Muslim Trade and City Growth before the 19th Century: Comparative Urbanization in Europe, the Middle East and Central Asia

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Abstract

When and why did once thriving urban centers across Eurasia fall into decline, sometimes abandoned by the wider world? In the year 1200 CE, most of the largest cities in Western Europe were inhabited by just tens of thousands of individuals while Middle Eastern and Central Asia cities — like Baghdad, Marrakesh and Merv — had upwards to 100,000 residents each. By 1800, however, this pattern had reversed. In this paper, we explore the importance of historical Muslim trade in explaining urban growth and decline in the run-up to the Industrial Revolution. Using a difference-in-differences approach, we look at Eurasian urbanization patterns as a function of distance to Middle Eastern trade routes before and after 1500, the turning point in terms of Europe's breakthroughs in seafaring, trade and exploration. Our results suggest that proximity to Muslim trade routes was positively associated with urbanization in 1200 but not in 1800. These findings speak to why Middle Eastern and Central Asian cities — long beneficiaries of locational centrality between Europe and Asia — declined as Europeans found alternative routes to the East and opened new trade opportunities in the New World.

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The late 15th century is often heralded as a world historic juncture, ushering in exploration, and eventual exploitation, of the New World; the Columbian Exchange of crops, peoples and diseases; and an age of colonial rule by Europeans. While the New World discoveries were history-changing in their significance for world economic and institutional development, Columbus's discovery of the New World in 1492 CE often overshadows another important circumnavigation which took place only years later. When Portuguese explorer Vasco da Gama sailed around Africa's Cape of Good Hope in 1498, this event was momentous for economic development in the Middle East and Central Asia, world regions which long benefitted from connecting markets in Western and Southern Europe with South and East Asia.

Both Columbus and da Gama were desperately seeking opportunities to trade with societies of Asia when they began their risky journeys West and East, respectively. Up until that point, spices, textiles and other "Eastern" commodities moved from China and India through Middle Eastern cities, like Aleppo and Cairo, before continuing to Venice or other European destinations. Da Gama's feat of exploration meant that Europeans would be able to create a route to Eastern ports, allowing them direct access to valued commodities. Observers commenting at the time believed that Cairo and Mecca would be "ruined" as a result (Frankopan 2016, 222).[1] Cities that indirectly benefited from Middle Eastern trade were also concerned about the new developments. For example, it was believed that Venice would "obtain no spices except what merchants were able to buy in Portugal" and a sense of "shock, gloom and hysteria" set in among Venetians who believed that da Gama's discovery marked an end to their city's prosperity (Frankopan 2016, 220-222).[2]

In this paper, we compare the impact of historical, Middle Eastern trade on city size before and after breakthroughs in Europe's "Age of Exploration." In particular, using a difference-in-differences approach, we examine Eurasian urbanization patterns as a function of distance to Middle Eastern trade routes before and after 1500, the turning point in terms of Europe's breakthroughs in seafaring, trade and exploration. We find that cities proximate to historical Middle Eastern trade routes were larger in 1200 than areas further from those routes; this pattern reverses, however, between 1500 and 1800.[3] To address the issue of the endogenous development of trade routes, we exploit the fact that prior to European advances in seafaring, the world's most important trade routes connected land and sea choke points.

[1]Long distance traders were especially concerned that goods transported overland would be subject to taxes and fees, whereas a complete sea route would allow Portuguese merchants to undercut prices (Frankopan 2016, 220).

[2]Eventually Venice's merchant galleys were "mothballed," sitting out most of their usual trips (Cliff 2011, 362).

[3]To what extent should we think of these as "Muslim" trade routes? Routes linking the Red Sea, Persian Gulf, and other major waterways and trade destinations date back to Roman times and even earlier (Findlay and O'Rourke 2007, 87). That said, the Arab conquests and subsequent spread of Islam across the Middle East encouraged forms of language unification and cultural similarity that may have encouraged long-distance trade (Lombard 1975, 2-3). The Arab conquests may also have encouraged the spread of particular institutional configurations across the region (Chaney 2012). In other words, although the peoples of the Middle East were long important in trade, the rise of Islam may have encouraged the consolidation of their control of Eastern trade (Cliff 2011, 109).

We use the distance to lines connecting these choke points as an instrumental variable for actual trade routes. Taken together, our results suggest that Middle Eastern traders may have been some of the original "losers of globalization" in world history.[4]

Our focus on the impact of international trade on city growth provides a different perspective on the question of the economic divergence of Muslim and Christian societies than those which are prominent in the existing political economy literature. Influential works consider the effects of Islamic law (Kuran 2010), Islam's outsized political influence relative to other world religions (Rubin 2017) or the way that cultural institutions common in Muslim societies may have hindered economic growth (Greif 1994). Blaydes and Chaney (2013) argue that Europe's reliance on decentralized feudal institutions to manage state-society relations enjoyed better economic outcomes in the long run compared to the centralized mamluk institutions common in the Muslim world. Our findings suggest that while institutional advantages may have helped pave the way for European exploration, the benefits this conferred in trade are responsible for at least some of the reversal in economic fortune observed for the historical trajectories of Muslim and Christian societies. In other words, part of the "long" divergence between the Middle East and Europe can be explained through a causal channel associated with changing global trade patterns, a factor subject to sudden disruptions.[5]

Our paper differs from, and builds upon, existing works on the legacy of long distance trade and urbanization. In comparison to Bosker et al. (2013), we benefit from a larger, more balanced sample of Muslim cities — including cities located in Iran, Central Asia and Muslim India — which allows us to more fully explore the effects of long-distance trade on city growth, a factor which was not a focus of their analysis.[6] We also provide a different perspective than Greif (1994) who has argued that cultural differences between "Eastern" and "Western" societies in the realm of long distance trade created the conditions under which European societies generated growth-promoting institutions that ultimately fostered economic prosperity. Our narrative, on the other hand, suggests that Greif's Maghrebis and Genoese were subject to the same fundamental trade shocks and, as a result, rose or declined as a result of their similarities, not differences.

While our findings speak primarily to the rise and fall of cities in the Muslim world, the relevance of proximity to Muslim trade routes for European cities also suggests a partial account for the "little divergence" in economic prosperity which occurred *within* Europe

[4]Abu-Lughod (1991) describes the emergence of a 13th century globalized and interconnected world system in which Muslim merchants played a pivotal role. The major developments in exploration that took place in the 16th and 17th centuries introduced what has been described as a period of "proto-globalization" or early modern globalization (e.g., Hopkins 2002; Bayly 2004; Stearns 2010). This might be contrasted with the modern period of globalization in the 19th and 20th centuries which is the overwhelming focus of the existing literature on globalization.

[5]See Kuran (2010) for more on the "long" divergence.

[6]While Bosker et al. (2013) have 677 European cities in their sample, they have a sample of only 116 Middle Eastern and North African cities. The geographic scope of their analysis stops at the contemporary borders of Iraq and Turkey, making it difficult to fully explore the effects of long distance trade on urbanization. Instead, Bosker et al. (2013) are more focused on growth based on "urban potential" which takes into account the size of nearby cities of the same dominant religious identification.

during the early modern period. Southern Europe long benefited from proximity to Middle Eastern trade routes — an advantage that was lost with the seafaring breakthroughs of the 16th century. Findlay and O'Rourke (2007, 206) also argue that the discovery of the Cape Route both integrated European and Asian markets but also "increased market integration within Europe, by overturning old monopolies and increasing competition." Our findings suggest that changing trade patterns had the dual effect of both increasing the importance of proximity to the Atlantic and the New World (Acemoglu et al. 2005) while simultaneously decreasing the relevance of old, Middle Eastern trade routes, with important implications for the levels of global economic development.

1 Trade, Islam and City Growth

If agricultural development created the earliest forms of wealth for world societies, it was historical trade that encouraged new heights in human prosperity. The first towns and cities typically arose in empires of the alluvial lowlands of places like Mesopotamia, as these were the first locations of systematized agriculture (Frankopan 2016, 3). As urban living began to spread to other areas, political, economic and cultural life began to consolidate in cities where merchants and artisans increasingly found markets for their products (Wickham 2009, 24-25). Wickham (2009, 24) calls the Roman Empire, for example, a "union of cities," each of which enjoyed forms of autonomy but shared a common commitment to "citiness or civilitas."

Antiquity was a period of intense and lucrative trade which fed dramatic increases in prosperity. A byproduct of that exchange was the growth of major urban centers, particularly in Southern Europe, North Africa and the Levant where relatively high levels of urbanization reflected prosperity and increases in standards of living. The rising living standards might be attributed, at least in part, to growing trade. Pre-Islamic Persian societies, for example, built sophisticated administrative systems with educated bureaucracies that eased trade by validating the quality of goods at market and maintaining a road system which criss-crossed the empire (Frankopan 2016, 4). Roman provinces in North Africa and the Levant were considered the "bread basket" of the empire, providing wheat, olive oil and other commodities valued by city dwellers in Rome and elsewhere. So important was the Carthage-Rome trade "spine" that when that trade ended, "population of the city of Rome began to lessen precipitously," dropping more than 80 percent (Wickham 2009, 78). While Europe became isolated from the richest Roman lands, the Roman provinces of the East continued to be urban, wealthy and sophisticated.

Findlay and O'Rourke (2007, xxii) point out that the Islamic world was the only major world region to maintain sustained and direct contact with all other major world regions of Eurasia during the late antique and medieval periods.[7] Long distance trade, which leveraged the unique locational advantages of the Middle East and Central Asia, served as a driver for economic prosperity and urbanization during the medieval period. Many of the cities

[7]Similarly, Hodgson (1974, 65) argues that Muslim regions were central to the "Afro-Eurasian Oikoumene" and, as such, interregional trade had the potential to be "determinative" of the region's fate.

in the region thrived as trade centers drawing on specialized goods from different places as middlemen profited from these exchanges. Lombard (1975, 10) goes as far as to describe Muslim cities during this period as a "series of urban islands linked by trade routes."[8] This also meant that they were, perhaps, less likely over the long run to develop themselves as producers of tradable goods, leading their economic prosperity to become unsustainable when Europeans overtook the region in trade capability.

1.1 Medieval Long Distance Trade

While the medieval period did not witness a rebirth of the intense, short-haul trade of the Roman Empire, long distance trade was an important feature of the Middle Ages, particularly for Middle Eastern societies that were well positioned to participate in trade which sought to connect distant world population centers.[9] In particular, trade connecting the Middle East to South and East Asia was robust with merchants using both Central Asian overland routes as well as sea routes connecting the Indian Ocean to the Red Sea. Spices, like pepper which made meat palatable, and textiles, including Indian cottons and Chinese silks, were in much demand. Holy Land Crusades beginning in the late 11th century opened new opportunities for the economic reintegration of Western Europe into this trade (Abu-Lughod 1989, 47; Blaydes and Paik 2016). But the Crusades were not only critical for stimulating economic markets in Western Europe — they also had the effect of enriching "Muslim middlemen who spotted that new markets could produce rich rewards" (Frankopan 2016, 144).

Trade was vitally important to Middle Eastern urban prosperity. Merchants made fortunes as they met growing demand for goods from China and India (Frankopan 2016, 144). For example, analysis from mid-fifteenth century Cairo suggests that the two hundred most important merchants "possessed over two million pieces of gold each" (Labib 1970, 77). Court records from Bursa from the late 15th century suggest that the wealthiest merchants in the city were those involved in either the spice or silk trade, both Eastern products (Inalcik 1994, 344-345). Lombard (1975, 146) argues that the concentration of wealth in the hands of merchants encouraged them to conclude profitable deals with court circles who spent their wealth on luxury goods.

Increasing trade fed the growth and development of what historians have called the "classical period" of the Islamic city, typically described as the period between the 12th and 15th centuries. Cairo — situated at the intersection of Red Sea trade routes and overland routes to Sub-Saharan Africa — was home to palaces, city fortifications and large mosques (Hanna 1998).[10] Proximity to Alexandria linked Cairo to the Mediterranean Sea. Beyond Egypt, the

[8]For example, many Persian Gulf ports, like Muscat, were primarily trading links in a chain connecting overseas markets, facilitating a "transshipment of goods between the sea and land trade" (Floor 2006, 2).

[9]Leading figures of the Muslim expansion were traders and there is no evidence to suggest Islam, as a religion, hindered capitalist or commercial development (Rodinson 1978).

[10]For example, Goldberg (2012, 339) argues that long-distance merchant activity played a critical role in "creating and sustaining the immense core cities of the Mediterranean, the eleventh century megapolises" and that traders created a "secondary Islamic urbanism" by integrating regional agricultural and craft production with larger and more distant markets.

Seljuks introduced major innovations in the development of the urban citadel, typically located on high ground with sizable walls and towers (Kennedy 2010, 280). From Samarkand to Damascus, massive buildings and monumental structures were undertaken as elites sought to leave a physical imprint on cities characterized by growing prosperity (Kennedy 2010, 280). Keene (2010) argues that these grand cities were the ultimate expression of civilized living during the medieval period, with amenities beyond the imagination of even the most sophisticated urban dwellers in Europe.

Middle Eastern and Central Asian states had a strong incentive to maintain security in the interest of maintaining long distance trade. Caravan routes could be disrupted by war, political change and Bedouin incursions; sea traffic was susceptible to naval action and piracy (Constable 2010).[11] States sought to secure and maintain trade routes by building roads and armed fortresses at stopping points on major routes as well as constructing rest houses to serve merchants and pilgrims (Hanna 1989, 23).

To what extent did rapacious sultans hinder the ability of traders to engage in commercial activity? While it is difficult to draw a conclusion for such a large region over a long time period, scholars have offered summary conclusions for particular historical moments. For example, in Fatimid Egypt and Syria there was "comparatively little interference by the governments in the trade of their subjects — a fact also manifested in reasonable customs tariffs — and the generally favorable situation created by the growing needs of an economically rising Europe" (Goiten 1967, 33).[12] Although customs duties existed, Goiten (1967, 61) describes the Mediterranean area as "free-trade community." Goldberg (2012, 351), writing about a similar period, suggests that merchants were suppliers of imported commercial goods which rulers themselves valued and sought to access (Goldberg 2012, 351). In addition, while it may have been possible for rulers to expropriate the wealth of merchants, Hodgson (1974, 137) describes this as a short-sighted strategy since traders could move or hide their assets with relative ease.[13]

How were trade routes affected by political instability and shocks to security? Beginning in the 11th century, the Islamic world's Eastern frontier became increasingly insecure, targeted by nomadic marauders and Turkic migrants. While Middle Eastern states were long

[11]Yet even under difficult political circumstances, Muslim merchants could flourish as a result of their ability to pragmatically negotiate across relevant actors — like consumers, jurists and local officials — while taking advantage of some unified aspects of Islamic law and available commercial facilities (Constable 2010).

[12]Lopez (1976) characterizes Europe's medieval commercial development. A variety of papers in political economy discuss the implications of the Commercial Revolution and its associated institutions (e.g., Milgrom et al. 1990; Greif et al. 1994; Cantoni and Yuchtman 2014).

[13]A robust literature in new institutional economics would suggest trade routes would move away from localities with political leaders who failed to respect property rights. Yet there is little evidence in the historical record to suggest that this was a major concern of traders. This was largely true because political leaders knew that should they predate on long distance merchants in this way, they would drive away this type of economic activity. For example, Dale (1994, 11) argues that Indo-Muslim merchants were able to travel and trade without obstruction over large distances. Trade supported the interests of states leading political leaders to be highly concerned with ensuring favorable conditions for traders (Goldberg 2012, 167). Traders often fostered the local market economy and provided rulers with the rare, luxury goods they desired (Chaudhuri 1985, 16). Merchants often took advantage of "competition among political rulers in attracting trade to their own ports" (Chaudhuri 1985, 107).

impaired by vulnerability to invasion by nomadic forces, this susceptibility seems to have been more acute at this historical juncture and more so in the Middle East than other world regions. Among the most noteworthy of these nomadic attacks came from the rise of the Mongols, a steppe people who succeeded in creating the largest land empire ever witnessed.

The conventional narrative about how the Mongol invasions impacted urban life in the settled cities of the Muslim world suggests a highly negative effect. Black (2008, 142) finds that the Mongol invasions devastated Islam's Eastern frontier, from the Oxus River to Damascus. In this process, ancient cities were destroyed and underground irrigation systems in Persia were irrevocably damaged (Black 2008, 142). A surprisingly large number of cities opposed the Mongols through popular rebellion and resistance were associated with high levels of destruction (Manz 2010, 134). Mongol leaders met resistance with "methodical mass murder on a scale not previously seen in Middle Eastern warfare" (Faroqhi 2010, 316).

While there is no doubt that there was a negative, short-term impact of the Mongols on forms of urban life, there has been little work which explicitly considers the empirical impact of the Mongols on urban development more generally. Indeed, a growing literature suggests a positive impact of the Mongol empire on trade. For example, Abu-Lughod (1989, 154) argues that the Mongols — through their political unification of large swaths of trade route lands — created "an environment that facilitated land transit with less risk and lower protective rent...by reducing these costs they opened a route for trade over territories that...broke the monopoly of the more southerly routes." In the process, the Mongols provided forms of stability across Eurasia where "rule of law was fiercely protected when it came to commercial centers" (Frankopan 2016, 178). Taxes were lowered and prices were rationalized in the Mongol Empire (Frankopan 2016, 173). The net result was a dramatic increase in the movement of people and goods (Levi 2010), leading money to "pour" into the towns of Central Asia (Frankopan 2016, 157).

1.2 Changing Patterns of Trade in the Early Modern Period

While overland trade remained active and stable in Central Asia through the 15th century, trade patterns after that point were considerably less certain (Levi 2010).[14] In addition, technological improvements, including advances in ship building, were critical to shifts in sea trade routes (Chaudhuri 1985, 15). Da Gama's explorations, for example, allowed the Portuguese to create their own "silk road" linking Lisbon with Angola, Mozambique, East Africa and, then, India and the Spice Islands, with important implications for the relevance of existing routes (Frankopan 2016, 224).[15] English and Dutch seafarers arrived in the Indian Ocean by the end of the 16th century, consolidating European trade influence in South and East Asia.

[14]For example, favorable political changes in Iran and along the Central Asian steppes could divert trade away from the southern sea route (Keene 2010).

[15]In order to create control over those strategically-important ports, the Portuguese also pursued an aggressive military approach (Frankopan 2016, 221).

Declines in spice purchases in Middle Eastern cities like Alexandria and Beirut were reported almost immediately after discovery of the Cape Route (Inalcik 1994, 341).[16] Before da Gama's breakthrough, Middle Eastern merchants were purchasing over a million pounds of pepper a year, much of which was resold in Europe (Labib 1970, 73). In the two decades afterwards, however, Germany, England and Flanders began to purchase their pepper from Portuguese merchants (Inalcik 1994, 342).[17] While trading activity in Cairo did not end, Cairene merchants had to face a "considerable shrinking of a market for merchants...when the Dutch came to dominate the spice markets of Europe" (Hanna 1998, 76). The real Dutch price of pepper — a distinctively "Eastern" commodity — declined steadily between 1500 and 1700 CE despite the fact that other widely traded commodities — like sugar — fluctuated considerably over the same interval (Findlay and O'Rourke 2007, 226).[18]

In response to the changing nature of trade, the imperial administrations of major Muslim societies fought to maintain the continued health and relevance of the routes they controlled (Levi 2010). The Mamluk sultan asked rulers on the Malabar coast of the Indian sub-continent to close their markets to the Portuguese (Inalcik 1994, 319).[19] The Ottoman Empire sought to strengthen their commercial position by modernizing roadways and upgrading sea and land fortifications (Frankopan 2016, 225).[20] The Ottoman sultan also sought to align himself with Muslim rulers in Sumatra with the goal of eliminating the Portuguese monopoly of certain trade routes (Inalcik 1994, 328). Muslim rulers in Central Asia, Persia and South Asia invested in maintenance and improvement of trade routes by repairing overland roads, providing security for caravans and quieting tribal peoples who sometimes obstructed commercial traffic (Levi 2010).

Yet despite efforts to maintain the competitive edge in commerce, cities were vulnerable to fluctuations in the benefits derived from trade. For example, beginning in 1503 the number of vessels arriving in Jeddah from central Indian ocean ports like Calicut and Daybul fell by as much as 60 percent, delivering a serious blow to the local economy (Meloy 2015, 219). The Portuguese sought to place limits on the number of vessels sailing to Jeddah from Indian ports and force those that did to receive special licenses (Meloy 2015, 224). According to Meloy (2015, 224), "although the Portuguese never completely dominated the Indian Ocean trade, they were able to reduce and even regulate the flow of its maritime commerce." In

[16]The price of pepper also increased in Cairo shortly thereafter (Inalcik 1994, 344).

[17]In addition, Venetians could no longer find adequate supplies of spices in Egypt (Lapidus 1967).

[18]Existing research suggests that not all of Northwestern European cities were becoming economically vibrant simultaneously. Lubeck and other cities associated with the Hanseatic League were in relative decline while those places linked to long-distance trade, like Antwerp and Amsterdam grew economically (Israel 1989, 5). Technical and design innovation of the Dutch shipbuilders turned out to be critically important for Dutch seafaring hegemomy (Israel 1989, 21).

[19]The Mamluk Sultanate and the Venetians also contemplated the possibility of digging a canal from the Mediterranean to the Red Sea with the goal of creating an alternative all-sea route from India to Europe (Crowley 2011).

[20]Not all regimes were in a position to mount an effective maritime response. For example, the Mamluk Sultanate — lacking forests and associated wood supplies for shipbuilding — could not easily compete as a maritime power (Crowley 2015). Crowley has also suggested that the steppe origins of the mamluk military caste made the Mamluk Sultanate particularly ill-suited to develop a maritime response.

1514, for example, only three ships were permitted to go from Calicut to Jeddah and Aden, respectively (Meloy 2015, 225).[21]

Basra is another important city which witnessed economic disruption as a result of changing trade patterns. Basra was historically both a sea port and a caravan city connecting Aleppo with the eastern Arabian peninsula (Abdullah 2001, 17). Merchants of Basra imported goods from India, sending back Arabian horses — which were highly valued on the sub-continent — and dates — which served as both a valuable commodity and as ship's ballast (Abdullah 2001). In 1200, Basra was estimated to have a population of about 50,000. By the early 18th century, conversations between the Ottoman governor in Basra and local merchants suggested a decline in the number of ships from India, likely as a result of the resurgence of alternative routes commodities traveled from India to Europe (rather than decline in demand for Indian goods). While the trade eventually rebounded, there was tremendous instability in levels of trade, damaging the prosperity of the city. By 1840, the French consular agent in Basra reported that the city's population had fallen precipitously (Abdullah 2001, 55).

The Atlantic explorations also impacted the nature of Old World trade patterns. In particular, dynamism in international trade shifted from the Mediterranean to the Atlantic with the New World discoveries.[22] Cities like London and Amsterdam rose in prominence relative to the declining economic prospects of cities in Italy and along the Adriatic, which had largely linked the Middle East to Europe. According to Frankopan (2016, 255), "Old Europe in the east and the south which had dominated for centuries...now sagged and stagnated...New Europe in the north-west...boomed." Formerly prominent Middle Eastern societies were unable to effectively compete in the new world economy — while northern and western European cities were growing rapidly, "in the Ottoman world...the number of cities with populations of more than 10,000 remained broadly the same between 1500 and 1800 CE" (Frankopan 2016, 256). Karaman and Pamuk (2010) show that per capita revenue in the Ottoman Empire was also flat over this interval, while England and the Dutch Republic were growing at an impressive rate.

2 Empirical Analysis

The narrative that we have presented suggests that trade — particularly long distance exchange — was a driver of economic prosperity in the medieval period. Yet, reliance on trade also implies susceptibility to the effects of shocks to trade paths. Scholars in the field of international political economy have argued that changes in the international economic environment, particularly related to trade networks and global value chains, can induce economic vulnerability (Gereffi et al. 2006) and volatility (Gray and Potter 2012) for those

[21]The 16th century was a period of intense upheaval in the Persian Gulf as well, particularly with the Portuguese seizure of the Kingdom of Hormuz in 1515 which facilitated Portuguese control over the Persian Gulf (Floor 2006, 9).

[22]Puga and Trefler (2014) consider the effects of trade integration on medieval Venice but do not consider the effect of the negative trade shock associated with the discovery of the cape route.

locales impacted by new economic dynamics.[23] In this section, we explore the impact of changes to trade compared to the advantages or disadvantages conferred by other factors, including geographic characteristics, religious identification or a city's proximity to other large cities? We test a series of hypotheses about the nature of urban growth and decline in the Islamic world and Christian Europe, with a focus on time periods before and after 1500 CE to examine the extent to which the urbanization patterns changed before and after Europe's breakthroughs in seafaring, trade and exploration.

2.1 Measuring Historical Patterns of Urbanization

As suggested above, we believe that a key reason for the decline of Muslim city populations relative to Christian cities relates to the loss of the Muslim's world's "middleman" role after seafaring technology improvements initiated by Europeans in the 15th and 16th centuries. Our goal is not to suggest that these technological advancements were exogenous; these developments were the culmination of increasing institutional advantage enjoyed by European polities rooted in Europe's evolving Commercial Revolution. That said, until critical discoveries were realized — like da Gama's discovery of the Cape Route — Muslim trade routes were economically significant despite Europe's emerging economic advantages.

In order to best isolate the effect of changing trade patterns on prosperity, we home in on changes in city size over the interval 1200 and 1800.[24] Although trade patterns were evolving in advance of da Gama's circumnavigation of Africa and Columbus's discovery of the New World, we take 1500 as the midpoint for our analysis as it represents a disjuncture in terms of breakthroughs in both eastern and western exploration. We have chosen 1800 as the end point for our analysis because city size at that point represents the state of the world on the cusp of the Industrial Revolution. Our analysis begins in 1200 — a high point in Islam's "Golden Age" — during which trade was of growing relevance for Western Europe and of continued importance for cities of the Muslim world.

The main source of data for our outcome variable — city population estimates for localities across Europe, Muslim Africa, Western Asia, Central Asia and Muslim South Asia —

[23] An existing literature discusses how countries develop trade paths and what happens when there are shocks or shifts to these paths. For example, Gereffi et al. (2006) highlight the dynamic aspects of global value chains, arguing that there are strong relational components to shifts in value chain organization. Countries that exist along a particular trade path as a result of quotas, for instance, are economically vulnerable to changes in quota policy. Gray and Potter (2012) examine the effects of trade openness on economic volatility. When states become peripheral or marginalized in the international trading network, this introduces greater economic volatility.

[24] To what extent should we think of city size as a reasonable proxy for economic development? De Long and Shleifer (1993, 675) suggest that the population of pre-industrial European cities serves as the best available indicator of economic prosperity, arguing that urban areas were key nodes of information and economic exchange that relied on high levels of agricultural productivity and economic specialization. Acemoglu et al. (2002) argue that increasing per-worker production and associated structural economic changes, resulted in growing city size. Acemoglu et al. (2002) present both cross-sectional and time-series evidence suggesting a close empirical association between urbanization and income per capita for cities around the world in the pre-industrial period.

come from Chandler and Fox (1974; henceforth Chandler).[25] The authors provide population data estimates for cities around the world, with increasingly comprehensive data beginning around 800 and continuing into the 20th century.[26]

In addition to population estimates, the authors have compiled lists of the world's largest cities for different points in time. The cities on this list are rank ordered by size. Population estimates are provided for many of the cities on the list, allowing us to benchmark estimated figures even for those localities that do not have city size values. For some of the cities which have information on their ranks but are missing actual population figures, we obtain population estimates using the power law distribution of city sizes and rank information.[27]

One important challenge in using the largest world cities lists is that a city which appears on a largest cities list for a given year does not necessarily remain on the subsequent lists of top cities. Conversely, there are cities which rise in their prominence only in later periods, and are thus missing in the previous lists of top cities. For example, Fez appears as the second largest city in the world in 1200 with population of 250,000, but drops in ranking to the sixteenth place in 1500 with population of 125,000, and does not appear on the list in 1800. London — listed as the second biggest city in the world in 1800 with population of 861,000 — is not on the list of largest cities in 1500 or 1200.

We adopt the following procedures for handling this issue in the establishment of our dataset. After compiling all the cities which appear at least once in any of the lists for the world's largest cities between 1200 and 1800, we assign a lower bound and an upper bound for its populations. Where a population estimate exists, either provided by Chandler or from the estimate based on the power law, both the lower bound and the upper bound values are assigned the same estimate. In the case where a city is missing from the list of a given year but appears on our compiled list, we assign zero as the lower bound, and the population of

[25]The main advantage of using this data set is that it allows us to collect city population data for cities across continents from a single source. To our knowledge, no other source attempts to code all of Europe as well as West, South and Central Asia and Muslim Africa for the historical time periods we are interested in examining. While Bairoch (1988) has been used as the primary source for population estimates for European cities, it does not have comparable data for cities in parts of West, South and Central Asia. For example, Bosker et al. (2013) utilize data from Bairoch (1988) for European cities and collect city estimates from additional sources for the Middle East and North Africa; their analysis does not, however, extend east of Baghdad. As Bairoch et al. (1988) notes, Chandler's data are the first study of its kind. In an endeavor to improve upon the study, Bairoch uses Chandler's data and enlarges the list of cities especially in Europe and Latin America with more recent available sources. In addition, Bairoch also provides population density estimates and an estimate of the margin of error. However these additions and improvements on the data have omitted regions outside Europe and Latin America. For our study we also do not believe that using Chandler's data poses a major cause for concern, as the data are highly correlated with those from both Bairoch and Bosker et al. (2013). Between 800 and 1800, we are able to match a total of 283 city-year observations from our data with Bairoch. The correlation between the two is 0.98. When we match our data with Bosker et al. (2013) with 293 observations, the correlation between the two data sets is 0.91.

[26]Chandler's works (1974, 1987) have been used extensively as a reference for compiling city populations. Chandler (1987) repeats much of the information provided in Chandler (1974) with the inclusion of an extension of historical coverage back to 2250 BCE. Modelski (2000, 2003) builds on Chandler's work to extend historical city data back to 3500 BCE. Reba et al. (2016) use both Chandler and Modelski's work to construct a spatially explicit dataset of urban settlements from 3700 BCE to 2000 CE.

[27]The appendix provides further details on this estimation approach.

the smallest (i.e., the 75th largest city in the world) that does appear on the year's list as the upper bound of the city's population. In other words, a city that appears on a top list in any given period, but does not make the "cut" in another year, is assigned a range of population estimate between zero and the lowest estimate from the largest cities list for that year.[28] Finally, we make use of the extensive population data records from Chandler to fill in additional population figures for the years when a city drops off the list of the world's largest cities. We believe that data quality for cities that were ever large, or began as small and then became large, will be higher than for other cities. The prominence of these locations in any time period would have increased the incentives for historians to learn about their population size for *all* time periods.

2.2 Coding Dominant Religion at the City Level

Although our primary interest is in comparing the parts of Eurasia that were near and far from Muslim trade routes both before and after Europe's Age of Exploration, there existed important institutional differences between polities in the Muslim world and Christian Europe which need to be accounted for. Our sample is focused on cities that were ever Muslim or Christian "dominant" for the specified regions.

Determining the dominant religious identification of a city might be challenging for a number of reasons in the historical period. For example, there are frequently divides between the religious identity of city dwellers versus their political leaders. As a result, we relied primarily on the accounts of experts to help us determine the dominant religious affiliation. We used a number of sources to code the cities in our dataset including, but not limited to: *Travels in Asia and Africa, 1325-1354* (Ibn Battuta), *The New Islamic Dynasties* (Bosworth), *The Rise and Fall of Great Cities* (Lawton), *A History of the Muslim World Since 1260* (Egger) and *Islamic and Christian Spain in the Early Middle Ages* (Glick). While our empirical approach does not allow us to chart fast-changing religious transformations (e.g., periods of rapid change in religious regime followed by reversion), we are able to chart the main trends in religious transformation on the time interval. This variable allows us to test the effect of institutional changes for each city, which co-vary with dominant religious identification.

To summarize, our sample includes all cities that ever appeared on a "largest cities of the world" list for places that became Muslim or Christian dominant in 1200 and 1800 CE. We focus on cities that are designated as Christian or Muslim, based on our coding of the dominant religion of the city for each of the years. We also validate our coding of cities based on Kennedy (2002) who maps the spread of Islam during this historical period.

[28] While this approach does not allow us to distinguish the difference between a city that has zero population and one that is non-existent, we do not believe this is a critical issue. A city devoid of any inhabitants would naturally cease to function as a proper city; furthermore, it is often difficult to establish when the founding year of a city is, since the basis for determining the date likely differs on who is considered to be the first inhabitant of the locale.

2.3 Empirical Approach and Results

Our focus is on the long-term effects of historical trade on city size as well as the effect of subsequent changes in trade routes on urbanization levels. Our empirical analysis is based on a difference-in-differences (DID) strategy between pre-1500 (1200) and post-1500 (1800). Our approach also follows Lieberman (2001) who suggests that a cornerstone of comparative historical analysis relies on the periodization of a historical chronology where a key marker of variation might be used to create an explanatory variable. Using this approach, the baseline relationship between the city population and the Muslim trade routes can be described in the following way:

$$\begin{aligned} \text{LogPop}_{it} = \quad & \beta_0 + \beta_1 \text{Dist2Trade}_i + \beta_2 \text{Post1500} + \beta_3 \text{Dist2Trade}_i \cdot \text{Post1500} \\ & + X_i\gamma + \varepsilon_{it}, \end{aligned} \tag{1}$$

where $LogPop_{it}$ is the natural log of city population of city i in year t, $Dist2Trade_i$ is the city's distance to the nearest Muslim trade route in 1100,[29] $Post1500$ is the period dummy for 1800, X_i is a vector of geographic controls, and the robust standard errors ε_{it} are clustered by city. In the above equation, we do not include city fixed effects, since $Dist2Trade_i$ is fixed for city i over time. We do include a vector of time-unvarying city-level controls, and also adjust the standard errors for within-city correlation since our data consist of repeated observations for each city over time.[30] Using our interval data with population estimates for each city, we utilize a generalized maximum log likelihood interval model to obtain the coefficient value estimates.[31] The DID estimate, β_3, captures the effect of changes in the distance to the nearest Muslim trade route on changes in city population.

The geographical control variables, X_i, are drawn from a variety of sources, and we include them in Columns 2 through 7 in Table 1. We first include the longitude and latitude of city location, distances to the nearest coast as well as dummy variables for the different continents. As fertile lands likely sustained higher population density and overall development in history, we also include the agricultural suitability index from Ramankutty (2001), which gives the

[29] Kennedy (2002) presents a series of Muslim trade route maps in 900, 1100, 1300, 1500 and 1700 CE. In the absence of trade route map for 1200, we use the Muslim trade route in 1100 instead.

[30] Country fixed effects would not apply here, as the state borders changed over the time periods for many of the cities.

[31] We use the `stata` command `intreg`, which takes interval data (including point, right and left-censored) and calculates the maximum log likelihood to obtain the coefficient estimates. With ε normally and identically distributed, the log likelihood can be expressed as:

$$lnL = -\frac{1}{2}\sum_{j\epsilon P}\{(\frac{y_j - x\beta}{\sigma})^2 + log2\pi\sigma^2\} + \sum_{k\epsilon I} log\{\Phi(\frac{y_{2k} - x\beta}{\sigma}) - \Phi(\frac{y_{1k} - x\beta}{\sigma})\} \tag{2}$$

where $j \epsilon P$ refers to observation j in point data, and $k \epsilon I$ refers to observation k in interval data, in which the unobserved y_k is in the interval $[y_{1k}, y_{2k}]$.

fractional value for the probability that the land will be cultivated based on its climate and soil properties.[32]

Because we believe that natural geographic features conducive for trade are important for city size, in Column 3 we control for any effect coming from being closer to the geographic connecting points between continents. Being closer to the trade route will also typically mean that some cities are also closer to a "choke point." We control for distance to the choke point to separate these two effects. We identify five natural geographic choke points: the Strait of Hormuz, the Strait of Gibraltar, the Bab al-Mandab (i.e., the Mandab Strait which connects the Red Sea to the Gulf of Aden), the Bosphorus Strait, and the isthmus of Suez. Figure 2 shows the locations of these points. With the exception of the isthmus of Suez, all of the choke points are narrow sea pathways located in-between continents. These were natural connecting points for sea traders, and would have featured prominently as endpoints in the overland caravan trade routes. We also include the isthmus of Suez, which is the narrow (i.e., 75 mile-wide) neck of land connecting Africa and the Arabian Peninsula; it served as a natural pathway through which the Muslim traders traveled to transport goods.

In Column 4, we control for whether being a Muslim, as opposed to a Christian, city had an effect on the urban population, independent of its proximity to the trade routes. Muslim societies operated differently from Christian cities as a result of divergent institutional structures. As a result, the urbanization of Muslim cities was likely determined by both trade as well as other institutions common to Muslim polities. One objective of our study is to understand how patterns of trade in this medieval and early modern periods impacted urbanization while also statistically controlling for a city's religious orientation.

In Column 5, we also include the Muslim and Christian "urban potential" for each city. Bosker et al. (2013) argue that city growth between 800 and 1800 depended heavily on whether a city was proximate to large cities of shared religious affiliation, as interdependent trade networks which formed within religious groups contributed to economic growth. We calculate the urban potential for each city using the formula defined in Bosker et al. (2013) and include the urban potential outcome as an additional control variable.

Next, one might be concerned that there are cases in which the city's dominant religion was different from the religion of the empire that ruled it. In particular, we observe an increase of the number of cities coded as Muslim in India by 1500, but we do not have consistent information about the nature of religious conversion on the part of the city populations. The rise of the Mughal Empire in the early 16th century may capture an India-specific effect different from the general Muslim effect we have sought to characterize. In Column 6, we thus include an additional control for cities located in India.

Finally, in Column 7 we investigate the importance of the Mongol invasion in the 13th century, which led to destruction of key cities in Eurasia. Devastating raids and pillages likely contributed to changes in trade routes and depopulation of key cities in the Middle East and Central Asia. As discussed in the previous section, however, there are also emerging

[32] An alternative measure to Ramankutty discusses the maximal caloric yield obtainable for each region; Galor and Ozak (2016) calculate the maximal yield, with the calculation changing before and after 1500 to account for exchanges in crops between the Old and New World to enrich the access to a variety of crops. Using this measure instead does not change our results in a substantive way.

debates on the opposite effect of Mongol rule. Peace and consolidation of vast lands brought under the rule of a single Mongol empire created opportunities for expansion of trade and urbanization.[33] With this specification we seek to assess the impact of the Mongol expansion on urbanization.[34]

Column 1 in Table 1 shows the baseline results. The distance to historical Muslim trade routes (β_1) suggests that cities closer to the routes were larger in 1200; a 10 percent greater distance away from the routes is associated with a city smaller in size by 1.4 percent. The coefficient for the interaction term (β_3) shows that relative to 1200, cities far from historical Muslim trade routes increased in size in 1800, compared to other cities; a 10 percent increase in the distance is associated with a 1.7 percent increase in the city size. Both coefficients are statistically significant at the one percent level. The "reversal of fortune" for cities close to the Muslim trade routes appears evident in the post-1500 period. This pattern remains robust with the inclusion of additional control variables, and the magnitude of the effect remains similar to the baseline.

In our main specification, being a Muslim city does not appear to have an impact on city size after controlling for the distance to historical Muslim trade routes.[35] In order to better understand this result in light of the existing literature on the growth-hindering impact of the region's cultural (e.g., Grief 1994), religious (e.g., Kuran 2010; Rubin 2017) and military-political institutions (Blaydes and Chaney 2013), we run an additional set of empirical tests to explore the potentially time varying impact of a city's dominant religious identification as well as tests to see if our results are robust within a split sample of Muslim and Christina cities. In Table 2, we replicate our main results in three additional specifications.

In the first column, we work to understand more about the potentially time varying effects of being a Muslim city.[36] While in our main specification, we find that there is no statistically significant effect of Islam on city size, in Column 1 we show the coefficient values where we also include the interaction between the Muslim city dummy variable and the variable indicating observations for 1800. Our results suggest that while Muslim status had a positive effect on city size in 1200, the interaction between Muslim city status and 1800 is negative. In other words, the effect of Muslim city status is time varying. Substantively, our results suggest that compared to 1200, being a Muslim city in 1800 meant around a 44 percent decrease in population size, controlling for other factors. Importantly for our arguments here, even after taking into account the time varying effect of Muslim city status

[33]See, for example, Mitchener and Weidenmier (2008) for more on the benefits of trade within empires.

[34]We compiled the list of cities coded as under the Mongol rule by looking at a number of maps depicting the Mongol Empire's rule at its apex in the late 13th century, including Shepherd (1911) and Kahn (1998); the list is available upon request.

[35]Identifying a "Muslim" city effect is empirically challenging for a number of reasons. First, most cities located closer to historical trade are Muslim and they do not change their dominant religion over time. As a result, the Muslim and trade effect are likely conflated. In addition, the relationship between pre-Islamic trade and the spread of Islam is a complicated one. For example, Michalopoulos et al. (2016) argue that Islam spread along caravan travel routes, where arid lands dominated the landscape and inhabitants may have had a preference for relatively egalitarian Islamic legal institutions.

[36]Our discussion of traders within Muslim societies is not intended to exclude Christian and Jewish traders who operated in predominantly Muslim polities.

on city growth, we find a similar magnitude of effect to our main results for distance to historical Muslim trade routes.[37]

In Columns 2 and 3, we show the effect of distance to trade for just Muslim and Christian cities, respectively. These two, split sample specifications are analogous to running the main regression with an interaction term for all predictors.[38] We find the same basic patterns in terms of the sign and statistical significance of distance to historical Muslim trade routes and the interaction between distance to trade and the variable indicating 1800. It is notable that the coefficient size is even larger for Christian than Muslim cities, providing support for implications related to the "Little Divergence."

In sum, our empirical results suggest that, regardless of religious affiliation, proximity to Muslim trade routes appears to have benefitted city growth. This advantage, however, disappears with Europe's breakthroughs in exploration and may explain some of the decline of cities in southeastern Europe relative to northwestern Europe by 1800. While cities, in general, grew in size over this time period (Bosker et al. 2013), our results suggests that by 1800, those close to the trade routes stagnated to the extent that they became relatively smaller than those further away from the trade routes. While the rise of cities in Northwestern Europe was spurred by the birth of Atlantic trade (Acemoglu et al. 2003), our analysis provides an alternative — and complementary — narrative for the broader effect of Europe's seafaring breakthroughs, which included the alienation of Muslim cities from their advantage in trade, with implications for those European urban areas that benefited most from that advantage.

2.3.1 Examining Pre-Treatment Time Trends

A key assumption of our DID approach is that urbanization patterns for cities near and far from Muslim trade routes were parallel in the pre-treatment period. One way to check whether trends differ before 1200 is to run a placebo test, to determine whether the distance to the Muslim trade routes by 1200 already had a differential effect between the previous time period (we consider 600) and 1200. If the interaction term with the dummy variable for the year 600 is statistically significant (that is, the distance to the historical Muslim trade routes has a differential effect even before the discovery of the Cape Route), the parallel

[37]It is worth noting that we do not explicitly control for different types of city institutions. While communes and parliaments in Christian cities had greater flexibility in responding to trade shocks and were thus able to generate a greater mean level of trade (e.g., Greif 2006; Cox 2016), their development was also likely endogenous to city size. Similarly, cities experiencing violence may have experienced different development outcomes from the rest (e.g., Dincecco and Onorato 2016; Bosker et al. 2013), but these events themselves can be considered as outcomes dependent on the city size. Accordingly, we interpret these important factors mainly as potential outcomes of proximity to the edge routes, rather than controls in our regressions. As an additional robustness check on our main results, however, we also do consider past conflict as yet another control and find that the distance to trade effect remains consistently strong; see Table A.2 in the appendix for further details.

[38]We choose not to use this for our main specification since it is not clear that all of our explanatory and control variables require an "interaction" with Muslim city identification.

trends assumption may be violated.[39] We estimate the following equation, in which the omitted period (1200) serves as the baseline:

$$\begin{aligned} \text{LogPop}_{it} = \quad & \beta_0 + \beta_1 \text{Dist2Trade}_i + \beta_2 600 + \beta_3 1800 \\ & + \beta_4 \text{Dist2Trade}_i \cdot 600 + \beta_5 \text{Dist2Trade}_i \cdot 1800 \\ & + \text{X}_i\gamma + \varepsilon_{it}, \end{aligned} \tag{3}$$

The results presented in Table 3 show that the coefficient for the distance variable interacted with the previous time period (β_4) is not statistically significant, suggesting that the effect of proximity to the trade routes on urbanization did not differ over the time periods before 1500. Figure 3a shows time trends on the mean predicted city population, in which we see parallel growth of cities close and far from the trade routes in the period leading up to 1200. Afterwards, we observe that the cities close to the trade route experience stagnation between 1200 and 1800, while those far from the trade route experience growth to surpass others by 1800.

Next, we investigate further the changes observed between 1200 and 1800 by taking the distance to the nearest trader route in 1500 in Kennedy (2002) as the baseline, and assessing the pre-1500 trends in 1200 versus post-1500 trends in 1800. The estimation is specified in the following equation:

$$\begin{aligned} \text{LogPop}_{it} = \quad & \beta_0 + \beta_1 \text{Dist2Trade}_i + \beta_2 1200 + \beta_3 1800 \\ & + \beta_4 \text{Dist2Trade}_i \cdot 1200 + \beta_5 \text{Dist2Trade}_i \cdot 1800 \\ & + \text{X}_i\gamma + \varepsilon_{it}, \end{aligned} \tag{4}$$

In the equation above, the omitted period (i.e., 1500) serves as the baseline period, and 1800 as the post-1500 period. The interaction of the year 1200 dummy variable and the distance to trade route allows us to test for pre-treatment trends. The interaction of the year 1800 dummy variable with distance to the trade route in 1200 gives information on the direction and magnitude of the proximity effect by 1800. Table 4 presents the results. We find that cities with varying proximities to the trade routes were unlikely to follow different trends in 1200 relative to 1500, as indicated by the statistically insignificant β_4 coefficient estimate. From 1500 to 1800 we observe the "reversal" result, where the proximity effect reverses its sign and turns positive. This result is primarily driven by the relative rise of the cities far from the trade routes and stagnation of those closer to the routes after 1500, as indicated in Figure 3b.

2.3.2 Instrumental Variable Analysis

As is common in the literature examining the effects of trade on growth, we wrestle with the question of how to take into account endogenously created trade networks. Scholars of trade

[39] The population estimates for 600 are drawn from Chandler's list in 622, and constructed the same way as described in the data section above.

history suggest that the location of trade entrepots and routes are a function of a variety of factors, including geographical features, historical trajectories and economic conditions (Chaudhuri 1985, 161). Scholars seeking sources of exogenous variation in the location of routes tend to either use old transportation routes as a source of quasi-random variation or they rely on a sample that is "inconsequential" in the sense that unobservable attributes do not impact the placement of the trade or transportation network (Redding and Turner 2015).

We adopt an instrumental variable approach as a way to mitigate these concerns. As an instrumental variable for the distance to the Muslim trade routes in 1200, we construct line segments between five natural sea and land choke points across North Africa, the Middle East and Central Asia. The lines connect the Strait of Gibraltar and the isthmus of Suez, the isthmus of Suez and the Bab al-Mandab, and the Bosphorous Strait and the Strait of Hormuz. The line segments are meant to capture historical trade networks. We note that major end point cities along the Muslim trade routes located themselves near these points and, as such, the lines connecting these choke points also approximated the travel routes connecting the cities. For example Cairo, located close to the isthmus of Suez, was a major destination for Trans-Saharan and Indian Ocean trade, as it is located with relatively easy access to the southwest and northwest corners of the Mediterranean, respectively. Fez is Morocco's imperial city located closest to the Strait of Gibraltar; Constantinople (later Istanbul) is on the Bosphorus Strait; and Sana'a is the largest major settlement near the Bab al-Mandab (i.e., the Mandab Strait). Figure 2 presents these lines connecting the choke points.[40]

Our empirical strategy draws on the idea that the connective line segments would have no reason to go through regions of particular significance, other than that those regions represent the shortest path between natural choke points. That is, the lines are not drawn intentionally to go through historically important cities, the proximity to which would necessarily mean larger population by construction and not by proximity to a trade route. We also assume that the distance to the line segment is an excludable instrument for the Muslim trade routes, and that there is no other transportation network that may have developed due to urbanization during this time period.[41]

[40] We note that lines connecting the choke points should accurately reflect historical overland trade routes. Bab al-Mandab and the Strait of Hormuz, for example, are not connected by a line because historically there was no trade route going through the Empty Quarter. Even if drawing more lines to connect all the choke points could reflect trade routes better, such an approach raises the possibility of an "overfitting" problem associated with a proliferation of lines. More lines also imply that, in general, cities' proximity to the lines would become closer, such that cities further away from a line would, at the same time, be closer to another, making the proximity comparison difficult.

[41] One notable exception may be historical Roman roads. Although built long before the focus of our analysis, Roman roads may correlate with our instrument, as they extended beyond Europe to North Africa, the Levant and Anatolia. Inclusion of the distance to the nearest Roman road from DARMC as an additional control variable does not alter our main findings in table 5.

Our analysis requires that we validate that the line segments actually capture the historical trade networks.[42] Table 5, Column 1 shows the first-stage result, where the distance to the nearest Muslim trade route in 1200 is regressed on the distance to the nearest line segment connecting the natural choke points, along with other control variables. We find that the distance to the nearest line is positively correlated with distance to the nearest Muslim trade routes. In particular, a ten percent increase in the distance to a line segment connecting the natural choke points is associated with a 7.5 percent increase in the distance to the nearest historical Muslim trade route; this coefficient is statistically significant at the one-percent level. Next, Column 2 presents the result in which the distance to the nearest trade route is instrumented by the distance to the line segment. We find that, consistent with the findings in Table 1, the distance effect on city population remains negative in 1200, while the differential effect of distance on city population is positive by 1800. Compared to the Table 1 results, both effects increase in magnitude and are statistically significant.[43]

2.4 Robustness Checks

Our main results suggest that the reversal in economic prosperity observed across regions of Eurasia can be explained, at least in part, by changing patterns of trade. In particular, we have shown that cities closer to historical Muslim trade routes were larger before 1500 but that proximity to these routes is negatively correlated with city size in 1800. In this section, we consider our findings in light of two sets of robustness tests — empirical evaluation with additional control variables and consideration of alternative time spans for our investigation.

2.4.1 Additional Control Variables

Although we have included a number of geographic, economic and political control variables in our main specifications, in this section we consider additional factors which may explain city size. We consider various historical and regional developments in Europe that may confound our main results that we have not yet accounted for in our empirical analysis.

The specifications reported in Table 6 maintain all of the same of control variables used in Table 1 and add additional control variables. In Columns 1 and 2, we include measures of Carolingian political influence and Holy Land Crusade mobilization, respectively, as both have been suggested as historical channels which might impact the development paths of cities (Blaydes and Chaney 2013; Blaydes and Paik 2016). In Column 3, we include a dummy variable for whether a city was located in one of the Low Countries (e.g., Luxembourg, Belgium and the Netherlands). The Low Countries have been thought to enjoy geographic and institutional structures that led to better economic growth and greater urbanization compared to the rest of Europe (van Bavel 2010; Mokyr 1977). We also check for effects

[42] We use the `stata` command `eintreg`, which accommodates endogenous covariates in interval regressions and calculates the maximum log likelihood to obtain the coefficient estimates; see Roodman (2011) for further details.

[43] If we were to include the Khyber Pass — the narrow mountain pass which connects Central with South Asia — as an additional choke point, our empirical results remain substantively similar.

related to the European "city-belt" in Column 4; this region encompasses northern Italy, areas of the Alps and southern Germany, as well as the Low Countries. The cities along this belt formed strong trade networks particularly along the Rhine River and Baltic Seas during the High Middle Ages, allowing them to remain strong enough to deter expansion efforts by territorial states (Abramson 2016).

Next, we include a Roman Empire control variable in Column 5. Trade within the European city-belt and other parts of Europe was facilitated by Roman roads since these roads provided critical infrastructure which supported economic development (Dalgaard 2017). And because Roman roads not only covered European cities but also many of the cities of North Africa, Anatolia and the Levant, we are able to include this variable for both Muslim and Christian cities in our sample.[44]

In Column 6, we include an Ottoman Empire control variable. From its beginning in the 14th century and through its expansion until the late 17th century, the Ottoman Empire controlled many of the most important Muslim trade routes both in the Mediterranean Sea, Persian Gulf and Red Sea regions. Consolidation of different parts of the Middle East under single imperial polity may have led to the growth of cities, especially during periods of the Empire's expansion.[45]

Finally, we examine the impact of the Atlantic trade on urbanization in Column 7. The growing success of Atlantic coastal cities in maritime trade and exploration was associated with the ability of Atlantic traders to seek their own routes both to the East and to the New World. In particular, a reorientation of trade toward the New World strongly advantaged these locations. Being an Atlantic trading city, therefore, may have helped a city to grow with an expectation that this impact would increase over time. We follow Acemoglu et al. (2005) in identifying cities which are located in Atlantic states (i.e., England, France, Portugal, Spain, and the Netherlands, each coded as an "Atlantic Country"), and control for the Atlantic effect to explore if the proximity to the Muslim trade routes still emerges as a statistically significant result.[46]

In Table 6, we find that the inclusion of these potential confounding variables in our analysis has little impact on the magnitude and statistical significance of our main effects associated with the time-differing impact of proximity to historical Muslim trade routes on city size.

2.4.2 Alternative Time Intervals

In Tables 7 and 8, we examine whether our main empirical results are robust when examining periods shorter than the 1200 to 1800 CE time span. In all of our alternative specifications,

[44]We code each city to be part of the Roman Empire if it was under Roman rule in 200 CE. An alternative would be to calculate the distance to the nearest Roman road utilizing the Roman Empire's transportation network map by Harvard University's Digital Atlas of Roman and Medieval Civilizations (DARMC) `http:\\darmc.harvard.edu`. Using this alternative control variable does not change our main result.

[45]We code a city to be under Ottoman rule using the reference map of the Ottoman Empire in Encyclopedia Britannica `http:\\www.britannica.com`.

[46]Coding cities along the Atlantic coastline (i.e., an "Atlantic City") instead of coding for cities located with an Atlantic country does not change the main result.

1500 still represents the "mid-point" in our analysis and we close the temporal window around 1500.

Table 7 presents results where the pre-1500 period of analysis begins in 1300 and the post-1500 period of analysis ends in 1700. For this exercise, we measure each city's distance to the nearest Muslim trade route in 1300, and compare city populations in 1300 and 1700. Table 8 presents results where the pre-1500 CE period of analysis begins in 1400 and the post-1500 period of analysis ends in 1600.[47] In both Tables 7 and 8, we see similar results as those found in our main specification presented in Table 1; cities closer to the Muslim trade routes are likely to be larger in size pre-1500, while increases in the distance away from the routes are associated with increases in population post-1500. The magnitude of the differential effect is smaller for the shorter time intervals, however. In Tables 7 and 8, (β_3) values range from 0.04 to 0.07, while the range is from 0.17 to 0.19 in Table 1.

Tables A3 and A4 in the Appendix replicate results from Table 2, but for the shorter time spans. Similarly, Tables A5 and A6 provide robustness checks for Tables 7 and 8, respectively, but with the inclusion of additional control variables to our main specifications. We find that both the statistical significance and magnitudes of coefficients for the shorter time intervals remain similar with the inclusion of the additional controls.

3 Conclusions

The cities of the Muslim world were among the largest and most prosperous of the medieval period. Some part of this prosperity can be attributed to the pivotal role Muslim cities played in long distance trade. Strategic location was crucial as "Islam occupied a key position, at the point of intersection of the major trade routes," connecting the two most important economic units of the period — the Indian Ocean trade zone with the Mediterranean Sea (Lombard 1975, 9-10). Eastern products were highly valued and had few obvious substitutes. This led the total volume of Euro-Asian trade between the 11th and 15th centuries to be large, creating economic prosperity for Middle Eastern traders (Chaudhuri 1985, 59-63). Indeed, Lombard (1975, 203) argues that during this period the greatest source of economic strength for the Middle East related to the "existence of large-scale foreign trade...and the existence of an active urban network."

Kennedy (2010, 274) writes that the "vast size" and the "importance of merchants" in medieval Muslim cities made them important locales for economic, political and religious life.[48] During this period, the cities that mattered were not Paris or London but rather those

[47]Since a map of Muslim trade routes in 1400 is unavailable in Kennedy (2002), we use the 1300 map of Muslim trade routes instead.

[48]The political implications of the existence of an influence-wielding merchant class is beyond the scope of this paper. Brett (2010) offers one explanation for why the merchants of Muslim cities were not more politically active; he considers them emasculated by their dependence on the warrior state for security. The influence of a large merchant class in medieval Muslim societies contrasts significantly with Western Europe during the same period, where "elite power was based in the countryside and the rural estate...cities were comparatively small and merchants regarded with suspicion" (Kennedy 2010, 274).

cities which "connected to the East...cities that linked to the Silk Roads running across the spine of Asia" (Frankopan 2016, 125).

How and why, then, was this pattern so decisively reversed? Muslim lands of the Middle East and Central Asia mainly benefited from locational centrality, conferring those societies with a comparative advantage in bridging world regions through trade. As a result, emphasis was placed on securing and maintaining trade routes, rather than developing alternative forms of comparative advantage. Trade entrepots like Venice and Egypt were commercial middlemen, "dealing less in the export of its own products than in the transit trade in foreign raw materials and manufactured goods" (Labib 1970, 73).[49] And because prosperity depended on locational advantage, it persisted only as long as that advantage did.

European improvements in seafaring meant that countries in Europe were relentlessly seeking their own routes to South and East Asia and, eventually, developing colonial political institutions to confer maximum economic advantage to the metropole. Where Middle Eastern societies did produce goods for export, scholars have argued that economic connection with Europe eventually may have driven indigenous manufacturers out of business as they became less competitive in world markets (Bromley 1994, 53).[50] Findlay and O'Rourke (2007, 304-305) conclude that by the "middle of the eighteenth century, the international economy had been transformed out of all recognition from the system that had existed at the beginning of the millennium." According to Cliff (2011, 361), "for nearly a thousand years, trade...had been conducted on Muslim terms...suddenly, the Portuguese had torn up the old order...swaths of the Islamic world were faced with economic decline." An entire network of Mediterranean-centered commerce which had prospered since antiquity was dislocated (Crowley 2011). Indeed, "conquest of the high seas" conferred an advantage to Europe "that lasted for centuries" (Braudel 1967, 300). The result was that Western Europe "became the dominant society in the world," a development which represented a "whole new era in world history" (Curtin 2000, viii).

We find that trade is a more consistent predictor of city size than Muslim religious identification and that the impact of trade on city size is robust to a variety of measurement strategies and empirical specifications. While our results do suggest that there may have been a negative, time-varying impact of Muslim religious identification, our results on the importance of changing trade are largely unchanged by the inclusion of variables which seek

[49] Another way to interpret our results suggests that Muslim societies proved not to be particularly resilient to exogenous, economic shocks. While these societies did enjoy high levels of human capital and financial resources, Muslim societies could not take those advantages and pivot to a new source of economic revenue. The question of why Middle Eastern cities did not develop their own industrial capacity is beyond the scope of this paper but one for which existing work suggests some explanations. Hodgson (1974, 137) writes that the manufacturing sectors of Middle Eastern societies tended to be dominated by governments, not private interests, and that military equipment was commonly produced. In addition, private investment was not able to flourish due to the insecurity of "visible wealth" (Hodgson 1974, 137). Manufacturers were particularly vulnerable to expropriation because of the limited mobility of their assets. The net result "rarely allowed for sustained industrial growth alongside the often exceedingly active commercial life" (Hodgson 1974, 67).

[50] The maritime revolution also gave the Europeans a military advantage since mobility of seapower made it possible for Europeans to build empires even when they were "inferior militarily on land" (Curtin 2000, 4).

to measure that changing influence of Islamic cultural (Greif 1994), religious (Kuran 2010; Rubin 2017) and political-military institutions (Blaydes and Chaney 2013). Our insights are also consistent with Abu-Lughod (1989, 243) who argues that, in the pre-modern period, the ways that failure to control key international trade routes may have had a pivotal impact on Middle Eastern economic prosperity. Our results suggest that the typical political economy characteristics of Muslim cities and states — including centralized forms of governance and slave soldier military administrations — may have impacted urbanization rates less consistently than changes to predominant patterns of trade during the pre-modern period.

We also find that the changing influence of proximity to historical Muslim trade routes is not driven by improvements to the prospects for Atlantic cities, alone. Acemoglu (2005, 547) suggest that "areas lacking easy access to the Atlantic, even such non-absolutist states as Venice and Genoa, did not experience any direct or indirect benefits from Atlantic trade." We go even further to suggest that these cities not only failed to benefit from Atlantic trade but also suffered a major trade shock as a result of the discovery of the Cape Route — a world historical event that occurred contemporaneously with the Atlantic discoveries.

Our findings are focused on the medieval and early modern period and, as a result, do not speak to the way Muslim and Christian cultural, political and economic institutions impacted growth during the modern period, when industrial production became an increasingly important part of economic growth. We do identify, however, an indirect channel by European institutional advantages damaged the economic prosperity of the Middle East. Rather than a conventional narrative about European exploitation of the colonized, European discoveries of new trade routes — an outcome likely driven by growth and investment-promoting institutions — made Middle Eastern middlemen obsolete, hurting the development prospects for the region.[51]

[51]This interpretation is consistent with Paine (2013, 376) who argues that the navigational triumphs of Europeans age of exploration should not be seen as accidents of history, but rather "the result of deliberate processes of purposeful exploration."

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Table 1: The Effect of Distance to Muslim Trade Routes on City Size

	Baseline	Geography	Distance	Muslim	Urban Potential	India	Mongol
Distance to Muslim Trade Route	-0.136***	-0.148***	-0.144***	-0.147***	-0.158***	-0.169***	-0.164***
	(0.021)	(0.024)	(0.025)	(0.025)	(0.026)	(0.026)	(0.026)
Distance X 1800 CE	0.167***	0.177***	0.179***	0.181***	0.189***	0.191***	0.176***
	(0.028)	(0.030)	(0.030)	(0.031)	(0.031)	(0.030)	(0.030)
1800 CE	-0.490***	-0.510***	-0.512***	-0.520***	-0.411**	-0.413**	-0.264
	(0.145)	(0.148)	(0.148)	(0.148)	(0.163)	(0.162)	(0.177)
Distance to Chokepoint			-0.120	-0.128*	-0.157*	-0.186**	-0.177*
			(0.074)	(0.077)	(0.091)	(0.092)	(0.091)
Muslim City Dummy				-0.128	-0.050	-0.045	-0.065
				(0.147)	(0.169)	(0.168)	(0.165)
Christian Urban Potential					-0.244**	-0.243**	-0.306**
					(0.116)	(0.115)	(0.120)
Muslim Urban Potential					-0.241	-0.257	-0.248
					(0.189)	(0.189)	(0.188)
Indian City Dummy						0.444**	0.344
						(0.209)	(0.218)
Mongol Empire Dummy							-0.227*
							(0.130)
Constant	3.935***	3.859***	5.507***	5.665***	6.353***	6.746***	6.539***
	(0.104)	(0.364)	(1.005)	(1.081)	(1.272)	(1.292)	(1.292)
N	615	603	603	603	603	603	603
Geography	No	Yes	Yes	Yes	Yes	Yes	Yes

1100 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.* p <0.1, ** p <0.05, *** p <0.01.

Geographic controls include longitude and latitude, continental dummies for Asia and Africa, distance to coast, and agricultural suitability index.

Table 2: Alternative Specifications

	Interaction	Muslim Cities	Christian Cities
Distance to Muslim Trade	-0.121***	-0.103***	-0.216***
	(0.026)	(0.030)	(0.043)
Distance X 1800 CE	0.121***	0.119***	0.202***
	(0.033)	(0.040)	(0.050)
1800 CE	0.214	-0.218	-0.121
	(0.208)	(0.291)	(0.316)
Distance to Chokepoint	-0.161*	-0.208*	-0.188
	(0.095)	(0.125)	(0.121)
Muslim City Dummy	0.356*		
	(0.187)		
Muslim City X 1800 CE	-0.578***		
	(0.141)		
Christian Urban Potential	-0.314**	-0.683	-0.421**
	(0.123)	(0.448)	(0.166)
Muslim Urban Potential	-0.244	-0.271	-0.103
	(0.182)	(0.202)	(0.364)
Indian City Dummy	0.278	0.233	-0.855
	(0.200)	(0.200)	(1.115)
Mongol City Dummy	-0.157	-0.007	-0.208
	(0.128)	(0.156)	(0.310)
Constant	6.003***	7.116***	6.640***
	(1.345)	(1.940)	(1.636)
N	603	254	349

Robust standard errors corrected for clustering at the city level.

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

Geographic controls include longitude and latitude, continental dummies for Asia and Africa, distance to coast, and agricultural suitability index.

Table 3: Pre-treatment Trends — 600, 1200 and 1800

	600, 1200, 1800
Distance to Muslim Trade Route	-0.159***
	(0.026)
Distance X 600 CE	0.066
	(0.064)
Distance X 1800 CE	0.179***
	(0.031)
600 CE	-1.269
	(1.224)
1800 CE	-0.389**
	(0.166)
Constant	6.303***
	(1.411)
N	778

1100 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.
* p <0.1, ** p <0.05, *** p <0.01.
Includes the full set of controls from Table 1 column 7.

Table 4: Pre-treatment Trends — 1200, 1500 and 1800

	1200, 1500, 1800 CE
Distance to Muslim Trade Route	-0.132***
	(0.031)
Distance X 1200 CE	-0.028
	(0.027)
Distance X 1800 CE	0.136***
	(0.031)
1200 CE	0.189
	(0.176)
1800 CE	-0.346*
	(0.199)
Constant	6.187***
	(1.061)
N	928

1500 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.
* p <0.1, ** p <0.05, *** p <0.01.
Includes the full set of controls from Table 1 column 7.

Table 5: Instrumental Variable Regression

	First-stage Reg. DV: Dist2Trade		IV Regression DV: LogPop
Distance to Lines Connecting Choke Points	0.752***	Distance to Muslim Trade Route	-0.267**
	(0.219)		(0.106)
Distance X 1800 CE	0.127**	Distance X 1800 CE	0.316***
	(0.051)		(0.077)
1800 CE	-0.520	1800 CE	-0.959**
	(0.688)		(0.426)
Constant	4.988*	Constant	7.855***
	(2.567)		(1.480)
Observations	603		603

Robust standard errors (in parentheses) are clustered at the city level.
* p <0.1, ** p <0.05, *** p <0.01.
Includes the full set of controls from Table 1, Column 7.

Table 6: Robustness Check — Additional Control Variables

	Carolingian	Crusader	Low Countries	European City-belt	Roman	Ottoman	Atlantic
Distance to Muslim Trade Route	-0.163***	-0.170***	-0.165***	-0.163***	-0.164***	-0.149***	-0.152***
	(0.026)	(0.027)	(0.026)	(0.026)	(0.026)	(0.027)	(0.026)
Distance X 1800 CE	0.177***	0.180***	0.176***	0.176***	0.176***	0.160***	0.160***
	(0.031)	(0.031)	(0.030)	(0.031)	(0.031)	(0.030)	(0.032)
1800 CE	-0.234	-0.091	-0.245	-0.285	-0.264	-0.112	-0.264
	(0.176)	(0.188)	(0.177)	(0.176)	(0.177)	(0.179)	(0.176)
Carolingian Empire Dummy	0.059						
	(0.129)						
Distance to Crusader Location		-0.117**					
		(0.048)					
Low Countries Dummy			0.131				
			(0.143)				
European City-belt Dummy				-0.056			
				(0.103)			
Roman Empire Dummy					-0.002		
					(0.106)		
Ottoman Empire Dummy						-0.332***	
						(0.128)	
Atlantic Country Dummy							-0.167
							(0.128)
Atlantic Country X 1800 CE							0.284**
							(0.141)
Constant	6.633***	8.761***	6.614***	6.471***	6.536***	6.565***	6.431***
	(1.370)	(1.720)	(1.305)	(1.326)	(1.289)	(1.249)	(1.312)
N	603	603	603	603	603	603	603

1100 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.* p <0.1, ** p <0.05, *** p <0.01.

All columns include the full set of controls in Table 1 Column 7.

Table 7: The Effect of Distance to Trade Routes on City Size: 1300 vs 1700 CE

	Baseline	Geography	Distance	Muslim	Urban Potential	India	Mongol
Distance to Muslim Trade Route	-0.104***	-0.145***	-0.131***	-0.129***	-0.135***	-0.160***	-0.158***
	(0.026)	(0.035)	(0.037)	(0.037)	(0.037)	(0.038)	(0.037)
Distance X 1700 CE	0.057**	0.061**	0.061**	0.062**	0.065**	0.067**	0.067**
	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
1700 CE	0.098	0.086	0.085	0.082	0.238	0.272	0.268
	(0.173)	(0.177)	(0.180)	(0.181)	(0.210)	(0.209)	(0.209)
Distance to Chokepoint (ln)			-0.138	-0.135	-0.220*	-0.285**	-0.288**
			(0.096)	(0.098)	(0.113)	(0.126)	(0.126)
Muslim City Dummy				0.070	0.249	0.292*	0.290*
				(0.145)	(0.156)	(0.159)	(0.158)
Christian Urban Potential (ln)					0.084	0.111	0.124
					(0.164)	(0.166)	(0.170)
Muslim Urban Potential (ln)					-0.497**	-0.621**	-0.622**
					(0.245)	(0.260)	(0.260)
Indian City Dummy						0.556*	0.592
						(0.325)	(0.366)
Mongol Empire Dummy							0.057
							(0.194)
Constant	3.641***	4.252***	6.029***	5.975***	7.307***	8.195***	8.245***
	(0.161)	(0.524)	(1.181)	(1.214)	(1.494)	(1.652)	(1.668)
N	689	677	677	677	677	677	677
Geography	No	Yes	Yes	Yes	Yes	Yes	Yes

1300 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.* p <0.1, ** p <0.05, *** p <0.01.

Geographic controls include longitude and latitude, continental dummies for Asia and Africa, distance to coast, and agricultural suitability index.

Table 8: The Effect of Distance to Trade Routes on City Size: 1400 vs 1600 CE

	Baseline	Geography	Distance	Muslim	Urban Potential	India	Mongol
Distance to Muslim Trade Route	-0.091***	-0.162***	-0.145***	-0.151***	-0.151***	-0.206***	-0.204***
	(0.026)	(0.036)	(0.036)	(0.036)	(0.035)	(0.041)	(0.039)
Distance X 1600 CE	0.042**	0.047**	0.047**	0.046**	0.053**	0.054**	0.054**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)	(0.022)	(0.022)
1600 CE	-0.019	-0.041	-0.036	-0.030	-0.031	0.026	0.025
	(0.121)	(0.122)	(0.125)	(0.125)	(0.142)	(0.140)	(0.139)
Distance to Chokepoint (ln)			-0.198**	-0.216**	-0.289***	-0.442***	-0.444***
			(0.087)	(0.085)	(0.101)	(0.112)	(0.115)
Muslim City Dummy				-0.307**	-0.216	-0.207	-0.203
				(0.139)	(0.150)	(0.143)	(0.146)
Christian Urban Potential (ln)					0.335**	0.421***	0.426***
					(0.162)	(0.156)	(0.158)
Muslim Urban Potential (ln)					-0.255	-0.483**	-0.484**
					(0.204)	(0.217)	(0.219)
Indian City Dummy						1.093***	1.113**
						(0.342)	(0.443)
Mongol Empire Dummy							0.028
							(0.238)
Constant	3.652***	4.395***	6.967***	7.311***	8.073***	10.024***	10.047***
	(0.164)	(0.538)	(1.136)	(1.145)	(1.377)	(1.539)	(1.592)
N	716	704	704	704	704	704	704
Geography	No	Yes	Yes	Yes	Yes	Yes	Yes

1300 CE Muslim trade routes. Robust standard errors corrected for clustering at the city level.* p <0.1, ** p <0.05, *** p <0.01.

Geographic controls include longitude and latitude, continental dummies for Asia and Africa, distance to coast, and agricultural suitability index.

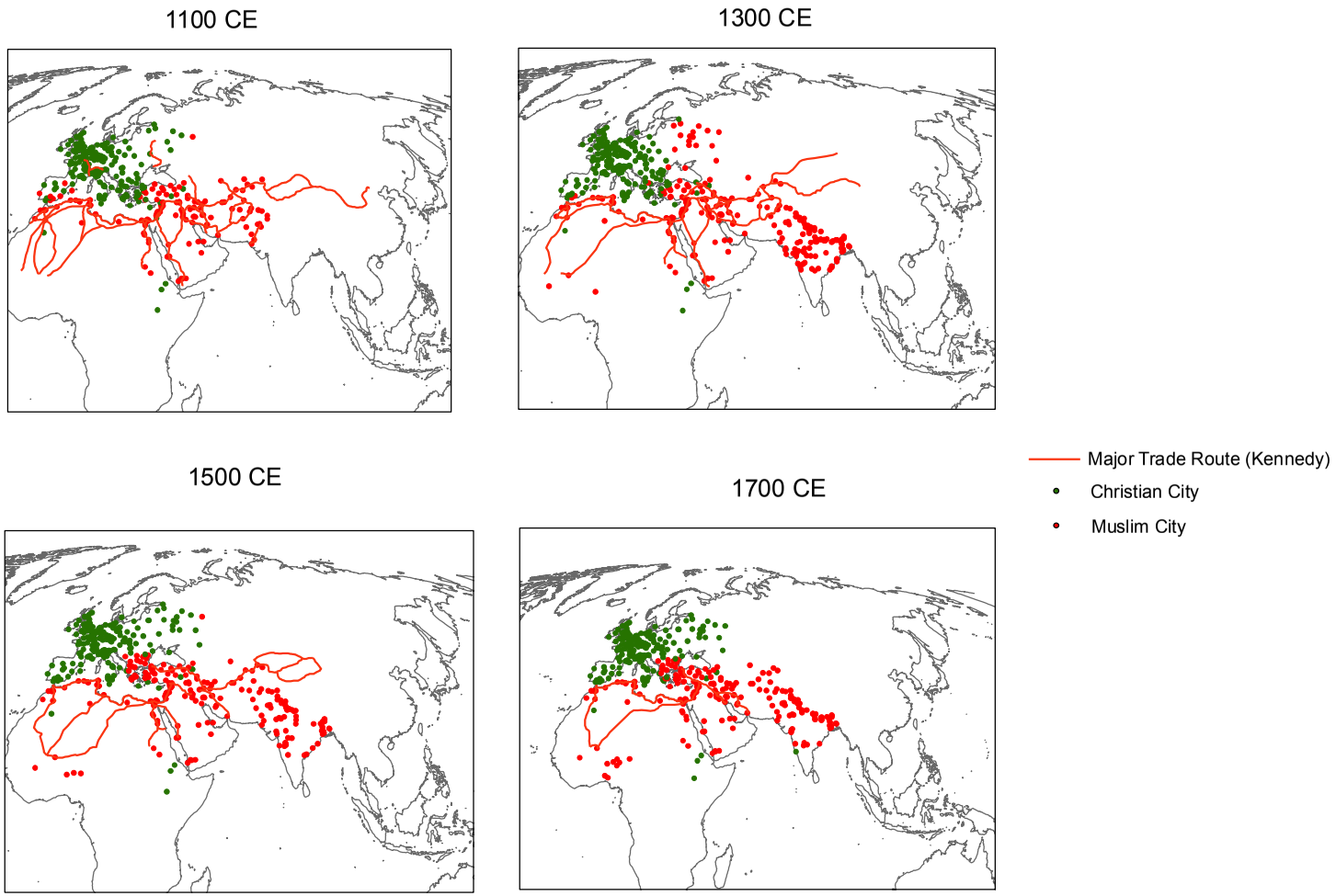


Figure 1: *Muslim Trade Routes (Kennedy (2002))*

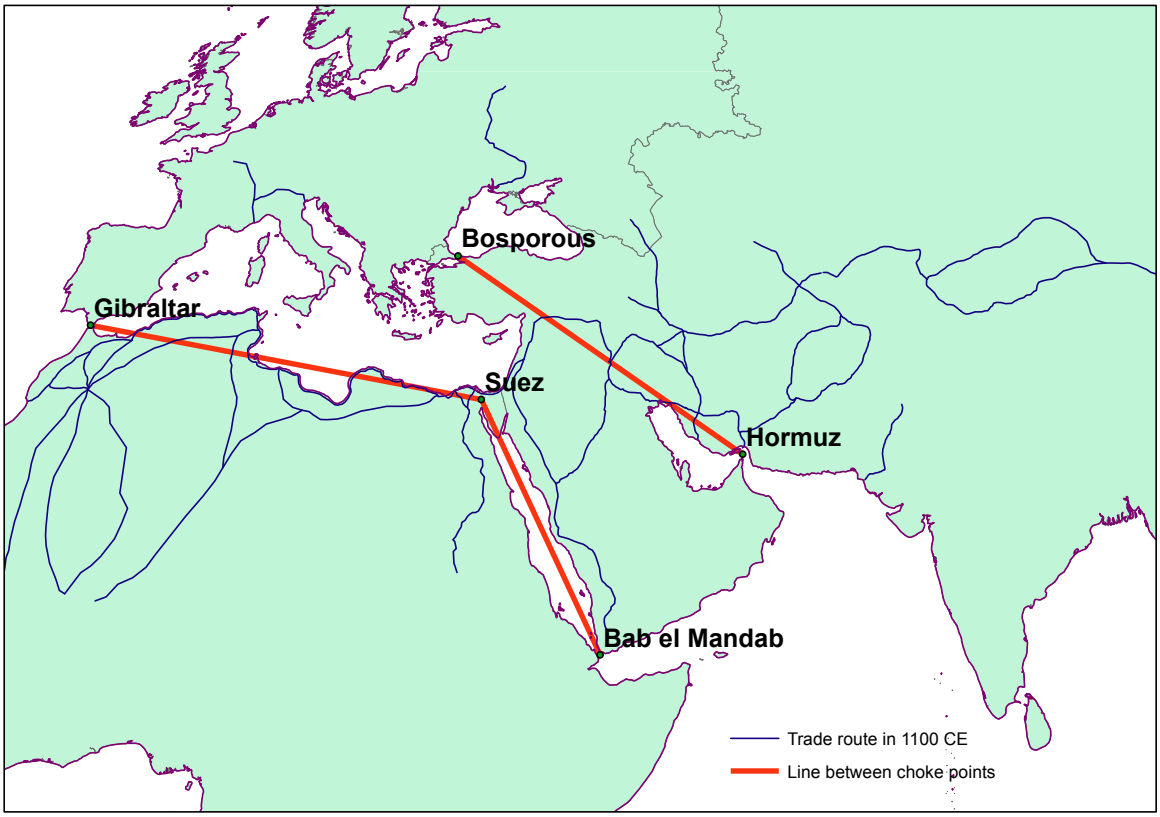
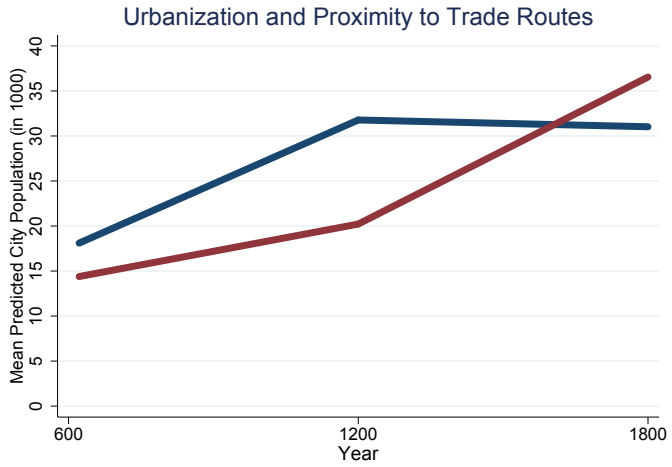
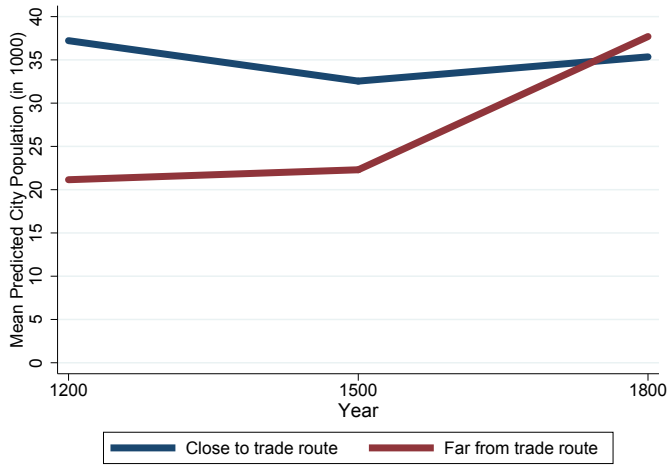


Figure 2: *Lines Connecting Major Choke Points*



(a)



(b)

Figure 3: *Pre-Treatment Trends: (a) Mean Predicted City Population in 600, 1200 and 1800 (b) Mean Predicted City Population in 1200, 1500 and 1800*