Trade and Geography in the Origins of Islam

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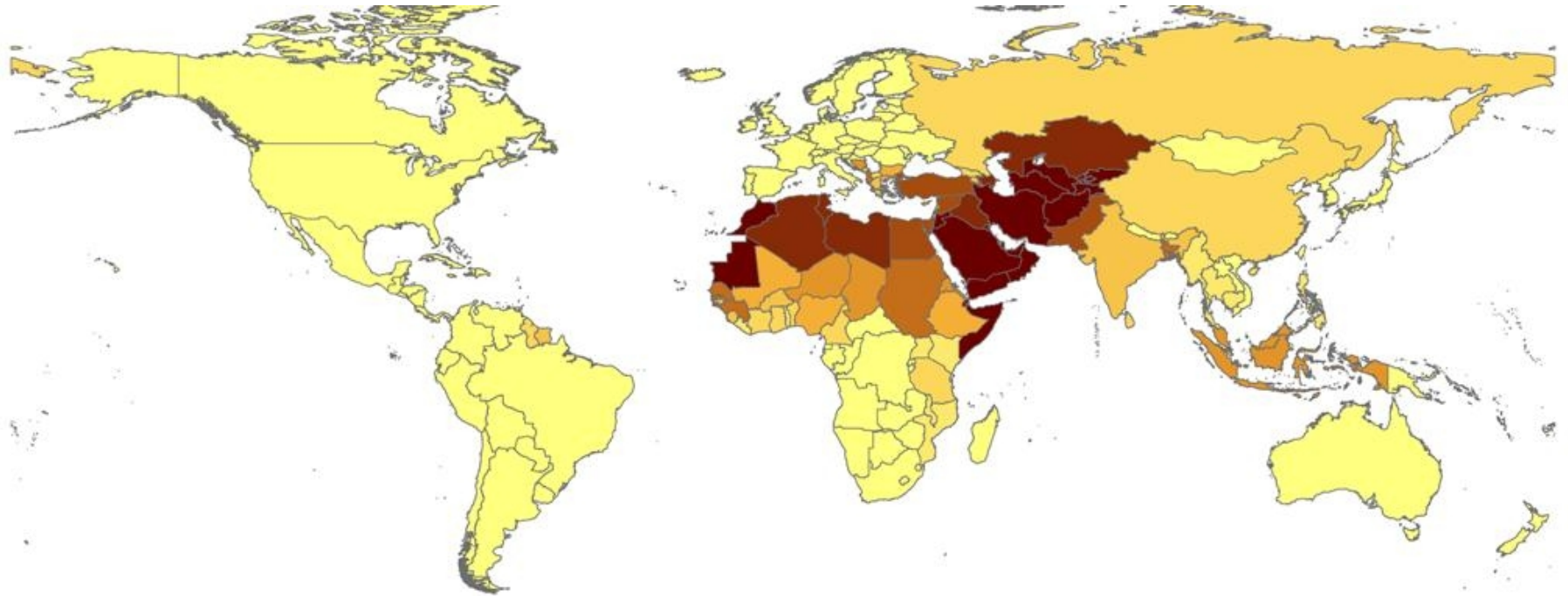
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Objectives

- Introduce a new hypothesis for understanding the economic origins of Islam: Role of Geography in the rise and spread of Islam

- Build theoretical framework and test it empirically: Muslim adherence strongly correlated with highly unequal distribution of agricultrual potential
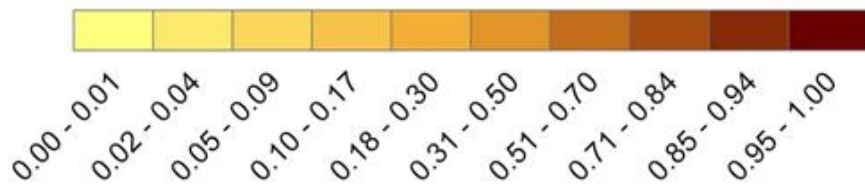
Map 1: Inequality in Regional Agricultural Suitability Across Countries

Inequality in Regional Agricultural Suitability

Gini Index

0.00 - 0.30   0.31 - 0.60   0.61 - 0.90
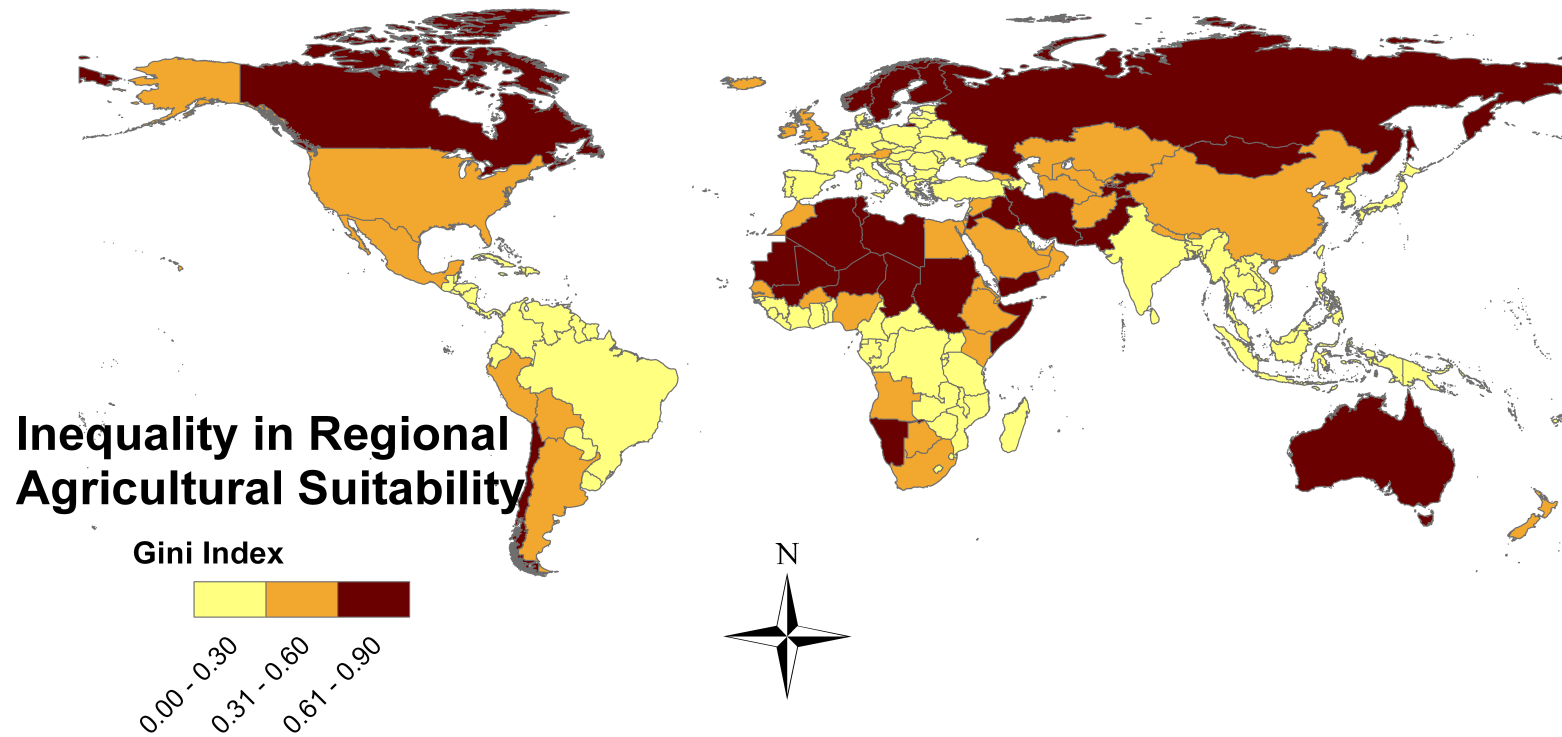
Map 2: % of Muslim Population in 1900 Across Countries

Percentage of Muslim Population in 1900 AD

0.00 - 0.01   0.02 - 0.04   0.05 - 0.09   0.10 - 0.17   0.18 - 0.30   0.31 - 0.50   0.51 - 0.70   0.71 - 0.84   0.85 - 0.94   0.95 - 1.00

N

Preview of findings

inequality in agricultural endowments
$$\Longrightarrow$$
*increases Muslim representation
across ethnic groups*

Where inequality in agricultural endowments = few pockets of fertile land many regions of poor land quality.

- This particular type of geography dictated the Islamic principles and

- shaped the economic performance of the Islamic lands in the pre-industrial world

Theoretical Intuition

inequality in agricultural endowments

$\Longrightarrow$differential gains from trade across regions

$\Longrightarrow$predatory behaviour from poorly endowed regions

$\Longrightarrow$few fertile regions concede to secure passage and access to trade networks

$\Longrightarrow$endogenous adoption of the Islamic doctrine (zakat, no riba, waqf).

Empirical Validity

results obtain

(i) after controlloing for trade effects caused by distance to historical trade routes

(ii) after controlling for contagion effects: proximity to Mecca and Muslim empires

(iii) for ethnic groups that have never been dominated by any Muslim empire

(iv) when performing the analysis at the virtual country level.

We do not rule out spread of Islam through conquests but focus on non-forced adoption outside Muslim empires.

Acceptance of Islam in Inner Asia, Sout East Asia, and Sub-Saharan Africa through contact with merchants and a means of entry into extensive trade networks

Economics & Religion: Literature

- Long standing subject of research in the realm of social sciences on salience, identity, etc.

- Marx (1933): Religion like any other institution, dependent on economic realities of a given society, i.e. outcome of its productive forces.

- Economists' focus on the interaction of religion and economic performance: religious beliefs $\Leftrightarrow$ economic outcomes

- Effect of Religion on Economic Performance: Industrial Revolution and Protestant Ethics (Max Weber 1905)

Religion and Economic Outcomes: Literature

- Religiosity and Economic Outcomes Across Countries (Barro and McCLeary 2005)

- Evidence on the impact of Islam on economics is controversial:

1. negative effect: La Porta et al 1997, Barro and McCLeary 2005

2. positive or insignificant : Pryor 2007, Sala-i-Martin et. al 2004

HOWEVER,

the *economic origins* of Islamic religious principles and adherence are poorly understood, both empirically and theoretically

Identifying the foundation of Islam will improve on the interpretation of existing findings.

Historical background: Trade before Islam

- Pre-Islamic Arabia: Economy based on few scattered oases producing agricultural goods (Medina, Yemen, etc.). The rest deserts, semi-arid regions, nomadic life-style, conducting raids on commercial caravans.

- trade maintained by peripheral kingdoms (Ghassanids, Lakhmids, etc.) who buffered trade routes and policed Bedouins.

- despite efforts to reestablish their dominance since early $4th$ century to restore order in desert, protect trade and oasis cultivators, all disintegrated in the course of $6th$ century.

- Political and commercial control over Bedouin communities no longer exerted

- Arabian economy in decline.

Byzantine-Sassanid wars

- a series of long and exhausting wars since the start of the $6th$ century between Byzantines and Persians

- by early $7th$ century conflicts had ruined or disrupted major international trade routes bewteen the two empires

- Piracy in the Red sea also on the increase due to the declining sea power of the Byzantines

- diversion of merchant traffic into the peninsula giving new commercial value to overland trade routes in Arabia

- potential economic benefits: 1. sell to merchants = take advantage of outside markets, 2. increased caravan traffic = higher demand of local goods.

Map 3: Empires, kingdoms, and trade routes on the eve of Islam
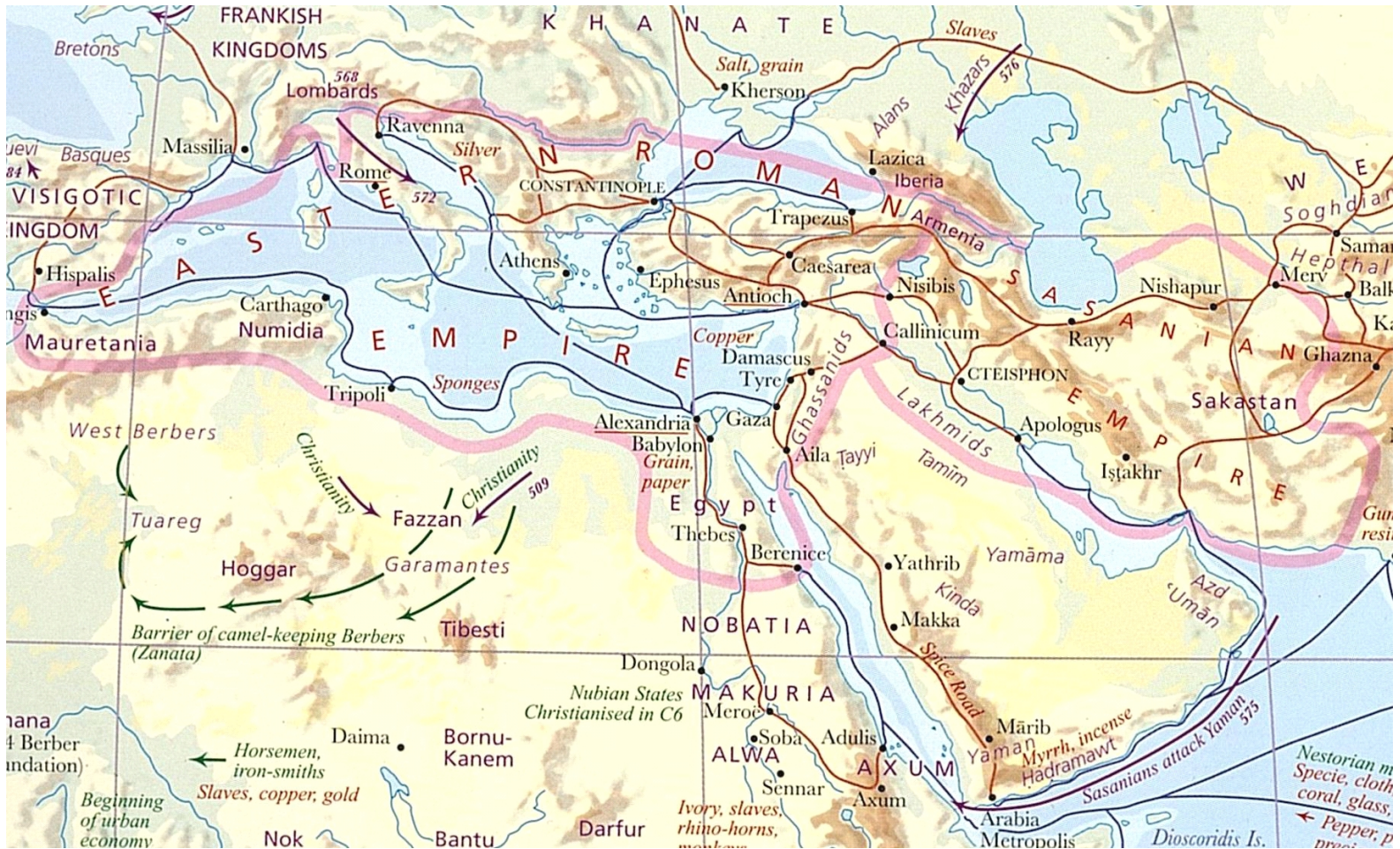
Muhammad and the Doctrine

- few regions were able to benefit from these routes, most could not

- to materialize benefits, oasis cultivators needed to reach important trade hubs along trade routes, i.e. Mecca

- surrounded by unsafe deserts due to extremely unequal geography of Arabia, caravans constantly exposed to raids

- conflicting environment with merchants and oasis cultivators on one side and Bedouins on the other

- in this cross section of historical events Muhammad was born. political base needed to align conflicting interests nurtured by unequal geography.

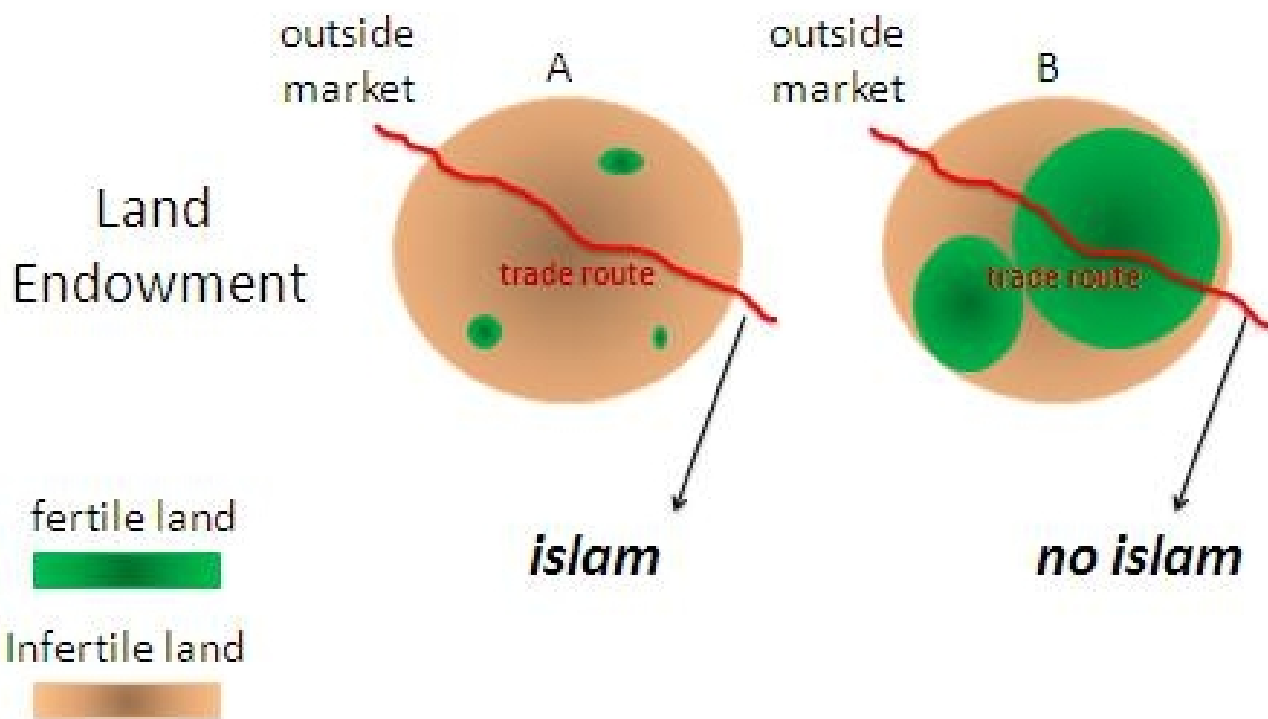# A Primer on Islamic Economic Principles

- Obligation of rich to redistribute part of their income to the poor, **Zakat** (one of the Five Pillars of Islam)

  but as rich have higher propensity to save and leave capital bequests, income inequality exacerbates, poor's relative standing over time falls, redistribution becomes unsustainable.

- Impediments on physical capital accumulation to prevent bequests exclusively benefiting heirs of the rich

  - the prohibition of interest in loan contracts, **no-riba**

  - the prohibition of complex organizational forms, no corporation

  - strict equitable inheritance laws

- Induce public investments in religious endowments enhancing community's productive capacity (and welfare), **waqf** (in form of schools mosques, accomodation, hospitals, public utility)

Intuitions for the underlying theory

- conditions under which an unequal geography exposed to trade opportunities may lead to adoption of Islamic principles.

- appearance of trade routes offers economic opportunities only benefiting surplus producing regions and not those with poor land.

- vulnerability of caravans against raids depends on their defense capability, determined by relative size and wealth.

- Size and wealth determined by geographical inequality in the region and decides the endogenous adoption of the Islamic doctrine.

- To faciliate access to new trade routes and hubs in Arabia, later to existing trade routes and Muslim trading networks

outside market

A

outside market

B

Land Endowment

trade route

trade route

islam

no islam

fertile land

Infertile land

The basic structure of the model

- Overlapping-generations economy, $t = 0, 1, 2, ...$

- Single Good, factors of production are physical and human capital

- A continuum of regions normalized to 1

- Two types of land quality High and Low: λ fraction of Low quality regions

- No labor mobility

- No population growth, one person - one region

Production of final output

- Output in region r:

$$y_{r,t} = T_r((1-\alpha)h_{r,t} + \alpha k_{r,t})$$

- $T_r \equiv$ land productivity, with $T_R = 1$ and $T_P = 1/v_0 < 1$

- $h_{r,t} \equiv$ effective labor in region r

- $k_{r,t} \equiv$ level of physical capital

marginal productivities: $\begin{cases} w_r = (1-\alpha)T_r \\ \\ R_r = \alpha T_r \end{cases}$ $\qquad \alpha > \frac{1}{2}$

Individuals

- Individuals get utility from consumption, plus potential gross income of their offspring, $I^G_{r,t+1}$, with the constraint $c_t \leq \tilde{c}$ (satiation level), where $\beta < 1$.

$$U(c_t; I^G_{t+1}) = c_t + \beta I^G_{t+1}$$

- One-period-active individuals. Adulthood: (i) get gross income through labor and inheritance, (ii) trade + redistribution $\Rightarrow$ net income $I^N_{r,t}$ and (iii) leave bequest.

Bequests

1) savings to be transformed into physical capital in $t + 1$:

$$s_{r,t} = k_{r,t+1}$$

2) public good/labor productivity investments, $e_{r,t}$ $\Rightarrow$ **waqf** $\Rightarrow$ increase effective labor across *all regions*

$$h_{t+1} = 1 + \gamma \left((1 - \lambda) e_{R,t} + \lambda e_{P,t} \right)$$

- Bequests can only be left if satiation level reached:

$$k_{r,t+1}^*(I_{r,t}^N), e_{r,t}^*(I_{r,t}^N) = \begin{cases} 0 & if \quad I_{r,t}^N < \tilde{c} \\ I_{r,t}^N - \tilde{c} & if \quad I_{r,t}^N > \tilde{c} \end{cases}$$

Optimization

- Solving backward, we consider achieved the post-trade and post-redistribution income $I_{r,t}^N$.

- Individual r maximizes utility under his budget constraint $(I_{r,t}^N)$ internalizing his child's gross income:

$$I_{r,t+1}^G = (1 - \alpha)T_r h_{r,t+1} + \alpha T_r \delta s_{r,t}$$

  where δ is a distortion on returns on physical capital (**anti-riba laws**)

- Together with the waqf expression, individuals choose to invest in physical capital as long as $\alpha\delta > (1 - \alpha)\gamma(1 - \lambda)$

Trade

- Trade incurs a fixed cost, μ, of setting up a caravan that poor cannot overcome:

$$I_{P,t}^{G} < \mu < \tilde{c}, \forall t$$

- Gains from trade are meaningful:

$$p > \underline{p} \equiv \frac{\tilde{c}}{(1 - \alpha - \mu)\theta}$$

- In the absense of trade no individuals can leave bequest:

$$1 - \alpha < \tilde{c}$$

- Initial land inequality large enough so that poor cannot trade/leave bequests after redistribution:

$$v_0 > \underline{v} \text{ where } v_0 = \frac{T_R}{T_P} = \frac{1}{T_P} > 1$$

Raid

- If rich are raided, may retain a fraction $f_R(\lambda, v_t)$ of the goods

$$\frac{\partial f_R(\lambda, v_t)}{\partial \lambda} < 0 \quad , \quad \frac{\partial f_R(\lambda, v_t)}{\partial v_t} > 0 \; ; v_t = \text{income inequality}$$

- conducting a raid is costly:

1. represented in terms of a fraction θ of the booty collected by raiders.

2. Raid $\Rightarrow$ rich retain fraction $f_R = 1 - f_P$, poor retain fraction $f_P - \theta$.

- *Raiding is a meaningful threat iff* $\lambda > \underline{\lambda}(v_0)$ where $f_P(\underline{\lambda}, v_0) = \theta$
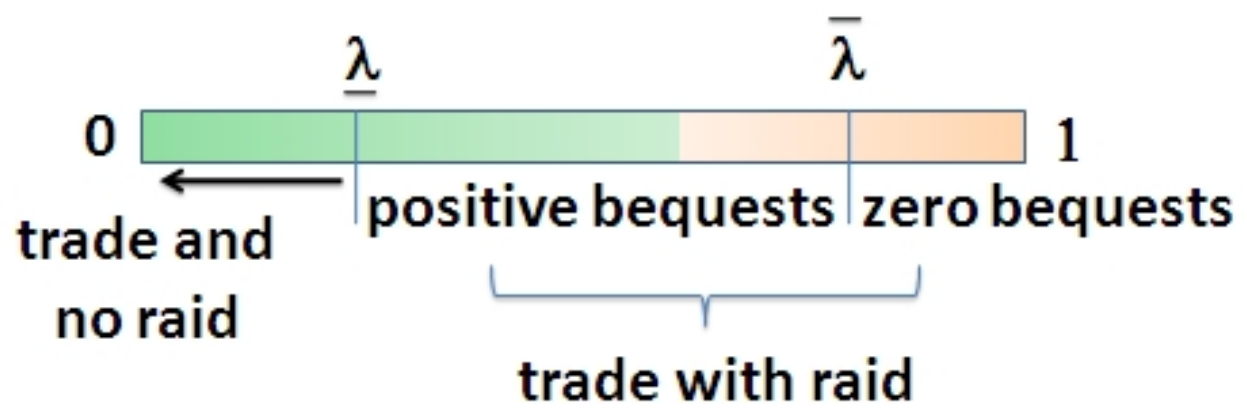
Redistribution

- Avoiding conflict is *per se* always preferred by the rich

  (minimum zakat required alway lower than losses in a raid)

-
  | Rich's maximum redistribution rate: | $\bar{z}(\lambda, v_t)$ | $=$ | $f_P(\lambda, v_t)$ |
  | Poor's minimum redistribution rate: | $\underline{z}(\lambda, v_t)$ | $=$ | $f_P(\lambda, v_t) - \theta$ |

- *A positive zakat is paid voluntarily for $\lambda > \underline{\lambda}(v_0)$*

- with zakat only, bequests by rich allocated into capital accumulation, over time regional income inequality, v_t, **increases**

  $\Rightarrow$ threat by the poor, $[f_P(\lambda, v_t)]$ decreases, the redistribution comes to a halt when poor no longer a threat, i.e. $f_P(\lambda, v_t) = \theta$.
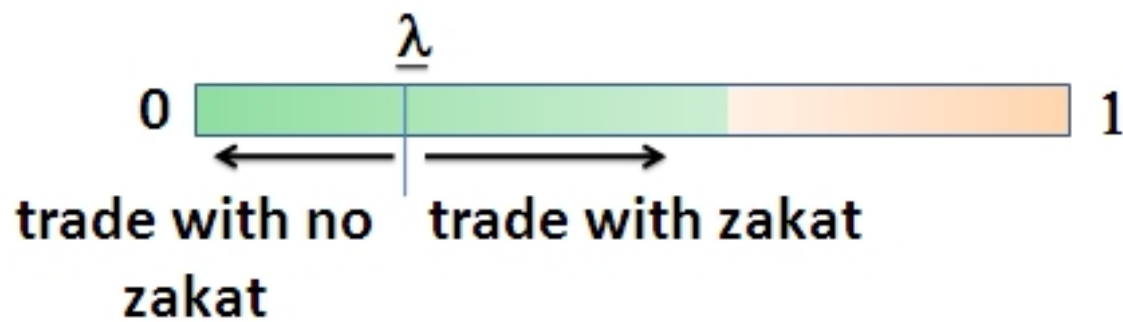
The Islam "Contract"

- Zakat $+$ anti-riba that divert rich's resources to **waqf** always preferred by poor

- The extent of the threat by the poor is determined by geographical inequality

- *physical capital bequests positive iff* $\lambda < \bar{\lambda}(v_0)$ where $f_P(\bar{\lambda}, v_0) \Rightarrow I^N_{r,t} = \tilde{c}$

- Islam accepted for $\lambda > \bar{\lambda}(v_0)$ as the only option to leave bequest is **waqf**

- For $\lambda < \bar{\lambda}(v_0)$, rich face trade-off between capital/raid and Islam/no raid

  - static gain: higher income with no raid, more resources to bequeath: θ

  - dynamic loss: lower returns from waqf than capital (decreasing in λ)

- *Doctrine agreed upon by rich for* $\lambda > \lambda^{\xi}(v_0)$
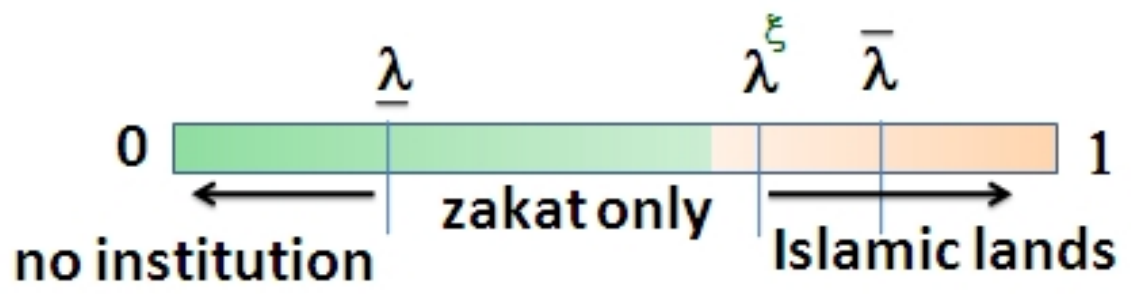
The long run comparative statics

- Under Islam:

    - Bequests are allocated into public goods

    - Capital accumulation is negligible

    - Income inequality remains bounded

    - Lower steady state income

Testable prediction

- *Unequally distributed agricultural potential increases the incentives to adopt Islamic rules*

$$\nearrow \quad \text{Share of Infertile Regions } (\lambda) \quad \Rightarrow \quad \nearrow \quad \text{Muslim \%}$$
$$\nearrow \quad \text{Dispersion in Land Fertility } (v_0) \quad \Rightarrow \quad \nearrow \quad \text{Muslim \%}$$

- Gini index of land productivity distribution $G = \frac{1}{2}\left[\lambda - \dfrac{1}{1+v_0\left(\frac{1-\lambda}{\lambda}\right)}\right]$; $\frac{\partial G}{\partial v_0} > 0$

  $\forall \lambda;\ \frac{\partial G}{\partial \lambda} > 0$ excluding combinations of large λ and low v_0, i.e. equality.

Data

- **RHS**: Grid consisting of 66004 observations (0.5 degrees, latitude x longitude, average size about 55km by 35km) about probability of land being cultivated, constructed using Climate and Soil Conditions for 1961-1990 (Global data on agricultural Suitability, Ramankutty et al., 2002).

- **LHS**: Muslim % within an ethnic group in 2005 (World Religion Database) and the Traditional Homeland of each Ethnic Group (Ethnologue linguistics database, GMI World Language Mapping System).

  - Muslim % within each country in 1900: not used because of usual problems with country-level cross-section analysis. Correlates 0.93 with 2005 measure at ethnic group level.

Example from Ethiopia
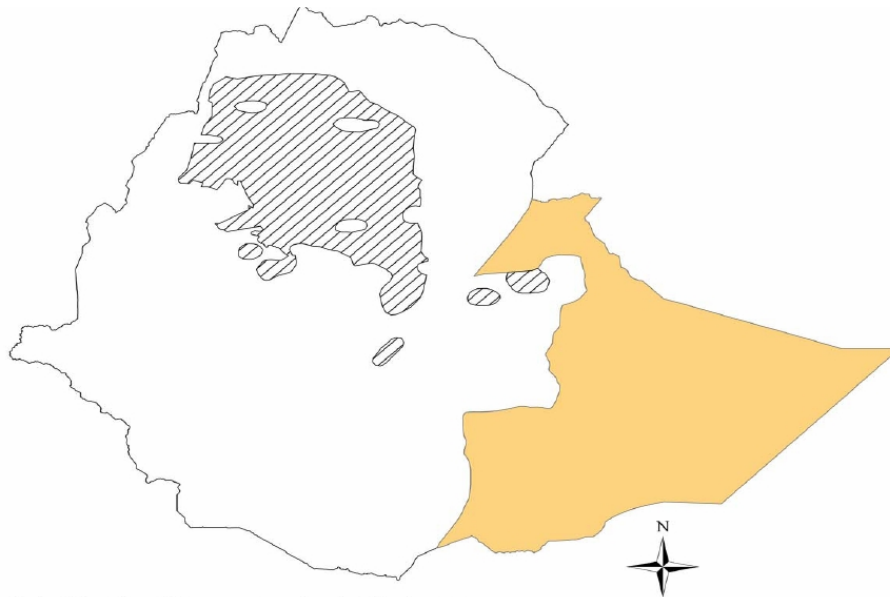
2 Ethnic Groups in Ethiopia

Homeland of the Amharic Group - 1% Muslim in 2005

Homeland of the Somali Group - 100% Muslim in 2005
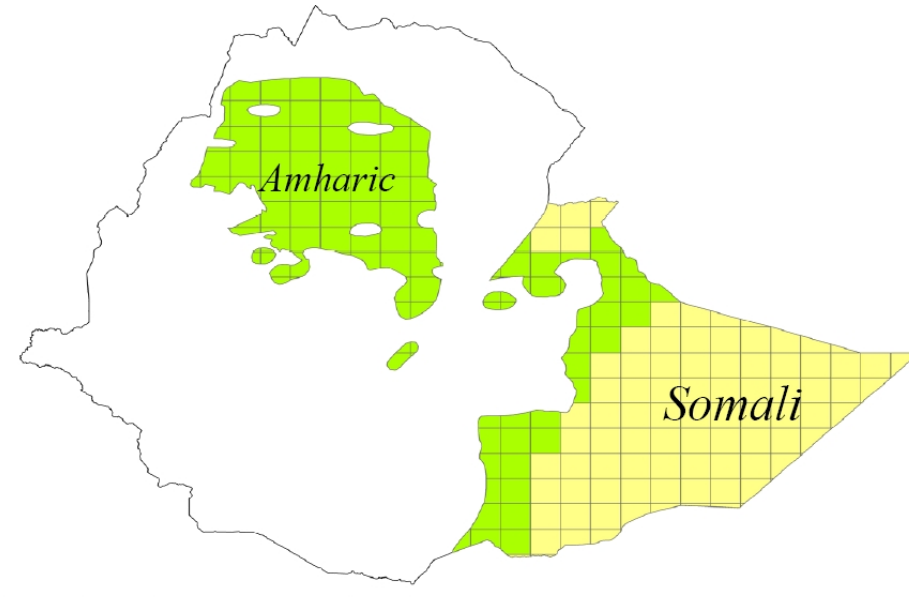
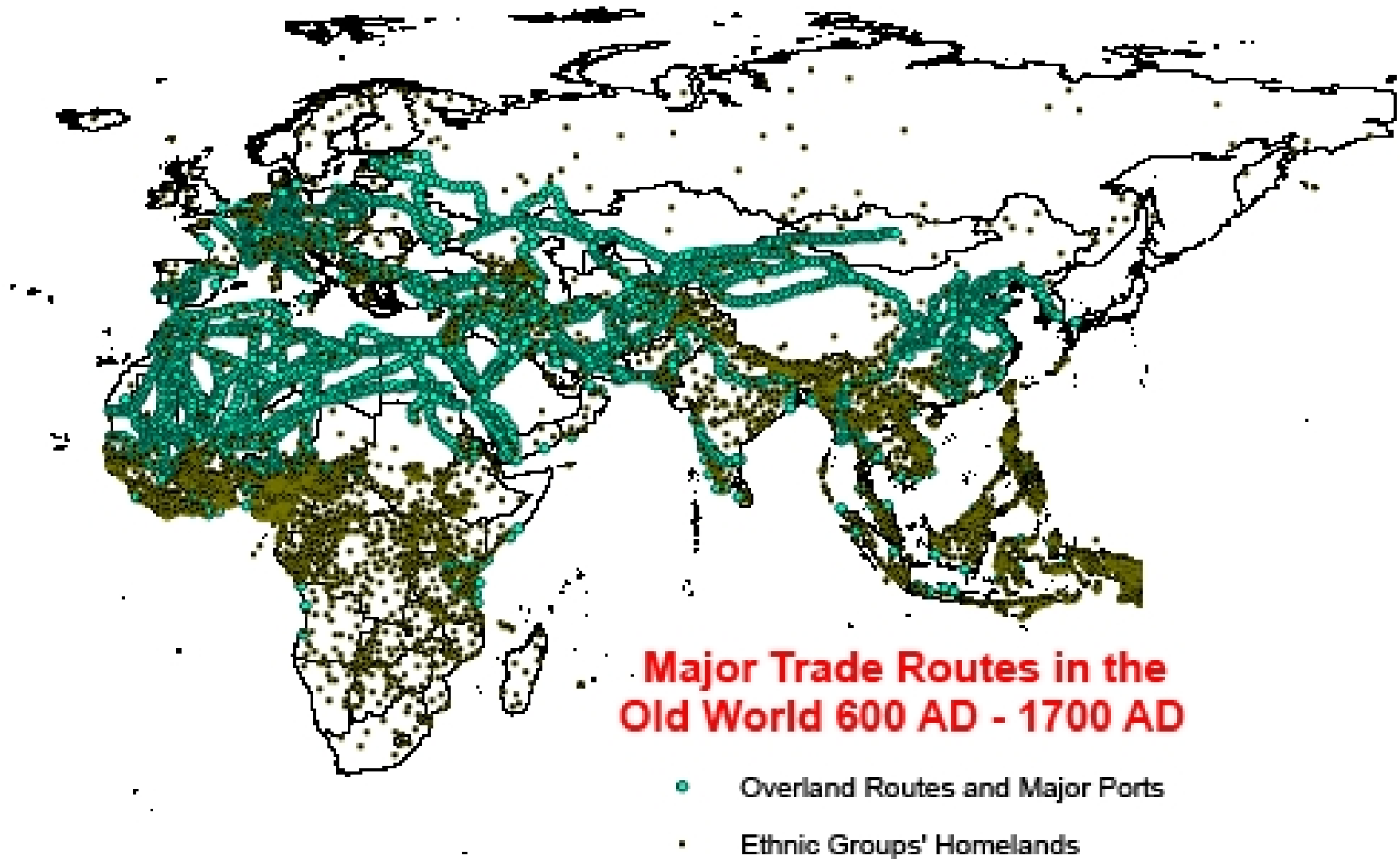**Regional Land Quality for Agriculture**

< 10% Agricultural Potential

> 10% Agricultural Potential

Alternative testable theories

- Trade Effect: distance from trade routes (gain access to Muslim merchant networks)

- Contagion Effect: distance from Mecca and borders of all Muslim empires (distance from place of origin or strong Muslim empires)

Map 4: Historical trade routes up to $1700 AD$

**Major Trade Routes in the
Old World 600 AD - 1700 AD**

- Overland Routes and Major Ports
- Ethnic Groups' Homelands

Empirics: Results with full sample - Ethnic groups

| VARIABLES	%Muslim	%Muslim	%Muslim (Old World)	%Muslim (New World)
lqgini	0.282***	0.298***	0.334***	0.001
	(0.069)	(0.077)	(0.088)	(0.001)
lndmecca	-0.370***	-0.367***	-0.415***	0.008
	(0.133)	(0.138)	(0.156)	(0.009)
lndroutes	-0.064***	-0.064***	-0.064***	0.000
	(0.017)	(0.016)	(0.016)	(0.001)
lndempire	-0.026	-0.030	-0.027	-0.005
	(0.022)	(0.024)	(0.026)	(0.006)
areakm2		-0.003***	-0.004***	-0.000
		(0.001)	(0.001)	(0.000)
staterel	0.038	0.261***	0.651***	-0.001
	(0.065)	(0.064)	(0.159)	(0.001)
Observations	1877	1877	1540	337
R^2	0.63	0.64	0.61	0.17

*** p<0.01, ** p<0.05, * p<0.1, Standard errors clustered at the country level

All specifications include country and continental fixed effects, absolute latitude, distance from sea, elevation, average land quality and a dummy for the Colonizer's identity, (3) focuses on Africa, Asia and Europe, (4) focuses on the Americas and the Pacific.

The spread of Islam

- Through conquests and tax incentives in Muslim empires

- Through merchant contacts in the rest of the Old World

  – to identify non-forced adoption focus on territories that have not been under a Muslim empire

  – omit places that have been under direct rule of all empires originally Muslim

  – this eliminates issues such as conquerors being interested in more fertile regions, coercion, tax incentives, migration)

- Is "Islamic" geography a characteristic of other monotheistic religions?

# Map 5: Old world out of Islamic empires

Muslim Empires in the Old World
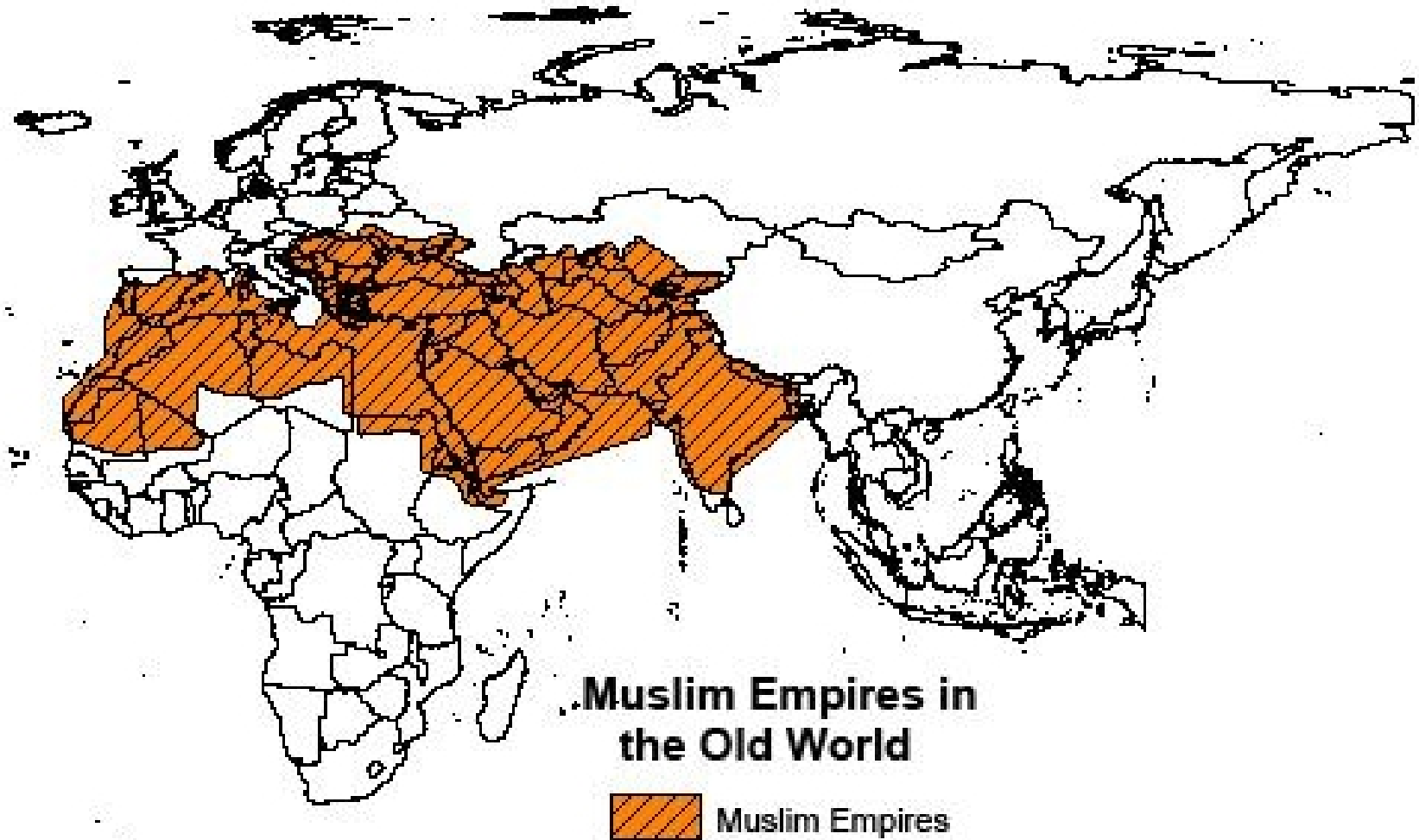
Muslim Empires

Outside old Islamic empires

VARIABLES	%Muslim	%Christian
lqgini	0.343***	-0.117
	(0.109)	(0.109)
lndmecca	-0.191	0.128
	(0.298)	(0.319)
lndroutes	-0.077***	0.038
	(0.016)	(0.023)
lndempire	-0.135**	0.065
	(0.067)	(0.062)
areakm2	-0.007**	0.010**
	(0.003)	(0.004)
staterel	0.162	-0.161
	(0.164)	(0.178)
Observations	1241	1241
R^2	0.50	0.60

All specifications include country and continental fixed effects, absolute latitude, distance from sea, elevation, average land quality and a dummy for the Colonizer's identity, (3) focuses on Africa, Asia and Europe, (4) focuses on the Americas and the Pacific.

Virtual country analysis

- Cross-country analysis subject to criticism due to endogenous border problems

- Unit of analysis: artificial countries of 2.5 degrees latitude by 2.5 degrees longitude

- Median land quality and elevation observations per artificial country : 20

- Dependent variable: % of Muslims

  – using information on the location and Muslim adherence of ethnic groups
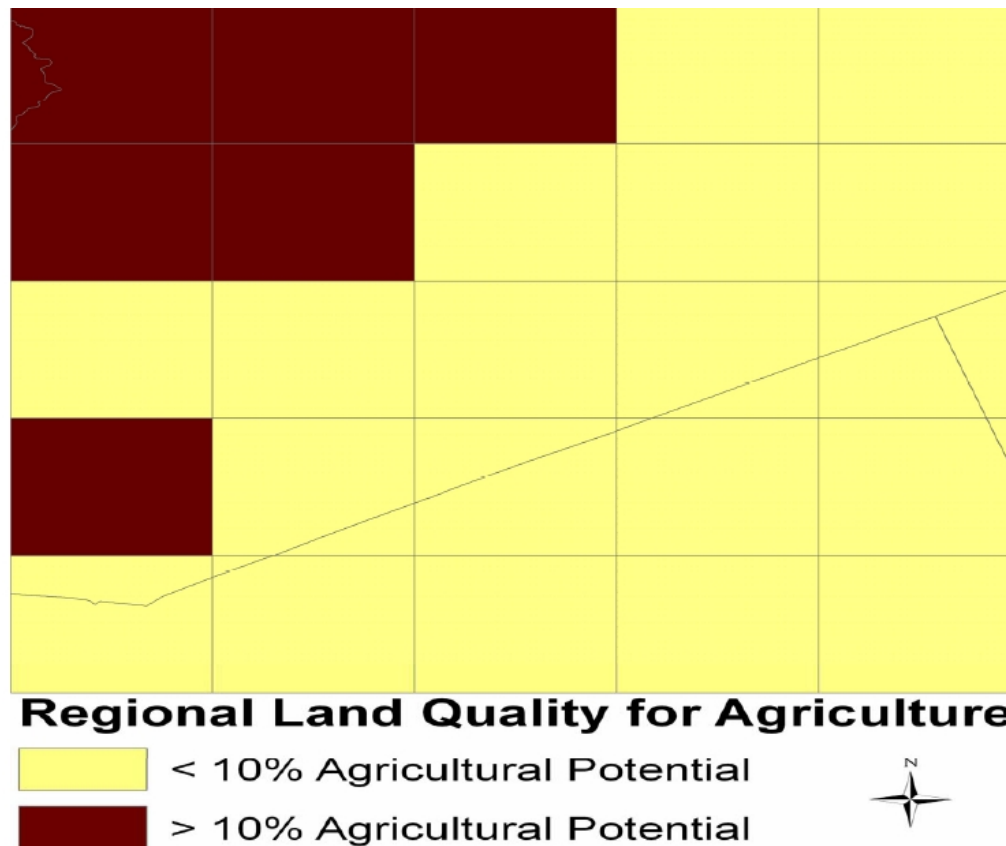
Map 6: Virtual countries
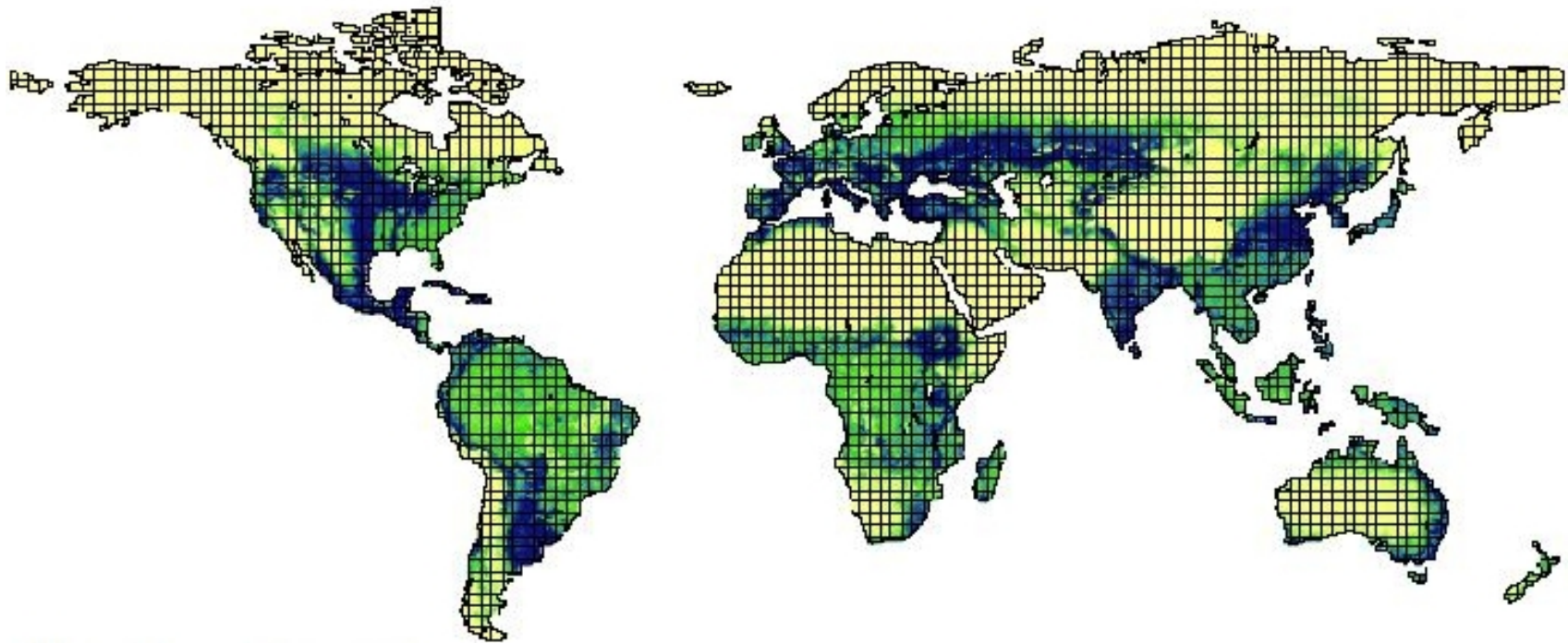
Global Land Quality

High : 0.999

Low : 0.000

Virtual country, example from near east

- Virtual country made of pieces of 3 countries (Jordan, Lebanon and Syria) and 11 ethnic groups.

Regional Land Quality for Agriculture

- < 10% Agricultural Potential
- > 10% Agricultural Potential

Virtual country, results

VARIABLES	%Muslim (All)	%Muslim (Old World)	%Muslim (No Emp)	%Christian (No Emp
lqgini	0.105**	0.121***	0.157***	0.087
	(0.043)	(0.046)	(0.058)	(0.079)
lndmecca	-0.043	-0.054	-0.078	-0.073
	(0.073)	(0.079)	(0.099)	(0.094)
lndroutes	-0.028***	-0.032***	-0.042**	0.028**
	(0.010)	(0.011)	(0.017)	(0.010)
lndempire	-0.029**	-0.027**	-0.022	-0.005
	(0.013)	(0.014)	(0.028)	(0.024)
avg	-0.079**	-0.114**	-0.113	0.176***
	(0.038)	(0.055)	(0.076)	(0.054)
staterel	0.205***	0.730***	0.374***	-0.416***
	(0.042)	(0.054)	(0.034)	(0.072)
Observations	1923	1464	1085	1085
R^2	0.88	0.87	0.77	0.79

Standard errors in parentheses, clustered at the counrty level. All specifications include country and continental fixed effects, area, elevation, # of country, absolute latitude, distance from sea and a dummy for the Colonizer's Identity

Conclusions

- Theoretical insight:

  - Muslim doctrine is endogenous to the geography of the Islamic Lands

  - This doctrine shaped the economic trajectory of the Muslim world

- Muslim Adherence is higher:

  - in ethnic groups found across unequal land endowments

  - in virtual countries with unequal agricultural suitability across regions