The Great Revenue Divergence*

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Abstract

This article describes and explains a previously unnoticed empirical pattern in state revenue collection. As late as 1913, central governments in the West collected levels of per capita revenue similar to the rest of the world, despite ruling richer societies and having a long history of fiscal innovation. Only over the next sixty years did Western revenue levels permanently diverge. We argue that fiscally strong states require both a pressing demand for revenue and an existing supply of effective bureaucratic institutions. Neither factor in isolation will lead to sustained high levels of fiscal extraction. We formalize this insight in a formal model in which governments can choose among low-effort, legibility-intensive, and crony-favoring strategies for raising revenues. Empirically, our theory accounts for low taxation and reliance on indirect taxes in periods of low demand (nineteenth-century West) or low bureaucratic supply (twentieth-century former colonies), and subsequent revenue spikes in the West.

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

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The gap in the quality of government services in Western and non-Western countries is founded on disparities in taxation. Between 2010–19, central governments in Western European states and offshoots extracted, on average, 43% of their country's annual GDP in government revenues, compared to 27% in non-European countries. When and why did such discrepancies in revenue collection emerge? Understanding this question is critical because tax collection and fiscal capacity are strongly associated with economic development, political order, and governance quality more broadly (Levi, 1989; Besley and Persson, 2014; Dincecco, 2017).

We demonstrate that major discrepancies in state revenue collection have emerged only relatively recently. On the eve of World War I, South American countries and some export-oriented colonies collected per capita revenue levels similar to those in the West despite being poorer; and often exceeded Western revenue collection when accounting for income differences.. Britain, though noted for its long history of intensive taxation, extracted roughly the same level of per capita revenues as colonial Cuba. Many Asian and African countries lagged Europe, but even these differences were small by twentieth-century standards. However, between 1913 and 1950, nominal per capita revenue increased by over five-fold in Britain and over two-fold France. This created a revenue gap between Western and non-Western countries that persisted, and in fact widened, even after former European colonies gained independence. Thus, the *great revenue divergence* is a twentieth-century phenomenon.

We identify this novel pattern using a new panel dataset of central government revenue, which includes data going back to the mid-nineteenth century with broad coverage across global regions—including numerous non-Western countries and colonies. To construct this measure, we combined data on central government revenue from Mitchell (1998) with historical exchange rates, gold prices, and population. The main contribution of our dataset is its spatial and temporal breadth: at least one year for seventeen Western countries (including thirteen with at least one data point in the nineteenth century) and seventy-five non-Western countries (forty in the nineteenth century). This contrasts with existing government revenue datasets that have coverage before the twentieth

century only (or mainly) for European countries (Beramendi et al., 2019; Dincecco, 2011, 2015; Karaman and Pamuk, 2013; Scheve and Stasavage, 2016), or only the late twentieth century (International Monetary Fund, 2017; Queralt, 2019). This combination of depth and breadth makes our dataset uniquely suitable for analyzing global historical trends in revenue levels.[1] We supplement our main variable with alternative measures that either normalize for or measure revenue as a proportion of GDP. This reduces the sample, but the degree of revenue divergence in the twentieth century is even starker.

Existing theories of fiscal extraction, taken in isolation, cannot explain the great revenue divergence. Some scholars propose *fiscal demand* explanations that emphasize how some states have greater revenue extraction needs than others, focusing mainly on international wars. By contrast, *fiscal supply* explanations focus on the bureaucratic institutions used to gather information about the population. By making production legible to the state, bureaucracies help states to target their taxes and extract revenues.

Yet these families of explanations cannot answer two key questions about the twentieth-century revenue divergence. First, why did it occur so late? Existing accounts date large and permanent discrepancies in revenue collection to the nineteenth century or earlier. European countries were clearly distinguished from others in many important ways by the turn of the twentieth century that relate to fiscal supply (Tilly, 1992). They had invented sophisticated debt instruments to finance expensive wars (Brewer, 1990; Stasavage, 2011), enacted modern fiscal devices such as income taxes (Mares and Queralt, 2015), collected a large amount of information about their populations (Brambor et al., 2020), and were in the early stages of industrial development (Pomeranz, 2009). In the late eighteenth century, England and France each collected considerably more revenue per capita than several major non-Western empires (Karaman and Pamuk 2010, 623; Rosenthal and

[1] As we describe below, although other scholars have also constructed datasets using Mitchell (1998), our approach to making data points comparable across countries yields a considerably broader sample.

Wong 2011, 175; Hoffman 2015, 51; Dincecco 2017, 69), and much of the rest of the world was under Western colonial rule. Why were earlier revenue differences no longer apparent on the eve of World War I?

Second, in the twentieth century, why did non-Western countries continue to fall behind even after gaining independence? Leading existing explanations focus on how non-European countries during this period either fought too few wars, or only limited international wars funded by debt and civil wars (Herbst, 2000; Centeno, 2002; Besley and Persson, 2011).[2] Yet demand for public expenditures was potentially high in many newly independent states. Many anti-colonial activists believed that jurisdictional sovereignty would engender higher levels of public spending by aligning the government's incentives with their citizens rather than with European bondholders and civil servants (Naoroji, 1901; Furnivall, 2014), and anti-colonial movements sought to use government to provide greater services for citizens. Furthermore, international competition was high in some parts of the post-colonial world (Middle East, South Asia, and East Asia), and most colonies experienced mass franchise expansion shortly before gaining independence, which created additional demands for public expenditures.

To unravel these puzzles about the great revenue divergence, we develop a theoretical framework that highlights the interaction of fiscal demand and supply factors. In a game-theoretic model, the government makes a choice over fiscal capacity that affects if, and how, they collect taxes from citizens. The government can exert low fiscal effort (e.g., rely on customs revenue), or choose either of two high-effort strategies. On the one hand, they can offer broad-based economic rights and impose an income tax on the entire citizenry. On the other hand, they can target a subset of producers for economic privileges (e.g., state-run monopolies or crony-owned firms), in return for revenue. Bureaucratic capacity determines which high-effort strategy is more effective. We refer to the first option as the *legibility-intensive* strategy because it requires high knowledge about

[2]Related, Dincecco et al. (2016) and Queralt (2019) analyze the legacies of fighting the "wrong" kinds of wars in the nineteenth century.

citizens' exit options to be effective. Yet the second, *crony-favoring* strategy, can be lucrative precisely because it relies on a distinct comparative advantage in government control over major segments of the economy.

Our main theoretical implication is that states choose legibility-intensive extraction only if *both* fiscal demand and supply are high. Absent high demand, states are unwilling the face the social costs associated with heavy extraction, even if latent fiscal capacity is high. Yet contrary to implications from existing models such as Besley and Persson (2011), high demand does not necessarily engender "common value" states that do not predate their economy. States facing a demand shock cannot develop an effective bureaucracy overnight because levels of social legibility are highly persistent, at least in the short term (Scott, 1998; Lee and Zhang, 2017; Blaydes, 2018; Stasavage, 2020). When high demand combines with low legibility, states are ineffective at collecting direct sources of taxation, and instead pursue predatory strategies to raise revenue. Only high-demand states that also have high bureaucratic supply will choose the legibility-intensive path. This implication is qualitatively similar when we model multiple periods and assume that legibility-intensive extraction endogenously builds fiscal capacity over time. Even when fiscal demand is expected to be high in the future, low initial bureaucratic supply encourages crony-favoring policies.

Our theory of the interaction of high fiscal demand and supply fits the facts well. By the nineteenth century, Western countries had amassed considerable advantages in fiscal capacity relative to other countries. Throughout the century, these states accentuated their advantages in legibility. But the relative lack of intra-European wars between 1815 and 1914—a period that also predated modern welfare states—limited the demand for revenues, and thus tax collection. Primary product exporters in South America as well as some colonial dependencies could generate similar levels of revenue simply by collecting customs taxes. Furthermore, some non-Western empires partially caught up because threats from the West created high fiscal demand within these empires. Thus, on the eve of World War I, there was a small or non-existent gap between the West and several groups of non-Western countries.

The two World Wars and Great Depression changed this calculus for Western states. They restructured their economies to fight total war and faced increased demands for social spending due to franchise expansion, the rise of labor and socialist parties, and the creation of welfare states. Their existing stock of fiscal institutions enabled them to meet these challenges and raise direct taxes effectively. The result was unprecedented levels of revenue collection that were orders of magnitude larger than in previous periods. For example, Britain's achievements during the Napoleonic Wars were tiny by twentieth-century standards, and these represented its high mark of revenue intake until World War I. Twentieth-century European states relied on legibility-intensive extraction, especially income and value-added taxes, which was possible only because of prior bureaucratic development.

However, European colonies tended to have low levels of legibility. Easy-revenue strategies, such as promoting primary product exports or collecting direct taxes locally to balance the budget, may have been adequate from the perspective of the colonizers, but were wholly inadequate for meeting heightened demand after countries gained independence. Many post-colonial states in which fiscal demand was particularly high turned toward crony-favoring strategies rather than legibility-intensive collection because of their inability to collect direct taxes effectively. The main exceptions were East Asian states, in particular Japan, where intense geopolitical pressure combined with a history of bureaucratic government enabled large increases in direct taxation.

1 The Great Revenue Divergence: Trends Over Time

After introducing our new data, this section provides descriptive evidence of a great revenue divergence between Western Europe (and Japan) 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 revenue extraction in Europe.

1.1 Introducing the Revenue Data

To construct our main measure, central government revenue per capita in the local currency, we performed the following steps.

1. We use revenue data from Mitchell (1998). 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 use population data from Mitchell (1998), to construct measures of revenue per capita. Exact population estimates are typically available only in census years, and we estimated population in non-census years by interpolating between censuses (although we drop observations for which no census occurred within two decades). For this reason, revenue per capita cannot be estimated before the date of the first census, even when revenue data is available from an earlier date.[3]

3. We converted all currency measures to their equivalents in British pounds to generate a common scale for revenue levels. This required constructing a new time series of historical exchange rates into pounds.[4] If the local currency was quoted in U.S. dollars, we then converted the rate into pounds using the current U.S. dollar-British pound exchange rate. We

[3]One exception is that for Africa we incorporated Frankema and Jerven's (2014) data for 1850–1960, which prevents much of this data from being dropped from the sample. We also incorporate additional population data for Russia that we discuss in Appendix A.7.

[4]We converted local currency units into British pounds. Correlates of War (COW) trade data (Barbieri et al., 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 frequent short gaps 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%. We further supplemented the COW data using Denzel (2010) and Officer (2016).

were unable to perform this step for country-years with non-convertible currencies, and thus we drop such observations even if revenue and population data are available.[5]

4. Finally, we converted revenue per capita in British pounds into gold grams using gold ounces from Officer (2016). This step is unnecessary for cross-national comparisons, but reduces problems in data visualization stemming from the volatility of the pound.

Our revenue variable advances existing quantitative data on state revenue in both geographical and chronological coverage. The amount of data available is extensive, extending back to the early nineteenth century in Western Europe and the late nineteenth century in most of the rest of the world. Specifically, the fiscal data include at least one year for seventeen Western countries and seventy-five non-Western countries. Thirteen Western countries have at least one data point in the nineteenth century, as do forty non-Western countries. Relative world currency prices have fluctuated violently since the end of the Bretton Woods system. For this reason, we only analyze data before 1970. Appendix A.1 plots revenues over time for each territory in the dataset and lists the first year for which we have revenue, population, or exchange rate data for each case, hence accounting for years for which we lack data (and why).

Although we are not the first to use the Mitchell revenue data for historical analysis, our approach to weighting the data points enables us to incorporate considerably more information than used in existing studies. For example, Besley and Persson (2014) incorporate information only from eighteen rich countries and compute an unweighted average over time. Consequently, they do not calculate revenue collection for poorer countries in the nineteenth or early twentieth centuries, nor do they make time-series cross-section comparisons across a broad country and time sample. Mann (1993, 358-401) and Karaman and Pamuk (2010, 2013) use Mitchell data from the nineteenth

[5]Although we included some currencies with fixed exchange rates, we excluded currencies for which either published exchange rates bore no relation to market supply and demand, or the exchange rate fluctuated sharply from year to year. In many cases, this meant excluding periods of instability when a country's link to either gold or the dollar changed.

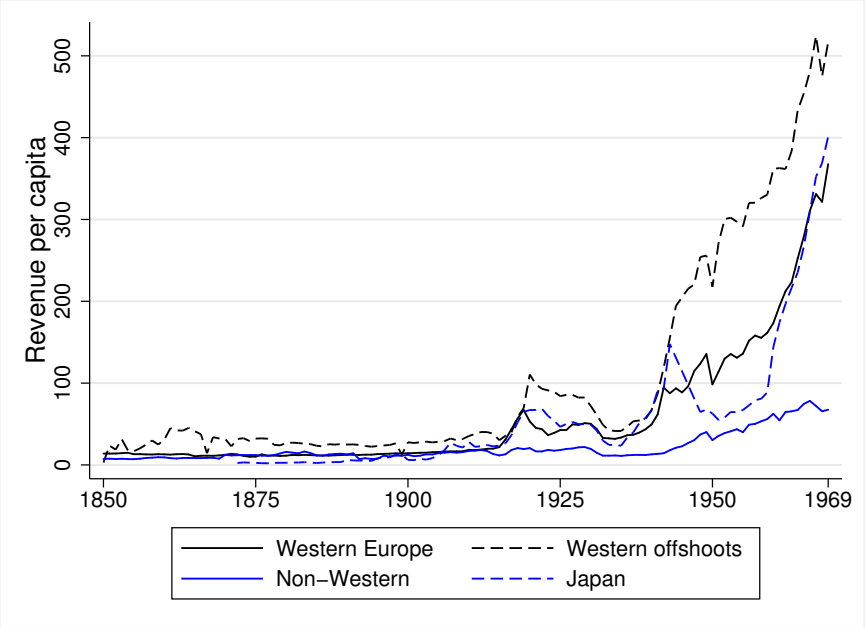
century, but only for European countries. Cagé and Gadenne (2018) and Beramendi et al. (2019) use Mitchell and other sources to construct a sample that is expansive globally after 1945, but confined to Western Europe, Japan, and the Southern Cone in the nineteenth century.

1.2 Main Pattern

Figure 1 summarizes two main patterns. First, before World War I, different world regions exhibited roughly similar levels of revenue collection. Second, only afterward did a subset of nations—Western Europe, its offshoots (United States, Canada, Australia, and New Zealand), and Japan—clearly diverge from the rest of the world. For example, Denmark collected 44% less nominal central government revenue than Argentina, and only 20% more than Egypt and 24% more than Jamaica. As a percentage of GDP, Brazil collected twice as much as Canada, and 56% more than Britain.

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. Western countries experienced a massive expansion in state revenue collection during this period, consistent with existing characterizations (Lindert, 2004). However, revenue collection stagnated in the rest of the world despite broad exposure to these international events and pressures. Between 1913 and 1950, per capita revenue grew 560% in Britain compared to increases of 42% in India and 62% in Jamaica. In France, nominal per capita revenue increased by 212%, compared to 53% in Madagascar and 64% in Tunisia. But divergence was not entirely limited to the West. As the Figure shows, the pattern in Japan largely mirrored that of Western countries.

Figure 1: The Great Revenue Divergence



Notes. The lines show central government revenue per capita in gold grams (converted at nominal exchange rates) averaged over different categories of countries.

1.3 Accounting for Income Differentials

Despite clear advantages of expansive country and time coverage, our approach to measuring state revenue intake also has drawbacks. Although we follow some existing work by expressing revenue in gold (Dincecco, 2011, 2017) or silver (Karaman and Pamuk, 2010, 2013), most of the literature measures fiscal extraction using government revenue as a percentage of GDP. Thus, Figure 1 does not rule out the possibility that changes in societal income explain most of the changes in revenue levels. We address this concern in two ways. First, we use ours and related data to account for differences in GDP, albeit at the cost of a more restricted set of country-years that is skewed toward richer countries and more recent years. The evidence for a great revenue divergence is even stronger when accounting for GDP. Second, we compare the timing of revenue and income divergence to show that dramatic increases in revenue-raising among Western countries lagged large income gains by at least a half century.

Figure 2 plots revenues over the same time period as Figure 1 using four different measures of

revenues that account for GDP. In Panel A, we incorporate available data from Mitchell (1998) on nominal GDP in the local currency to calculate revenues as a fraction of GDP. Among non-Western countries before 1914, this includes data for Brazil, Chile, and South Africa; and many more after 1950. In Panel B, we divide our data on nominal revenues by constant-dollar GDP estimates from Bolt et al.'s (2018) update of Angus Maddison (specifically, 2011 U.S. dollars). Although normalizing revenue in this manner yields non-intuitive units, the advantage is that Maddison's coverage of non-Western countries is considerably more extensive than the income data in the other panels presented in Figure 2. Panels C and D use data from Beramendi et al. (2019) and Andersson (2018), respectively, on taxes as a percentage of GDP. Beramendi et al.'s (2019) replication data includes only four non-OECD countries before 1920: Argentina, Brazil, Chile, and Uruguay, and Andersson (2018) includes seven additional Latin American countries. Table 1 summarizes the differences in tabular form. It presents average per capita revenue intake among Western countries as a percentage of revenue intake among non-Western countries in 1913 and 1969.

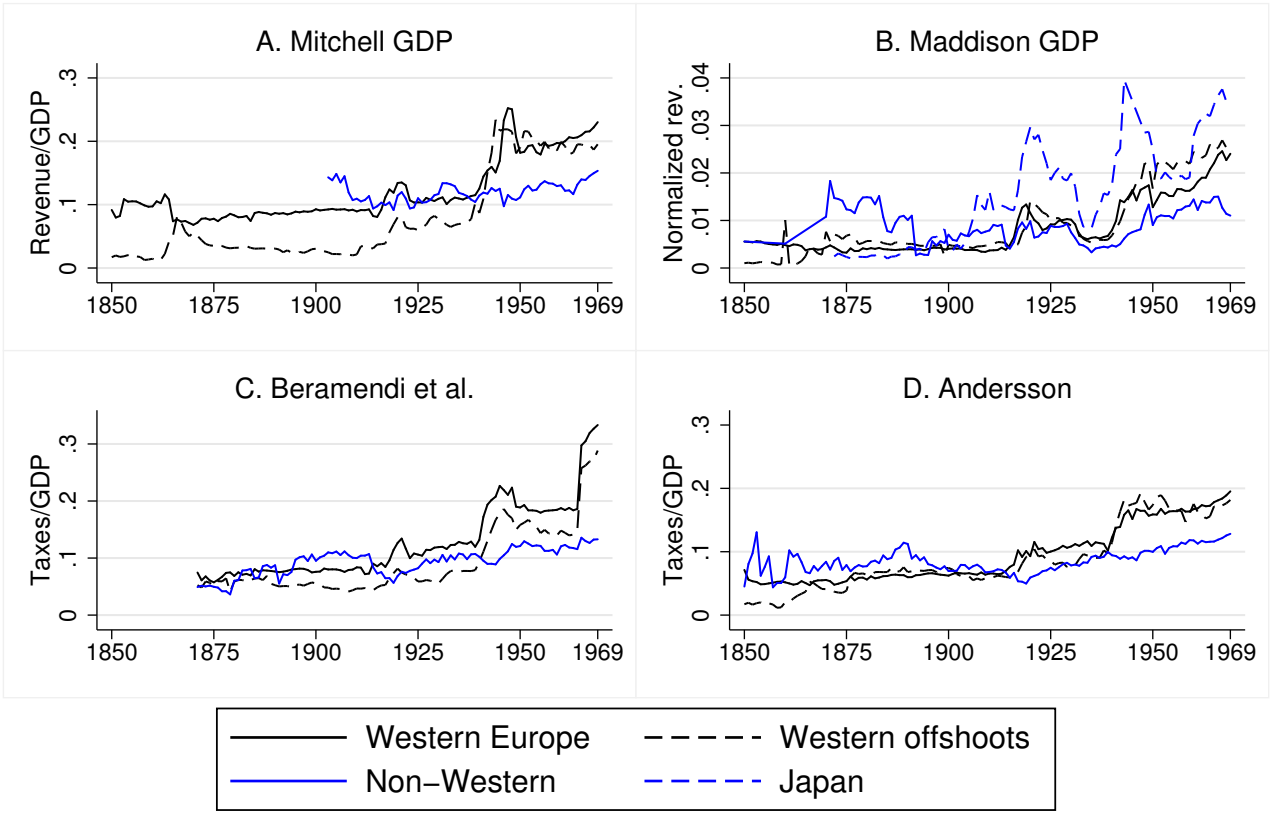
Table 1: Revenue Divergence: Comparing Different Datasets

Year	*Nominal revenue (Mitchell)*	*Revenue/GDP (Mitchell)*	*Normalized revenue (Maddison)*	*Taxes/GDP (Beramendi et al.)*	*Taxes/GDP (Andersson)*
1913	210%	51%	47%	41%	96%
1969	519%	126%	198%	214%	156%

Notes: For each of the aforementioned datasets, we present average per capita revenue intake among Western countries as a percentage of revenue intake among non-Western countries in 1913 and 1969.

When accounting for differences in GDP, the magnitude of revenue divergence between 1913 and 1969 is even more striking. In fact, it suggests a reversal of fortunes. In three of the four revenue measures that account for GDP, Western countries collected roughly half the amount of non-Western countries. Even Andersson's (2018) dataset suggests no advantage for the West in 1913, compared to the two-fold difference apparent in our main, nominal measure. Of course, the interpretation of these figures is qualified by the small size of the samples with GDP data, in particular in 1913. The primary takeaway is that the South American countries with coverage across the datasets had *higher* levels of fiscal extraction (relative to GDP) than Western countries in the late nineteenth century, but then fell behind during the twentieth century.

Figure 2: Accounting for Income Differentials

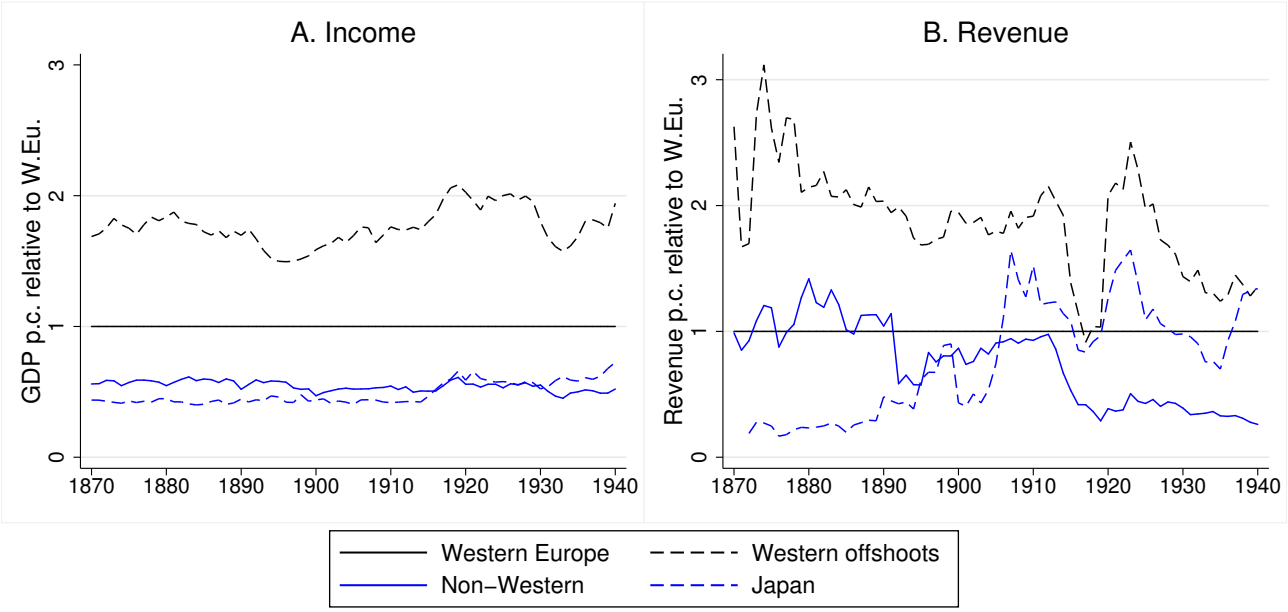


Notes. See preceding text for the data sources for each panel.

The robustness of our main finding to differences in GDP is unsurprising when we considers its timing. When economic historians discuss a "great divergence," they usually refer to the divergence in per capita economic output between Western and non-Western countries (Pomeranz, 2009). Although scholars debate the timing and causes of this divergence, they agree it occurred no later than the mid-nineteenth century, after the Industrial Revolution had spread across Europe. Figure 3 compares revenue trends to GDP trends between 1870 and 1940 using data from Maddison. Whereas large cross-national differences in GDP per capita were evident by 1870, government revenues in the West did not change sharply until World War I began. Therefore, the great revenue divergence postdates the great economic divergence by at least a half century, and probably

more.[6]

Figure 3: Comparing Income and Revenue Divergence



Notes. In both panels, the average outcome for each category of countries is compared to the average outcome among Western European countries. Panel A depicts GDP per capita estimates in constant 2011 U.S. dollars from Bolt et al. (2018), and Panel B depicts the revenue measure used in Figure 1.

1.4 Additional Robustness Checks

In the appendix, we present various robustness checks that yield a qualitatively similar pattern as just described. One concern with our main measure of nominal revenues per capita is that, by using nominal exchange rates, longitudinal changes in revenue per capita may reflect changes in the foreign exchange market rather than changes in actual revenue. Appendix A.2 explains two ways in which our main measure guards against these concerns, and presents intra-imperial comparisons

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

(hence territories using the same currency or a highly stable peg). We also cannot directly account for differences in purchasing power, nor do we directly measure *tax* intake, although Appendixes A.3 and A.4 explain why these shortcomings are unlikely to influence the findings. We also created a separate series that expresses central government revenues per capita in ounces of silver, rather than gold. Ultimately, the choice of precious metal does not qualitatively alter the main pattern. In Appendix A.5, we discuss our choice of gold rather than silver for our primary measure. Finally, in Appendix A.6, we estimate regression coefficients for the interaction of regional location and time period.

2 Existing Theories

Why did a permanent and large revenue divergence occur in the twentieth century, but not earlier? To answer this question, we build upon the rich existing literature on government revenues and state capacity. We disaggregate existing theories based on whether they focus on the *demand* for greater public spending, or the *supply* of bureaucratic institutions that facilitate revenue collection. Although both perspectives yield important insights, each is incomplete for explaining the twentieth-century great revenue divergence.

2.1 Fiscal Demand

Demand-based theories of taxation focus on factors that create stronger preferences for central government revenues. The most commonly studied demand factor in the literature is international warfare. Participation in and preparation for external conflict raises the state's need for revenue to pay and deploy soldiers for the conflict. Mass mobilization wars in particular can create political consensus for egalitarian taxation systems (Scheve and Stasavage, 2016). These conditions may also persist in a post-war ratchet effect (Peacock and Wiseman, 1961). States need to service debt accumulated during the conflict, and may also face pressure to sustain programs of social

redistribution—which require high taxes to fund—that emerged during the war (Lindert, 2004). Such concerns are particularly pressing when participation in warfare leads to franchise expansion to groups that prefer an active state and redistribution. Besley and Persson (2011) formalize the central idea of the war-demand logic. The key choice in their model is whether the incumbent government invests in future tax-collection capacity. A high valuation for public goods in "common-interest states" increases the value of future revenues, which boosts incentives for fiscal investments. They propose external threats as the most natural interpretation of a high value of their public goods parameter (46-7, 58).

Scholars broadly accept that international warfare played a central role in facilitating modern European states (Tilly, 1992; Brewer, 1990). Other authors make the converse argument that less intense geopolitical competition in many ex-colonies in Sub-Saharan Africa and Latin America has undermined state-building efforts (Herbst, 2000; Centeno, 2002; Thies, 2004). Yet numerous counterexamples raise questions about the universality of the war-demand logic as well as the importance of related demand factors. For example, between 1940 and 1975, India fought in a world war under threat of invasion (during which it raised the largest volunteer army in world history), achieved independence alongside mass franchise expansion and an ascendent political elite strongly committed to social welfare measures, and engaged in three wars with Pakistan. Yet per capita central government revenue intake was 62 times higher in Western Europe than in India in 1970. Similar international pressures in the twentieth-century Middle East (Barnett, 1992) and nineteenth-century South America (Centeno, 2002) also failed to engender strong fiscal apparatuses. Even in European history, warfare often generated crippling debt and encouraged irresponsible actions such as debasing the currency (e.g., Louis XIV; Rosenthal 1998, 81), as opposed to promoting fiscal systems that could generate consistent tax revenues over the longer term.

2.2 Fiscal Supply

Other scholars focus on the "supply" of bureaucratic institutions that facilitate revenue collection. The core element of fiscal, or bureaucratic, capacity is information about where citizens and other producers live and how much they produce. Standardized records enable bureaucrats to determine appropriate tax quotas and to sanction non-payers effectively, and make society "legible" (Scott, 1998; Lee and Zhang, 2017; Blaydes, 2018; Stasavage, 2020). Absent legibility, citizens and other producers can exit by either physically migrating or engaging in informal economic activity beyond the state's reach. Throughout history, states have needed some bureaucratic capacity to collect taxes on land and to directly tax production. Modern income and value-added taxes are considerably more information-intensive. Although the concept of bureaucratic supply is inherently multi-faceted, recent research measures key components of states' information-collection abilities across broad comparative samples. Brambor et al. (2020) collected data on civil registration systems and state statistical offices dating back to the eighteenth century. Data on births, deaths, and marriages is essentially a precondition for effective direct taxation because otherwise bureaucrats face difficulties to simply identifying the citizenry. Similarly, Lee and Zhang (2017) and D'Arcy and Nistotskaya (2017) compiled data on the effectiveness of censuses in the twentieth century, which strongly predicts public goods provision.

Importantly, *fiscal capacity* differs from *revenue intake*. States can collect information about production and life events (birth, death, marriage) without using them for taxation. They can also govern a literate population capable of filling out written tax forms, but might not require them to do so. In such scenarios, fiscal capacity is *latent* and ready to be employed when the ruling group wishes.

One factor that influences societal legibility is participation in warfare. European history provides numerous examples of states enacting political reforms to gain an advantage at fighting. For example, Britain introduced the Bank of England in 1694 during the Nine Years' War with France, which creating a major financing advantage (Brewer, 1990). Later, Britain responded to dire fiscal needs

during the Napoleonic Wars to impose the world's first modern income tax. Mann (1993, 444-78) examines five great powers (Britain, France, Prussia, Austria, United States) and argues that warfare was the main stimulus to bureaucratic reforms before the French Revolution that constituted the early stages of modern statehood. These reforms introduced at least minimal standards for hiring and promotion, and shifted toward salaried rather than office-owning state officials.

If fiscal supply was solely a function of short-term fluctuations in fiscal demand, this would be problematic for our conceptual and empirical distinction between demand and supply factors. However, three empirical observations distinguish these concepts.

First, bureaucratic capacity is highly persistent. Consequently, states facing a demand shock are rarely able to rapidly and dramatically improve societal legibility. Dincecco's (2017) discussion of the historical origins of state capacity in Europe dates back to the fall of the Carolingian Empire in the 800s and extends into the twentieth century (see also Stasavage 2020). Conversely, once created, bureaucracies tend to be self-perpetuating even when fiscal demand is temporarily low. Some legibility reforms can persist without any spending at all. For instance, Scott (1998) discusses the introduction of last names and addresses as being crucial for states to find citizens and distinguish them from each other. Once a state has forced its citizens to adopts last names and addresses, this information provides the basis for future revenue extraction, even if not used immediately.

Second, numerous factors influence legibility that are independent of war, or of state policy. In agricultural societies, the structure of agricultural production influences the feasibility of creating an effective bureaucracy. In ancient China, intensive agriculture made production legible to the central government (Stasavage, 2020, 80-83), and in modern Africa, production by co-ethnics is more legible to the government than is production by other groups (Kasara, 2007). The type of terrain also influences legibility. For example, peasants can easily escape the reach of the state when surrounded by mountains, but not when surrounded by deserts (Scott, 2009). Geographic size, high linguistic diversity, external rule, and low literacy are other characteristics that undermine legibility. Thus, countries such as Sweden with flat terrain, low linguistic diversity, a long-standing

indigenous state, and high levels of literacy are inherently better situated to collect considerable information about their citizens than are countries such as the Democratic Republic of the Congo, which enjoys none of these advantages.

Third, even in Europe, participation in warfare provides an unconvincing explanation for key bureaucratic reforms in the nineteenth century. We discuss this important point in depth in the empirical analysis.

Despite adding another important piece, analyses of fiscal supply also offer incomplete explanations of the great revenue divergence. In particular, these accounts cannot explain why a large and permanent divergence did not occur earlier. For most of the nineteenth century, Western Europe and the United States outpaced the rest of the world in terms of collecting information about their citizens and educating their population. As noted, Britain even imposed the world's first successful income tax during the Napoleonic Wars. However, it suspended its income tax after the wars and did match its 1810 per capita revenue record until 1915. Britain's high fiscal capacity remained largely latent throughout the nineteenth century.

3 A Formal Model of Revenue-Extraction Strategies

To address the shortcomings of theories of fiscal demand and fiscal supply when considered in isolation, we develop a theoretical framework that formally models their interaction. If demand is low, then societal opposition to high levels of taxation yields low revenue intake—regardless of the state's latent ability to raise revenues. The onset of war or franchise expansion changes this calculus by creating demand for higher revenue extraction, but states can respond in different ways. Demand shocks may propel the incumbent government to pursue *legibility-intensive* extraction. This entails imposing broad-based taxes, like income taxes, that require information about citizens. However, only states with high bureaucratic capacity (i.e., high supply) can generate high yields from income taxes. Instead, the government can choose *crony-favoring* extraction that

promotes monopolies and other forms of easy rent extraction that require less information about citizens.

In the short term, crony-favoring extraction can generate considerable revenues because it does not require high bureaucratic competence to implement. However, over the longer term, state pursuing this fiscal strategy will lag their peers that choose legibility-intensive extraction and build bureaucratic capacity over time. Thus, only some states facing high fiscal demand will make investments that enhance future fiscal supply. This implication contrasts with, for example, Besley and Persson's (2011) proposition about high demand and common-interest states.[7] States with low bureaucratic capacity do indeed respond to demand shocks by sinking fixed costs to raise revenue, but crony-favoring strategies perpetuate low bureaucratic capacity. Conversely, a state with quality bureaucratic institutions and low demand might temporarily stagnate in revenue, but then experience spikes in revenue collection if demand becomes high in the future.

3.1 Setup

We model an interaction between a government actor and citizens, which unfolds over two periods. Time is denoted by $t \in \{1, 2\}$. The continuum of atomless citizens in society has a mass of $N \in \left(1, \overline{N}\right)$, with an upper bound $\overline{N} > 1$ defined in the analysis. In both periods, each citizen has an exit option valued at $e_i \in (0, 1)$. The exit option is individual-specific (with citizens indexed by i) and is independently drawn for each citizen in both periods from a smooth density function $H(e_i)$ with positive support on $[0, 1]$.[8]

In both periods, the government moves first and chooses a revenue-extraction strategy. They start with a revenue endowment of $R^{\text{exo}} > 0$. The government can rely solely on this revenue endowment to fund expenditures, or can choose either of two high-effort extraction strategies that require

[7] The two alternative revenue-extraction strategies in our model instead more closely resemble those in Queralt (2015).

[8] We omit time subscripts on e_i to reduce unnecessary notation.

sinking a cost to boost revenues.

First, under a *legibility-intensive* strategy, the government grants basic economic rights (e.g., legal rights to participate in the formal economy) to all N citizens. This choice enables each citizen to produce an output of $Y_i = 1$, which is subject to taxation. However, due to limitations in bureaucratic capacity, the government does not know the value of the exit option for each citizen. A fraction $l_t < 1$ of citizens are *legible*, and the government perfectly knows their value of e_i. The remaining fraction $1 - l_t$ of citizens are illegible and the government knows only the prior distribution of possible values of e_i for such citizens. Choosing legibility-intensive extraction entails a fixed cost $F \in \left(0, \overline{F}\right)$, with an upper bound $\overline{F}$ defined in the analysis.[9]

Second, under a *crony-favoring* strategy, the government favors a subset of legible citizens, normalized to mass 1. This could involve limiting economic production to a specific set of cronies, or putting economic production directly under state ownership. Restructuring the economy to reduce competition enables each favored citizen to produce $Y_i = Y$, which is subject to taxation, but pushes any income produced by the mass $N - 1$ of remaining citizens outside the reach of the state. To make the tradeoffs non-trivial, we assume that the crony-favoring strategy bolsters the income of favored citizens $\left(Y > 1\right)$, but diminishes the mass of citizens subject to taxation $\left(1 < l_t \cdot N\right)$ as well as total taxable output $\left(Y < N\right)$. This revenue-extraction strategy also incurs a fixed cost. Despite not requiring a similar bureaucratic effort as the legibility-intensive strategy, subsidies paid to favored firms and the difficulty of displacing vested economic interests creates costs for a government to actively intervene to stifle market competition. To isolate the role of legibility in distinguishing this from the previous strategy, we assume the fixed cost F is the same (see also the stipulations in footnote 9).

The fraction of legible citizens, l_t, is a function of bureaucratic capacity. We assume that l_1 is an

[9]The government pays this cost only in periods it chooses this strategy. For example, choosing legibility-intensive extraction in both periods would entail paying F in both periods, whereas it would only pay F once if it chose legibility-intensive extraction in a single period.

exogenous parameter. However, l_2 depends in part on the revenue-collection strategy period 1. If the government chooses the legibility-intensive strategy, then $l_2 = (1 - \beta) \cdot l_1 + \beta$. Higher values of $\beta \in (0, 1]$ indicate greater learning-by-doing in developing fiscal capacity. By contrast, if the government does not pursue the legibility-intensive strategy, then $l_2 = l_1$.[10]

After choosing its revenue-raising strategy, the government proposes an individual-specific tax rate $\tau_i \in [0, 1]$ to each citizen. Each simultaneously responds by acquiescing and consuming $1 - \tau_i$, or exercising their exit option and consuming e_i.

Total revenues in each period, R_t, equal the endowment R^{exo} plus any additional taxes collected from pursuing either high-effort extraction strategy. For the government, the marginal benefit equals 1 for any revenue intake up to an exogenously determined amount R_t^{dem}. For higher amounts, the marginal benefit of exogenous rents is 0, and is negative for taxes garnered from legibility-intensive or crony-favoring policies. We conceptualize societal demand for revenue as R_t^{dem}. The government is rewarded for increasing revenue to get closer to the societal optimum and penalized for setting taxes such that revenue exceeds the desired amount. We assume that Nature draws R_t^{dem} independently each period from a Bernoulli distribution that takes value $R_{\text{high}}^{\text{dem}}$ with probability $p_{\text{high}} \in (0, 1)$, and $R_{\text{low}}^{\text{dem}}$ with complementary probability. These terms satisfy $0 < R_{\text{low}}^{\text{dem}} < R_{\text{high}}^{\text{dem}}$, and below we impose additional threshold values that make the difference between the low and high draws strategically meaningful. The government additionally pays the fixed cost F if they pursue either high-effort extraction strategy. Consumption for each citizen is as described above: acquiescing to taxation yields $1 - \tau_i$, and choosing the exit option yields

[10] Assuming a deterministic relationship between revenue extraction strategies and bureaucratic development enhances tractability, although the results would be qualitatively similar under alternative assumptions. For example, we could assume that initial bureaucratic capacity atrophies upon pursuing crony-favoring policies (e.g., Democratic Republic of the Congo). We could also assume a small probability that states pursuing crony-favoring policies nonetheless nonetheless experience a gain in bureaucratic capacity in period 2 (e.g., South Korea).

e_i.[11]

3.2 Discussion of the Government's Menu of Choices

The model incorporates important elements from existing theories of fiscal demand and fiscal supply. Here we briefly elaborate upon the substantive motivation for the menu of choices available to the government. Certain revenue sources require minimal information about the population to collect. Examples include customs taxes, natural resource rents, government-owned or otherwise favored monopolies or oligopolies, selling offices, debasing the currency, defaulting on the debt, and fixing uncompetitive prices on agricultural marketing boards. Whether such revenue sources constitute the exogenous revenue endowment R^{exo}, or constitute crony-favoring extraction, depends on the state of the economy at the outset of the game. In colonies, and the succeeding independent countries, in which prior state intervention organized the economy to produce certain cash crops, collecting revenues on them requires only a few customs agents at one or a handful of ports. Similarly, in cases where governments sign concessions to receive a cut of profits from international oil companies, revenues flow in essence as "manna from heaven." Such sources constitute the exogenous revenue endowment.

By contrast, we conceptualize crony-favoring revenue sources as ones that require significant state involvement in and restructuring of the economy. This justifies the fixed cost F to implement crony-favoring extraction. Such restructuring enables only highly legibility citizens to produce valuable goods, or facilitates direct government control over valuable assets. The clearest examples of crony-favoring economic interventions occur when governments construct state-owned enterprises or otherwise favor monopolies in certain industries. 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. This justifies the as-

[11] All citizens that lack legal rights under a crony economy are assumed to consume their exit option.

sumption that the output of favored citizens increases to $Y > 1$. An extreme example of this tactic was the forced collectivization of agriculture in the Soviet Union, although more typical cases are ones like Egypt and India in which the government actively intervenes in the economy to create a "captive tax base" (Waterbury, 1993, 134), or cases in which oil-rich countries create national oil companies. Overall, "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).

By contrast, legibility-intensive extraction requires information about the broad population. Direct taxes such as income taxes and value-added taxes provide the primary source of revenue for most modern states. Efficient collection of such taxes requires detailed information about the identities and productivity of citizens, as well as complex bureaucracies to collect and process this information. Consequently, as we show below in the analysis, if governments with low fiscal supply need to immediately raise additional revenues, they must turn to revenue sources that do not require high levels of legibility to implement.

We also adopt the core idea from the literature, discussed earlier, that bureaucratic capacity is sticky over time. Hence, initial legibility, l_1, is a fixed parameter that may take the same value in period 2. However, we also allow bureaucratic capacity to evolve between the two periods if the government chooses legibility-intensive extraction in period 1. This is a natural assumption about learning-by-doing, and also resembles the fiscal-capacity investment decision in Besley and Persson (2011).

3.3 Short-Term Strategies: Analysis of Period 2

We solve backwards to characterize subgame perfect Nash equilibria. In period 2, the government cares solely about short-term revenue intake. High demand induces the government to choose

whichever high-effort strategy maximizes revenues in period 2.[12] This is the legibility-intensive strategy if bureaucratic supply is high enough, and the crony-favoring strategy otherwise. Alternatively, if demand is low, then the state underutilizes its fiscal potential.

The effect of fiscal demand is straightforward. The tax yield that maximizes the government's utility equals the (positive) difference between the demand for public expenditures, R_2^{dem}, and exogenous revenues, R^{exo}. If this difference is negative, then the government does not seek additional tax revenues and underutilizes its fiscal capacity.

If instead fiscal demand is higher, $R_2^{\text{dem}} > R^{\text{exo}}$, then the government pays the fixed costs associated with either legibility-intensive or crony-favoring extraction (assuming the fixed cost F is low enough, as we discuss below). The following explains which option they choose. For each legible citizen, the government sets the individual-specific tax rate to make the citizen indifferent between producing formally or informally, $\tau_i^* = 1 - \frac{e_i}{Y_i}$. By contrast, the government lacks this ability for illegible citizens, and its optimal strategy is to set the same tax rate on each. This rate balances two considerations: although a higher tax rate yields greater revenues from citizens that comply, it also increases the fraction that exits instead. Consequently, the optimal tax rate on each illegible citizen solves $\hat{\tau} \equiv \arg\max_{\tau \in [0,1]} \int_0^{(1-\tau)\cdot Y_i} \tau \cdot Y_i \cdot dH(e_i)$.

Crony-favoring policies yield a unit mass of favored citizens that each produce $Y_i = Y$ and are perfectly legible, and the remaining mass of $N - 1$ citizens exist outside the formal economy. Legibility-intensive policies enable all citizens to legally produce $Y_i = 1$, but only a fraction l_t are legible. Thus, expected revenues under each strategy are:

$$R^{\text{crony}} = \underbrace{\int_0^1 (Y - e_i) \cdot dH(e_i)}_{\text{All favored citizens are legible}}. \tag{1}$$

[12] To keep the focus entirely on revenues while leaving expenditures as reduced form, we conceptualize the fixed cost F as constituting lost revenues.

$$R^{\text{leg}}(l_2) = N \cdot \Bigg[\underbrace{l_2 \cdot \int_0^1 (1 - e_i) \cdot dH(e_i)}_{\text{Legible citizens}} + \underbrace{(1 - l_2) \cdot \int_0^{1-\hat{\tau}} \hat{\tau} \cdot dH(e_i)}_{\text{Illegible citizens}} \Bigg]. \tag{2}$$

Comparing these two terms shows that legibility-intensive revenue extraction yields higher revenues if and only if bureaucratic capacity is high enough:[13]

$$l_2 \geq \underline{l}_2 \equiv \frac{\frac{1}{N} \cdot \int_0^1 (Y - e_i) \cdot dH(e_i) - \int_0^{1-\hat{\tau}} \hat{\tau} \cdot dH(e_i)}{\int_0^1 (1 - e_i) \cdot dH(e_i) - \int_0^{1-\hat{\tau}} \hat{\tau} \cdot dH(e_i)} \in (0, 1). \tag{3}$$

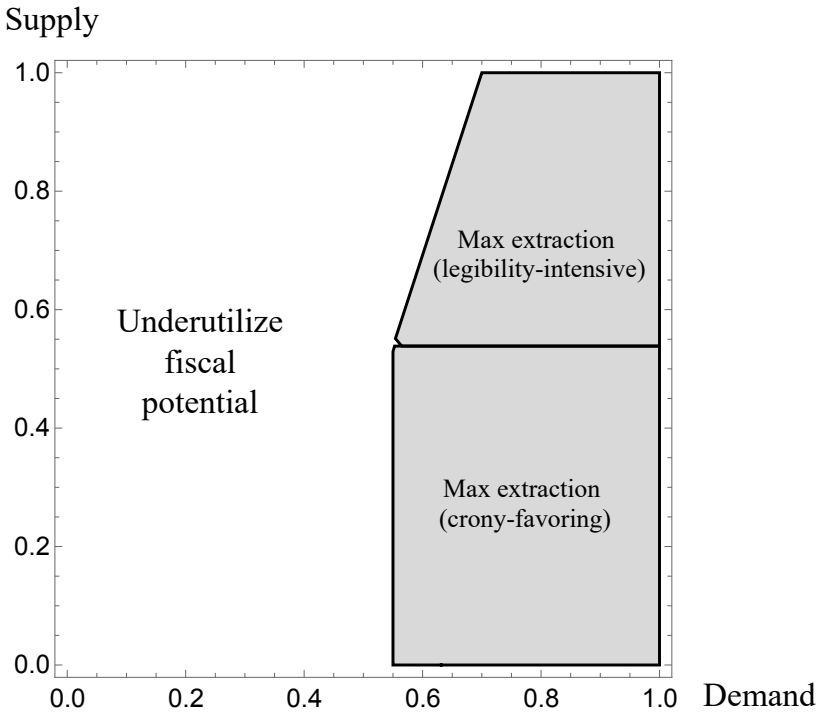
Thus, maximum revenues in period 2 are:

$$R_2^{\max} = \begin{cases} R^{\text{crony}} & \text{if } l_2 < \underline{l}_2 \\ \\ R_2^{\text{leg}}(l_2) & \text{if } l_2 \geq \underline{l}_2. \end{cases} \tag{4}$$

These results establish the interactive effect of demand and supply factors on the government's optimal revenue strategy, which we summarize in Figure 4. Only if legibility (l_2) is high does high demand (R_2^{dem}) push the government to choose legibility-intensive revenue extraction. Otherwise, high demand encourages the government to follow the crony-favoring path. Thus, existing arguments are correct that demand stimulates governments to collect more revenues. However, formal theories such as Besley and Persson (2011) do not consider the possibility that to do so, governments will pursue crony strategies that predate the economy in order to extract more.

[13]The following explains why $\underline{l}_2 \in (0, 1)$ for appropriately set $\overline{N}$. The denominator is strictly positive because expected revenues from legible producers exceed those from illegible producers. To see this formally, rearrange the denominator to $\int_0^{1-\hat{\tau}} (1 - e_i - \hat{\tau}) \cdot dH(e_i) + \int_{1-\hat{\tau}}^1 (1 - e_i) \cdot dH(e_i)$. The bounds of the first integral assume $e_i < 1 - \hat{\tau}$, thus establishing the claim. Given this, the numerator is also strictly positive for low enough N, and hence we set the upper bound of N as $\overline{N} \equiv \frac{\int_0^1 (Y - e_i) \cdot dH(e_i)}{\int_0^{1-\hat{\tau}} \hat{\tau} \cdot dH(e_i)}$. Finally, because $Y < N$, both terms in the numerator are strictly bounded between 0 and 1. Thus, because $Y > 1$ and $N > 1$, the preceding results establish that the difference between these terms is strictly less than 1.

Figure 4: Interaction of Demand and Supply



Notes. In this region plot, the horizontal axis is R_2^{dem} and the vertical axis is l_2. The parameters are $H \sim U(0,1)$, $N = 1.3$, $F = 0.05$, and $R^{\text{exo}} = 0.05$.

Proposition 1 presents a subgame perfect Nash equilibrium strategy profile.[14] The only element not covered in the preceding discussion concerns the precise thresholds at which the government chooses each strategy, which additionally incorporate the fixed costs F associated with either the legibility-intensive or crony-favoring strategies. To eliminate strategically uninteresting cases, we restrict the upper bound on the fixed costs, $\overline{F} < R^{\text{crony}}$.

Proposition 1 (Optimal revenue extraction in period 2)**.**

- ***Low demand.***
  - *If $R_2^{dem} \leq R^{exo} + F$, then the government does not pursue additional revenues: $R_2 = R^{exo}$.*
  - *If $R^{exo} + F < R_2^{dem} < R^{exo} + R^{crony}$ and $l_2 < \underline{l}_2$, then the government chooses*

[14] All equilibria are payoff equivalent. There are a continuum of equilibria because the government is indifferent between legibility-intensive and crony-favoring extraction for some intermediate values of R^{dem}.

crony-favoring extraction but underutilizes its fiscal potential: $R_2 = R_2^{dem}$.

- *If* $R^{exo} + F < R_2^{dem} < R^{exo} + R^{leg}(l_2)$ *and* $l_2 \geq \underline{l}_2$*, then the government chooses legibility-intensive extraction but underutilizes its fiscal potential:* $R_2 = R_2^{dem}$.

- ***High demand and low supply.*** *If* $R_2^{dem} \geq R^{exo} + R^{crony}$ *and* $l_2 < \underline{l}_2$*, then the government chooses crony-favoring extraction and uses its full fiscal potential:* $R_2 = R^{exo} + R^{crony}$.

- ***High demand and high supply.*** *If* $R_2^{dem} \geq R^{exo} + R^{leg}(l_2)$ *and* $l_2 \geq \underline{l}_2$*, then the government chooses legibility-intensive extraction and uses its full fiscal potential:* $R_2 = R^{exo} + R^{leg}(l_2)$.

3.4 Long-Term Strategies: Analysis of Period 1

In period 1, the government cares not only about how its fiscal strategy affects contemporaneous revenues, but also intake in period 2. Compared to the single-shot game encapsulated by the period 2 calculus, the government faces greater incentives in period 1 to choose legibility-intensive extraction because of the boost to bureaucratic capacity in period 2. We derive two conditions that are jointly sufficient for the government to choose legibility-intensive extraction in period 1: initial bureaucratic supply is relatively high, and demand is anticipated to be high in the future. These incentives arise *even if demand is low in period 1*. Overall, analyzing a shadow of the future explains how initial differences in bureaucratic capacity (even if small) that do not manifest as higher revenues in the short term can engender large long-term differences in revenue intake. Furthermore, even if legibility-intensive and crony-favoring strategies can yield comparable amounts of revenue in the short run, in the longer run, countries pursuing each strategy will experience divergent trajectories.

We first demonstrate the necessity of high-enough initial supply. Absent this condition, even upon pursuing legibility-intensive extraction in period 1, the government would not gain enough in bureaucratic capacity from learning-by-doing to prefer legibility-intensive over crony-favoring extraction in period 2. Formally, if $l_1 < \frac{\underline{l}_2 - \beta}{1-\beta}$, then the government's calculus is the same as in period 2 because $l_2 < \underline{l}_2$.

If instead initial supply is higher, $l_1 \geq \frac{l_2-\beta}{1-\beta}$, we show that anticipation of high demand in the future is sufficient to induce the legibility-intensive extraction strategy. To simplify the number of cases to examine without qualitatively altering the insights, we place bounds on the low and high draws for fiscal demand. For a low draw of fiscal demand, the government does not seek additional revenues in period 2. For a high draw of fiscal demand, the government seeks maximum extraction. These are formalized as $R^{\text{dem}}_{\text{low}} < R^{\text{exo}} + F$ and $R^{\text{dem}}_{\text{high}} > R^{\text{exo}} + R^{\text{leg}}(1)$, respectively.[15]

A state facing low demand in period 1, i.e., $R^{\text{dem}}_1 = R^{\text{dem}}_{\text{low}}$, may nonetheless choose legibility-intensive extraction in period 1, contrary to its short-term interest. In addition to the stipulation that initial supply is high enough, the scope conditions for this choice are that anticipation of fiscal demand in period 2 is high. If the government chooses legibility-intensive extraction, then its expected utility is:

$$\underbrace{R^{\text{exo}} - F}_{\text{Period 1}} + \underbrace{R^{\text{exo}} + p_{\text{high}} \cdot \Big[R^{\text{leg}}\big((1-\beta)\cdot l_1 + \beta\big) - F \Big]}_{\text{Period 2}}. \tag{5}$$

If instead the state does not pursue additional revenues in period 1, its expected utility is:

$$\underbrace{R^{\text{exo}}}_{\text{Period 1}} + \underbrace{R^{\text{exo}} + p_{\text{high}} \cdot \Big[\max\big\{R^{\text{crony}}, R^{\text{leg}}(l_1)\big\} - F \Big]}_{\text{Period 2}}. \tag{6}$$

Comparing these two shows that the state pursues legibility-intensive extraction if and only if anticipation of future demand is high enough:

$$p_{\text{high}} \geq \underline{p}_{\text{high}} \equiv \frac{F}{R^{\text{leg}}\big((1-\beta)\cdot l_1 + \beta\big) - \max\big\{R^{\text{crony}}, R^{\text{leg}}(l_1)\big\}}. \tag{7}$$

Lemma 1 summarizes this intuition.[16]

[15] Proposition 1 provides the rationale for these thresholds. For the upper bound, note that $\max\{R^{\text{crony}}, R^{\text{leg}}(l_t)\}\big|_{l_t \in [0,1]} = R^{\text{leg}}(1)$.

[16] For ease of exposition, we omit a formal proposition for optimal strategies in Period 1. This

Lemma 1 (Sufficient conditions for legibility-intensive extraction in period 1)**.** *Suppose* $l_1 \geq \frac{l_2-\beta}{1-\beta}$ *and* $p_{high} \geq \underline{p}_{high}$.

- *The government chooses legibility-intensive extraction in period 1.*
- *If* $R_1^{dem} = R_{low}^{dem}$*, then the government underutilizes its fiscal potential:* $R_1 = R_{low}^{dem}$.

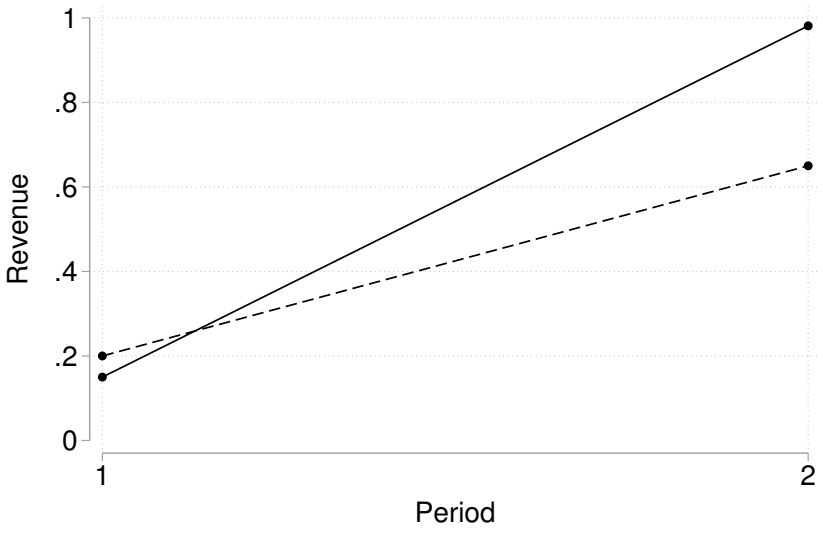
Figure 5 summarizes the major intuition from the model, which tracks the motivating empirical pattern well. We depict two different hypothetical revenue trajectories. In both cases, demand is low in period 1, and both governments simply consume their exogenous revenue endowment. The solid line corresponds with a state with relatively high initial bureaucratic capacity that grows over time. Despite low demand, the state invests in bureaucratic institutions in period 1, which is why revenue intake is in fact lower for the solid line in period 1. Demand is high for both governments in period 2, which generates a divergence. The dashed line corresponds with a state with low bureaucratic competence. Consequently, they do not invest in institutions in period 1, and in period 2, they respond to the demand shock with crony-favoring extraction. Although this is the short-term revenue maximizing strategy, it produces lower revenues over the longer term.

4 Empirical Evidence for Theoretical Implications

Our main theoretical implication is that the conjunction of high fiscal supply and high fiscal demand is necessary to explain high revenue intake. This fits the evidence well. Although Western countries enjoyed an advantage in bureaucratic supply across the entire period, demand was low until World War I. This enabled non-Western primary product exporters, and some agrarian empires, to keep pace or catch up with the West. Later, the conjunction of high fiscal demand and high fiscal supply explains the subsequent revenue spike in the West, and hence the emergence of huge fiscal discrepancies relative to non-Western countries. After independence, their colonies

is the most substantively interesting case, and otherwise the optimal choices resemble those from Proposition 1.

Figure 5: Examples of Revenue Trajectories



Notes. Parameters are $H \sim U(0,1)$, $N = 1.9$, $F = 0.05$, $R^{\text{exo}} = 0.2$, $\beta = 0.5$, and $l_1 = 0.5$ for the solid line. For the dashed line, any suitably low value of l_1 yields this trajectory.

experienced demand shocks. However, low supply prevented high levels of revenue collection, which explains why the revenue divergence was permanent and large.

In Appendix B, we propose one way to operationalize fiscal demand and supply for a large-N sample. Using two-way fixed-effects models, we demonstrate in that participation in warfare (which proxies for demand shocks) exhibits a positive and statistically significant association with revenues only in countries with a civil registration system (which proxies for high bureaucratic supply), hence exhibiting a positive interaction effect.

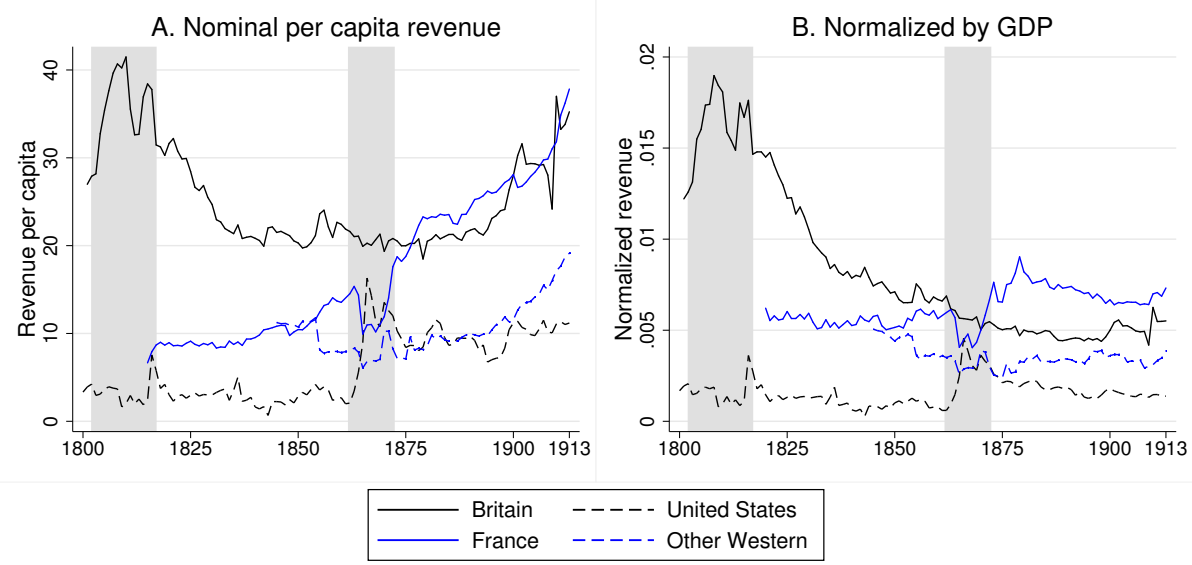
4.1 Low Fiscal Demand in the West Before World War I

Between the conclusion of the Napoleonic Wars and the start of World War I, revenue intake was low in Western countries, which we show in Figure 6. Britain imposed the world's first modern income tax during the Napoleonic Wars, a period we highlight in gray.[17] However, per capita revenue intake declined afterwards, and this decline is even more pronounced when accounting

[17] See Aidt and Jensen (2009, 172); Dincecco (2017).

for Britain's strong economic growth. Even when Britain reimposed an income tax in 1842, the marginal rate began at 2.9%, and it remained low into the twentieth century. France imposed a new set of direct taxes starting with its Revolution, but did not implement an income tax until World War I. The United States experienced a brief spike in revenues when it imposed an income tax during its Civil War and Reconstruction (1862–72), which we also highlight in gray. However, for most of the nineteenth century, the government was a "state of courts and parties" (Skowronek, 1982). Customs revenues were sufficient to cover the small federal budget, and during the century they constituted on average 72.1% of U.S. revenues. The only major exception is New Zealand, which throughout the century consistently collected high levels of customs taxes relative to its small white population enumerated in its censuses.[18]

Figure 6: Western Revenue Intake Before World War I



Notes. In Panel A, the lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates (see Figure 1). Panel B normalizes by GDP (see Panel B in Figure 2).

Low revenue intake reflected low fiscal demand. The long nineteenth century was considerably

[18]We omit New Zealand from the average of other Western countries because it is a large outlier. Prior to World War II, New Zealand accounts for the gap in revenue collection between Western Europe and offshoots depicted in Figures 1 through 3.

more peaceful than the preceding or subsequent periods. Britain, for instance, participated in a major war against at least one other European power for 76 of the 150 years from 1665 to 1815, but in only three years between 1815 to 1914. Similarly, until the very end of this period, limited franchises dampened domestic incentives for social provision and redistributive taxation. Britain did not provide old-age pensions until 1908, unemployment and health insurance until 1911, or universal secondary education until 1918. Both Britain's upper class political leadership saw little personal advantage to high levels of taxation, and faced no demands from their middle-class electorate to do so. Across the region, demand for welfare provisions was low throughout the nineteenth century (Lindert, 2004).

By contrast, legibility was high and growing throughout this period. This observation is consistent with the idea in the model that states may make concerted effort to improve their bureaucratic capacity even when fiscal demand is temporarily low. The two main theoretical scope conditions for such behavior fits European states well. First, initial bureaucratic supply was already relatively high. Second, they anticipated that demand would be high in the future, given the extensive history of warfare among European great powers.

Two main factors made Western societies more legible in the twentieth century than they had been before French Revolution. First, every Western country experienced some industrialization prior to World War I. The state was actively involved in projects such as building railroads and expanding public education. Moreover, allowing economic reforms initiated outside the state reflected a conscious decision by ruling elites potentially fearful of losing power (Acemoglu and Robinson, 2012). Second, European states engaged in extensive bureaucratic reforms, as process that Mann (1993) describes for five major powers. Indicative of these reforms, all ten countries that introduced registration systems for births and deaths before 1850 are in Western Europe or its offshoots (Brambor et al., 2020). Daunton (2001) describes the related process by which Britain reformed its tax system in the nineteenth century. Public frustration with the taxation engendered by high spending through the Napoleonic wars led to major retrenchment afterwards. Although *overall*

revenue intake dropped throughout the nineteenth century, the reintroduction of the income tax in 1842 eventually facilitated greater public trust by making the tax system more equitable (see also Levi 1989 for the importance of quasi-voluntary compliance for collecting taxes).

These increases in fiscal capacity also demonstrate that fiscal supply and fiscal demand varied independently. European countries retained or boosted their bureaucratic capacity during an extended period of low warfare. Unsurprisingly, given generally low fiscal demand, participation in warfare is uncorrelated with information-capacity levels; in fact, Brambor et al. (2020, 202) estimate a negative correlation. Whereas Mann (1993) stresses the importance of warfare for bureaucratic reforms during the eighteenth century, he highlights industrialization and pressure from outside the ruling class as an equally important factor between 1780–1850, and the most important factor afterwards (and attributes no role to warfare in this latter period).

4.2 Customs Revenues in Primary Product Exporters

Even with low demand for public expenditures in the West, we might still expect these states to collect more revenue than states currently or previously under Western colonial rule. European colonial rule was typically based on predatory extraction, which perpetuated low fiscal supply. Colonizers shaped the fiscal systems of dependencies to reflect the needs of the metropole. Most colonies made extensive use of either coercive labor institutions or local intermediaries, both of which lended to reduce the central government's level of cash receipts. Spanish administrators in the Americas plundered their colonies for gold and silver, often using indigenous forced labor for mining and other production purposes. Elsewhere, Europeans forcibly imported millions of Africans to work as slave on plantations throughout the West Indies and other areas where the climate permitted the production of sugar and other valued commodities. African colonies were also characterized by high labor coercion (Van Waijenburg, 2018), but also considerable financial decentralization. Britain collected head, hut, and other direct taxes in Africa through Native Authority chiefs acting on the state's behalf (Gardner, 2012). Throughout Africa, the general prin-

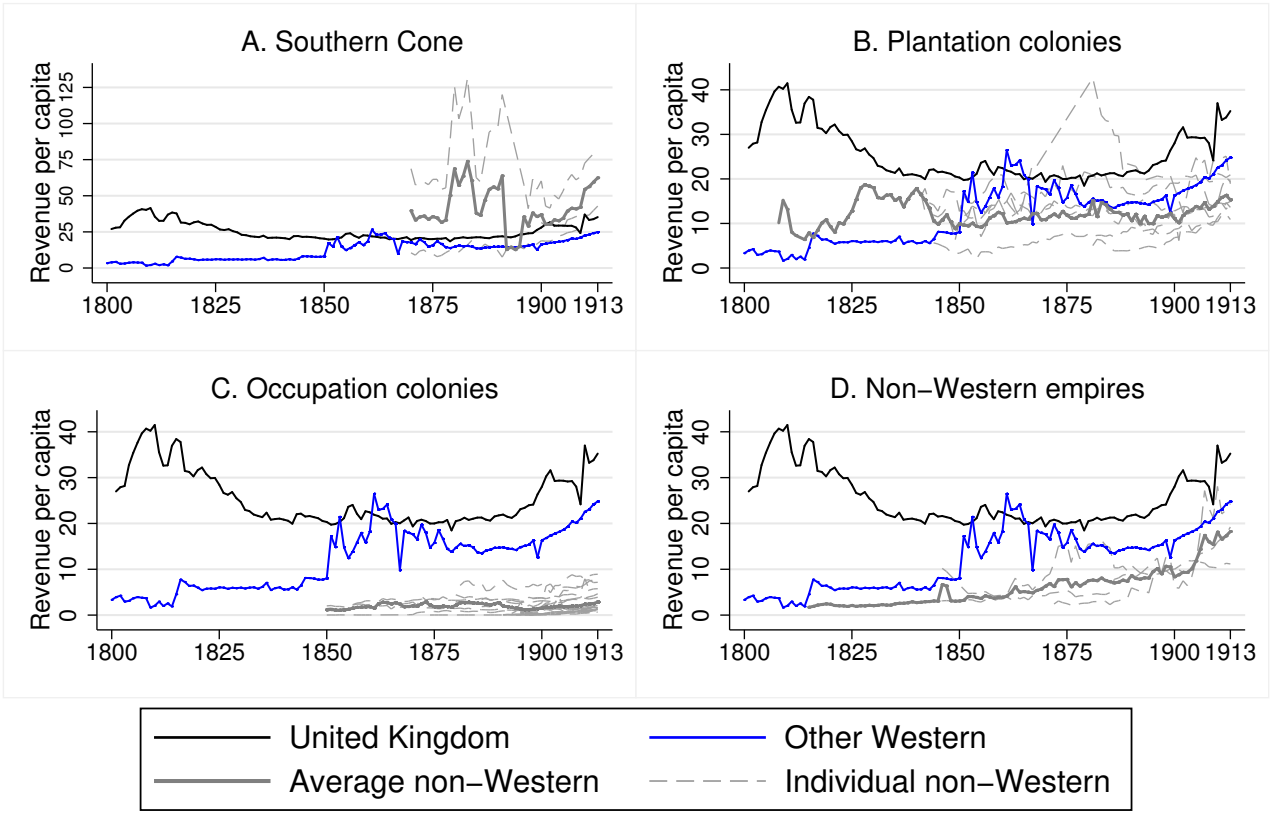
ciple was to impose "hegemony on a shoestring" by co-opting local indigenous institutions and collecting enough taxes to balance the budget (Berry, 1992). Similarly, in the majority of areas in colonial India, colonial officials delegated the collection of the land revenue tax to princes or large landlords, and the government faced great difficulty in raising the rates that they assessed (Lee, 2019).

Despite low legibility, European colonizers as well as newly independent rulers in South America structured local economies to facilitate primary product exports. This enabled some of these states to keep pace with the West without high levels of fiscal effort. In Figure 7, we compare Britain (black line) and average revenue intake in other Western countries (blue line) to four baskets of non-Western countries between 1800–1913 (individual non-Western countries are plotted in dashed gray, and their average in a thick, solid gray line). Figure 7 compares revenue in four different baskets of territories to the West.

In the Southern Cone, a formally independent region in the 19th century, revenue intake was quite high. Between 1900–13, the Southern Cone countries collected 74% more in nominal revenue per capita than Britain, and two times the amount of revenue of other Western countries, on average. The discrepancies are even starker when normalizing by GDP: 2.74 greater revenue intake than Britain, and over three times that for the rest of Western Europe. Chile's high totals were the product of a boom in nitrate mining, and between 1900–13 customs taxes constituted, on average, 71.2% of Chile's total revenues. The ease of collecting customs taxes from a handful of ports enabled a primary product exporter to collect more revenues than in low-demand Western fiscal powers.

In Panels B and C, we plot revenues from territories subjected to colonial occupation until after World War II. We distinguish between two types of colonies: plantation colonies in which a high fraction of the population was forced migrants engaged in production of cash crops on plantations, and colonies of occupation with largely indigenous populations. Once again, the dashed gray lines represent individual countries, and the solid black line is the average. Plantation colonies, with

Figure 7: Comparative Revenue Intake Before World War I



Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates (see Figure 1). The set of non-Western countries are as follows. Panel A: Argentina, Chile, Uruguay. Panel B: Barbados, Cuba, Fiji, Guyana, Jamaica, Malaysia, Mauritius, Trinidad and Tobago. Panel C: Algeria, Benin, Cameroon, Cyprus, Ghana, Guinea, India, Indonesia, Ivory Coast, Madagascar, Malawi, Niger, Nigeria, Senegal, Sri Lanka, Tanzania, Togo, Uganda, Zambia, Zimbabwe. Panel D: Egypt, Japan, Russia.

few indirect rule institutions and high levels of trade collected somewhat less revenue than European countries: from 1900–13, 55% less than Britain, and 31% less than other Western European countries.[19] However, these gaps are strikingly small compared to modern discrepancies or when considering the vastly superior bureaucratic institutions in the West. Furthermore, when normalizing by GDP, the advantage flips. Plantation colonies collected 69% more than Britain, and 2.2

[19]These differences in nominal revenue collection, as well as those for occupation colonies (see below), are similar in magnitude to those in Frankema (2010), who compiled his revenue data for the British empire from the colonial blue books.

times more than other Western European colonizers.

Western countries were clearly distinguished from occupation colonies in revenue intake, even before World War I. Between 1900–13, Britain collected over sixteen times more in nominal revenue per capita than occupation colonies, and the discrepancy was more than ten-fold for other Western countries. Yet once again, these magnitudes were small by modern standards, and differences in GDP account for most of the discrepancy. When normalizing by revenue intake, Britain collected slightly more than two times the amount of per capita revenue than occupation colonies, and the rest of the West collected only 56% more than occupation colonies.[20]

A possible concern is that comparing sovereign and non-sovereign polities may yield misleading conclusions. Specifically, perhaps colonizers exploited their colonies to fund expenditures at home, which would enable them to keep domestic taxes low. However, this is unlikely to explain away the patterns presented here. This alternative hypothesis cannot explain why independent states in the Southern Cone extracted large amounts of revenue, nor why occupation colonies in Africa and Asia extracted small amounts of revenue. Research by economic historians shows that in the largest empires (Britain and France), colonial subsidies and defense expenditures exceeded in magnitude any revenue intake, which departed from the goal of financial self-sufficiency in the colonies. Analyzing Britain in the half century preceding World War I, Davis and Huttenback (1982, 119) argue that the empire is best characterized as "a redistribution of income within the United Kingdom than as a transfer from the empire to the mother country." Although many European investors benefitted from colonial rule, this was possible because of the security environment funded by metropolitan taxpayers. Only in the small empires with one or several profitable colonies (Dutch, Belgian,

[20]The sample of non-Western countries for which we have GDP data at this time is much smaller than those for which we also have revenue data (only India, Indonesia, and Sri Lanka). From 1900–13, these three colonies average to collect 75% more in nominal per capita revenues than the entire group of occupation colonies. However, even among this subsample, differences in GDP explain most of the gap in nominal revenue intake.

Portuguese) did the empire contribute a significant net inflow to the metropole, mirroring patterns from imperial Spain in earlier centuries (Frankema and Booth, 2019, 6-8). These authors also stress that "colonial revenues were first and foremost needed to secure *internal* order . . . [and] to pay the salaries of government officials who administered the government departments" (5).

4.3 Reforms in Non-Western Empires

In the final panel in Figure 7, we compare the West to major non-Western empires. Much recent scholarship highlights a large gap in revenue intake between the West (in particular Britain) and major non-Western empires by the end of the eighteenth century (Karaman and Pamuk 2010, 623; Rosenthal and Wong 2011, 175; Hoffman 2015, 51; Dincecco 2017, 69). Despite this early mini-divergence, we show that this gap was relatively small at the beginning at the twentieth century for some of these empires, which we attribute to high fiscal demand.

We have data for three major non-Western states before World War I: Egypt, Japan, and Russia.[21] Like several other empires (China, Ethiopia, Ottoman, Siam), these states engaged in defensive modernization programs to resist Western encroachment. Their ruling elites perceived high demand for centralized revenues, even in years that these states were not actively participating in war. Reforms in Japan followed two centuries of isolation and decentralized rule under the Tokugawa Shogunate, in which demand for public expenditures was low. Japan enjoyed a long history of domain-level taxation and professionalized state service (Sng and Moriguchi, 2014), which facilitated the implementation of a civil registration system in 1874. Consequently, Japan caught up to the West in nominal revenue intake by the early twentieth century, and raised roughly double the amount of per capita revenue as Britain when normalizing by GDP.

Our data show that Russia also converged toward Western revenue intake. Our first data point is for 1815. In this year, nominal per-capita revenue collection in Britain was 22.6 times higher, and that

[21] In Appendix A.7, we discuss this sample of non-Western empires and the revenue data in more detail.

in France was 3.9 times higher than in Russia. This is consistent with an early revenue divergence shown by other scholars. In fact, the gap between the West and Russia at the conclusion of the Napoleonic wars is even larger than the discrepancies listed by Dincecco (2017, 69) in the 1780s, which were 6.6 and 3 for Britain and France, respectively. However, this gap closed considerably by the onset of World War I. In response to defeat in the Crimean War, the Russian state initiated a drive to industrialize and build railroads. To finance this drive, the Russian state engaged in various crony-favoring methods to raise revenue. In 1902, state monopolies and state domains accounted for 56% of revenues, compared to only 7% for direct taxes. The liquor monopoly established in 1895 constituted 25% of total revenues by itself.[22] Between 1900–13, Russia collected 45% of the per capita revenue of Britain, and 69% of other Western countries. Although we lack GDP data during this period, it is likely that this relatively small gap is entirely explained by income differences.

Finally, by 1870, reforms in Egypt initiated by Muhammad Ali enabled Egypt to catch up to the average Western country in per capita revenue intake, and it exceeded both the average and Britain in normalized revenue intake. Egypt's subsequent declines can be attributed to British colonization in 1882.

4.4 Rising Demand and Permanent Fiscal Divergence

Starting with World War I, Europe governments experienced high demand for revenues. The two world wars required unprecedented mobilization of troops, reorganization and management of the economy to supply the war effort, and financing needs. European states not only overhauled their tax systems (Scheve and Stasavage, 2016), but also experienced pressure to expand the franchise and provide citizens with a broad array of social welfare benefits to reward their sacrifices (Lindert, 2004), even in countries that did not directly participate in the wars.[23] Although demand was the

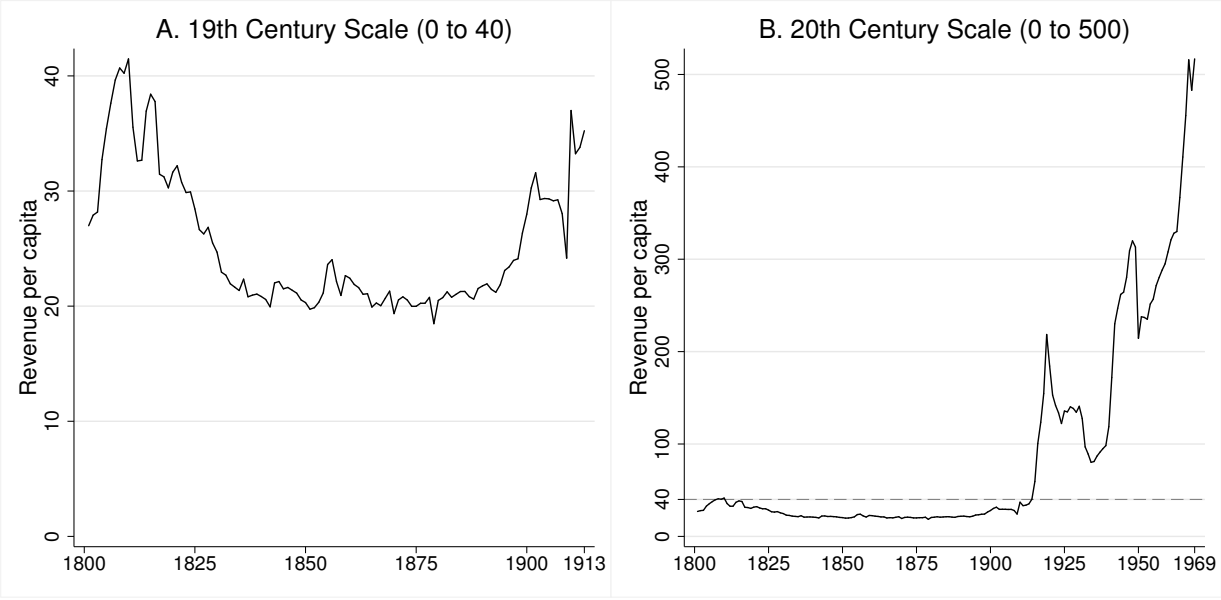
[22] Calculated by the authors from *The Statesmans Yearbook* for 1904.

[23] See Appendix Figure B.2 for evidence on the non-belligerents in WWI.

main factor that changed relative to the pre-WWI period, their prior legacy of high bureaucratic supply was crucial. The "night watchman" states in the West in the nineteenth century developed the latent capacity to raise impressive amounts of money when pressed (Briggs, 1961).

The disjuncture is striking. In Figure 8, we plot British revenues on two different scales. The dashed line replicates the pattern in Figure 6, and shows nominal per capita revenues in Britain from 1800–1913. These observations correspond with the y-axis on the left, which shows revenues on a scale appropriate for expressing pre-WWI revenue intake (0 to 40 gold grams per capita). The solid line presents revenues over 1800–1970. These observations correspond with the y-axis on the right, which shows revenues on a scale appropriate for expressing twentieth-century revenue intake, whose range is *15 times* greater (the difference is less wide as a percentage of GDP). On this scale, Britain's gains in revenue during the Napoleonic Wars are barely perceptible.

Figure 8: British Revenues: Comparing 19th and 20th Centuries

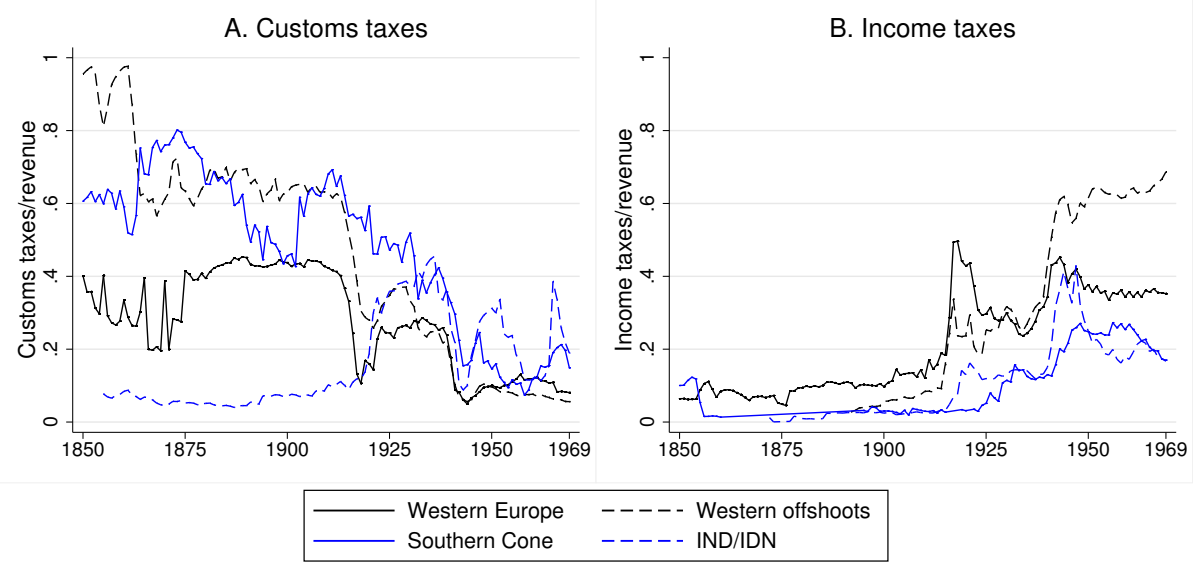


Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates (see Figure 1). The only differences between the two panels are the years on the x-axis and the scale of the y-axis.

This increase in taxation was based on a shift in tax technology. In Figure 9, we present the percentage of revenue deriving from both customs and income taxes. Whereas customs taxes once

constituted the main source of revenues in Western offshoots and the Southern Cone, and were also sizable in Western Europe, they had become largely unimportant by the second half of the twentieth century.[24] Instead, income taxes became the predominant source of revenues in Western countries. Income taxes represented a major technological breakthrough in taxation capacity, with Mares and Queralt (2015, 1975) praising the "unprecedented revenue generating capacity" of "the most advanced fiscal instrument to date." A similar description applies to advanced consumption taxes (e.g., value-added tax) that have become common in Western Europe (Steinmo, 1996).

Figure 9: Source of Revenue: Customs and Income Taxes



Notes. Most data points from Andersson (2018), whose sample includes Western Europe and South America/Mexico. We supplemented his dataset with data from Mitchell (1998) for additional non-Western countries.

The revenue gap between the West and the rest of the world increased exponentially after World War II, when most of the colonized world gained independence. Leading existing explanations focus on how non-European countries during this period either fought too few wars, or the wrong

[24]The dashed blue line presents the average of India and Indonesia. India was a relatively poor colony for which the land tax was the main source of revenues (Roy 2021). This is similar to many African colonies that lacked cash-crop exports, and instead relied on inefficiently collected direct sources of taxation (Gardner, 2012).

kinds of wars: limited international wars funded by debt, and civil wars (Herbst, 2000; Centeno, 2002; Besley and Persson, 2011).[25] Yet demand for public expenditures was high in many newly independent states. Many anti-colonial activists believed that jurisdictional sovereignty would engender higher levels of public spending by aligning the government's incentives with their citizens rather than with European bondholders and civil servants (Naoroji, 1901; Furnivall, 2014), and anti-colonial movements sought to use government to provide greater services for citizens. Furthermore, international competition was high in some parts of the post-colonial world (Middle East, South Asia, and East Asia), and most colonies experienced mass franchise expansion shortly before gaining independence, which should create additional demands for public expenditures.

Focusing solely on the demand side overlooks the crucial gap between the West and other states in bureaucratic institutions. Insufficient bureaucratic reforms during the colonial period offers a more compelling explanation for the general inability of non-Western states after gaining independence to converge toward revenue intake in the West. The predominant strategies of taxing cash crop exports and relying on local intermediaries did not require bureaucratic development. For example, British administrators in Africa largely gave up on efforts to make the population more legible (Gardner, 2012). These easy-revenue sources were often sufficient to meet the limited needs of colonial states before World War II, and did not greatly distinguish the colonial world because Western states exhibited such low fiscal demand.

However, after fiscal demand became higher, the neglect of bureaucratic reforms in the colonies became problematic. As of 1960, future OECD countries on average had experienced twice as many years with a civil registration system as others (133 versus 60).[26] At this time, India had 46 times as much census-age misreporting as the United States (Lee and Zhang, 2017). Given low supply, it is

[25]Related, Dincecco et al. (2016) and Queralt (2019) analyze the legacies of fighting the "wrong" kinds of wars in the nineteenth century.

[26]The latter number is an overestimate because it excludes the many non-Western countries with missing data on Brambor et al.'s (2020) registration variable, which almost certainly covaries negatively with civil registration years.

unsurprising that heightened fiscal demand after gaining independence did not constitute a critical juncture in revenue collection, as Lee and Paine (2019) demonstrate by estimating null differences in countries' revenue intake before and after gaining independence. In many post-colonial countries, low supply has persisted long after independence. Many 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 (Moore, 2008, 40-41).

Low legibility is reflected in a relatively slow change in the composition of tax revenues (see Figure 9). In some African and Asian countries, customs revenues became *more* important in the mid-twentieth century, as governments gained freedom to set tariff rates, and older land or labor taxes declined in importance or were abolished by post-independence governments intent on reform. Bates (1981) explains how many African rulers after independence used funds from agricultural marketing boards—which serve the ostensible purpose of stabilizing prices for and revenues from primary products—to raise revenues by exploiting farmers. Even when non-Western states have tried to impose modern direct and production taxes, they are hindered by a lack of bureaucratic capacity. World regions exhibit dramatic differences in income tax avoidance, with higher rates in Africa, South Asia, Latin America, and the Middle East than elsewhere. Losses vary from 8% of GDP in Chad to 0.16% in Finland (Cobham and Janskỳ, 2018).

Several "most likely" cases—given existing demand theories—highlight the importance of institutional supply and exemplify the alternative modes of revenue collection that rulers pursue when demand is high but supply is low. Although Egypt and India each faced high demand for revenue given their participation in prolonged international rivalries (with Israel and Pakistan, respectively) that on several occasions flared into war, both developed large and inefficient public sectors rather than cultivated more sustainable sources of revenues. As Waterbury (1993, 134) describes for these countries: "The SOE sector does represent a captive tax base, and even as the SOEs run at a loss and seek financing abroad, they still generate a predictable source of taxes and compulsory payments to various fiscal agencies." Egypt's attempt to implement a broad land reform in the 1950s

and 1960s, which would have cut out large landowners as intermediaries in the tax-collection process, failed due to basic problems of bureaucratic information about land titles and related issues (Migdal, 1988). In India, the proportion of revenue collected through direct taxes fell during the twentieth century (from 28% in 1900 to 15% in 2000, with a low of 6.5% in 1987),[27] as tax-avoidance rates remained high and the government choose to raise import duties and nationalize large sectors of the economy.

The main exceptions to the general pattern of fiscal weakness in the non-Western world are the "developmental states" of East Asia. Our theory anticipates these exceptions, which combined high supply and demand. Japan, Taiwan, and South Korea all had long traditions of professionalized bureaucracies, in fact, longer than those in the West. Furthermore, despite the brutalities of Japanese colonial rule in South Korea and Taiwan, scholars argue that Japanese institutions spurred rapid development after World War II (Kohli, 2004). These countries also experienced high demand for revenue to fund participation in World War II, their subsequent recovery, Cold War rivalries (including the Korean War), and ambitious programs of infrastructural development and public service provision.

5 Conclusion

The twentieth century saw a historically important—and unprecedented—divergence in fiscal intake between Western countries and the rest of the world, a divergence that occurred much later than existing theories would expect. We explain both the cross-sectional and longitudinal trends by distinguishing existing explanations in terms of "demand" and "supply" hypotheses. Whereas existing research tends to examine these in isolation, we provide a theory of how demand shocks can cause governments to engage in either legibility-intensive or crony-favoring extraction, and

[27] See *Statistical abstract relating to British India from 1894-95 to 1903-04*, Table 45; and *Handbook of Statistics on Indian Economy 2018-19*, Table 96.

we show that the optimal choice depends on extant bureaucratic supply. We then provide evidence to establish that the conjunction of high demand and high supply produces sustained revenue boosts.

In addition to identifying and offering an explanation for the great revenue divergence, we also advance our understanding of fiscal development and state development more broadly. Our framework centers around the importance of bureaucratic development and states' information-gathering capabilities. Wars undoubtedly contributed to state centralization and improved fiscal capacity in some European cases in both the early modern period and the twentieth century. However, this observation does not support a simple bellicist theory in which the effect of warfare has been largely constant. The twentieth-century world wars constituted a critical juncture because the scale of European states' involvement was unprecedented (Scheve and Stasavage, 2016), which in turn facilitated unprecedented levels of revenue intake. A necessary condition for this transformation was prior bureaucratic development, which had laid largely latent in the nineteenth century.

Our emphasis on the interaction between fiscal demand and fiscal supply can also explain. Earlier in European history, bureaucratic capacity was uniformly low, but differences in the incidence of parliaments still help to explain heterogeneity in the effect of warfare. Although any increases in revenues during earlier periods were small by twentieth-century standards, states with limited government typically gained a greater war boost because they could borrow at lower rates and have higher levels of tax compliance(Dincecco, 2011; Stasavage, 2011; Karaman and Pamuk, 2013; Cox, 2016).

Our perspective also highlights the lack of bureaucratic development as central to understanding low taxation in the non-European world, shifting the focus away from the amount or type of warfare. In the nineteenth century, states with largely illegible societies but valuable primary products—which required minimal bureaucratic capacity to generate revenues—could keep pace with with the West. However, once demand picked up across the globe, these states were heavily restricted in their ability to raise modern sources of revenues such as income taxes. Even cases

that did experience considerable international competition could not keep pace with the West. The main exceptions were East Asian cases, such as Japan, that experienced not only high demand, but also a prior history of bureaucratic development. In Europe's colonies, the institutional conditions for conflict driven statebuilding did not exist .

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A Supporting Information on Data and Patterns

A.1 Additional Information on the Sample

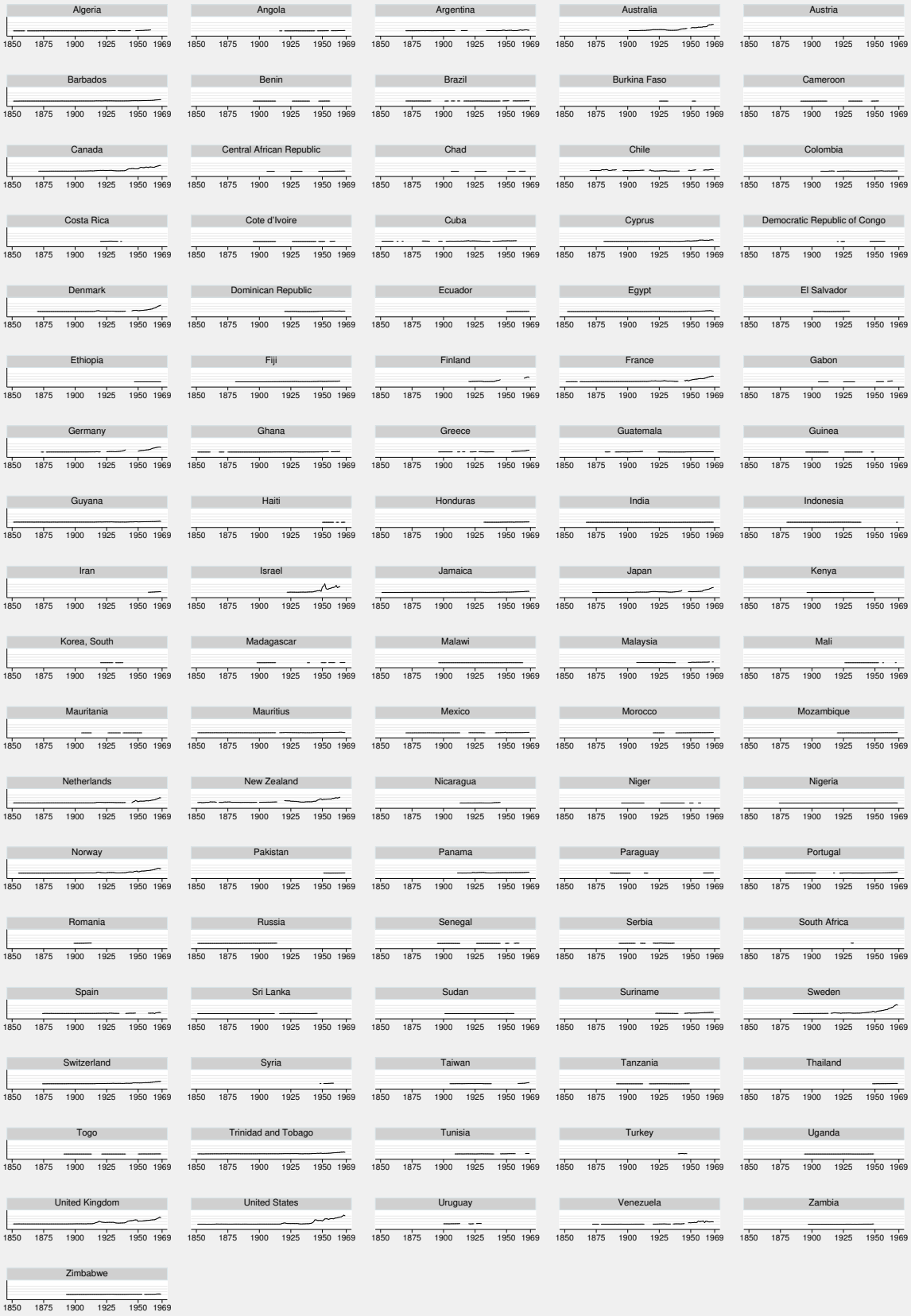
Table A.1: Missing Data for Revenue Per Capita

Country	Population	Revenue	Exchange Rate
Algeria	1791-1855	1791-1829, 1933, 1961-3	1791-1814, 1861, 1945-7, 1964-8
Angola	1791-1939	1791-1914, 1945-1945, 1956-1956	1914-1915, 1919-1919
Argentina	1791-1868	1791-1863	1791-1869, 1910-1913, 1920-1933
Australia	1791-1850	1791-1900	1948-1949
Austria	None	1791-1922, 1938-1944, 1956-1956	1791-1920, 1924-1968
Bangladesh	1791-1950	1791-1968, 1969-	1791-1950
Barbados	1791-1850	1791-1834, 1836-1839, 1841-1844, 1846-1849	1970-
Benin	All	1791-1894, 1914-1925, 1957-1968, 1969-	1941-1944, 1946-1946
Brazil	1791-1853	1900-1900	1791-1869, 1891-1900, 1905-1905, 1910-1910, 1914-1915, 1946-1946, 1953-1954
Bulgaria	1791-1887	1791-1878, 1942-1968, 1969-	1791-1869, 1879-1949
Burkina Faso	All	1791-1924, 1933-1947, 1950-1950, 1955-1961	1941-1944, 1948-1948
Burma	1791-1871	1791-1939, 1941-1945, 1966-1966	1791-1869, 1931-1933, 1940-1968
Cambodia	1791-1957		1948-1968
Cameroon	All	1791-1890, 1913-1928, 1954-1961	1876-1876, 1941-1944, 1946-1946
Canada	1791-1870	1791-1866	1791-1870
CAR	1791-1935	1791-1905, 1913-1924, 1935-1946	1941-1944, 1946-1946
Chad	1791-1935	1791-1905, 1913-1924, 1935-1950, 1958-1959, 1966-1968, 1969-	1941-1944, 1946-1946
Chile	1791-1834	1791-1856	1791-1869, 1892-1895, 1914-1916, 1942-1947, 1955-1959
China	1791-1952	All	1791-1869, 1931-1933
Colombia	1791-1869	1791-1904, 1906-1906	1791-1869, 1919-1919
Costa Rica	1791-1874	1791-1883, 1892-1892	1791-1919, 1935-1935, 1938-1968
Cote d'Ivoire	All	1791-1894, 1914-1925, 1953-1955	1946-1946
Cuba	1791	1795-1807, 13, 61-2, 65-6, 69-80, 82, 90, 92, 94-5, 1900-1, 38, 59, 66-8, 69-	1960-8
Cyprus	1791-1880	1791-1878	1791-1854
DR Congo	1791-1935	1791-1919, 1922-1922, 1959-1961, 1965-1965	1927-1945, 1961-1968
Denmark	None	1791-1852	1791-1869, 1941-1944
Dom. Rep.	1791-1919	1791-1904	1970-
Ecuador	1791-1949	1791-1883, 1894-1896	1791-1869, 1885-1888, 1914-1919, 1933-1943, 1970-
Egypt	1791-1845	1791-1820, 1822-1832, 1834-1835, 1837-1841, 1843-1845, 1848-1851	1791-1825
El Salvador	1791-1900	1791-1882	1931-1968
Ethiopia	1791-1955	1791-1946	1791-1955
Fiji	1791-1880	1791-1874	1791-1869, 1965-1968
Finland	None	1791-1881	1791-1919, 1946-1963
France	1791-1800	1791-1814	1791-1814, 1861-1861, 1941-1944

Country	Population	Revenue	Exchange Rate
Gabon	1791-1935	1914-1924, 1935-1950, 1958-1959, 1965-1968, 1969-	1941-1944, 1946-1946
Germany	1791-1851	1791-1871, 1922-1923, 1943-1945	1791-1872, 1876-1876, 1921-1924, 1941-1941, 1945-1949
Ghana	1791-1870	1791-1849, 1862-1867, 1873-1874, 1956-1956	1791-1849, 1965-1968
Greece	1791-1852	1791-1895, 1918-1918, 1927-1927, 1941-1953	1791-1873, 1908-1910, 1914-1914, 1919-1920, 1941-1953
Guatemala	1791-1879	1791-1881, 1887-1889	1791-1869, 1913-1923, 1970-
Guinea	All	1791-1894, 1914-1925, 1950-1968, 1969-	1941-1944, 1946-1946
Guyana	1791-1840	1791-1837, 1848-1848	1970-
Haiti	1791-1949	1791-1897, 1960-1960, 1964-1964	1791-1894, 1900-1900, 1902-1909, 1911-1911, 1914-1921, 1970-
Honduras	1791-1880	1791-1878, 1887-1887, 1889-1891, 1903-1903	1791-1931, 1970-
Hungary	1791-1959	1791-1968, 1969-	1791-1950
India	1791-1866		1791-1818
Indonesia	1791-1879	1791-1815, 1940-1949	1791-1815, 1941-1944, 1947-1966
Iran	1791-1955	1791-1919	1791-1869, 1905-1909, 1914-1919, 1929-1929, 1935-1935, 1938-1942, 1957-1957
Iraq	1791-1946	1791-1926	1791-1869, 1905-1918, 1934-1934, 1938-1968
Israel	1791-1921	1791-1919	1791-1869, 1965-1968
Italy	1791-1851	1791-1861	1791-1968
Jamaica	1791-1843	1791-1839	1791-1843
Japan	1791-1871	1791-1867	1791-1869, 1944-1947
Jordan	1791-1951	1791-1950, 1966-1966	1791-1968
Kenya	1791-1920	1791-1895	1950-1968
Madagascar	1791-1910	1791-1897, 1914-1937, 1954-1954, 1961-1963	1941-1944, 1946-1946, 1948-1948
Malawi	1791-1900	1791-1895	1964-1968
Malaysia	1791-1900	1791-1882, 1939-1945, 1947-1947, 1966-1966	1791-1906, 1943-1947
Mali	1791-1965	1791-1925, 1954-1955, 1958-1959, 1968-1968	1791-1965
Mauritania	All	1914-1925, 1937-1937, 1954-1964	1970-
Mauritius	1791-1849		1914-1915
Mexico	1791-1830	1914-1916	1791-1869, 1914-1919, 1934-1940
Morocco	1791-1959	1791-1919, 1930-1937	1791-1959
Mozambique	1791-1927	1791-1919	1914-1915, 1919-1919
Netherlands	1791-1815	1791-1844	1791-1815, 1941-1944
New Zealand	1791-1850		1915-1919, 1965-1967
Nicaragua	1791-1905	1791-1899, 1905-1909, 1912-1912, 1950-1950	1791-1911, 1946-1968
Niger	All	1791-1894, 1914-25, 1947, 53-5, 59, 61-2, 64, 66-	1946, 48
Nigeria	1791-1920	1791-1873	1791-1920
N. Korea	All	1791-1952, 1966-1966	1791-1968
Norway	1791-1854		1791-1852
Pakistan	1791-1950	1791-1946	1946-1947
Panama	1791-1910	1791-1908	1791-1869
Paraguay	1791-1885	1791-1880, 1903-12, 1917-8, 1933-4, 1952, 1954-7	1791-1873, 1917-8, 1920-59, 1970-

Country	Population	Revenue	Exchange Rate
Peru	1791-1835	1791-1845, 47, 49, 51, 53, 55-60, 62, 64-8, 70, 72, 14, 76, 78, 80-6, 88, 90, 95	1791-1968
Philippines	1791-1902	1791-1900, 1941-1944	1791-1968
Portugal	1791-1853	1791-1878, 1904-1916, 1920-1921, 1969-1969	1791-1869, 1914-1915, 1919-1919
Romania	1791-1898	1791-1882, 1896-1896, 1915-1915, 1944-1968, 1969-	1791-1889, 1914-1968
Russia	Pre-1815	1791-1802, 1915-23, 35-7, 39, 41-49, 51, 54, 57	1791-1814, 1886-1968
Senegal	All	1791-1894, 1914-1925, 1953-1955, 1961-1961, 1969-1969	1946-1946, 1948-1948
Serbia		1791-1892, 1907-1909, 1915-1919, 1941-1945	1791-1877, 1915-1919, 1938-1968
Sierra Leone	1791-1849	1791-1830, 1832-1836, 1970-	1791-1968
Singapore	1791-1946, 1958-	1791-1856, 1866-1867, 1941-1962	1791-1906, 1943-1947, 1963-1966
South Africa	1791-1910		1791-1930, 1934-1968
S. Korea	1791-1919, 45-48	1791-1904, 1939-1948, 1950-1950, 1955-1955	1791-1869, 1931-1931, 1945-1954, 1956-1968
Spain	1791-1856	1936-1939	1791-1873, 1949-1957
Sri Lanka	1791-1849	1791-1810, 1913-1913	1791-1818, 1914-1915, 1947-1968
Sudan	1791-1968, 1969-	1791-1900	1957-1968
Suriname	1791-1920	1791-1886, 1921-1921	1941-1944
Sweden		1791-1880	1791-1869, 1873-1884, 1914-1914
Switzerland			1791-1873
Syria	1791-1945	1791-1922, 1927-1927, 1950-1950, 1960-1960	1791-1919, 1940-1947, 1961-1968
Taiwan	1791-1904	1791-1897, 1939-1948	1791-1869, 1945-1958
Tanzania	1791-1920	1791-1890, 1913-1916	1876-1876, 1950-1968
Thailand	1791-1910	1791-1850, 1890-1891	1791-1947
Togo	1791-1957	1791-1890, 1914-1920, 1948-1949	1876-1876, 1941-1944, 1946-1946
T&T	1791-1850	1791-1849	1970-
Tunisia	1791-1910	1791-1908, 1958-1964	1941-1944, 1970-
Turkey	1791-1909	1791-1922	1914-1924, 1926-1929, 1931-1939, 1948-1968
Uganda	1791-1910	1791-1893	1950-1968
UK	1791-1800		1791-1800
U.S.	1791-1799	1791-1791	1791-1799
Uruguay	1791-1899	1791-1869, 1871-1871, 1873-1873, 1878-1879, 1881-1883	1791-1881, 1914-1919, 1925-1925, 1931-1968
Venezuela	1791-1824	1791-1829, 1863-1863, 1870-1871, 1878-1878	1791-1869, 1914-1919, 1935-1935, 1946-1947
Vietnam	1791-1959	1950-1954, 1970-	1791-1968
Zambia	1791-1903	1791-1896	1950-1968
Zimbabwe	1791-1900	1791-1892	1954-1954

Figure A.1: Revenues Per Capita by Country, 1850–1970



Graphs by cname

A.2 Exchange Rate Effects?

Another possible concern with our main measure of revenues is that, by using nominal exchange rates, 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 exhibit many sharp short-term changes that clearly reflect currency revaluations. Two of our scope conditions address this concern: we examine only pre-1971 data, when the Gold Standard and Bretton Woods regimes stabilized exchange rates; and we excluded currencies for which the published exchange rate was grossly manipulated (e.g., the Soviet ruble).

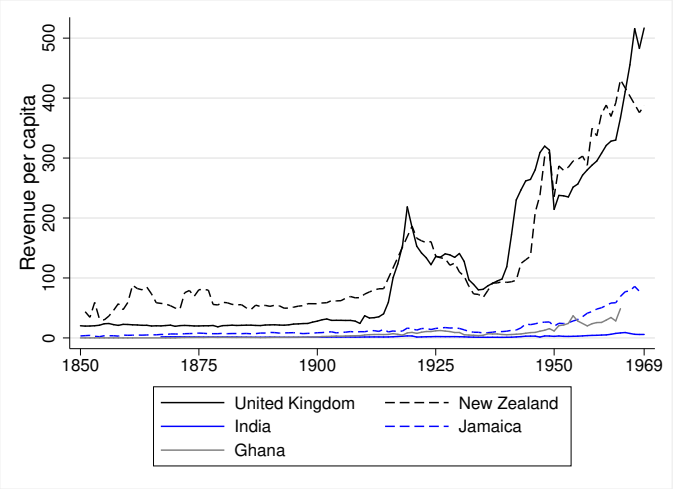
To further guard against this concern, we present intra-imperial comparisons here. Exchange rate fluctuations do not influence the results because the exchange rates remain constant over time, either because the colonies used the same currency as the mother currency or a highly stable peg. Figure A.2 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. This comparison has the advantage in that each country (except for India before 1899 and after 1947) used sterling or a currency pegged to sterling throughout the period, meaning that exchange rate fluctuations should not influence the results. Although New Zealand and Britain 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 Britain was slightly more than three times that in Jamaica, while by 1950 it was ten times as much. Even the modest early differences would likely disappear after accounting for differences in income and purchasing power. Jamaica—a small, open economy mainly reliant on customs duties—very extracted *more* resources per capita than the mother country after accounting for wealth differentials. While have no prewar measures of Jamaican GDP, in 1950 the UK's per capita was 3.7 times that of Jamaica, substantially more than the prewar revenue differences. We cannot directly account for differences in purchasing power, but this was almost certainly greater in the 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. We engage with this consideration in more depth in the next appendix section.

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 Britain 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 Britain and New Zealand. Between 1913 and 1969, Britain'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 expanded only by 41% per capita (Bolt et al., 2018).

Figures A.3 and A.4 show evidence of revenue divergence within the French empire as well as 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 Britain's during the two world wars—similar to much of Western Europe, which suffered negative direct effects of

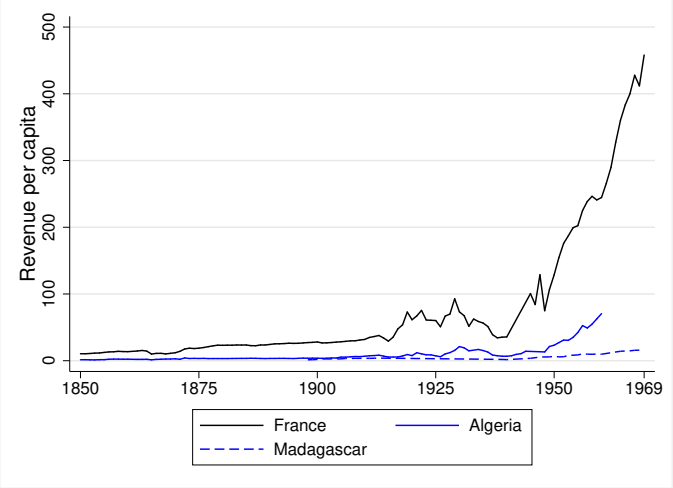
the war—but its post-1950 increases were even more dramatic. Whereas Denmark's per capita revenue was only 1.4 times Brazil's in 1913, this figure had ballooned to more that 17 times by 1969. In the decade before 1914, booming customs revenues made Brazil one of the most fiscally successful states in the world. However, by 1969, Brazil collected a share of revenues relative to GDP at about a third of Denmark's levels, and slightly behind Burkina Faso.[28]

Figure A.2: Revenue Trends in the British Empire



Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates.

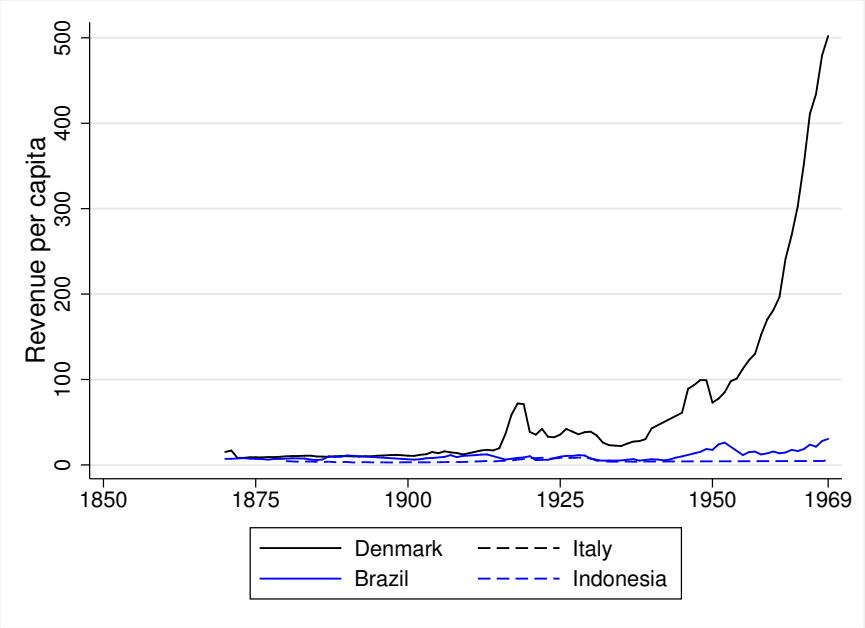
Figure A.3: Revenue Trends in the French Empire



Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates.

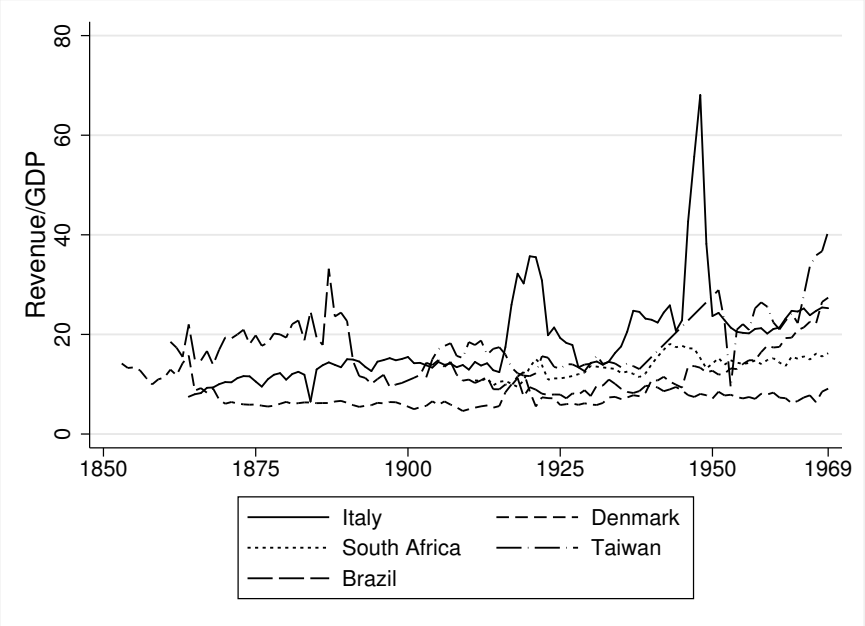
[28]See Appendix Figure A.5. Revenue levels in Brazil recovered somewhat in the late 20th century.

Figure A.4: Revenue Trends Among Other Countries



Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates.

Figure A.5: Revenue/GDP in Selected Countries



Notes. The lines show estimated central government revenue per capita as a percentage of GDP, using the Mitchell data.

A.3 Price Effects?

Even after we account for artificial exchange rates or short-term fluctuations in exchange rates, our 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 price data prior to the late twentieth century—let alone price data comparable across nations—implies that accounting for prices would severely constrict the sample and would make impossible many of the illuminating historical comparisons that we present. Cross-national purchasing power data are available only since 1950 (Summers and Heston, 1991), after the great revenue divergence we identify had already occurred.

However, differences in purchasing power are unlikely to explain our pattern for three reasons. First, the differences are still present when we use state revenue as a percentage of GDP as the measure.

Second, 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 Britain in 1955, nominal per capita revenues were 441% higher in Britain 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).

Finally, the regression models with 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 show that although purchasing power increased in Western Europe/East Asia relative to the rest of the world in this period, this increase was modest relative to differences in per capita nominal revenue increases. Between 1950 and 1968, 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 Europe/East Asia compared to 18% in the rest of the world during this period.

A.4 Non-Tax Revenue

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 expatriates. A large literature documents the empirical importance of "rentier" revenue sources and examines their effects on political outcomes (Ross, 2012; Morrison, 2014; Menaldo, 2016). Alternatively, states can substitute for taxes by borrowing (Centeno, 2002; Queralt, 2019), 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 twentieth century because of their superior ability to increase tax revenues (Scheve and Stasavage, 2016), not because of their superior exploitation of natural resources, which was not especially high in these countries. 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. Nor can resource curse arguments explain why many *resource poor* countries have also failed to catch up to the West. Similarly, Western countries have had better (and cheaper) access to loans for a much longer period than other parts of the world (Stasavage, 2007).

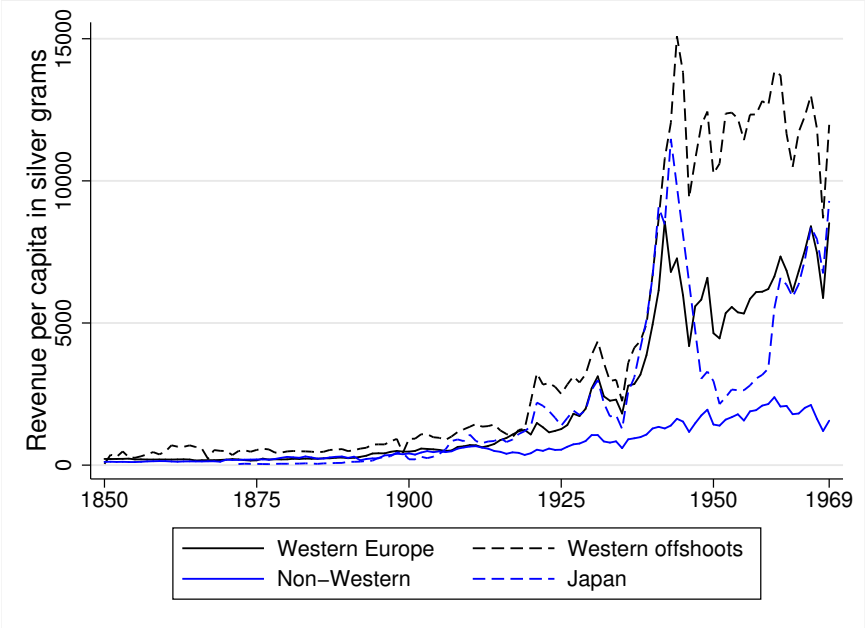
A.5 Gold versus Silver

In the period before 1970, world currencies were very often, though not always, fixed in relation to gold, silver, or both. Which of these two precious metals is a more appropriate "yardstick" for value across time? This question would be moot if the two moved in unison, but this is far from the case: Silver prices in relation to gold fell by about 50% between the 1870s and the 1890s, and then plunged even lower in the 1930s before recovering. We have chosen gold for two reasons. Firstly, for most of our period the majority of currencies were linked to gold rather than silver, meaning that denominating in gold minimizes the amount of volatility in exchange rates. Of the 69 countries with revenue data in 1900, 53 were on the gold or gold exchange standard, 36 had been on it for at least 20 years, and another 7 would go on the gold standard by 1907. This predominance was not reflective of anything inherent about gold, but the fact that the core western European nations adopted it and imposed it on their colonies and economic clients.

In addition, we have some reason to think that denominating in gold leads our measures to be more stable with respect to prices than denominating in silver. Bampinas and Panagiotidis (2015), for instance, find that in the 1792 period gold hedges US and UK inflation much better than silver does. Notably, the nations that stayed on the silver standard, in particular China, had higher inflation than others, a fact that played a role on the debates over metallic standards in the west (Van der Eng, 1999).

However, as Figure A.6 shows, the choice makes little substantive difference. Revenue in silver grams show similar patterns to revenue denominated in gold.

Figure A.6: Revenue Trends in Silver



Notes. The lines show estimated central government revenue in silver grams (converted at nominal exchange rates). Silver-to-gold price ratios from Officer (2016).

A.6 Regression Evidence of the Great Revenue Divergence

Table A.2 estimates regression coefficients to substantiate the basic intuitions highlighted in Figures 1 and 2: Western countries diverged from other countries only after 1913. In Columns 1 and 2, the dependent variable is the logged version of our main revenue variable (revenue per capita in gold grams converted at nominal exchange rates). In Columns 3 and 4, the dependent variable is the log of the normalized version of this variable (see Panel B of Figure 2). Every specification contains a lagged dependent variable and clusters standard errors by country. In the odd-numbered columns, we pool the data and regress revenues on an indicator for Western countries, and indicator for post-1913, and their interaction. In the even-numbered columns, we include only the interaction term and additionally include country and year fixed effects (perfect collinearity precludes including the lower-order terms in these specifications). The year fixed effects account for time-specific factors such as changes in the price of gold or international shocks, and the country fixed effects account for country-specific sources of heterogeneity that remain constant over time.

The regression estimates confirm the intuitions from the figures. In all specifications, the interaction term is positive and statistically significant. The marginal effect estimates for Columns 1 and 3 additionally show that Western countries did not raise significantly more revenue than other countries prior to 1914.

Table A.2: The Great Revenue Divergence: Regression Evidence

DV:	Log revenue p.c.	Log revenue p.c.	Log norm. rev. p.c.	Log norm. rev. p.c.
	(1)	(2)	(3)	(4)
West*Post-1914	0.0578***	0.0775***	0.0448***	0.0887***
	(0.0118)	(0.0198)	(0.0155)	(0.0293)
West	0.000949		-0.0251*	
	(0.00732)		(0.0144)	
Post-1914	0.0205***		0.0255**	
	(0.00601)		(0.0109)	
Country-years	5,588	5,588	3,171	3,171
Countries	90	90	78	78
R-squared	0.984	0.967	0.953	0.929
LDV	YES	YES	YES	YES
Country FE	NO	YES	NO	YES
Year FE	NO	YES	NO	YES
			Marginal effect estimates	
West | Pre-1914	.0009		-.0003*	
	.0073		.0002	
West | Post-1914	.0587***		.0003**	
	.0088		.0001	

Notes. Table A.2 summarizes a series of OLS regressions with country-clustered standard errors. *** p<0.01, ** p<0.05, * p<0.1.

A.7 Revenues in Major Non-Western Empires

In Panel D of Figure 7, we present revenue intake for select non-Western empires with available data in the nineteenth century. Here we address that sample in more detail, as well as additional details about our estimates for Russia.

Scholars typically portray reforms in the Ottoman empire and China as less successful than those in Japan and, to a lesser extent, Russia. Compared to Russia, at at the end of the eighteenth century, both exhibited larger gaps with Britain and France in nominal per capita revenue collection (Karaman and Pamuk 2010, 623; Rosenthal and Wong 2011, 175; Hoffman 2015, 51; Dincecco 2017, 69). Karaman and Pamuk show that the gap between the Ottoman empire and the West remained large in the early twentieth century, with Britain collected over four times more revenue per capita. Income differentials are undoubtedly part of the story, although we lack the data to know definitely what percentage of this gap is explained by income. The first GDP point for Turkey is in 1950, when Britain's GDP per capita was roughly four times greater. Overall, if we had data on more non-Western empires, we might observe a slightly larger gap between Western and other countries before World War I, but our core observation would remain qualitatively unchanged.

We present additional details on our estimates for Russia because, in the early twentieth century, our estimates differ somewhat from those in Karaman and Pamuk (2010). Table A.3 compares our revenue estimates using the five decade averages presented in Karaman and Pamuk, plus an additional average for 1910–13 from our dataset. As the table shows, although our data are largely aligned in the nineteenth century, by the twentieth century a discrepancy had emerged. Over 1900–9, our estimate is 64% higher, and we report a considerable increase over that figure by 1910–13.

Table A.3: Russian Revenue Data

Decade	*Karaman and Pamuk*	*Our data*
1780–89	1.7	no data
1820–29	2.5	2.1
1850–59	3.6	3.2
1880–89	6.5	6.1
1900–09	7.5	12.3
1910–13	no data	17.4

Notes: For both series, revenue amount is annual nominal per capita revenue in gold grams, averaged over the time periods specified.

This discrepancy is surprising because we both use Mitchell as the source data for revenues in the local currency, and McEvedy and Jones (1978) for population data (at least until 1897, when the first census occurred and hence Mitchell's population data begins). Thus, our treatment of Russia violates our general rule to not include data points before the first census (which occurred in 1897), and to not interpolate if there was more than twenty years in between censuses (the next one occurred under the Soviet Union in 1926). We view this choice as justified given the importance of Russia as a comparison point for non-Western empires, and Karaman and Pamuk's use of similar data.

Our revenue estimates differ because of a technical consideration about currency conversion. We convert revenue amounts in the local currency into British pounds based on nominal exchange rates. That is, we measure how many pounds a country would receive if they exchange all their annual revenue into pounds. In this case, the ruble was pegged to the franc, and thus we are in effect converting francs into pounds. We then use pound-to-gold exchange rates to express revenue in gold grams, although this is purely for convenience of interpretation (given greater volatility in the pound than in gold). By contrast, as they explain in their appendix, Karaman and Pamuk convert Russia's revenues in rubles into its value in silver *based on the silver content of the ruble*, before then converting this amount into gold based on the silver-to-gold exchange rate. Thus, they evaluate revenue intake based on the intrinsic value of the local currency (as measured in silver), rather than on the amount at which the local currency could be exchanged for pounds. Although the ruble might well have been overvalued given its low underlying silver content, we view our estimation procedure as more faithfully estimating the international market value of a given amount of revenue intake.

B Regressions for Interaction of Fiscal Demand and Supply

B.1 Data Setup

We estimate a series of regression models to assess whether the insights from the more qualitative discussion in the text generalize to a broader sample. Our main theoretical implication about combining supply and demand yields a natural statistical test: the interaction of these variables should positively associate with revenue intake. The revenues variable is our main measure, nominal central government revenues per capita in gold grams, although we log it for the regressions. The core sample includes 90 countries and consists of all country-years prior to 1971 with available revenue data (including colonies with data), although missing data reduces the number of observations in some specifications.

Drawing from our review of the literature, we proxy demand with data from Correlates of War (Sarkees and Wayman, 2010) on participation in a major international war (at least 1,000 battle deaths). For supply, we use Brambor et al.'s (2020) data on the presence of a mandatory civil registration system for births, marriages, and deaths. Our main measure is the stock of years with such a system, although we also analyze an indicator for the presence of a civil registration system. We lag each measure by one year in the regressions, and we divide the stock variable by 100 (so, effectively, the variable is hundreds of years with a registration system) to make the coefficient estimates more easily interpretable.

We also offer an important caveat about measurement. As highlighted in the qualitative discussion in the text, fiscal demand and fiscal supply are each multifaceted concepts that are difficult to operationalize with a single variable. For example, historically, participation in warfare has propelled fiscal demand, and it certainly played this role during the two world wars of the twentieth century. However, by this time, the scope of states (first in the West, and then elsewhere) had expanded such that *non*-participation in warfare does not necessarily indicate low demand. Similarly, the lack of permanent civil registration system is strongly indicative of low bureaucratic capacity, but a country that adopts one without other prerequisites (industrialization, a history of impartiality in bureaucratic recruitment) does not necessarily have high fiscal supply. Thus, our measures offer reasonable ways to operationalize fiscal demand and supply for a large-N sample, although these concepts are inherently difficult to measure.

We estimate models with two-way fixed effects to eliminate sources of heterogeneity that are constant across countries or time. Of course, decisions to participate in war and to develop a civil registration system are likely driven to some extent by country-specific time-varying factors. However, even if so, it is not clear that this would bias the interaction term in a positive direction. Earlier we showed that the development of civil registration systems was not, in general, driven by participation in war. It also seems unlikely that states can usually anticipate their war needs accurately and preventively ramp up fiscal capacity. For example, although World War I eventually yielded unprecedented revenue intake in Western countries, every participant was shocked by the scale of the war effort. These states waited several years after 1914 to impose high statutory rates on income taxes or introduce universal conscription (Scheve and Stasavage, 2016). However, given these

unavoidable caveats and data limitations, we regard these statistical associations as a plausibility probe for our theory rather than as conclusive evidence for a causal effect.

The statistical model is:

$$ln(Revenue/pop.)_{i,t} = \beta_{lag} \cdot ln(Revenue/pop.)_{i,t-1} + \beta_{war} \cdot War_{i,t-1} + \beta_{reg} \cdot Reg.system_{i,t-1} + \beta_{inter} \cdot War_{i,t-1} \cdot Reg.system_{i,t-1} + \beta_i + \beta_t + \epsilon_{i,t}. \quad \text{(B.1)}$$

We index countries by i and years by t. The main parameter of interest is β_{inter}, the coefficient estimate for the interaction term. Standard errors are clustered by country. In addition to the country and year fixed effects, every model also contains a lagged dependent variable. In unreported tests, 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 country and year fixed effects, and these tests reject at the 1% significance level the null hypothesis that all panels contain unit roots.

B.2 Results

Table B.1 presents the main results. Column 1 interacts war participation and the stock of years with a civil registration system. It contains the full sample of 5,627 country-years across 90 countries. The coefficient estimate is statistically significant. Column 2 adds covariates for logged population and whether the territory is independent, both lagged by one year, which minimally change the coefficient estimate. These covariates address two alternative explanations about country-specific time trends that may influence the coefficient estimates: demographic changes or comparing sovereign countries to colonized territories. For the latter, it is appropriate to compare colonies with independent countries because the ability to raise revenues matters, not where the revenues are spent, although it is useful to show that such comparisons do not drive the results. Additionally, although colonized territories tended to not have civil registration systems, this is not by definition in Brambor et al.'s (2020) coding, as several colonized territories did indeed implement civil registration systems. This is consistent with our discussion in the article that European colonizers tended to not advance bureaucratic development. Below we elaborate upon measuring war participation for colonized territories.

For Columns 3 and 4, we consider an alternative version of the civil registration system variable. Our source data, Brambor et al. (2020), is missing for many countries in our sample. For the main version of the civil registration system variable, we code countries with missing data as never having a civil registration system. This is justified under the reasonable premise that countries for which Brambor et al. (2020) were unable to collect systematic information about their bureaucracy are unlikely to have a civil registration system. However, in Columns 3 and 4, we set the civil registration systems variable as missing for any countries not in Brambor et al.'s (2020) data. The sample decreases considerably to 3,176 country-years across 47 countries. Similar to the difference between Columns 1 and 2, Column 4 adds the two covariates to the specification from

Column 3, and minimally changes the coefficient estimate. The coefficient estimates are statistically significant in each specification, although are slightly smaller in magnitude. Across the table, no lower-order terms for war participation or civil registration system are statistically significant. This shows that, in this sample and with these measures, either high supply or high demand covary with high revenue intake only when interacted with each other.

Figure B.1 provides a scatterplot that corresponds with a cross-section of countries with revenue intake measured in 1970. The x-axis is cumulative years with participation in war between 1914 and 1970. We disaggregate countries by whether they had established an early registration system (specifically, before 1900; these countries are in black) or not (gray). We present separate regression lines for these two groups, and the line slopes steeply upward for countries with an early civil registration system (i.e., the interaction effect of theoretical interest), but is downward-sloping for other countries. Unsurprisingly, every country in the top right part of the scatterplot is Western European, Western offshoots, or Japan. An unreported regression specification shows that the coefficient for the interaction term is statistically significant (but not either lower-order term). Note that the generally low participation of high-supply states in wars in the nineteenth century makes such a corresponding figure largely uninformative for this earlier period.

The scatterplot also highlights shortcomings of our demand measure, although in a direction that biases against a positive interactive effect. Several Western countries did not participate in World War I (or, for some cases, either world war). Yet there were clear spillover effects, as they experienced similar pressures as the participants given the threat of invasion and rising pressure for welfare spending. In Figure B.2, we highlight the spikes during World War I for the neutral states in Western Europe. This figure also highlights cases that support Schenoni's (2021) contention that the near absence of wars in South America in the twentieth century undermined fiscal-capacity building efforts in the region. As the figure shows, many of these countries developed civil registration systems early, but had relatively low revenue intake in 1970. Thus these cases differ in an important way from ones discussed in the article (such as India and Egypt) that had the opposite combination of high fiscal demand with low supply.

In the remaining tables, we consider several additional robustness checks. In Table B.2, we consider two alternate measures (in each case, altering Column 1 and 2 of Table B.1 with the following changes). In Columns 1 and 2 of Table B.2, we replace the stock of civil registration system years with an indicator for the presence of a civil registration system in the previous year. In Columns 3 and 4, we measure war participation differently for colonies. In the main measure, for the world-war belligerents, we code all their colonies as participants. This is the most appropriate coding decision given our theoretical interest, as the colonies supplied troops to the metropolitan country and there was greater impetus on not draining the metropolitan treasury for colonial expenses. However, in Columns 3 and 4, we do not code the colonies as participants in the world wars.

Finally, in the remaining tables, we address whether our findings simply track increases in GDP over time. We consider this unlikely given the information presented in the article: visually, the patterns look qualitatively similar when analyzing measures that account for differences in GDP (Figure 2), and income spiked in Western Europe at least a half century before the great revenue divergence occurred (Figure 3). Severe missingness in historical GDP data circumscribes our ability to convincingly rule out this alternative, although we estimate similar regression models as above using data on taxes as a fraction of GDP for the dependent variable. Tables B.3 and B.4

use the measures from Andersson (2018) and Beramendi et al. (2019), respectively. In each, the number of observations is much smaller in Column 1 than in the same specification in Table B.1. With Andersson, the number of country-years drops by 49%, and the number of countries by 69%. With Beramendi et al., the number of country-years drops by 70%, and the number of countries by 69%. As noted in the article, these samples drop most country-years outside of the West and South America, in particular before World War II. The estimates for the interaction terms remain statistically significant using Andersson's data, but not Beramendi et al.'s. However, as we show in Table B.5, if we re-run our main specifications (with nominal revenue) using the Beramendi et al. sample, the estimates are also statistically insignificant. This suggests that the differences in coefficient estimates are driven primarily by the restricted sample rather than because differences in GDP explain away the core pattern. However, because of data scarcity, it is unfortunately not possible to definitively rule out this alternative hypothesis.

B.3 Tables and Figures

Table B.1: Interacting War Participation with Civil Registration Systems

	DV: Log central gov. revenue p.c. in gold grams			
	(1)	(2)	(3)	(4)
War*Stock of reg. system	0.0724***	0.0740***		
	(0.0216)	(0.0215)		
War*Stock of reg. system (alt.)			0.0492*	0.0490*
			(0.0252)	(0.0251)
War	-0.0130	-0.0138	0.00943	0.0104
	(0.0191)	(0.0191)	(0.0228)	(0.0229)
Stock of reg. system	0.0180	0.0192		
	(0.0319)	(0.0322)		
Stock of reg. system (alt.)			0.200***	0.260***
			(0.0298)	(0.0454)
Population		-0.0239		-0.0245
		(0.0174)		(0.0203)
Independent		-0.00440		-0.0290
		(0.0212)		(0.0252)
Country-years	5,588	5,588	3,151	3,151
Countries	90	90	47	47
R-squared	0.967	0.967	0.968	0.968
LDV	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

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

Figure B.1: Cross-Section of Interactive Effect

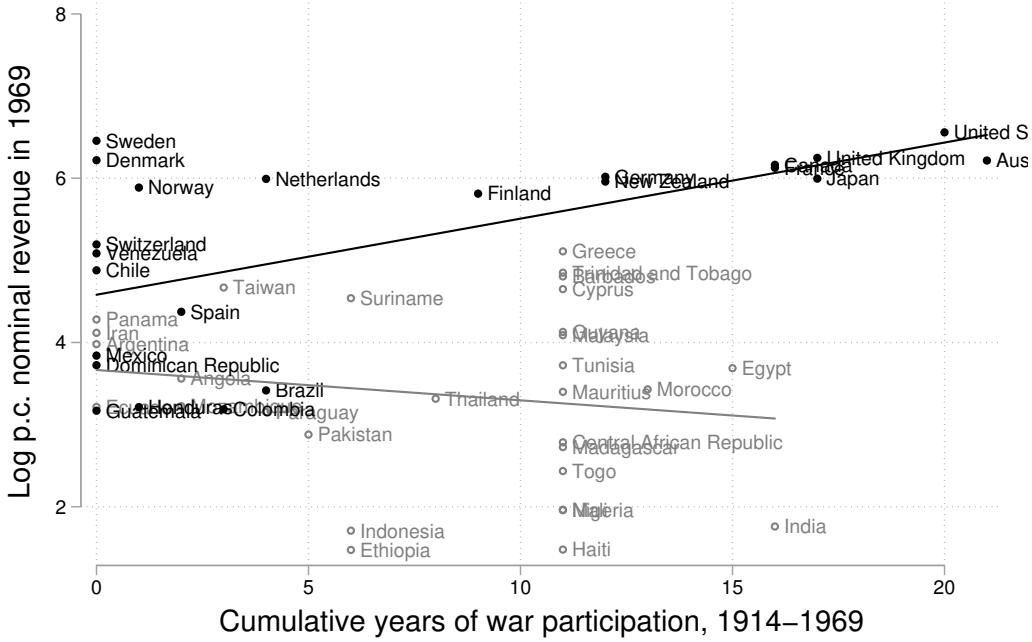
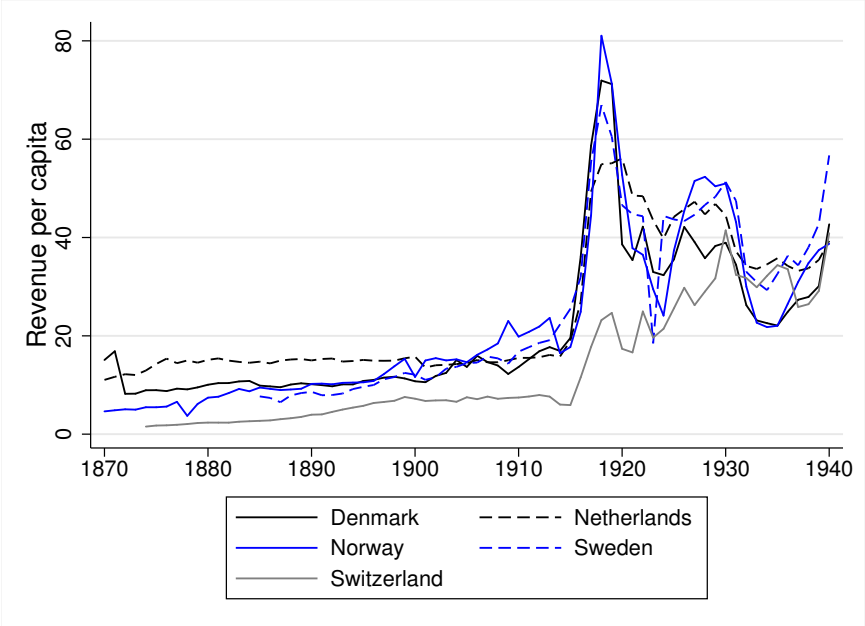


Figure B.2: Revenue Trends in WWI Neutrals



Notes. The lines show estimated central government revenue per capita in gold grams, converted at nominal exchange rates.

Table B.2: Alternative Measures

	DV: Log central gov. revenue p.c. in gold grams			
	(1)	(2)	(3)	(4)
War*Reg. system indicator	0.0891***	0.0917***		
	(0.0303)	(0.0297)		
War (alt.)*Stock of reg. system			0.0594**	0.0592**
			(0.0267)	(0.0273)
War	-0.0303	-0.0315		
	(0.0208)	(0.0206)		
War (alt.)			0.0138	0.0153
			(0.0264)	(0.0271)
Reg. system indicator	-0.0701***	-0.0697***		
	(0.0153)	(0.0155)		
Stock of reg. system			0.0206	0.0220
			(0.0323)	(0.0324)
Population		-0.0231		-0.0233
		(0.0182)		(0.0179)
Independent		0.00450		-0.00464
		(0.0175)		(0.0218)
Country-years	5,588	5,588	5,588	5,588
Countries	90	90	90	90
R-squared	0.967	0.967	0.967	0.967
LDV	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

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

Table B.3: Tax/GDP from Andersson (2017)

	DV: Tax/GDP from Andersson (2017)			
	(1)	(2)	(3)	(4)
War*Stock of reg. system	0.429*	0.494**		
	(0.216)	(0.218)		
War*Stock of reg. system (alt.)			0.429*	0.494**
			(0.216)	(0.218)
War	0.111	0.0370	0.111	0.0370
	(0.181)	(0.200)	(0.181)	(0.200)
Stock of reg. system	0.592***	1.258***		
	(0.155)	(0.305)		
Stock of reg. system (alt.)			0.592***	1.258***
			(0.155)	(0.305)
Population		-0.333*		-0.333*
		(0.167)		(0.167)
Independent		0.341**		0.341**
		(0.128)		(0.128)
Country-years	2,874	2,780	2,874	2,780
Countries	28	28	28	28
R-squared	0.924	0.924	0.924	0.924
LDV	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

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

Table B.4: Tax/GDP from Beramendi et al. (2018)

	DV: Tax/GDP from Beramendi et al. (2018)			
	(1)	(2)	(3)	(4)
War*Stock of reg. system	0.00691	0.00675		
	(0.00520)	(0.00523)		
War*Stock of reg. system (alt.)			0.00691	0.00675
			(0.00520)	(0.00523)
War	0.00577	0.00599	0.00577	0.00599
	(0.00780)	(0.00783)	(0.00780)	(0.00783)
Stock of reg. system	0.0117**	0.0176***		
	(0.00448)	(0.00602)		
Stock of reg. system (alt.)			0.0117**	0.0176***
			(0.00448)	(0.00602)
Population		-0.00443*		-0.00443*
		(0.00228)		(0.00228)
Independent		-0.000149		-0.000149
		(0.00118)		(0.00118)
Country-years	1,693	1,688	1,693	1,688
Countries	28	28	28	28
R-squared	0.904	0.904	0.904	0.904
LDV	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes. Table B.4 presents OLS regression estimates with country-clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5: Nominal revenue (Beramendi et al. sample)

	DV: Normalized central gov. revenue p.c. in gold grams			
	(1)	(2)	(3)	(4)
War*Stock of reg. system	0.0512	0.0484		
	(0.0339)	(0.0355)		
War*Stock of reg. system (alt.)			0.0512	0.0484
			(0.0339)	(0.0355)
War	-0.00237	0.00366	-0.00237	0.00366
	(0.0444)	(0.0443)	(0.0444)	(0.0443)
Stock of reg. system	0.229***	0.365***		
	(0.0541)	(0.0791)		
Stock of reg. system (alt.)			0.229***	0.365***
			(0.0541)	(0.0791)
Population		-0.0844**		-0.0844**
		(0.0362)		(0.0362)
Independent		0.000850		0.000850
		(0.0192)		(0.0192)
Country-years	1,523	1,523	1,523	1,523
Countries	24	24	24	24
R-squared	0.974	0.975	0.974	0.975
LDV	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

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