Trade and Geography in the Origins and Spread of Islam*

Stelios Michalopoulos†, Alireza Naghavi‡, Giovanni Prarolo§

September 2012

Abstract

This research examines the economic origins and spread of Islam in the Old World and uncovers two empirical regularities. First, Muslim countries and ethnic groups exhibit highly unequal regional agricultural endowments. Second, Muslim adherence is systematically higher along the pre-Islamic trade routes. We discuss the possible mechanisms that may give rise to the observed pattern and provide a simple theoretical argument that highlights the interplay between an unequal geography and proximity to lucrative trade routes. We argue that these elements exacerbated inequalities across diverse tribal societies producing a conflictual environment that had the potential to disrupt trade flows. Any credible movement attempting to centralize these heterogeneous populations had to offer moral and economic rules addressing the underlying economic inequalities. Islam was such a movement. In line with this conjecture, we utilize anthropological information on pre-colonial traits of African ethnicities and show that Muslim groups have distinct economic, political, and societal arrangements featuring a subsistence pattern skewed towards animal husbandry, more equitable inheritance rules, and more politically centralized societies with a strong belief in a moralizing God.

Keywords: Religion, Islam, Geography, Redistribution, Land Inequality, Africa, Wealth Inequality, Trade.
JEL classification Numbers: O10, O13, O16, O17, O18, F10, Z12.

---

*The authors would like to thank Daron Acemoglu, Quamrul Ashraf, Roland Benabou, Maristella Botticini, Matteo Cervellati, Ernesto Dal Bo, Allan Drazen, Skander Esseghaier, Ioanna Grypari, Oded Galor, Gordon Hanson, Andros Kourtellos, Timur Kuran, Gilat Levy, Beatrice Manz, Peter Neary, Gianmarco Ottaviano, Elias Papaioannou, Jean-Philippe Platteau, Nancy Qian, Ronny Razin, Jared Rubin, Giulio Soravia and Thierry Verdier for valuable comments and suggestions. We would like, also, to thank participants at the Central European University, Collegio Carlo Alberto, Harvard University, Institute for Advanced Study, University of Bologna, Econometric Society World Congress 2010, NBER Summer Institute 2009, the NBER conference on the Economics of Religion, the NEUDC 2009, the CEPR conference on Economics of Culture, Institutions, and Crime, Northeastern University, Toulouse School of Economics, Stockholm University, Tufts University, University College Dublin, University of Los Andes, University of Milan and University of Oxford for valuable comments.

†Brown University and the NBER. E-mail: smichalo@brown.edu. The author was a visiting Fellow at Collegio Carlo Alberto while this project was written and gratefully acknowledges their hospitality. Funding from Faculty Research Awards Committee at Tufts University is also acknowledged.

‡University of Bologna. Department of Economics, Piazza Scaravilli 2, 40126 Bologna, Italy, E-mail: alireza.naghavi@unibo.it

§University of Bologna. Department of Economics, Piazza Scaravilli 2, 40126 Bologna, Italy, E-mail: giovanni.prarolo@unibo.it.

" For the protection of the Quraysh.
Their protection during their trading caravans in the winter and the summer.
So let them serve the Lord of this House.
Who feeds them against hunger and gives them security against fear."[1]
(Qur'an, 106: 1-4; MH Shakir's translation)[2]

1 Introduction

Religion is widely viewed in the realm of social sciences as instrumental for the understanding of socioeconomic processes. In economics there is a growing body of work that links religious affiliation and religiosity to differences in economic and political development across countries. Similarly, within sociology, anthropology, political science, psychology and history, the volume of research investigating the causes and effects of religion attests to its paramount importance.

This study contributes to the strand of literature on the economics of religion examining the origins and spread of Islam. Motivated by prominent Islamic historians and scholars, like Lapidus (2002), Berkey (2003) and Lewis (1993), who emphasize the role of historical trade routes as well as the distinctively unequal geography of areas associated with the birth and the expansion of Islam, we provide a systematic exploration of the determinants of Muslim adherence within as well as across countries shedding light on its geographic roots.

The empirical investigation establishes that geographic inequality, captured by inequality in regional suitability for agriculture, is a fundamental determinant of contemporary Muslim adherence. It also shows that distance from pre-Islamic trade routes has a lingering effect on the contemporary distribution of Muslims with communities closer to preindustrial trade routes featuring a larger fraction of Muslim adherents. These findings provide a justification to the growing empirical literature that treats Muslim representation as predetermined with respect to contemporary economic and political indicators. However, the uncovered deeply-rooted determinants are likely to interact with contemporary development beyond their effect on Muslim adherence.

To conduct the empirical investigation we construct new data on (i) the regional potential for farming and on (ii) the pre-Islamic and preindustrial trade routes in the Old World. Combining these sources with information on Muslim adherence we establish the following empirical regularities. First, countries with unequal endowments of regional agricultural potential and those located closer to pre-Islamic trade routes have higher Muslim representation. Second, we focus on ethnic groups. Exploiting within-country variation mitigates concerns related to the

[1] Quraysh was the tribe dominating Meccan trade in the eve of Islam. Mohammad himself was member of the Quraysh.
[2] Tahrike Tarsile Qur'an, Inc., (1983).

endogeneity of contemporary political boundaries. Modern states, arguably, have differentially affected religious affiliation via state-sponsored religion, for example. As such it is crucial to account for these state-specific histories. Unlike a cross-country setting, this is feasible in the within-country-across-ethnic-groups analysis where we show that ethnicities whose traditional homelands are characterized by unequal land endowments located closer to historical trade routes have higher Muslim adherence.

Though the major contribution of this paper is to empirically identify the geographic origins of Muslim adherence, we discuss the possible mechanisms via which geographic inequality facilitated the rise and spread of Islam and provide a simple theoretical argument. We start with the observation that Islam surfaced in the Arabian peninsula under conditions featuring an extremely unequal land productivity distribution across regions, on the one hand, and proximity to lucrative trade routes, on the other. As a result, when dwellers from the oases were attempting to cross the surrounding vast arid lands in pursuit of trade profits, they were facing the constant threat of nomadic groups. These encounters had the potential to bring trade flows to a halt setting the stage for the emergence of a centralizing force featuring redistributive rules. We argue that Islam was such a movement and, thus, its economic tenets had to address the inherent economic inequities across clans (see section 2.2 for a detailed discussion on Islam's redistributive principles).[3]

A prediction that derives from this view is that Muslim groups should differ with respect to their economic and societal arrangements. In an effort to provide such evidence we utilize anthropological information on pre-colonial traits of African ethnicities. Consistent with the proposed hypothesis we show the following: first, geographic inequality makes ethnic groups rely more intensely on animal husbandry vis a vis agriculture. Second, societies residing along geographically unequal territories are more likely to be economically unequal. Third, the link between geographic and social inequality is substantially weaker for Muslim compared to non-Muslim groups. Fourth, Muslim groups are more likely to have equitable inheritance rules.

The direct effects of proximity to trade routes and geographic inequality are consistent with various explanations. For example, since Islam's first followers in the Arabian peninsula were in their majority pastoralists then to the extent that their skills (military and productive) were specific to such environments one would expect to observe Muslims migrating and populating regions similar to their ancestral homelands, see Chaney (2012) and Michalopoulos (2012). Similarly, Muslims had a preference of conducting trade with coreligionists because it allowed access to Islamic judiciaries that facilitated the resolution of trade disputes, see Lapidus (2002) and Hodgson and Burke (1993). This could explain why we observe fewer Muslim adherents

[3]Note that the proposed theory is an attempt to rationalize the redistributive nature of economic principles embedded in the Islamic doctrine, remaining agnostic as to its theological underpinnings.

further from historical trade routes.

Nevertheless, the conjecture that Islamic economic principles arose from the interplay between geographic inequality and trade opportunities generates an auxiliary prediction. Namely, the intensity of adoption of Islam within unequally endowed groups should depend on the proximity to trade routes. This prediction is borne out by the data. In the empirical analysis the interaction of distance to trade routes and geographic inequality enters with a negative and significant coefficient. This finding is in line with the narrative of Insoll (2003) and Lewis (1993) describing how the highly developed legal codes of Islam with a single source of authority offered a strong commitment device suitable to handle desert issues across communities engaged in trade and lacking a concentrated authority necessary to impose duties or inflict penalties across heterogeneous groups.[4] The role of Islam as a commitment mechanism is also stressed by Greif (2006) who sees Islam as a bundle of religious, political and economic rules regulating most aspects of life. Consistent with the view that Islam was a state-building force we present evidence from Africa showing that Muslim groups are more politically centralized and are also more likely to believe in a "moralizing God", i.e. in a God supportive of human morality imposing moral rules to its adherents and sanctions to those deviating.

Islam spread both via conquests and via the peaceful adoption of the doctrine. For example, the acceptance of Islam in most of Inner Asia, Southeast Asia, and Sub-Saharan Africa is well known to have occurred through contacts with Muslim merchants, Lapidus (2002) and Insoll (2003). A prominent example includes the case of Indonesia whose location along highly lucrative commercial routes precipitated the spread of Islam since the 11^{th} century, Ricklefs (1991). To shed light on the forces that led to the voluntary adoption of Islam in the empirical analysis we also focus on regions outside the Muslim empires. Doing so allows us to single out the role of geography and trade and mitigate concerns related to the process of conversion within Muslim empires arising from coercion, Arab migration, and differential taxation.[5]

Related Literature

The link between the structure of production and institutional formation has been proposed by Marx (1833 [1970]). According to Marx (1833 [1970]), religion, like any other social institution, is a product of the society's productive forces. Likewise, Ibn Khaldun (1377) notes that it is the physical environment-habitat, climate, soil, and food, that explain the different ways in which people, nomadic or sedentary, satisfy their needs, and form their customs and

[4] Note also that Muslim merchants brought the additional benefit of restraining the Bedouins whose adherence to Islam was brought about by the promise of booty (Turner, 1998).

[5] Jews and Christians in Muslim empires were subject to higher taxes than Muslims in exchange for economic and political rights and security, Lewis (2001).

institutions to obtain a living. Along similar lines, this study argues that the Islamic economic institutions had to be compatible with the clashing interests of tribal groups nurtured by an unequal geography.

The present study belongs to the literature in economics starting with Greif (1994), Platteau (2008, 2009), Becker and Woessmann (2009), Botticini and Eckstein (2005, 2007), Cervellati, Jansen, and Sunde (2008), Rubin (2009) and Nunn (2010) that explores the role of the economic environment in determining religious rules and vice versa. The uncovered evidence makes also contact with the studies by Engerman and Sokoloff (1997, 2002) and Acemoglu et al. (2001, 2002) among others, that have stressed the role of geography in shaping the type of institutions (extractive versus growth promoting) that Europeans established during the colonial period. Our findings complement this literature by empirically demonstrating that the Muslim world follows a consistent geographic pattern. Islamic economic principles were devised as a means of centralizing the divergent interests of tribal populations residing along geographically unequal territories in the beginning of 7^{th} century Arabia triggered by new trade opportunities. Islam, consequently, expanded and eventually persisted across ethnic groups and territories featuring similarly unequal agricultural endowments close to pre-industrial trade routes.

The cross–country growth literature has seen an increased interest on the relationship between religion and politico-economic outcomes (see Barro and McCleary (2006a, 2006b) for an overview). Nevertheless, the evidence regarding the impact of Islam on economic and political indicators is at best controversial. Some studies identify a negative effect, see La Porta et al. (1997) and Barro and McCleary (2003), whereas others conclude that the effect is positive or insignificant, see Pryor (2007) and Martin, Doppelhofer, and Miller (2004). Thus, (non) findings relating Islam to economic and political outcomes have to be carefully interpreted.

The rest of the paper is organized as follows. Section 2 discusses the elements of the Muslim economic doctrine and describes the role of trade and geography in the formation and expansion of Islam providing historical evidence from the pre-Islamic Arabia, Mali, and the Malay empire. Section 3 outlines the theory. Section 4 discusses the data and presents the empirical analysis conducted across countries and across ethnic group. Section 5 summarizes and concludes.

2 Historical Background

2.1 The Rise of Islam

Arabia has a distinct geography with few places in Yemen, Bahrain, Central Arabia and several scattered oases in the interior producing agricultural goods, such as frankincense, myrrh, vine,

dyes and dates in the eve of Islam. The rest of the peninsula features deserts and semi-arid regions where nomadic life-style was the norm, Ibrahim (1990). Across these infertile swaths of land, tribes were directly involved in the collection of booty by conducting raids, known as *ghazw,* on commercial caravans trading local produce as well as spices, gold, ivory, pearls, precious stones, and textiles - arriving at the local ports from Africa, India, and the Far East, Berkey (2003). Scholars have argued that this distinctive geography shielded the local populations from any form of urbanization allowing them to maintain their tribal culture, preventing the formation of a unifying social structure, Haber and Menaldo (2010). At the same time, the infrequent urban commercial economies in a limited number of oases exacerbated social and economic inequities between clans, Berkey (2003).

In the pre-Islamic era, trade was maintained in the Peninsula as long as peripheral kingdoms along the edges of Arabia, namely Himyarites, Ghassanids and Lakhmids, guarded the routes and policed Bedouin tribes. These kingdoms all disintegrated in the course of the 6^{th} century. As a result, political and commercial control over the Bedouin communities could no longer be exerted and the Arabian economy got in decline, Lapidus (2002).

In parallel, the Persian and Byzantine empires had been fighting a series of long and exhausting wars since the start of the 6^{th} century. By the early 7^{th} century the conflicts had disrupted the major international trade routes between the two empires, Lewis (1993). Piracy in the Red Sea was also on the rise due to the declining sea power of the Byzantines, Winder (2008). These events caused a diversion of trade through the peninsula giving profound commercial value to overland trade routes in Arabia. The resulting trade diversion created new potential economic benefits for the relatively fertile regions. First, by selling to the merchants they could take advantage of markets outside Arabia, and second, the increased caravan traffic was equivalent to higher demand for local produce.[6]

In order to materialize these benefits the trade hubs along the routes had to be safely reached. Yet due to the hostile Arabian geography, these hubs were surrounded by unsafe deserts. As a result caravans were constantly exposed to raids by the Bedouins, who made up a considerable fraction of the population in the Arabian peninsula at that time, Berkey (2003). This situation prompted early attempts to mitigate conflict in pre-Islamic Arabia. For example, in search for security the Meccan merchants offered the arrangement of *ilaf* according to which they would carry with them commodities produced by other tribes to be sold in markets and fairs. In exchange, these tribes would provide security and protection (*khafara*) for Meccan caravans passing through their territories. Also, within Mecca rich merchants were engaging in alms provision to alleviate poverty. Such attempts coupled with the formation of tribal

[6] Crone (2007) discusses the possibility that Meccans benefited directly from the Persian and Byzantine wars supplying leather and hides to the Roman army.

alliances partially decreased tensions, nevertheless these measures were short-lived since many tribes were not bound by the institution of *ilaf* and alliances were constantly switching, Ibrahim (1990). These elements produced a conflictual environment featuring the merchants and oasis cultivators, on one side, and the Bedouins, on the other. Ibrahim (1990) succinctly summarizes the economic conditions prevailing in the eve of Islam: "An unequal distribution of wealth and resources already existed in and around Mecca. This unequal distribution had the potential to disrupt its network of alliances and trade routes".[7]

It was in this cross-section of historical events that Muhammad, himself a Meccan merchant, was born. An agreement to avoid raids and ensure redistribution required a commitment device to make cooperation between tribes viable. The existence of informal and formal punishments in Islam, such as those related to *ridda* (apostasy), gave Islam an edge over similar pre-existing, short-lived attempts. Islam emerged aiming at creating a strong sense of community effectively acting as a state-building force. It offered a means by which tribes could be unified through a common identity under one god that transcended clan and class divisions (Stearns, Adas, Schwarz, and Gilbert (2010)). Within economics, religious affiliation has been invariably linked to the formation of a common identity. For example, Levy and Razin (2012) argue that religious organizations arise endogenously to foster social cooperation and social behavior by instilling beliefs on the connection between rewards and punishments. Similarly, Iannaccone (1992) considers religion as a club good featuring positive congestion externalities and shows how people choose rationally to participate in a religion that involves voluntary limitations.

2.2 Islamic Economic Principles

Poverty alleviation and redistribution feature prominently among the Islamic economic traits. Acts of charity are voluntary (*sadaqa*) and obligatory (*zakat*). *Zakat* is a religious obligation and is one of the Five Pillars of Islam.[8] The Qur'an requires a believer of sufficient economic means to give a fraction of her accumulated income for alms. During the early decades of Islam *zakat* was collected and distributed by the government appointed officials in a centralized manner and it was effective in alleviating poverty, see Habib (2004) and the references therein. Over time, however, its centralized collection was infrequently enforced and relegated to the local authorities, see Kuran (2008b).[9] The role of equitable inheritance laws, anti-usury laws

[7] Aswad (1963) notes that Muhammad's message was first accepted in Medina as a result of Medina's oasis cultivators facing increased conflict from nomads in the periphery.

[8] It is interesting to note that the majority of those who contributed to the crystallization of the Muslim law over time had a merchant or craftsman background, Cohen (1970).

[9] Kuran (2001) notes that the third Caliph Uthman turned the obligation to pay *zakat* essentially into a tax on agricultural output.

and the prohibition on the rise of the corporation are other prominent examples. In particular, the Islamic law by recognizing only natural persons effectively blocked the emergence of more complex organizational forms restricting the mobilization and pooling of resources. Regarding inheritance laws Qur'an specifies that two-thirds of one's wealth be allocated to various family members, including very distant relatives making it a rather egalitarian distribution system, Kuran (2008a).[10]

We do not argue that the economic principles discussed above are unique to Islam. Indeed, similar principles on redistribution, limits on capital accumulation and donations to religious endowments may be found in the other Abrahamic religions. We do argue, though, that a movement aiming at centralizing the tribally diverse societies of Arabian peninsula had to offer principles consistent with the needs of such heterogeneous populations. Moreover, we show that the empirical relationship between trade, geographic inequality and religious affiliation is unique to the Muslim religion.

Lewis (2001) and Platteau (2008) argue that, unlike Islam which seeks to moderate most aspects of life, Christianity tends to draw boundaries because it initially flourished in regions with an already strong presence of state where laws and social codes were enforced by the Roman empire. Also, the fact that Christianity spread to regions with a radically different geography compared to Islam, i.e., Western Europe and the Mediterranean, arguably influenced its economic predicaments. For example, although Christianity did enforce rigorously the prohibition on interest primarily on consumption loans, over time and particularly with the Protestant Reformation attitudes towards usury were relaxed, Lewison (1999) and Rubin (2011). Perhaps more importantly, in Christianity inheritance laws were preserving economic inequality allowing in several instances such laws as that of primogeniture, see Bertocchi (2006), and there were no restrictions on the formation of the corporation effectively facilitating the mobilization of resources and the accumulation of wealth. Finally, the fact that Arab merchants dominated African and Eurasian trade routes from the 7^{th} till the 15^{th} century (see Labib (1969)) implies that the indigenous populations in Asia and Africa were primarily exposed to the Muslim doctrine.

So, even if one were to take the view that Christianity and Islam are doctrinal substitutes, historically the effective choice of tribal areas outside the Muslim empires was to either convert to Islam or keep their tribal religions. As it is shown in the empirical section, local tribal religions persisted in territories with equal productive endowments whereas it was Islam that

[10] Equitable inheritance laws coupled with the fact that more wealthy individuals were allowed to have more wives and consequently children, was an additional force against the concentration of wealth and the increase in inequality. For a thorough discussion on the economic principles of Islam see Kuran (2004). Incidentally, Kuran (2003) argues that a by-product of such inheritance laws was an increase in the costs of dissolving a business partnership following a partner's death rendering business enterprises small, simple, and generally ephemeral.

was readily adopted in places close to trade routes featuring an unequal geography.

3 The Model

3.1 The Basics

This section builds a simple model to illustrate how an unequal geography exposed to trade opportunities makes the adoption of redistributive rules more likely. The appearance of trade routes creates divergent economic opportunities across groups characterized by unequal agricultural endowments. On the one hand, fertile, surplus-producing regions can greatly benefit from trade by selling their output at higher prices whereas regions with poor land endowments cannot. However, to the extent that the latter may threaten the trade activities of the former, a set of redistributive schemes may emerge. Hence, it is the juxtaposition of few fertile pockets of land with a sizeable share of agriculturally poor regions that enables the predatory behavior of the poorly endowed groups when trade opportunities arise. As in Anderson and Bandiera (2006) the interaction of predators, whose density in our model is shaped by the mass of infertile territories, and prey is crucial.

Consider a static model where each region produces a single homogeneous good. The good is produced linearly using land quality (i.e. a TFP parameter), which can take values T_R (rich land) or T_P (poor land), and labor by individuals supplied inelastically and normalized to one. There is one to one mapping between regions and individuals so regional and per capita quantities coincide. Without loss of generality we set $T_R = 1$ so relative land quality equals $\frac{T_R}{T_P} = \frac{1}{T_P} > 1$. The size of the rich regions is normalized to 1 and the size of the poor ones is denoted by $\lambda > 0$, so that $\frac{1}{1+\lambda}$ and $\frac{\lambda}{1+\lambda}$ represent the proportion of the rich and the poor, respectively. We abstract from migration between regions.[11] The vector (T_P, λ) characterizes the economy-wide land quality distribution with geographic inequality decreasing in T_P and increasing in λ.

Agents are risk neutral and maximize utility by maximizing income. So, they may sell their regional output at a foreign market if profitable. The price at the foreign market is $p > 1$, where 1 is the normalized domestic price. Trade involves a fixed cost, $\mu < 1$, needed to set up a caravan going to the foreign market. If an agent does not find it profitable to trade, he may challenge those who engage in trade by conducting a raid. Hence, traders face a risk of losing a fraction of their goods in an organized ambush by the poor (the Bedouins in the context of the

[11] This is consistent with historical accounts suggesting that differences in skills specific to agricultural and pastoral activities were a strong barrier to mixing. Nevertheless, the theoretical predictions would remain intact if we were to allow for labor mobility and property rights over land. Doing so, wage income would be equalized across regions but land rents would be higher in the high land quality regions so income inequality between groups would persist.

Arabian peninsula). The greater the density of the latter the more vulnerable are commercial activities. In the context of the theory this relative capacity to avoid predation, shaped by the underlying geographical inequality, is the ultimate determinant of the extent of income redistribution between the interested parties, the nomads and the agriculturalists.

3.2 Trade and Raids

In absence of trade production equals income and a region generates either $y_R = 1$ or $y_P = T_P < 1$. Foreign prices p and the level of land quality determine whether a region trades. For high levels of inequality, i.e., low T_P, poor regions cannot overcome the fixed trade costs and cannot directly profit from trade. The divergent trade opportunities create a conflict of interests between the two groups.

The poor may raid the caravans from those engaging in trade and obtain part of the merchandise by incurring an exogenous cost δ required to organize an ambush and attack. We consider raids to be a collective action as one of the primary features of tribalism is that in a Bedouin society the social unit is the group not the individual, Lewis (1993). The outcome of the raid depends on the strength of the nomads determined by the size of the poorly endowed regions. In particular, the contest function is $f_i(\lambda) \in [0,1]$, where $f_R(\lambda) = 1 - f_P(\lambda)$ and $\partial f_P/\partial\lambda > 0$, determines the share of traded goods for each side after a confrontation.

We model the trade and raid process as a two-stage sequential game where the rich evaluate the profitability of trade conditional on the poors' decision whether or not to raid. Given the possibility of a raid, the rich representative agent would trade if his post-raid income, y_R^T, exceeds his income with no trade, $y_R = 1$:

$$y_R^T \equiv f_R(\lambda)p(1-\mu) > 1. \tag{1}$$

Poor regions may plunder the goods being traded. We assume a raid may occur when caravans are on their way to the trade routes. After a raid the net income of the poor is equal to their residual income after incurring the raid cost, δ, plus the potential booty, both divided equally among them (divided by the size of poor regions, λ). Thus, poor regions will resort to attacking the trade routes if:

$$y_P^T \equiv T_P - \frac{\delta}{\lambda} + \frac{f_P(\lambda)(1-\mu)}{\lambda} > T_P. \tag{2}$$

Equation (1) suggests that trade is more likely to occur when gains from trade are large (higher prices p), and (2) implies that a raid is more probable when the ability of the poor to seize goods during a raid is high (larger λ). The former can be associated to proximity to trade routes and the latter to large proportions of infertile land.

3.3 Redistributive Institution

We now introduce the possibility of a redistributive mechanism, which in the context of Islamic economic rules can be thought of as *zakat*, the moral obligation of *waqf*, or the adoption of egalitarian inheritance rules. Consider a scheme where the rich redistribute a fraction z of their income to the poor. We assume that this transfer takes place prior to trade. The poor would prefer this transfer over the alternative of raiding if:

$$y_P^Z \equiv T_P + \frac{z(1-\mu)}{\lambda} > y_P^T. \tag{3}$$

This gives a minimum redistribution rate accepted by the poor equivalent to:

$$z_{\min} = \max\left\{0; f_P(\lambda) - \frac{\delta}{(1-\mu)}\right\}. \tag{4}$$

The merchants would be willing to pay a transfer if their post-trade income under the redistributive regime is higher than that after a raid:

$$y_R^Z = p(1-z)(1-\mu) \geq y_R^T. \tag{5}$$

This gives a maximum redistribution rate that merchants are willing to pay equivalent to:

$$z_{\max} = 1 - f_R(\lambda). \tag{6}$$

A redistribution scheme becomes feasible when $z_{\max} > z_{\min}$. Inspecting (4) and (6) shows that both $z_{\min}$ and $z_{\max}$ are increasing in λ; that is poor regions in order to refrain from raiding require a larger transfer when their representation increases, and in this case also the rich are willing to offer a larger share of their trade gains. Hence, the degree of redistribution increases as land inequality increases.

3.4 The Role of Islam

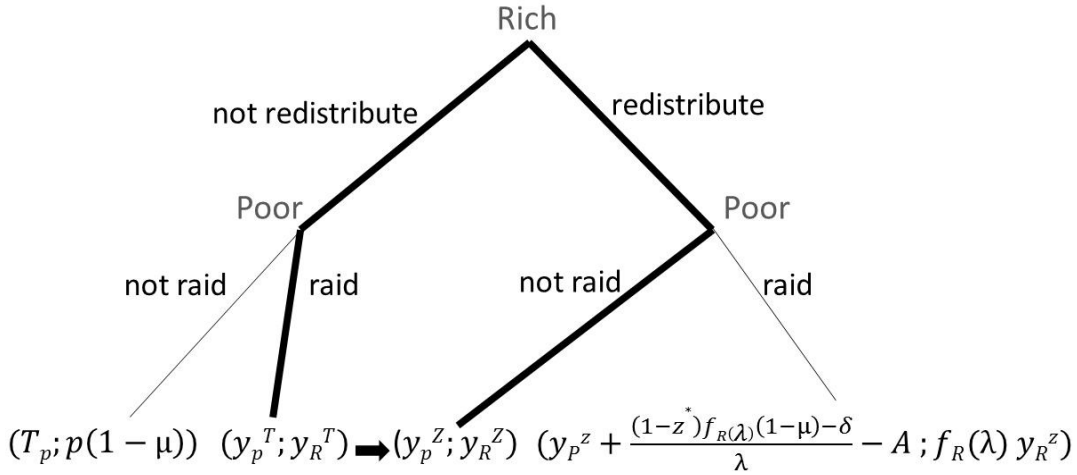
While the previous section explores the appeal of a redistributive contract for the two sides, a simple game-theoretic argument shows that the implementation of such an agreement is far from guaranteed. The following simple two-stage game illustrates the point. Assume that trade and raid are feasible, i.e., inequalities (1) and (2) are satisfied. The sequence of events is as follows: The rich pay the trade cost and choose whether to redistribute before their caravan sets off for trade.[12] The poor then decide whether to raid the rich along the trade routes. The payoffs for each pair of strategies are illustrated in the following matrix where $z_{\min} \leq z^* \leq z_{\max}$

[12] The timing of the zakat transfer and the raid, i.e., whether they take place pre- or post-trade, does not affect the qualitative predictions.

is the implemented redistribution rate:

	Rich trade not redistribute	Rich trade redistribute
Poor: raid	$y_P^T;\ y_R^T$	$y_P^Z + \frac{(1-z^*)f_P(\lambda)(1-\mu)-\delta}{\lambda};\ f_R(\lambda)y_R^Z$
Poor: not raid	$T_P;\ p(1-\mu)$	$y_P^Z;\ y_R^Z$

It is easy to see that the unique subgame perfect Nash equilibrium to such a game is (Not Redistribute, Raid) resembling a prisoner's dilemma interaction where both sides end up in the socially inefficient equilibrium ($y_P^Z \geq y_P^T$, $y_R^Z \geq y_R^T$). This situation illustrates why the pre-Islamic redistribution attempts between tribes in Arabian peninsula, such as the case of *ilaf,* were ephemeral, highlighting the need for a credible commitment device to achieve the socially efficient outcome. This was the role played by Islam as a religion. Indeed, the terms of Muhammad's agreements with the tribes were always the same: the tribe agreed to refrain from attacking Muslims and their allies and to pay the *zakat*, Lewis (1993). In terms of the game above this means adding a cost, A, for deviating from the (Redistribute, Not Raid) equilibrium. We interpret A as the cost of apostasy (i.e., abandoning Islam) or, more general, of deviating from the Muslim law. Islam indeed imposes sanctions for Muslims stealing from other Muslims (the cost A attached to the poor's payoff in the (Redistribute, Raid) outcome). By imposing credible punishments on those who deviated the Muslim law, the cooperative solution (Redistribute, Not Raid) becomes the unique equilibrium outcome which is also Pareto optimal. How the addition of a non-cooperation penalty changes the equilibrium outcome of the game is illustrated in its extensive form below:



The discussion above suggests that the adoption of Islam is more likely in places with substantial inequality in land quality (small T_P), where the majority of the population is nomadic (large shares of low productive land, λ) and trade opportunities are present (large p).

Both intuitively and under a broad class of inequality measures, a distribution characterized by parameters λ and T_P is more unequal the larger is λ and the smaller is T_P. Therefore, in the empirical section we use different indexes of geographic inequality as our main explanatory variable of Muslim representation. To capture regional access to trade we use proximity to historical trade routes.

The aim of the proposed theory is to capture not only the feasibility of a redistribution system in places with large land inequality in the vicinity of trade routes but also to highlight the importance of a centralizing force in achieving the socially efficient outcome. In Section 4.6 we provide evidence that Islam was such a force exploring the distinct pre-colonial institutional and economic arrangements of Muslim groups in Africa.

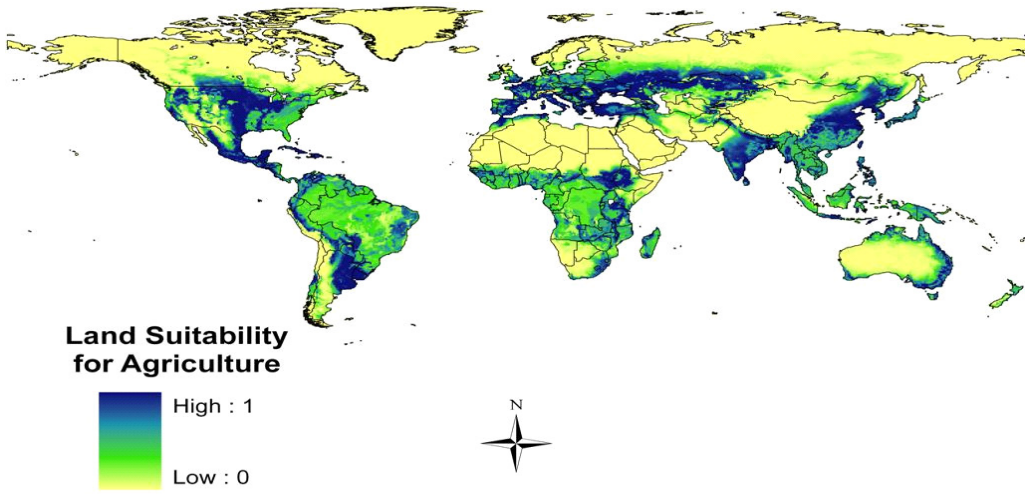
4 Empirical section

4.1 The Data Sources

Given that Islam surfaced at a point in time when land was the single most important input in the production process and in absence of historical data, we use contemporary disaggregated data on the suitability of land for agriculture, to proxy for regional productive endowments. Naturally, fertile areas able to produce a surplus would trade, whereas poorly endowed ones would not be able to do so (see Section 4.6 below on how inequality in land suitability shapes the subsistence pattern across African groups).

The global data on current land quality for agriculture were assembled by Ramankutty, Foley, Norman, and McSweeney (2002) to investigate the effect of the future climate change on contemporary agricultural suitability and have been used by Michalopoulos (2012). This data set provides information on land quality characteristics at a resolution of 0.5 degrees latitude by 0.5 degrees longitude. In total there are $64,004$ observations. Each observation takes a value between 0 and 1 and represents the probability that a particular grid cell may be cultivated. The Appendix discusses in detail the exact formulas used in the construction of the land quality index and the data sources. These raw global data, presented in Figure 1, provide the basis for constructing the distribution of land quality at the desired level of aggregation.

Figure 1: Regional Agricultural Suitability Across the Globe



Using contemporary geographic data to proxy for historical inequality in agricultural endowments presents its own potential pitfalls which merit further discussion. For example, a potential concern is how representative is land quality of the period under investigation. This is because precipitation, temperature and soil properties, which are the basis of this index, may have changed regionally over the last $1,500$ years. Hence, this measure of land quality is a noisy index of what might have been the true distribution of agricultural quality in the past. On the one hand, this measurement error may make it harder to detect a relationship between inequality in agricultural suitability and Muslim adherence. On the other hand, this measurement error could be systematic; the same forces that engineer religious affiliation (modern statehood) may also be associated with human interventions that affect the landscape, generating a spurious relationship. This possibility underscores the need for the analysis to be conducted at a level of aggregation where country fixed effects can be explicitly incorporated. This is the case in our ethnic-group analysis. Another concern is the possibility of reverse causation with Muslims systematically affecting regional land quality. To alleviate concerns related to the possible endogeneity of the soil characteristics and to the extent that climate is less prone to human interventions, we show that results are similar when we use the purely climatic component of agricultural suitability to construct our indexes.

In the cross-country analysis the dependent variable employed is the fraction of Muslims in the population as early as 1900 *AD* at the country level reported by Barrett, Kurian, and Johnson (2001). With respect to the cross-ethnic group analysis the dependent variable is the fraction of Muslims and of other religious denominations within an ethnic group. The data

come from the World Religion Database (WRD) which provides estimates of Muslim adherence in 2005 for an ethnic group within a country.[13] These estimates are derived from the World Christian Database and are subsequently adjusted based on three sources of religious affiliation: census data, demographic and health surveys and population survey data.[14] In absence of historical estimates of Muslim representation at an ethnic group level, we are constrained in using contemporary data. Reassuringly, country-level estimates of Muslim representation derived from the WRD estimates of Muslim adherence across ethnic groups within a country exhibit a correlation of 0.93 with the cross-country estimates of Muslim adherence in 1900 AD.

Information on the location of ethnic groups' homelands is available from the World Language Mapping System (WLMS) database. This data set maps the locations of the language groups covered in the 15th edition of the Ethnologue (2005) database. The location of each ethnic group is identified by a polygon. Each of these polygons delineates the traditional homeland of an ethnic group; populations away from their homelands (e.g., in cities, refugee populations, etc.) are not mapped. Also, the WLMS (2006) does not attempt to map immigrant languages. Finally, ethnic groups of unknown location, widespread ethnicities (i.e., ethnic groups whose boundaries coincide with a country's boundaries) and extinct languages are not mapped and, thus, not considered in the empirical analysis. The matching between the WLMS (2006) and the WRD is done using the unique Ethnologue identifier for each ethnic group within a country.[15] Distance to trade routes is calculated between the centroid of the relevant unit of analysis (a country or an ethnic group) and the closest historical trade route or principle port in 600 AD or 1800 AD. The location of trade routes is outlined in Brice and Kennedy (2001).

Finally, we combine anthropological information on African ethnic groups from Murdock (1967) with the Ethnologue (2005) enabling us to examine the pre-colonial societal and economic traits of Muslim groups.

[13] WRD classifies as Muslims the followers of Islam in its 2 main branches (with schools of law, rites or sects): Sunnis or Sunnites (Hanafite, Hanbalite, Malikite, Shafiite), and Shias or Shiites (Ithna- Ashari, Ismaili, Alawite and Zaydi versions); also Kharijite and other orthodox sects; reform movements (Wahhabi, Sanusi, Mahdiya), also heterodox sects (Ahmadiya, Druzes, Yazidis), but excluding syncretistic religions with Muslim elements, and partially-islamized tribal religionists.

[14] Hsu, Gibbon, Hackett, and Reynolds (2008) show that the country level estimates for Muslim representation in WRD are highly correlated (above 0.97) with similar statistics available from World Values Survey, Pew Global Assessment Project, CIA World Factbook, and the U.S. Department of State. At the ethnic group level there are no comparable statistics.

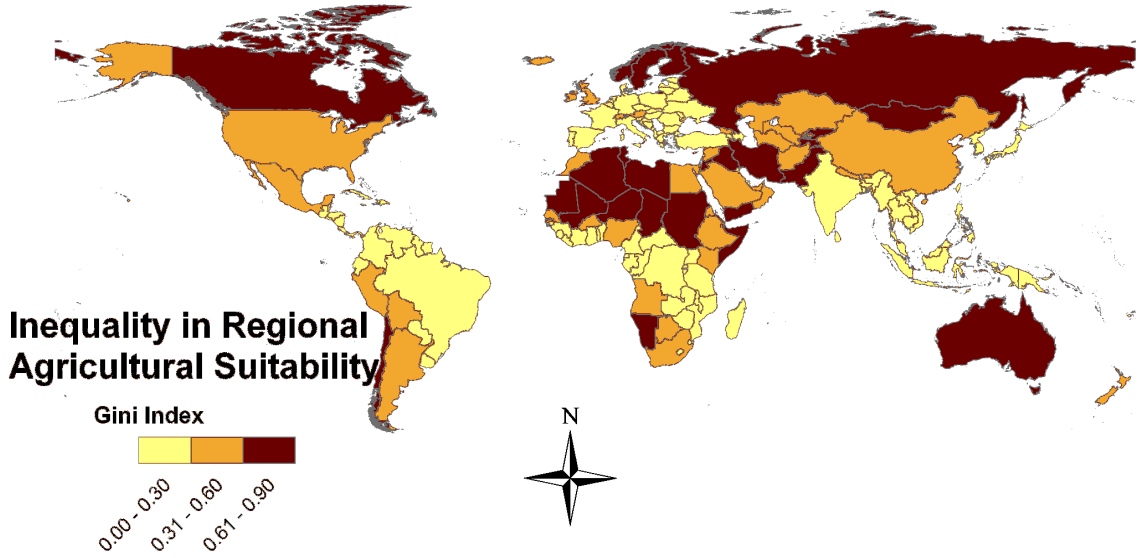
[15] For some language groups in WLMS (2006) the WRD offers information at the subgroup level. In this case the religious affiliation is the average of the subgroups' affiliations.

4.2 Cross-Country Analysis

We start by investigating the relationship between geographic inequality and Muslim adherence across modern-day countries. Using current countries as the unit of analysis has the advantage that we can employ data on Muslim representation that date back to 1900 AD. We use the global data on the suitability of land for agriculture to construct the Gini coefficient of regional productivity across countries. The prediction is that states featuring few pockets of fertile land and a majority of infertile areas, i.e. a higher λ and/or lower T_P in the context of the theory, would find in Islam an attractive set of rules which would bridge the divergent interests of the underlying tribal populations.

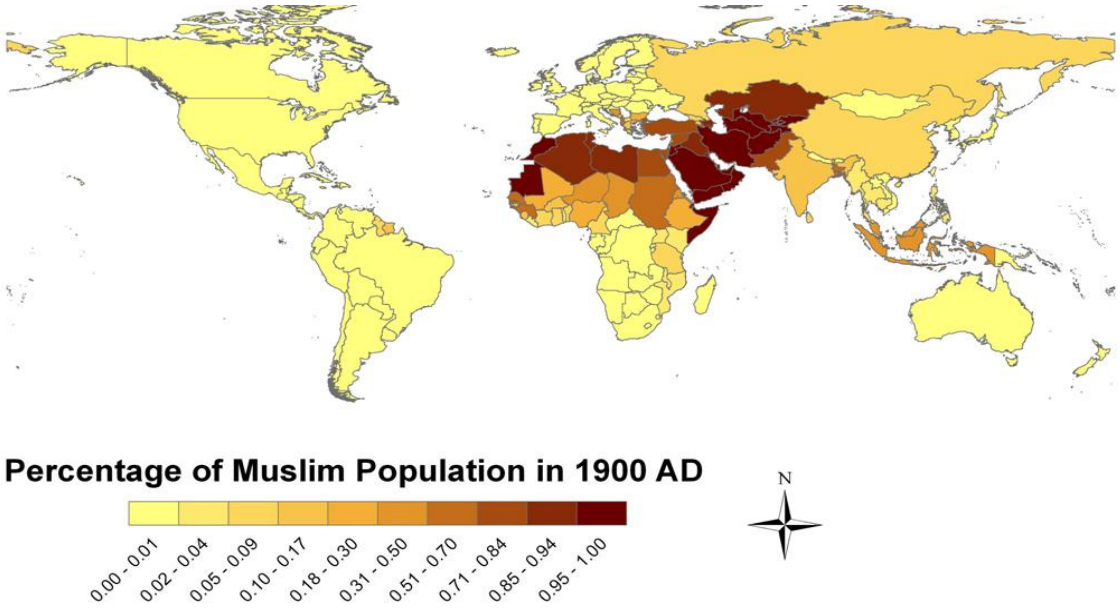
Regional observations for suitability of land for agriculture within a country extend from a single observation for Monaco to 12,279 for Russia. The median is 82. Figure 2*a* shows the variation in the Gini coefficient of regional agricultural suitability across countries. The descriptive statistics and the raw correlations between the variables of interest are presented in Tables 1 and 2, respectively.[16] A typical country has a Gini index of land inequality of 0.35 whereas in 1900 AD an average country had about 27% of Muslims (see Figure 2b). These two variables have a correlation of 0.52.

Figure 2*a*: Inequality in Regional Suitability for Agriculture Across Countries



[16] The Gini index of land quality is skewed. Thus, in the regressions below we use its natural log.

Figure 2*b*: % of Muslim Population in 1900 Across Countries



The proposed theory focuses on the endogenous adoption of Islam. However, when countries from the New World joined the transatlantic trade the indigenous populations were severely disrupted and replaced by European colonizers, see Acemoglu, Johnson, and Robinson (2002). Our focus, therefore, is on the Old World.[17]

To estimate the role of geographic inequality and proximity to trade routes on Muslim adherence we adopt the following LS specification:

$$\%\ \text{Muslim } 1900_i = \gamma_0 + \gamma_1 \text{Land Inequality}_i + \gamma_2 \text{Distance to Trade Routes}_i + \boldsymbol{\gamma}_3 \mathbf{X}_i + \nu_i \quad (7)$$

where % Muslim 1900_i is the fraction of the population adhering to Islam in 1900 AD.[18] In column 1 of Table 3 we include as only regressor the inequality in land endowments. It enters with the expected positive sign wielding significant explanatory power. Variation in country-level land inequality captures 23% of the variation in Muslim representation as of 1900 AD. A one-standard-deviation increase in the Gini index of land quality increases the fraction of Muslims by a sizeable 19%. In column 2 we add the distance of a country's centroid from the closest pre-Islamic (600 AD) trade routes. The latter enters with the expected negative coefficient. The estimate suggests that a country 1,000 kilometers further from pre-Islamic trade routes will have 8% fewer Muslims.

[17] Including the New World shows that geography plays virtually no role in shaping Muslim adherence across groups in the New World. At any rate Muslim adherence in the latter is negligible.

[18] We focus on countries with at least 20 regional observations of land quality to ensure that our findings are not driven by countries with limited regional coverage. Using as dependent variable the Muslim representation as of 2000 the coefficients of interest are larger and more precisely estimated. Presumably this is because earlier estimates of religious affiliation are bound to be measured with noise.

In column 3 we add continental dummies and control for a series of geographical characteristics to assuage concerns related to omitted variable's bias.[19] In particular, we control for average land quality, distance to Mecca, absolute latitude, distance to the coast and average elevation. We also control for the distance to the nearest border of a Muslim empire. To construct the latter we follow Black (2005) and identify the regions that have been dominated by the Umayyads, Abassids, Karakhanids, Ghurids, Ghaznavids, Mughals, Ottomans, Mamluks, Seljuks, Timurids, Fatimids, Almoravids and the Almohads (illustrated in Figure 3*a*) and calculate the distance of each country and ethnic group from the closest Muslim border. Note that territories within a Muslim empire get the value of 0. Adding these controls decreases the estimated coefficient on geographic inequality which remains highly significant, but it increases substantially the standard errors of the distance to 600 AD trade routes making it insignificant. This is partly an outcome of the high correlation between the distance measures (distance to Mecca, to 600 AD routes and distance to Muslim empires).

The proposed theory identifies the geographic conditions under which Islamic principles would be adopted from indigenous populations. However, groups of people coming under the direct rule of a Muslim empire might face other incentives for converting to Islam, see Chaney (2008) and Bulliet (1979). For example, the lower tax rates granted to Muslims over non-Muslims within Muslim Empires or the status achieved by switching to the ruler's religion might differentially affect conversion rates. Likewise, instances of forced conversion, religious persecution during the Muslim expansion, or Arab migration movements within the Muslim empires might have shaped the observed religious affiliation. To mitigate such plausible concerns we limit the analysis to countries (and later ethnic groups) that have not been under the direct rule of a Muslim empire (excluding the shaded regions in Figure 3*a*).

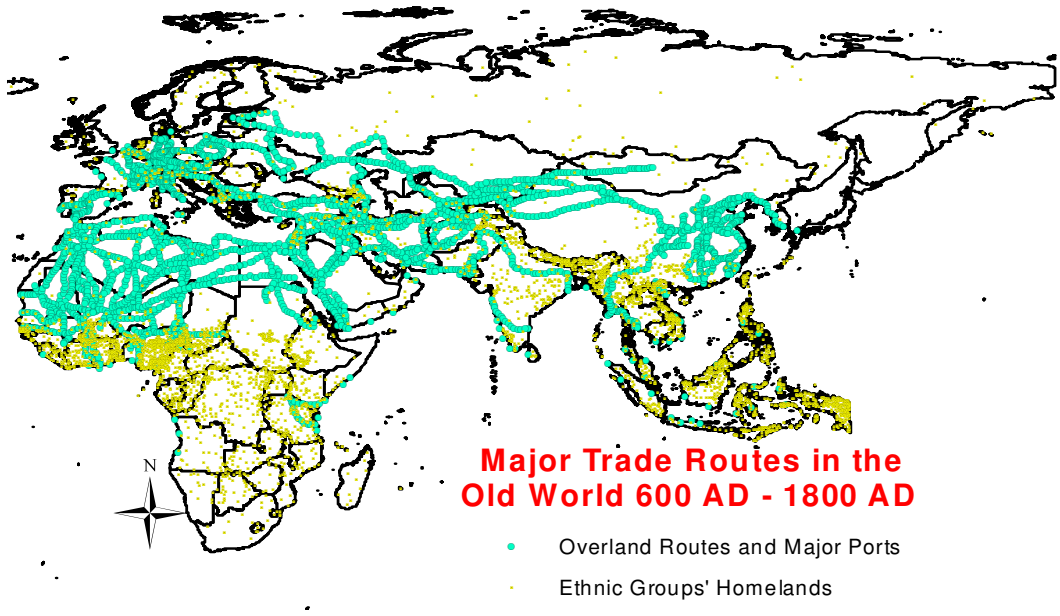
Column 4 focuses on this subset of countries. The estimate on the land inequality index remains unchanged whereas the distance to pre-Islamic trade routes regains significance. The negative coefficient on the distance to a Muslim empire is consistent with the diffusion hypothesis. In column 5 we add the interaction between land inequality and distance to trade routes. This is meant to capture the implications derived in our theoretical framework, i.e., unequal geography *in presence of* trade opportunities induces Muslim adherence. The interaction between distance to trade routes in 600 AD and land inequality has the expected negative sign but it is insignificant at conventional levels, whereas the direct effect of trade is negative and significant. The insignificance of the interaction term is possibly due to the low number of observations together with the fact that in 600 AD only very few trade routes existed outside the borders of

[19] We follow the World Bank regional classification and assign indicators for countries in Sub-Saharan Africa, East Asia and the Pacific, South Asia, Western Europe, North Africa and Middle East and Eastern Europe and Central Asia.

the greater Muslim empires. Therefore, in column 6 we use distance to trade routes as of 1800 AD (see Figure 3*b*). Note that using trade routes created between 600 AD and 1800 AD the direct effect of trade-routes proximity on Muslim representation may reflect reverse causality. Nevertheless, irrespective of who set up these trade routes unequally endowed places closer to trade routes would be differentially impacted. Indeed, the negative coefficient of the interaction term now becomes highly significant. This is in line with the hypothesis that Islamic principles were well suited for tribal populations residing across productively unequal territories facing trade opportunities. Finally, average elevation enters with a negative sign in both columns 5 and 6. This is an intuitive finding given that Muslims controlled the preindustrial trade routes between Asia and Europe and the latter were more likely to cross low elevation terrains. Additional geographical controls like: average land quality, the distance from the equator, and distance to the coast do not systematically correlate with Muslim adherence.

Figure 3*a*: Regions Dominated by Muslim Empires in the Old World

Figure 3*b*: Pre-industrial Trade Routes in the Old World



4.3 Cross-Ethnic-Group Analysis

The evidence presented above points to a strong correlation between geographic inequality, trade opportunities and Muslim representation across countries. However, the spread of Islam is a historical process that took place mainly before the formation of modern states. Consequently, using countries as the unit of analysis is subject to the criticism that what we may identify is not a causal link between geography and the adoption of Islam but the fact that modern political boundaries, for example those imposed by European colonizers after the fall of the Ottoman empire, shaped the observed unequal distribution of land endowments across Muslim countries. Also, the very individual histories of modern day countries have largely engineered both their current borders as well as the composition of religious shares by promoting or demoting religious uniformity.

In order to overcome these issues we investigate empirically the role of geography and proximity to trade routes in shaping Muslim representation across ethnic groups within countries. Establishing that, conditional on country-specific characteristics, ethnic groups residing along unequal agricultural endowments close to preindustrial trade routes sustain larger Muslim populations will greatly enhance the validity of the proposed hypothesis and alleviate any concerns related to the border and country formation inherent to any cross-country analysis.

Figure 4*a* shows the traditional homelands of two ethnic groups in Ethiopia. The Amhara occupy the northern part whereas in the southwestern part of current day Ethiopia the Somali

people are located. Figure 4*b* illustrates the regional land quality within each of these two ethnic groups. The green colored regions are those with at least 10% of agricultural potential whereas the yellow colored ones are below this threshold. Amharic areas are characterized by uniformly fertile lands with an estimated Gini index of land quality $Gini_{Amhara} = 0.13$. On the other hand, 72% of Somali's homeland is dominated by agriculturally poor regions dotted with few pockets of fertile land, $Gini_{Somali} = 0.62$. According to the WRD, the Somali group is 100% Muslim in 2005 whereas within the Amhara only 1% is adhering to Islam.

Figure 4a: Location and Muslim Representation in Ethiopia
The Case of the Amharic and Somali Ethnicities

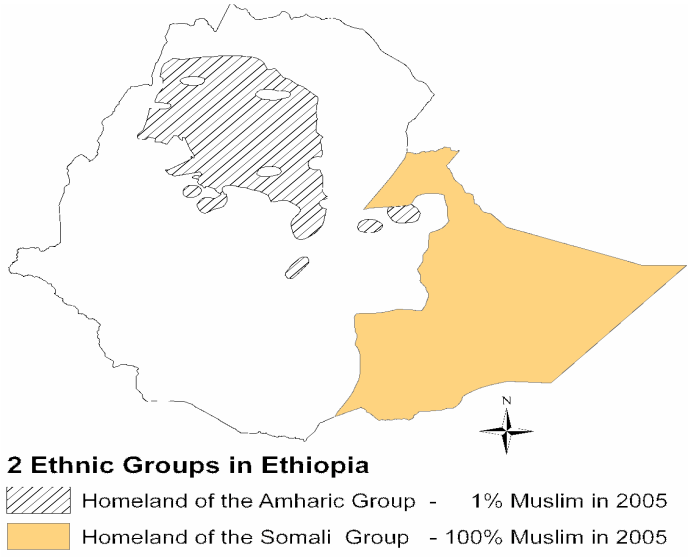
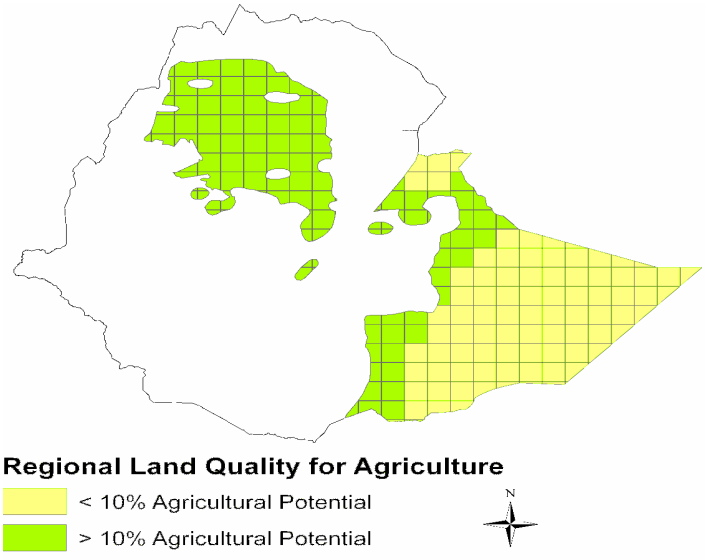


Figure 4b: Regional Land Quality across Groups in Ethiopia
The Case of the Amharic and Somali Ethnicities



4.4 Results

Table 4 presents the summary statistics of the variables employed in the cross-ethnic-group analysis which excludes ethnic groups of the New World.[20] An average ethnic group in the Old World has 25% of its population adhering to Islam in 2005 and a Gini coefficient of land equality of 0.19. Similar to the cross-country analysis we have constructed several distance measures to account for the spatial diffusion of Islam. An average ethnic group is 4,630 kilometers from Mecca, 1,630 kilometers from the frontier of Muslim empires and 1,230 kilometers from trade routes in the 600 AD. Table 5 shows the raw correlations among the variables of interest. Muslim representation at an ethnic group is positively related to the degree of inequality in the regional suitability for farming (0.30) and negatively related to its distance to Mecca (−0.24) and its distance to the trade routes in 600 AD (−0.09). The two main differences between the cross-country and the cross-ethnicity analysis is that in the latter we use Muslim representation as of 2005 AD (instead of 1900 AD) and that we include country fixed effects. Hence, the following specification is adopted:

$$\%\text{ Muslim in } 2005i = \beta_0 + \beta_1 \text{Land Inequality}_i + \beta_2 \text{Distance Trade Routes}_i + \beta_3 \delta_c + \boldsymbol{\beta}_4 \mathbf{X}_i + v_i, \tag{8}$$

where δ_c represents the country-specific constants.[21]

Across all specifications of Table 6 we include country fixed effects. This allows to take into account any systematic time-invariant element related to the state histories of existing countries and, thus, produce reliable estimates of the effect of geographic inequality and distance to trade routes on Muslim adherence. The pattern uncovered in the cross-country analysis resurfaces in the cross-ethnicity one. Exploiting within-country variation in column 1 of Table 6 shows that ethnic groups with large Muslim adherence in the Old World consistently exhibit higher levels of inequality in agricultural endowments. A one-standard-deviation increase in the log Gini coefficient increases the fraction of the Muslim population of an ethnic group by 6%. In column 2 the coefficient on the distance to the 600 AD trade routes is negative and highly significant suggesting that within countries today, groups that are closer to pre-Islamic routes experience a significant boost in their Muslim populations.

In column 3 we add a series of controls to account for alternative hypotheses that have been proposed in the literature. The coefficient on land inequality declines somewhat but remains precisely estimated. Similar to the cross-country pattern the coefficient on distance

[20] We focus on ethnic groups with at least 5 regional land quality observations. Using all ethnic groups does not change the results.

[21] The results presented here are OLS estimates with the standard errors clustered at the country level.

to 600 AD trade routes declines substantially but remains both economically and statistically significant. A one-thousand-kilometers increase in the latter is associated with a decline of Muslim population of 9%. This is in line with the argument that historians of Islam have proposed. Following the demise of the Persian empire in the 7^{th} century Muslims came to dominate the pre-existing trade routes. Hence, local populations had an incentive to convert to Islam in order to take advantage of the expansive Muslim trade network. Distance from the borders of the Muslim empires and distance from Mecca, although with the expected negative sign, are not significant at conventional levels.

In column 4 of Table 6 we limit the analysis to groups whose homelands have not been historically under the direct rule of a Muslim empire. Such restriction produces a sample of $1,419$ groups. The coefficient on land inequality is unchanged and, interestingly, distance to trade routes, average land quality, and mean elevation gain a notable strength in explaining Muslim representation. Similar to the cross-country analysis, adding in column 5 the interaction between distance to trade routes in 600 AD and inequality in land endowments enters with a negative sign but it is insignificant. Nevertheless, using the trade routes as of 1800 AD in column 6 to capture preindustrial trade opportunities the interaction term becomes statistically significant. This is consistent with the proposed hypothesis that it was close to trade routes that groups characterized by unequal geographies had the incentive to adopt Islam. In fact, the coefficients suggest that the impact of land inequality on Muslim affiliation becomes insignificant for groups further than $1,180$ kilometers from 1800 AD routes (this is the case for 8% of the sample).

One might argue that the identified relationship between geography and Muslim adherence is not particular to the Muslim religion but it may either be a feature of all monotheistic religions or an outcome of some other major religion following the opposite geographic pattern. We tackle this issue by asking whether the "Islamic" geography is systematically associated with other major religions. In tables $7a$ and $7b$ we present the summary statistics and correlations between the different religious affiliations. For comparability purposes in column 1 of Table $7c$ we use as a dependent variable the fraction of Muslims (essentially replicating column 4 of Table 6). In columns 2, 3 and 4 we use as a dependent variable the percentage of people within an ethnic group adhering to 3 other major religions i.e., Christianity, Hinduism and Buddhism, respectively. Lastly in column 5 we use the fraction of people adhering to local animistic, or shamanistic religions, that is, ethnoreligionists. Neither Christians nor Hindus are systematically found along unequal land endowments whereas Buddhists, like Muslims, are more likely to be found along agriculturally unequal territories farther from pre-Islamic trade routes, nevertheless. It is interesting to note that the local tribal denominations follow the op-

posite geographic pattern compared to Muslims. Our interpretation is that when Islam spread, the ethnic groups that maintained their local tribal religions had exactly the type of geographic endowments (relatively uniform distribution of agricultural potential) that were not conducive to the adoption of the Islamic principles, whereas those residing along more unequally endowed regions endogenously adopted the Islamic economic principles. These findings uncover the so-far neglected crucial role of geographical inequality and trade-routes proximity in shaping the differential adherence to Islam across ethnic groups and shed new light on the geographical origins and spatial distribution of Muslims within modern day countries.

In the next section we show that the patterns established are robust to alternative measures of Muslim representation, indexes of geographic inequality and measures of land fertility.

4.5 Robustness

This section addresses the robustness of the results obtained at the cross-ethnic-group level.[22] The columns of Table 8*c* replicate column 1 of Table 6 using alternative dependent and independent variables. Specifically, in column 1 we use as a dependent variable a dummy equal to one for ethnic groups with a Muslim majority. The remaining four columns instead address the sensitivity of our results to the choice of the land inequality index. In columns 2 and 3 we use the Mean Logarithmic Deviation and the Theil index, respectively, to proxy for degree of geographic inequality.

We further test the robustness of our results by constructing two additional land inequality measures separating the climatic and soil components of land productivity. The former being less amenable to human intervention than the latter. One concern could, in fact, be that land productivity, in particular its distribution, may be affected by the specific civilization living in the area, therefore introducing a problem of reverse causality regarding the link between land inequality and Muslim representation. Also, the mere fact that human action can alter land productivity could lead to measurement errors and therefore to imprecise estimates of land inequality on Muslim adherence. To this end, in columns 4 and 5 we use as inequality measures the Gini index of climate productivity and the Gini index of soil productivity, respectively. Across all specifications the inequality measures as well as the distance to trade routes enter with the expected signs and are strongly significant highlighting the robustness of the uncovered pattern.

[22] Tables 8*a* and 8*b* present the summary statistics and the correlation structure of the variables used in the robustness section.

4.6 African-Ethnic-Groups Analysis

So far the analysis has uncovered a robust link between geography, trade-routes proximity and Muslim adherence. However, it does not shed light on the mechanism behind this empirical pattern. This section provides evidence consistent with the building blocks of our hypothesis. In particular, we utilize anthropological information on pre-colonial, ethnicity-specific traits to explore how an unequal geography shapes the economic and societal arrangements of African ethnicities giving rise to Muslim representation. Limiting the analysis to African groups allows us to focus on a region where trade is known to have played a critical role in the voluntary spread of Islam and because recent research shows that ethnicity is the relevant unit of analysis for understanding African institutional and economic development, see Michalopoulos and Papaioannou (2012). Nevertheless, it is useful to keep in mind that the patterns shown below are not specific to African ethnicities. Regressions including all groups in the Old World deliver similar results (available upon request).

Murdock (1967) produced an Ethnographic Atlas (published in twenty nine installments in the anthropological journal Ethnology) that coded around 60 variables, capturing cultural, societal and economic characteristics of 1, 270 ethnicities around the world. We linked Murdock's Ethnographic Atlas African groups to the Ethnologue's linguistic homelands. The two sources do not always use the same name to identify a group. Utilizing several sources and the updated version of Murdock's Atlas produced by Gray (1999), we matched 522 ethnicities from the Ethnographic Atlas to 968 linguistic homelands in the Ethnologue (2005). Similar to the cross-ethnic group analysis in Section 4.4 we focus on groups with at least 5 regional land quality observations. The summary statistics and correlations between the variables used are presented in Tables 9*a* and 9*b*. Using this all-African sample we show the following.

First, we evaluate how land inequality, distance to trade routes and their interaction shape Muslim representation. This is done by means of LS, controlling for average land quality with standard errors clustered at the country level. The results are shown in Table 10. Column 1 introduces the Gini in land quality and distance to trade routes in 1800 AD.[23] Both estimates including average land quality enter significantly with the expected signs. Quantitatively, the results are larger than the corresponding ones in the full sample of ethnicities: a one-standard-deviation increase in log land inequality increases Muslim representation by 9%, while an ethnic group 500 kilometers closer to the routes (roughly one standard deviation) increases its Muslim adherence, ceteris paribus, by 18%. Note that in column 2 adding a full set of 48 country fixed effects decreases the magnitudes of the coefficients moderately but does not change their

[23] Since no major trade routes passed through Africa on the eve of Islam (600 AD), we use trade routes as of 1800 AD.

statistical significance. The interaction term in column 3 enters negatively, as expected, and is highly significant. The estimated coefficients suggest that geographic inequality is no longer significantly correlated with Muslim representation for groups further than 1,140 kilometers from trade routes. The pattern is robust to controlling for country fixed effects in column 4. The significance of both proximity to trade routes and its interaction with land inequality is consistent with our historical narrative on the spread of Islam in Africa, particularly the case of the Mali empire (see case studies below).

In Table 11 we investigate how geography shapes the production structure of an ethnic group. In column 1 the dependent variable is the percentage of pre-colonial subsistence from animal husbandry. Groups endowed with unequal geographic endowments derive a larger share of their subsistence from pastoralism. Column 2 shows the opposite is true for the share of subsistence from agriculture. Finally, in column 3 we take the ratio of pastoral vis a vis agricultural dependence confirming the pattern shown in the first two columns (the introduction of country fixed effects in column 4 does not alter the results). These findings corroborate a key assumption of the theory provided, namely the fundamental role of an unequal geography in producing a distribution of activities skewed towards pastoralism featuring few pockets of surplus-producing agricultural regions. Finally, in columns 5 and 6 we show that indeed African Muslim communities are predominantly pastoral.

One additional building block of the proposed hypothesis is that an unequal geography sows the seeds of an economically unequal society. Thanks to Murdock's (1967) Atlas we can test this assumption. Column 1 in Table 12 shows that inequality in land endowments across groups harbors heterogeneous economic opportunities leading to the emergence of economically stratified societies. One-standard-deviation increase in geographic inequality increases the probability that a group will be stratified by 12%. A key prediction of our model is that Muslim communities mitigate the impact of land inequality on economic "social" inequality. To investigate whether this is the case in columns 2 and 3 we split the sample between Muslim and non-Muslim groups, respectively. Unlike non-Muslim groups, for which the association between geographic and social inequality is strong the tendency of an unequal geography to breed social inequality within a group is muted for Muslim-majority ethnicities. Columns 4, 5 and 6 replicate the first 3 columns adding country fixed effects without affecting the pattern.

But what type of economic traits characterize Muslim communities? As reviewed in Section 2.2 Islamic doctrine prescribes an array of redistributive economic principles. Unfortunately data on the extent of charity or usury laws within a group are not available; however, there is evidence on the type of the pre-colonial inheritance system that Kuran (2003, 2004) among others have stressed as a key aspect of Islamic economic principles. The dependent

variable in columns 1 and 2 of Table 13 is a dummy that takes the value 1 when the inheritance of movable property is "equal or relatively equal" or when there is "absence of inheritance", whereas in columns 3 and 4 the dependent variable is the presence of equal inheritance with respect to land property. The estimates in columns 1 and 3 suggest that groups whose majority adheres to Islam are 34% and 24% more likely to have equal inheritance rules regarding movable and land property, respectively.[24] Again the introduction of country fixed effects in columns 2 and 4 does decrease the magnitude of the coefficients which remain statistically and economically significant.

The evidence presented so far points to the importance of geography in shaping the productive and social traits of Muslim groups; nevertheless, one may wonder why a group needs to adopt a religion rather than just the appropriate economic principles. Such a question is vast in its scope and a comprehensive answer cannot be provided within the confines of the present study. Nonetheless, we have already alluded to the importance of the Islamic religion as a coordination device. Is this facet of Islam evident in the anthropological record? Fortunately, among the pre-colonial traits recorded by Murdock (1967) there is an entry describing whether a group believes or not in gods that are supportive of human morality. Anthropologists and evolutionary biologists (Swanson (1960); Alexander (1987)) argue that the belief in moralizing gods, that is, gods who tell people what they should (not) do, was necessary to keep societies together by condemning infringements on other group members. Subsequent studies (Peoples and Marlowe (2012); Roes and Raymond (2003)) have shown that the presence of moral gods in historical societies is associated with intensive competition for resources, high threat of free-riding, and collective-action problems. Similarly, we argue that the presence of an unequal geography and trade opportunities intensified the need for cooperation among heterogeneous clans. Such cooperation could be achieved by adopting a religion which besides the appropriate economic rules would also provide a coordination mechanism penalizing those deviating from the prescribed norms.[25] With this in mind in Table 14 we regress whether a group believes in moral gods on Muslim representation. The coefficient in column 1 suggests that a 50% increase in Muslim adherence within a group (close to one standard deviation) increases the likelihood that the group believes in gods that dictate what should (not) be done by 40% uncovering the importance of Islam as a commitment device. In column 2 adding country fixed

[24] Note that since we do not have data on the institutional and societal traits of a group before its Islamization one cannot rule out the possibility that groups that became Muslim already had societal characteristics similar to the ones prescribed by the Muslim doctrine.

[25] Alexander (1987) notes that the effective way to impose moral rules on society members is to have these rules prescribed by gods. This is because divine moral rules convincingly portrayed as imposed by impartial gods without material interests are superior to those imposed by humans since the latter invite the suspicion that some members of the group will profit disproportionately. Additionally, gods are often considered immortal, so their rules may last for many generations.

effects the coefficient declines somewhat but remains economically and statistically significant. In columns 3 and 4 of Table 14 we use as independent variables the share of Christians and Ethnoreligionists within a group, respectively. The negative coefficients suggest that groups characterized by higher representation of either of these two creeds are less likely to have harbored beliefs in a moralizing god in the pre-colonial period.

The narrative suggests that Islam by appropriately crafting its economic principles attempted to bring together heterogeneous tribal societies. But was it successful in doing so, i.e., is there evidence that Muslim groups are more politically centralized than non-Muslim ones? The last two columns of Table 14 suggest this to be the case. The dependent variable is the number of jurisdictional layers beyond the local community, an index that has been used to capture pre-colonial state capacity at the ethnic level, see Michalopoulos and Papaioannou (2012) and Fenske (2012). Comparing a group without any Muslim representation to a fully Islamic one increases the jurisdictional levels within the group by half a standard deviation. This correlation is suggestive of Islam's state-building capacity providing evidence consistent with the idea that Islam was successful in gaining a hearing across tribal populations politically integrating them into more centralized units.

4.7 Case Studies

Conversion to Islam by groups through social and political action is most notable across Africa and Southeast Asia. Levtzion (1978). In this section we discuss the conversion to Islam in the Mali empire and in the Malay Archipelagos.

The Spread of Islam in the Mali empire The voluntary adoption of Islam in the birth and development of the Mali empire after the collapse of the Ghana empire kingdom is a historical example consistent with our hypothesis. The Mali empire thrived in the western part of the Sahel, the African biogeographic zone where Sahara desert and savannas meet. This region includes parts of today's Ghana, Mali, Mauritania and Senegal, featuring few pockets of arable land.

At the end of the first millennium AD, natural resources such as gold and salt helped the Ghana empire achieve a primal position in the area by satisfying the increasing demand from the northern African empires, in particular the Almoravids, Chu and Skinner (1965). The Ghana Empire started disintegrating in the 11^{th} century due to repeated attacks by the nomadic tribes located in the northern part of Ghana attempting to gain control of the lucrative trade routes linking North Africa with Ghana, Goucher, Leguin, and Walton (1998).

The socioeconomic conditions in the beginning of the Mali empire were similar to those prevailing in the 7^{th} century Arabian peninsula. It was under tribal feuding and trade opportu-

nities that Islam started gaining a hearing across the diverse tribal populations residing along unequally endowed regions. Specifically, it was trade contact with the Almoravids and other Muslim tribes that introduced Islam to the indigenous. After more than a century of conflict around 1235 AD the Muslim king Sundiata founded the Mali Empire. Islamic adherence increased in the subsequent decades and in 1312 AD, at the apex of Mali Empire, Mansa Musa became the first truly devout Muslim Mali emperor. Mansa Musa gathered fame for his efforts to make Islam the religion of the nobility, the establishment of several universities and mosques, and the further development of trade, Stride and Ifeca (1971). Contemporaneous chronicles associate the increasing spread of Islam in the Mali Empire with the successful unification of the indigenous tribes. Moreover, these chronicles refer to the population of the Mali Empire as "seldom unjust, with greater abhorrence of injustice than any other people", and also document the security that inhabitants and travelers felt, Battuta (1929).

The Spread of Islam in the Malay Archipelagos Historical accounts regarding the spread of Islam in the Malay and Indonesian Archipelagos paint a picture similar to the case of the Mali empire, see Hirth and Rockhill (1911). The strategic location of the Malay Archipelago, which sits in the middle of the China-India trade route, had helped in the development of trade in the region. The decline of the powerful Srivijaya kingdom in the 13^{th} century crippled the trade routes of the time. It was during this period of heightened local feuding and foregone trade opportunities that Islam made its way to Sumatra spreading through contacts with Arab and Indian traders. By the late 13^{th} century, the kingdom of Pasai in northern Sumatra converted to Islam whereas the history of Islam in Malacca began almost a century later when a prince of Srivijaya origin, Parameswara, converted to the religion by an Arab scholar from Mecca. Adoption of Islam was followed by a reinvigoration of the trade routes.

5 Conclusion

This research sheds new light on the role of trade and geography in the spread of Islam. Constructing detailed data on the distribution of land quality and distance to trade routes the empirical analysis uncovers that Muslim societies are located closer to pre-Islamic trade routes and are characterized by high inequality in the regional suitability for agriculture. These findings offer empirical support to claims that prominent Islamic scholars including Lapidus (2002), Berkey (2003) and Lewis (1993), have made regarding the role of trade as well as the distinctive geography of regions associated with the birth and the expansion of Islam.

The analysis is conducted across countries and across ethnic groups. Exploring within country variation in Muslim adherence mitigates a host of concerns related to cross-country

regressions. Such issues are particularly pressing in our context given the intimate relationship between country formation and religious denomination. Across both levels of aggregation, the link between geographic inequality, proximity to trade routes and Muslim representation is robust to employing different sources of Muslim adherence, constructing alternative indexes of land inequality as well as distance measures to pre-Islamic and pre-industrial trade routes. The identified pattern is unique to the Muslim denomination and it obtains for ethnic groups that historically have not been part of a Muslim empire. Overall, the empirical analysis highlights the prominent role of trade and geography in the spread of Islam after the age of conquests.

We discuss the possible mechanisms via which geographic inequality facilitated the rise and spread of Islam and provide a simple theoretical framework. We argue that the unequal distribution of land endowments conferred differential gains from trade across regions, fostering predatory behavior from the poorly endowed ones. Cooperation among the tribal heterogeneous communities was necessary for trade to survive. We argue that Islam emerged as a centralizing force featuring economic principles that entailed redistribution to the poor in exchange of security for the trading caravans of the richer clans. The conjecture that Islamic economic traits arose from the interaction between geographic inequality and trade opportunities implies that Islam would spread more successfully among unequally endowed regions close to trade routes. The latter pattern holds true in the data.

A final noteworthy feature of this study is a tentative exploration of the pre-colonial economic and societal arrangements of African Muslim groups. We show that ethnicities characterized by unequal land endowments are more likely to be socially stratified. Nevertheless, the link between geographic and social inequality is weakened considerably among Muslim groups. Moreover, Muslim societies are more likely to have equitable inheritance rules, as the Islamic doctrine would dictate. These findings are consistent with the conjecture that geography is a key determinant of a society's productive and social structure and that Islam, with its redistributive principles aiming at limiting the social inequalities, found eager followers across such territories.

We view these findings as a stepping stone for further research. For example, having identified the forces behind the formation of Islamic economic doctrine one might examine the economic consequences on the short-run and the long-run development of Muslim societies in the preindustrial world. Could it be that the very Islamic economic principles allowing the Muslim lands to escape from a state of constant feuding subsequently hindered the potential for growth in the eve of large-scale shipping and industrialization? We plan on tackling some of these issues in subsequent research.

References

Acemoglu, D., S. Johnson, and J. A. Robinson (2001): "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91(5), 1369–1401.

——— (2002): "Reversal Of Fortune: Geography And Institutions In The Making Of The Modern World Income Distribution," *Quarterly Journal of Economics*, 107(4), 1231–1294.

Alexander, R. D. (1987): *The Biology of Moral Systems*. Aldine de Gruyter, New York, NY.

Anderson, J. E., and O. Bandiera (2006): "Traders, Cops and Robbers," *Journal of International Economics*, 70(1), 197–215.

Aswad, B. C. (1963): "Social and Ecological Aspects in the Origin of the Islamic State," *Papers of the Michigan Academy of Science, Arts and Letters*, 48, 419–442.

Barrett, D. B., G. T. Kurian, and T. M. Johnson (2001): *World Christian Encyclopedia, 2nd Edition*. Oxford University Press.

Barro, R., and R. M. McCleary (2003): "Religion and Economic Growth Across Countries," *American Sociological Review*, 68, 1.

——— (2006a): "Religion and Economy," *Journal of Economic Perspectives*, 20(2), 49–72.

——— (2006b): "Religion and Political Economy in an International Panel," *Journal for the Scientific Study of Religion*.

Battuta, I. (1929): *Travels in Asia and Africa 1325-1354*. translated by Sir Hamilton Gibbs. Routledge, New York.

Becker, S. O., and L. Woessmann (2009): "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *The Quarterly Journal of Economics*, 124(2), 531–596.

Berkey, J. P. (2003): *The Formation of Islam: Religion and Society in the Near East, 600-1800*. Cambridge University Press, Cambridge.

Bertocchi, G. (2006): "The Law of Primogeniture and the Transition from Landed Aristocracy to Industrial Democracy," *Journal of Economic Growth*, 11, 41–68.

Black, J. (2005): *Atlas of World History*. London, Dorling Kindersley, London.

Botticini, M., and Z. Eckstein (2005): "Jewish Occupational Selection: Education, Restrictions, or Minorities?," *Journal of Economic History*, 65, 922–948.

——— (2007): "From Farmers to Merchants, Conversions and Diaspora: Human Capital and Jewish History," *Journal of the European Economic Association*, 5, 885–926.

Brice, W. C., and H. Kennedy (2001): *An Historical Atlas of Islam*. Brill Academic Publishers, Leiden.

Brien, P. K. O. (1999): *Oxford Atlas of World History*. Oxford University Press, Great Britain.

Bulliet, R. W. (1979): *Conversion to Islam in the Medieval Period: An Essay in Quantitative History*. Harvard University Press, Cambridge, MA.

Cervellati, M., M. Jansen, and U. Sunde (2008): "Religious Norms and Long Term Development: Insurance, Human Capital and Technological Change," Working Paper, mimeo University of Bologna.

Chaney, E. (2008): "Tolerance, Religious Competition and the Rise and Fall of Muslim Science," Working Paper, mimeo Harvard University.

——— (2012): "Islam and Human Capital Formation: Evidence from Pre-Modern Muslim Science," in *Handbook of the Economics of Religion*, ed. by R. McCleary. Oxford University Press, Oxford, UK.

Chu, D., and E. Skinner (1965): *A Glorious Age in Africa*. Garden City, New York, US.

Cohen, H. J. (1970): "The Economic Background and the Secular Occupations of Muslim Jurisprudents and Traditionists in the Classical Period of Islam: (Until the Middle of the Eleventh Century)," *Journal of the Economic and Social History of the Orient*, 13, 16–61.

Crone, P. (2007): "Quraysh and the Roman Army: Making Sense of the Meccan Leather Trade," *Bulletin of SOAS, School of Oriental and African Studies*, 70, 63–88.

Engerman, S. L., and K. L. Sokoloff (1997): "Factor Endowments, Institutions, and Differential Paths of Growth among New World Economies," in *How Latin America Fell Behind*, ed. by S. Haber, pp. 260–304. Stanford University Press, Stanford, CA.

——— (2002): "Factor Endowments, Inequality, and Paths of Development among New World Economies," Working Paper No. 9259, NBER.

Ethnologue (2005): Languages of the World, SIL International; Fifteenth edition.

Fenske, J. (2012): "Ecology, Trade and States in Pre-colonial Africa," mimeo Oxford University.

Gennaioli, N., and I. Rainer (2007): "The Modern Impact of Precolonial Centralization in Africa," *Journal of Economic Growth*, 12(3), 185–234.

Goucher, C., C. Leguin, and L. Walton (1998): "Trade, Transport, Temples, and Tribute: The Economics of Power," in *In the Balance: Themes in Global History*, ed. by McGraw-Hill, pp. 231–245. Stanford University Press, Oxford, UK.

Gray, P. J. (1999): "A Corrected Ethnographic Atlas," *Wolrd Cultures*, 10, 24–85.

Greif, A. (1994): "Cultural Beliefs and the Organization of Society: A History and Theoretical Reflection on Collectivist and Individualist Societies," *The Journal of Political Economy*, 102(5), 912–950.

——— (2006): *Institutions and the Path to Modern Economy: Lessons from Medieval Trade*. Cambridge University Press.

Haber, S., and V. A. Menaldo (2010): "Rainfal, Human Capital, and Democracy," mimeo Stanford University and University of Washington.

Habib, A. (2004): "Role of Zakah and Awqaf in Poverty Alleviation," Islamic Development Bank Group, Occasional Paper No. 8.

Hirth, F., and W. Rockhill (1911): "Chau Ju-kua, His Work on the Chinese and Arab Trade in the Twelfth and Thirteenth Centuries, entitled Chu-fan-chi," Available at http://ebook.lib.hku.hk/CADAL/B31403797/.

Hodgson, M. G. S., and E. Burke (1993): *Rethinking World History: Essays on Europe, Islam and World History*. Cambridge University Press, Cambridge, UK.

Hsu, B., J. Gibbon, C. Hackett, and A. Reynolds (2008): "Estimating the Religious Composition of All Nations: An Empirical Assessment of the World Christian Database," *Journal for the Scientific Study of Religion*, 74(4), 678–693.

Iannaccone, L. R. (1992): "Sacrifice and Stigma: Reducing Free-riding in Cults, Communes, and other Collectives," *The Journal of Political Economy*, 100(2), 271–291.

Ibrahim, M. (1990): *Merchant Capital and Islam*. University of Texas Press, Austin.

Insoll, T. (2003): *The Archaeology of Islam in Sub-Saharan Africa*. Cambridge University Press, Cambridge and New York.

Khaldun, I. (1377): *Muqaddimah: An Introduction to History, transl. Franz Rosenthal (1967)*. Princeton University Press, Princeton, NJ.

KURAN, T. (2001): "Provision of Public Goods under Islamic Law: Origins, Impact, and Limitations of the Waqf System," *Law and Society Review*, 35(4), 841–897.

——— (2003): "The Islamic Commercial Crisis: Institutional Roots of Economic Underdevelopment in the Middle East," *Journal of Economic History*, 63, 414–446.

——— (2004): *Islam and Mammon: The Economic Predicaments of Islamism*. Princeton University Press, Princeton.

——— (2008a): "Institutional Causes of Underdevelopment in the Middle East: A Historical Perspective," in *Institutional Change and Economic Behavior*, ed. by J. Kornai, L. Matyas, and G. Roland, pp. 64–76. Palgrave-Macmillan, New York.

——— (2008b): "Islamic Redistribution Through Zakat: Historical Record and Modern Realities," in *Poverty and Charity in Middle Eastern Contexts*, ed. by M. Bonner, M. Ener, and A. Singer, pp. 275–293. State University of New York Press, Albany.

LABIB, S. Y. (1969): "Capitalism in Medieval Islam," *The Journal of Economic History*, 29(1), 79–96.

LAPIDUS, I. M. (2002): *A History of Islamic Societies*. Cambridge University Press, Cambridge.

LEVTZION, N. (1978): "The Sahara and the Sudan from the Arab conquest of the Maghrib to the rise of the Almoravids," in *The Cambridge History of Africa. Volume 2: from c. 500 BC to AD 1050*, ed. by J. D. Fage, pp. 637–684. Cambridge University Press, Cambridge, MA.

LEVY, G., AND R. RAZIN (2012): "Religious Beliefs, Religious Participation and Cooperation," American Economic Journal: Microeconomics, forthcoming.

LEWIS, B. (1993): *The Arabs in History, 6th Edition*. Oxford University Press, Oxford, UK.

——— (2001): *What Went Wrong? Western Impact and Middle Eastern Response*. Harper Collins, New York.

LEWISON, M. (1999): "Conflicts of Interest? The Ethics of Usury," *Journal of Business Ethics*, 22(4), 327–339.

MARTIN, X. S. I., G. DOPPELHOFER, AND R. I. MILLER (2004): "Determinants of Long-Run Growth: a Bayesian Averaging of Classical Estimates (BACE) Approach," *American Economic Review*, 94(4), 813–835.

Marx, K. (1833 [1970]): *Critique of Hegel Philosophy of Right*. Cambridge University Press, Ed. Joseph Malley, London.

Michalopoulos, S. (2012): "The Origins of Ethnolinguistic Diversity," *American Economic Review*, 102(4), 1508–1539.

Michalopoulos, S., and E. Papaioannou (2012): "Pre-colonial Ethnic Institutions and Contemporary African Development," Econometrica, forthcoming.

Murdock, G. P. (1967): *Ethnographic Atlas*. University of Pittsburgh Press, Pittsburgh, PA.

Nunn, N. (2010): "Religious Conversion in Colonial Africa," *American Economic Review Papers and Proceedings*, 100(2), 147–152.

Peoples, H. C., and F. W. Marlowe (2012): "Subsistence and the Evolution of Religion," *Human Nature, forthcoming*.

Platteau, J.-P. (2008): "Religion, Politics, and Development: Lessons from the Lands of Islam," *Journal of Economic Behavior and Organization*, 68, 329–351.

——— (2011): "Political Instrumentalization of Islam and Threat of an Obscurantist Deadlock," *World Development*, 39, 243–260.

Porta, R. L., F. L. de Silanes, A. Shleifer, and R. Vishny (1997): "Legal Determinants of External Finance," *Journal of Finance*, 52(3), 1131–1150.

Pryor, F. L. (2007): "The Economic Impact of Islam on Developing Countries," *World Development*, 35(11), 1815–1835.

Ramankutty, N., J. A. Foley, J. Norman, and K. McSweeney (2002): "The Global Distribution of Cultivable Lands: Current Patterns and Sensitivity to Possible Climate Change," *Global Ecology and Biogeography*, 11, 377–392.

Ricklefs, M. (1991): *A History of Modern Indonesia since c.1300, 2nd Edition*. MacMillan, London.

Roes, F. L., and M. Raymond (2003): "Belief in Moralizing Gods," *Evolution and Human Behavior*, pp. 126–135.

Rubin, J. (2009): "Social Insurance, Commitment, and the Origin of Law: Interest Bans in Early Christianity," *Journal of Law and Economics*, 52, 761–777.

——— (2011): "Institutions, the Rise of Commerce, and the Persistence of Laws: Interest Restrictions in Islam and Christianity," *Economic Journal*, 121, 1310–1339.

Stearns, P. N., M. Adas, S. B. Schwarz, and M. J. Gilbert (2010): *World Civilizations: The Global Experience (6th Edition)*. Prentice Hall, Upper Saddle River, NJ.

Stride, G. T., and C. Ifeca (1971): *Peoples and Empires of West Africa: West Africa in History, 1000-1800*. Africana Publication Corp., New York.

Swanson, G. E. (1960): *The Birth of Gods*. University of Michigan Press, Michigan, MI.

Winder, R. (2008): "Makka - The Modern City," in *Encyclopaedia of Islam*, ed. by C. B. E. V. D. P. Bearman, Th. Bianquis, and W. Heinrichs. Brill, Leiden.

WLMS (2006): World Language Mapping System, Version 3.2 Available on-line at http://www.gmi.org/wlms/.

WRD (2006): World Religion Database, BRILL, Available on-line at http://www.worldreligiondatabase.org/.

Appendix B - Data Sources

Geographical Variables

Absolute Latitude: Absolute latitudinal distance from the equator from the centroid of the respective unit of analysis, i.e. country or ethnic group.

Source: Constructed using ArcGis.

Average Land Quality: Average suitability for farming based on climatic and soil characteristics within the respective unit of analysis.

Source: Michalopoulos (2012). The raw dataset is available at the Atlas of the Biosphere.[26]

In order to construct this index Ramankutty, Foley, Norman, and McSweeney (2002) empirically estimate the probability density function of the percentage of croplands around 1990 with respect to climate and soil characteristics. Then the authors combine the derived probability with data on climate and soil quality to predict regional suitability for agriculture at the resolution of 0.5 degrees latitude by 0.5 degrees longitude worldwide. The climatic characteristics are based on mean-monthly climate conditions for the 1961–1990 period and capture (i) monthly temperature (ii) precipitation and (iii) potential sunshine hours. All the climatic conditions weakly increase the suitability of land for agriculture. Regarding the soil suitability the traits considered are a measure of the total organic content (carbon density) and the nutrient availability (soil pH). The relationship of these indexes with agricultural suitability is non-monotonic. Low and high values of pH limit cultivation potential, since these values signal that soils are too acidic or too alkaline, respectively. Specifically, Average Land Quality, lq, is the product of two components capturing the climatic suitability for cultivation, lq_{clim}, and the soil suitability, lq_{soil}. Hence, $lq = lq_{clim} * lq_{soil}$. Each component is constructed in the following way: $lq_{clim} = f_1(GDD) * f_2(m)$, where GDD denotes growing degree days and m is a moisture index capturing the availability of water to plants. Regarding soil characteristics, $lq_{soil} = g_1(C_{soil}) * g_2(pH_{soil})$, where C_{soil} stands for soil carbon density and pH_{soil} captures the acidity or alkalinity of soil. Each functional form is derived from the probability density function of actual cropland area versus each component. For example, in the case of $f_1(GDD)$ and $f_2(m)$ according to Ramankutty, Foley, Norman, and McSweeney (2002) a sigmoidal function best fits the observed empirical relationship between the fraction of a cell that was cultivated in 1990 and the GDD and m respectively. Specifically, $f_1(GDD) = 1/(1 + \exp(a(b - GDD)))$ and $f_2(m) = 1/(1 + \exp(c(d - m)))$ with $a = 0.0052$, $b = 1334$, $c = 14.705$ *and* $d = 0.3295$. The functional forms of $g_1(C_{soil})$ and $g_2(pH_{soil})$ are the following: $g_1(C_{soil}) = (a/(1 + \exp(b(c - C_{soil})))) * (a/(1 + \exp(d(e - C_{soil}))))$ with $a = 3.9157$, $b = 1.3766$, $c = 3.468$ *and* $d = -0.0791$

[26] It may be dowloaded from http://www.sage.wisc.edu/iamdata/grid_data_sel.php.

$$\text{and } g_2(pH_{soil}) = \left\{ \begin{array}{ccc} -2.085 + 0.475pH_{soil} & if & pH_{soil} \leq 6.5 \\ 1.0 & if & 6.5 < pH_{soil} < 8 \\ 1.0 - 2.0pH_{soil} & if & pH_{soil} \geq 8 \end{array} \right\}.$$

Distance to Muslim Empires: Great-circle distance from the borders of the Muslim empires of the centroid a country or ethnic group in thousand kilometers. Muslim empires include the Umayyads, Abassids, Karakhanids, Ghurids, Ghaznavids, Mughals, Ottomans, Mamluks, Seljuks, Timurids, Fatimids, Almoravids and the Almohads.

Source: Calculated using the empire maps constructed by Jarle Grøhn based on Black (2005).

Distance to Mecca: Great-circle distance from Mecca of the centroid a country or ethnic group in thousand kilometers.

Source: Calculated using the Haversine Formula.

Distance to Trade Routes in 600 AD: Great-circle distance from the nearest trade route 1800 *AD* of the centroid a country or ethnic group in thousand kilometers.

Source: Calculated using the trade routes mapped in Brice and Kennedy (2001) in 600 AD.

Distance to Trade Routes in 1800 AD: Great-circle distance from the nearest trade route in 1800 *AD* of the centroid a country or an ethnic group in thousand kilometers.

Source: Calculated using the trade routes mapped in Brice and Kennedy (2001) between 600 AD and 1800 AD. This information is supplemented by maps from Brien (1999) which contain information on trade routes within Europe, SE Asia, West Africa and China during the same time period.

Mean Elevation: Average elevation in kilometers within the unit of analysis, i.e. country or ethnic group.

Source: The Atlas of Biosphere available at http://www.sage.wisc.edu:16080/atlas/.

Land Inequality: Inequality in the regional suitability for agriculture within the unit of analysis. Three separate measures are used namely the Gini index, the Theil index and the Mean Logarithmic Deviation.

Source: See **Average Land Quality**

Sea Distance: Distance from the nearest coastline (1000's of km.) of the centroid of a country or an ethnic group.

Source: Center for International Development for the country analysis. For ethnic groups and virtual countries the distance is constructed using the coastlines of seas, oceans dataset. Publisher: Global Mapping International, Colorado Springs, Colorado, USA. Series name: Global Ministry Mapping System. Series issue: Version 3.0

Historical Variables

% **Muslim in 2005 AD**: Fraction of Muslim population in 2005 within an ethnic group. Source: World Religion Database, available at: http://www.worldreligiondatabase.org/

% **Muslim in 1900 AD**: Fraction of Muslim population in 1900AD within country. Source: Religion Adherence Data - McCleary and Barro (2005) available at http://ksghome.harvard.edu/~rmcclea/data.html

Muslim Majority: Dummy variable equals 1 if **% Muslim in 2005 AD** $> 50\%$ Source: See **% Muslim in 2005 AD.**

Animal Husbandry: $0-9$ scale index reflecting the intensity of pastoralism. The index equals 0 when there $0\% - 5\%$ dependence; 1 when there is $6\% - 15\%$ dependence; 2 when there is $16\% - 25\%$ dependence; 3 when there is $26\% - 35\%$ dependence; 4 when there is $36\% - 45\%$ dependence; 5 when there is $46\% - 55\%$ dependence; 6 when there is $56\% - 65\%$ dependence; 7 when there is $66\% - 75\%$ dependence; 8 when there is $76\% - 85\%$ dependence; and 9 when there is $86\% - 100\%$ dependence. *Source: Murdock (1967); variable code in the Ethnographic Atlas v4.*

Agriculture: $0 - 9$ scale index reflecting the intensity of agriculture. The index equals 0 when there $0\% - 5\%$ dependence; 1 when there is $6\% - 15\%$ dependence; 2 when there is $16\% - 25\%$ dependence; 3 when there is $26\% - 35\%$ dependence; 4 when there is $36\% - 45\%$ dependence; 5 when there is $46\% - 55\%$ dependence; 6 when there is $56\% - 65\%$ dependence; 7 when there is $66\% - 75\%$ dependence; 8 when there is $76\% - 85\%$ dependence; and 9 when there is $86\% - 100\%$ dependence. *Source: Murdock (1967); variable code in the Ethnographic Atlas v5.*

Class Stratification: Ordered variable ranging from 0 to 4 quantifying "*the degree of class differentiation, excluding purely political and religious statuses*". A zero score indicates "*absence of significant class distinctions among freemen, ignoring variations in individual repute achieved through skill, valor, piety, or wisdom.*" A score of 1 indicates "*the presence of wealth distinctions, based on possession or distribution of property, which however have not crystallized into distinct and hereditary social classes.*" A score of 2 indicates "*elite stratification in which an elite class derives its superior status from control over scarce resources, particularly land, and is thereby differentiated from a propertyless proletariat or serf class*". A score of 3 indicates a "*dual stratification into a hereditary aristocracy and a lower class of ordinary commoners or freemen, where traditionally ascribed noble status is at least as decisive as control over scarce resources.* A score of 4 indicates "*complex stratification into social classes correlated in large measure with extensive differentiation of occupational statuses.*" *Source: Murdock (1967); variable code in the Ethnographic Atlas v66.*

Class Stratification Indicator: Following Gennaioli and Rainer (2007) we define a dummy stratification index that equals zero when Murdock's variable equals zero indicating "*absence of significant class distinctions among freemen, ignoring variations in individual repute achieved through skill, valor, piety, or wisdom,*" and one when Murdock's class stratification measure equals 1, 2, 3, or 4. *Source: Murdock (1967); variable code in the Ethnographic Atlas v66.*

Inheritance Distribution for Movable Property: Non-Ordered variable that equals 1 when distribution is "equal or relatively equal", 2 when it is "exclusively", 3 when it is "ultimogeniture", 4 when it is "primogeniture" and 9 when there is "absence of inheritance of real property". *Source: Murdock (1967); variable code in the Ethnographic Atlas v77.*

Egalitarian Inheritance Distribution for Movable Property Indicator: takes on the value of 1 when the **Inheritance Distribution for Movable Property** is "equal or relatively equal" and when there is "absence of inheritance of real property" and zero otherwise. *Source: Murdock (1967); variable code in the Ethnographic Atlas v77.*

Egalitarian Inheritance Distribution for Land Property Indicator: takes on the value of 1 when the **Inheritance Distribution for Land Property** is "equal or relatively equal" and when there is "absence of inheritance of real property" and zero otherwise. *Source: Murdock (1967); variable code in the Ethnographic Atlas v76.*

High Gods: A "High God" is described as "a spiritual being who is believed to have created all reality and/or to be its ultimate governor, even though his/her sole act was to create other spirits who, in turn, created or control the natural world." The values of this variable are: (1) absent or not reported; (2) present but not active in human affairs; (3) present and active in human affairs but not supportive of human morality; and (4) present, active, and specifically supportive of human morality. We recoded values 1–3 into 0, thus, creating a variable "High Gods Supportive of Human Morality", with two values: either supportive of human morality,or not. *Source: Murdock (1967); variable code in the Ethnographic Atlas v34 ("High Gods").*

Jurisdictional Hierarchy beyond Local Community: Ordered variable ranging from 1 to 5 indicating the number of jurisdictional levels (political complexity) in each society above the local level**.** A 1 indicates stateless societies, 2 and 3 indicate petty and large paramount chiefdoms (or their equivalent), 4 and 5 indicate large states. *Source: Murdock (1967); variable code in the Ethnolinguistic Atlas v33; A revised version of Murdock's Atlas has been made available by J. Patrick Gray at:*
http://eclectic.ss.uci.edu/~drwhite/worldcul/EthnographicAtlasWCRevisedByWorldCultures.sav.

Appendix A - Tables

Table 1: Summary Statistics for the Cross-Country Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
% Muslim (1900)	114	0.27	0.38	0.00	1.00
Ln Gini Index of Land Quality	114	-1.29	0.72	-3.45	-0.13
Average Land Quality	114	0.42	0.25	0.00	0.95
Mean Elevation	114	0.63	0.59	0.01	3.08
Distance to Mecca	114	4.13	1.82	0.57	9.25
Distance to Muslim Empires	114	1.08	1.32	0.00	4.82
Distance to 600 AD Trade Routes	114	0.89	0.95	0.02	3.39
Distance to 1800 AD Trade Routes	114	0.34	0.46	0.01	2.38
Distance to the Coast	114	0.39	0.48	0.02	2.39

See Appendix B for variables' definitions.

Table 2: Correlation Matrix for the Cross-Country Analysis

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	% Muslim (1900)	1.00								
(2)	Ln Gini Index of Land Quality	0.49	1.00							
(3)	Average Land Quality	-0.45	-0.80	1.00						
(4)	Mean Elevation	0.10	0.27	-0.07	1.00					
(5)	Distance to Mecca	-0.46	-0.28	0.20	-0.08	1.00				
(6)	Distance to Muslim Empires	-0.46	-0.13	-0.01	0.04	0.61	1.00			
(7)	Distance to 600 AD Trade Routes	-0.20	0.02	-0.25	-0.15	0.30	0.46	1.00		
(8)	Distance to 1800 AD Trade Routes	-0.26	0.07	-0.18	0.15	0.22	0.72	0.45	1.00	
(9)	Distance to the Coast	0.31	0.44	-0.34	0.31	-0.13	0.00	0.10	0.15	1.00

See Appendix B for variables' definitions.

Table 3: Cross-Country Analysis - Muslim World in 1900 AD

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var			% Muslim in 1900 AD			
Ln Gini Index of Land Quality	0.260***	0.263***	0.165***	0.163***	0.261***	0.311***
	(0.043)	(0.041)	(0.060)	(0.057)	(0.093)	(0.082)
Distance to 600 AD Trade Routes		-0.084***	-0.035	-0.113**	-0.221**	
		(0.028)	(0.066)	(0.053)	(0.102)	
Average Land Quality			-0.221	-0.088	-0.082	0.097
			(0.188)	(0.164)	(0.164)	(0.159)
Average Elevation			-0.033	-0.091	-0.128**	-0.168***
			(0.062)	(0.060)	(0.059)	(0.049)
Distance to Mecca			0.015	0.100**	0.104*	0.028
			(0.050)	(0.050)	(0.053)	(0.036)
Distance to Muslim Empires			-0.054	-0.084***	-0.071**	-0.070**
			(0.036)	(0.032)	(0.035)	(0.032)
Distance to the Coast			0.113	0.065	0.07	0.033
			(0.085)	(0.114)	(0.108)	(0.109)
Absolute Latitude			-0.011***	-0.006	-0.005	-0.005
			(0.003)	(0.004)	(0.004)	(0.003)
Ln Gini Land Quality x Distance to 600 AD Trade Routes					-0.068	
					(0.050)	
Distance to 1800 AD Trade Routes						-0.144
						(0.090)
Ln Gini Land Quality x Distance to 1800 AD Trade Routes						-0.181***
						(0.061)
Continental FE	NO	NO	YES	YES	YES	YES
Observations	114	114	114	77	77	77
R-squared	0.24	0.28	0.65	0.43	0.45	0.46

OLS results, robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1
Specifications (1) to (3) focus within the Old World i.e. Europe, Africa and Asia, while specifications (4) to (6) focus within the Old World in countries that have not been under a Muslim Empire.
See Appendix B for variables' definitions.

Table 4: Summary Statistics for the Cross-Ethnic Group Analysis - Old World

Variable	Obs	Mean	Std. Dev.	Min	Max
% Muslim in 2005	1714	0.25	0.39	0	1
Ln Gini Index of Land Quality	1714	-1.92	0.82	-4.61	-0.02
Average Land Quality	1714	0.42	0.23	0	0.98
Average Elevation	1714	0.72	0.75	-0.07	5.54
Distance to Mecca	1714	4.63	2.16	0.44	11.46
Distance to Muslim Empires	1714	1.63	1.42	0	6.47
Distance to 600 AD Trade Routes	1714	1.23	1.06	0	4.78

See Appendix B for variables' definitions.

Table 5: Correlation Matrix for the Cross-Ethnic Group Analysis - Old World

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	% Muslim in 2005	1.00						
(2)	Ln Gini Index of Land Quality	0.30	1.00					
(3)	Average Land Quality	-0.23	-0.53	1.00				
(4)	Average Elevation	-0.03	0.35	-0.08	1.00			
(5)	Distance to Mecca	-0.24	-0.15	0.00	-0.12	1.00		
(6)	Distance to Muslim Empires	-0.33	-0.19	-0.09	-0.16	0.58	1.00	
(7)	Distance to 600 AD Trade Routes	-0.09	-0.10	-0.20	-0.32	0.29	0.48	1.00

See Appendix B for variables' definitions.

Table 6: Cross Ethnic Group Analysis - Muslims in 2005 AD

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var			% Muslim in 2005 AD			
Ln Gini Index of Land Quality	0.071***	0.067***	0.048***	0.051***	0.063***	0.074***
	(0.022)	(0.020)	(0.012)	(0.012)	(0.018)	(0.023)
Distance to 600 AD Trade Routes		-0.181***	-0.093***	-0.130***	-0.151***	
		(0.014)	(0.026)	(0.027)	(0.031)	
Ln Gini Land Quality x Distance to 600 AD Trade Routes					-0.010	
					(0.013)	
Average Land Quality			-0.129	-0.220*	-0.221*	-0.216*
			(0.110)	(0.117)	(0.117)	(0.123)
Average Elevation			-0.038	-0.068**	-0.070***	-0.076***
			(0.031)	(0.027)	(0.026)	(0.023)
Distance to Muslim Empires			-0.047	-0.055	-0.056	-0.08
			(0.088)	(0.103)	(0.103)	(0.085)
Distance to Mecca			-0.063	-0.016	-0.014	-0.05
			(0.052)	(0.070)	(0.069)	(0.076)
Distance to Coast			-0.045	-0.038	-0.04	-0.039
			(0.051)	(0.049)	(0.049)	(0.056)
Absolute Latitude			0.010	0.010*	0.010*	0.010
			(0.006)	(0.006)	(0.006)	(0.008)
Distance to 1800 AD Trade Routes						-0.144*
						(0.086)
Ln Gini Land Quality x Distance to 1800 AD Trade Routes						-0.046**
						(0.019)
Country FE	YES	YES	YES	YES	YES	YES
Observations	1714	1714	1714	1419	1419	1419
R-squared	0.54	0.59	0.61	0.51	0.51	0.5

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
All specifications focus within the Old World excluding territories that have been subjected to a Muslim Empire in the past. See Appendix B for variables' definitions.

Table 7a: Summary Statistics for the Cross-Ethnic Group Analysis

Old World - Out of Muslim Empires

Variable	Obs	Mean	Std. Dev.	Min	Max
% Muslim in 2005 AD	1419	0.19	0.34	0.00	1.00
% Christian in 2005 AD	1419	0.41	0.38	0.00	1.00
% Hindu in 2005 AD	1419	0.01	0.08	0.00	0.99
% Buddist in 2005 AD	1419	0.05	0.19	0.00	1.00
% Ethnoreligious in 2005 AD	1419	0.31	0.34	0.00	1.00
Ln Gini Index of Land Quality	1419	-1.97	0.79	-4.61	-0.02
Average Land Quality	1419	0.42	0.21	0.00	0.98
Distance to Mecca	1419	4.96	2.18	0.51	11.46
Distance to Muslim Empires	1419	1.97	1.33	0.00	6.47
Distance to 600 AD Trade Routes	1419	1.43	1.06	0.01	4.78

See Appendix B for variables' definitions.

Table 7b: Summary Statistics for the Cross-Ethnic Group Analysis

Old World - Out of Muslim Empires

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	% Muslim in 2005 AD	1.00									
(2)	% Christian in 2005 AD	-0.48	1.00								
(3)	% Hindu in 2005 AD	-0.05	-0.11	1.00							
(4)	% Buddist in 2005 AD	-0.14	-0.26	-0.01	1.00						
(5)	% Ethnoreligious in 2005 AD	-0.34	-0.44	-0.07	-0.14	1.00					
(6)	Ln Gini Index of Land Quality	0.20	-0.14	-0.01	0.12	-0.14	1.00				
(7)	Average Land Quality	-0.13	0.01	0.10	-0.05	0.11	-0.36	1.00			
(8)	Distance to Mecca	-0.10	-0.23	0.00	0.13	0.25	-0.06	-0.05	1.00		
(9)	Distance to Muslim Empires	-0.21	0.30	-0.14	-0.19	0.02	-0.07	-0.12	0.51	1.00	
(10)	Distance to 600 AD Trade Routes	0.06	0.12	-0.12	-0.25	0.03	0.02	-0.24	0.18	0.34	1.00

See Appendix B for variables' definitions.

Table 7c: Cross-Ethnic-Group

Old World - Out of Muslim Empires - Other Religions in 2005

	(1)	(2)	(3)	(4)	(5)
Dep. Var	% Muslim	% Christian	% Hindu	% Buddhist	% Ethnoreligious
Ln Gini Index of Land Quality	0.051***	-0.010	0.002	0.022**	-0.075***
	(0.012)	(0.017)	(0.004)	(0.011)	(0.021)
Distance to 600 AD Trade Routes	-0.130***	0.169***	0.013	0.024	-0.025
	(0.027)	(0.041)	(0.012)	(0.014)	(0.029)
Average Land Quality	-0.220*	0.164**	0.031	-0.088*	0.056
	(0.117)	(0.076)	(0.020)	(0.047)	(0.114)
Average Elevation	-0.068**	0.050	-0.025	0.096***	-0.014
	(0.027)	(0.032)	(0.016)	(0.036)	(0.023)
Distance to Muslim Empires	-0.055	0.076	0.021	0.020	-0.114
	(0.103)	(0.065)	(0.025)	(0.030)	(0.094)
Distance to Mecca	-0.016	-0.089*	-0.028	-0.030	0.171**
	(0.070)	(0.046)	(0.028)	(0.029)	(0.066)
Distance to the Coast	-0.038	-0.022	0.008	-0.008	0.082*
	(0.049)	(0.052)	(0.009)	(0.022)	(0.045)
Absolute Latitude	0.010*	-0.007	-0.001	-0.003	0.001
	(0.006)	(0.005)	(0.002)	(0.002)	(0.004)
Country FE	YES	YES	YES	YES	YES
Observations	1419	1419	1419	1419	1419
R-squared	0.51	0.63	0.36	0.46	0.34

OLS estimates with standard errors clustered at the country level in parentheses.

***p<0.01, **p<0.05, *p<0.1.

All specifications focus within the Old World excluding territories that have been subjected to a Muslim Empire in the past. See Appendix B for variables' definitions.

Table 8a: Summary Statistics for the Robustness Checks of the Cross-Ethnic-Group Analysis
Old World Out of Muslim Empires

Variable	Obs	Mean	Std. Dev.	Min	Max
% Muslim in 2005 AD	1419	0.19	0.34	0.00	1.00
Muslim Majority (dummy)	1419	0.17	0.38	0.00	1.00
Ln Mean Log Deviation of Land Quality	1419	-2.92	1.23	-4.61	0.96
Ln Theil Index of Land Quality	1419	-3.00	1.11	-4.61	0.71
Ln Gini Index of Land Quality	1419	-1.97	0.79	-4.61	-0.02
Average Land Quality	1419	0.42	0.21	0.00	0.98
Ln Gini of Land Quality based on Soil	1419	-2.16	0.70	-4.61	-0.02
Average Land Quality based on Soil	1408	0.51	0.19	0.06	0.99
Ln Gini of Land Quality based on Climate	1419	-3.61	1.35	-4.61	-0.02
Average Land Quality based on Climate	1419	0.83	0.30	0.00	1.00
Distance to 600 AD Trade Routes	1419	1.43	1.06	0.01	4.78
Distance to 1800 AD Trade Routes	1419	0.48	0.52	0.00	4.78

See Appendix B for variables' definitions.

Table 8b: Summary Statistics for the Robustness Checks of the Cross-Ethnic-Group Analysis - Old World Out of Muslim Empires

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	% Muslim in 2005 AD	1.00										
(2)	Muslim Majority (dummy)	0.95	1.00									
(3)	Ln Mean Log Deviation of Land Quality	0.20	0.21	1.00								
(4)	Ln Theil Index of Land Quality	0.21	0.22	0.99	1.00							
(5)	Ln Gini Index of Land Quality	0.20	0.21	0.92	0.94	1.00						
(6)	Average Land Quality	-0.13	-0.14	-0.42	-0.46	-0.37	1.00					
(7)	Ln Gini of Land Quality based on Soil	0.20	0.19	0.65	0.69	0.82	-0.21	1.00				
(8)	Average Land Quality based on Soil	-0.01	0.00	0.07	0.03	0.07	0.68	-0.11	1.00			
(9)	Ln Gini of Land Quality based on Climate	0.22	0.24	0.77	0.76	0.67	-0.44	0.30	0.23	1.00		
(10)	Average Land Quality, based on Climate	-0.25	-0.27	-0.66	-0.68	-0.59	0.64	-0.27	-0.04	-0.88	1.00	
(11)	Distance to 600 AD Trade Routes	0.06	0.03	-0.04	-0.02	0.02	-0.24	0.09	-0.25	-0.02	-0.06	1.00
(12)	Distance to 1800 AD Trade Routes	-0.30	-0.26	0.03	0.04	0.01	-0.25	-0.07	-0.06	0.16	-0.23	0.24

See Appendix B for variables' definitions.

Table 8c: Cross-Ethnic-Group

Old World - Out of Muslim Empires - Other Religions in 2005

	(1)	(2)	(3)	(4)	(5)
Dep. Var	Muslim Majority		% Muslim in 2005 AD		
Ln Gini index of Land Quality	0.056***				
	(0.014)				
Distance to 600 AD Trade Routes	-0.137***	-0.134***	-0.133***	-0.127***	-0.126***
	(0.030)	(0.027)	(0.027)	(0.025)	(0.034)
Average Land Quality	-0.255*	-0.189	-0.182		
	(0.133)	(0.120)	(0.118)		
Average Elevation	-0.075**	-0.073***	-0.071***	-0.103***	-0.043*
	(0.030)	(0.025)	(0.026)	(0.026)	(0.026)
Distance to Mecca	-0.019	-0.014	-0.015	-0.016	-0.003
	(0.077)	(0.071)	(0.071)	(0.082)	(0.069)
Distance to Muslim Empires	-0.049	-0.050	-0.049	-0.056	-0.070
	(0.115)	(0.104)	(0.104)	(0.108)	(0.102)
Distance to the Coast	-0.043	-0.044	-0.043	-0.078*	-0.032
	(0.057)	(0.047)	(0.048)	(0.046)	(0.058)
Absolute Latitude	0.012*	0.010*	0.010*	0.002	0.014**
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Ln Mean Log Deviation of Land Quality		0.043***			
		(0.009)			
Ln Theil index of Land Quality			0.047***		
			(0.009)		
Ln Gini of Land Quality based on Climate				0.057**	
				(0.025)	
Average Land Quality based on Climate				-0.325**	
				(0.125)	
Ln Gini of Land Quality based on Soil					0.035**
					(0.015)
Average Land Quality based on Soil					-0.014
					(0.139)
Country FE	YES	YES	YES	YES	YES
Observations	1419	1419	1419	1408	1408
R-squared	0.44	0.52	0.52	0.54	0.50

OLS estimates with standard errors clustered at the country level in parentheses.

***p<0.01, **p<0.05, *p<0.1.

All specifications focus within the Old World excluding territories that have been subjected to a Muslim Empire in the past. See Appendix B for variables' definitions.

Table 9a: Summary Statistics for the African-Ethnic-Group Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
% Muslim in 2005 AD	549	0.29	0.39	0.00	1.00
Muslim Majority (dummy)	549	0.27	0.44	0.00	1.00
Ln Gini Index of Land Quality	549	-1.81	0.74	-4.61	-0.14
Distance to 1800 AD Trade Routes	549	0.50	0.50	0.00	2.49
Average Land Quality	549	0.40	0.23	0.00	0.98
Class Stratification (dummy)	482	0.65	0.48	0.00	1.00
% Dependence on Pastoralism	549	2.56	2.06	0.00	9.00
% Dependence on Agriculture	549	5.74	1.72	0.00	9.00
Pastoralism/Agriculture	543	0.29	0.20	0.00	1.00
Egalitarian Inheritance (Movable)	488	0.46	0.50	0.00	1.00
Egalitarian Inheritance (Land)	445	0.39	0.49	0.00	1.00
Belief in Moral God (dummy)	338	0.35	0.48	0.00	1.00
Jurisdictional Hierarchy	520	2.44	1.01	1.00	5.00

See Appendix B for variables' definitions.

Table 9b: Correlation Matrix for the African-Ethnic-Group Analysis

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	% Muslim in 2005 AD	1.00												
(2)	Muslim Majority (dummy)	0.97	1.00											
(3)	Ln Gini index of Land Quality	0.47	0.47	1.00										
(4)	Distance to 1800 AD Trade Routes	-0.56	-0.52	-0.13	1.00									
(5)	Average Land Quality	-0.51	-0.50	-0.62	0.16	1.00								
(6)	Class Stratification (dummy)	0.18	0.17	0.15	0.06	-0.14	1.00							
(7)	% Dependence on Pastoralism	0.44	0.44	0.38	-0.17	-0.25	0.10	1.00						
(8)	% Dependence on Agriculture	-0.27	-0.28	-0.30	-0.01	0.30	0.04	-0.58	1.00					
(9)	Pastoralism/Agriculture	0.41	0.43	0.41	-0.09	-0.29	0.10	0.92	-0.80	1.00				
(10)	Egalitarian Inheritance (Movable)	0.51	0.49	0.26	-0.34	-0.33	0.11	0.36	-0.11	0.29	1.00			
(11)	Egalitarian Inheritance (Land)	0.36	0.35	0.29	-0.16	-0.32	0.09	0.34	-0.21	0.34	0.62	1.00		
(12)	Belief in Moral God (dummy)	0.77	0.74	0.42	-0.40	-0.43	0.25	0.60	-0.28	0.54	0.61	0.46	1.00	
(13)	Jurisdictional Hierarchy	0.21	0.20	0.22	0.12	-0.13	0.56	0.12	0.17	0.04	0.09	0.05	0.21	1.00

See Appendix B for variables' definitions.

Table 10: African-Ethnic-Group Analysis - Muslims in 2005 AD

	(1)	(2)	(3)	(4)
Dep. Var	% Muslim in 2005 AD			
Ln Gini Index of Land Quality (a)	0.125***	0.053**	0.209***	0.114**
	(0.026)	(0.023)	(0.050)	(0.048)
Distance to 1800 AD Trade Routes (b)	-0.363***	-0.229**	-0.590***	-0.428***
	(0.054)	(0.103)	(0.107)	(0.127)
Interaction: (a)*(b)			-0.139**	-0.108**
			(0.052)	(0.049)
Average Land Quality	-0.411***	-0.530***	-0.365***	-0.504***
	(0.126)	(0.124)	(0.136)	(0.121)
Country FE	NO	YES	NO	YES
Observations	549	549	549	549
R-squared	0.41	0.67	0.43	0.68

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
All specifications focus on African ethnic groups.
See Appendix B for variables' definitions.

Table 11: African-Ethnic-Group Analysis - Pastoralism vs Agriculture

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var	% Pastoral	% Agricultural	(% Pastoral)/(% Agricultural)			
Ln Gini Index of Land Quality	1.077***	-0.476***	0.107***	0.057***		
	(0.133)	(0.109)	(0.013)	(0.012)		
Average Land Quality	0.347	0.953	-0.001	-0.08		
	(0.662)	(0.718)	(0.076)	(0.072)		
% of Muslim in 2005					0.177***	0.148***
					(0.038)	(0.050)
Country FE	NO	NO	NO	YES	NO	YES
Observations	549	549	543	543	543	543
R-squared	0.13	0.08	0.15	0.44	0.12	0.43

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
All specifications focus on African ethnic groups.
See Appendix B for variables' definitions.

Table 12: African-Ethnic-Group Analysis - Class Stratification

	(1)	(2)	(3)	(4)	(5)	(6)
	All Groups	Muslim Groups	Non-Muslim Groups	All Groups	Muslim Groups	Non-Muslim Groups
Dep. Var	Class Stratification			Class Stratification		
Ln Gini Index of Land Quality	0.159***	-0.009	0.190***	0.155**	0.009	0.181**
	(0.056)	(0.046)	(0.051)	(0.076)	(0.063)	(0.080)
Average land Quality	-0.137	-0.664***	0.110	-0.092	-0.469**	0.241
	(0.155)	(0.193)	(0.165)	(0.243)	(0.183)	(0.306)
Country FE	NO	NO	NO	YES	YES	YES
Observations	482	138	344	482	138	344
R-squared	0.08	0.15	0.06	0.19	0.43	0.23

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
Specifications (1) and (4) include all African ethnic groups. Specifications (2) and (5) ((3) and (6)) focus on Muslim-majority (non-Muslim majority) African ethnic groups.
See Appendix B for variables' definitions.

Table 13: African-Ethnic-Group Analysis - Egalitarian Inheritance Rules

	(1)	(2)	(3)	(4)
Dep. Var	Egalitarian Inheritance Movable Property		Egalitarian Inheritance Land Property	
Muslim Majority (dummy)	0.338***	0.161**	0.240***	0.134**
	(0.072)	(0.075)	(0.072)	(0.058)
Country FE	NO	YES	NO	YES
Observations	488	488	445	445
R-squared	0.09	0.27	0.05	0.27

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
All specifications focus on African ethnic groups.
See Appendix B for variables' definitions.

Table 14: African-Ethnic-Group Analysis

Believe in a Moral God - Pre-colonial Centralization

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var	Belief in a Moral God				Jurisdictional Hierarchy	
% Muslim	0.810***	0.604***			0.5410***	0.6818*
	(0.057)	(0.136)			(0.177)	(0.325)
% Christian			-0.414**			
			(0.179)			
% Ethnoreligious				-0.437***		
				(0.128)		
Country FE	NO	YES	YES	YES	NO	YES
Observations	338	338	338	338	520	520
R-squared	0.53	0.64	0.58	0.57	0.04	0.19

OLS estimates with standard errors clustered at the country level in parentheses.
***p<0.01, **p<0.05, *p<0.1.
All specifications focus on African ethnic groups.
See Appendix B for variables' definitions.