H i C N Households in Conflict Network
The Institute of Development Studies - at the University of Sussex - Falmer - Brighton - BN1 9RE
www.hicn.org

State and Development: A Historical Study of Europe from 0 AD to 2000 AD*

S.P. Harish† Christopher Paik‡

HiCN Working Paper 219

May 2016

Abstract:
State presence and longevity have long been associated with growth and development, and yet analyzing their relationship remains challenging as both the length of state rule and geographical boundaries change over time. After addressing conceptual and practical concerns on its construction, we present a measure of the mean duration of state rule that is aimed at resolving some of these issues. We then present our findings on the relationship between our measure and local development, drawing from observations in Europe spanning from 0 AD to 2000 AD. We find that during this period, the mean duration of state rule and the local income level have a nonlinear, inverse U-shaped relationship, controlling for a set of historical, geographic and socioeconomic factors. Regions that have historically experienced short or long duration of state rule on average lag behind in their local wealth today, while those that have experienced medium-duration state rule on average fare better.

Keywords: Development, Economic Output, Sovereign Turnovers

JEL Codes: O10, O47, O52

---

* The authors would like to thank David Stasavage, Abdul Noury, Christos Nussli, the participants of the Workshop on Political Institutions and Inclusive Development at Hertie School of Governance (Nov. 2014), the Annual Meeting of the American Political Science Association (Sept. 2014), and the Canadian Economic Association Meeting (July 2014) for comments on earlier versions of the paper.
† PhD Candidate, New York University; E-mail: psr245@nyu.edu
‡ Assistant Professor, NYU Abu Dhabi; E-mail: christopher.paik@nyu.edu

1 Introduction

Does state presence determine local development? If so, how do state changes influence outcomes? While state longevity is conducive to political stability and thus to growth,[1] longevity can also cause rent-seeking interests to accrue over time and thus lead to economic stagnation (Olson 1982)[2]. In this paper, we attempt to adjudicate between these two opposing perspectives by constructing suitable measures of state variables over space and time. We discuss various issues involved in this endeavor and present our results that focus on Europe from 0 AD to 2000 AD. Over this time period, we calculate the mean duration of state rule for identically sized grid-cells that cover the continent. While the relationship between the state variables and economic development can be studied in detail for any given region or a period, a large-N case study can help us to understand the general pattern of such changes. We pursue our inquiry using data from Europe, since it is the region on which there is foremost a large body of existing literature. The rise of the West in particular has been attributed to many different factors, and we test these competing explanations to examine whether our measure of state duration remains closely related to income levels after controlling for them. To our knowledge this is the first such attempt at a systematic empirical analysis on the relationship between state duration, turnovers and development. [3]

Estimating sovereign state presence and changes over time faces several challenges. First,

[1]Strayer (1970) for example argues that with an increase of political stability in Western Europe from 1000 CE and onwards came an economic revival. This included increases in agricultural production and population growth as well as commerce.

[2]Stasavage (2014) presents a similar set of opposing arguments to motivate his research on the economic stagnation and survival of city-states in Europe.

[3]The topic of state changes and economic development in more contemporary time periods however has been studied extensively. See for example Alesina et al. (1996)'s work on political instability and Durham (1999) on regime types and economic growth using more recent panel data.

because these states' borders have not remained constant over the centuries, it is inappropriate to view them as they are today. Many sovereign states ceased to exist, while others were founded in their place, but with different borders, and the newly drawn borders inevitably encroached upon neighboring states. In order to minimize this issue and expand the number of observations in Europe, we construct identically sized grid-cells for our analysis. This is done by first creating a rectangle covering Europe and surrounding bodies of water, and dividing it into small rectangles. Next, we identify the number of centuries of state presence (out of 20 centuries in total), as well as the number of unique sovereign states that ruled over each grid-cell from 0 AD up to 2000 AD in one-century-intervals (from 1 to a maximum of 21). Based on the total number of different sovereign states that ruled over the area, we then derive the mean duration of state rule conditional on the centuries of state presence. For our outcome variable we also calculate the present-day GDP per capita for each grid-cell (a more detailed description of this approach is discussed in section two and three). Our state variable is intended to capture both the variation in different states' rule and the length of state presence. The unit of our observation makes it possible to observe the variation in state rule and presence at the local level, and to move beyond the context of ruler changes under fixed regimes and geographical borders.

With the construction of these variables, we find a non-linear relationship between the mean duration of state rule and the current local income level. Regions at both ends of the spectrum show lower incomes relative to the ones in the middle range. That is, we find an inverse U-shaped relationship between the mean duration of state rule throughout the two millennia and their income levels today. The number of centuries of state presence tells us the extent to which the region experienced rule of law and public goods provision. The mean duration of state rule is weighted by the number of unique states present in the grid-cell, such that other factors held equal, a higher number of states decreases the measure. We find that regions under the rule of either short-lived or extremely long-lived states on average fall behind those that had experienced rule by states with relatively modest duration. Substantively, we find that the marginal effect on income is positive until a state governs for around six centuries, but then it subsequently turns negative. Put differently, the optimal ratio of the number of centuries of rule to the number of unique sovereign states is around six. This means that a state's institutions contribute positively to growth for about 600 years but they begin to stagnate after and negatively affect growth thereafter.

In order to address potential problems arising from omitted factors influencing both the mean duration of state rule and the economy, we introduce the following set of controls. First, we include geographic variables such as elevation and agricultural suitability, as well as the distance to water and agricultural adoption date. These variables collectively measure the level of natural resources that certain regions were endowed with and also explain the timing of state formation prior to 0 AD. Here we posit that natural resources have always changed states over time through predation and innovations, while continuing to determine the income level today. Second, we include the region's distance to the nearest cities over the time, in order to control for cities that played central roles in historical development as well as the economy today. We also include grid coordinates (the longitude and latitude, and their product), as one may argue that the core of Europe likely experienced more turnovers than the peripheries. Finally, we include year-2000 country fixed effects, to control for any unobservables that vary across current state borders.[4]

Notwithstanding all the controls that we have addressed, there still remain challenges

[4]Yet another potential concern is reverse-causality, in which less economic development leads to civil unrest and revolts overthrowing state regimes, thereby increasing the number of turnovers. We are less concerned by this issue, given that our turnover variable is a cumulative count of state changes over the past 2000 years from 0 AD to 2000 AD, while our outcome variable is the local income level in 2010. The level of historical development is also accounted for by both the distance to cities and geographic factors included in our analysis.

in generalizing our findings and addressing potential measurement errors. We therefore control for the presence of empires in our main results, and include regional dummies across different specifications. In order to check whether our results are robust to measurement errors, we present our findings under different measures of mean duration of state rule and GDP per capita. We also present models adjusting for potential spatial autocorrelation to find that our result remains robust. Finally, we present our findings from running our analysis across different cutoff periods in time (0 to 500 AD vs. 500 to 2000 AD, 0 to 1000 AD vs. 1000 to 2000 AD, 0 to 1500 AD vs. 1500 to 2000 AD), and show that overall the inverse U-shaped curve remains throughout, with one notable exception. In support of Strayer(1970)'s argument, we find that within the range of mean duration of state values in our data, political stability from 1000 AD and onwards appears to have had a net positive association with the eventual economic growth. This result is evident from the almost linear relationship between our mean duration of state variable and the current local income per capita, both in the intervals from 1000 to 2000 AD, and 1500 to 2000 AD.

The rest of this paper proceeds as follows. Section two discusses the importance of state presence and changes in development as discussed in the literature. Section three presents the data sources, construction of our main variable, the mean duration of state rule, and other control variables. Section four lists the estimation equation, and Section five discusses the main findings of the paper where we present evidence of the negative and nonlinear relationship. In Section six, we present various alternative explanations and measures and show the robustness of our results. Possible extensions to this paper are discussed in the final section.

2 Sovereign State Presence and Changes

Much of the growth literature has largely focused on the proximate effects of development like physical and human capital, and technological advancement (Solow 1956; Lucas 1988; Grossman and Helpman 1991; Romer 1990), while other works have examined the effects of geography, institutions, culture and luck on economic development (Sachs, Mellinger, and Gallup 2001; Sachs 2001; Acemoglu, Johnson, and Robinson. 2001; Weber 2008; Easterly et al. 1993; Becker et al. 2001). Existing studies have also regarded nations' size and number as outcomes of tradeoffs between the benefit of size and costs of heterogeneity (Stasavage 2010; Alesina and Spolaore 1997). The literature on the effects of state presence and changes as determinants of development, aside from these other factors, draws from the seminal work of Bockstette et al. (2003), which show a significant and positive relationship between state history and the current income level. Extensions of the original data used in Bockstette, Chanda, and Putterman (2002) appear in other studies including Ang (2013) and Ahlerup and Olsson (2012) . More recently, Borcan, Olsson, and Putterman (2015)'s work on state antiquity and productivity extend the antiquity data from Bockstette, Chanda, and Putterman (2002) to 3500 BC when the first recorded statehood appears in history.

In our paper we emphasize the importance of both state presence and changes by making three related points. First, the presence of sovereign states is critical for development, in that it has the rule-making capability crucial for facilitating transactions, protecting private property and reducing uncertainty. Every sovereign state puts in place a set of institutions that are "rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction" (North 1990, p.3). Of specific interest here are institutions that a sovereign ruler can put in place that give incentives to different domestic groups to advance their interests.[5] For example, the Romans made significant investments in the creation of labor and financial markets, and allowed business to flourish through trade

[5] Despite these benefits, there have been numerous non-rule-of-law states historically. Hoff and Stiglitz

with other parts of the empire (Temin 2006). This allowed Roman merchants to thrive and improve the economy for the whole empire. The main goal of such institutions is to improve cooperation among different economic units by improving information flow, resolving collective action problems, lowering transaction costs, sanctioning members and improving state capacity in general (Besley and Persson 2009; Jones 1988; Fearon and Laitin 1996; Knack and Keefer 1995). These institutions hence offer the necessary certainty for these economic agents to engage in productive activities, and the stability of such institutions, provided by the sovereign state, is a necessary condition for economic development.

Second, these rules or institutions initially put in place by the sovereign state by themselves may not sustain economic growth in the long run when they become resistant to changes (North and Thomas 1973; Olson 1982). Lagerlof (2016) for example presents an institutional mechanism in which autocracies invest in extractive capacity and become more resistant to democracy, while Hariri (2012) presents similar arguments in the case of former colonies. The longer an institution persists in a society, the more a particular group of economic actors become beholden to that institution. Such special interest groups contribute to institutional stagnation that could, in turn, result in lowering economic growth over time (Coates, Heckelman, and Wilson 2010; Coates, Heckelman, and Wilson 2011; Horgos and Zimmermann 2009). So even if a particular institution is inefficient, the beneficiaries of such an institution will resist any change to make the rules more efficient (North 1971). The institution then remains inefficient and yet persists over time, leading to stagnation. This situation has been identified as a commitment problem, where groups that will benefit from an institutional change cannot credibly commit to compensate the existing beneficiaries for their loss (Acemoglu and Robinson 2000). Related to this point, Borcan, Olsson, and Putterman (2015) show that old states indeed suffer from excessive centralized power, and lag

(2008) explains the phenomenon as a result of coordination failure where a commitment to forgive thefts is not credible, thereby hindering transition.

behind productivity relative to those with shorter state history. That is, older states, despite established bureaucratic infrastructure, have propensity to be autocratic under instability and over-extract taxes at the expense of economic growth (Olson 1993). The authors however also point to the importance of state experience; young states suffer from weak fiscal capacity (Tilly 1992; Collier 2009), which in turn leads to lower economic prosperity (Besley and Persson 2013; Dincecco and Katz forthcoming). The two opposing effects lead to a negative U-shaped relationship between state history and development.

Third, while there are potential drawbacks from old institutions as laid out above, too many state turnovers may also have significant negative impact on growth and development. On the one hand, institutional modifications impact local economic development through increases in state capacity, wealth and redistribution, even when such changes are violent and destructive (Dincecco and Katz forthcoming; Stasavage and Scheve 2012; Tilly 1992). These changes may also mean the creation of institutions in regions with no prior state foundation, or new institutions replacing old and inefficient ones, varying by natural surroundings and exogenous shocks (Acemoglu, Johnson, and Robinson 2005). These findings are not based on multitudes of state turnovers, however. Rather, a period of instability is often followed by establishment of stronger institutions, and the transition is complete after few turnovers. After the initial benefit of state changes, the detrimental effect of instability from multiple turnovers may be compounded. Weak states, their demise and subsequent takeovers lead to instability.[6]. In the presence of frequent conflict, rulers have little incentive to invest in state-building, and strong states fail to emerge (Cox, North, and Weingast 2015). In addition, there is also evidence that violent conflict, which often accompany state turnovers, can have long-term negative effects on economic, health, and educational outcomes (Abadie

[6]Blaydes and Chaney (2013) find for example that their mean ruler duration measure is negatively correlated with the likelihood of a ruler being deposed; in our paper we look at the mean state duration instead, which can be similarly interpreted as as measure of state instability.

and Gardeazabal 2003; Akresh and Walque 2008; Chamarbagwala and Morán 2011). Finally, it is also well established that political instability is harmful for development (Alesina and Perotti 1996; Barro 1996). These findings together suggest that while incipient turnovers may benefit subsequent development, frequent turnovers may have the opposite effect.

3 Data Sources & Description

In constructing our mean duration of state rule variable and other controls, we use two main data sources in this paper: (1) Euratlas, which provides historical maps of Europe, and (2) Eurostat, which provides GDP data for the entire continent.[7] The historical maps from Euratlas contain geographic boundaries of all political entities in Europe for every 100 years starting from the year 0 AD until 2000 AD. These maps provide us with information on the sovereign entity that ruled a given region of Europe at the turn of the century over the past 2000 years. They are particularly useful since the maps allow us to track political changes for a particular region over time; by overlaying these maps we can obtain a list of the different sovereign entities that governed a given area. As an example, consider different parts of present-day Germany; many sovereign entities have ruled parts of these areas, and major ones include the Kingdom of Austrasia, Saxony, Bavaria, Kingdom of the East Franks, Kingdom of the Holy Roman Empire, Brandenburg, Bohemia, Prussia, Hanover, the German Empire and the Federal Republic of Germany. Such a listing of sovereign rulers allows us to count the number of centuries for which each region was occupied by a state, but also identify to unique sovereign states that occupied these areas.

Figure 1 presents the overlap of the political boundaries for the entire continent using all 21 Euratlas maps. Europe provides an apt case study for us, since there were extended

[7]The Euratlas data is available at `http://www.euratlas.com/index.html` and the Eurostat data is available at `http://ec.europa.eu/eurostat`, both accessed 30 September 2015.

periods of fragmentation of former empires but also consolidation of nation states.[8]

[Figure 1 about here.]

In order to identify what we mean by sovereign states, we first require a working definition. Since the study covers 0 AD to 2000 AD, our definition of 'sovereignty' should be one that is consistent over this time period. Admittedly this task is difficult, because the concept of sovereignty has changed over the centuries (Benton 2009), and there have been both institutional and jurisdictional fragmentation of states in European history (Epstein 2000; Brewer 1989; Drelichman and Voth 2014). The goal of our paper is not to define a new, encompassing terminology that satisfies all the different definitions of sovereignty over different regions and time periods. That said, it is possible to identify sovereign states in Europe as long as we are consistent in the manner through which we single out such entities. In this paper, we identify a sovereign state as an independent entity that possesses four features:[9] (1) a territory delimited by borders, (2) a population, (3) an authority exercising the effective public power on population and territory, (4) supremacy, that is with capacity to control absolutely the territory and the population.

Both big empires and small city-states (the Roman Empire and Venice, for example) are classified as sovereign states in Euratlas, since they satisfy all of the said criteria. On the other hand, Euratlas inevitably excludes some entities that could be described as independent polities but did not satisfy one or more of these criteria. For example it describes some of the excluded entities as autonomous peoples: generally nomadic, semi-nomadic or

[8]According to Euratlas, between 0 and 2000 AD the number of sovereign states in existence in Europe reaches its peak of 158 by 1300 AD, and then decreases with centuries of state consolidation afterwards.

[9]This definition is adapted from Euratlas (`http://www.euratlas.net/`). Further information on the definition of sovereign states is available at `http://www.euratlas.net/history/europe/explanation.html`, accessed 19 August 2015.

not well-known populations without evident central authority. This approach necessarily limits the number of entities in consideration, especially in the early periods. Nevertheless, we only focus on the sovereign states as defined above, because our main interest lies on the effect of changes in both defined territorial borders and central authorities that have become fundamental to the modern states today. There are clear advantages when identifying sovereign states in this manner. First, the definition can be consistently applied over the last twenty centuries. Second, this conception of a sovereign state is different and more general from the other similar terms such as 'regime,' which is used primarily to distinguish between democracies and autocracies (Przeworski et al. 2000; Jong-A-Pin and Haan 2011). Our use of the term 'sovereign state' and 'sovereign entity' (used interchangeably in this paper) is preferred, because we cover a vast time span (0 AD-2000 AD) where typologies such as democracy and autocracy are less relevant especially in the early centuries. Lastly, it is consistent with our empirical data source, ensuring that our theoretical conception of a 'sovereign state' matches the empirical strategy in this paper.[10]

Given this definition of a sovereign state, a change in sovereignty of a particular region

[10]Other categories of states including what some may consider to be semi-independent are addressed on case-by-case basis. For example Cologne officially became a free imperial city from 1475 until the French occupation of 1794 and is thus considered a sovereign state in 1500 AD, although the real legal status of the imperial cities was unclear before the 16th century. Venice was an administrative unit of the (Eastern) Roman Empire from its foundation until about 810 AD. Some historians consider Venice as a semi-independent state from about AD 715 which remained semi-independent until 1060-1090 AD over the war between Constantinople and Normans. Euratlas considers the city state to be fully sovereign in the 1100 to 1700 AD period. Finally, Milan was a city of the Lombard Kingdom and then of the Empire of the Romans (known later as the Holy Roman Empire) until the wars of the Lombard League. After the 13th century Milan became a sovereign state but sometimes semi-independant until the Spanish conquest in the 15th century. Euratlas codes Milan as a sovereign state in 1300 and 1400 AD.

refers primarily to a change in the authority that governs the region and its population. Nussli (2011) defines the succession of states by turnovers as described in national textbooks which the author has gathered for each country in Europe. The French source, for example, treats modern-day France as being the same continuous entity from the Carolingian empire and Capetian kingdom, successors of the ancient Franks, with the exception of a period of domination by the Roman Empire, identified as a supra-state empire with a separate identity from France.[11] Typically dynastic changes or ruler turnovers are not considered as state turnovers in the data; we therefore focus predominantly on conquests that involve domination by foreign entities. According to this approach, mergers and turnovers following implosion of a state would also not be considered state turnovers, so long as the region retains a common entity as listed in Nussli (2011)'s references.[12]

Combining state presence and turnovers, we construct our measure of mean duration of state rule as follows:

$$MeanStateDuration_i = \frac{1}{\#States_i} \frac{\#Centuries\ of\ Rule_i}{20\ Centuries} \tag{1}$$

where subscript i refers to gridcell i, $\#States$ refers to the number of unique sovereign states that ruled over the gridcell from 0 AD to 2000 AD, and $\#Centuries\ of\ Rule$ refers to the number of centuries (out of a total of 20) for which the grid-cell witnessed state rule. The above formula gives a composite measure of mean duration of state rule, capturing both the number of states the ruled over the region over different time periods, as well as

[11] See Duby (2013).

[12] Although some of these dynastic changes are certainly considered pivotal in the region's subsequent development trajectory (see Blaydes and Chaney (2013) for example), our aim for this paper is to systematically identify changes in sovereign states that minimizes ambiguities arising from the definition of turnovers. The resulting conservative measure for state changes is a response to the otherwise conceptually unclear classification of many state (vs. dynastic) turnovers observed over centuries.

the number of centuries of state presence within the twenty-one century time frame in our data. One could interpret the measure as a proxy for state instability, similar to Blaydes and Chaney (2013))'s ruler duration as a measure of political instability.[13] The difference however is that our measure captures the level of instability through state turnovers rather than ruler changes. The measure also incorporates the fraction of time for which region i witnessed presence of a sovereign state. The importance of state presence and its antiquity is discussed at length in both Bockstette, Chanda, and Putterman (2002) and Borcan, Olsson, and Putterman (2015)'s work, which also present findings that are in line with our empirical findings below. Our approach to understanding the impact of state history differs from these authors, in that we use a fixed geographic unit of observation (grid-cell) to count the number of unique sovereign states, and calculate the weighted average duration of state based on this number. Unlike the existing works, we focus on the outcome of state changes at the *local* level instead of the state level in the current period, as the geographical boundaries of these states have changed over time and created regions with different state histories and yet within the same current state.

The other data that we use in this paper are Gross Domestic Product (GDP) and the population in the year 2010 from the NUTS-3 classification, the most disaggregated administrative level in Eurostat.[14] The construction of the dataset involves the merging of the Euratlas and Eurostat data. In order for us to obtain comparable units, we again begin with a geographical grid that covered the entire European continent. This approach follows existing works in the literature that make use of grid-cells as units of analysis, and potentially run into methodological tradeoffs (Alesina, Easterly, and Matuszeski 2011). In our case we

[13]The authors find that there is an inverse relationship between ruler duration and the probability of being overthrown.

[14]More information on the NUTS classification is available at `http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction`.

need to determine how to interpret several intersections of land within a grid-cell, in which each different slice of land has a different history of state changes. We also note, however, that such decisions are even more problematic for larger geographic units of analysis, and that grid-cells instead have the attractive feature of allowing for considering only some of the border changes at a time. Given the various state changes over different centuries, it is otherwise difficult to assess changes using, for example, the entire boundary. Moreover, this approach allows for changes in a sovereign state's territorial size over time. For example, France has been a sovereign state for many centuries but its size has expanded and contracted over time (for e.g. expansion during the Napoleon period and contraction thereafter). By using the grid-cell approach, we are able to account for such territorial changes at the borders of the main sovereign state. A similar approach has been taken to look at historical conflicts and city locations in Europe (Dincecco and Onorato forthcoming), and more recent waves of conflict and global income levels (Tollefsen, Strand, and Buhaug 2012).

Our grid comprises of $10,000$ cells, each approximately 77km $\times$ 62km. This grid is first overlayed with each of the twenty-one Euratlas maps (see Figure 2). Out of the 10,000 cells, we restrict the analysis to about 2,400 grid-cells that have some land mass, and to sovereign entities that govern at least 0.1 km of the grid-cell area.[15] This ensures that grid-cells only containing water and sovereign rulers that only rule a very small section of the grid-cell are not included in the analysis. Next, we identify the sovereign entity that governed a particular grid-cell at the turn of each century. If a grid-cell is part land and part water (e.g. coastal grid-cells), we identify the sovereign entity that govern the land mass in that grid-cell. In addition, if there is more than one sovereign entity that rules a grid-cell in a given year, we use the sovereign entity that governs the maximum area of the grid-cell. Figure 2 presents the distribution of the number of sovereign state owners per grid-cell.

[15]Grid-cells that did not have a sovereign ruler in the year 2000 were considered to not possess any land mass.

[Figure 2 about here.]

Next, we overlap the grid with NUTS-3 Eurostat maps and calculate the year 2010 GDP per capita for each grid-cell. As before, we restrict the analysis to grid-cells that have some land mass, and to NUTS-3 areas that occupy at least 0.1km of the grid-cell area. If a particular grid-cell is part of two or more NUTS-3 regions, we use the GDP per capita data based on the NUTS-3 region that occupy the maximum area of the grid-cell. These steps ensure that the process of calculating the regional income data is consistent with that of the sovereign rulers (we also calculate the 'average' and 'area-weighted' income data for each grid-cell for robustness). Figure 3 shows the distribution of year 2010 GDP per capita for each grid-cell.

[Figure 3 about here.]

In sum, the unit of analysis we use in this paper is the grid-cell. This is a preferable option compared to that of present-day states because the state boundaries have changed over time and there are only a limited number of countries in Europe. The use of the grid-cell as the unit of analysis also ensures that the size of the different units are the same over time and makes it possible to conduct a micro large-N analysis. The main outcome variable is GDP per capita in the year 2010 for each grid-cell (calculated in Purchasing Power Standards thousands of Euro per capita),[16] and the main predictor variable is the mean state duration associated with the grid-cell over the period from 0 AD to 2000 AD.

For each grid-cell we calculate the number of centuries during which there was a sovereign state in power, and the total number of unique sovereign entities that governed the same

[16] Purchasing Power Standards (PPS) is the term used by Eurostat to calculate the GDP of different regions, taking price-level differences into account. For more information on PPS, see `http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Purchasing_power_standard_(PPS)`, accessed 31 July 2014.

area. We then construct the mean duration of state rule as laid out in Equation 1 above. In addition to the state duration measure, we consider four different alternative explanations of economic development. First, the geographic environment of a region influences its economic development (Sachs 2001). For instance, agriculturally productive areas are associated with higher levels of production and income (Johnston and Mellor 1961). In particular, Diamond (1999) and Ashraf and Michalopoulos (2015) argue that the geographical location of Europe made it more suitable for agriculture and domestication of animals that eventually led to the Neolithic Revolution. Especially in periods prior to industrialization, the share of agriculture of the GDP was very high, making agricultural suitability an important determinant of economic development and a coveted resource for sovereign states. We obtained agricultural suitability data from Ramankutty et al. (2008) and calculated the suitability index for each grid-cell measured as the fraction of land suitable for agriculture. Agricultural suitability is also related to the elevation of a particular region, since high-altitude areas are more conducive to growing certain types of crops. We obtain the mean elevation data from ESRI 2008 GIS Maps.

Second, the European economic growth is also associated with the maritime trade, especially in the post-1500 period (Acemoglu, Johnson, and Robinson 2005). Trade between European countries and their colonies increased the power of traders and merchants who demanded better property rights. In turn, these institutions are associated with higher levels of economic growth in those regions. In addition to arable land, regions that had access to water passages would have more value to sovereign states and potentially witnessed more incidents of regime changes and turnovers. We control for this mechanism using the distance from the center of a grid-cell to the nearest body of water.

Third, if (as we claim in this paper) state changes are important determinants of current economic outcome, then the existence of states before 0 AD may also have lasting influence. While we necessarily limit our calculation of state changes back to 0 AD, one way to control for additional (pre)historical state presence is by including the state formation variable as identified by the timing of agricultural adoption (Borcan, Olsson, and Putterman 2015)[17]. That is, we use the number of years from the adoption date up to the year 2000 (Pinhasi, Fort, and Ammerman 2005), as a proxy for the pre-0 AD regime influence.

Fourth, the growth of cities is correlated with places moving from an agriculture-based economy to more industrialized forms of production. Cities bring together the manufacturing and service arms of different sectors, making the transport of goods, dissemination of information and procurement of labor more efficient (Stasavage 2014; Henderson 1988; Glaeser et al. 1992). Moreover, high population densities in cities are seen as essential to the increase in labor productivity and economic growth of that region (Ciccone and Hall 1996). These urban centers are also often targets for invasion due to their wealth and strategic locations, which may lead to more state changes. Hence we control for the distance to the nearest city within a grid-cell to account for impact of urbanization on GDP output.

Finally, we include the latitude and longitude controls, as well as the year 2000 country indicators, further demanding tests that help control for location and current border shocks. Certain locations, even controlling for geographical endowments and historical development, may witness frequent turnovers simply due to its proximity to the core of Europe, while the peripheries experience less (Merriman 2003). In addition, we expect that local income levels are likely driven by the state-level unobservables that vary across the modern state boundaries.

Table 1 presents the summary statistics of all the variables used in our analysis. There is considerable variation in the number of unique sovereign states that ruled a given grid-cell. Less than one percent of the grid-cells, all of which lie in the peripheral stretches of land by

[17]In Borcan, Olsson, and Putterman (2015), the authors show that there is a strong and positive correlation between the timing of agricultural transition and the timing of first state formation; earlier establishment of states would imply more opportunities for changes and turnovers

the sea or remote islands, are coded as having been ruled by just one sovereign state, and only one grid-cell was governed by the maximum number of 12 different sovereign states. On average, a grid-cell was ruled by five unique sovereign entities over the 21 centuries. As described above, mean state duration is the fraction of time for which a region was ruled by a sovereign state. This variable ranges between 0-0.75 with a mean of 0.19, and from Equation 1 this translates to the mean ratio of centuries of rule over the number of unique states being 3.8. Grid cells with mean levels of state rule are located in present-day United Kingdom, Ireland and Germany. As shown in the maps earlier, there are also expected variations in the GDP per capita across the continent. On average, the GDP per capita of a grid-cell was about 19,000 PPS euros per thousand people with a fairly high standard deviation of 10600. The distribution is similar when we use other variations of the GDP per capita measure.[18]

[Table 1 about here.]

4 Mean State Duration on Development

How does the mean state duration explain the current local income level? On the one hand, Borcan, Olsson, and Putterman (2015) shows that both countries with short and long state antiquities suffer from low productivity relative to those in the middle range. The former inhibits productivity because of its inability to increase fiscal capacity, while the latter does so as the centralized power becomes extractive and entrenched in power struggles. But the relationship between the mean duration of state and development may also be non-linear and inverse-U shaped, as the general findings discussed in the literature suggest that turnovers may impact subsequent state performance. As in Equation 1, the mean duration of state is calculated not only by the length of state presence in a region, but also the number of state

[18] The constructions of these alternative GDP per capita measures are discussed below in the Robustness section.

turnovers. Holding other things equal, more turnovers decrease the mean duration of each unique sovereign state, a critical distinction that separates a stable state presence from an unstable one. This means that both regions where states had short average durations and those where they had long durations suffer from lower development. The former has either a short state history, frequent turnovers, or both, while the latter has a long state history, low turnovers, or both.

To see whether the mean duration of state rule affects the local income level today as predicted, we use the following estimation equation for our analyses:

$$\begin{aligned} Income_i =& \beta_0 + \beta_1 * [\text{Mean State Duration}]_i + \beta_2 * [\text{Mean State Duration}]_i^2 + \\ & \beta_3 * \mathbf{X}_i + \gamma_j + \epsilon_{ij} \end{aligned}$$

where $Income_i$ is the GDP per capita in the year 2010 in grid-cell i, Mean State Duration$_i$ is the mean duration of state rule, and Mean State Duration^2 is its square. This specifically allows us to examine a non-linear relationship between the mean duration of state and GDP per capita. The matrix $\mathbf{X}_i$ contains the list of control variables for grid-cell i including the geographic and urbanization controls. Geographic controls include the agricultural adoption date, agricultural suitability, distance to water, elevation, and a polynomial of latitude and longitude for each grid-cell. We use the distance to the nearest city as our measure for urbanization. Lastly, we also include year 2000 state fixed effects (γ_j).

5 Main Findings

We present our main findings in Table 2. Model one is the base model where the GDP per capita in the year 2010 is regressed on the mean duration of state rule between 0 AD and 2000 AD and its square term . The mean duration of state rule has a positive coefficient estimate whereas the square term has a negative coefficient estimate, and both estimates are statistically significant at the one percent level. This suggests that there is a non-linear relationship between mean duration of state rule and present-day GDP per capita. The signs on the two coefficient estimates suggest an inverse-U relationship: Mean duration of state rule is associated with higher present-day income levels but this relationship tapers off and ultimately becomes negative as state rule continues for longer centuries.

Model two through Model seven progressively introduce different control variables. In all models the positive and statistically significant coefficient estimate the mean duration of state rule and the negative and statistically significant coefficient estimate of its square term are present at the one percent level. All seven models include year-2000 fixed effects to account for possible unobservables in present-day state boundaries that could affect the GDP per capita of a region in the year 2010. Furthermore, given that our results may potentially be driven by where the grid-cells are located, we include latitude, longitude and the product of the two for every specification. Again, this set of coordinate controls are placed in addition to the country dummies in order to present more stringent tests that help control for any location-specific factors.

[Table 2 about here.]

Figure 4 presents the inverse-U relationship between mean state duration and present-day GDP per capita based on the full model in Table 2. The figure shows that 2010 GDP per capita increases with the mean state duration but does so only up to point. As the mean state duration goes beyond 0.3, its association with GDP begins to decrease. To substantively make sense of these findings, we presents the marginal effect of mean state duration on the change in the 2010 GDP per capita levels in Figure 5, holding all other controls at their mean levels. It shows that the marginal effect of states has a positive association on income initially but that this effect is decreasing and ultimately turns negative. We can identify the inflection point of the U-shaped curve: We do that by identifying when the marginal effect on the change in GDP levels is zero and this is equal to 0.3 from Figure 5. Using Equation 1, this value translates to six centuries. So the optimal ratio of the number of centuries of rule to the number of unique sovereign states is around six, meaning that a state's presence contributes positively towards growth for around six centuries but its institutions become stagnant and negatively affects development after this period. From our sample, regions that exhibit this optimal ratio are located in Norway, Denmark and Sweden.

[Figure 4 about here.]

[Figure 5 about here.]

6 Robustness

In this section, we provide further support for our results through additional robustness tests. Specifically, we account for specific empires ruling Europe for long periods of time and have been cited as possible determinants of long-term economic growth on the continent. We also account for certain regions of Europe experiencing different levels of state capacity or specific historical events like communism. Alternative measures of our outcome variable are also examined and show that our results are not dependent on a specific construction of GDP per capita. Lastly, we account for possible spatial correlation between different grid cells and present robustness with both spatial lag and spatial error models.

6.1 Empires

Some areas of Europe that witnessed domination by certain empires may have benefitted in terms of economic growth because of institutions that survived since that time.[19] In addition to the Roman Empire's rule, which is often included in the literature as a determinant of a region's long term economic growth (Duncan-Jones 1982; Temin 2006), there are other successful and historically significant empires that we can explore in the analysis. These include the Mongolian and Ottoman Empire, and for each of these empires we calculate the duration (in centuries) of its rule on the grid-cell. Table 3 includes the number of centuries under each empire's rule as an additional set of controls to our regressions, and we find that the mean state duration and its square term continues to have positive and negative signs, respectively, and both coefficients remain statistically significant.

[Table 3 about here.]

6.2 Specific Regions

Our approach follows other papers that have similarly used either century or half-century intervals to tract political situations (Stasavage 2014; Bockstette, Chanda, and Putterman 2002; Borcan, Olsson, and Putterman 2015). There is arguably no objective and measurable criterion to define the relative importance of specific years, or the delineation of correct time intervals for analysis. Euratlas captures state presence at fixed moments in history; ideally we would like to obtain a map of Europe for every year, since there could be cases where state changes have taken place within a given century. With respect to criticism Euratlas, in presenting only the states at the beginning of each century, potentially leaves important information out but does show the result of every time sequence within the 2000 years. While

[19]Empires also enabled increased trade and led to economic integration for constituent nations, leading to higher economic growth; see Mitchener and Weidenmier (2008).

such events are not captured in the Euratlas data, it is also unlikely that state changes took place systematically by the imposed century-intervals, in anticipation of the beginning of a new century. That is, we find no reason to believe that our observations in the beginning of each century would lead to a bias with an outcome different from those observed over some other time intervals. On the other hand, there still remain potential issues with measuring the mean state duration, as we can only track state presence at the beginning of each century. We attempt to control for systematic measurement issues in certain regions that can lead to estimation biases by introducing a set of controls. These include both standard geographic and development indicators that lead to more changes in some areas (agriculturally rich regions located in the core of Europe, for example) but fewer in others (the peripheries).

In addition, different regions of Europe have had different levels of state capacity, and economic development in some parts of the continent today may be the result of specific geographies or historical events. Specifically, communist legacies in Eastern Europe may be partially responsible for economic outcomes today (Pop-Eleches 2007). Similarly, the geography and institutional structure in the Low Countries may have a different economic trajectory from the rest of the continent (Bavel 2010; Mokyr 1977). Another region that may have a different economic path is West Germany, especially the Rhineland, which consisted of several hundred small states from the Kingdom of the Romans and the Small States of the Holy Roman Empire after the Great Interregnum (1254 to 1273). In our data, the Kingdom of the Holy Roman Empire as a single entity encompasses approximately 400 small lordships and principalities within the territory, whose boundaries were in some cases unknown. Because these data are absent and this area was amongst the wealthiest throughout history, the results from treating it as one entity may be biased against a positive effect.

In order to account for these specific regions that may affect development today, we control for West Germany, Eastern Europe and the Low Countries.[20] Table 4 shows that

[20]We use the following countries according to the current boundaries as part of Eastern Europe: Belarus,

the coefficient of mean state duration and its square term remain statistically significant and with the same signs as in our main findings when we control for either Eastern European countries, Low Countries, West Germany or all three regions. These results suggest that specific regions in Europe do not alter our main results.

[Table 4 about here.]

6.3 Alternative Measures

An alternative measure for state changes, instead of the number of unique sovereign states, can be the number of turnovers that states experienced. Turnovers may refer either to a new entity that has not ruled the region previously, or an old entity that has ruled the area before and returns to power. The variable thus allows for a higher count of changes than the number of unique states, because an old sovereign state coming back to reclaim its land would be counted in the former but not in the latter. To see the difference between turnovers and the number of unique sovereign states, consider a hypothetical region ruled by the following kingdoms in chronological order: Romans, French, Ottoman, French, Ottoman, and the Republic of Germany - in this case, there are four unique sovereign state owners but five sovereign state turnovers. The two state change measures are highly correlated, and Table 5 shows that under this alternative specification, our main result implications remain essentially the same.

[Table 5 about here.]

Next, since we calculate economic development using a new geographic unit of analysis, our results may be dependent on how we measure the outcome variable. In order to check

Bulgaria, Czechoslovakia, Hungary, Moldova, Poland, Romania, Russia, Slovakia, and Ukraine. The Low Countries include Belgium, Netherlands, and Luxembourg.

whether the findings are robust, we also consider alternative measures of different variables to provide robustness of our results. First, we examine alternative measures of our outcome variable, the GDP per capita in the year 2010. For our main findings, we used the value associated with the region that covered the maximum area of the grid-cell when there were two or more NUTS-3 regions overlapping with a grid-cell. Here we present results where the outcome variable is calculated using (1) the simple average, and (2) the area-weighted average of the different NUTS-3 regions. Tables 6 and 7 present the same seven models as in our main findings, and the mean state duration continues to have an inverse U-shaped statistically significant relationship in all models.

[Table 6 about here.]

[Table 7 about here.]

6.4 Spatial Autocorrelation

Our main results assume that different grid-cells are independent and identically distributed. However, because some grid-cells are in close geographic proximity to others, it is possible that they influence the variables of interest in a neighboring grid-cell. This is especially the case in our empirical approach, given that a representative political entity often occupies multiple grid-cells, and all the same attributes of the entity are assigned to these grid-cells that are adjacent to each other. We have found that areas of historically high turnovers overlap with areas of lower income levels today, but if we want to estimate the effect of state changes on the development outcome today without controlling for spatial autocorrelation, we may obtain biased estimates. In order to check whether the negative relationship between the two variables holds under potential spatial autocorrelation, we run both a spatial error model and a spatial lag model.[21] The spatial error model assumes spatially correlated

[21]The models were run using the sg162 package available in Stata (Pisati 2001).

omitted variables, while the lag model assumes a diffusion process in which the local income level of an area is dependent on the income level in adjacent areas.

[Table 8 about here.]

[Table 9 about here.]

Tables 8 and 9 present the results of the spatial error and spatial lag models respectively. Controls are introduced progressively like in Table 2, and we find that similar to our baseline results, the inverse-U relationship between the mean state duration and present-day GDP per capita continues to hold.

7 Discussion

We have shown that there is an inverse-U relationship between mean state duration and present-day growth levels in Europe over the time period 0 AD-2000 AD, and that these results are robust to alternative measures, spatial autocorrelation, and accounting for specific regions and empires. These findings are consistent with the existing literature that show how politically stable state presence is important for economic growth, as well as with works arguing that extended state presence may also be detrimental for development. In this section, we further explore whether the inverse-U relationship is evident if we choose different time period cutoffs.

We start by constructing our mean state duration variable for different time periods. We use the same structure as Equation 1, but we restrict the number of states and number of centuries of state presence based on the duration under consideration. As an example, in order to compute the state duration for the time period 0 AD - 500 AD, we first identify the number of unique sovereign states that governed each grid cell and the number of centuries of state presence for this time period. Then we divide by five centuries, giving us the mean state duration for the time period 0 AD - 500 AD. Such a construction ensures that the mean state duration variable is always between 0 and 1, making it comparable across different time periods.[22]

[Figure 6 about here.]

Figure 6 presents the quadratic relationship between mean state duration and present-day GDP per capita for different time periods. It shows that the relationship is generally inverse U-shaped as from our main finding from the 0 to 2000 AD time period, but the association becomes more positive and linear in the more recent centuries. While this may simply suggest that the range of observed values over the x-axis (mean duration of state) is limited and therefore captures only the upward sloping part of the entire cure, the trend is also consistent with the literature on medieval-modern Europe suggesting that longevity means stability and higher economic growth (Strayer 1970; Epstein 2000). The figure also shows that the length of the time period does not appear to determine the shape of the curve, since both 0 AD - 500 AD and 500 AD - 2000 AD are U-shaped, while 0 AD - 1000 AD, and 1000 AD - 2000 AD are almost linear.

8 Conclusion

In this paper we introduce a measure of mean duration of state rule, and show a strong and positive relationship between the variable and the current local income level. Using data from a vast time period (0 AD-2000 AD) in Europe, we find that a region under either short or long mean duration of state rule also witnesses a lower economic standing today

[22] However, we need to be careful in converting the mean state duration to number of centuries: for example, for the time period 0 AD - 2000 AD, a mean state duration of 0.3 would correspond to 6 centuries, but for the time period 0 AD - 500 AD, a mean state duration of 0.3 would correspond to 1.5 centuries.

relative to others. In line with existing empirical and theoretical works in the literature, our empirical findings suggest that state presence is important for establishing rule of law and public goods provision, and the length of its duration signals stronger fiscal capacity and subsequent development. They also suggest that a region may benefit from opportunities for state turnovers when the surviving states, after long duration, become overly extractive and hinder progress.

As our findings stand robust to various controls and alternative measures, we believe that there are several potential avenues for future research. First, this paper focuses on Europe because of the availability of relevant data on sovereign state changes and GDP at the micro-level. Hence a fruitful exercise would be to extend this analysis to other parts of the world, especially in places formerly under European colonial rule. The current evidence for these regions has mainly focused on the effect of European colonization on economic growth (Banerjee and Iyer 2005; Acemoglu, Johnson, and Robinson. 2001), and we do not yet know if this is a result of an accumulation of sovereign state presence and their changes over time, or if the European colonization was the main determinant of development in these regions.[23] Another apt region to test our hypothesis would be China, where despite the sizable land mass there were significantly fewer sovereign state changes (at least in the case of China proper) over the same time period.

A second research avenue would be in exploring the impact of state changes on the emergence of democracy. Each sovereign entity in the modern period could be coded as a monarchy, autocracy or democracy based on the extension of suffrage and the existence of a monarchy. Much of the existing literature has focused on the dichotomy between autocracies/democracies and its relation to economic growth (Przeworski et al. 2000). With the

[23]A recent paper by Maloney and Valencia (2015) suggests that pre-colonial prosperity explains the current level of economic activity; similarly pre-colonial institutional variables, including turnovers, may have a persistent effect independent of colonization.

availability of sovereign state data over the past 2000 years, one may examine the root of divergence of modern states, explore the extent to which monarchies differ from autocracies and democracies in delivering growth, or whether a certain level of economic output in required before a transition from monarchy to democracy or autocracy.

Finally, one can also explore the given data by investigating the extent to which the duration of each sovereign state is a function of geographic factors. For example, the existing set of maps affords the possibility of contributing to the current literature on the relationship between the polity size, the level of decentralization and the duration of polity (Stasavage 2010; Alesina and Spolaore 1997). Big states benefit from economies of scale when providing non-rival public goods as well as the size of markets, and may rely on more efficient forms of taxation; smaller countries, on the other hand, benefit from lower communication and transport costs. The size of states in each period can therefore be seen as an endogenous outcome of both political and economic outcomes, such that the geographic scale of a state may provide a signal for its survival in the next period.

Works Cited

Abadie, Alberto and Javier Gardeazabal (2003). “The Economic Costs of Conflict: A Case Study of the Basque country”. In: *American Economic Review* 93.1, pp. 112–132.

Acemoglu, Daron, Simon Johnson, and James Robinson (2005). “The Rise Of Europe: Atlantic Trade, Institutional Change, And Economic Growth”. In: *American Economic Review* 95, pp. 546–579.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. (2001). “The Colonial Origins of Comparative Development: An Empirical Investigation”. In: *American Economic Review* 91.5, pp. 1369–1401.

Acemoglu, Daron and James A. Robinson (2000). “Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective”. In: *Quarterly Journal of Economics, 115, 1167-1199.* 115, pp. 1167–1199.

Ahlerup, P. and O. Olsson (2012). “The Roots of Ethnic Diversity”. In: *Journal of Economic Growth* 17.2, pp. 72–102.

Akresh, Richard and Damien de Walque (2008). “Armed conflict and schooling: evidence from the 1994 Rwandan genocide”. In: *Households in Conflict Network Working Paper*, p. 47. URL: `http://www.hicn.org/wordpress/wp-content/uploads/2012/06/wp47.pdf`.

Alesina, Alberta, Sule Ozler, Nouriel Roubini, and Phillip Swagel (1996). “Political instability and economic growth”. In: *Journal of Economic Growth* 1.2, pp. 189–211.

Alesina, Alberto, William Easterly, and Janina Matuszeski (2011). “Artificial States”. In: *Journal of the European Economic Association* 9.2, pp. 246–277.

Alesina, Alberto and Roberto Perotti (1996). “Income distribution, political instability, and investment”. In: *European Economic Review* 40.6, pp. 1203–1228.

Alesina, Alberto and Enrico Spolaore (1997). “On the Number and Size of Nations”. In: *Quarterly Journal of Economics* 107.4, pp. 1027–1056.

Ang, J. (2013). "Institutions and the Long-run Impact of Early Development". In: *Journal of Development Economics* 105, pp. 1–18.

Ashraf, Quamrul and Stelios Michalopoulos (2015). "Climatic Fluctuations and the Diffusion of Agriculture". In: *The Review of Economics and Statistics* 97.3, pp. 589–609.

Banerjee, Abhijit and Lakshmi Iyer (2005). "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India". In: *American Economic Review* 95.4, pp. 1190–1213.

Barro, Robert J. (1996). "Democracy and Growth". In: *Journal of Economic Growth* 1.1, pp. 1–27.

Bavel, Bas van (2010). *Manors and Markets: Economy and Society in the Low Countries 500-1600*. Oxford University Press.

Becker, Sascha O., Katrin Boeckh, Christa Hainz, and Ludger Woessmann. "The Empire is Dead, Long Live the Empire! Long-run Persistence of Trust and Corruption in the Bureaucracy". In: *The Economic Journal* 126 (590), pp. 40–74.

Benton, Lauren (2009). *A Search for Sovereignty: Law and Geography in European Empires, 1400-1900*. Cambridge University Press.

Besley, T. and T. Persson (2013). "Taxation and Development". In: *Handbook of Public Economics*. Ed. by A. Auerbach, R. Chetty, M. Feldstein, and E. Saez. Vol. 5. 2, pp. 51–110.

Besley, Timothy and Torsten Persson (2009). "The Origins of State Capacity: Property Rights, Taxation, and Politics". In: *American Economic Review* 99.4, pp. 1218–1244.

Blaydes, Lisa and Eric Chaney (2013). "The Feudal Revolution and Europe's Rise: Political Divergence of the Christian West and the Muslim World before 1500 CE". In: *American Political Science Review* 107.1, pp. 16–34.

Bockstette, V., A. Chanda, and L. Putterman (2002). "States and Markets: The Advantage of an Early Start". In: *Journal of Economic Growth* 7.4, pp. 347–369.

Borcan, Oana, Ola Olsson, and Louis Putterman (2015). "State History and Economic Development: Evidence From Six Millennia". Working Paper. URL: http://economics.gu.se/digitalAssets/1531/1531739_states7_merged.pdf.

Brewer, John (1989). *The Sinews of Power: War and the English State, 1688-1783*. Unwin Hyman.

Chamarbagwala, Rubiana and Hilcias E. Morán (2011). "The Human Capital Consequences of Civil War: Evidence from Guatemala". In: *Journal of Development Economics* 94, pp. 41–61.

Ciccone, Antonio and Robert E. Hall (1996). "Productivity and Density of Economic Activity". In: *American Economic Review* 86.1, pp. 54–70.

Coates, Dennis, Jac C. Heckelman, and Bonnie Wilson (2010). "The Political Economy of Investment: Sclerotic Effects from Interest Groups". In: *European Journal of Political Economy* 26.2, pp. 208–221.

— (2011). "Special Interest Groups and Growth". In: *Public Choice* 147, pp. 439–457.

Collier, P. (2009). "The Political Economy of State Failure". In: *Oxford Review of Economic Policy* 25.2, pp. 219–240.

Cox, Gary W., Douglass C. North, and Barry R. Weingast (2015). "The violence trap: A political-economic approach to the problems of development (Working Paper)". URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2370622.

Diamond, Jared M. (1999). *Guns, Germs, and Steel: The Fates of Human Societies*. W. W. Norton & Company.

Dincecco, Mark and Gabriel Katz (forthcoming). "State Capacity and Long-run Economic Performance". In: *The Economic Journal*.

Dincecco, Mark and Massimiliano Gaetano Onorato (forthcoming). "Military Conflict and the Rise of Urban Europe". In: *Journal of Economic Growth*.

Drelichman, Mauricio and Hans-Joachim Voth (2014). *Lending to the Borrower from Hell: Debt, Taxes, and Default in the Age of Philip II*. Princeton University Press.

Duby, Georges (2013). *Atlas historique Duby*. Larousse.

Duncan-Jones, R. (1982). *Economy of the Roman Empire*. Cambridge University Press.

Durham, J. Benson (1999). "Economic Growth and Political Regimes". In: *Journal of Economic Growth* 4.1, pp. 81–111.

Easterly, William, Michael Kremer, Lant Pritchett, and Lawrence H Summers (1993). "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks". In: *Journal of Monetary Economics* 32.3, pp. 459–483.

Epstein, Stephan R. (2000). *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750*. Routledge.

Fearon, James D. and David D. Laitin (1996). "Explaining Interethnic Cooperation". In: *American Political Science Review* 90.4, pp. 715–735.

Glaeser, Edward L., Hedi D. Kallal, José A. Scheinkman, and Andrei Shleifer (1992). "Growth in Cities". In: *Journal of Political Economy* 100.6, pp. 1126–1152.

Grossman, Gene M. and Elhanan Helpman (1991). *Innovation and Growth in the Global Economy*. MIT Press.

Hariri, Jacob Gerner (2012). "The Autocratic Legacy of Early Statehood". In: *American Political Science Review* 106.3, pp. 471–494.

Henderson, J. Vernon (1988). *Urban Development: Theory, Fact and Illusion*. Oxford University Press.

Hoff, Karla and Joseph E. Stiglitz (2008). "Exiting a Lawless State". In: *The Economic Journal* 118.August, pp. 1474–1497.

Horgos, Daniel and Klaus W. Zimmermann (2009). "Interest Groups and Economic Performance: Some New Evidence". In: *Public Choice* 138.3-4, pp. 301–315.

Johnston, Bruce F. and John W. Mellor (1961). "The Role of Agriculture in Economic Development". In: *The American Economic Review* 51.4, 566=593.

Jones, Eric Lionel (1988). *Growth Recurring: Economic Change in World History*. Oxford University Press.

Jong-A-Pin, Richard and Jakob De Haan (2011). "Political Regime Change, Economic Liberalization and Growth Accelerations". In: *Public Choice* 146.1-2, pp. 93–115.

Knack, Stephen and Philip Keefer (1995). "Institutions and Economic Performance: Cross-Country Tests using Alternative Institutional Measures". In: *Economics & Politics* 7.3, 207227.

Lagerlof, Nils-Petter (2016). "Statehood, Democracy and Preindustrial Development". In: *Journal of Economic Dynamics and Control* 67.June, pp. 58–72.

Lucas, Robert E. (1988). "On the Mechanics of Economic Development". In: *Journal of Monetary Economics* 22, pp. 3–42.

Maloney, William F. and Felipe Valencia (2015). "The persistence of (subnational) fortune". In: *accepted for publication in The Economic Journal*.

Merriman, John (2003). *A History of Modern Europe: From the Renaissance to the Present (Second Edition)*. W.W. Norton and Company.

Mitchener, Kris James and Marc Weidenmier (2008). "Trade and empire". In: *The Economic Journal* 118.November, pp. 1805–1834.

Mokyr, Joel (1977). *Industrialization in the Low Countries, 1795-1850*. Yale University Press.

North, Douglass C. (1971). "Institutional Change and Economic Growth". In: *The Journal of Economic History* 31.1, pp. 118–125.

— (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

North, Douglass C. and Robert Paul Thomas (1973). *The Rise of the Western World: A New Economic History*. Cambridge University Press.

Nussli, Christos (2011). *Euratlas*. URL: http://www.euratlas.com/about.htm.

Olson, M. (1993). "Dictatorship, Democracy, and Development". In: *American Political Science Review* 3.87, pp. 567–576.

Olson, Mancur (1982). *The Rise and Decline of Nations*. Yale University Press.

Pinhasi, Ron, Joaquim Fort, and Albert J. Ammerman (2005). "Tracing the Origins and Spread of Agriculture in Europe". In: *PLoS Biol* 3.12, pp. 2220–2228.

Pisati, Maurizio (2001). "sg162". In: *Stata Technical Bulletin*.

Pop-Eleches, Grigore (2007). "Historical Legacies and Post-Communist Regime Change". In: *Journal of Politics* 69.4, pp. 908–926.

Przeworski, Adam, Michael E. Alvarez, Jose Antonio Cheibub, and Fernando Limongi (2000). *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*. Cambridge University Press.

Ramankutty, Navin, Amato T. Evan, Chad Monfreda, and Jonathan A. Foley (2008). "Farming the Planet: 1. Geographic Distribution of Global Agricultural Lands in the year 2000". In: *Global Biogeochemical Cycles* 22.1.

Romer, Paul M. (1990). "Endogenous Technological Change". In: *Journal of Political Economy* 98, pp. 71–102.

Sachs, Jeffrey D. (2001). "Tropical Underdevelopment". In: *NBER Working Paper* 8119. URL: http://www.nber.org/papers/w8119.

Sachs, Jeffrey D., Andrew D. Mellinger, and John L. Gallup (2001). "he Geography of Poverty and Wealth". In: *Scientific American*, pp. 71–74.

Solow, Robert M (1956). "A Contribution to the Theory of Economic Growth". In: *Quarterly Journal of Economics* 70, pp. 65–94.

Stasavage, David (2010). "When Distance Mattered: Geographic Scale and the Development of European Representative Assemblies". In: *American Political Science Review* 104.4, pp. 625–643.

Stasavage, David (2014). “Was Weber Right? The Role of Urban Autonomy in Europe’s Rise”. In: *American Political Science Review*, pp. 1–18.

Stasavage, David and Kenneth Scheve (2012). “Democracy, War, and Wealth: Evidence of Two Centuries of Inheritance Taxation”. In: *American Political Science Review* 106.1, pp. 81–102.

Strayer, Joseph (1970). *On the Medieval Origins of the Modern State*. Princeton University Press.

Temin, Peter (2006). “The Economy of the Early Roman Empire”. In: *Journal of Economic Perspectives* 20.1, pp. 133–151.

Tilly, Charles (1992). *Coercion, Capital and European States: AD 990 - 1992*. Wiley-Blackwell.

Tollefsen, Andreas For, Hvard Strand, and Halvard Buhaug (2012). “PRIO-GRID: A Unified Spatial Sata Structure”. In: *Journal of Peace Research* 49.2, pp. 363–374.

Weber, Max (2008). *The Protestant Ethic and the Spirit of Capitalism with Other Writings on the Rise of the West*. Oxford University Press.

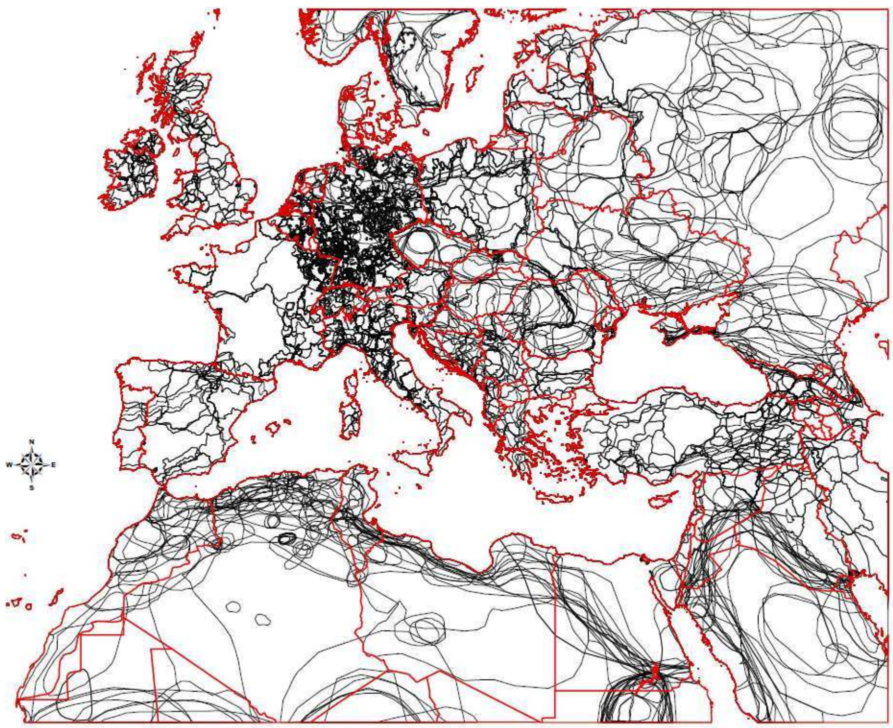

Figure 1: Overlap of Sovereign Rulers (0 AD - 2000 AD)

Note: The above figure presents the overlapped boundaries of all sovereign rulers in Europe based on Euratlas for the period 0AD-2000AD. The boundary in red color refers to present-day (year 2000) state boundaries.

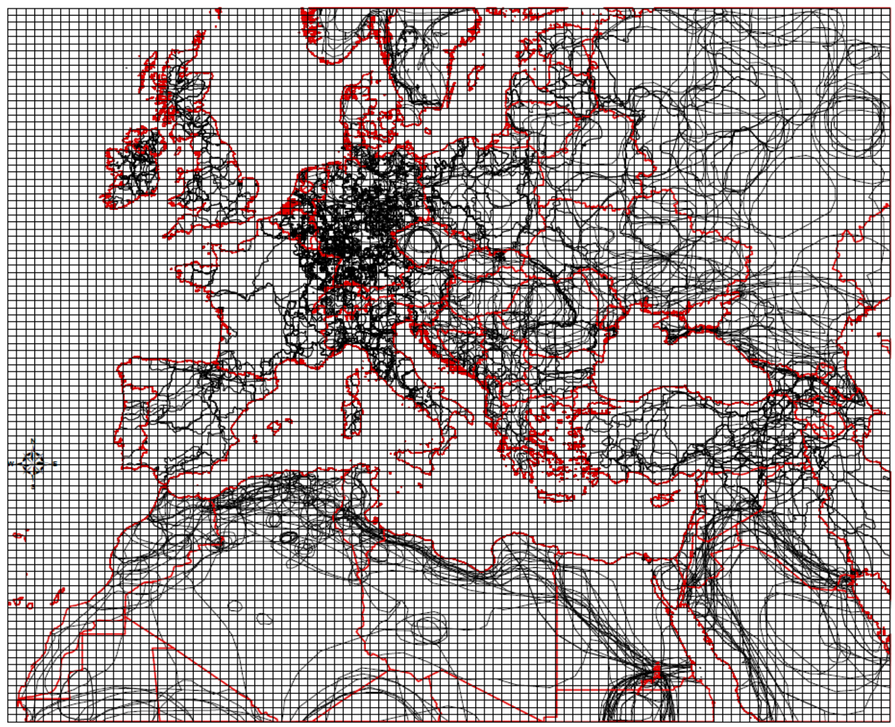

Figure 2: Overlap of Sovereign Entities (0 AD - 2000 AD)

Note: The above figure presents the overlapped boundaries of all sovereign rulers in Europe based on Euratlas for the period 0AD-2000AD along with the grid that comprises of 10,000 grid-cells. The boundary in red color refers to present-day (year 2000) state boundaries.

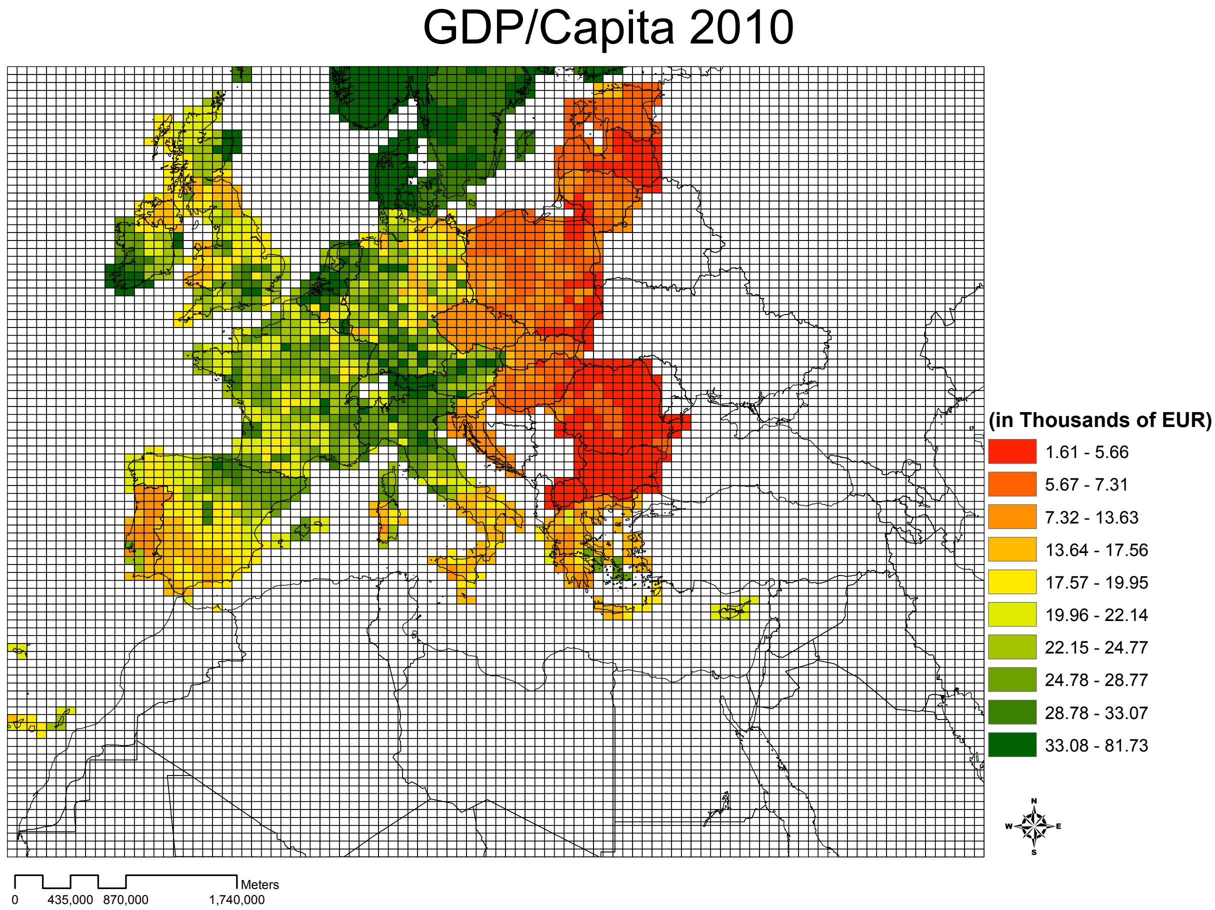

Figure 3: GDP per Capita Distribution

Note: The above figure presents the distribution of GDP per capita based on Euratlas in the year 2000 along with the grid that comprises of 10,000 grid-cells. The data is restricted to only those grid-cells have some land mass. The boundary shown refers to present-day (year 2000) state boundaries.

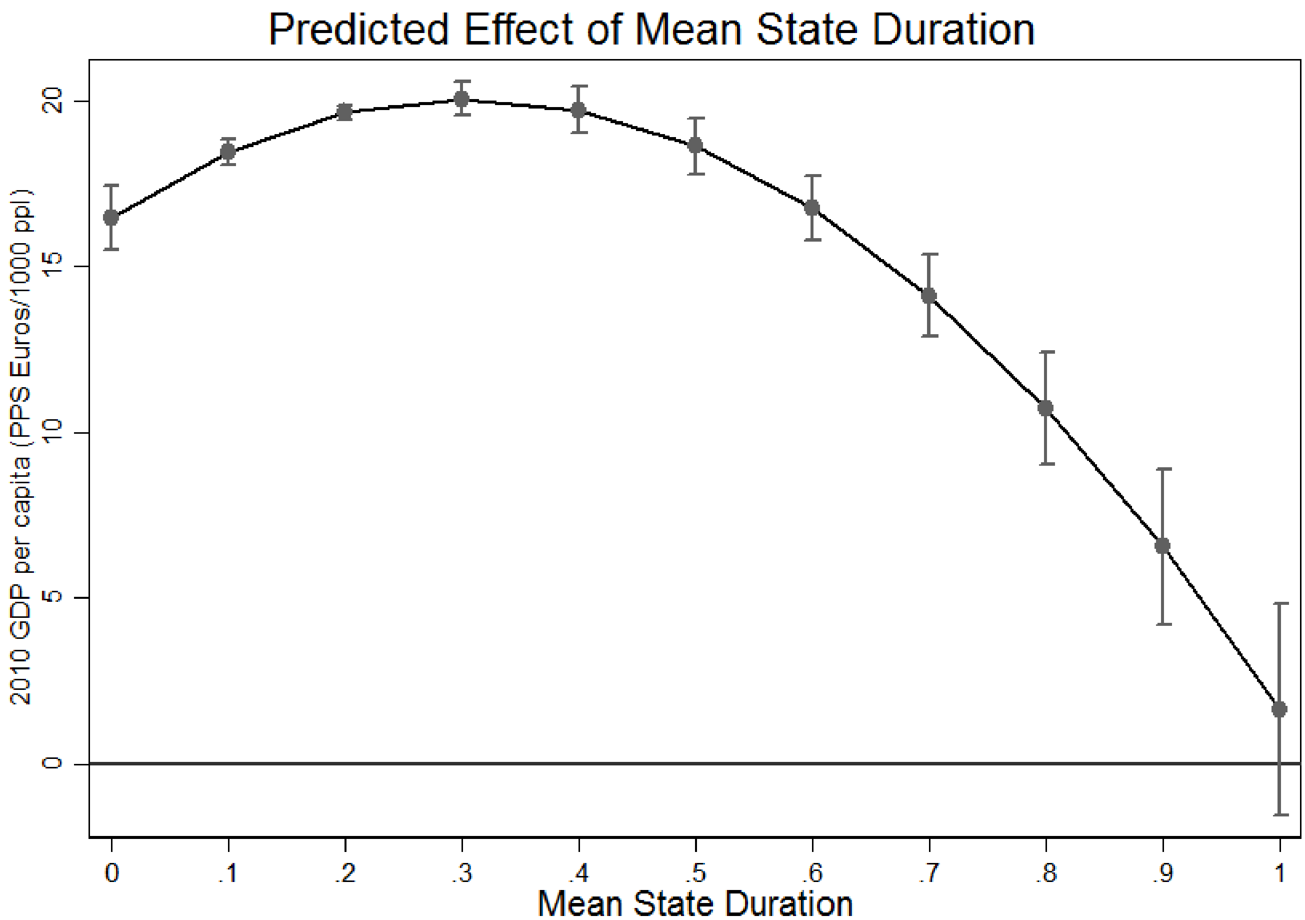

Figure 4: Quadratic Relationship between Mean State Duration and GDP per capita.

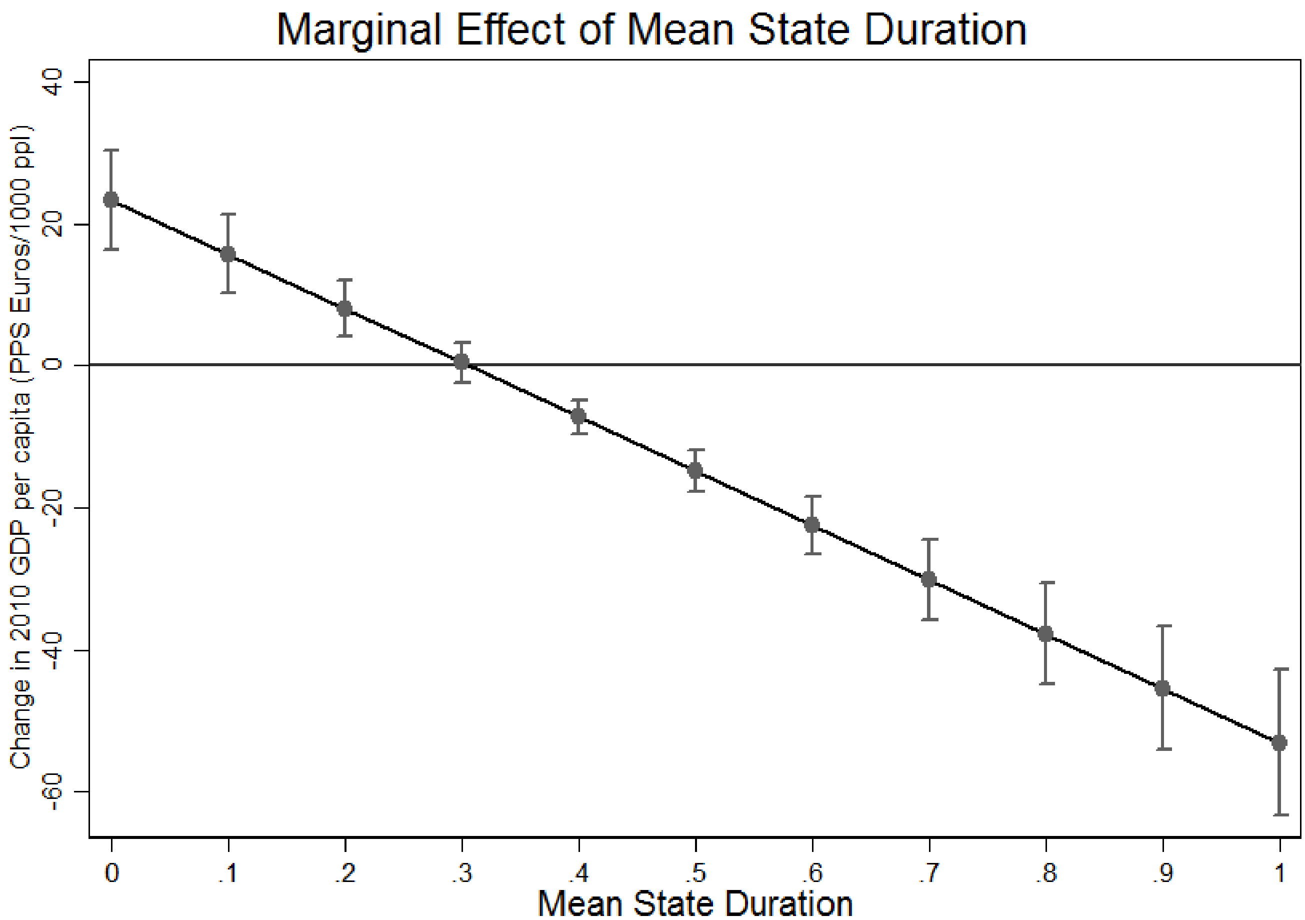

Figure 5: Linear Marginal Effect of Mean State Duration on GDP per capita.

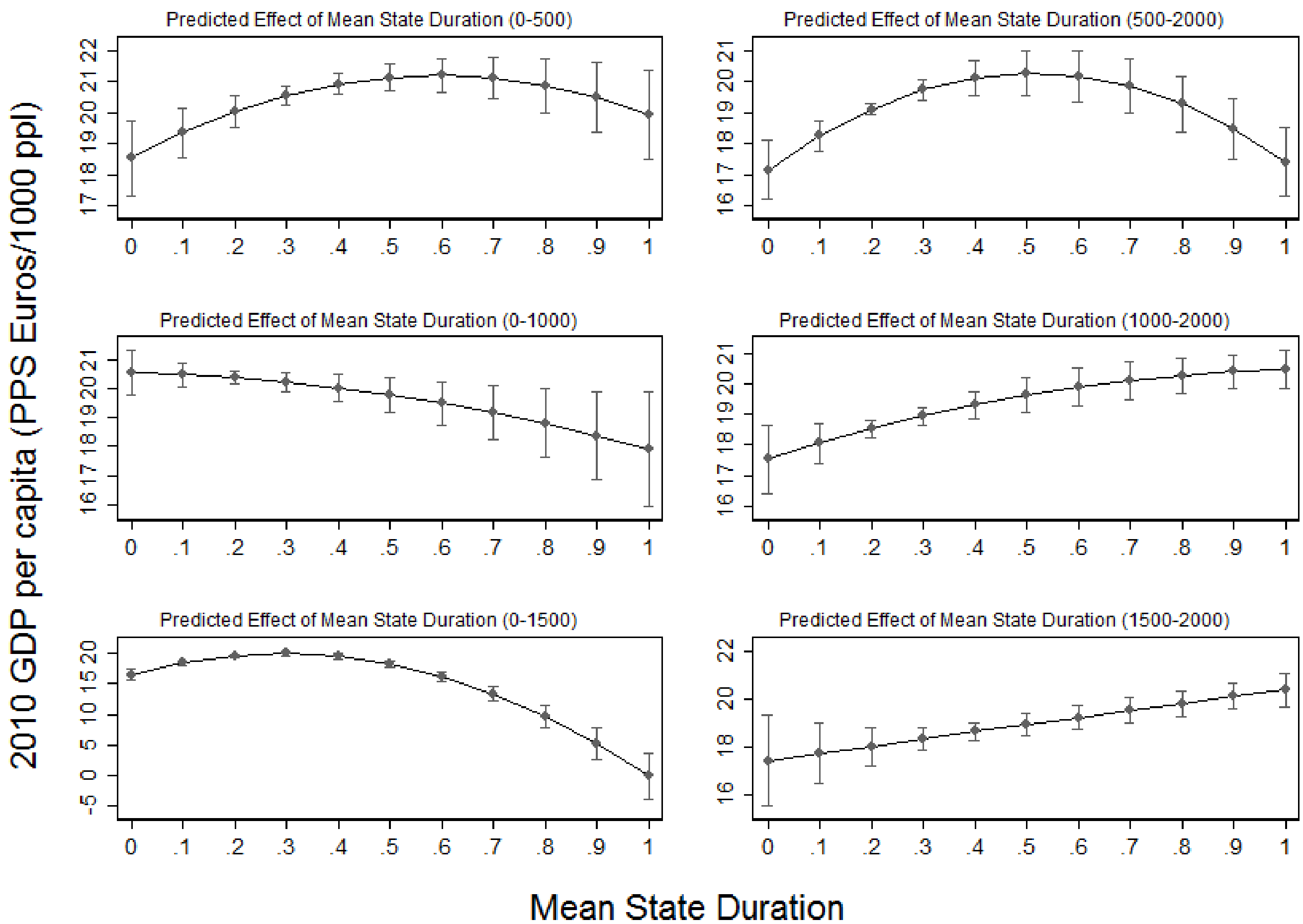

Figure 6: Quadratic Relationship between Mean State Duration and GDP per capita for Different Time Periods.

	mean	sd	min	max	count
GDP per Capita (Max Area, PPS Euros/1000 ppl)	19.12	10.66	1.61	81.73	2223
GDP per Capita (Avg, PPS Euros/1000 ppl)	19.93	10.69	1.61	61.09	2223
GDP per Capita (Weighted, PPS Euros/1000 ppl)	19.55	10.61	1.61	74.06	2223
Mean State Duration	0.19	0.10	0.06	0.75	2223
Mean State Duration (Sq)	0.05	0.07	0.00	0.56	2223
Agri Adoption	6.78	0.70	5.42	9.81	2223
Agri Suitability	0.59	0.28	0.00	1.00	2223
Distance to Water (km)	86.20	93.25	0.00	462.46	2223
Elevation (mean)	302.36	345.17	-1.85	2304.88	2223
Distance to City	30542.25	64709.28	0.00	963983.19	2223
Roman Empire	3.14	3.45	0.00	14.00	2223
Ottoman Empire	0.48	1.38	0.00	7.00	2223
Mongolian Empire	0.00	0.05	0.00	1.00	2223
Latitude	48.75	6.16	34.78	59.26	2223
Longitude	10.34	10.79	-9.89	34.14	2223
Lat*Lon	509.84	531.68	-537.90	1656.49	2223

Table 1: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	24.567***	25.759***	27.427***	29.119***	27.562***	26.996***	23.385***
	(3.503)	(3.550)	(3.538)	(3.557)	(3.479)	(3.504)	(3.576)
Mean State Duration (Sq)	-36.151***	-37.819***	-39.665***	-41.878***	-41.194***	-40.432***	-38.217***
	(4.296)	(4.347)	(4.352)	(4.384)	(4.224)	(4.237)	(4.249)
Agricultural Suitability		✓	✓	✓	✓	✓	✓
Elevation (Mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2376	2314	2313	2313	2223	2223	2223

Table 2: Mean State Duration on GDPPC Max Area. The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	25.736***	26.716***	28.789***	31.628***	30.116***	29.640***	21.956***
	(3.562)	(3.624)	(3.612)	(3.633)	(3.615)	(3.624)	(3.880)
Mean State Duration (Sq)	-37.429***	-39.032***	-41.406***	-45.106***	-44.280***	-43.631***	-36.730***
	(4.337)	(4.424)	(4.427)	(4.461)	(4.386)	(4.377)	(4.582)
Agricultural Suitability		✓	✓	✓	✓	✓	✓
Elevation (Mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Roman Empire	✓	✓	✓	✓	✓	✓	✓
Ottoman Empire	✓	✓	✓	✓	✓	✓	✓
Mongolian Empire	✓	✓	✓	✓	✓	✓	✓
Observations	2376	2314	2313	2313	2223	2223	2223

Table 3: Mean State Duration on GDPPC Max Area (controlling for specific empires). The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)
Mean State Duration	23.385***	23.385***	19.644***	19.644***
	(3.576)	(3.576)	(3.562)	(3.562)
Mean State Duration (Sq)	-38.217***	-38.217***	-34.219***	-34.219***
	(4.249)	(4.249)	(4.259)	(4.259)
Agricultural Suitability	✓	✓	✓	✓
Elevation (Mean)	✓	✓	✓	✓
Distance to Water (km)	✓	✓	✓	✓
Agri Adoption	✓	✓	✓	✓
Distance to City	✓	✓	✓	✓
Latitude	✓	✓	✓	✓
Longitude	✓	✓	✓	✓
Lat*Lon	✓	✓	✓	✓
Year 2000 FE	✓	✓	✓	✓
Eastern Europe	✓			✓
Low Region		✓		✓
West Germany			✓	✓
Observations	2223	2223	2223	2223

Table 4: Mean State Duration on GDPPC Max Area (controlling for specific regions). The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* p<0.10, ** p<0.05, *** p<0.01.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	9.531***	9.777***	10.785***	12.284***	10.099***	10.059***	8.008***
	(2.691)	(2.754)	(2.765)	(2.808)	(2.727)	(2.727)	(2.808)
Mean State Duration (Sq)	-8.740***	-8.969***	-9.620***	-11.057***	-9.285***	-9.229***	-8.749***
	(2.351)	(2.392)	(2.395)	(2.444)	(2.355)	(2.360)	(2.427)
Agricultural Suitability		✓	✓	✓	✓	✓	✓
Elevation (Mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2376	2314	2313	2313	2223	2223	2223

Table 5: Mean State Duration Using the Number of Turnovers on GDPPC Maximum Area. The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	26.275***	27.209***	29.119***	30.898***	30.199***	29.244***	23.688***
	(3.648)	(3.714)	(3.676)	(3.678)	(3.624)	(3.641)	(3.609)
Mean State Duration (Sq)	-36.761***	-38.697***	-40.829***	-43.157***	-42.902***	-41.615***	-37.467***
	(4.604)	(4.683)	(4.668)	(4.681)	(4.571)	(4.557)	(4.487)
Agricultural Suitability		✓	✓	✓	✓	✓	✓
Elevation (Mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2376	2314	2313	2313	2223	2223	2223

Table 6: Mean State Duration on GDPPC Average. The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the average within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	26.523***	27.761***	29.488***	31.125***	29.864***	29.052***	24.195***
	(3.492)	(3.543)	(3.512)	(3.528)	(3.450)	(3.466)	(3.474)
Mean State Duration (Sq)	-37.671***	-39.265***	-41.180***	-43.323***	-42.672***	-41.577***	-38.154***
	(4.428)	(4.470)	(4.457)	(4.486)	(4.340)	(4.328)	(4.298)
Agricultural Suitability		✓	✓	✓	✓	✓	✓
Elevation (Mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2376	2314	2313	2313	2223	2223	2223

Table 7: Mean State Duration on GDPPC Weighted Average. The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the area-weighted average within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	20.402***	20.395***	20.590***	22.078***	22.236***	21.798***	20.582***
	(4.093)	(4.094)	(4.093)	(4.104)	(4.106)	(4.113)	(4.141)
Mean State Duration (Sq)	-31.727***	-31.752***	-32.217***	-33.987***	-33.884***	-33.365***	-32.165***
	(5.689)	(5.698)	(5.700)	(5.707)	(5.707)	(5.713)	(5.735)
Agri Suitability		✓	✓	✓	✓	✓	✓
Elevation (mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2223	2223	2223	2223	2223	2223	2223

Table 8: Mean State Duration on GDPPC Max Area (Spatial Error Model). The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mean State Duration	18.851***	18.781***	19.518***	19.843***	20.168***	20.031***	22.465***
	(3.772)	(3.773)	(3.772)	(3.797)	(3.789)	(3.803)	(3.829)
Mean State Duration (Sq)	-25.801***	-25.991***	-26.985***	-27.429***	-26.619***	-26.440***	-29.014***
	(5.357)	(5.362)	(5.360)	(5.393)	(5.386)	(5.402)	(5.381)
Agri Suitability		✓	✓	✓	✓	✓	✓
Elevation (mean)			✓	✓	✓	✓	✓
Distance to Water (km)				✓	✓	✓	✓
Agri Adoption					✓	✓	✓
Distance to City						✓	✓
Latitude							✓
Longitude							✓
Lat*Lon							✓
Year 2000 FE	✓	✓	✓	✓	✓	✓	✓
Observations	2223	2223	2223	2223	2223	2223	2223

Table 9: Mean State Duration on GDPPC Max Area (Spatial Lag Model). The outcome variable in all the above models is the GDP Per Capita in year 2010 (in PPS thousands EUR per thousand people) calculated using the maximum area within a grid-cell. All models include year 2000 fixed effects and robust standard errors are shown in parenthesis.* $p<0.10$, ** $p<0.05$, *** $p<0.01$.