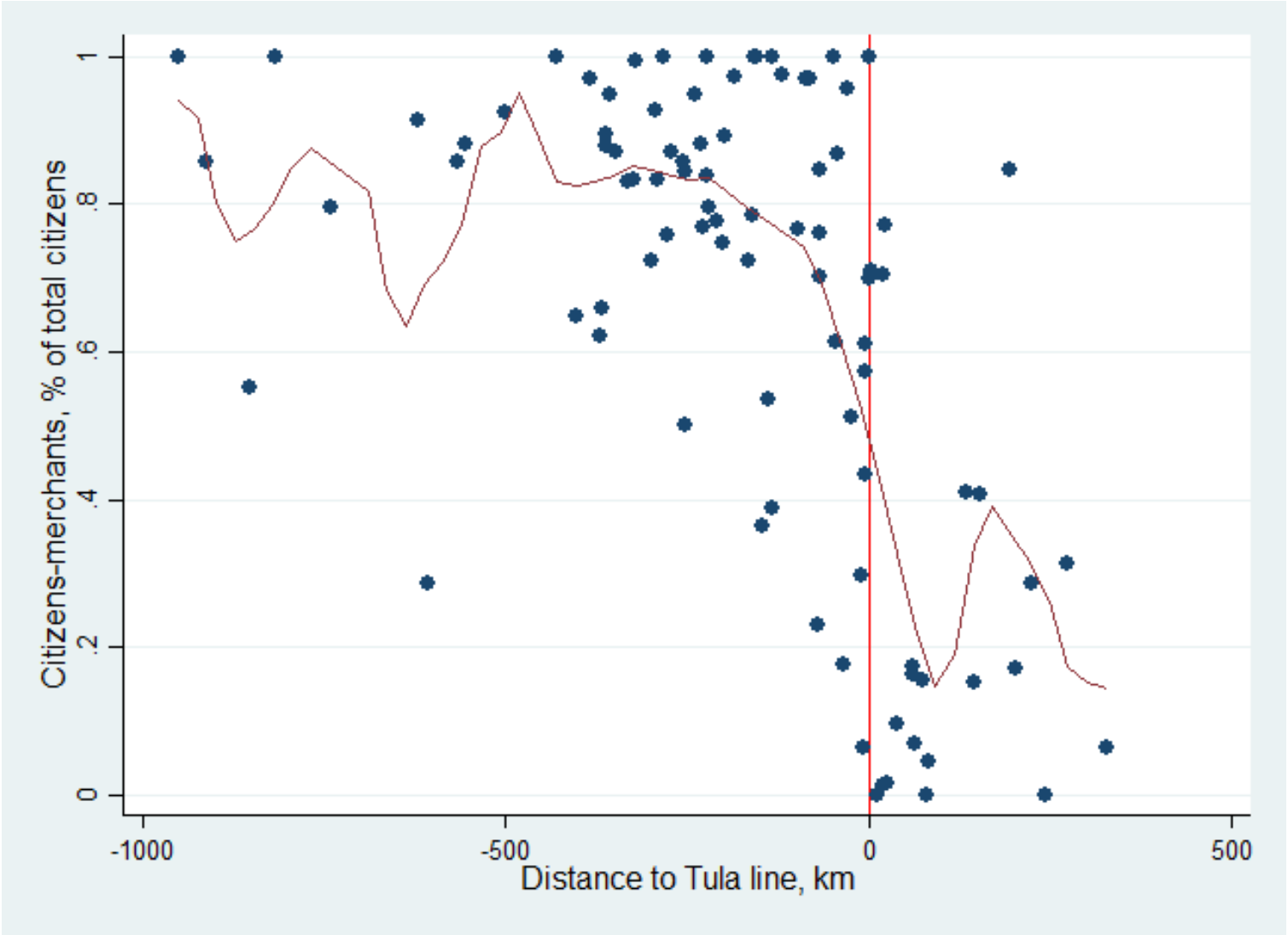
# Citizens

| | (1) Citizens, total | (2) Citizens-merchants | (3) Citizens-statesmen |
|---|---|---|---|
| District on Tula line | 0.174* | 0.121 | 0.180** |
| | (1.94) | (1.33) | (2.01) |
| Potential crop yield (mean) | 0.168* | 0.123 | 0.153* |
| | (1.83) | (1.31) | (1.66) |
| Potential crop yield (std) | -0.022 | -0.076 | 0.032 |
| | (-0.23) | (-0.82) | (0.34) |
| Ruggedness (mean) | 0.034 | -0.035 | 0.107 |
| | (0.37) | (-0.38) | (1.18) |
| District on Volga | 0.015 | 0.060 | -0.031 |
| | (0.17) | (0.66) | (-0.34) |
| $R^2$ | 0.077 | 0.055 | 0.085 |
| Observations | 131 | 131 | 131 |

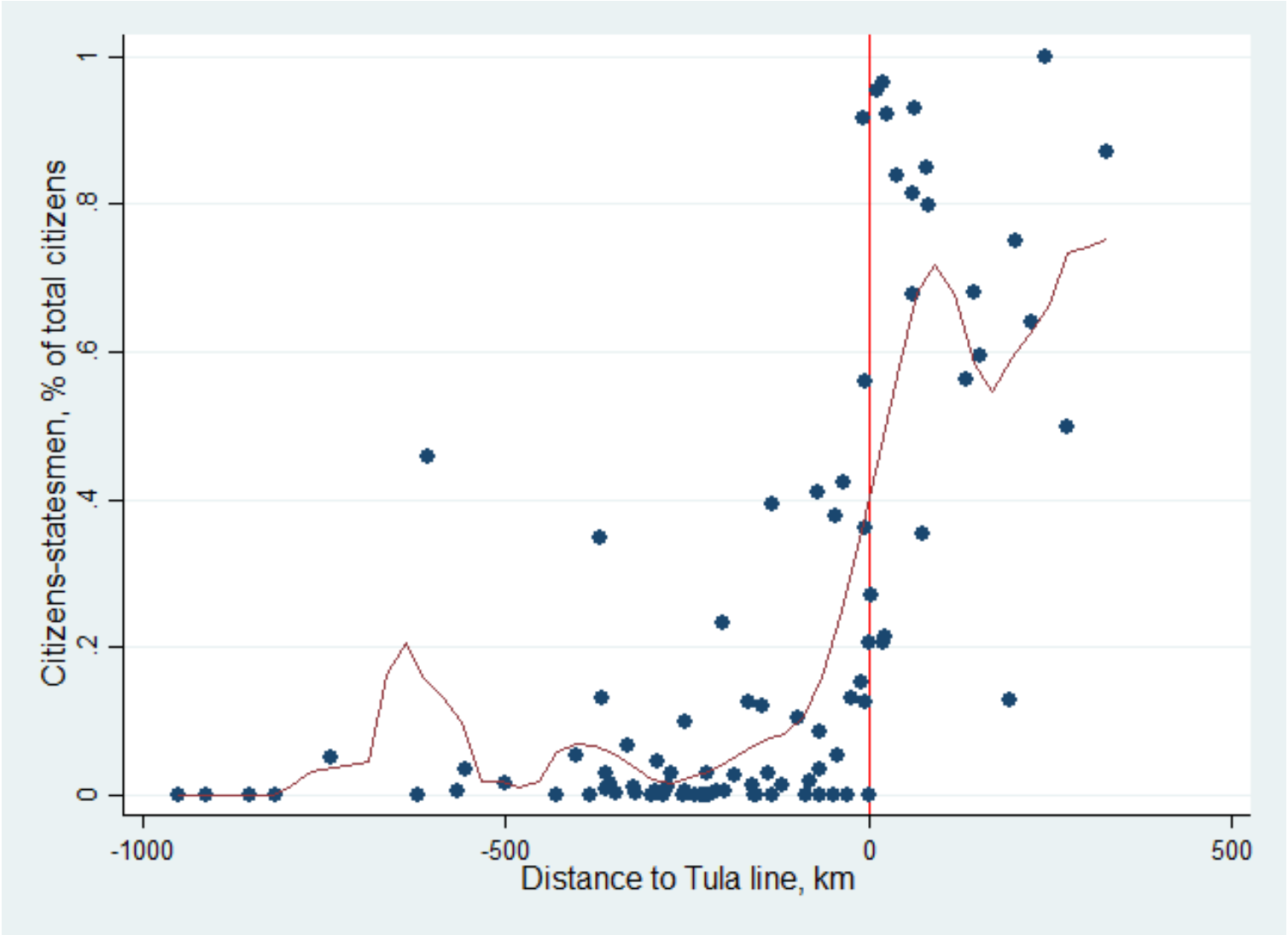
Standardized beta coefficients; $t$ statistics in parentheses

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

# Citizens-merchants



# Citizens-statesmen

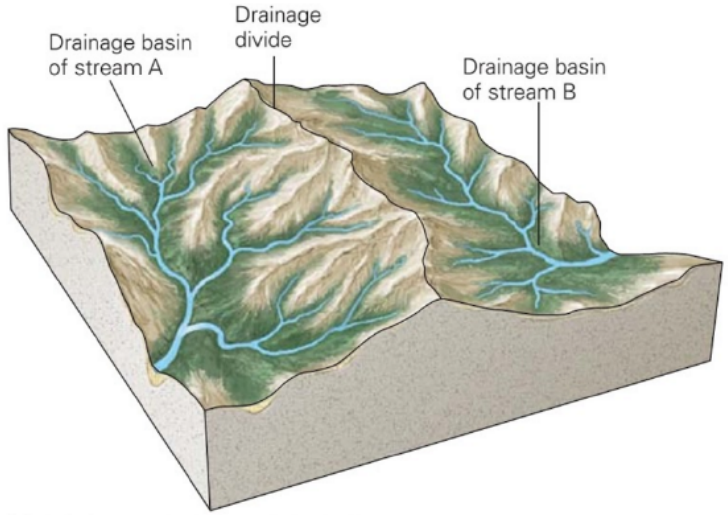


# Endogeneity concerns

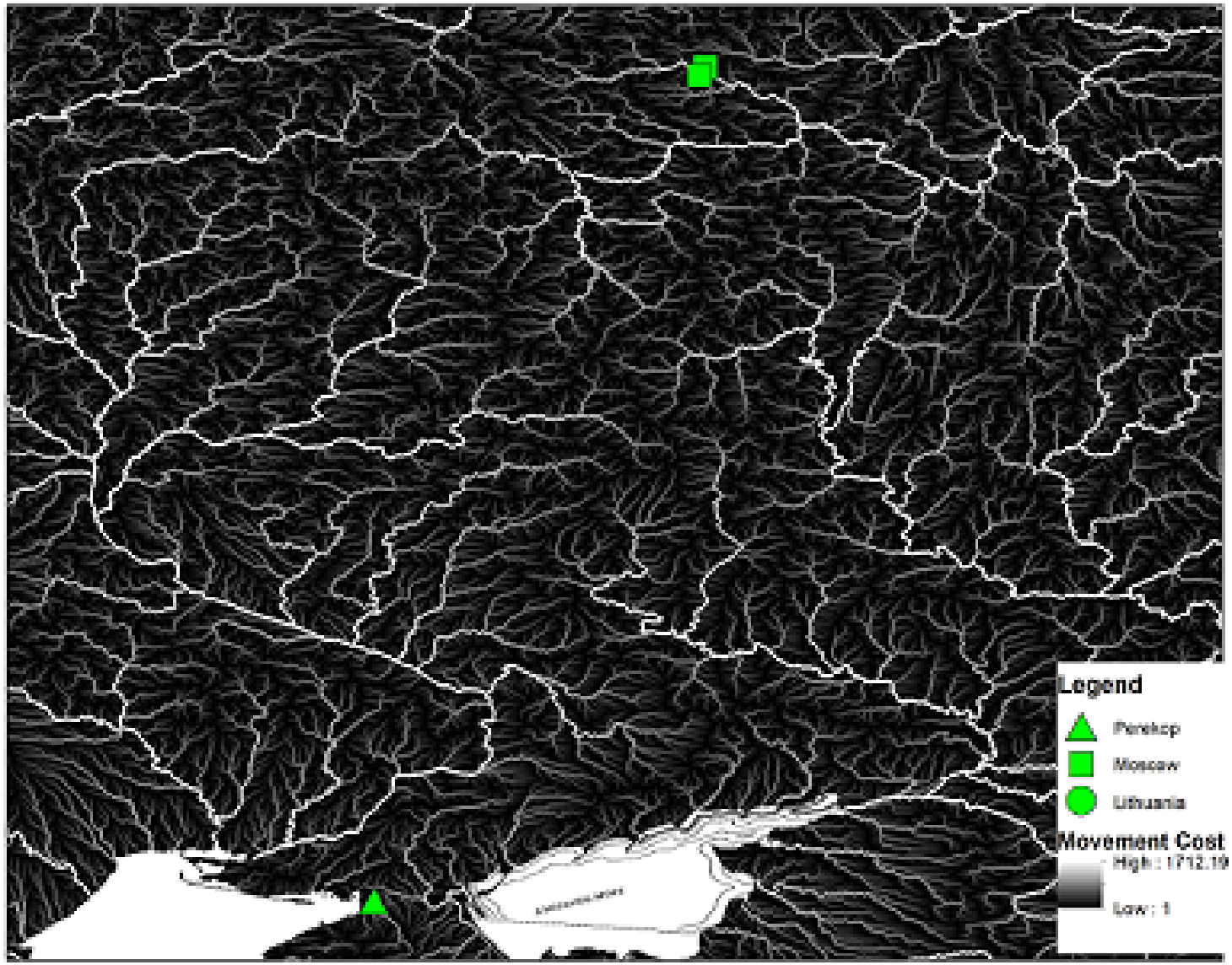
- The pattern of serfs' settlement could be due to other unmeasured factors.
- To deal with endogeneity we construct an instrumental variable.
- Successful defence against nomads depends on the:
  - proximity to invasion routes
  - availability of construction material (mainly wood).
- Thus, Russian military officials when deciding on the location of the line were optimizing (at least) two-variable function:
  - $min$(distance to invasion routes) $max$(forest cover).

# Optimal invasion routes: an algorithm

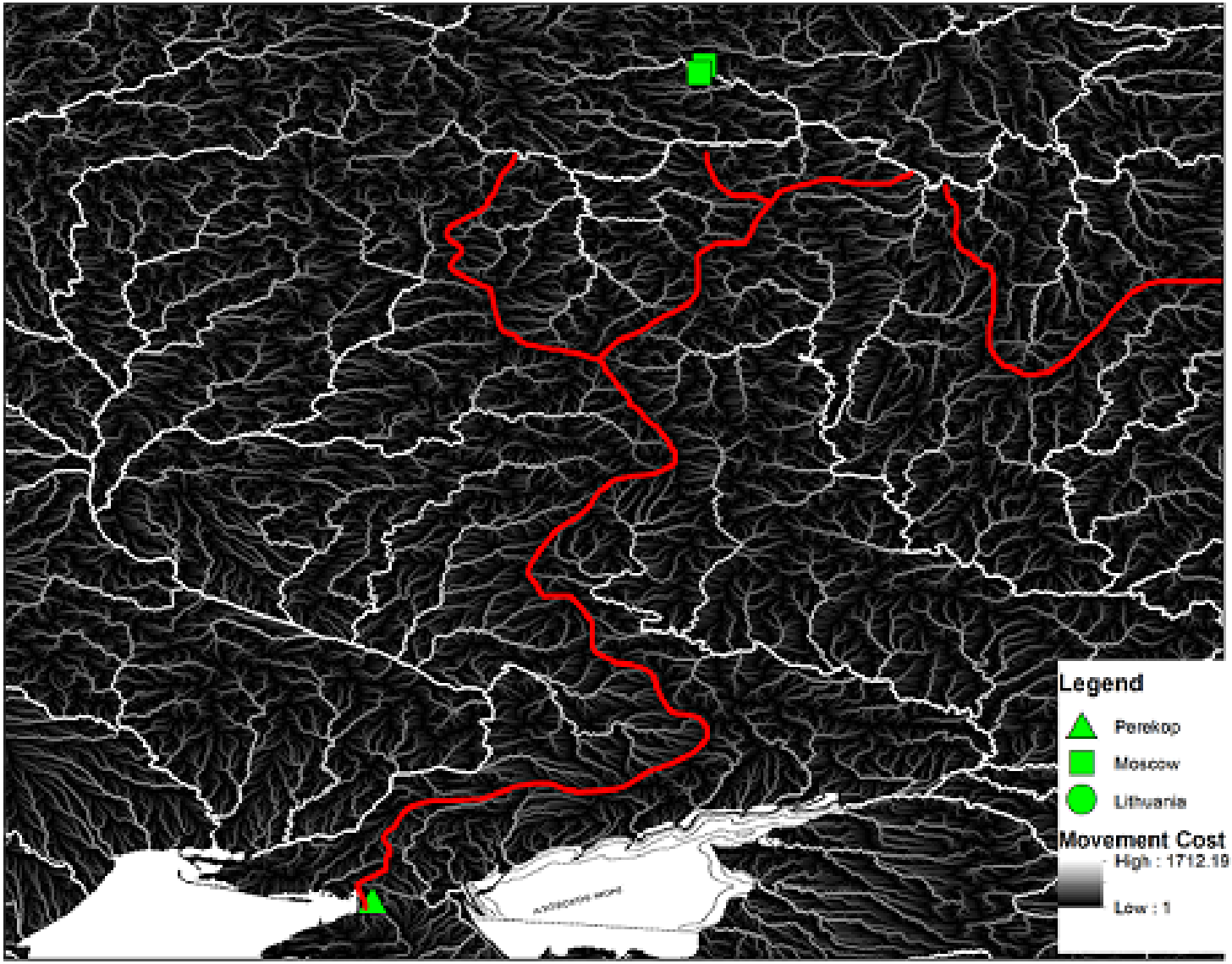
- We calculate optimal invasion routes based on terrain features (drainage divide).
  - maximize movement speed
  - minimize the number of rivers to cross
  - iterate $n$ times



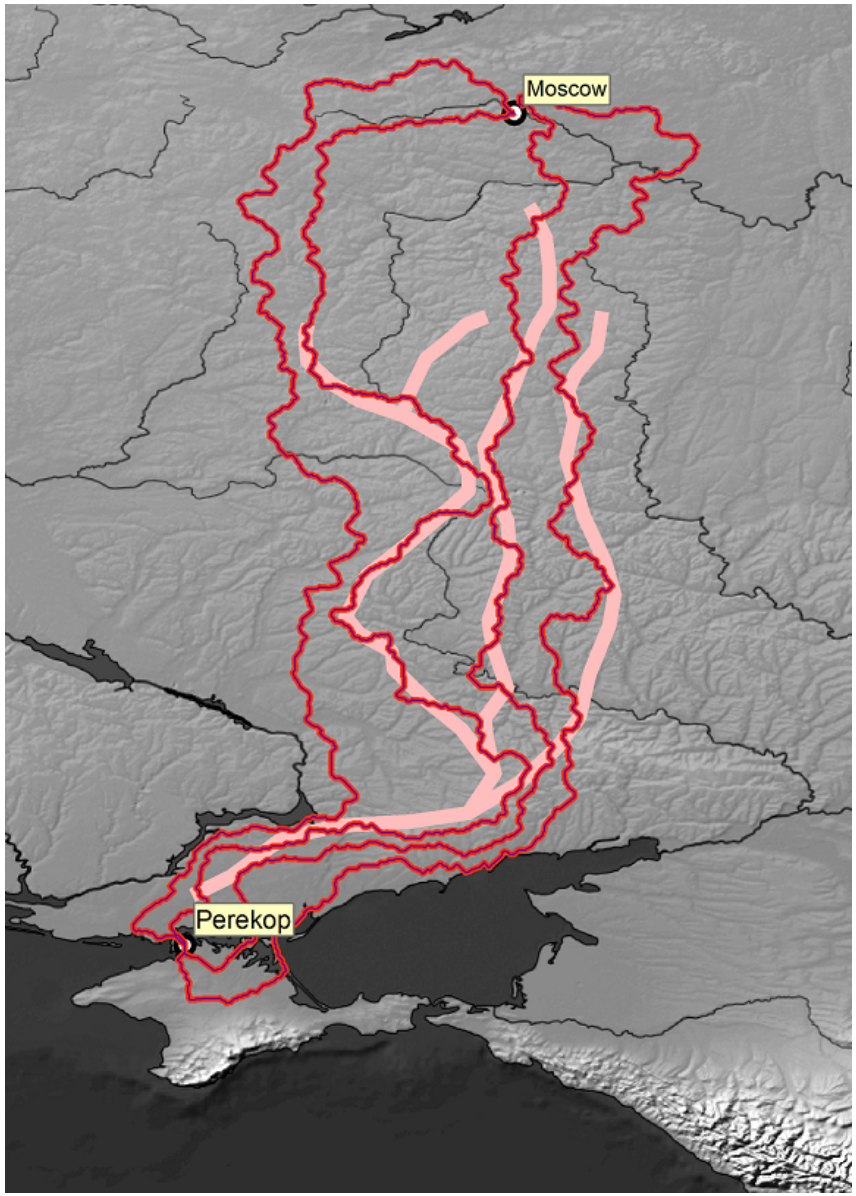
# River network



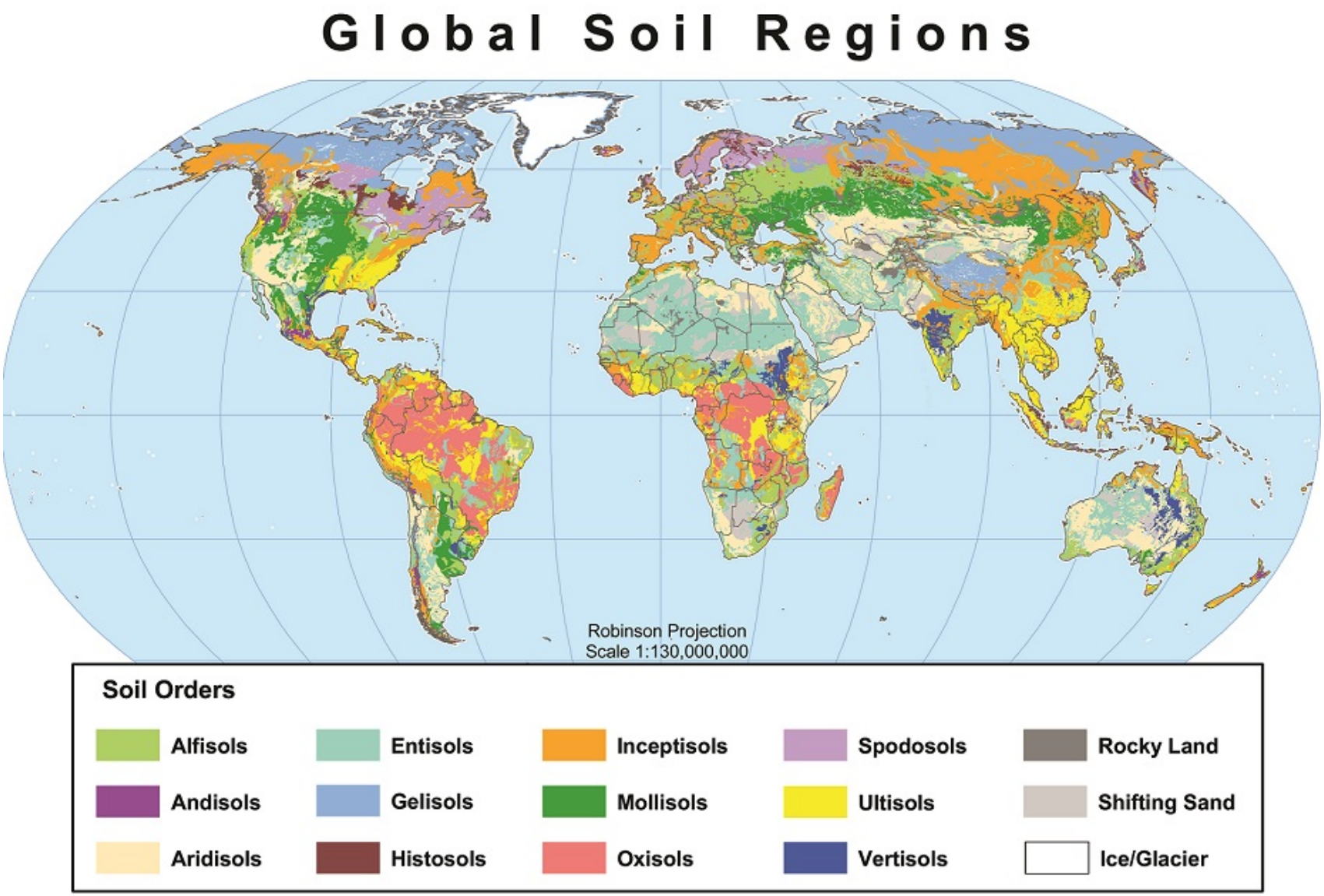
# Optimal invasion routes



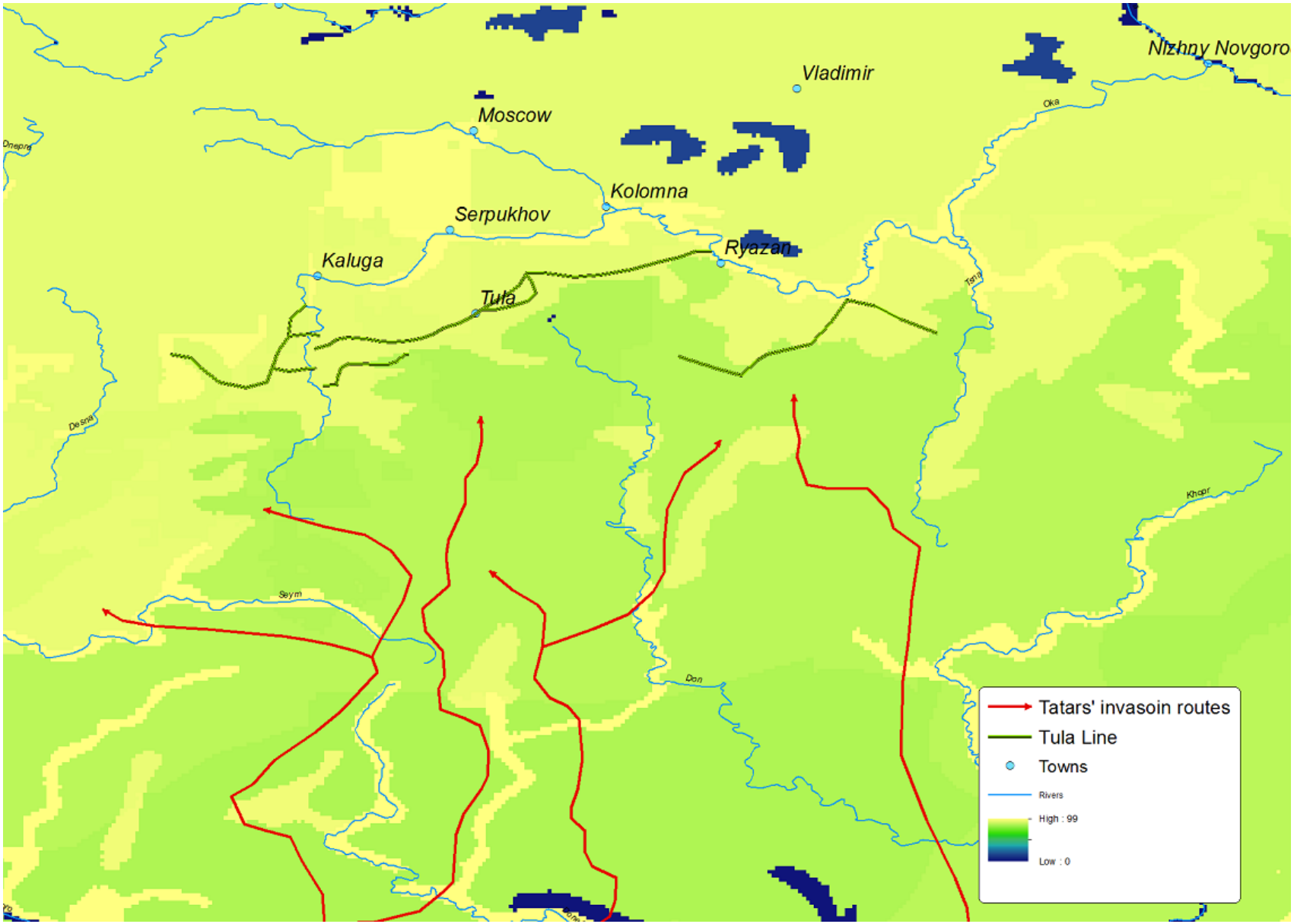
# Optimal and actual invasion routes




Novgorod
Pskov
Yaroslavl
Kostroma
Tver
Nizhny Novgorod
Vladimir
Moscow
Kazan
Kolomna
Serpukhov
Smolensk
Kaluga
Ryazan
Tula
Perekop
Russian towns
Perekop


Global Soil Regions
Robinson Projection
Scale 1:130,000,000
Soil Orders
Alfisols
Andisols
Aridisols
Entisols
Gelisols
Histosols
Inceptisols
Mollisols
Oxisols
Spodosols
Ultisols
Vertisols
Rocky Land
Shifting Sand
Ice/Glacier
USDA
NRCS
US Department of Agriculture
Natural Resources
Conservation Service
Soil Survey Division
World Soil Resources
soils.usda.gov/use/worldsoils
November 2005

# Soil types and Tula defense line



# IV regressions

| | Feudal peasants, total | Peasants | Poor peasants | Servants and serfs | Servants, serfs, and poor peasants |
|---|---|---|---|---|---|
| District on Tula line | 0.769*** | 0.556*** | 0.677*** | 1.190*** | 0.937*** |
| | (5.23) | (3.64) | (3.81) | (4.43) | (4.82) |
| Full set of controls | yes | yes | yes | yes | yes |
| Second stage $R^2$ | 0.503 | 0.342 | 0.550 | 0.477 | 0.620 |
| Soil boundary on the invasion trail | 0.439*** | 0.439*** | 0.439*** | 0.439*** | 0.439*** |
| (first stage coefficient) | (5.26) | (5.26) | (5.26) | (5.26) | (5.26) |
| First stage $F$-statistics | 8.39 | 8.39 | 8.39 | 8.39 | 8.39 |
| First stage $R^2$ | 0.251 | 0.251 | 0.251 | 0.251 | 0.251 |
| Observations | 131 | 131 | 131 | 131 | 131 |

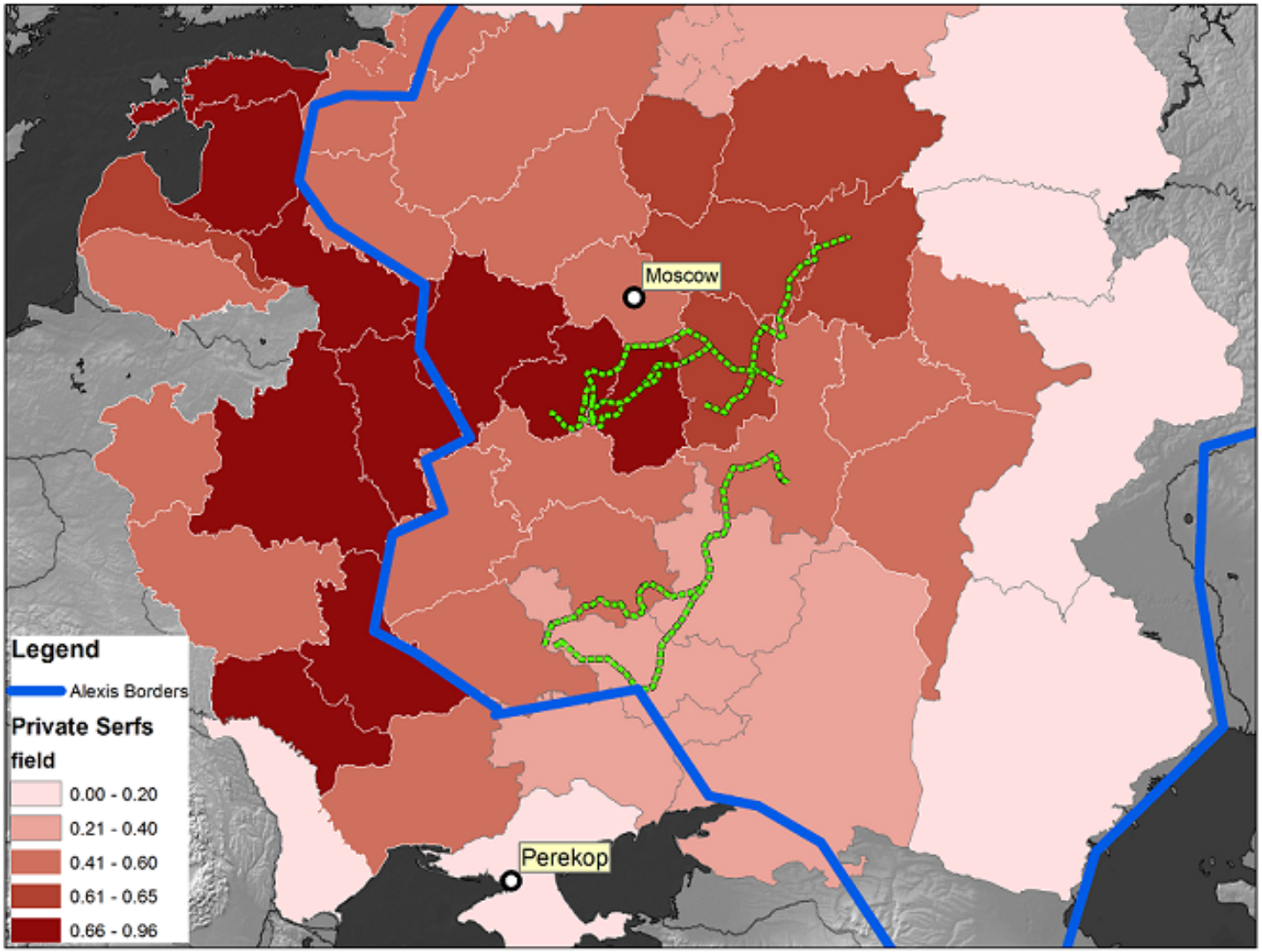
Standardized beta coefficients; $t$ statistics in parentheses

# IV regressions with other peasant types

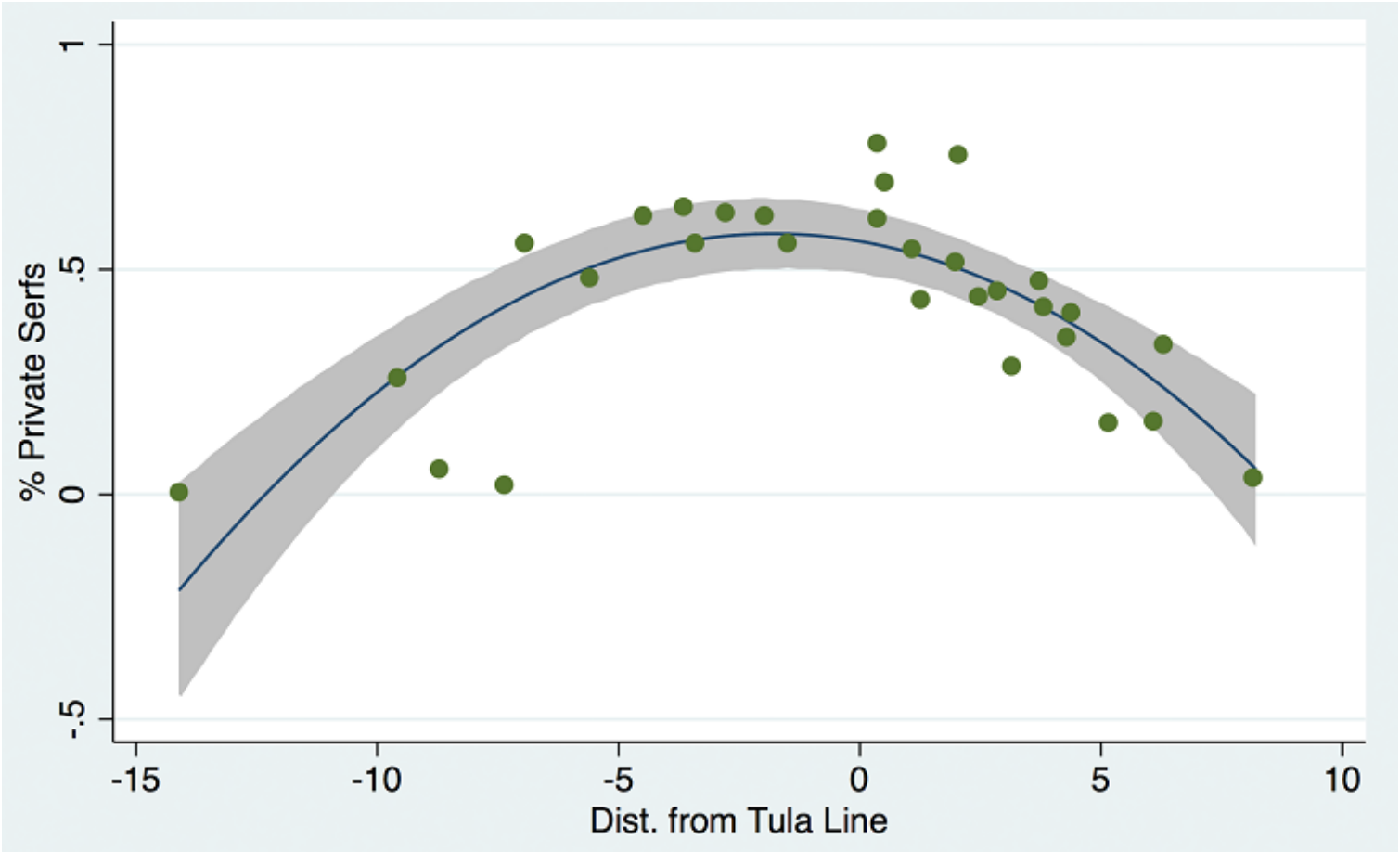
| | Church peasants | Tsar's peasants | Free peasants | Servicemen *(odnodvortzy)* | Citizens-merchants |
|---|---|---|---|---|---|
| District on Tula line | -0.310 | -0.118 | 0.877 | 0.337 | 0.074 |
| | (-1.57) | (-0.83) | (1.61) | (1.32) | (0.34) |
| Full set of controls | yes | yes | yes | yes | yes |
| Second stage $R^2$ | 0.503 | 0.342 | 0.550 | 0.477 | 0.620 |
| Soil boundary on the invasion trail | 0.439*** | 0.439*** | 0.439*** | 0.439*** | 0.439*** |
| (first stage coefficient) | (5.26) | (5.26) | (5.26) | (5.26) | (5.26) |
| First stage $F$-statistics | 8.39 | 8.39 | 8.39 | 8.39 | 8.39 |
| First stage $R^2$ | 0.251 | 0.251 | 0.251 | 0.251 | 0.251 |
| Observations | 131 | 131 | 131 | 131 | 131 |

Standardized beta coefficients; $t$ statistics in parentheses

# Private serfs in 1858 and the defense lines



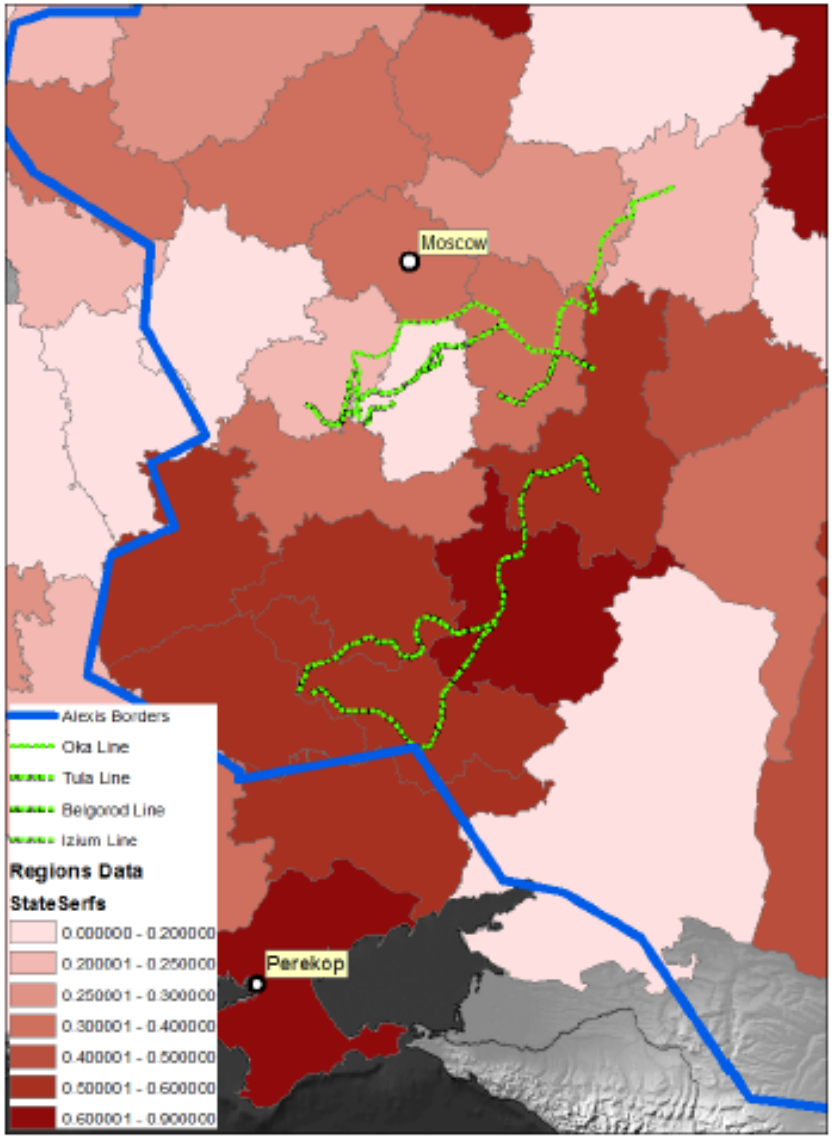
# Private serfs in 1858 and the defense lines



# Private serfs in 1858 and the defense lines

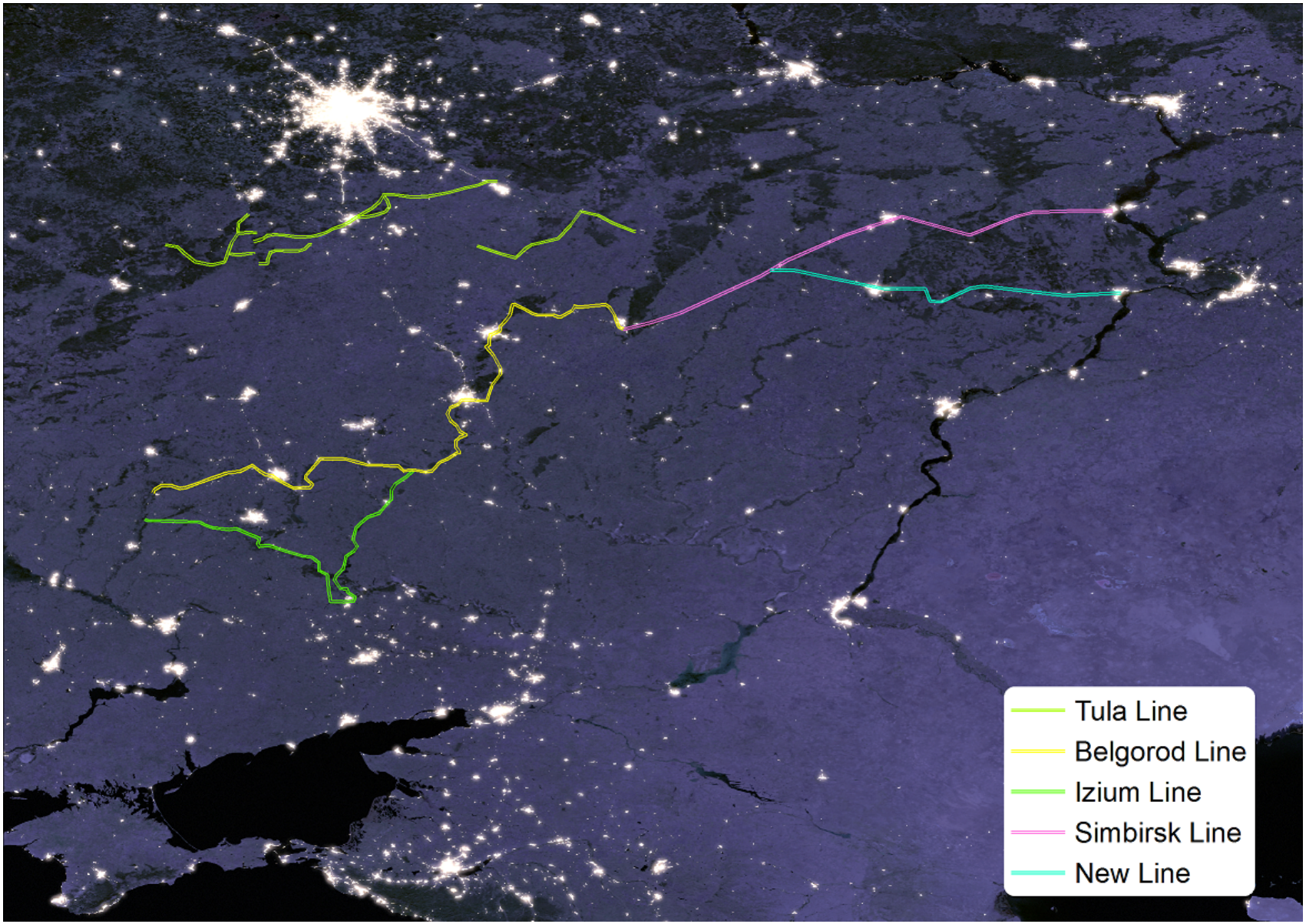
| | (1) PrivSerf | (2) PrivSerf | (3) PrivSerf | (4) PrivSerf | (5) PrivSerf | (6) PrivSerf |
|---|---|---|---|---|---|---|
| tuldist_mean | -0.0552*** | -0.0571*** | -0.0439*** | -0.0466** | -0.0525** | -0.0527* |
| | (-6.60) | (-6.98) | (-4.11) | (-2.88) | (-3.14) | (-2.34) |
| tulprotfra~n | | 0.0949 | 0.0434 | 0.0852 | 0.0253 | 0.0253 |
| | | (1.67) | (0.71) | (1.22) | (0.30) | (0.29) |
| grass_mean | | | 0.000464 | | | |
| | | | (1.83) | | | |
| barley_mean | | | | 0.0000209 | 0.0000500 | 0.0000510 |
| | | | | (0.26) | (0.60) | (0.45) |
| latitude | | | | | 0.0147 | 0.0102 |
| | | | | | (1.20) | (0.03) |
| latitude2 | | | | | | 0.0000415 |
| | | | | | | (0.01) |
| _cons | 0.661*** | 0.610*** | 0.362* | 0.559* | -0.262 | -0.143 |
| | (15.04) | (11.67) | (2.49) | (2.18) | (-0.36) | (-0.02) |
| N | 30 | 30 | 30 | 23 | 23 | 23 |

# State serfs in 1858 and the later defense lines

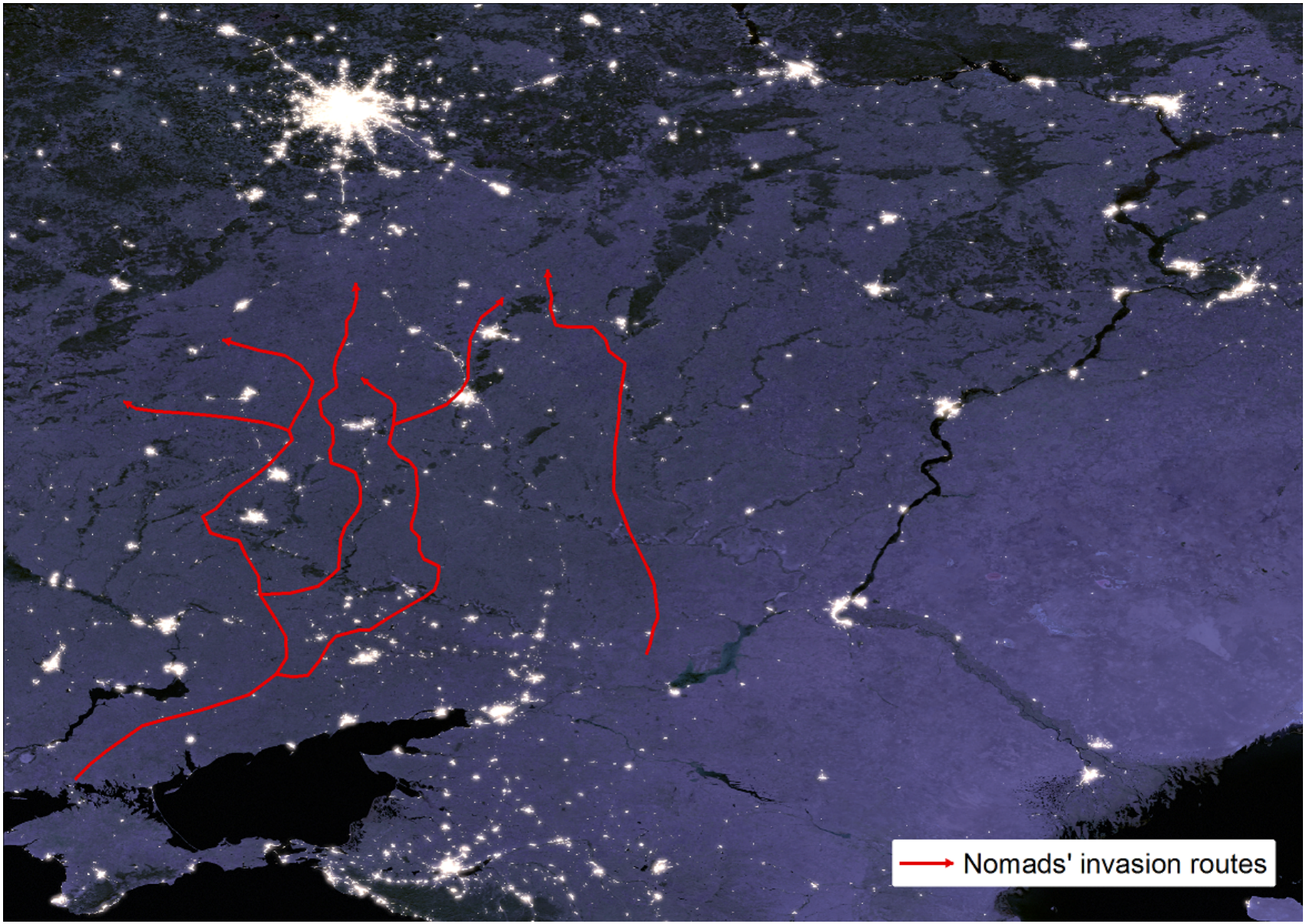


# Urban settlements today

# Urban settlements and defense lines



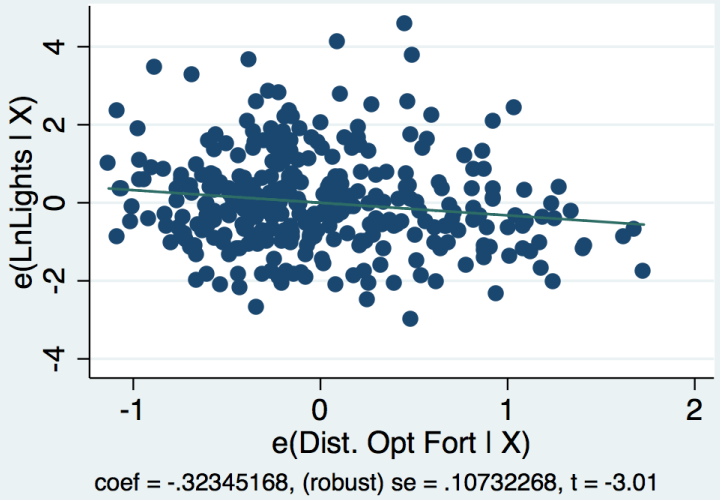
# Urban settlements and invasion routes

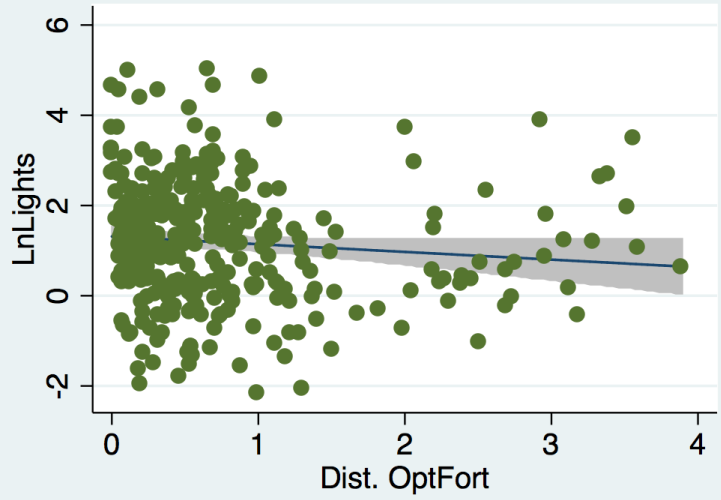


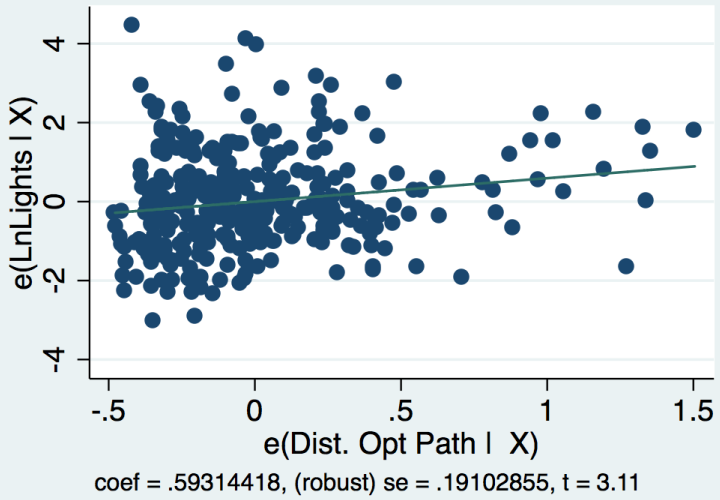
# Persistence of fortress towns

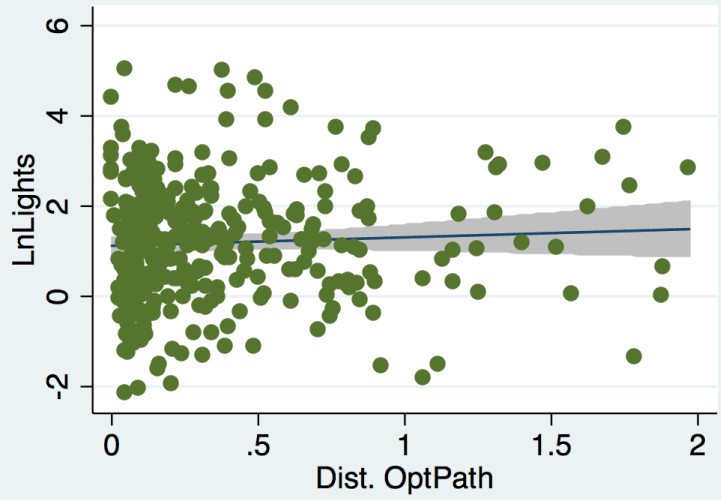
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | Ln Night Lights | | | |
| Distance to Line | -0.098* | -0.119** | -0.130** | -0.234*** | -0.213*** | -0.179*** |
| | (0.069) | (0.031) | (0.026) | (0.000) | (0.000) | (0.003) |
| Dist. to Optimal Invasion Route | | 0.084 | 0.177*** | 0.170*** | 0.173*** | 0.167*** |
| | | (0.173) | (0.001) | (0.002) | (0.002) | (0.002) |
| Barley Yield | | | 0.316*** | 0.322*** | 0.329*** | 0.333*** |
| | | | (0.000) | (0.000) | (0.000) | (0.000) |
| Grass Yield | | | -0.417*** | -0.193** | -0.199** | -0.190** |
| | | | (0.000) | (0.037) | (0.031) | (0.039) |
| Distance to Moscow | | | | 0.122 | 0.123 | 0.212 |
| | | | | (0.651) | (0.661) | (0.450) |
| Latitude | | | | -0.181 | -0.176 | -0.118 |
| | | | | (0.495) | (0.526) | (0.672) |
| River Size | | | | | 0.023 | 0.303** |
| | | | | | (0.731) | (0.033) |
| River Size$^2$ | | | | | | -0.303** |
| | | | | | | (0.039) |
| Observations | 344 | 344 | 336 | 336 | 334 | 334 |
| $R^2$ | 0.010 | 0.016 | 0.135 | 0.158 | 0.160 | 0.171 |

# Persistence of fortress towns



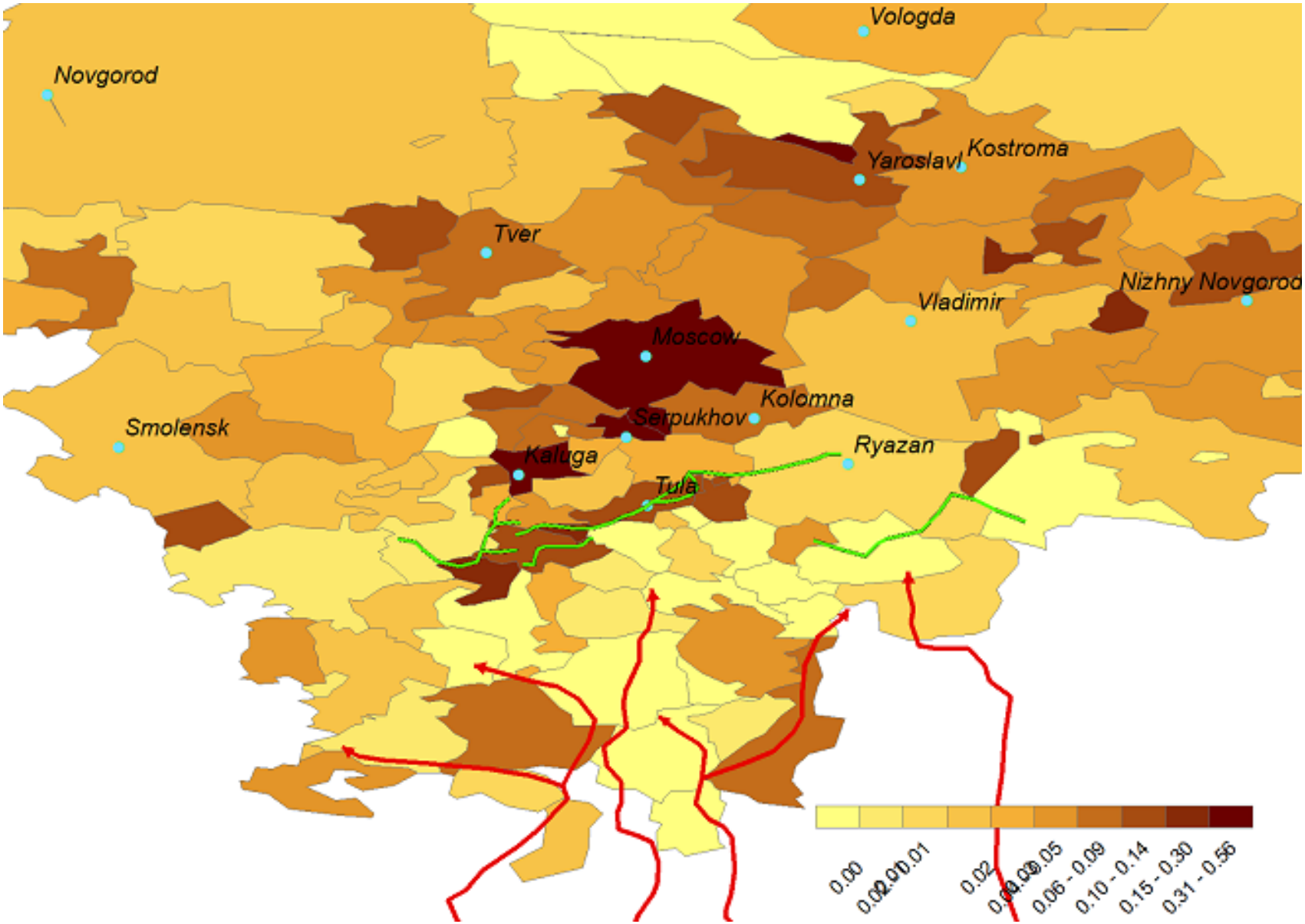
# Moving Forward

- Collect population data for $18^{\text{th}}$ century Russia and check the spread of serfdom to other regions.
- Other countries in Eastern Europe – Poland-Lithuania, Romania – also confronted slave raid attacks from Crimea.
- How did they respond to this challenge?
- Are the effects comparable with Russia?

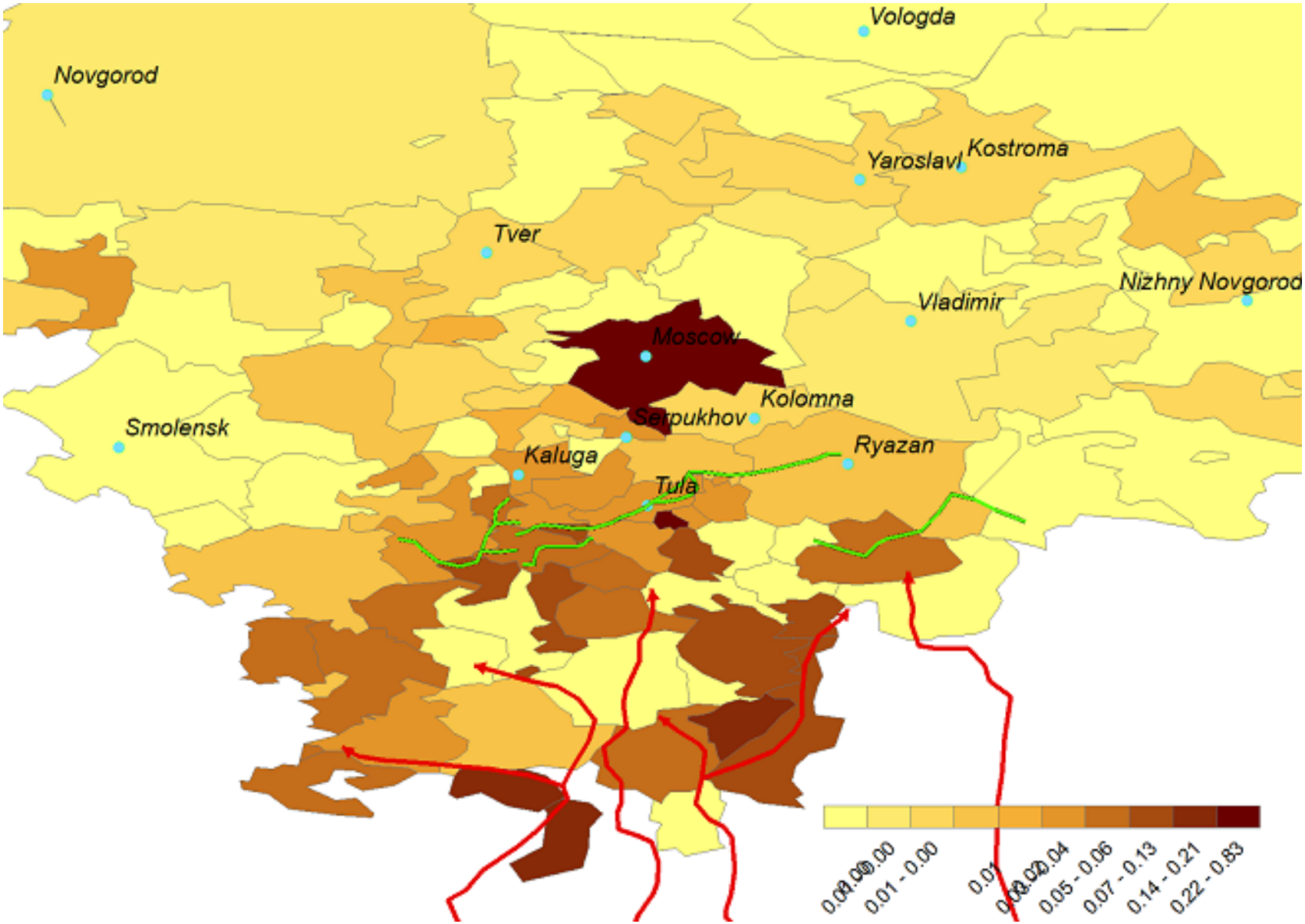
# Conclusions

- We propose an alternative reason for serfdom: an imbalance between the population distribution that results from the free market, and that which ensures the defense of the state.
- An alternative interpretation: peasants who relocate to regions with higher wages are not internalizing the negative safety externality that they are imposing on everybody else.
- Serfdom is a (very crude and cruel) coordination device.
- Clearly this was not the only reason for emergence of serfdom institution, but the stylized facts and empirical results are all in agreement.

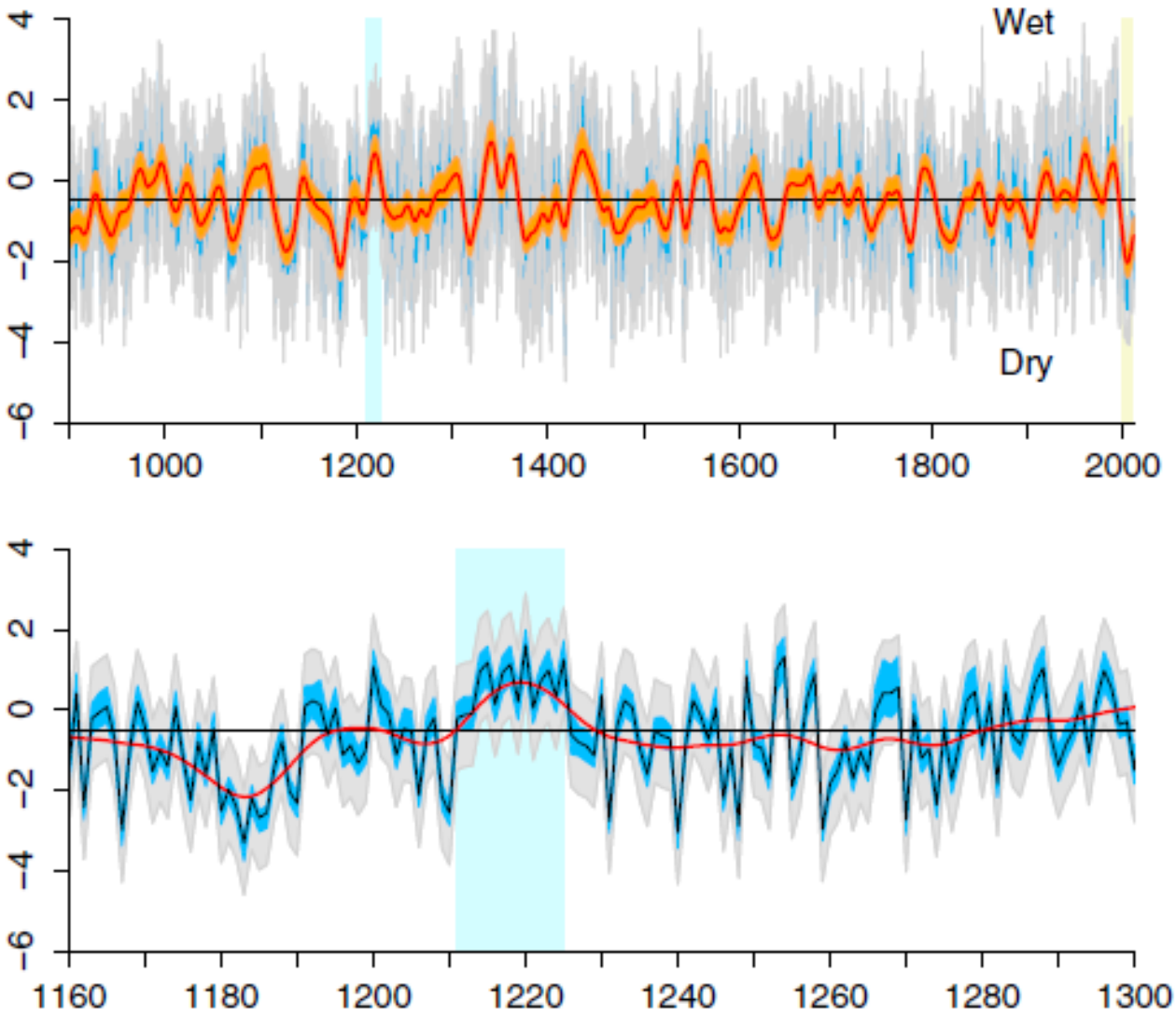
# Citizens-merchants



# Citizens-statesmen



# Moisture Balance in Mongolia *(Pederson et al., 2014)*



# The Mongol Empire (1206–1259)

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