The Great Revenue Divergence

Alexander Lee* Jack Paine†

June 30, 2018

Abstract

This paper uses new data to document a striking empirical pattern in country-level revenue collection. In 1900, relative to the rest of the world, Western European and East Asian countries exhibited similar per capita aggregate revenue intake. However, over the next 70 years, their fiscal extraction grew much more rapidly. The paper then explains this trend by building on existing fiscal capacity research emphasizing that fiscally strong states require high demand for revenue (e.g., funding wars or redistribution) or an existing supply of high-quality bureaucratic and political institutions. A formal model demonstrates that neither supply nor demand shocks on their own will necessarily translate into an effective fiscal state, and demand shocks coupled with low supply may diminish revenue intake in the long run. Empirically, we help to explain the great revenue divergence by showing a positive association between the interaction of various supply/demand factors and revenues over two centuries.

Keywords: Government revenues, Fiscal capacity, State capacity, War, Bureaucracy

*Assistant Professor of Political Science, University of Rochester, Harkness Hall, Rochester, NY 14627. Email: alexander.mark.lee@rochester.edu.

†Assistant Professor of Political Science, University of Rochester, Harkness Hall, Rochester, NY 14627. Email: jackpaine@rochester.edu.

In 1900, central government revenue in future OECD countries resembled those in other countries. For example, Denmark collected only 20% more in nominal central government revenue per capita than Egypt, 24% more than Jamaica, and 44% less than Argentina. Despite being poorer than the West, many Latin American countries and Western colonies collected per capita revenue levels commensurate to those collected by Western governments—and, frequently, their intake was higher as a percent of GDP. Although many Asian and African countries lagged Europe, even these differences were small by 20th-century standards. Countries such as Britain exhibited temporary spurts in revenue intake during earlier great wars. However, by the mid-19th century, Britain—despite its long history of intensive taxation—extracted roughly the same level of per capita revenues as contemporary colonial Cuba. Although economic historians have argued that Western and non-Western countries experienced a "great divergence" in societal income levels no later than the mid-19th century (Pomeranz, 2009; Broadberry and Gupta, 2006; Jones, 2003), cross-national differences in *government* income remained modest through the 19th century.

However, during the 20th century, central government revenues per capita skyrocketed in Western Europe, the Anglophone settler colonies, and East Asia (especially Japan). This generated a permanent divergence between these regions and the rest of the world. Between 1913 and 1950, nominal per capita revenue in the United Kingdom increased by 560%—compared to increases in nominal per capita revenues of 42% in India and 62% in Jamaica. Within the franc zone during this period, nominal per capita revenue increased by 212% in France compared to more modest increases of 53% in Madagascar and 64% in Tunisia. Divergent economic growth rates or prices cannot explain these large differences. Given existing research on the importance of fiscal capacity for state-building and governance quality (Levi, 1989; Tilly, 1992; Besley and Persson, 2011), understanding the causes of this great *revenue* divergence is crucial for explaining broader political and economic differences between Western Europe and East Asia relative to the rest of the world.

This paper makes two contributions to explaining state capacity and fiscal development. First, it empirically documents that Western Europe, its offshoots, and East Asia diverged from the rest of the world in the 20th century in terms of revenue intake per capita. The primary evidence comes from a new panel dataset that includes data on per capita state revenue from the mid-19th century for a sample with broad coverage across global regions. We combined this data with historical exchange rates, gold prices, and population to estimate nominal per capita state revenue in gold ounces. The advantage of this dataset relative to existing work is

its spatial and temporal breadth, including numerous non-Western countries and colonies. This dataset supplements existing comparative fiscal capacity datasets with narrower country coverage, such as only or mainly European countries (Beramendi, Dincecco and Rogers, 2018; Dincecco, 2011, 2015; Karaman and Pamuk, 2013; Scheve and Stasavage, 2016; Queralt, 2015). Other datasets feature less comprehensive temporal coverage, such as only the late 20th century (International Monetary Fund, 2017; Thies, 2004) or analyze a cross-section for a particular year (Queralt, 2016). This combination of depth and breadth makes our dataset uniquely suitable for analyzing differences in revenues between the West and the rest of the world during the 19th and 20th centuries.[1]

The second contribution is to provide a new theory that explains this great revenue divergence. Extensive research on origins of fiscal capacity has produced two broad families of explanations. "Demand-side" explanations emphasize that some states face greater revenue extraction needs than others. Many have focused on the importance of wars or international rivalries (Herbst, 2000; Centeno, 2002; Thies, 2004, 2005; Scheve and Stasavage, 2016), which vastly increase the cost of desired goods and create political conditions needed for increasing taxation. Related research examines greater demands placed on the state in countries with inclusive political institutions, or institutions that favor constituencies in favor of higher spending (Beramendi, Dincecco and Rogers, 2018; Mares and Queralt, 2015; Andersson, 2018; Saylor and Wheeler, 2017). By contrast, "supply-side" fiscal capacity theories emphasize the historical contingency of constructing effective extractive and information-gathering institutions (Brambor et al., 2016; Lee and Zhang, 2017), the difficulty of producing educated bureaucrats, and the necessity of strong political institutions that constrain the executive (Acemoglu, Johnson and Robinson, 2005; Dincecco, 2011, 2015). According to these authors, high levels of fiscal extraction require sustained "investments" in fiscal capacity that take time to be realized, and that reflect the dominance of specific types of political coalitions.

Both families of explanations face empirical and theoretical challenges for explaining the 20th-century divergence in fiscal outcomes. Demand theories convincingly explain variation over time: within Western Europe, participation in the two world wars and franchise expansion are reasonably strongly correlated with revenue increases in the 20th century. However, demand theories do not convincingly explain cross-sectional

[1]Although large and sustained revenue divergence did not emerge until the 20th century, our findings potentially complement existing arguments about inter-regional differences during the 18th century, which predates our data coverage. Appendix Section B.3 provides additional discussion.

variation. Many states outside Western Europe or East Asia should also have high demand for revenue due to participation in warfare or franchise expansion, but have not exhibited comparable fiscal gains. For example, why did India not create a fiscally strong state in response its international rivalries and wars with Pakistan and China, nor Egypt amid conflict with Israel?

By contrast, supply-side theories can explain the cross-national differences in revenue collection that emerged by the mid-20th century, but cannot explain why they did not emerge earlier. Long prior to 1914, Western countries had already pioneered industrial technology, colonized most of the world, enacted fiscal innovations (such as income taxes) based on bureaucratic structures that increasingly resembled Weber's legal-rationale ideal, and improved property rights protection by constraining the executive. Reflecting this, many prominent accounts of fiscal capacity expansion in Europe focus on institutional changes that occurred prior to the 20th century (Tilly, 1992; Brewer, 1990; Dincecco, 2011). Although we agree with these authors that Europe differed with regard to its fiscal tools compared to the rest of the world at least as early as the late 18th century, these theories cannot explain why actual differences in revenue extraction were quite small (and perhaps declining during the 19th century) until later in the 20th century.

A new theory of revenue extraction better explains the great revenue divergence by showing why supply and demand factors *interact* to produce fiscal capacity increases. We present a formal model in which a government taxes citizens who can produce in either a formal or informal economic sector. A demand shock increases the government's willingness to bear costs that improve revenue collection in the short term, but proactive state-building strategies do not necessarily increase revenues over the long run. When bureaucratic supply is high, then the government optimally responds to a demand shock in ways similar to Besley and Persson's (2011) model and other demand-based theories: it chooses beneficial policies for society (here, increasing market competition) to raise revenues. However, when bureaucratic supply is low, the government engages in "bad state-building": promoting inefficient but easily taxed monopolies that can promote short-term revenue gains. In the long run, this strategy undermines fiscal capacity by stifling bureaucratic development. Therefore, unlike existing theories, high demand is not unambiguously beneficial for long-run revenue promotion.[2]

[2]Although not focused specifically on our demand and supply factors, Dincecco's (2011) and Karaman and Pamuk's (2013) research on historical state-building in Europe also posits interactions among multiple causal factors.

The main theoretical implication from the model—high demand and high supply positively interact to produce fiscal capacity gains—matches intuitive perceptions of which countries experienced massive revenue expansion and when. Western Europe and East Asia exhibited high demand and high supply in the 20th century, whereas these regions in the 19th century—and the rest of the world in the 20th century or earlier—did not. However, rather than rely solely on rough conceptualizations of demand and supply, we present additional associational evidence across a broad sample using plausible empirical measures of these concepts from the literature. Evidence from regressing fiscal intake on interactions between various demand (war, majority rule) and supply (civil registration, executive constraints, education) measures using two-way fixed effects models supports the thesis that combining supply and demand can help to explain the great 20th-century revenue divergence.

1 The Great Revenue Divergence: Trends Over Time

After introducing the data, this section provides graphical and regression evidence of a great revenue divergence between Western Europe/East Asia and the rest of the world starting around 1914. It then compares the late onset of this revenue divergence with the earlier economic gap that had emerged between the West and the rest of the world, and with existing evidence on state-building in Europe.

1.1 Measuring Revenues

This paper uses previously unanalyzed data to generate a new measure of central government revenue. We used data from Mitchell (1998) to construct the main measure, central government revenue per capita in the local currency. Since exact population is generally only available at census years, non-census years were estimated based on interpolating between censuses. For this reason, revenue per capita cannot be estimated before the date of the first census, even when revenue data was available from an earlier date. To put revenue levels on a common scale, we then converted all currency measures to their equivalents in gold. To do this, we constructed a new time series of historical exchange rates into pounds and then converted pounds into gold. World gold prices have fluctuated violently since gold was delinked from the dollar in 1971. For this reason, we only analyze pre-1971 data. We also excluded country-years with non-convertible currencies. Appendix Section A.1 provides additional information on how we compiled the data.

These data advance existing quantitative data on fiscal capacity in both geographical and chronological coverage. The amount of data available is impressive, extending back to the early 19th century in Western Europe, the early 20th century in Africa (including colonial years), and the late 19th century in most of the rest of the world. Specifically, the fiscal data include at least one year for 19 Western countries and 68 non-Western countries. Sixteen of the Western countries have at least one data point in the 19th century, as do 28 of the non-Western countries. Appendix Figure B.1 plots revenues over time for each territory in the dataset.

Although more expansive data coverage provides an advantage, it also creates two important limitations. First, most results do not normalize by GDP. While some existing work expresses revenue in gold (e.g., Dincecco, 2011), most of the literature measures fiscal extraction using government revenue as a percentage of GDP (Thies, 2004; Beramendi, Dincecco and Rogers, 2018).[3] Normalizing by GDP accounts for variation in wealth and price levels, but also carries an important disadvantage. The set of country-years with reliable GDP data is much smaller than those with reliable revenue data, and is skewed toward wealthy countries with high state capacity. The statistical analysis following the formal model discusses this problem in more detail, although Appendix Table B.1 and Figures B.3, B.5, and B.7 show that many of the findings are similar when conditioning on GDP. Second, we are unable to directly account for exchange rate effects or for differences in purchasing power, although Appendix Sections A.2 and A.3 discuss why these limitations are unlikely to affect the results.

1.2 Graphical Evidence

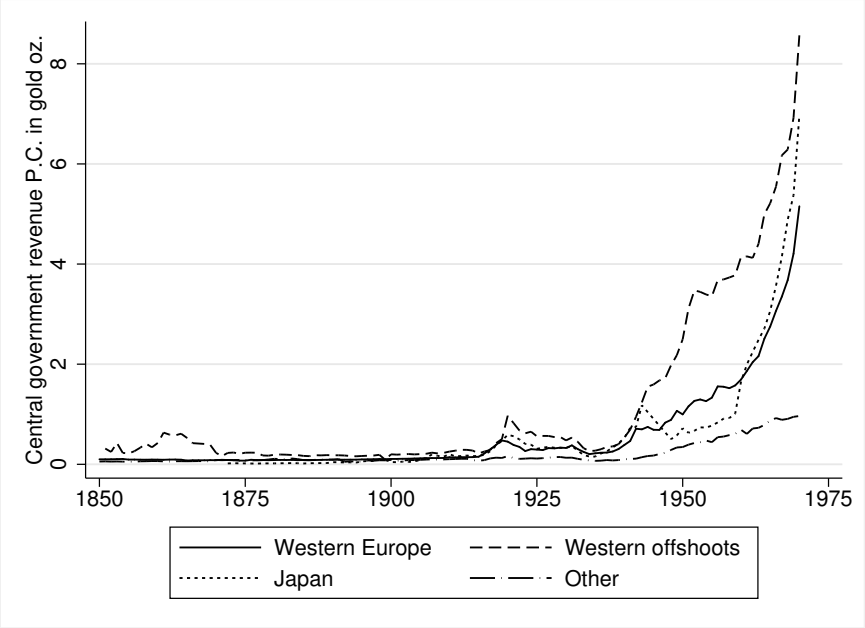
Aggregate patterns. Figure 1 shows a clear divergence between a subset of nations—Western Europe, its offshoots (United States, Canada, Australia, and New Zealand), and Japan—and the rest of the world.[4] After 1914, many countries participated in the two world wars, a worldwide depression, geopolitical competition during the Cold War, and spent increased sums on redistributive policies following franchise expansion. Future OECD countries experienced massive expansion in state revenue collection during this period, con-

[3] However, Saylor (2013) critiques using the tax ratio to measure state capacity.

[4] Appendix Figure B.1 shows every country in the sample and its data coverage. Although available data from South Korea and Taiwan shows that the East Asian pattern is not limited to Japan, Figure 1 excludes them because of considerable missing data in the mid-20th century.

sistent with existing characterizations (Lindert, 2004). However, revenue collection stagnated in the rest of the world—despite broad exposure to these international events and pressures. The country-by-country plots in Appendix Figure B.1 disaggregate these trends, and Appendix Table B.1 provides regression evidence that supplements the main patterns shown in Figure 1.

Figure 1: The Great Revenue Divergence

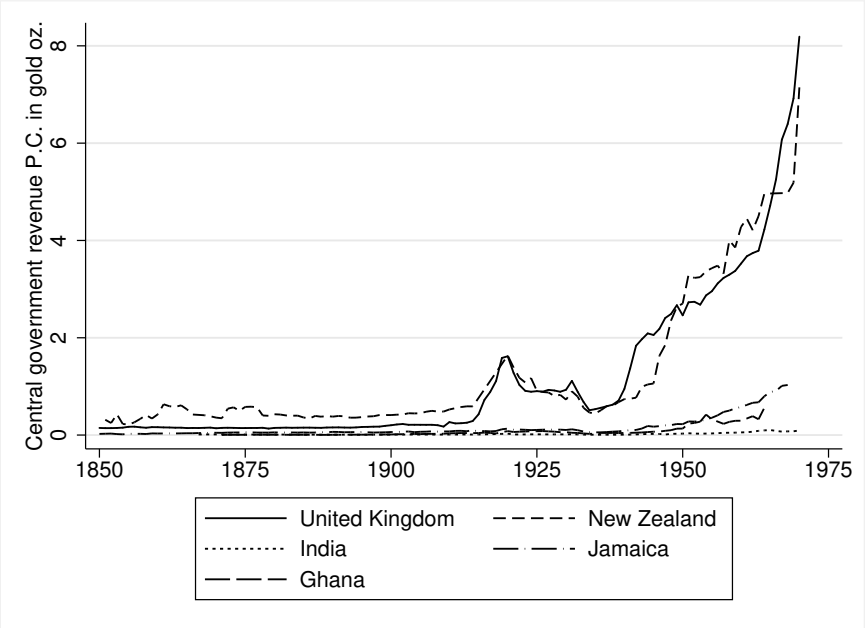


Appendix Figure B.2 replicates Figure 1 using data from Beramendi, Dincecco and Rogers (2018) on revenue as a percentage of GDP. The relative rise of the West and of East Asia is even more dramatic than in our data—a reversal of fortune rather than simply a divergence. The figure also illustrates the differences in coverage between our dataset and existing ones. Beramendi, Dincecco and Rogers's (2018) replication data includes only four non-OECD countries before 1920: Argentina, Brazil, Chile, and Uruguay. Relative to GDP, these southern cone countries had *higher* levels of fiscal extraction than Western countries in the late 19th century, but quickly fell behind during the 20th century, and by 1965 took in less than half of Western European levels.

British Empire. Figure 2 illustrates the growing difference between European countries and their colonies by showing changes in per capita revenue over time across five continents within the British Empire. The figure shows that although New Zealand and the United Kingdom had higher levels of revenue per capita than the other major colonies in 1914, these differences were small by modern standards. Per capita revenue

in the UK was slightly more than three times that in Jamaica, and less than twice that in Trinidad and Tobago (not shown). Many of the larger differences, such as the sixfold difference from the Gold Coast/Ghana, were small by modern standards. Furthermore, even these modest differences disappear once economic differences are accounted for. Appendix Figure B.3 normalizes the revenue amounts in Figure 2 using per capita GDP and shows that Jamaica—a small, open economy mainly reliant on customs duties—extracted more resources than the mother country after accounting for wealth differentials. Finally, these differences would be even smaller if we could account for differences in purchasing power, which was almost certainly greater in the poorer colonies. For example, in 1990, the purchasing power of a pound was 2.75 times higher in Jamaica than in Britain, and 3.66 times higher in India than in Britain.

Figure 2: Revenue Trends in the British Empire



However, a dramatic change occurred after World War I. Revenues in the self-governing parts of the Empire increased precipitously whereas the colonies were left behind. Between 1913 and 1950, per capita revenues in the UK increased by 560% compared to much smaller per capita increases of 42% in India and 62% in Jamaica. This divergence accelerated after World War II as colonies moved toward independence. Although many territories experienced large increases in revenue collection, none matched the stark expansion in the UK and New Zealand. Between 1913 and 1969, the UK's per capita revenue increased nearly tenfold compared to only doubling in India.

Economic growth alone cannot account for these differences. Although per capita GDP in India had contracted in this period, by 8%, the British economy only expanded by 41% per capita (Bolt et al., 2018). Exchange rate fluctuations are also unlikely to account for these differences because most of these countries used currencies linked to sterling before 1947. Instead, the magnitude of the difference yields an unambiguous conclusion: a great revenue divergence had indeed occurred within the British Empire during the 20th century. Countries that had previously collected revenue at comparable levels (e.g., Jamaica) and countries that had lagged even in 1914 (e.g., India) declined relative to Britain in revenue intake.

Additional comparisons. Appendix Figures B.4 through B.7 show evidence of revenue divergence within the French empire and among select other countries. Whereas several high-flying countries like France and Denmark exhibited a spike in revenue collection during and immediately after the two world wars, Brazil, Indonesia, and even Italy stagnated. Denmark's increase was less pronounced than the UK's during the two world wars—similar to much of Western Europe, which suffered negative direct effects of the war—but its post-1950 increases were even more dramatic. Whereas Denmark's per capita revenue was only 1.4 times Brazil's in 1913, this figure had ballooned to more that 17 times by 1969. In the decade before 1914, booming customs revenues made Brazil one of the most fiscally successful states in the world. However, by 1969, Brazil collected a share of revenues relative to GDP closer to Madagascar than to Denmark.

Participating in the two world wars—the focus of considerable existing research (Scheve and Stasavage, 2016)—accounts for much variation in the figures. However, world war participation is neither necessary nor sufficient for these historically unprecedented revenue spikes. Appendix Figure B.8 shows that every northern European country that stayed neutral in World War I (Sweden, Norway, Denmark, Netherlands, and Switzerland) experienced major revenue increases following the war while undergoing franchise expansion. By contrast, smaller and less enduring increases occurred in some World War I belligerents in southern and eastern Europe, and especially in combatant nations' colonies. For example, although the Italian state expanded during and after the war—nominal revenue in gold increased by 70% from 1913 to 1930—neutral Sweden's revenue intake increased by 145% during the same period, eclipsing its slight fiscal disadvantage relative to Italy in 1913.

1.3 Timing of Divergence

The late timing of this great revenue divergence is surprising relative to (1) the timing of economic divergence and (2) existing discussions of state-building in Europe. First, when economic historians discuss a "great divergence," they usually refer to the divergence in per capita economic output between Western and non-Western countries. Although the timing and causes of this divergence are fiercely debated (e.g., Pomeranz, 2009; Broadberry and Gupta, 2006; Jones, 2003), scholars agree it began well before 1914 and likely no later than the mid-19th century after the Industrial Revolution had spread across Europe.[5] Figure 3 illustrates this consideration by comparing revenue trends to GDP trends between 1870 and 1940 using data from Bolt et al.'s (2018) update of Angus Maddison's data. Two points are immediately clear. First, large cross-national differences in GDP per capita were evident by 1870.[6] Second, although GDP growth trends were fairly similar across regions, government revenues in the West exhibited a sharp change starting around World War I. Therefore, the emergence of large differences in country-level revenue intake postdate the great economic divergence by at least a half century, and probably more.[7]

Second, the timing of revenue divergence documented here also challenges conventional wisdom about state-building in Europe that emphasizes the importance of pre-20th century developments, particularly in select European countries (Tilly, 1992; Brewer, 1990; Dincecco, 2011). Brewer (1990), for instance, documents how the pressure of wars with France led Britain to develop a highly effective fiscal state. Our data, which extend back to 1800 for a few countries, replicate one important finding from these authors: Britain did indeed see a substantial increase in per capita state revenue during this earlier period, especially during the Napoleonic wars.

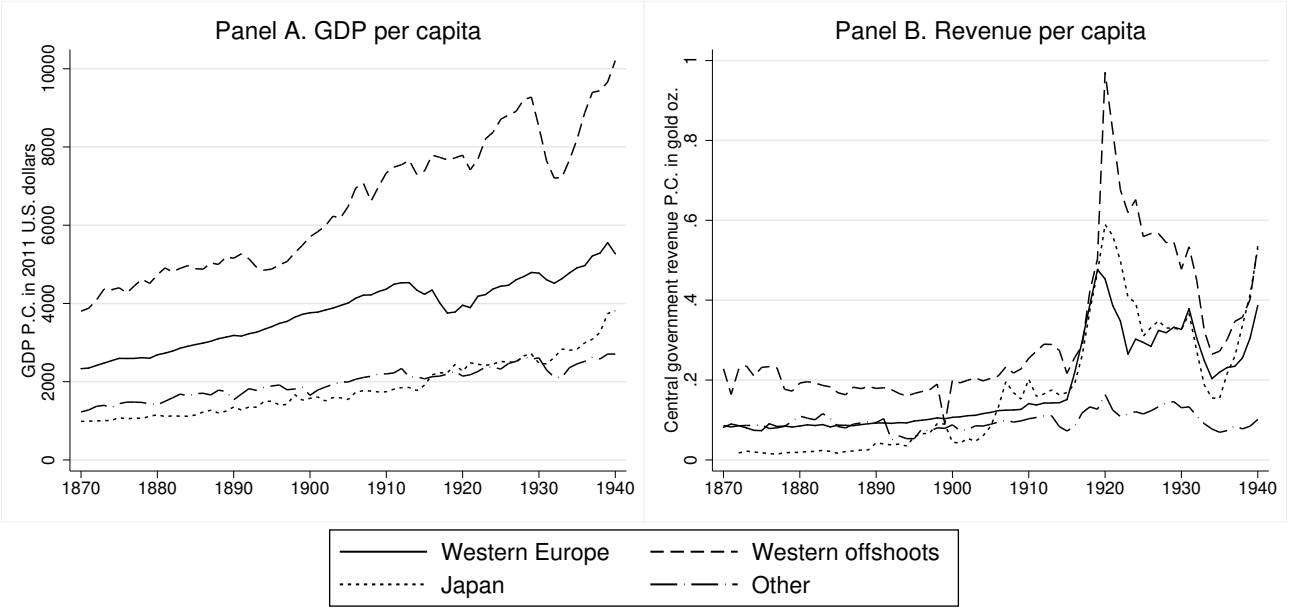
However, examining our long and broad panel shows that the very large contemporary differences in revenue between Western and non-Western countries postdate this period. Two trends stand out. First, whereas

[5] Appendix Section B.3 summarizes existing evidence in more depth.

[6] These comparisons account for differences in purchasing power, unlike the 1914 revenue differences in the last section.

[7] As noted above, there is limited coverage in GDP data outside of the West prior to the 20th century. However, under the reasonable assumption that income per capita is negatively correlated with historical data coverage, then the "Other" line is upwardly biased and underestimates the magnitude of the pre-20th century great economic divergence.

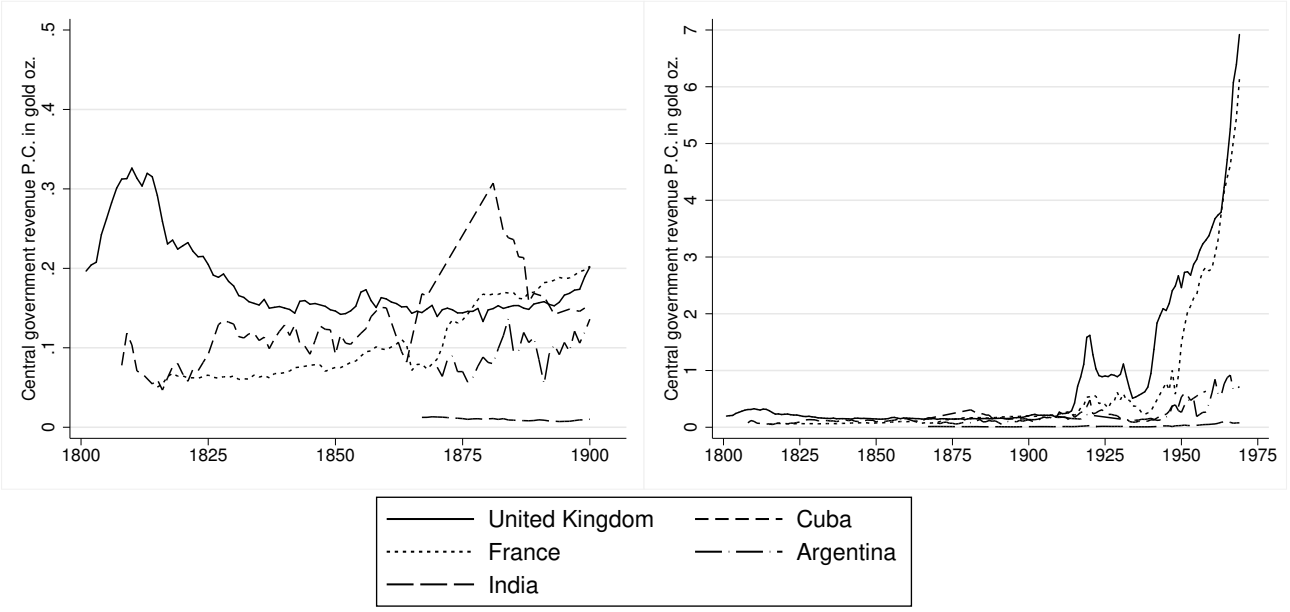
Figure 3: When Did Divergence Occur? GDP vs. Revenue



levels of revenue collection in mid-20th century Europe never reverted to 19th-century levels, Britain did not sustain throughout the 19th century the level of fiscal effort it had achieved during the Napoleonic wars. Panel A of Figure 4 plots revenue data between 1800 and 1900 and shows that although per capita revenue increased by 60% between 1801 and 1814, it declined quickly thereafter—even as the economy grew precipitously and as other territories experienced revenue increases. Britain did not surpass its 1801 revenue levels until 1900, nor did it surpass its 1814 revenue levels until 1915, during World War I. At the turn of the 20th century, Britain enjoyed similar revenue intake as wealthy colonies such as Cuba and primary exporters such as Argentina, although it exceeded poorer colonies such as India. Second, increases in nominal revenue in the 19th century were tiny compared to 20th-century increases. Panel B of Figure 4 plots revenue data for the same countries from 1800 through 1970. Commensurate with the difference in magnitude between the 19th and 20th centuries, the maximum value in the scale for Panel B is 14 times larger than that for Panel A. Using scaling appropriate for highlighting the 20th-century great divergence, Britain's Napoleonic-era fiscal achievement is barely visible.

Although our data do not enable examining pre-Napoleonic trends, other scholars provide limited cross-sectional estimates of pre-1800 revenue levels. For example, Dincecco (2017) presents evidence that Eng-

Figure 4: When Did Divergence Occur? 19th vs. 20th Century Revenues



land and France exhibited large differences in per capita revenue relative to non-Western empires in the late 18th century. Appendix Section B.3 discusses how combining these earlier trends with findings from our dataset suggests there may have been slight revenue *convergence* in the 19th century—which makes the explosive divergence in the 20th century even more puzzling.

2 Existing Theories of Fiscal Capacity

Why did a great revenue divergence occur in the 20th century but not before? To answer this question, we build upon the rich existing literature on origins of fiscal capacity. These theories can usefully be disaggregated depending on whether they focus on the *supply* of bureaucratic institutions that enable revenue collection, or *demand* for greater public spending. Although both perspectives yield important insights, they each face empirical problems for explaining the great 20th-century revenue divergence.

2.1 Supply

Western Europe differed in many important ways from the rest of the world at the turn of the 20th century. One crucial difference was their supply of bureaucratic institutions. In order to collect direct taxes, states must possess *information* about their citizens such as who they are, where they live, and what they earn. This requires bureaucratic institutions that can collect this information and enforce compliance. By contrast, states unable to exert this type of control are vulnerable to burgeoning informal sectors.

Scholars have recently begun to systematically measure states' information-collection abilities. Brambor et al. (2016) collect data on civil registration systems and state statistical offices—a crucial source of information for the state—while Lee and Zhang (2017) compares the effectiveness of censuses. Both show that government information collection was more accurate much earlier in the West and in East Asia than in the rest of the world. Western Europe contained all 10 countries that introduced registration systems for births and deaths before 1850. Earlier research on bureaucracies argues that "embedded" rationalized bureaucracies facilitate stronger states and economic development (Evans, 1995). Similarly, Dincecco (2011, 2015) shows that centralized bureaucracies were necessary for increased taxation in early modern Europe. Related, more educated societies enable recruiting bureaucrats better able to keep accurate records. By contrast, many post-colonial countries suffer from low bureaucratic capacity (Evans, 1995).

Another key attribute of institutional supply is constraints on the executive to prevent predating public funds. Examining European countries in historical perspective, Acemoglu, Johnson and Robinson (2005) document that stronger executive constraints in northwest Europe facilitated trade and development, and North and Weingast (1989), Karaman and Pamuk (2013), and Dincecco (2015) focus specifically on revenue extraction. Absent executive constraints, it is difficult to induce elites and other citizens to pay taxes, knowing that they might be used for corrupt purposes. Acemoglu, Johnson and Robinson (2001) argue and provide evidence for this converse point by showing that colonies without massive European settlement tended not to constrain the executive.

These differences between the West and the rest of the world by the turn of the 20th century beg the question of why the West developed stronger bureaucratic institutions and why the rest of the world failed to gain them. Others have proposed long-run factors such as history of government above the local level (Bockstette, Chanda and Putterman, 2002), favorable cultural traits such as high generalized morality (Tabellini,

2008), and climatic difficulties to transplanting European institutions to colonies (Acemoglu, Johnson and Robinson, 2001). Although we do not propose our own explanation for the deep-rooted causes of divergence in supply institutions, factors such as bureaucratic quality and societal conditions that enable constraining the executive are highly persistent and only change over long periods, usually gradually. Therefore, although institutional supply is certainly not exogenous in the long run, even over the time period that our data covers, it appears reasonable to take differences in supply as largely given.

2.2 Demand

Demand-based theories of fiscal capacity focus on factors that create stronger preferences for revenues. The most important demand hypothesis in the literature is preparation for or participation in warfare. International wars often raise the state's need for revenue and create the political consensus necessary to create institutions, which may persist in a "ratchet effect" after the war is over (Peacock and Wiseman, 1961). Security is a high-demand public good, either because citizens place a high value on not having their country invaded (Besley and Persson, 2011, 58) or because success in conflict is a core goal of rulers (Tilly, 1992). The positive relationship between international wars and state-building is conventional wisdom in explaining the rise of European states (Tilly, 1992; Brewer, 1990; Queralt, 2016). Other authors have made the converse point that less intense geopolitical competition in many ex-colonies in Sub-Saharan Africa and Latin America has yielded less effective state-building (Herbst, 2000; Centeno, 2002; Thies, 2004).

Besley and Persson (2011) formally present one variant of the demand logic. In their model, a government decides whether to invest to increase future fiscal capacity. This choice is contingent on the likelihood that future governments will choose to provide public goods—as opposed to private transfers—which itself depends on the value of public goods. Factors like war increase the likelihood that public goods will be sufficiently high-valued that the government will optimally invest to increase future fiscal capacity. This distinguishes "cohesive" and "redistributive" states from "weak states" that face low demand and do not invest in fiscal capacity. Scheve and Stasavage (2016) propose a different logic. Wars, especially "mass mobilization" wars, create social conditions that favor creating egalitarian taxation systems and programs of social redistribution—which require high taxes to fund.

Warfare is not the only possible source of demand for fiscal capacity. Where levels of political participation

are higher, the set of participants may be more willing to either acquiesce to or to actively demand higher taxation to fund broadly beneficial public goods. Some empirical work has shown a positive association between democracy (and, in particular, franchise expansion) and spending (Stasavage, 2005). The same political influence logic also implies that political changes that empower social groups favorable to increased public goods spending, such as industrial elites, should lead to revenue increases (Saylor and Wheeler, 2017; Beramendi, Dincecco and Rogers, 2018; Mares and Queralt, 2015; Karaman and Pamuk, 2013).

Another important strand of the literature focuses on how non-tax revenues such as natural resources, foreign aid, and sovereign debt can substitute for tax revenues. Appendix Section B.4 reviews these theories but also argues that they are unlikely to explain our main pattern.

2.3 Shortcomings of Existing Theories

Supply and demand theories of state building each accurately describe conditions in Western Europe, neo-European offshoots, and rapidly growing East Asian states in the 20th century. These countries have tended to experience frequent external warfare and/or strong popular pressure for welfare states, especially since 1914. Similarly, nearly all these countries have capable bureaucracies, strong executive constraints, and highly educated populations. Therefore, unsurprisingly, cross-national quantitative analyses and case studies consistently find evidence for various demand factors and supply factors.

However, experiences outside these regions in the 20th century suggests that high demand or quality supply—in isolation—tends not to promote fiscal extraction. For example, on the demand side, many have argued that World War I, the Great Depression, and World War II elevated demand for state revenue in the United States and the United Kingdom (Peacock and Wiseman, 1961; Scheve and Stasavage, 2016). However, many countries outside Western Europe also experienced these demand factors without creating fiscally strong states. Between 1940 and 1975, India experienced numerous political shocks that enhanced demand for revenue: fighting a world war with threat of invasion (during which it raised the largest volunteer army in world history), achieving independence (coupled with mass franchise expansion and an ascendent political elite strongly committed to social welfare measures and an interventionist state), and the emergence of a major international rivalry with Pakistan—which yielded three distinct wars. Yet despite high demand for revenues, India's revenue intake grew more slowly than Europe's. In Egypt, the government focused on de-

veloping inefficient state-owned enterprises to raise revenues to pay for persistent international competition with Israel (Waterbury, 1993). Earlier, South America experienced considerable international warfare in the 19th century but most countries failed to build a strong fiscal apparatus, preferring debt and indirect taxes (Centeno, 2002).

Supply-side examples highlight similar puzzles. For most of the 19th century, Western Europe and the United States outpaced the rest of the world in terms of information about their citizens and professionalized bureaucracies (Brambor et al., 2016), imposing constraints on the executive, and educating their population. Countries such as Britain had also enjoyed early imposition of income taxes and other fiscal advantages (Dincecco, 2017). Yet, given low demand—including relative international peace and a limited franchise—Britain's revenue intake decreased throughout much of the 19th century.

3 Theory: Complementary Supply and Demand Effects

These observations suggest the need for a new theory that combines supply and demand factors. Our new theoretical insight is to explain why high demand will not produce revenue gains unless accompanied by high bureaucratic supply. We present a formal model in which a government taxes citizens who can produce in either a formal or informal economic sector. A demand shock increases the government's willingness to bear costs that improve revenue collection in the short-term, but proactive state-building strategies do not necessarily increase revenues over the long run. When bureaucratic supply is high, then the government optimally responds to a demand shock in ways similar to Besley and Persson's (2011) model and other existing demand-based theories: it chooses beneficial policies for society (here, increasing market competition) to raise revenues. However, when bureaucratic supply is low, the government engages in "bad state-building": promoting inefficient but easily taxed monopolies that can promote short-term revenue gains. In the long run, this strategy undermines fiscal capacity by stifling bureaucratic development. Therefore, contrary to existing theories, high demand is not unambiguously beneficial for long-run revenue promotion.

3.1 How Do Governments Collect Revenue?

To show how different combinations of supply and demand factors affect governments' state-building strategies—and their effects on equilibrium revenue collection—it is necessary to construct an underlying political economy setup that addresses (1) constraints that governments face to collecting revenue, (2) factors that enable revenue collection despite these constraints, and (3) state-building strategies that governments can pursue to improve revenue intake. The following provides substantive motivation for the model's key premises before formalizing them below.

Constraints to collecting revenue. Throughout history, one of the greatest difficulties that states have faced to taxing societal output is that producers can circumvent the state's reach by migrating or by engaging in "informal" economic activities. In pre-colonial Africa and Southeast Asia, areas with low population density or with mountainous terrain facilitated migration outside the reach of nascent states that sought to expand their frontiers (Herbst, 2000). de Soto (2000) discusses the prevalence of informal economic activities in the contemporary post-colonial world and estimates that in 1997 citizens of the Third World and former communist countries held at least $9.3 trillion worth of real estate that they did not legally own.

Although an omniscient government could counteract these constraints by "finding" production by their citizens or subjects, in reality, governments also face constraints to gathering information about economic production. In colonial Africa, European administrators tended to have limited information about their populations, which made it difficult to assess how much different individuals or even regions could afford to pay (Gardner, 2012). This issue continues to plague many developing countries, which lack extensive written or electronic records to monitor activity, or banking intermediaries that reduce the need for government agents to meet in person to collect taxes. Economic exit coupled with limited information constitute the core impediments to revenue collection in the model.

What factors enable revenue collection despite these constraints?[8] One important factor existing research discusses is the structure of the economy. When only one or a handful of firms produce in a market, as

[8]The model does not examine the possibility of borrowing money to meet fiscal demand. Although this would be a particularly attractive strategy for countries with low bureaucratic capacity, such states also face the greatest liquidity constraints to borrowing in international markets—implying that borrowing may not provide an easy substitute for taxation.

opposed to a more competitive market structure, governments can more easily collect taxes. This premise constitutes ***Assumption 1*** in the model. Restricted market competition generates rents for firms, which the government can tax. Examples include access to import permits or to required licenses (Haber, 2006, 701). This often creates a symbiotic political relationship whereby the government has easier access to information about the firm's production, and the firm gains economic advantages from its political access. The government can also promote state-owned monopolies that further relax monitoring problems. "In cases where the government becomes the primary employer and producer and assumes the role of setting prices, its task is simplified to monitoring the activities of corporations and agencies that it owns and manages" (Chaudhry, 1993, 252). These considerations apply not only to regulating the domestic market, but also to tariff and other trade barriers.

Bureaucratic capacity also affects the severity of the impediments to revenue collection caused by economic exit and limited information. Although no government can perfectly monitor and assess all individuals' economic activity, states with higher-quality bureaucracies are better at collecting information (***Assumption 2***). For example, Evans (1995, 52) describes the Economic Planning Board in South Korea in the 1960s. The agency coordinated economic policy by controlling the budget process, which enabled "the concentration of talent and expertise and gives economic policy a coherence that it lacks in a less clearly organized state apparatus." By contrast, in Zaire under Mobutu Sese Seko, the bureaucracy followed the dictum to "make the quest for wealth and money an obsession," which encouraged citizens to engage in economic production outside the reach of the state (47).

Better bureaucracies can also mitigate the monitoring challenges created by greater market competition (***Assumption 3***). Chaudhry (1993, 251-2) discusses how "creating and regulating markets requires myriad financial, legal, and civil institutions, with stable and firm long-term commitments to regulate the actions of producers, importers, and labor; enforce contracts; and ensure the free exchange of information among economic groups." The government can only provide legal and other institutions to underpin market competition by possessing considerable information about the private sector.

What state-building strategies can a government pursue to boost revenue intake? Governments actively shape the structure of economic production rather than take it as fixed, and can choose whether to promote or to restrict market competition. Engerman and Sokoloff (1997, 284) summarize the view from historians of early U.S. economic history that "broad advances in productivity were induced by the growth in volume

and geographic extent of commence, originating in the extension of networks of low-cost transportation and increases in income" amid "the dramatic expansion of markets that characterized the period." Tax technologies for extracting such wealth include property taxes and income taxes.

Alternatively, governments can actively seek to limit market competition and to create economic rents by engaging in co-optation arrangements (Haber, 2006, 701). Bates (1981) discusses how many African governments retained government-pricing schemes for agricultural marketing boards after independence—originally created to smooth income from cash crop exports—because they provide an easy source of taxation (15). State-owned enterprises are prevalent across the post-colonial world because they provide a "captive tax base" (Waterbury, 1993, 134). The Soviet Union provides an extreme example of eliminating all economic competition and forcing individuals to work for the state. Governments can also protect domestic markets from international competition, such as through mercantilist trade policies (Queralt, 2015), tariffs, or subsidized "infant industry" production. Such policies can generate considerable customs revenue.

Ideally, a government would construct a bureaucracy that collects perfect information about its citizens, therefore eliminating their outside option to escape the reach of the state. However, as the literature has established, effective "supply" institutions require high levels of human capital, legitimacy, and physical infrastructure that are difficult or impossible to assemble in the short term (Acemoglu, Johnson and Robinson, 2001; Carpenter, 2001; Brewer, 1990). Instead, the model takes initial bureaucratic supply as given, but assumes that if the government invests in competitive market institutions, then bureaucratic capacity evolves over time via learning by doing (***Assumption 4***). This captures an important historical channel through which a government can improve bureaucratic supply in the medium term.

We also assume that creating property protection institutions is easy in the sense that "good" state-building entails the same fixed cost as "bad" state-building. Assuming away many factors typically proposed to hinder tax collection biases *against* governments choosing bad state-building, as opposed to incorporating richer details about the difficulty of protecting property rights that would more closely match empirical reality. However, we also incorporate an important difficulty to altering market competition by assuming the government can only change it before period 1, therefore capturing similar intuition as the persistence of supply institutions.

3.2 Setup

To formalize these premises and to show how they affect strategic incentives and long-run revenue intake, we present a formal model. This section provides most details, although it also contains references to a series of technical notes that appear in Appendix Section C.1 that more precisely define different aspects of the setup. In the game, a government G strategically interacts with a group of citizens $i \in [0, 1]$.[9] The interaction occurs across two periods, $t \in \{1, 2\}$. Three main sets of actions occur in the game. First, before period 1, G chooses a state-building strategy. Second, in both periods, each legal producer decides how much to produce. Third, in both periods, G proposes tax rates and each legal producer decides whether to sell in the formal or the informal market.

State-building investment. Citizens may be denied legal ownership rights over their means of production, whereas those with such rights are denoted legal producers. Initially, $l_0 \in (0, 1)$ percent of citizens have legal production rights.[10] After seeing the endowed level of l_0, G can pay a state-building cost to either increase or decrease the competitiveness of market production (i.e., the percentage of citizens that can produce legally) in both periods of the game.[11] If G alters market competitiveness,[12] then it pays a state-building cost $s > 0$, whereas it does not pay this cost if it does not alter the market structure.

The state-building strategy also affects the future supply of bureaucratic quality, $b_2 \in (0, 1)$, which formalizes the discussion of Assumption 4 in the previous section. If G invests to create high market competition, then bureaucratic capacity increases over time via a learning-by-doing effect. Formally, $b_2 = b_1 + \epsilon$.[13] If instead G invests to decrease market competition or does not pay the state-building cost, then $b_2 = b_1$. Throughout, $b_1 \in (0, 1)$ is exogenous.

Production. After the initial state-building strategy determines the percentage of legal producers in both periods, identical production and taxation choices occur in periods 1 and 2. Each legal producer simultaneously chooses how much to produce of a single good, $q_{i,t} \geq 0$. We denote total production by Q_t, and the good's price $p(Q_t)$ strictly decreases in total production.[14] The marginal cost of production equals

[9] Technical note 1.
[10] Technical note 2.
[11] Technical note 3.
[12] Technical note 4.
[13] Technical note 5.
[14] Technical note 6.

$c(q_{i,t}) \geq 0$.[15] Before-tax profits for each legal producer equal per unit profit multiplied by quantity produced, $\pi_{i,t} \equiv \big[p(Q_t) - c(q_{i,t})\big] \cdot q_{i,t}$.

Taxation and selling decisions. G then proposes an individual-specific tax rate $\tau_{i,t} \in [0, 1]$ to each legal producer, who simultaneously respond by selling their endowment in the formal or the informal sector. Non-legal producers' only choice is to engage in informal economic activities, and are not strategically relevant actors in the game. For any producer, selling in the formal sector yields consumption $(1 - \tau_{i,t}) \cdot \pi_{i,t}$ and selling in the informal sector yields consumption $(1 - T_i) \cdot \pi_{i,t}$. The parameter T_i captures the transaction costs of selling outside the government's reach. This economic exit option is individual-specific and is independently drawn for each citizen from a density function $F(T_i)$ with mean $\overline{T}$.[16] G has complete information about the value of the economic exit option for $v(\cdot) \in (0, 1)$ percent of legal producers, and is completely uninformed for the remaining $1 - v$. These two groups of producers are respectively referred to as "visible" and "hidden" citizens.[17] Two parameters affect the percentage of legal producers that are visible and formalize the remaining three assumptions that the previous section motivated. Assumption 1 is that v strictly decreases in the percentage of legal producers, $\frac{dv}{dl_t} < 0$, because it is more difficult for governments to monitor production in more competitive markets. Assumption 2 states that v strictly increases in bureaucratic quality, $\frac{dv}{db_t} > 0$, because higher-quality bureaucracies are better at gathering information about production. Assumption 3 is that greater bureaucratic capacity strictly mitigates the negative effect of more legal producers on v, $\frac{d^2v}{dl_t db_t} > 0$, because higher-quality bureaucracies also mitigate the challenge of collecting production information in more competitive markets.[18]

Consumption. In each period, all tax revenue funds a public good valued at $\alpha > 0$ by the government and by all citizens. Consistent with existing arguments about war or redistribution raising the value of public goods, higher α corresponds with higher demand for revenue. As a public good, every citizen consumes α regardless of whether it produces in the formal or informal sector. To reduce unnecessary model components and to isolate the main mechanism, the setup implicitly assumes the executive is constrained from diverting public revenues to private rents. Additionally, G faces a $p \in (0, 1)$ percent chance of losing power between periods 1 and 2. If it loses power, then an identical governing actor takes power in period 2 and faces the

[15] Technical note 7.
[16] Technical note 8.
[17] Technical note 9.
[18] Technical note 10.

same taxation decisions.

Overall, citizens consume the public good and after-tax profits from private production in each period, and whether or not G loses power after period 1 does not affect these amounts. For each citizen, this yields total consumption across the two periods:

$$\sum_{t\in\{1,2\}} \Big\{ \Big[1 - \big[\underbrace{\gamma_{i,t}\cdot\tau_{i,t}}_{\text{Produce in formal sector}} + \underbrace{(1-\gamma_{i,t})\cdot T_i}_{\text{Produce in formal sector}} \big] \Big] \cdot \underbrace{\pi_{i,t}}_{\text{Profit}} + \underbrace{R_t\cdot\alpha}_{\text{Public goods}} \Big\}, \tag{1}$$

where $\gamma_{i,t}$ is an indicator variable that equals 1 if citizen i sells in the formal sector in period t and 0 if it instead sells in the informal sector. Revenues in period t equal the sum of individuals' tax rates multiplied by their production.[19] The government's only source of consumption is the public good. Therefore, G expects to consume:

$$\underbrace{\big(R_1 + p\cdot R_2\big)\cdot\alpha}_{\text{Total expected public good consumption}} - \underbrace{\mu\cdot s}_{\text{State-building cost}}, \tag{2}$$

where μ indicates if G has paid a state-building cost.[20]

Sequence of moves. In sum, the sequence of moves is:

- Before period 1: G chooses a state-building strategy.
- Period 1:
  - Each citizen i chooses how much to produce.
  - G proposes a tax rate for each citizen.
  - Each legal producer decides whether to sell in the formal or informal sector.
- Between periods 1 and 2: G loses power with probability p.
- Period 2: Same sequence of choices as in period 1.

3.3 Short-Run Revenue Effects: Interaction Between Supply and Market Competition

The following provides intuition for the main model results, and Appendix Section C.2 provides formal statements and proofs. Equation 3 and Figure 5 convey the main intuition for how bureaucratic supply and market competition interact to affect per-period revenue intake (short-run effect). Equation 3 expresses

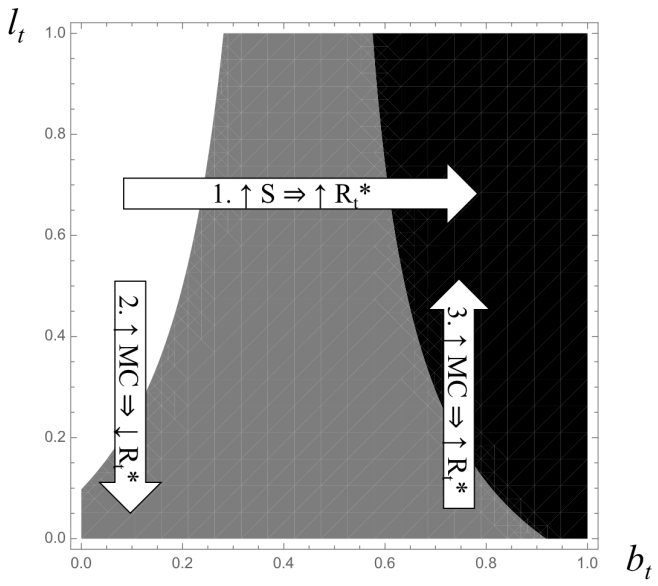
[19] Technical note 11.

[20] Technical note 12.

equilibrium per-period revenues R_t^* conditional on bureaucratic supply (b_t) and market competition (l_t), disaggregated into four expressions: percentage of visible citizens, average tax rate on visible citizens, average (effective) tax rate on hidden citizens, and total production. Figure 5 plots Equation 3 as a function of b_t and l_t. To make the main takeaways easier to visualize, it disaggregates revenue intake into three discrete amounts—low (white), medium (gray), and high (black)—although R_t^* is continuous in parameters.

$$R_t^*(l_t, b_t) = \Big[\underbrace{v(l_t, b_t)}_{\text{\% visible}} \cdot \underbrace{\overline{\tau}^{v*}}_{\text{Avg. tax visible}} + \underbrace{\big[1 - v(l_t, b_t)\big]}_{\text{\% hidden}} \cdot \underbrace{\big[1 - F(\tau^{h*})\big] \cdot \tau^{h*}}_{\text{Avg. tax hidden}}\Big] \cdot \underbrace{Q^*(l_t)}_{\text{Total output}}, \tag{3}$$

Figure 5: Short-Run Revenue Effects: Interaction Between Supply and Market Competition



Notes: Figure 5 plots Equation 3 by showing low (white), medium (gray), and high (black) revenue levels R_t^* as a function of bureaucratic supply (b_t) and market competition (l_t). The threshold for medium revenue is $R_t^* = 0.3$ and the threshold for high revenue is $R_t^* = 0.35$. The assumed functional forms are $v(l_t, b_t) = \frac{1}{1+e^{-(\beta_l \cdot l_t + \beta_b \cdot b_t + \beta_{lb} \cdot l_t \cdot b_t)}}$, $c(q_{i,t}) = \frac{q_{i,t}^2}{2}$, and $F(T_i) \sim U[0, 1]$. The fixed parameter values are $\beta_l = -1$, $\beta_b = 1$, $\beta_{lb} = 3$, $d_0 = 1$, and $d_m = 0.1$.

The equation and figure yield three main takeaways. The first arrow in Figure 5 highlights that per-period revenues increase in bureaucratic supply for any level of market competition. Higher bureaucratic supply increases the percentage of visible producers (Assumption 2), and the average effective tax rate (including compliance) for visible producers exceeds that for hidden producers. The government can price-discriminate in its tax rate against visible producers by holding them to their reservation value to producing in the informal sector, inducing every visible citizen to produce formally and yielding an average tax rate $\overline{\tau}^{v*}$ among visible

citizens (Appendix Equation C.2). By contrast, the government cannot price-discriminate for hidden citizens because it does not know their reservation value. Instead, the government balances between a low tax rate inducing more hidden citizens to produce in the formal sector and a high tax rate generating greater revenues from each hidden citizen that produces in the formal sector. In equilibrium, the optimal tax rate for hidden citizens is τ^{h*}, and $1 - F(\tau^{h*})$ percent of hidden citizens produce in the formal sector (Appendix Equation C.3). Formally, Appendix Lemma C.2 establishes that $\overline{\tau}^{v*} > \left[1 - F(\tau^{h*})\right] \cdot \tau^{h*}$.

Second, the different signs of arrows 2 and 3 in Figure 5 show that increasing market competition ambiguously affects per-period revenues. Raising the percentage of citizens with the option to produce legally in the formal sector exerts two countervailing effects on revenue intake. On the one hand, market competition directly *increases* equilibrium revenues by increasing taxable output $Q^*(l_t)$ (see Appendix Lemma C.1). On the other hand, an increase in legal producers causes a *negative* indirect effect by decreasing the percentage of visible citizens (Assumption 1). Appendix Lemma C.3 summarizes these effects.

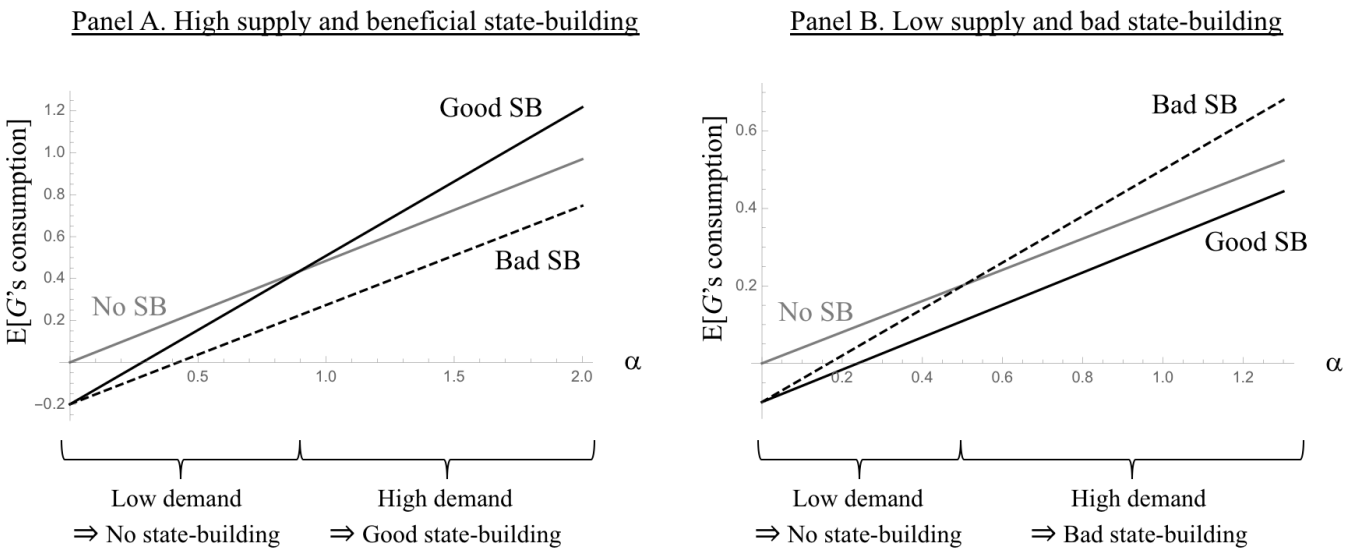
These two findings underpin the key implication for short-run revenues. Bureaucratic supply positively interacts with market competition: more competitive economies yield lower per-period revenues if bureaucratic supply is low (arrow 2 in Figure 5) and higher revenues if supply is high (arrow 3). Two mechanisms generate the positive interaction. First, higher b_t increases the magnitude of the positive direct effect of market competition described in the previous paragraph by increasing the percentage of visible producers. Fixing output, the government can tax visible producers at higher rates—the logic described for arrow 1. Second, higher b_t decreases the magnitude of the negative indirect effect of market competition described in the previous paragraph because higher b_t mitigates the negative effect of l_t on the percentage of visible citizens (Assumption 3). Lemma C.4 formalizes this result and formally characterizes a unique threshold such that more market competition lowers R_t if b_t is low enough, but raises R_t if b_t is high enough.

3.4 Long-Run Revenue Effects: Interaction Between Supply and Demand

The short-run revenue effects yield two possible scenarios when G chooses its state-building strategy, and Figure 6 summarizes the main intuition for how demand (the value of public goods, α) affects the state-building decision. Panel A highlights the conventional scenario from the literature: as public goods increase in value, G's utility to raising market competition (solid black line) increases relative to no state-building

(gray line). In this case, bureaucratic supply is high in period 1 ($b_1 = 0.6$). Higher market competition not only increases period 1 revenues, but also period 2 revenues—when the bureaucratic learning-by-doing effect is assumed to increase supply to $b_2 = 1$. At low levels of α, the government will not pay the state-building cost s because public goods are low-valued (Equation 2 provides G's lifetime consumption). However, high demand reverses this decision: G enhances market competition to generate more revenues to fund more valuable public goods.

Figure 6: Ambiguous Effects of Demand Shocks: Good and Bad State-Building



Notes: Figure 6 depicts G's lifetime expected consumption (see Equation 2) as a function of demand (α), disaggregated by whether G chooses no state-building (gray line), good state-building (solid black), or bad state-building (dashed black). It uses the same functional form assumptions and fixed parameter values as in Figure 5. The additional fixed parameters in both panels are $p = 0.4$, $s = 0.2$, $l_0 = 0.5$, $\underline{l} = 0.1$, and $\bar{l} = 1$ (the last two terms refer respectively to the possible low and high levels of market competition that G can choose by paying the state-building cost). In Panel A, $b_1 = 0.6$ and $\epsilon = 0.4$. In Panel B, $b_1 = 0.1$ and $\epsilon = 0.9$. We altered the slopes of the lines to more clearly display the main takeaways, although the main intuition is qualitatively identical.

Panel B highlights the contrarian scenario. Here, initial bureaucratic supply is low ($b_1 = 0.1$), and *decreasing* market competition will raise period 1 revenues. However, despite this short-run effect, bad state-building is not beneficial in the long run because it negates the bureaucratic learning-by-doing effect that G would experience if it promoted high market competition. Figure 6 assumes that the learning-by-doing effect is large enough in magnitude that G maximizes *total* revenues across periods 1 and 2 by choosing beneficial state-building policies rather than bad state-building policies (see Appendix Assumption C.1 and Appendix Lemma C.5), even though bad state-building maximizes period 1 revenues.

Although this assumption biases toward G choosing beneficial state-building policies, combining low initial

bureaucratic supply with G's relatively insecure hold on power ($p = 0.4$) in Panel B causes G to choose bad state-building if demand is high. As in Panel A, at low levels of α, the government will not pay the state-building cost because public goods are low valued. But if demand is high, then G optimally reduces market competition. Although bad state-building does not maximize long-run revenues, G's political insecurity causes it to value period 1 revenues considerably more than period 2 revenues, and therefore it chooses the short-term revenue maximization strategy (bad state-building) over long-run maximization (good state-building).[21]

In sum, the key model implication challenges the conventional wisdom linking higher demand to state-building—economic gains and fiscal capacity go hand-in-hand—posited by Besley and Persson (2011) and many others. Existing arguments are true if bureaucratic supply is high. However, given the difficulties of taxing market-based activity, rulers may respond to demand shocks by engaging in bad state-building in circumstances of low bureaucratic capacity. The aforementioned cases of India and Egypt exemplify bad state-building in the form of developing bloated state-owned sectors to raise revenues in response to international competition. Economically inefficient policies can promote short-term revenues at the expense of long-term fiscal capacity improvements. Appendix Proposition C.1 states equilibrium strategies as a function of supply and demand.

4 Measuring Demand and Supply

The main theoretical implication from the model—high demand and high supply positively interact to produce fiscal capacity gains—matches intuitive perceptions of which countries experienced huge fiscal expansion and when. Many have discussed Western Europe, its offshoots, and East Asia as having more effective institutional legacies than other parts of the world, and the 20th century also exhibited increasing demand for state spending, driven in particular by two world wars and associated military rivalries. However, rather than rely solely on rough conceptualizations of demand and supply, we find supportive associational evidence across a broad sample using plausible empirical measures of these concepts from the literature. Although standard causal inference concerns apply, as demand and supply are themselves endogenous to many his-

[21] Although p is identical in Panels A and B, low p does not deter good state-building policies in Panel A if demand is high because greater market competition enhances both short-term and long-term revenues.

torical factors for which data are scarce, we control for country and year fixed effects to guard against many generic confounding concerns when presenting the associational patterns. Appendix Section D.3 analyzes a secondary implication about income taxes versus customs taxes.

4.1 Data

Dependent variable and sample. The revenues variable is the same as in Section 1, central government revenues per capita in gold ounces, which we log because of right-skewedness. The unit of analysis is country-years. The core sample includes 87 countries and consists of all country-years prior to 1971 with available fiscal data (including colonies with data), although missing data on other variables reduces the number of observations in most specifications. For theoretical purposes, it is appropriate to compare colonies with independent countries—what matters is the ability to raise revenues, not where the revenues are spent—although robustness checks include an indicator for post-independence status. Appendix Table D.1 provides summary statistics.

Supply and demand measures. Measuring macro factors such as institutional supply and demand for revenues is complicated by the lack of consensus in the literature regarding which factors are most important, and by questions of operationalization and data availability. Table 1 examines three demand measures and three supply measures that, in addition to corresponding with the conceptualizations of demand and supply from the literature, each meet two criteria: reasonably wide coverage for our sample of countries and time period, and are time-varying. The contribution of our fiscal data is its broad country and time coverage relative to the existing literature, and choosing supply and demand measures with limited spatial or temporal coverage would mitigate that advantage. We also focus only on time-varying factors because we predict not only divergence among countries, but also at specific periods of time. Future research may find it beneficial to assess other possible measures of supply and demand, but the six that we analyze best match these conceptual, practical, and theoretical considerations.

For supply, we measure state information capacity by counting the number of years since a country/colony introduced a mandatory civil registration system for births, marriages, and deaths (*reg. system*). Having a civil registration system is essentially a precondition for direct taxation because otherwise bureaucrats face difficulties simply identifying the citizenry. Brambor et al. (2016) provide most data points, which

we supplement for some countries with missing data. Whereas Sweden, the United Kingdom, and France all had registration systems before 1800, Yemen and Haiti only implemented mandatory systems in the 1990s. To measure constraints on political leaders, we use the Varieties of Democracy dataset's (V-Dem; Coppedge, 2018) legislative constraints on the executive index (*exec. const.*).[22] The third supply measure uses van Leeuwen and Li's (2014) data on average years of educational attainment (*education*).

For demand, following the focus in existing research on international wars, one measure is an indicator for whether or not the country participated in international warfare in the previous year using Correlates of War data (Sarkees and Wayman, 2010) (*war*). The literature also posits that revenue increases in wartime tend to be sustained afterward, leading to state growth through a "ratchet" effect (Peacock and Wiseman, 1961). For example, Scheve and Stasavage (2016) argue that the world wars provided the consensus needed in Western European countries to construct welfare states, which have lasted long since the wars ended. The second demand measure captures this ratchet effect by computing a discounted measure of cumulative years that a state participated in an interstate war since 1815 (*war stock*).[23] Finally, to capture arguments about political participation and demand for revenue, we use legally enfranchised population percent from V-Dem (*suffrage*).

Statistical models. We present results from OLS models with a lagged dependent variable, country and year fixed effects, and country-clustered standard errors. Indexing countries by i and years by t, Table 1 estimates:

$$ln(Revenue/pop.)_{i,t} = \beta_R \cdot ln(Revenue/pop.)_{i,t-1} + \beta_S \cdot Supply_{i,t-1} + \beta_D \cdot Demand_{i,t-1} + \beta_{SD} \cdot Supply_{i,t-1} * Demand_{i,t-1} + \beta_i + \beta_t + \epsilon_{i,t}. \quad (4)$$

The supply and demand measures vary by column using the variables described above, and β_{SD} is the coefficient estimate for the interaction term and provides the main parameter of interest. The year fixed effects account for secular changes in revenue collection over time. The country fixed effects account for unit-

[22]Extending the model intuition, executive constraints should plausibly affect citizens' willingness to pay taxes (captured by their value of selling in the informal sector, T_i). For example, citizens may be less willing to pay if an unconstrained executive diverts revenues to corruption, leading to higher revenue collection costs.

[23]Table 1 uses an annual depreciation rate of 10%, although the results are similar with 5% or 20%.

specific sources of heterogeneity. Appendix Tables D.5 and D.6 estimate similar models but include several time-varying covariates that account for various country-year-specific sources of heterogeneity.[24]

4.2 Regression Results

Table 1 provides the main results by interacting each demand measure with each supply measure, for a total of nine specifications. Among the measures that meet the criteria outlined above, we are agnostic regarding which constitute the "main" measure of each concept, which is why we present all combinations. In six of the nine specifications, the estimate for the variable that interacts the supply and demand measure is positive and statistically significant at 5%, and another at 10% (additionally, the p-value for the interaction term in Column 8 is 0.128). Furthermore, education is the only lower-order supply or demand term that is positive and statistically significant in any specification, implying that high levels of either supply or demand only covary with high revenues when interacted with each other.[25] To illustrate the magnitude of the coefficient estimates, computing long-run multipliers for the coefficient estimates in Column 1 shows that the average increase in expected revenue intake for a country-year with a war in the previous year (high demand) and 115 years of a civil registration system (high supply)[26] is 204% higher than a country-year lacking either of these factors. By contrast, the corresponding figure is 6% for high demand with low supply and 96% for high supply with low demand.

Although controlling for country and year fixed effects guards against many common confounding considerations, there may still be concern that country-specific time trends drive the results. Three possibilities are that our findings simply track increases in GDP over time—even though income spiked in Western Europe at least a half century before the great revenue divergence occurred (Figure 3)—they reflect demographic changes, or they are an artifact of including colonies in the sample or new countries entering the sample (although country fixed effects address the latter). Appendix Section D.2 addresses these considerations

[24] We assessed the dependent variable for non-stationarity by running a series of Fisher-type unit-root tests based on augmented Dickey-Fuller tests. We calculated residuals from auxiliary regressions that include the unit and year fixed effects, and these tests reject at the 1% significance level the null hypothesis that all panels contain unit roots (results available upon request).

[25] Appendix Tables D.2 and D.3 analyze each supply and demand term independently.

[26] This is the average value of this variable among Western European and East Asian countries in 1946.

Table 1: Assessing Supply and Demand Interaction Effects

	DV: Logged central government revenue P.C. in gold oz.								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
War$_{t-1}$*Reg. system$_{t-1}$	0.000575***								
	(0.000191)								
War$_{t-1}$*Exec. const.$_{t-1}$		0.144***							
		(0.0476)							
War$_{t-1}$*Education$_{t-1}$			0.0124***						
			(0.00407)						
War stock$_{t-1}$*Reg. system$_{t-1}$				7.85e-05*					
				(4.24e-05)					
War stock$_{t-1}$*Exec. const.$_{t-1}$					0.0338***				
					(0.0118)				
War stock$_{t-1}$*Education$_{t-1}$						0.00206**			
						(0.000965)			
Suffrage$_{t-1}$*Reg. system$_{t-1}$							2.27e-06		
							(3.97e-06)		
Suffrage$_{t-1}$*Exec. const.$_{t-1}$								0.00116	
								(0.000751)	
Suffrage$_{t-1}$*Education$_{t-1}$									0.000149**
									(7.17e-05)
War$_{t-1}$	0.00392	-0.0433	-0.00831						
	(0.0230)	(0.0333)	(0.0236)						
War stock$_{t-1}$				0.00644	-0.00728	0.00223			
				(0.00454)	(0.00804)	(0.00593)			
Suffrage$_{t-1}$							9.38e-05	-0.000468	-0.000376
							(0.000324)	(0.000468)	(0.000322)
Reg. system$_{t-1}$	0.000541			0.000409			4.59e-05		
	(0.000470)			(0.000499)			(0.000724)		
Exec. const.$_{t-1}$		0.0216			-0.00890			-0.0578	
		(0.0299)			(0.0321)			(0.0578)	
Education$_{t-1}$			0.0161**			0.0137**			0.00537
			(0.00674)			(0.00662)			(0.0117)
Country-years	4,491	3,863	4,846	4,491	3,863	4,846	2,905	2,890	3,335
Countries	68	83	81	68	83	81	64	79	77
R-squared	0.973	0.971	0.973	0.973	0.971	0.973	0.966	0.965	0.967
LDV?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Table 1 presents OLS regression estimates with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

and shows that controlling for population and an independence indicator does not strongly affect the findings. Severe missingness in historical GDP data circumscribes accounting for this alternative explanation, although we provide suggestive evidence that it does not drive the results.

One important limitation of the main revenues variable is that it uses nominal rather than real exchange rates that adjust for differences in purchasing power. Although this affects the precision of the estimates in Table 1, Appendix Sections A.2 and A.3 discuss why this factor is unlikely to overturn the results.

Finally, Appendix Section D.3 disaggregates revenue from income taxes and customs taxes using limited available data.

5 Conclusion

In addition to documenting and explaining the great 20th-century revenue divergence, the analysis generates important implications for historical research on Western Europe and on the rest of the world. Within Europe, the results suggest an alternative interpretation for why the world wars and associated franchise expansion were significant. Although these demand shocks coincided with historically unprecedented mobilization of social resources (Scheve and Stasavage, 2016), explaining divergence relative to the rest of the world requires incorporating supply-side arguments because the ability to mobilize successfully for mass modern warfare depends on ample institutional supply. Therefore, demand shocks enabled *societies with a specific set of institutions* to respond to these crises with high taxation and spending.

Conversely, our theory also casts doubt on the usefulness of applying Eurocentric models—such as Tilly's (1992) thesis that war contributes to state-building—to explaining non-European state-building. For example, some have argued that low levels of international conflict prevented the conditions that led to high demand in earlier periods of European history in which "the near-constant threat of war prompted most states to become stronger in order to survive" (Herbst, 2000, 113). This argument implies that more frequent warfare would have contributed to fiscal capacity building. Our results instead show that high demand in the context of low supply will tend not to promote fiscally effective states. The general absence of high bureaucratic supply makes the European model based on warfare generating high demand inapplicable for most of the non-European world.

The theoretical and empirical analyses also offer new directions for future research. Distinguishing "good" from "bad" state-building likely carries implications for expenditure patterns in addition to revenue collection. Future theories could incorporate the possibility of private goods and corruption, as well as add other components to the model such as domestic political constituencies and additional (dis)incentives for tax compliance, which we omitted here to isolate a circumstance in which bad state-building can occur despite the absence of many factors typically proposed to hinder tax collection. Furthermore, our empirics rely heavily on factors identified in the existing literature, as our measures of supply and demand are taken (directly or indirectly) from existing studies. Future work could potentially examine the state formation process in light of the interactive relationship and identify new explanatory factors.

References

Acemoglu, Daron, Simon Johnson and James A. Robinson. 2001. "The Colonial Origins of Comparative Development." *American Economic Review* 91(5):1369–1401.

Acemoglu, Daron, Simon Johnson and James Robinson. 2005. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review* 95(3):546–579.

Andersson, Per F. 2018. "Democracy, Urbanization, and Tax Revenue." *Studies in Comparative International Development* 53(1):111–150.

Bates, Robert H. 1981. *Markets and States in Tropical Africa*. University of California Press.

Beramendi, Pablo, Mark Dincecco and Melissa Rogers. 2018. "Intra-Elite Competition and Long-Run Fiscal Development." *Journal of Politics* .

Besley, Timothy and Torsten Persson. 2011. *Pillars of Prosperity*. Princeton University Press.

Bockstette, Valerie, Areendam Chanda and Louis Putterman. 2002. "States and Markets: The Advantage of an Early Start." *Journal of Economic Growth* 7(4):347–369.

Bolt, Jutta, Robert Inklaar, Herman de Jong and Jan Luiten van Zanden. 2018. "Rebasing 'Maddison'." Maddison Project Working paper 10. Available at https://www.rug.nl/ggdc/historicaldevelopment/maddison, accessed 6/30/18.

Brambor, Thomas, Agustín Goenaga, Johannes Lindvall and Jan Teorell. 2016. "The Lay of the Land: Information Capacity and the Modern State." *STANCE Working Paper Series. Available at http://www.stanceatlund.org/working-papers.html.* .

Brewer, John. 1990. *The Sinews of Power*. Harvard University Press.

Broadberry, Stephen and Bishnupriya Gupta. 2006. "The Early Modern Great Divergence." *Economic History Review* 59(1):2–31.

Carpenter, Daniel P. 2001. *The Forging of Bureaucratic Autonomy*. Princeton University Press.

Centeno, Miguel Angel. 2002. *Blood and Debt*. Penn State Press.

Chaudhry, Kiren Aziz. 1993. "The Myths of the Market and the Common History of Late Developers." *Politics & Society* 21(3):245–274.

Coppedge, Michael et al. 2018. "V-Dem [Country-Year/Country-Date] Dataset v8. Varieties of Democracy (V-Dem) Project.".

de Soto, Hernando. 2000. *The Mystery of Capital*. Basic Books.

Dincecco, Mark. 2011. *Political Transformations and Public Finances*. Cambridge University Press.

Dincecco, Mark. 2015. "The Rise of Effective States in Europe." *The Journal of Economic History* 75(3):901–918.

Dincecco, Mark. 2017. *State Capacity and Economic Development*. Cambridge University Press.

Engerman, Stanley L. and Kenneth L. Sokoloff. 1997. Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies. In *How Latin America Fell Behind*, ed. Stephen Haber. Stanford University Press pp. 260–304.

Evans, Peter B. 1995. *Embedded Autonomy*. Cambridge University Press.

Gardner, Leigh. 2012. *Taxing Colonial Africa*. Oxford University Press.

Haber, Stephen. 2006. Authoritarian Government. In *Oxford Handbook of Political Economy*. Oxford University Press.

Herbst, Jeffrey. 2000. *States and Power in Africa*. Princeton University Press.

International Monetary Fund. 2017. "IMF Data." Available at http://www.imf.org/en/Data.

Jones, Eric. 2003. *The European Miracle*. Cambridge University Press.

Karaman, K Kivanc and Şevket Pamuk. 2013. "Different Paths to the Modern State in Europe." *American Political Science Review* 107(3):603–626.

Lee, Melissa M. and Nan Zhang. 2017. "Legibility and the Informational Foundations of State Capacity." *Journal of Politics* 79(1):118–132.

Levi, Margaret. 1989. *Of Rule and Revenue*. University of California Press.

Lindert, Peter H. 2004. *Growing Public: The Story: Social Spending and Economic Growth Since The Eighteenth Century*. Vol. 1 Cambridge University Press.

Mares, Isabela and Didac Queralt. 2015. "The Non-Democratic Origins of Income Taxation." *Comparative Political Studies* 48(14):1974–2009.

Mitchell, Brian. 1998. *International Historical Statistics: Europe 1750-1993*. Springer.

North, Douglass C. and Barry R. Weingast. 1989. "Constitutions and Commitment." *Journal of Economic History* 49(04):803–832.

Peacock, Alan T. and Jack Wiseman. 1961. *The Growth of Public Expenditure in the United Kingdom*. Gregg Revivals.

Pomeranz, Kenneth. 2009. *The Great Divergence*. Princeton University Press.

Queralt, Didac. 2015. "From Mercantilism to Free Trade." *Quarterly Journal of Political Science* 10(2):221–273.

Queralt, Didac. 2016. "The Legacy of War on Fiscal Capacity." Working paper. Available at https://www.didacqueralt.com/research, accessed 6/30/18.

Sarkees, Meredith Reid and Frank Whelon Wayman. 2010. *Resort to War: 1816-2007*. CQ Press.

Saylor, Ryan. 2013. "Concepts, Measures, and Measuring Well: An Alternative Outlook." *Sociological Methods & Research* 42(3):354–391.

Saylor, Ryan and Nicholas C. Wheeler. 2017. "Paying for War and Building States: The Coalitional Politics of Debt Servicing and Tax Institutions." *World Politics* 69(2):366–408.

Scheve, Kenneth and David Stasavage. 2016. *Taxing the Rich*. Princeton University Press.

Stasavage, David. 2005. "Democracy and Education Spending in Africa." *American Journal of Political Science* 49(2):343–358.

Tabellini, Guido. 2008. "Institutions and Culture." *Journal of the European Economic Association* 6(2-3):255–294.

Thies, Cameron G. 2004. "State Building, Interstate and Intrastate Rivalry." *International Studies Quarterly* 48(1):53–72.

Thies, Cameron G. 2005. "War, Rivalry, and State Building in Latin America." *American Journal of Political Science* 49(3):451–465.

Tilly, Charles. 1992. *Coercion, Capital, and European States, AD 990-1992*. Blackwell Oxford.

van Leeuwen, Bas and Jieli Li. 2014. Education since 1820. In *How Was Life? Global Well-Being Since 1820*, ed. Jan Luiten van Zanden. OECD Publishing.

Waterbury, John. 1993. *Exposed to Innumerable Delusions*. Cambridge University Press.

Online Appendix

Contents

List of Tables

List of Figures

A Data Appendix

A.1 Collecting the Data

The International Historical Statistics Database (Mitchell, 1998) provides the main data source, specifically, annual central government revenue in the local currency. We performed four steps to generate our dependent variable.

1. We translated fiscal years into calendar years to generate a data file measuring each country's annual revenues in thousands of local currency units.
2. We converted local currency units into British pounds. COW trade data (Barbieri, Keshk and Pollins, 2008) provide the main source for historical exchange rates. However, COW does not include data from before 1870 or from colonies (although most colonies used the mother country's currency).

Additionally, since COW data uses market quotes, it exhibits greater missing data problems for smaller countries. To reduce this problem, we interpolated rates in cases in which the data coverage gap was less than five years and the difference in rates on either side of the gap did not exceed 5%. If the local currency was quoted in U.S. dollars, then we converted the rate into pounds using the current U.S. dollar-British pound exchange rate. We further supplemented the COW data using Denzel (2010) and Officer (2016).

3. We converted revenue in British pounds to gold using the gold prices from Green (2016).
4. Finally, we divided total central government revenue in gold by population, again using data from the International Historical Statistics Database. Although it usually provides annual population data, in cases where it only provides data for census years, we interpolated data between census years if the coverage gap was less than twenty years. Because their population data is based on censuses, our outcome variable is missing for all country years before the first census.

A.2 Exchange Rate Effects?

Our measure aims to capture variation in the fiscal effort and fiscal capacity of governments, rather than changes in prices, exchange rates, or economic productivity. Using gold equivalents enables equally scaling the per capita revenue figures, but using nominal exchange rates raises the possibility that longitudinal changes in revenue per capita may reflect changes in the foreign exchange market rather than changes in actual revenue. In the short term, the data exhibits many sharp short-term changes that clearly reflect currency revaluations.

We took three steps to palliate this problem. First, we focus only on pre-1971 data, when the Nixon shock caused many currencies and the price of gold to float. The stability of many exchange rates for much of the pre-1971 period under the Gold Standard and Bretton Woods regimes implies that year-to-year exchange rate fluctuations are less concerning than at many other historical periods.

Second, we excluded currencies for whcih the published exchange rate was grossly manipulated (e.g., the Soviet ruble). Although we did not exclude all currencies with fixed exchange rates and fixed capital exchange rates, we excluded currencies that exhibited evidence that published exchange rates bore no relation to market supply and demand, or where the exchange differed considerably from long-term trends within the country. In many cases, this meant excluding periods of instability when a country's link to gold or the dollar was changed. Importantly, because our main models use country fixed effects, it is not necessary (though it would certainly be desirable) that currencies are perfectly valued. Instead, we only require that distortions caused by exchange rates remain constant over time.

Third, the within-empire figures in the text and the appendix—which exhibit similar patterns to the aggregate dataset—depict countries that used the same currency or highly stable pegs. In these cases, exchange rate fluctuations do not influence the results because the exchange rates remain constant over time.

A.3 Price Effects?

Even within-empire comparisons do not capture differences in prices. The ideal solution to this problem would be to normalize currencies using a purchasing power index that measures state revenue at purchasing power parity. However, the rarity of reliable pre-late 20th-century price data—let alone price data comparable across nations—implies that accounting for prices would severely constrict the sample and make

impossible many of the illuminating historical comparisons. Cross-national purchasing power data is available only since 1950 (Summers and Heston, 1991), and after 1950 there is virtually no variation in the major supply factors identified in the literature (conflict and the franchise) within Western Europe and East Asia, and the great revenue divergence had already occurred.

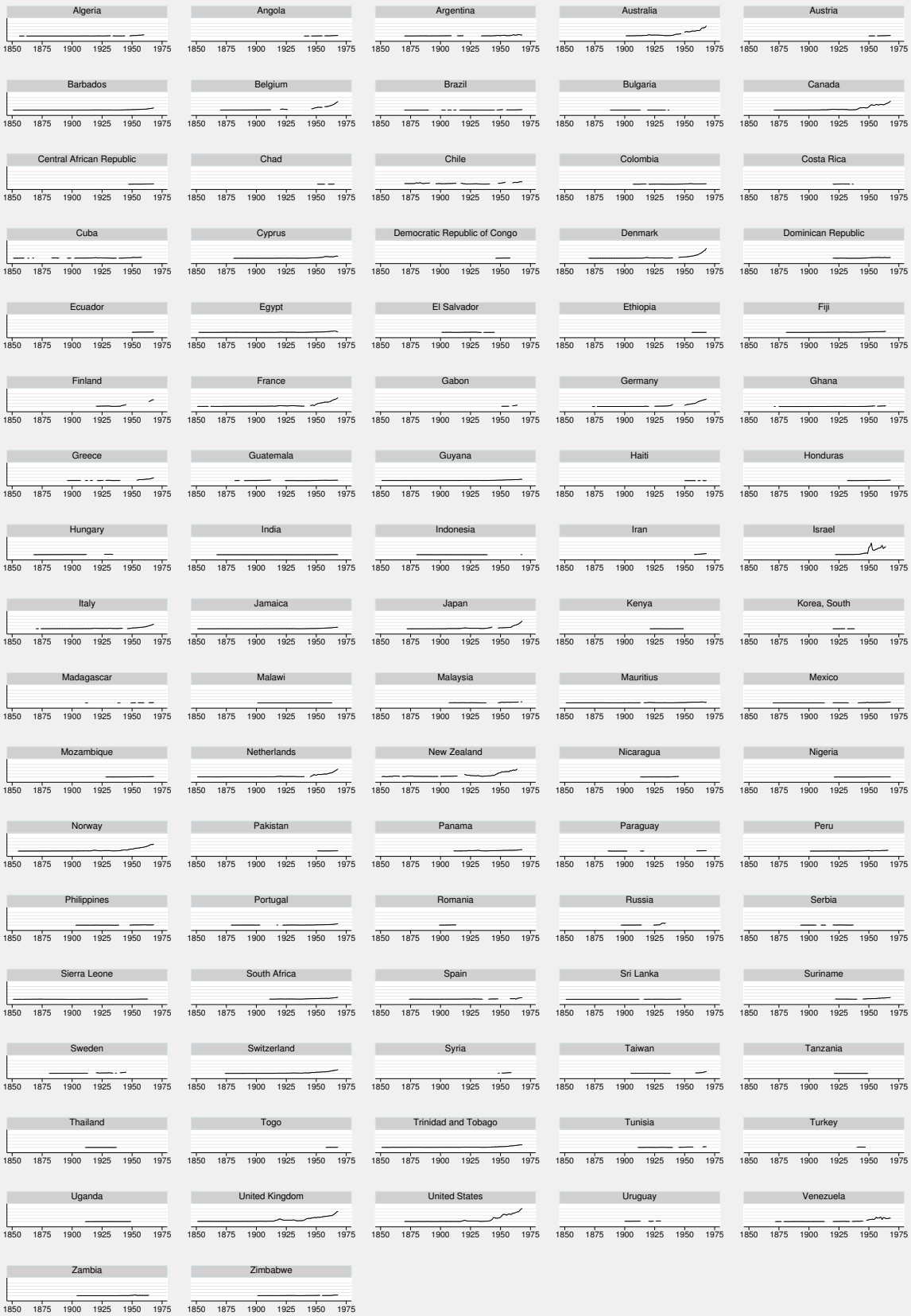
However, differences in purchasing power are unlikely to explain our pattern for two reasons. First, differences in purchasing power in 1950 were modest compared to the differences in revenue that we observe. Although purchasing power in South Africa was 73% more than in the UK in 1955, nominal per capita revenues were 441% higher in the UK than in South Africa. More broadly, there do not seem to be systematic differences in purchasing power across categories of countries. In 1950, average GDP purchasing power conversion factors were similar in Western Europe and East Asia compared to the rest of the world (0.102 versus 0.91).

Second, country fixed effects account for static cross-national differences in purchasing power. To confound the divergence trend, purchasing power would also have to diverge over time, with nominal revenue in Western Europe and East Asia increasing precipitously despite the real purchasing power of that revenue remaining static (at least relative to the non-Western world). Limited available data (i.e., only countries with PPP data in 1950 in the Penn World Tables dataset) late in our time frame (1950 to 1968) show that although purchasing power increased in Western Europe/East Asia relative to the rest of the world, this increase was modest relative to differences in per capita nominal revenue increases. The GDP conversion factor increased by 71% in Western Europe/East Asia compared to 20% in the rest of the world. However, revenue increased by 294% in Western European/East Asia compared to 18% in the rest of the world.

B Supporting Information for Sections 1 and 2

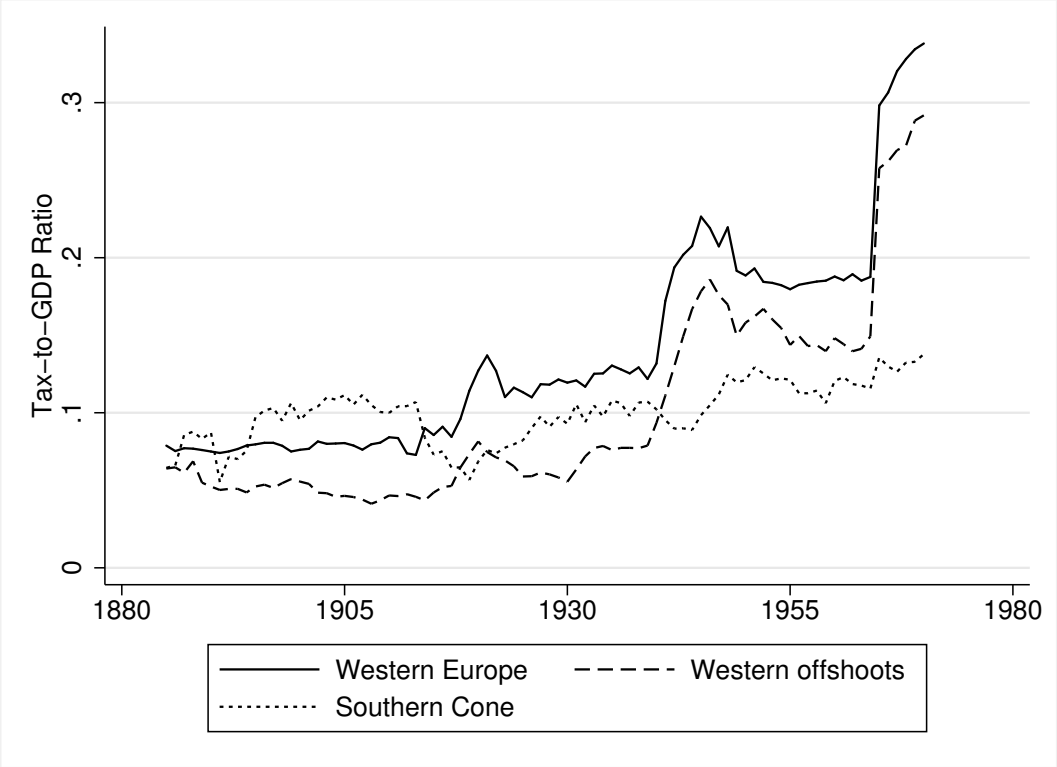
B.1 Additional Tables and Figures

Figure B.1: Revenues Per Capita in Gold by Territory, 1850–1970



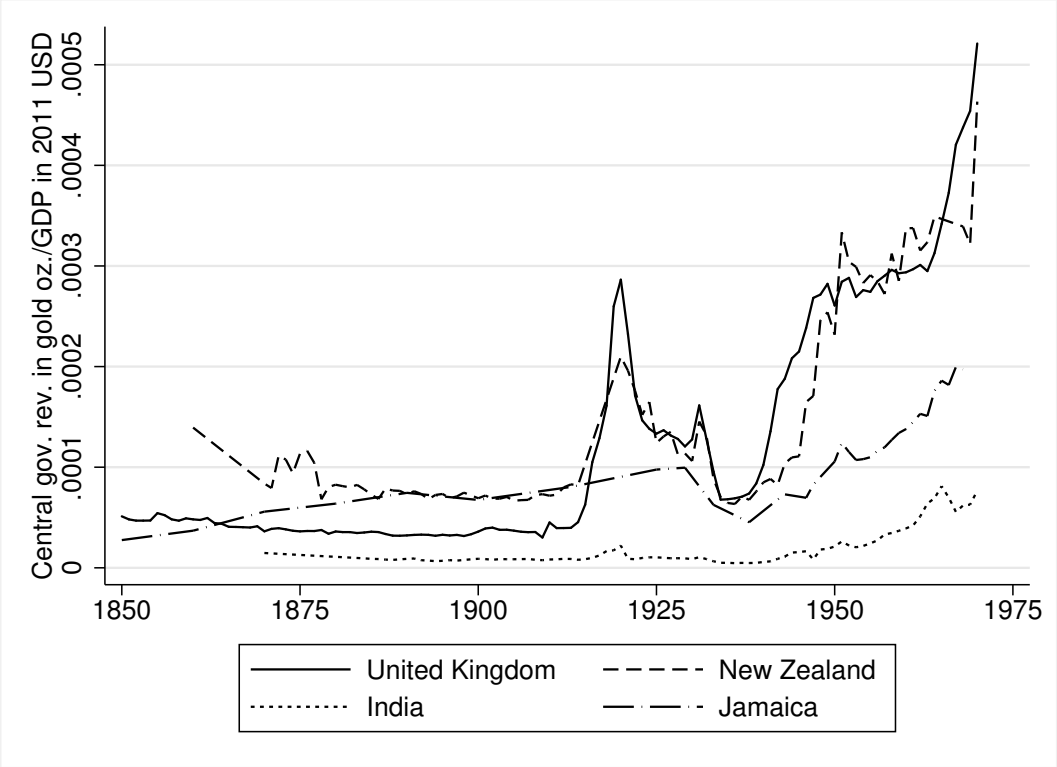
Graphs by cname

Figure B.2: Tax-to-GDP Ratio from Beramendi et al.



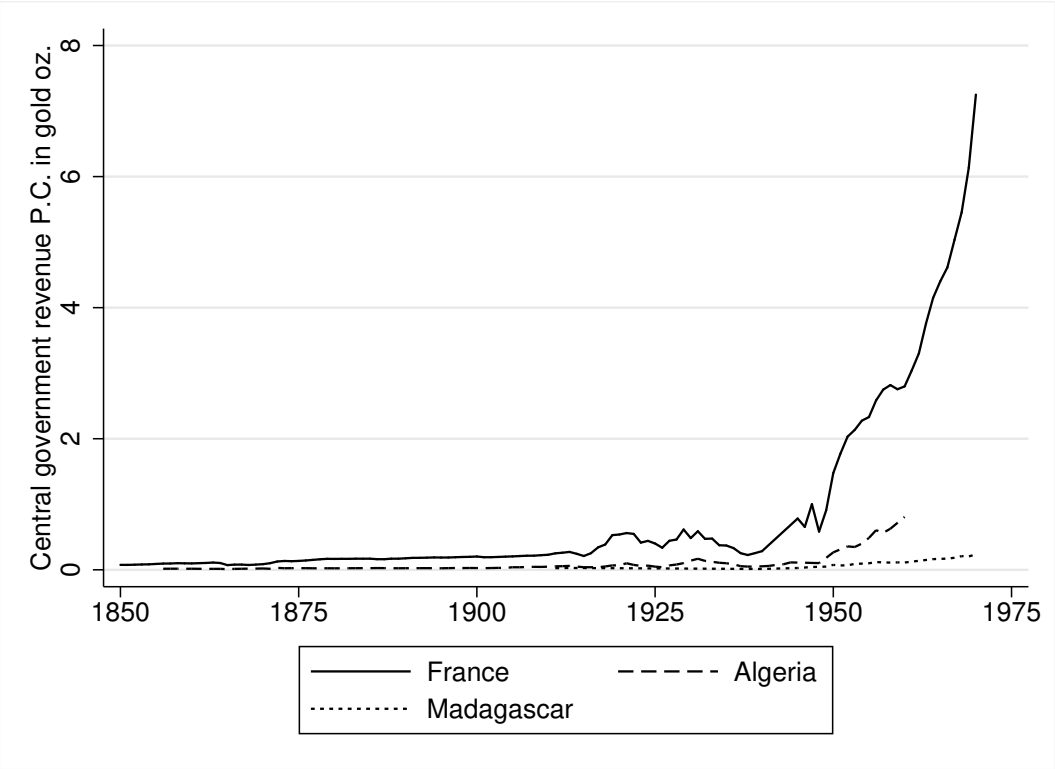
Note: The lines show estimated central government revenue as a percentage of GDP using data from Beramendi, Dincecco and Rogers (2018).

Figure B.3: Normalized Revenue Trends in the British Empire



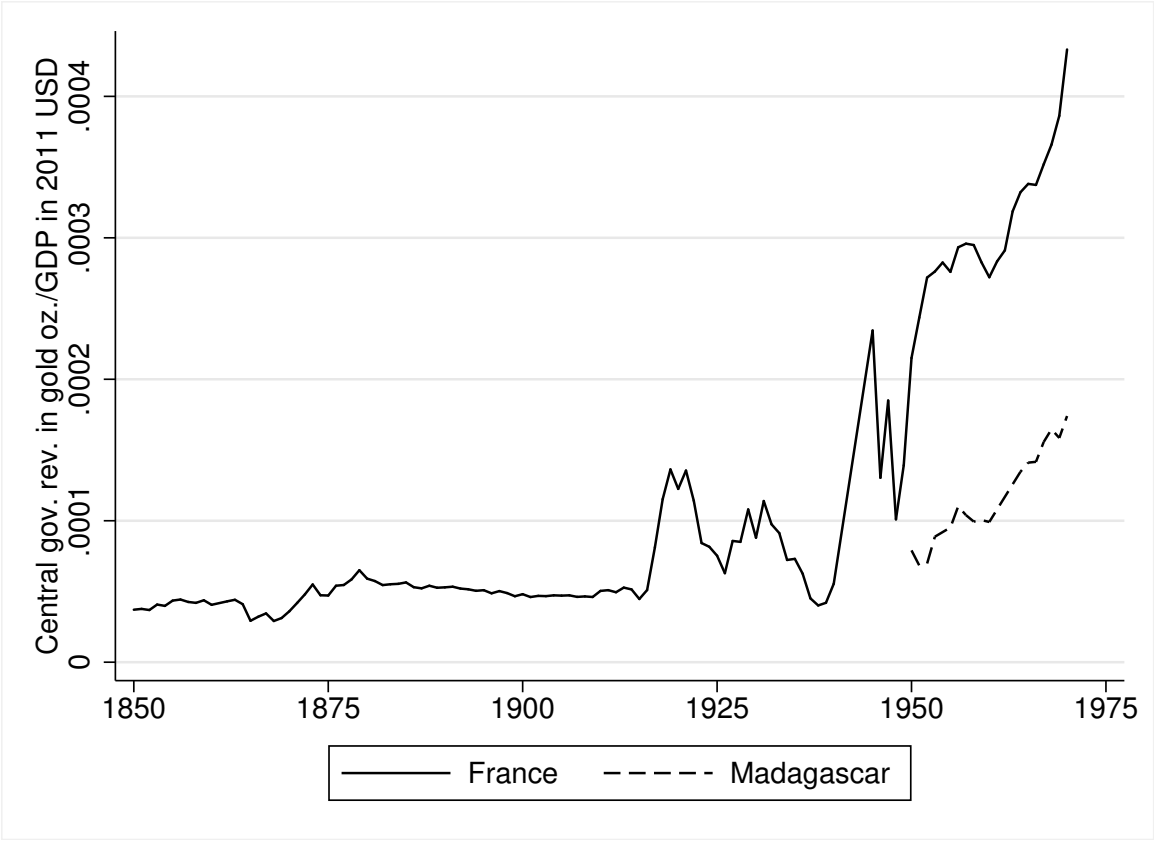
Note: The lines show estimated central government revenue in ounces of gold (converted at nominal exchange rates) divided by per capita GDP estimates in constant 2011 U.S. dollars from Bolt et al.'s (2018) update of Angus Maddison's data. Different units in the numerator and denominator imply that the magnitude of the normalized revenue variable cannot be interpreted in an absolute sense.

Figure B.4: Revenue Trends in the French Empire



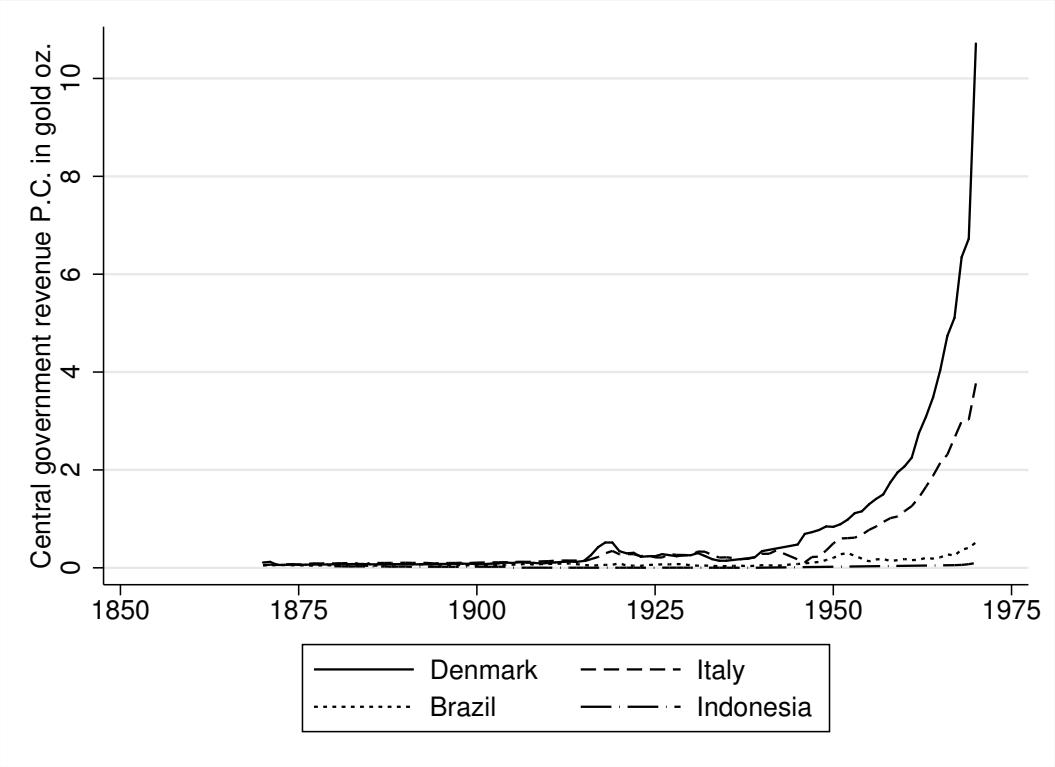
Note: The lines show estimated central government revenue per capita in ounces of gold, converted at nominal exchange rates.

Figure B.5: Normalized Revenue Trends in the French Empire



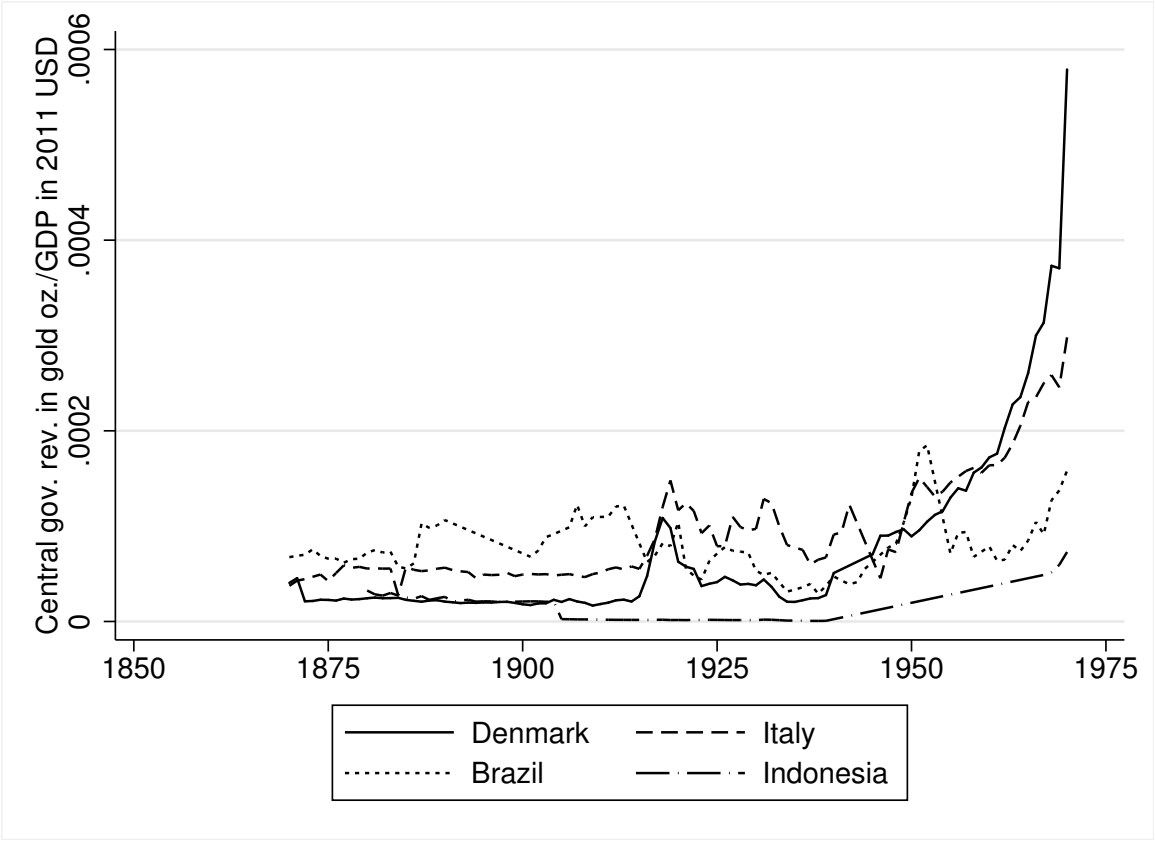
Note: The lines show estimated central government revenue in ounces of gold (converted at nominal exchange rates) divided by per capita GDP estimates in constant 2011 U.S. dollars from Bolt et al.'s (2018) update of Angus Maddison's data. Different units in the numerator and denominator imply that the magnitude of the normalized revenue variable cannot be interpreted in an absolute sense.

Figure B.6: Revenue Trends Among Other Countries



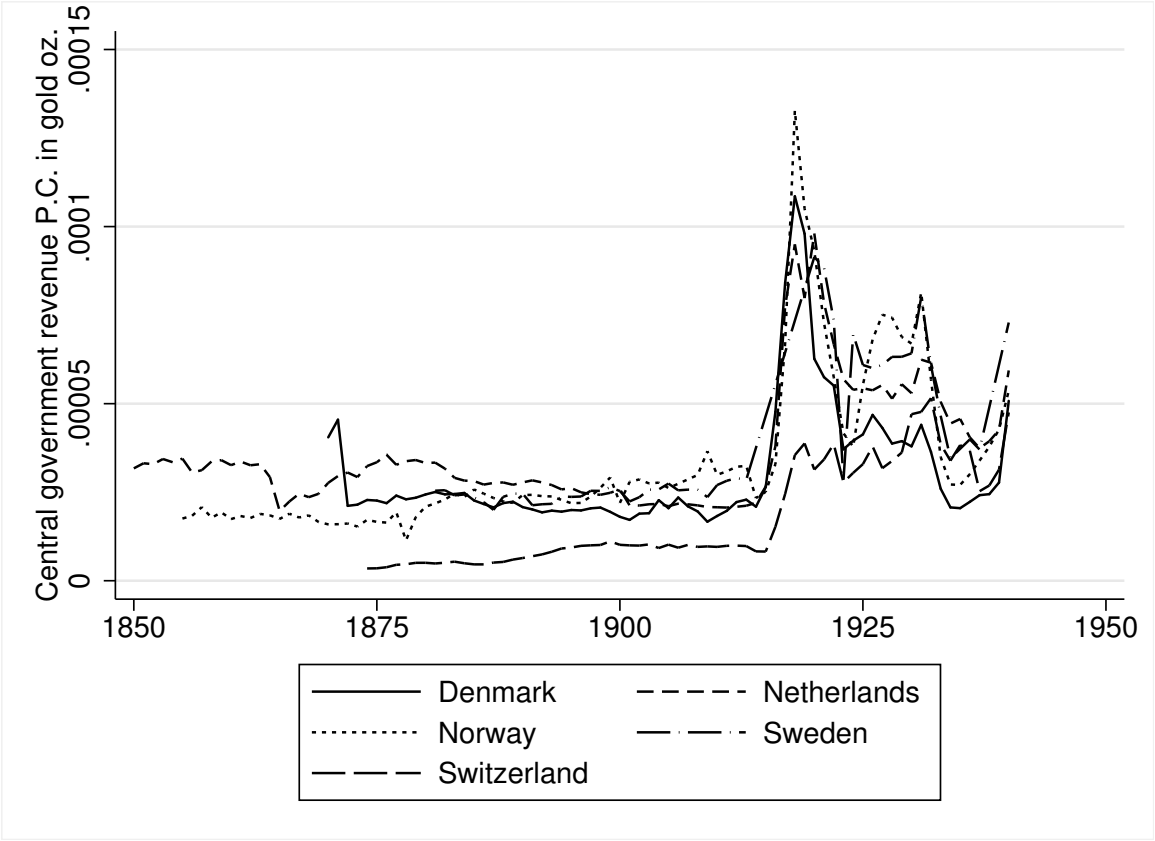
Note: The lines show estimated central government revenue per capita in ounces of gold, converted at nominal exchange rates.

Figure B.7: Normalized Revenue Trends Among Other Countries



Note: The lines show estimated central government revenue in ounces of gold (converted at nominal exchange rates) divided by per capita GDP estimates in constant 2011 U.S. dollars from Bolt et al.'s (2018) update of Angus Maddison's data. Different units in the numerator and denominator imply that the magnitude of the normalized revenue variable cannot be interpreted in an absolute sense.

Figure B.8: Revenue Trends in WWI Neutrals



Note: The lines show estimated central government revenue in ounces of gold (converted at nominal exchange rates) divided by per capita income estimates from Bolt et al.'s (2018) update of Angus Maddison's data.

B.2 Regression Evidence of the Great Revenue Divergence

Table B.1 provides numerical estimates of the pattern shown in Figure 1 by presenting a series of panel regression models with logged per capita central government revenue in gold as the dependent variable. Predictably, an indicator for countries in Western Europe, the offshoot settler colonies, or East Asia (WE/EA) and an indicator for post-1914 years each associate positively and statistically significantly with per capita revenue (Columns 1 and 2). Both models include country random effects. Column 1 models year fixed effects to account for time-specific factors such as changes in the price of gold or changes in military technology, although Column 2 cannot control for year fixed effects because of collinearity with the post-1914 indicator. Column 3 includes both these variables and their interaction. The interaction term is positive and statistically significant, which shows that being in these areas of the world since 1914 raises expected revenues above either WE/EA or post-1914 on its own. The estimated magnitudes are very large when not accounting for year fixed effects (Column 3). Using the estimated long-run multipliers, per capita revenue was 151% higher in WE/EA than in the rest of the world before 1914, and 1,402% higher afterwards. Accounting for year fixed effects (Column 4), per capita revenue was 93% higher in WE/EA than in the rest of the world before 1914, and 275% higher afterwards. In unreported bivariate regressions of logged revenue on WE/EA, the coefficient estimate is 67% in 1900 and 192% in 1945. The findings are similar in Columns 5 through 7 when including country fixed effects to account for unit-specific differences in geographical and institutional endowments, when adding GDP per capita as a control, and when normalizing revenue by GDP.

Table B.1: The Great Revenue Divergence: Regression Evidence

DV:	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Norm. Revenue
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WE/EA	0.0342***		0.00651	0.0171***			
	(0.00558)		(0.00526)	(0.00614)			
Post-1914		0.0360***	0.0343***				
		(0.00398)	(0.00458)				
W. Eur. & E. Asia*Post-1914			0.0196**	0.0335***	0.0808***	0.104***	0.109***
			(0.00882)	(0.0103)	(0.0171)	(0.0286)	(0.0280)
Log GDP P.C.$_{t-1}$						0.0417	
						(0.0296)	
Country-years	5,332	5,332	5,332	5,332	5,332	3,459	3,420
Countries	87	87	87	87	87	77	76
R-squared					0.973	0.975	0.950
LDV?	YES	YES	YES	YES	YES	YES	YES
Country FE?	NO	NO	NO	NO	YES	YES	YES
Year FE?	YES	NO	NO	YES	YES	YES	YES

Notes: Table B.1 summarizes a series of OLS regressions with country-clustered standard errors. The dependent variable is logged central government revenue per capita in gold ounces in Columns 1 through 6, and logged central government revenue in gold ounces divided by GDP in 2011 U.S. dollars in Column 7. $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

B.3 Additional Information on the Timing of Divergence

Economic divergence. Economic historians have debated the timing of economic divergence between Western Europe and the rest of the world. Traditional accounts argued that Western Europe had already achieved higher living standards than East Asia during the early modern period, if not the Middle Ages (Broadberry and Gupta, 2006; Jones, 2003). Pomeranz (2009) countered by arguing that Europe and select parts of East Asia had similar living standards until the late 18th century, the period of the industrial revolution and European colonialism. Both schools agree that Europe exhibited noticeable economic differences Africa/Latin America during the early modern period, although cannot precisely estimate the magnitude of these differences. The causes of this economic shift are much debated, with many scholars emphasizing various institutional advantages possessed by Western Europe in general or England in particular (North and Weingast, 1989; Acemoglu, Johnson and Robinson, 2001, 2005; Cox, 2017).

Revenue divergence. The body of the paper primarily compares the large 20th century differences in revenue collection between Western Europe/East Asia and the rest of the world to the absence of large differences in the 19th century. However, other research has discussed differences that had emerged by the late 18th century. According to Dincecco's (2017, 69) estimates, Britain collected over 11 gold grams per capita in revenue and France collected roughly 5. By contrast, the corresponding figure for India was 1, and less than that in the Ottoman Empire or China. However, Figure 4 shows that Britain's revenues dropped considerably after the Napoleonic wars while the Ottoman empire implemented fiscal reforms that substantially improved revenue collection (Karaman and Pamuk, 2010). Japan began to diverge from China during the 19th century (Sng and Moriguchi, 2014), but it began from a low base and was collected comparatively small revenue amounts throughout the 19th century (see Figure 1). Furthermore, Dincecco's comparisons do not include estimates for Latin America, which we document had high levels of revenues compared to the West throughout the 19th century (e.g., Southern Cone countries in Figure B.2 and Jamaica in Figure 2).

Although we do not provide a comprehensive explanation for this moderate 19th-century convergence that preceded the great 20th-century divergence, our framework appears relevant. The 19th century was relatively peaceful in Europe. Therefore, despite continued improvements in bureaucratic supply institutions, these countries did not experience the massive demand for revenues that occurred during and following World War I. This observation in particular helps to account for Britain's relative stagnation between the end of the Napoleonic Wars and the beginning of World War I. Our framework also accounts for why countries like Japan were able to respond to Western pressure in the mid-19th century by rapidly increasing state capacity, whereas most other countries could not.

B.4 Non-Tax Revenues

Conventional sources of tax revenue based on taxing output (head taxes, trade taxes, income taxes) do not provide the only possible source of government revenues. Governments may also benefit from natural resource production, foreign aid, and remittances from ex-patriots. A large literature documents the empirical importance of "rentier" revenue sources and examines their effects on political outcomes (Karl, 1997; Ross, 2012; Morrison, 2014; Menaldo, 2016). Alternatively, states can substitute for taxes by borrowing (Centeno, 2002; Queralt, 2016), which was a particularly common strategy earlier in European history.

Although we not dispute the importance of non-tax revenues for many political outcomes, we not engage with them in depth here because they are unlikely to explain our core pattern. Western Europe and East Asia began to distinguish themselves from the rest of the world in the early 20th century because of their superior

ability to increase tax revenues (Scheve and Stasavage, 2016), not because of their superior exploitation of natural resources. Nor do non-tax revenues convincingly explain relative stagnation in much of the non-Western world. There are certainly some cases, such as Nigeria and Sierra Leone, where natural resource abundance plausibly contributed to fiscally weak states. However, most countries outside the OECD that extract large revenue streams are also oil-rich (Ross, 2012), and therefore their abundance in natural resources biases *against* a great revenue divergence occurring. Furthermore, resource curse arguments cannot explain why many non-Western countries that are resource poor have also failed to catch up to the West.

C Supporting Information for Section 3

C.1 Technical Notes for Model Setup

1. Formally, the citizens are ex ante identical and the set of citizens is atomless.
2. To economize notation and without loss of generality, assume that this implies any individual $i \in [0, l_0]$ is a legal producer, whereas individuals $i \in (l_0, 1]$ cannot legally sell their output in the formal market.
3. Formally, G chooses $l_t \in \{\underline{l}, l_0, \bar{l}\}$, for $0 < \underline{l} < l_0 < \bar{l} \leq 1$ and $t \in \{1, 2\}$.
4. Formally, if G chooses $l_t \in \{\underline{l}, \bar{l}\}$
5. The parameter ϵ is contained within the set $(\tilde{\epsilon}, 1 - b_1)$, for $\tilde{\epsilon} > 0$ defined in Appendix Assumption C.1.
6. Because there is a continuum of producers without atoms, individual production decisions do not affect the price of the good, which instead is determined by total production among legal producers. Total production equals $Q_t \equiv \int_0^{l_t} q_{i,t} \cdot di$ and the price for the good is determined by a linear demand curve that equals $p(Q_t) = \max\{d_0 - d_m \cdot Q_t, 0\}$, for $d_0 > 0$ and $d_m > 0$.
7. The marginal cost function $c(\cdot)$ is smooth and bounded with $c(0) = 0$, $c' > 0$, and $c'' > 0$.
8. The density function $F(T_i)$ is smooth and has positive support on $[0, 1]$. The corresponding probability density function is $f(T_i)$. Correspondingly, citizens' mean transaction cost to selling in the informal sector is:
$$\overline{T} \equiv \int_0^1 T_i \cdot dF(T_i) \tag{C.1}$$
9. Because T_i is constant across periods, the same citizens are hidden and visible in periods 1 and 2. Following period 1, G does not learn about T_i among hidden citizens.
10. Two Inada-type restrictions are $\lim_{b_t \to 0} \frac{dv(l_t, b_t)}{dl_t} = -\infty$ and $\lim_{b_t \to 1} \frac{dv(l_t, b_t)}{dl_t} = 0$. Furthermore, $v(\cdot)$ is smooth in its arguments.
11. Formally, $R_t = \int_{\Gamma_t} \tau_{i,t} \cdot q_{i,t} \cdot di$, where Γ_t is the set of producers that sell in the formal sector in period t.
12. Formally, μ is an indicator variable that equals 1 if $l_t = \{\underline{l}, \bar{l}\}$ and 0 if $l_t = l_0$.

C.2 Supporting Information for Model Analysis

The following provides additional details on the equilibrium by solving backwards on the stage game, as well as stating and proving formal results from the text.

Government taxation decision. G faces different taxation considerations for visible and hidden producers. For the v percent of visible producers, G optimally sets an individual-specific tax rate $\tau_{i,t}^{v}$ that makes each producer indifferent between producing in the formal versus informal sector, $(1-\tau_{i,t}^{v}) \cdot q_{i,t} = (1-T_i) \cdot q_{i,t}$. This implies that G extracts the maximum taxes possible from each visible citizen conditional on inducing each visible citizen to sell on the formal market. Therefore, $\tau_i^{v*} = T_i$. As expected, G levies a higher tax rate upon visible citizens with weaker economic exit options, i.e., higher T_i. This calculus is identical in the two periods, which is why τ_i^{v*} does not contain a time subscript. This also implies that the average tax rate levied upon legal producers is:

$$\overline{\tau}^{v*} \equiv \overline{T}, \tag{C.2}$$

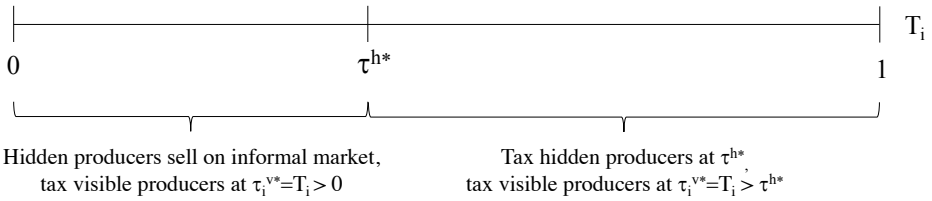
with $\overline{T}$ defined in Equation C.1.

For the $1-v$ percent of citizens that are hidden, G cannot profitably deviate from choosing the constant tax rate τ^h that maximizes expected revenues. Any individual with a low-valued economic exit option, $T_i > \tau^h$, will produce in the formal sector, whereas producers with low transaction costs $T_i < \tau^h$ will sell on the informal market. Therefore, in expectation, $1 - F(\tau^h)$ percent of individuals for whom G is uninformed will produce formally. This yields a tradeoff for G: higher τ^h yields more revenues from hidden citizens that sell on the formal market, but will cause more hidden citizens to exit to the informal sector. Solving for the first-order condition of the revenue objective function $\left[1 - F(\tau^h)\right] \cdot \tau^h \cdot Q_t$ implicitly characterizes the optimal tax rate τ^{h*} to offer to hidden citizens:

$$\underbrace{1 - F(\tau^{h*})}_{\text{MB: More revenue from tax compliers}} = \underbrace{\tau^{h*} \cdot f(\tau^{h*})}_{\text{MC: Fewer tax compliers}} \tag{C.3}$$

Figure C.1 summarizes the differences in effective tax rates between visible and hidden producers and explains why the government extracts more revenues per capita from the former.

Figure C.1: Revenue Difference Between Visible and Hidden Producers



These considerations yield per-period revenues as a function of total production:

$$R_t^* = \Big[\underbrace{v(l_t, b_t) \cdot \overline{\tau}^{v*}}_{\text{Revenue from visible producers}} + \underbrace{\left[1 - v(l_t, b_t)\right] \cdot \left[1 - F(\tau^{h*})\right] \cdot \tau^{h*}}_{\text{Revenue from hidden producers}} \Big] \cdot \underbrace{Q_t}_{\text{Total output}}, \tag{C.4}$$

Among the v percent of visible producers, everyone complies with the tax by producing in the formal sector. The equilibrium tax differs based on individuals' economic exit option, although the amount of

revenue raised can be summarized by the average tax rate $\overline{\tau}^{v*}$ defined in Equation C.2. Among the $1-v$ of hidden producers, there is imperfect compliance with the tax rate—and compliance depends on individuals' economic exit option—and they all pay the same tax rate, τ^{h*}.

Production. The production phase yields similar results as in Cournot production games: more legal producers yield lower profits for each legal producer individually, but higher total production. (The inability of atomistic producers to affect equilibrium prices motivates several changes from the standard Cournot setup.) Lemma C.1 states equilibrium production amounts and relates equilibrium production to the extent of market competition. Part b follows because the direct effect of adding a marginal legal producer on increasing equilibrium production dominates the indirect effect in which more legal producers decrease equilibrium production because a lower price for the good decreases the marginal benefit of production for each producer. Notably, production decisions do not depend on expectations about the tax rate because each legal producers' consumption is proportional to its production regardless of whether it sells on the formal or the informal market.

Lemma C.1 (Equilibrium production)**.**

Part a. *The unique symmetric production choice by each legal producer is* $q_{i,t} = q^* \in \mathbb{R}_{++}$ *satisfying:*

$$\underbrace{p(l_t \cdot q^*) - c(q^*)}_{\text{MB: More sales}} = \underbrace{c'(q^*) \cdot q^*}_{\text{MC: Higher costs}}$$

Total production that can potentially be sold in the formal sector is $Q_t = Q^* \equiv l_t \cdot q^*$.

Part b. *Each producers' output strictly decreases in* l_t*, but total output strictly increases in* l_t*. Formally,* $\frac{dq^*}{dl_t} < 0$ *and* $\frac{dQ^*}{d_t} > 0$.

Proof of Lemma C.1.

Part a. The first-order condition for the pre-tax profit function is:

$$\frac{d\pi_{i,t}}{dq_{i,t}} = d_0 - d_m \cdot Q_t - c(q_{i,t}) - c'(q_{i,t}) \cdot q_{i,t} = 0$$

The second derivative is $-2c'(q_{i,t}) - c''(q_{i,t}) \cdot q_{i,t} < 0$, where strict negativity follows from assuming $c' > 0$, $c'' > 0$, and $q_{i,t} \geq 0$. Therefore, the unique interior symmetric maximizer q^* satisfies:

$$\frac{d\pi_{i,t}}{dq_{i,t}} = d_0 - d_m \cdot l_t \cdot q^* - c(q^*) - c'(q^*) \cdot q^* = 0$$

The strict positivity of q^* follows from $d_0 > 0$ and $c(0) = 0$. That q^* is finite follows because $c(\cdot)$ is bounded and $c' > 0$.

Part b. Applying the implicit function theorem yields:

$$\frac{dq^*}{dl_t} = \frac{d_m \cdot q^*}{-d_m \cdot l_t + 2 \cdot c'(q^*) + c''(q^*) \cdot q^*} < 0$$

The imposed assumptions on the functions imply that the numerator is strictly negative and the denominator is strictly positive, and therefore the entire term is strictly negative. A similar calculation

yields:

$$\frac{d(l_t \cdot q^*)}{dl_t} = q^* + l_t \cdot \frac{dq^*}{dl_t} = \left[1 + \frac{d_m \cdot l_t}{-d_m \cdot l_t + 2 \cdot c'(q^*) + c''(q^*) \cdot q^*}\right] \cdot q^* > 0$$

Slight additional algebraic rearranging shows that the strict positivity of the term in brackets follows from $c' > 0$ and $c'' > 0$. ■

Solving for taxation and production decisions pins down equilibrium per-period revenues. The following results formalize the discussion from the text about the effects of supply, market competition, and their interaction.

Lemma C.2 (Supply effect)**.** *An increase in bureaucratic supply b_t strictly raises equilibrium revenues in period t, R_t^*, because G collects more revenue from each visible producer than from each hidden producer.*

Proof of Lemma C.2. Substituting total equilibrium production into Equation 3 yields:

$$R_t^* = \left[v(l_t, b_t) \cdot \overline{\tau}^{v*} + \big(1 - v(l_t, b_t)\big) \cdot F\big(\tau^{h*}\big) \cdot \tau^{h*}\right] \cdot Q^* \tag{C.5}$$

Writing out $\overline{T}$ defined in Equation C.1 enables expressing:

$$\frac{dR_t^*}{db_t} = \left\{ \int_0^1 \tau_i^{v*} \cdot dF\big(T_i\big) - F\big(\tau^{h*}\big) \cdot \tau^{h*} \right\} \cdot \frac{dv}{db_t} \cdot Q^*$$

Using the definition of a cumulative density function, the additivity of integrals, and substituting $\tau_i^{v*} = T_i$ enables rewriting this as:

$$\left[\int_0^{\tau^{h*}} T_i \cdot dF(T_i) + \int_{\tau^{h*}}^1 \big(T_i - \tau^{h*}\big) \cdot dF(T_i) \right] \cdot \frac{dv}{db_t} \cdot Q^* > 0$$

The bounds of the second integral assume $T_i > \tau^{h*}$. Therefore, assuming $\frac{dv}{db_t} > 0$ (Assumption 2) implies the overall term is strictly positive. ■

Lemma C.3 (Market competition effects)**.** *An increase in market competition l_t affects equilibrium revenues in period t, R_t^*, through two effects:*

1. ***Part a.*** *Strictly raises R_t^* by increasing taxable output.*
2. ***Part b.*** *Strictly lowers R_t^* by decreasing the percentage of visible producers.*

Proof of Lemma C.3. The derivative of Equation C.5 with respect to l_t can be decomposed into two components:

$$\frac{dR_t^*}{dl_t} = \underbrace{\left[v(l_t, b_t) \cdot \overline{\tau}^{v*} + \big(1 - v(l_t, b_t)\big) \cdot F(\tau^{h*}) \cdot \tau^{h*}\right] \cdot \left(q^* + l_t \cdot \frac{dq^*}{dl_t}\right)}_{\text{Part a. Output effect}}$$

$$+ \underbrace{\left[\overline{\tau}^{v*} - F(\tau^{h*}) \cdot \tau^{h*}\right] \cdot \frac{dv}{dl_t} \cdot l_t \cdot q^*}_{\text{Part b. Bureaucracy effect}} \tag{C.6}$$

For the output effect, the proof of Lemma C.1, part b shows that $q^* + l_t \cdot \frac{dq^*}{dl_t} > 0$. Therefore, the entire part a term is strictly positive. The strict negativity of the bureaucracy effect in Part b follows from assuming $\frac{dv}{dl_t} < 0$ (Assumption 1). ■

Lemma C.4 (Interactive effects)**.** *If supply is high in period t, then equilibrium revenues in period t strictly increase in the extent of market competition. If supply is low in period t, then equilibrium revenues in period t strictly decrease in the extent of market competition. Formally, there exists a unique threshold $\tilde{b} \in \mathbb{R}$ such that $\frac{dR_t^*}{dl_t}\Big|_{b_t > \tilde{b}} > 0$ and $\frac{dR_t^*}{dl_t}\Big|_{b_t < \tilde{b}} < 0$.*

Proof of Lemma C.4. Applying the implicit function theorem demonstrates the existence of at least one $\tilde{b}(l_t) \in (0,1)$ such that $\frac{dR_t^*(\tilde{b}(l_t), l_t)}{dl_t} = 0$, for $\frac{dR_t^*}{dl_t}$ defined in Equation C.6. Assuming $\lim_{b_t \to 0} \frac{dv(l_t, b_t)}{dl_t} = -\infty$ implies that $\frac{dR_t^*(l_t, 0)}{dl_t} < 0$ because the part a term in Equation C.6 is bounded. Assuming $\lim_{b_t \to 1} \frac{dv(l_t, b_t)}{dl_t} = 0$ implies that $\frac{dR_t^*(l_t, 1)}{dl_t} > 0$ because the part a term in Equation C.6 is strictly positive. Finally, $v(\cdot)$ is assumed to be smooth in l_t. Showing that $\frac{d^2 R_t^*}{dl_t db_t} > 0$ generates the unique threshold claim. The derivative of Equation C.6 with respect to b_t can be decomposed into two components:

$$\frac{d^2 R_t^*}{dl_t db_t} = \overbrace{\left[\overline{\tau}^{v*} - F(\tau^{h*}) \cdot \tau^{h*}\right]}^{①} \cdot \left\{ \underbrace{\overbrace{\left[q^* + l_t \cdot \frac{dq^*}{dl_t}\right]}^{②} \cdot \frac{dv}{db_t}}_{\text{Conditional output effect}} + \underbrace{\frac{d^2 v}{dl_t db_t} \cdot l_t \cdot q^*}_{\text{Conditional bureaucracy effect}} \right\}$$

The proof of Lemma C.2 shows that ① is strictly positive. The proof of Lemma C.1, part b shows that ② is strictly positive. Therefore, assuming $\frac{dv}{db_t} > 0$ (Assumption 2) implies that the conditional output effect is strictly positive. Assuming $\frac{d^2 v}{dl_t db_t} > 0$ (Assumption 3) implies that the conditional bureaucracy effect is strictly positive. ■

Assumption C.1 presents two assumptions. Part b states that the bureaucratic learning effect from governing a highly competitive market is large. However, to ensure there exists a "large enough" learning effect for all parameter values, it is necessary to make an assumption about ordering for the percentage of visible citizens for different values of market competitiveness and bureaucratic quality. In words, part a states that the increase in monitoring capacity that results from having high market competition and a perfectly competent bureaucracy relative to low market competition and a completely incompetent bureaucracy is greater than the increase in monitoring capacity that results from decreasing market competition if the bureaucracy is completely incompetent.

Assumption C.1.

Part a. $v(\bar{l},1) - v(\underline{l},0) > v(\underline{l},0) - v(\bar{l},0)$.

Part b. $\epsilon > \tilde{\epsilon}$, *for* $\tilde{\epsilon}$ *defined in the proof for Lemma C.5.*

Lemma C.5. *For any initial level of bureaucratic capacity* b_1*, total revenues are maximized by choosing the high level of market competition. Formally, for any* b_1 :

$$\frac{R_1^*(\bar{l},b_1) + R_2^*(\bar{l},b_1+\epsilon)}{2} > \max\left\{R_1^*(\underline{l},b_1), R_1^*(l_0,b_1)\right\}.$$

Proof of Lemma C.5. First show that $l_t = l_0$ cannot maximize revenues. If $b < \tilde{b}$, then applying Lemma C.4 implies that $R_1^*(\underline{l},b_1) > R_1^*(l_0,b_1)$. If $b > \tilde{b}$, then applying Lemma C.4 implies that $R_1^*(\bar{l},b_1) > R_1^*(l_0,b_1)$, and we also know that $b_1 > \tilde{b}$ implies $R_1^*(\bar{l},b_1+\epsilon) > R_1^*(\bar{l},b_1)$.

To demonstrate $\frac{R_1^*(\bar{l},b_1)+R_2^*(\bar{l},b_1+\epsilon)}{2} > R_1^*(\underline{l},b_1)$, substituting equilibrium terms into the expression from Lemma C.5 and rearranging yields:

$$\Delta R \equiv \underbrace{\left[\frac{v(\bar{l},b_1)+v(\bar{l},b_1+\epsilon)}{2}\cdot\bar{l}\cdot q^*(\bar{l}) - v(\underline{l},b_1)\cdot\underline{l}\cdot q^*(\underline{l})\right]}_{①}\cdot\underbrace{\left[\overline{\tau}^{v*} - F\left(\tau^{h*}\right)\cdot\tau^{h*}\right]}_{②}$$

$$+\underbrace{\left[\bar{l}\cdot q^*(\bar{l}) - \underline{l}\cdot q^*(\underline{l})\right]}_{③}\cdot F\left(\tau^{h*}\right)\cdot\tau^{h*} > 0$$

The proof for Lemma C.2 shows that ② is strictly positive. The proof for Lemma C.1, part b shows that ③ is strictly positive, and $F\left(\tau^{h*}\right)\cdot\tau^{h*}$ is strictly positive by construction. Therefore, it remains to demonstrate the strict positivity of ①.

- If $b > \tilde{b}$, then $\frac{v(\bar{l},b_1)+v(\bar{l},b_1+\epsilon)}{2} > v(\underline{l},b_1)$ for any $\epsilon > 0$. Combining this with $\bar{l}\cdot q^*(\bar{l}) > \underline{l}\cdot q^*(\underline{l})$ proves the claim for $b > \tilde{b}$.
- The proof if $b < \tilde{b}$ proceeds in two steps.
  1. Show that $\Delta R(\epsilon = 0)$ achieves its lower bound at $b_1 = 0$. Suffices to prove that $\Delta R(\epsilon = 0)$ strictly increases in b_1:

     $$\frac{\Delta R(\epsilon=0)}{db_1} = \left[\frac{dv(\bar{l},b_1)}{db_1}\cdot\bar{l}\cdot q^*(\bar{l}) - \frac{dv(\underline{l},b_1)}{db_1}\cdot\underline{l}\cdot q^*(\underline{l})\right]\cdot\left[\overline{\tau}^{v*} - F\left(\tau^{h*}\right)\cdot\tau^{h*}\right]$$

     We know $\bar{l}\cdot q^*(\bar{l}) > \underline{l}\cdot q^*(\underline{l})$. Assuming $\frac{d^2v}{dl_t db_t} > 0$ (Assumption 3) implies that $\frac{dv(\bar{l},b_1)}{db_1} > \frac{dv(\underline{l},b_1)}{db_1}$, which establishes the claim.
  2. Need to show that there exists a large enough ϵ such that $\Delta R(b_1 = 0) > 0$. Set $\epsilon = 1$.

Because $\bar{l} \cdot q^*(\bar{l}) > \underline{l} \cdot q^*(\underline{l})$, Assumption C.1, part a is sufficient to establish the claim.

Therefore, for all b_1, there exists $\tilde{\epsilon} \in [0, 1 - b_1)$ such that $\Delta R > 0$ for any $\epsilon > \tilde{\epsilon}$. Assumption C.1, part b assumes this range for ϵ values. ■

Equilibrium and summary of implications. Proposition C.1 summarizes the formal discussion by presenting the unique subgame perfect Nash equilibrium strategy profile with symmetric production strategies.

Proposition C.1 (Equilibrium strategy profile)**.**

- ***State-building at outset of game:***
  - *G chooses good state-building (raises market competition, $l_t = \bar{l}$) if:*
    - *Bureaucratic capacity is high ($b > \tilde{b}$) and there is high demand for public goods ($\alpha > \overline{\alpha}$, for $\overline{\alpha} > 0$ defined in the proof).*
    - *Bureaucratic capacity is low ($b < \tilde{b}$), the probability of losing power is low ($p > \tilde{p}$), and there is high demand for public goods ($\alpha > \overline{\alpha}$).*
  - *G chooses bad state-building (lowers market competition, $l_t = \underline{l}$) if bureaucratic capacity is low ($b < \tilde{b}$), the probability of losing power is high ($p < \tilde{p}$), and there is high demand for public goods ($\alpha > \underline{\alpha}$, for $\underline{\alpha} > 0$ defined in the proof).*
  - *G chooses no state-building (does not alter market competition, $l_t = l_0$) otherwise.*
- ***Production in both periods:*** *Each legal producer chooses $q_{i,t} = q^*$, for q^* defined in Lemma C.1.*
- ***Taxation in both periods:***
  - *G offers $\tau_{i,t} = T_i$ to each visible citizen.*
  - *G offers $\tau_{i,t} = \tau^{h*}$ to each hidden citizen, for τ^{h*} defined in Equation C.3.*
- ***Selling in both periods:***
  - *If $\tau_{i,t} \leq T_i$, then citizen i sells on the formal market.*
  - *If $\tau_{i,t} > T_i$, then citizen i sells on the informal market.*

Proof of Proposition C.1. The only part of Proposition C.1 not covered by the preceding results is G's optimal state-building decision. G can obtain the following expected consumption amounts under its three state-building choices:

- $E\big[U_G(l_t = l_0)\big] = (1 + p) \cdot R_1^*(l_0, b_1) \cdot \alpha$
- $E\big[U_G(l_t = \underline{l})\big] = (1 + p) \cdot R_1^*(\underline{l}, b_1) \cdot \alpha - s$
- $E\big[U_G(l_t = \bar{l})\big] = \big[R_1^*(\bar{l}, b_1) + p \cdot R_2^*(\bar{l}, b_1 + \epsilon)\big] \cdot \alpha - s$

The proof begins by comparing $E\big[U_G(l_t = \underline{l})\big]$ to $E\big[U_G(l_t = \bar{l})\big]$. Three critical values can be used to characterize the possibilities.

1. If $b > \tilde{b}$, then $R_1^*(\bar{l}, b_1) > R_1^*(\underline{l}, b_1)$ and $R_2^*(\bar{l}, b_1 + \epsilon) > R_2^*(\underline{l}, b_1)$, which implies $E\big[U_G(l_t = \bar{l})\big] > E\big[U_G(l_t = \underline{l})\big]$.
2. If $b < \tilde{b}$ and $p = 1$, then Assumption C.1 and Lemma C.5 implies $E\big[U_G(l_t = \bar{l})\big] > E\big[U_G(l_t = \underline{l})\big]$.
3. If $p = 0$, then $b < \tilde{b}$ implies $R_1^*(\underline{l}, b_1) > R_1^*(\bar{l}, b_1)$ and that $E\big[U_G(l_t = \bar{l})\big] < E\big[U_G(l_t = \underline{l})\big]$.

Given the second and third claims, showing that $E\big[U_G(l_t = \bar{l})\big] - E\big[U_G(l_t = \underline{l})\big]$ strictly increases in p proves the existence of a unique $\tilde{p} \in (0, 1)$ such that for all $b_1 < \tilde{b}$, $E\big[U_G(l_t = \bar{l})\big] > E\big[U_G(l_t = \underline{l})\big]$ if $p > \tilde{p}$ and $E\big[U_G(l_t = \bar{l})\big] < E\big[U_G(l_t = \underline{l})\big]$ if $p < \tilde{p}$. This strict monotonicity claim follows directly from $R_2^*(\bar{l}, b_1 + \epsilon) > R_2^*(\underline{l}, b_1)$.

The next part of the proof compares each of $E\big[U_G(l_t = \underline{l})\big]$ and $E\big[U_G(l_t = \bar{l})\big]$ to $E\big[U_G(l_t = l_0)\big]$ in the different parameter ranges just characterized:

1. If $b > \tilde{b}$, then need to compare $E\big[U_G(l_t = \bar{l})\big]$ to $E\big[U_G(l_t = l_0)\big]$. The difference equals $\overline{\Theta}(\alpha) \equiv \big[R_1^*(\bar{l}, b_1) + p \cdot R_2^*(\bar{l}, b_1 + \epsilon) - (1 + p) \cdot R_1^*(l_0, b_1)\big] \cdot \alpha - s$ and the derivative with respect to α is:
$$\frac{d\overline{\Theta}}{d\alpha} = R_1^*(\bar{l}, b_1) + p \cdot R_2^*(\bar{l}, b_1 + \epsilon) - (1 + p) \cdot R_1^*(l_0, b_1) \tag{C.7}$$
Lemma C.5 implies that this term is strictly positive. Therefore, to demonstrate the existence of the unique threshold $\overline{\alpha} > 0$ stated in the proposition, it suffices to demonstrate that $\overline{\Theta}(0) < 0$ and $\lim_{\alpha \to \infty} \overline{\Theta}(\alpha) > 0$. These two claims follow immediately from the statement of $\overline{\Theta}(\alpha)$ and from Equation C.7.
2. If $b < \tilde{b}$ and $p > \tilde{p}$, then need to compare $E\big[U_G(l_t = \bar{l})\big]$ to $E\big[U_G(l_t = l_0)\big]$. Same proof as just presented.
3. If $b < \tilde{b}$ and $p < \tilde{p}$, then need to compare $E\big[U_G(l_t = \underline{l})\big]$ to $E\big[U_G(l_t = l_0)\big]$. After defining $\underline{\Theta}(\alpha) \equiv (1 + p) \cdot \big[R_1^*(\underline{l}, b_1) - R_1^*(l_0, b_1)\big] \cdot \alpha - s$, the same proof structure as for part 1 generates the existence of the unique threshold $\underline{\alpha} > 0$ stated in the proposition. ■

D Supporting Information for Section 4

D.1 Additional Tables

Table D.1: Summary Statistics

Variable	Mean	Std. Dev.	N
Log revenues P.C. in gold	-2.095	1.402	5540
War	0.109	0.311	5540
War stock	1.157	1.492	5540
% pop. w/ suffrage	49.334	39.771	3794
Registration system years	61.68	56.973	4670
Executive constraints	0.536	0.285	4015
Avg. years of education	3.29	2.733	5037
Log GDP P.C.	8.031	0.766	3619
Log Population	8.364	1.802	5540
Independent	0.6	0.49	5540

Table D.2: Assessing Demand Factors

	DV: Logged central government revenue P.C. in gold oz.					
	(1)	(2)	(3)	(4)	(5)	(6)
War$_{t-1}$	0.0442***	0.0600***				
	(0.0142)	(0.0172)				
War stock$_{t-1}$			0.0113***	0.0133***		
			(0.00361)	(0.00459)		
Suffrage$_{t-1}$					0.000171	0.000221
					(0.000187)	(0.000263)
Log GDP P.C.$_{t-1}$		0.0525		0.0598*		0.0684
		(0.0331)		(0.0347)		(0.0416)
Log Pop.$_{t-1}$		-0.0814***		-0.0756***		-0.106***
		(0.0224)		(0.0218)		(0.0331)
Independent$_{t-1}$		0.00200		-0.00181		0.00408
		(0.0135)		(0.0133)		(0.0200)
Country-years	5,332	3,459	5,332	3,459	3,621	2,492
Countries	87	77	87	77	83	73
R-squared	0.973	0.975	0.973	0.975	0.966	0.965
LDV?	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES

Notes: Table D.2 presents OLS regression estimates with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

Table D.3: Assessing Supply Factors

	DV: Logged central government revenue P.C. in gold oz.					
	(1)	(2)	(3)	(4)	(5)	(6)
Reg. system$_{t-1}$	0.000712	0.00215***				
	(0.000456)	(0.000567)				
Exec. const.$_{t-1}$			0.0297	0.0441		
			(0.0308)	(0.0420)		
Education$_{t-1}$					0.0181***	0.00483
					(0.00651)	(0.0101)
Log GDP P.C.$_{t-1}$		0.0325		0.0751**		0.0582
		(0.0364)		(0.0355)		(0.0362)
Log Pop.$_{t-1}$		-0.0812***		-0.0926***		-0.0808***
		(0.0244)		(0.0313)		(0.0268)
Independent$_{t-1}$		0.00585		-0.000437		-0.00883
		(0.0139)		(0.0154)		(0.0133)
Country-years	4,491	3,121	3,863	2,954	4,846	3,293
Countries	68	61	83	73	81	74
R-squared	0.973	0.976	0.971	0.974	0.973	0.975
LDV?	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES

Notes: Table D.3 presents OLS regression estimates with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

D.2 Controlling for Covariates

Although controlling for country and year fixed effects guards against many common confounding considerations, there may still be concern that country-specific time trends drive the results. Three possibilities are that our findings simply track increases in GDP over time—even though income spiked in Western Europe at least a half century before the great revenue divergence occurred (Figure 3)—they reflect demographic changes, or they are an artifact of including colonies in the sample or of new countries entering the international system.[27] Table D.4 adds logged population (from Mitchell (1998)) and a post-independence indicator and shows largely similar results as Table 1 (the p-value in Column 4 is 0.117), although the war variables exhibit stronger evidence as important demand factors for revenues than franchise size. Table D.5 adds the third covariate, GDP per capita from Bolt et al.'s (2018) update of Angus Maddison's data. The results from Table D.5 are consistent with our argument, although less supportive that Table 1 because only four of the interaction terms attain any level of statistical significance.

However, the vast amount of missing GDP data that drastically alters the sample—rather than GDP per capita itself—better explains the differences between Tables 1 and D.5. Of the 3,642 country-years with revenue data before 1971 among countries outside of Western Europe, offshoots, or East Asia, 55% are missing GDP data. By contrast, missingness is limited among WE/EA: less than 2% of the 1,850 country-years. Therefore, given the limited data coverage of historical GDP data, controlling for this factor eliminates considerable relevant variation in our explanatory factors by dropping many observations outside of WE/EA—obviating the main advantage of our revenue data. Table D.6 shows this in a different way by omitting the GDP control but using the same sample as in Table D.5. The similarity of the findings between Tables D.5 and D.6 suggest that the differences from Table 1 arise because of missing data rather than because GDP per capita drives the results. Unfortunately, however, the limitations of historical GDP data make it impossible to more definitively rule out this alternative explanation. Other GDP datasets exhibit even greater limitations in historical coverage—especially outside Western Europe—than Bolt et al. (2018), such as Penn World Table and the World Inequality Database that draws primarily from Thomas Piketty's research.

[27] However, unit fixed effects should largely account for the last factor.

Table D.4: Assessing Interaction Effects, with Population and Independence Covariates

	DV: Logged central government revenue P.C. in gold oz.								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
War$_{t-1}$*Reg. system$_{t-1}$	0.000572***								
	(0.000195)								
War$_{t-1}$*Exec. const.$_{t-1}$		0.148***							
		(0.0492)							
War$_{t-1}$*Education$_{t-1}$			0.0125***						
			(0.00413)						
War stock$_{t-1}$*Reg. system$_{t-1}$				7.25e-05					
				(4.57e-05)					
War stock$_{t-1}$*Exec. const.$_{t-1}$					0.0352***				
					(0.0128)				
War stock$_{t-1}$*Education$_{t-1}$						0.00197*			
						(0.00105)			
Suffrage$_{t-1}$*Reg. system$_{t-1}$							1.05e-06		
							(3.92e-06)		
Suffrage$_{t-1}$*Exec. const.$_{t-1}$								0.000841	
								(0.000816)	
Suffrage$_{t-1}$*Education$_{t-1}$									9.94e-05
									(7.86e-05)
War$_{t-1}$	0.00457	-0.0427	-0.00726						
	(0.0228)	(0.0337)	(0.0234)						
War stock$_{t-1}$				0.00642	-0.00826	0.00251			
				(0.00459)	(0.00844)	(0.00626)			
Suffrage$_{t-1}$							0.000204	-0.000398	-0.000262
							(0.000357)	(0.000498)	(0.000374)
Reg. system$_{t-1}$	0.000337			0.000256			-0.000592		
	(0.000528)			(0.000548)			(0.000881)		
Exec. const.$_{t-1}$		0.0199			-0.00993			-0.0282	
		(0.0359)			(0.0366)			(0.0697)	
Education$_{t-1}$			0.0128*			0.0108			0.0109
			(0.00750)			(0.00723)			(0.0114)
Log population$_{t-1}$	-0.0326**	-0.0697***	-0.0466***	-0.0263*	-0.0662***	-0.0439***	-0.0669**	-0.0755***	-0.0742***
	(0.0133)	(0.0169)	(0.0121)	(0.0132)	(0.0165)	(0.0119)	(0.0291)	(0.0257)	(0.0220)
Independent$_{t-1}$	-0.00418	-0.000220	-0.00122	-0.00581	-0.00979	-0.00217	-0.0275	-0.00245	0.0129
	(0.0137)	(0.0186)	(0.0170)	(0.0137)	(0.0195)	(0.0163)	(0.0225)	(0.0217)	(0.0260)
Country-years	4,491	3,863	4,846	4,491	3,863	4,846	2,905	2,890	3,335
Countries	68	83	81	68	83	81	64	79	77
R-squared	0.973	0.971	0.973	0.973	0.971	0.973	0.966	0.965	0.967
LDV?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Table D.5 presents OLS regression estimates with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

Table D.5: Assessing Interaction Effects, Add GDP P.C. Covariate

	DV: Logged central government revenue P.C. in gold oz.								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
War$_{t-1}$*Reg. system$_{t-1}$	0.000363								
	(0.000290)								
War$_{t-1}$*Exec. const.$_{t-1}$		0.161***							
		(0.0557)							
War$_{t-1}$*Education$_{t-1}$			0.00772						
			(0.00587)						
War stock$_{t-1}$*Reg. system$_{t-1}$				5.70e-05					
				(6.41e-05)					
War stock$_{t-1}$*Exec. const.$_{t-1}$					0.0508***				
					(0.0123)				
War stock$_{t-1}$*Education$_{t-1}$						0.00219			
						(0.00149)			
Suffrage$_{t-1}$*Reg. system$_{t-1}$							5.48e-06		
							(4.28e-06)		
Suffrage$_{t-1}$*Exec. const.$_{t-1}$								0.00171**	
								(0.000765)	
Suffrage$_{t-1}$*Education$_{t-1}$									0.000236***
									(8.68e-05)
War$_{t-1}$	0.0259	-0.0533	0.0213						
	(0.0352)	(0.0404)	(0.0371)						
War stock$_{t-1}$				0.00901	-0.0183**	0.00391			
				(0.00657)	(0.00802)	(0.00960)			
Suffrage$_{t-1}$							-0.000201	-0.000929**	-0.000756**
							(0.000388)	(0.000433)	(0.000346)
Reg. system$_{t-1}$	0.00205***			0.00200***			-0.000827		
	(0.000572)			(0.000586)			(0.00161)		
Exec. const.$_{t-1}$		0.0353			-0.0137			-0.0913	
		(0.0401)			(0.0415)			(0.0688)	
Education$_{t-1}$			0.00414			0.00206			-0.0238
			(0.0108)			(0.0108)			(0.0147)
Log GDP P.C.$_{t-1}$	0.0405	0.0792**	0.0666*	0.0520	0.0993**	0.0780**	0.0629	0.0814*	0.0926*
	(0.0365)	(0.0358)	(0.0362)	(0.0392)	(0.0375)	(0.0381)	(0.0477)	(0.0408)	(0.0486)
Log population$_{t-1}$	-0.0843***	-0.0970***	-0.0866***	-0.0770***	-0.100***	-0.0805***	-0.0933**	-0.109***	-0.0983***
	(0.0240)	(0.0307)	(0.0263)	(0.0234)	(0.0293)	(0.0255)	(0.0352)	(0.0369)	(0.0323)
Independent$_{t-1}$	0.000841	-0.00611	-0.0128	-0.00251	-0.0129	-0.0155	-0.0122	0.00188	-0.00389
	(0.0135)	(0.0154)	(0.0131)	(0.0141)	(0.0156)	(0.0125)	(0.0176)	(0.0178)	(0.0172)
Country-years	3,121	2,954	3,293	3,121	2,954	3,293	2,154	2,151	2,370
Countries	61	73	74	61	73	74	57	69	70
R-squared	0.976	0.974	0.975	0.976	0.975	0.975	0.967	0.966	0.966
LDV?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Table D.5 presents OLS regression estimates with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

Table D.6: Assessing Interaction Effects in Sample with GDP Data (Excluding GDP Control)

	DV: Logged central government revenue P.C. in gold oz.								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
War$_{t-1}$*Reg. system$_{t-1}$	0.000362								
	(0.000296)								
War$_{t-1}$*Exec. const.$_{t-1}$		0.165***							
		(0.0580)							
War$_{t-1}$*Education$_{t-1}$			0.00792						
			(0.00604)						
War stock$_{t-1}$*Reg. system$_{t-1}$				5.19e-05					
				(6.45e-05)					
War stock$_{t-1}$*Exec. const.$_{t-1}$					0.0479***				
					(0.0129)				
War stock$_{t-1}$*Education$_{t-1}$						0.00218			
						(0.00150)			
Suffrage$_{t-1}$*Reg. system$_{t-1}$							5.65e-06		
							(4.25e-06)		
Suffrage$_{t-1}$*Exec. const.$_{t-1}$								0.00175**	
								(0.000832)	
Suffrage$_{t-1}$*Education$_{t-1}$									0.000223**
									(9.07e-05)
War$_{t-1}$	0.0235	-0.0593	0.0159						
	(0.0365)	(0.0417)	(0.0389)						
War stock$_{t-1}$				0.00757	-0.0192**	0.00122			
				(0.00663)	(0.00845)	(0.00954)			
Suffrage$_{t-1}$							-0.000268	-0.00104**	-0.000792**
							(0.000381)	(0.000471)	(0.000376)
Reg. system$_{t-1}$	0.00218***			0.00216***			-0.000431		
	(0.000579)			(0.000576)			(0.00161)		
Exec. const.$_{t-1}$		0.0484			0.00558			-0.0746	
		(0.0402)			(0.0429)			(0.0773)	
Education$_{t-1}$			0.00790			0.00629			-0.0139
			(0.0116)			(0.0116)			(0.0138)
Log population$_{t-1}$	-0.0781***	-0.0869***	-0.0773***	-0.0700***	-0.0882***	-0.0707***	-0.0742**	-0.0894**	-0.0782**
	(0.0237)	(0.0304)	(0.0265)	(0.0237)	(0.0295)	(0.0264)	(0.0325)	(0.0362)	(0.0343)
Independent$_{t-1}$	-0.00531	-0.0190	-0.0212	-0.00916	-0.0267	-0.0238	-0.0224	-0.0132	-0.0171
	(0.0137)	(0.0173)	(0.0151)	(0.0147)	(0.0185)	(0.0147)	(0.0155)	(0.0159)	(0.0172)
Country-years	3,121	2,954	3,293	3,121	2,954	3,293	2,154	2,151	2,370
Countries	61	73	74	61	73	74	57	69	70
R-squared	0.976	0.974	0.975	0.976	0.974	0.975	0.967	0.966	0.966
LDV?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP

Notes: Table D.6 presents OLS regression estimates with country-clustered standard errors. The sample in every regression only contains country-years with GDP data. *** p<0.01, ** p<0.05, * p<0.1.

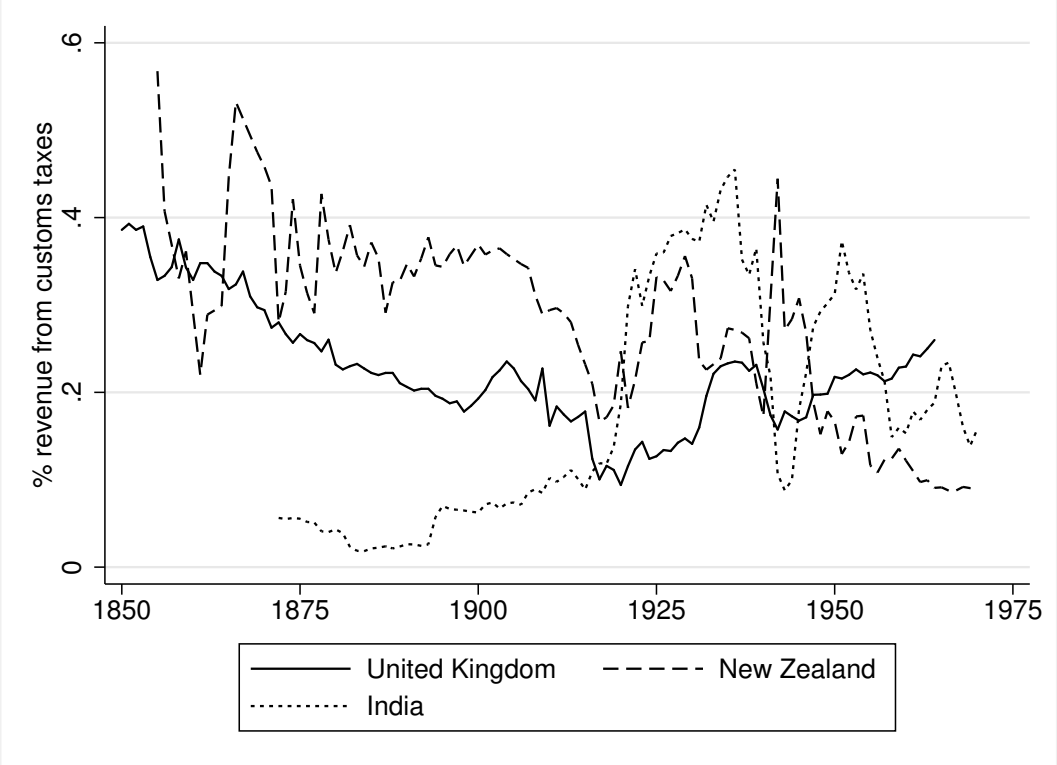
D.3 Income and Customs Taxes

It is possible that supply and demand for taxation can not only explain aggregate revenues, but also their source. Beneficial state-building strategies, which the model formalizes, may come in the form of taxing domestic production with income taxes, whereas one form of bad state-building is levying tariffs to restrict international competition and facilitate customs revenues. Although our dataset contains only fragmentary information on the composition of revenue, the available data shows that differences in tax source largely track the great revenue divergence. Appendix Figure D.1 provides data on custom tax revenue as a percentage of total revenue for several British empire countries and Figure D.2 for other countries with data, and Figure D.3 provides data on income tax revenue as a percentage of total revenue for several countries with data.

Despite Europe's many advantages relative to the rest of the world at the turn of the 20th century, it is puzzling that it did not already enjoy a large revenue advantage. One reason is that it was still possible for countries to collect large revenue streams by global standards mainly through trade taxes. The discussion surrounding Figures 1 and B.2 showed that Southern Cone countries enjoyed large revenue streams in 1900, which Appendix Figure D.2 shows derived largely from customs revenue. In terms of the model, a relevant consideration for South America is that it is possible for countries with low bureaucratic supply to collect similar levels of tax revenue in period 1 as in countries with high bureaucratic supply through bad state-building strategies such as international tariffs, but divergence should occur in period 2. The inability of colonial India to levy customs revenues may also help to account for its low revenues in 1900 (see Figures 2 and D.1). The converse of this observation is that Western countries were not raising large amounts of revenues from income taxes in 1900 (see Appendix Figure D.3 and Scheve and Stasavage (2016)). These patterns changed after World War I, as income taxes became the dominant source of revenues in the West and customs taxes declined in importance (see the appendix figures and Besley and Persson (2013)), although value-added taxes and other production taxes are as or more important than income taxes in some Western countries (Steinmo, 1996). Appendix Figure D.3 also shows that the importance of income taxes rose in *all* countries during the 20th century, although faster in the OECD.

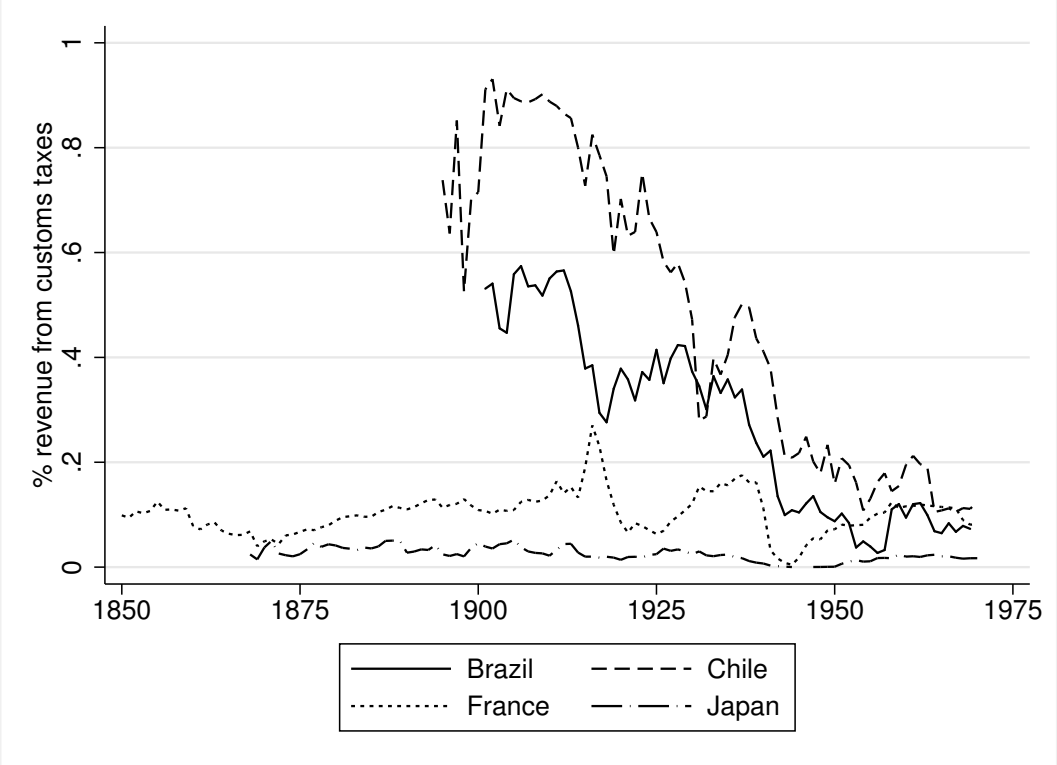
Therefore, our primary focus on aggregate revenue patterns complements recent research that examines more specific types of taxes in specific regions or time periods (Queralt, 2016; Scheve and Stasavage, 2016). Rather than the rise of income taxes in the West in the 20th century providing an alternative hypothesis to ours, the more reasonable interpretation is that the confluence of high demand and high supply facilitated a type of taxes that in other circumstances was collected at low levels either because of low demand despite high supply (e.g., Britain between the Napoleonic Wars and World War I) or because of low supply despite high demand (e.g., 20th-century India and Egypt).

Figure D.1: % Revenue from Customs Taxes in the British Empire



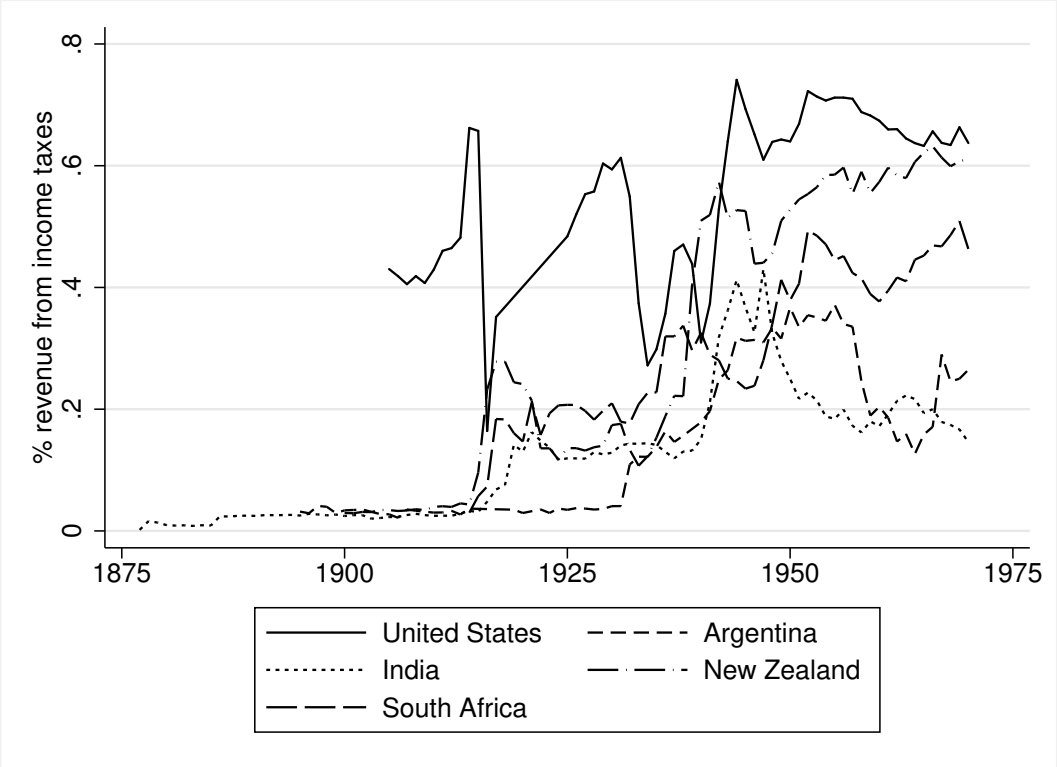
Note: The lines show the proportion of central government revenue drawn from customs revenue in select British Empire countries.

Figure D.2: % Revenue from Customs Taxes Outside the British Empire



Note: The lines show the proportion of central government revenue drawn from customs taxes in select non-British empire countries.

Figure D.3: % Revenue From Income Taxes



Note: The lines show the proportion of central government revenue drawn from income tax revenue in select countries.

References

Acemoglu, Daron, Simon Johnson and James A. Robinson. 2001. "The Colonial Origins of Comparative Development." *American Economic Review* 91(5):1369–1401.

Acemoglu, Daron, Simon Johnson and James Robinson. 2005. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review* 95(3):546–579.

Barbieri, Katherine, Omar Keshk and Brian Pollins. 2008. "Correlates of war project trade data set codebook." *Codebook Version* 2.

Beramendi, Pablo, Mark Dincecco and Melissa Rogers. 2018. "Intra-Elite Competition and Long-Run Fiscal Development." *Journal of Politics* .

Besley, T and T Persson. 2013. Public Finance and Development. In *Handbook of Public Economics*. Elsevier.

Bolt, Jutta, Robert Inklaar, Herman de Jong and Jan Luiten van Zanden. 2018. "Rebasing 'Maddison'." Maddison Project Working paper 10. Available at https://www.rug.nl/ggdc/historicaldevelopment/maddison, accessed 6/30/18.

Broadberry, Stephen and Bishnupriya Gupta. 2006. "The Early Modern Great Divergence." *Economic History Review* 59(1):2–31.

Centeno, Miguel Angel. 2002. *Blood and Debt*. Penn State Press.

Cox, Gary W. 2017. "Political Institutions, Economic Liberty, and the Great Divergence." *The Journal of Economic History* 77(3):724–755.

Denzel, Markus A. 2010. *Handbook of World Exchange Rates, 1590-1914*. Ashgate Publishing, Ltd.

Dincecco, Mark. 2017. *State Capacity and Economic Development*. Cambridge University Press.

Green, Timothy. 2016. "Historical Gold Price Table." World Gold Council.

Jones, Eric. 2003. *The European Miracle*. Cambridge University Press.

Karaman, K Kivanç and Şevket Pamuk. 2010. "Ottoman state finances in European perspective, 1500–1914." *The Journal of Economic History* 70(3):593–629.

Karl, Terry Lynn. 1997. *The paradox of plenty: Oil booms and petro-states*. Vol. 26 Univ of California Press.

Menaldo, Victor. 2016. *The Institutions Curse: Natural Resources, Politics, and Development*. Cambridge University Press.

Mitchell, Brian. 1998. *International Historical Statistics: Europe 1750-1993*. Springer.

Morrison, Kevin M. 2014. *Nontaxation and Representation*. Cambridge University Press.

North, Douglass C. and Barry R. Weingast. 1989. "Constitutions and Commitment." *Journal of Economic History* 49(04):803–832.

Officer, Lawrence H. 2016. "Exchange Rates Between the United States Dollar and Forty-one Currencies." MeasuringWorth.

Pomeranz, Kenneth. 2009. *The Great Divergence*. Princeton University Press.

Queralt, Didac. 2016. "The Legacy of War on Fiscal Capacity." Working paper. Available at https://www.didacqueralt.com/research, accessed 6/30/18.

Ross, Michael L. 2012. *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.

Scheve, Kenneth and David Stasavage. 2016. *Taxing the Rich*. Princeton University Press.

Sng, Tuan-Hwee and Chiaki Moriguchi. 2014. "Asia's Little Divergence: State Capacity in China and Japan before 1850." *Journal of Economic Growth* 19(4):439–470.

Steinmo, Sven. 1996. *Taxation and democracy: Swedish, British, and American approaches to financing the modern state*. Yale University Press.

Summers, Robert and Alan Heston. 1991. "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988." *The Quarterly Journal of Economics* 106(2):327–368.