

# Wealth and Property Taxation in the United States\*

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## Abstract

We study the history and geography of wealth accumulation in the US, using newly collected historical property tax records since the early 1800s. The property tax in the US was a comprehensive tax on all kinds of properties (real estate, personal property, and financial wealth), making it one of the first “wealth taxes.” Drawing on a multitude of historical records, we construct wealth series at the city, county, and state levels over time offering a consistent, high-frequency, and long-term database of wealth in the US. We first document the long-term evolution of household wealth in the US since the early 1800s, showing that the US experience an extraordinary spur of wealth accumulation after the Civil war and until the Great Depression. Before the Civil war, enslaved people were assessed as personal property of the enslavers, which is both morally abhorrent and implies wrongly counting forced labor income flows as capital. The regional distribution of wealth and the effects of the Civil war look very different if we do not count enslaved people as property. Second, we study the spatial inequality in the US over the long run. The initial distribution of property and subsequent growth over 60 years are strongly correlated with geographic, economic, and demographic factors. In particular, wealth inequality has a robust negative correlation with growth in property over the long run. Finally, we study the role of public policy, specifically the property tax (i.e., a “wealth tax”) on local capital accumulation, using the large and long variation in property tax rates across more than 300 municipalities. We find significant elasticities on the intensive and extensive (migration) margins, as well as evidence for tax competition between cities.

**Keywords:** taxation, wealth tax, wealth, inequality, convergence, property tax

**JEL Codes:** E01, H20, H71, N31, R12, J15

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# 1 Introduction

At the turn of the 19th century, a system of comprehensive and sophisticated wealth taxation emerged in the United States. At the time, it was unique and different from tax systems in European countries. While property taxes have existed since Antiquity, as documented for Egypt (McGregor (1956)), Greece (Seligman (1890) and Walker (1984)), and Rome (Walker (1984) p.265), they were typically based on land. The Danegeld was the first system of land taxation in Europe after the fall of the Roman empire, initially meant to pay off Viking invaders, but eventually becoming a nationwide tax. England's Land Tax was a major financing tool for its government in the 18th and 19th century that was also adopted in the British colonies in North America. Yet, the key US innovation was to apply a tax to all types of property, not only land. The General Property Tax (GPT) in the US was a comprehensive tax on all property, including personal and financial wealth, in addition to real estate and real assets, making it one of the first "wealth" taxes.

For a period of 90 years, the GPT remained a central tenet of the political and economic system of the US, representing a substantial share of all state and local governments' revenues. The GPT was characterized by its very local nature, with multiple jurisdictions potentially competing for the same tax base, and uniform and relatively high effective tax rates on all property. As a result, compared to European countries, the US relied heavily on the local taxation of wealth to fund its government expenditures and public goods. Only after the 1930s did the importance of the property tax decline, as it was replaced by other types of taxes. Over time, the property tax' base shrank to eventually become the current US property tax, which is no longer "general" and falls only on (a fraction of) real estate wealth.

The administration of such a comprehensive tax left detailed and valuable paper trails over a long period of time. We collected, digitized, and organized many different historical sources, reports, and records of cities, counties, and states. This allows us to provide a new historical data on US property and wealth over the long-run and at a granular geographical level. We constructed wealth measures for the US, all US states, counties, and for the 300 largest US cities. We are able to cover a long time period: 1800-1935 at the national level, 1850s or earlier (depending on the state) to 1935 at the county and state levels, and 1899 to 1938 at the city level. While there are existing national wealth estimates, reviewed below, our data based on the GTP offers a coherent, higher-frequency, and long-run source. Furthermore, there have not been until now consistent, coherent, and long-run subnational measures of property.

We use this new data to answer three questions: First, how did aggregate wealth evolve in this crucial period of US development? Second, how was property dis-

tributed across space and how did spatial inequality change over time? Third, what factors shaped local capital accumulation?

We show that the US experienced exceptionally rapid growth in its wealth-to-GDP ratio, driven by a rapid accumulation of wealth after the Civil war. If we compare the wealth-to-GDP ratio of the US to that of the UK or France, we can see that the US had significantly lower wealth than the European countries over the whole 19th century, and only caught up with Europe after WW1, despite GDP per capita having been larger than that of France or the UK since the late 1870s.

The higher frequency of our data allows us to see what happens around major events, such as the Civil war. The Northeast, Midwest, and Southern regions look relatively similar in wealth before the Civil war, but the South disconnects and remains poorer thereafter, while other regions take off and grow rapidly. However, the evolution of regional wealth and the effects of the Civil war critically depend on how enslaved people are accounted for. In the General Property Tax before the Civil war, enslaved people were considered personal property of the enslavers and assessed as such for tax purposes. This is obviously morally abhorrent and means that forced labor income flows are wrongly counted as capital. We therefore construct property series excluding the value of enslaved people from the property measure. This analysis reveals how wealth-poor Southern states and counties were already pre-Civil war and shows a much smaller drop in property following the war.

We then turn to studying spatial inequality after the Civil war. The geography of wealth is highly persistent at the county and state levels and the US exhibited much less spatial convergence in wealth per capita over time (in either the sense of  $\beta$ -convergence or  $\sigma$ -convergence) than the previous literature (using income per capita measures) seems to suggest (e.g. [Barro and Sala-i Martin \(1992\)](#), [Mankiw, Romer and Weil \(1992\)](#)). The slow convergence is driven by Southern states.

The relatively slow convergence implies that it is important to understand correlates of initial wealth levels—why were some places poorer than others after the Civil war—and what drives capital accumulation above and beyond convergence – why did some places do better than others conditional on initial conditions? We can use our rich data to study the correlates of capital accumulation and property over time. We start at the county level, for which we have a long series of property data and many covariates. We find that geographic, economic, and demographic factors strongly correlated with initial per capita wealth levels. A higher share of wealth from enslaved people is strongly negatively associated with starting wealth. Geographic factors are then less important for subsequent growth, conditional on starting conditions, except for proximity to the coasts, which matters significantly. The share of people working in the agricultural sector is strongly negatively correlated with growth. Importantly, in-

equality in wealth, as captured by the share of wealth held by the top 10%, shows a robust negative correlation with growth in property over the next 60 years, even if we control for a range of geographic, demographic, and economic factors.

Finally, we consider the role of the property tax for local capital accumulation. We make use of our rich data at the city level that covers more than 300 municipalities and a period of 40 years. We find significant elasticities of capital income at the ten-year horizon of around 0.6. If we decompose this effect into an intensive and extensive margin, we find 40% is due to migration effects (extensive margin) and the remaining 60% is due to the per capita property reaction (intensive margin). We find direct evidence for tax competition between cities. Furthermore, smaller cities face higher elasticities along the extensive and intensive margins. The migration elasticities are insignificant if we do not control for public expenditures, which confirms the idea that the property tax was sustainable despite its very local nature in small jurisdictions and its high effective taxes because it was used to finance valuable spending and local amenities.

## Contributions to the Literature

Our paper contributes to four strands of the literature studying (i) wealth estimates over the long run, in the US and other countries (ii) development and spatial inequality in the US (iii) the impact of taxation on wealth accumulation, (iv) the history of the property tax. We cover the literature on the history of the property tax more extensively in Sections 2 and 3.

**Wealth estimates over the long run.** While there exist several historical estimates of US national wealth based on sources other than the property tax records, there are no systematic estimates of wealth at the subnational level over the long-run. [Piketty and Zucman \(2014\)](#) compile national wealth series for the US and 7 other countries over the long-run. For the US, they rely on [Goldsmith \(1952\)](#), who produces national-level decadal wealth estimates from 1850 to 1950 using the perpetual inventory method and capital expenditures from national accounts. They also use the annual wealth estimates from 1916 to 1945 from [Goldsmith \(1952\)](#) who relies on national balance sheets data from national accounts. They also rely on the Census IPUMS Full Count data, national accounts, and balance sheet data and estimates for specific years from [Jones \(1977\)](#) and [Hoenack \(1964\)](#)). [Kopczuk and Saez \(2004\)](#) compute top wealth shares in the US since 1916 using estate tax returns and the estate multiplier method. For a more recent period, [Saez and Zucman \(2016\)](#) construct wealth distributions for the US, relying on a combination of tax data and national accounts balance sheets data and the capitalization method. [Gallman \(1986\)](#) (see also [Gallman and Rhode \(2019\)](#)) recon-

struct decadal wealth series for the US over a large part of the 19th century. In Figure 9, we compare our estimates of national wealth to these existing ones (described in Appendix II.8). For surveys of this strand of the literature, see [Kopczuk \(2015\)](#) and [Roine and Waldenström \(2015\)](#).

Our property tax data-based measures of national wealth offer one of the most comprehensive and consistent (i.e., based on the same source over time) series over the long run. Relative to the literature using the estate multiplier ([Kopczuk and Saez, 2004](#)) or the capitalization method ([Piketty and Zucman, 2014](#)), our approach requires fewer assumptions. Importantly, we can provide estimates of property at a subnational level over time, thanks to our finer-grained estimates at the city, county, and state levels.<sup>1</sup>

A body of work has constructed wealth estimates for other countries for more recent periods (typically starting in the 70s): [Acciari, Alvaredo and Morelli \(2020\)](#) for Italy; [Piketty and Yang \(2021\)](#) for Hong-Kong; [Charalampidis \(2018\)](#) for Greece; [Alvaredo, Assouad and Piketty \(2019\)](#) for the Middle-East (Egypt, Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen); and [Piketty, Yang and Zucman \(2019\)](#) for China. Longer-run estimates include [Katic and Leigh \(2016\)](#) for Australia 1915-2012; [Novokmet, Piketty and Zucman \(2018\)](#) for Russia 1905-2016; [Toussaint, de Vicq and Moatsos \(2022\)](#) for the Netherlands 1854-2019; [Albers, Bartels and Schularick \(2022\)](#) for Germany 1895-2018; and [Blanco, Bauluz and Martínez-Toledano \(2021\)](#) for Spain 1900-2017.

Studying the history of public finances, [Sylla, Legler and Wallis \(1993\)](#) build a dataset on revenues and spending of state and local governments from 1790 to 1915, which we use to impute the property tax base for some years, as described in Section 3. [Legler, Sylla and Wallis \(1988\)](#) assemble data on the revenues and expenditures of many cities by decade from 1850 and 1902.

**Economic development and spatial inequality.** We also contribute to the literature on economic development of and spatial inequality in the US by providing a new, fine-grained, and consistent measure of economic activity, namely wealth and property. Our measures can be useful complements to existing measures of economic activity such as income (which is derived from occupational scores and available at low frequency).<sup>2</sup> Wealth and income are distinct concepts and are far from perfectly corre-

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<sup>1</sup>Earlier historical wealth estimates are typically found for short periods of time and/or for a few states at a time ([Garmon Jr, 2014](#); [Jones, 1970](#); [Soltow, 1984](#)) as described in Appendix II.7.

<sup>2</sup>Occupational scores are typically derived from the cross-over between occupations and income in the 1950 Census.

lated across time and space, as can be seen in Appendix Figure A5.<sup>3</sup> Our new wealth data has higher granularity over time and space, and is directly measured, not imputed. Therefore, we can examine spatial inequality persistence and convergence in terms of wealth instead of income and show that it is very different. We can also highlight some of the key correlates of property and capital accumulation at the city, county, and state levels.

The literature has extensively studied the determinants of economic activity, as measured by different indicators. Among others, [Donaldson and Hornbeck \(2016\)](#) examine the historical impact of railroads on US economic activity, specifically agricultural output; [Hornbeck \(2012a\)](#) studies the effects of the American Dust Bowl on agricultural land values and revenues. [Hornbeck \(2012b\)](#) also emphasizes the role of the environment's influence on agricultural output and development.<sup>4</sup> [Fiszbein \(forthcoming\)](#) establish the important role of agriculture for the subsequent development of places in the US.

We focus on migration as one of the channels through which wealth accumulation changes across space. Historical migration and its impacts on local economic outcomes are studied in [Hornbeck and Naidu \(2014\)](#), [Collins and Wanamaker \(2014\)](#), and [Sequeira, Nunn and Qian \(2020\)](#). The story of the US South, which we also highlight in this paper and its relation to wealth from enslaved people is studied in [Ager, Boustan and Eriksson \(2021\)](#). The capital destruction in some Southern states following the Civil War – which is visible in our wealth estimates – is analyzed in [Feigenbaum, Lee and Mezzanotti \(2018\)](#).

**Impact of taxation on wealth accumulation.** Because the US property tax was historically a comprehensive tax on most property, it resembles a wealth tax much more than it resembles today's property tax, which applies only to real estate. Thus, our paper sheds light on the effects of wealth taxes on wealth accumulation, an area for which the evidence is growing, but still relatively scarce.

In Sweden, [Seim \(2017\)](#) assesses the effects of the annual wealth tax and finds sizable elasticities, including a significant role for under-reporting. [Jakobsen et al. \(2020\)](#) also find large elasticities for Denmark. In Switzerland, canton-level variation in wealth taxes is leveraged by [Brülhart et al. \(2019a\)](#) to estimate substantial wealth effects, driven in part by taxpayer mobility and house price capitalization. They argue that savings play only a small role, in light of the lack of third-party reporting. On the

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<sup>3</sup>The correlation between income and wealth at the state-year level is around 0.6 and a regression of wealth on income yields an  $R^2$  of 0.4.

<sup>4</sup>[Hornbeck \(2010\)](#) highlights the importance of property rights in the early modernization of agriculture.

estate tax, [Kopczuk and Slemrod \(2000\)](#) consider the effects of the estate tax on wealth accumulation and avoidance behavior from 1916 to 1996 (see also [Joulfaian \(2006\)](#)). In France, [Goupille-Lebret and Infante \(2018\)](#) show that the inheritance tax exhibits small effects on wealth.

There has also been a resurgence of interest in modern property taxation and its distributional impacts ([Wong \(2020\)](#); [Avenancio-León and Howard \(2019\)](#); [Brockmeyer et al. \(2019\)](#); [Löffler and Siegloch \(2021\)](#)).

The rest of the paper is organized as follows. Section 2 provides a brief historical and institutional overview of the General Property Tax in the United States. Section 3 describes our newly collected data. Section 4 analyzes the evolution of wealth accumulation and spatial inequality in the US. Section 5 considers the determinants of capital accumulation. Section 6 concludes.

## 2 History and Institutional Setting

This section provides a brief overview of the history and system of property taxation in the United States.

### 2.1 Brief History of the American General Property Tax

#### 2.1.1 From Colonial Times to the Invention of the US General Property Tax

The General Property Tax was a major component of the US tax system from its inception. Originating from England, property taxes were already recorded in the 10th century under the name of *danegeld* primarily as a tax on land ([Benson et al. \(1965\)](#)).<sup>5</sup> The key US "innovation" was to apply a tax on all classes of property and not only land.<sup>6</sup> During the period of American colonies, this translated into a complex system of property taxation on enumerated items with different tax schedules on classes

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<sup>5</sup>There is evidence on land taxation in Egypt by already 3000BC which were levied in kind (i.e., agricultural product) rather than in cash ([McGregor \(1956\)](#) p.265) and in Greece as early as around 600BC ([Seligman \(1890\)](#) and [Walker \(1984\)](#) p.265). The Roman Empire seems to have attempted a general property tax without much success, reverting to land taxes ([Walker \(1984\)](#) p.265). The Danegeld was the first system of land taxation since the fall of the Roman Empire. First levied by King Aethelred of England to pay off viking invaders, it had by 1014 become "a nationwide tax, collected on the systemic basis for the maintenance of a foreign fleet." ([Cohen \(2018\)](#) p.20 ). In 18th and 19th century England, the Land Tax was a major financing tool for government.

<sup>6</sup>[Fisher \(1996\)](#) p206.

of property such as land and improvement, livestock, merchant's equipment, or enslaved people (Jensen (1931) p.20, Fisher (1999) p. 91).<sup>7</sup> The general property tax was progressively established when these disparate tax on enumerated items of property were merged into a uniform tax on (almost) all property classes.

While property taxation always remained primarily a local tax, with many local specificities, two movements account for the progressive transformation of existing local property taxes into a US institution, the General Property Tax, whose main characteristics were common to all states.

### 2.1.2 The Principles of the General Property Tax

First, the **universality** principle, often embedded in state's constitutions, required that all classes of property be the subject to the property tax.<sup>8</sup> Exemptions were limited and clearly defined (see Section 2.2).

Second, property taxation is **ad valorem**, i.e. taxation is on the basis of value. This key concept allowed for the same tax *schedule* to apply to different classes of property, instead of having tax schedules depend on the kind of property being taxed and made the valuation of property a critical feature of the tax administration.

Third, the **uniformity** principle – also written into many state's constitutions– required that all property be subject to the same tax rate in proportion to its value. This clause ensured that a unique property tax rate be used, regardless of the class of property or the wealth of its owner. It also meant that property taxes were not aimed at progressivity.

Fourth, property taxes were **local** and administered and levied by state and local jurisdictions (city, county, special districts, state).<sup>9</sup> The process of listing and valuing property, as well as levying and collecting property taxes was done by local assessors usually from the same jurisdiction they administered. These local administrators were chosen locally for their knowledge and expertise and tended to be elected.

The local characteristic of the property tax meant that sources of revenues were linked to government spending. Some property taxes were clearly targeted at financing specific activities, such as taxes on school and road districts. In addition, some states

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<sup>7</sup>The colonial tax system also included poll taxes and a faculty tax on specific occupations Benson et al. (1965); Fisher (1999)

<sup>8</sup>Jensen (1931) pp. 101 writes that “The law may at one time provide that all persons shall pay taxes; at other times, that all property shall be taxed; frequently both provisions occur. It was evidently not always clear whether the general property tax was a tax on all persons according to the value of their property or a tax on all property, regardless of ownership. In fact, it is a combination of both.”

<sup>9</sup>There is no equivalent federal property tax. Congress temporarily imposed a progressive property tax in 1798 and 1812, modeled on the *Impot progressif* from the French revolution, but this was unpopular discontinued. Fisher (1997)

would create specific state property taxes for each spending category, such as the state tax for the road or school fund. The property tax thus provided valuable benefits to local taxpayers in exchange of their tax payments, which is what made it sustainable locally (politically and economically, in the face of mobility of factors and people).

We now provide a brief history of how different levels of government (local, state, and national) financed themselves between the early 1800s to the 1930s to illustrate the crucial importance of the property tax in state and local governments' budgets.

### 2.1.3 The early 1800s

The early 1800s were a period of active state governments and asset financing. In the 1790s and 1800s, states relied heavily on property tax financing (Wallis, 2000). Revenues from the property tax made up more than 60% of all state revenues and essentially 100% of all tax revenues. Over the period 1800-1830, states progressively decreased their reliance on taxes, most notably in the Eastern and Midwest states. They started to rely on asset finance, i.e., massive investments in banks first, and later in canals, railroads, and other transportation improvements. Asset income took the shape of tolls on canals, dividends from bank stocks, charter fees, and some land sales. Northeastern states were more able to rely on these alternative sources of revenues than the West or South. Even if states decreased their reliance on the property tax during this relatively short period, the property tax remained the main source of local tax revenues.

Starting in the 1830s, the property tax regained importance at the state level. A deep and prolonged economic depression began in 1839 and by 1842, eight states and the territory of Florida were in default because of their large state investments in canals and banks. Many states adopted as the result of this episode constitutional provisions limiting or altogether prevent the use of public funds to invest in private corporations, and restricting public debt.<sup>10</sup> This once again made the property tax the most important source of state revenue.

Starting in the 1830s, many new or revised state constitutions included uniformity and universality clauses that established the major characteristics of the general property tax discussed above. There is, however, additional historical evidence that the aspirations towards uniformity and universality predated the formal inclusion in the constitutions. Table A4 shows the dates at which these clauses first appear in the State

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<sup>10</sup>See for instance the "Stop and Tax" policy in New York to ban state borrowing for internal improvement and preventing the state from investing in corporations following the economic collapse of 1837 (Einhorn (2008) p.221. See Fisher (1996) pp.51-56 for case studies of Ohio and Illinois after 1840. Wallis (2017) describe how this crisis in public finance led to the idea that laws should be general, contrary to the system of special laws prevailing until then.

constitution and the dates at which these practices were first observed (many as early as 1793 as in Maryland).

#### 2.1.4 The Property Tax 1842-1933

Our core period of study, 1842-1933, is the “Era of property tax finance and local government.” (Wallis, 2000). During this period, property tax revenues represented between 50% of all state revenues (In the Northwest and South) and close to 80% of all state revenues (in the West and Midwest). At the local level, property taxes represented on average 64% of all city revenues (see Figure A4). As property tax financing increased, state government activity slowed considerably. The activity shifted to local governments who took over investments in water, sanitation, transportation, public works, and schools. By 1902, local revenues were roughly the same as state and national revenues combined (Wallis (2001)).

#### 2.1.5 The Demise of the General Property Tax

**Criticisms and Reforms At the Turn of the 20th Century** Frequent criticisms of the property tax became more pronounced as the economy grew more complex and more property became more mobile at the end of the 19th century. A large academic literature developed to push for reforms to the organization of the GPT.<sup>11</sup>

Criticism of the existing general property tax system focused three issues: its local administration in light of mobile property, the quality of assessment, and inequities in assessment (Benson et al. (1965)). First, property became less visible and less attached to a location as the importance of intangible property (e.g. stocks, bonds, and other financial assets) increased. As the economy grew more complex, ownership and control or wealth became more difficult to establish. Second, these factors also made the valuation of property, especially intangible one, more difficult. Furthermore, electoral concerns may have started to distort the valuations of tax assessors. Third, because of the increase in wage earnings, property value also became a less suitable measure of ability to pay (Fisher (2002)).

As criticisms over the unfairness of the tax system grew, several reforms took place. Tax commissions set up by states were in charge of centralizing and regulating assessment. States also pushed for the professionalization of the assessment functions by training assessors and using rigorous, scientific valuation methods. Second, a

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<sup>11</sup>Economists led the charge and were at the forefront of proposals for reforms to the GPT (see Seligman (1890); McPherson (1907) for a summary of criticism, and Ely (1888); Jensen (1931); Bullock (1916); Lutz (1921) for reviews and reform proposals. Another popular proposal was a single tax on land championed by George (1882).

movement of classification occurred, replacing the uniformity clause, and allowing for lower tax rates on intangible property.<sup>12</sup>

**The Demise of the GPT After the Great Depression** The 1930s marked the era of income tax financing and more active federal government (Wallis 2000). The reasons for the demise of the General Property Tax are still debated (Hindman (2010)), but it was likely driven by three interrelated changes.

First, after the Great Depression, the role of the federal government expanded. Large programs such as the New Deal and Social Security, welfare services, agricultural price supports, and public works implied an increase in the share of revenues collected by the federal government, which were then administered by states through a system of intergovernmental grants. The rise in military spending during WWII also persisted.

Second, new sources of financing appeared. At the federal level, the income tax gained in importance. For states, the introduction of other sources of revenues such as automobile license, fees, and motor fuel taxes, as well as general sales and income taxes made the property tax less necessary. More highly industrialized state with a large urban population that already had more diversified sources of revenues saw the importance of the general property tax decline sooner and quicker. Thus, New England, the Middle Atlantic and South Atlantic started relying on other taxes as soon as those were available. South Central and Mountain states tended to rely more heavily on property taxes until later.<sup>13</sup> Total property tax revenue as a share of total government revenue fell from 38.8% to 25.2% between 1927 and 1938, then to 8.1% in 1946 (Benson et al. (1965)).

At the same time, the fall in property value and rise in property tax delinquencies during the Great Depression meant that state began adopting state sales and income tax, while providing larger exemptions to property tax (Fisher (1997)). Finally, after WWII, homestead exemptions given to owner-occupied residence and limits on property tax rates put a nail in the coffin of the GPT Fisher (2002); Jensen (1936).

In brief, constraints on state governments began changing as constitutional restrictions such as the uniformity and universality clauses in state constitutions were eliminated.

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<sup>12</sup>For an exposition of the need for classification, see Bullock (1908). See for instance Foote (1910) for a description of the experience in Ohio.

<sup>13</sup>There are, however, exceptions, such as Illinois where half of all tax revenue was still from property taxes in 1921, see Jensen (1936).

## 2.2 Institutional Setting of the General Property Tax

**Types of property.** The General Property Tax was conceived as a tax on the value of all property held by households. Many states distinguish between real property and personal property. Real property is the value of land, buildings, and improvements. Personal property has a much less clear definition and essentially includes most other forms of property, such as tangible property – furniture, livestock, merchandise, and valuables – and intangible property – such as money and bank deposits, mortgages, debts and credits, stocks, and bonds.

The GPT applied in principle to all forms of property, both private and corporate, regardless of ownership.<sup>14</sup> In general, corporate property is taxed on the same basis as individual property. While there was not a generally agreed method of taxing corporate assets –some states taxed property owned by corporations, other taxed individuals who owned shares of stock and bonds issued by corporations–no state taxed *both* corporate assets and household-owned shares, implying that there was no within-state double taxation.<sup>15</sup> Issues of double taxation could arise if a corporation was held by shareholders from state *a*, but had its physical capital in state *b* and state *a* taxed stocks and bonds of corporations on the household side, while state *b* taxed corporate assets directly on the corporate side and there were no provisions for double taxation. In practice, this situation was likely not that common (Jensen (1931) pp.121-124). Some states (Utah, Massachusetts, Montana, Vermont) explicitly try to avoid the taxation of shares of stock in corporations when the property on which the shares are based has been taxed, including on out-of-state corporations.

Before the abolition of enslavement, enslaved people were considered as personal property of the enslavers; they were assessed as such in property tax records, and the same uniform property tax applied to enslaved people as for other types of property. We come back to this issue below.

Specific provisions allowed the deduction of debt from property value. At least eighteen states allowed the deduction of debt from the taxpayer's solvent credits in 1931,<sup>16</sup>

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<sup>14</sup>Some states specifically require that both people and corporations are subject to the property tax (Illinois, Idaho, Nebraska, Utah, Washington). A common constitutional provision by states required that all property should be taxed (e.g. in New Hampshire, Arizona, Wyoming, California, Texas, Utah, Virginia, and Washington) or specifically require that corporate property be included in the tax base for property taxation (e.g. Arkansas, Colorado, Georgia, Louisiana, among others), see Jensen (1931) pp/101-103).

<sup>15</sup>Jensen (1931) p. 122-124. For instance, Pennsylvania valued and taxed the capital stock owned by corporations, and exempted holders from paying taxes on their shares. On the contrary, Maryland required corporations to report resident shareholders and taxed them on the value of their bonds and stocks. (Jensen (1931) p. 190-194). Commercial banks were often taxed separately and taxed on the value of the shares (Jensen (1931) p. 206)

<sup>16</sup>Arizona, Arkansas, Colorado, Connecticut, Illinois, Indiana, Kansas, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, North Carolina, South Carolina, Texas, Utah, and West

and all states exempted debts from securities of the federal government or a state's own bonds. To prevent taxpayers from artificially declaring large debts, all states restricted the privilege of deduction to "debts owing in good faith", and usually further restricted the category of deductible debts.<sup>17</sup> Similarly, special provisions on mortgages allowed its deduction on either the lender or borrower to avoid double taxation.<sup>18</sup>

Some property was exempt and exemptions varied by state. Public property (land and public buildings), religious property (e.g., churches, cemeteries, religious societies), charities, hospitals, schools, and libraries were typically exempt from the GPT. In some states, other exemptions were imposed through public policies, for instance on Treasury bonds, abatements for individuals (e.g., one \$25 watch in Vermont), or specific sectors (e.g., 10 bee stands and beet sugar factories in Indiana ([U.S. Census Bureau \(1902\)](#))). Provisions to avoid double taxation, as just described for corporate assets and mortgages or debt also meant that one side of these assets was exempt.

**Tax legislation and administration.** Property taxes applied to private property were layered for each jurisdiction that the property was part of: city, county, state, and special districts. Special districts include school districts, road districts, fire districts, or drainage districts, which allowed for targeting of funds for special projects. Figure 1 shows that property tax rates in cities were on average between 1 and 2%, while county and state tax rates were lower at below 0.5%. In total, Figure 2 shows that property tax rates ranged from around 0.5% in low-tax areas to more than 5% in higher-tax ones.

The broad parameters of the property tax were defined at the state level in the State constitutions and by the State legislator in specific laws (e.g., revenue laws). State tax commissions supervised the assessment and collection of property taxes. In [U.S. Census Bureau \(1902\)](#) (p. 617) it is stated that "In general, the state laws leave wide discretionary powers to the local governments as to matters relating to taxation, but in each state there are some statutory provisions of a general character intended to bring about uniformity in the levy and collection, even of local taxes, within the state." There were also local legislative bodies at the city or county level whose role was to adjust differences in individual assessments by local assessors, and hear appeals.<sup>19</sup>

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Virginia.

<sup>17</sup>For instance, West Virginia prevented the deduction of contingent liabilities ([Jensen \(1931\)](#) p. 116).

<sup>18</sup>The nature of mortgage deductions varied from state to state. In 13 states, the lender of a mortgage was liable to the property tax on the mortgage value while mortgagors could deduct its amount from the value of land. In other states, borrowers were liable to the property tax and lenders could deduct the value of the mortgage from personal property. See [U.S. Census Bureau \(1902\)](#) p.622-623 for more details.

<sup>19</sup>It is unclear whether these bodies had any prerogative to adjust the definition of what counts as property or other parameters. These documents – such as city charters or ordinances– have never been reviewed by any of the sources we identified.

Taxes were collected on a tax day. The property tax was levied at the place and at the value it has on a specific day of the year. Loss of value or changes in location during the year were not recognized until tax day of the next year. There were early exceptions to this rule for property subject to manipulation for tax avoidance or to avoid obvious inequities. For instance, merchants' and manufacturers' inventories were made on the basis of average values rather than on a specific day.

### 3 Data Construction

In this section, we describe the various new data sources we collected and used to construct private property series at the city, county, state, and national levels. Appendix II provides extensive further information. We start with some important conceptual issues when measuring property and wealth.

#### 3.1 General Issues: From Reported Statistics to Measures of Private Property and Wealth

We first discuss some important measurement issues when using property tax data for inferring private wealth. Wealth is always difficult to measure, even in modern-day data. The historical setting we study poses some of the same challenges as researchers may face in contemporaneous settings but also offers some key advantages. First, because few countries tax wealth directly, wealth often has to be inferred from self-reported survey data or imputed from capital income. The existence of the general property tax and the records that were created because of it provide us with high-quality direct measures of wealth. Second, many assets are hard to value, e.g., private businesses, real estate in areas with few market transactions, etc. During the era of the General Property Tax, substantial and serious efforts were put into carefully valuing property, as described in Section 2 and further discussed below.

**From assessed value to market value.** First and foremost, one needs to account for the fact that the assessed value of a property reported by tax assessors may systematically differ from its true market value. Ultimately, the information on the value of property comes from state and city assessors charged with enumerating and valuing property for the purpose of property taxation. Assessors might deviate from the requirement of assessing at "market value" ("true," "full," or "just" valuation in the words of state constitutions) ([U.S. Census Bureau \(1902\)](#) p. 3-5). Typically, the assessed

values of property for the purpose of property taxation were significantly lower than the actual market value.

In other words, we observe for jurisdiction  $i$  in year  $t$  the property tax revenues  $R_{it}$ , the nominal tax rate on assessed value of property  $\tau_{it}$ , and the total assessed value of property measured by assessors  $\tilde{W}_{it}$ .

$$\begin{aligned} R_{it} &= \tau_{it} \cdot \tilde{W}_{it} \\ &= \tau_{it} \cdot \gamma_{it} \cdot W_{it} \end{aligned} \tag{1}$$

To reconstruct private property, we need the true market value  $W_{it}$ , which requires knowing the ratio of assessed to true value, or the so-called “assessment ratio”  $\gamma_{it} = \frac{\tilde{W}_{it}}{W_{it}}$ . Legally,  $\gamma = 1$  in most states, but in practice,  $\gamma < 1$

Fortunately, there is extensive data on assessment ratios across space and time coming from several sources, such as state reports and census analyses. In particular, State tax commissions and the Census conducted extensive comparisons of assessed to true valuations and left records of these studies. Section 3.2 dives into these various sources.

**Double-counting.** One worry about double counting may arise when accounting for corporate assets or for credits, loans, and mortgages. However, debts could be deducted from the property tax base, so that the assets they finance are not double counted. Furthermore, as explained in Section 2.2, corporate assets were – depending on the state– taxed either on the household side or the corporate side, but not double-taxed within-state. There are situations in which we may double-count corporate wealth if the owner resides in a different state from where the corporate assets are located. These special situations– in which double-taxation may arise– were described in Section 2.2 and were seemingly rare.

**Omissions.** There were some exemptions from the property tax, which varied by state, as explained in Section 2.2. However, many exemptions relate to public and religious property, charities, schools, or hospitals, and not to private wealth. Nevertheless, there may be specific, non-systematic private wealth exemptions which we cannot account for.

**Assigning wealth to the right place: cross-border ownership of real assets.** One challenge when measuring wealth is that the location of the wealth and the location of the owner may not be the same. Real estate and real assets were assessed and taxed in the jurisdiction where they are located, rather than in the jurisdiction of residence of its owner. Strictly speaking, our measures at the county and state levels are measures of

local property, rather than local wealth. Local property is an interesting measure per se, even if it sometimes deviates from local wealth, since it captures local economic activity.

Overall, our estimates of local private property will tend to underestimate true household wealth in jurisdictions where residents own important amounts of real property in other jurisdictions and overestimate true local household wealth in jurisdictions where a lot of real property is owned by non-residents. When considering spatial inequality for instance, inequality in property across counties and states may underestimate true wealth inequality. The distinction between property and wealth is attenuated as we move to higher levels of geographical aggregation. Thus, at the national level, however, we truly measure private domestic wealth (modulo net foreign assets).

We do have some suggestive and noisy information about cross-state ownership in 1880, based on work by the Census ([U.S. Census Bureau, 1880](#)). These are depicted in [Figure 3](#). The methodology the Census used to get at these numbers is unclear, so we should use them as suggestive evidence. We can see that the vast majority of states have a net cross-state position between -10 and +20 (with New York being by far the state whose residents hold most wealth, namely 20%, in other states). This data also shows us for which states we may need to be particularly careful when considering local property as a measure of wealth, namely Western states excluding the West Coast, such as Wyoming, Idaho, Nevada, or Arizona. In these states, a significant share of local assets are held by residents of other states. However, for the bulk of states on the East Coast, the midwest, the South, and West Coast, local property is highly correlated with local wealth.

## 3.2 Data Construction

We now discuss our data construction at the state, county, city, and national levels. We had to digitize all the records on tax rates, assessed wealth, and assessment ratios at the city, county, and state levels in order to input them into a usable database. We further had to make the data consistent over time and space by using assessment ratios as described below. At the state level, we also digitized the full primary sources, which contain an abundance of additional data, and created an exhaustive catalog of resources for each state. Because these primary sources change names over time and are available in different collections and libraries, such a catalog can be very useful for future research.

### 3.2.1 State-level property tax and wealth measures

**Assessed property.** We collected data from a variety of sources on the valuation (assessment) of private property. Our primary sources are official State reports, which were the chief financial documents of states and contained detailed information about sources of spending and revenues raised, in particular as relates to property taxation. The format and name of these reports varied from state to state, but were usually either called an Auditor', Treasurer's or Comptroller's report and were produced annually or every two years. We compiled a list of all state reports available on the *HathiTrust* digital library from 1790 until 1940. We also collected data from the State Tax Commission and the Board of Equalization in charge of supervising the assessment of property subject to taxation. Starting in 1915, the U.S. Census compiled and harmonized data from State reports in the series "*Financial Statistics of the States*" (U.S. Census Bureau, 1915). Where available, we also relied on special studies by the U.S. Census Bureau or U.S. Department of Commerce providing a time series of property taxes and valuation for all states (U.S. Census Bureau (1941); U.S. Department of Commerce (1967, 1982))<sup>20</sup> Table A7 gives the list of the sources used to construct state-level wealth series from state reports for each of the 52 states and territories.

Figure 4 illustrates the coverage of our state property series by showing the total value of private property as share of GDP for each of the states. We observe the value of wealth for most states since their admission to the Union and, for some, since the early 1800s. The data is naturally much sparser before 1850, which is why we focus our state-level analysis to the period starting in 1850. As shown in Figure 5, the share of the contemporaneous US population living in states for which we have wealth data reaches 50% in 1820, then progressively increases to 80% by 1865.

**Assessment Ratios.** To be able to construct the market value of wealth, we need to combine our data on assessed wealth with measures of the assessment ratios. We leveraged the existence of rich information on assessment practices coming from several main sources, which we compiled. At the state level, we use State reports and the Census analysis from the "*Wealth, Debt, and Taxation*" series, conducted decennially from 1870 to 1920. Substantial efforts were devoted by State tax commissions and the Census to compare assessed to true valuations and document these gaps. Second, wherever available, we also collected information from contemporaneous studies by economists, historians, and tax scholars (for instance, Ely (1888); Adams, Thomas Sewall Barnett, George Ernest Benton and Brough, Charles Hillman Schmeckebier (1900); Jensen (1931); Lutz (1921); National Tax Association (1927); Board (1923, 1925)) that

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<sup>20</sup>Where multiple sources are available, we rely on the most recently published series.

documented the ratio of assessment to market values of property. Third, we supplement this with information on assessment ratios from the series "*Financial Statistics of the States*" (U.S. Census Bureau, 1915). In the latter publication, the assessment ratios are self-reported by assessors, so we only use it to detect directional changes, but not to infer levels of assessment ratios.

Appendix II.3 describes in great detail the construction of assessment ratios for each individual state and depicts the time series of assessment ratios, assessed wealth, and the market value of wealth. These state-by-state time series illustrate by information on assessment ratios is so critical. Take the example of Ohio. In 1910, assessed wealth shows a sharp and sudden jump up. These sorts of discontinuities may cast doubts upon the benefits of assessed property tax data for economic analysis. However, our detailed data collection shows that, in 1910, Ohio experienced a clear decline in the assessment ratio because of the creation of the Ohio Tax Commission which was responsible for equalization. When we apply this change in the assessment ratio to the assessed wealth series according to formula (1), we obtain a perfectly smooth series of the market value of private wealth.

Figure 6 depicts the evolution of assessment ratios across space and over time. Over the long run, assessment ratios decreased in most states and, thus, in the US as a whole (see also Appendix Figure A8). Although there is no conclusive explanation for why this decline occurred, one possibility is that personal property became a larger share of private wealth and was more likely to be undervalued (Jensen (1931), p. 282).

**Wealth from enslaved people.** Before the abolition of enslavement, enslaved people were assessed as property in property tax records. The organization of Southern economies meant that some people could be considered the property of others. This is morally abject. In addition, in such a system, the income flows from the labor of enslaved people accrued to others. This made labor income flows look like wealth and property, which is inaccurate in addition to being morally repugnant. We therefore provide wealth series systematically without including wealth from enslaved people. For comparison with other series and to illustrate the Southern states' reliance on this abhorrent production mode in the pre-Civil war era, we also compute wealth series including enslaved people in the wealth measure.

There is evidence that wealth from enslaved people was under-assessed by assessors. We therefore use the number of enslaved people by county from the Census and the historical series on the price of enslaved people from Ransom and Sutch (1988) and Einhorn (2001). Our procedure is described in detail in Appendix II.2, together with a discussion of alternative price estimates.

**Cross-validation.** To validate the quality of our data on assessment ratios, we can use an external source of information on the market value of specific property. The Census of Agriculture conducted for certain states and years a thorough and independent assessment of the market value of farmland. This information was compiled by [Haines \(2014\)](#). Figure 7 compares our estimates of the market value of taxable land and improvements (for select states where this property category is reported separately) and the value of farmland land and buildings from the Census of Agriculture.<sup>21</sup> Note that the definition of farmland and improvements is more restrictive than taxable land and improvements that we observe in the property tax data, as not all land is farmland. This explains the presence of a small, non-zero intercept in the log-log relationship depicted. Reassuringly, we find that the best linear fit line lies very close and is parallel to the 45-degree line, with an estimated slope of 1. This cross-validation suggests that our assessment ratios offer a reliable estimate of the difference between property values reported in the tax data and their true market values.

We can also compare our property estimates to the wealth measures from the IPUMS Full Count data at the county level (for 1870) and the state level (for 1850, 1860, and 1870). These comparisons, shown in Figures [A22](#) and [A23](#), show that for many states, the pictures are quite consistent between these two data sources, although there are differences across space and time. These differences can be explained by at least three factors. First, the IPUMS data is a measure of local wealth, while our estimates are measures of local property. Second, our property estimates are based on assessments by tax authorities, while the IPUMS data is self-reported. Third, the IPUMS data is censored from below and top-coded.

### 3.2.2 County-level property tax and wealth measures

We collected data on county-level wealths from statistics compiled every decade from property tax lists by the Census in their *Wealth, Debt and Taxation* publications between 1870-1930 ([U.S. Census Bureau, 1880, 1890, 1902, 1912, 1922](#)). These statistics provided information on total, real, and personal property value, as well as the property tax rates for all counties. We supplement these statistics with data on real and personal property value from IPUMS full count data ([Ruggles et al., 2021a](#)), based on questions asked directly to individuals in 1850 and 1860. The Census only asked about real property values in 1850. We describe how we make use of the Census individual-level data to impute wealth in Appendix [II.1](#).

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<sup>21</sup>Notably, we compile data on thirteen states (Alabama, Arkansas, Florida, Georgia, Indiana, Kansas, Kentucky, Minnesota, North and South Carolina, Tennessee, Texas and Wisconsin) between years 1860 and 1910.

We use our constructed state-level assessment ratios for county-level assessment ratios. For 1870, the *"Wealth, Debt, and Taxation"* publications directly provide county-level assessment ratios, which we can use to cross-check the validity of the state-level estimates. Figure A14 shows that our use of the state-level assessment ratio is well-justified. The average population-weighted county assessment ratio is very close to the state-level assessment ratio for all states.

### 3.2.3 City-level property tax and wealth measures

Our city-level data is extracted from the series *Financial Statistics of Cities* from 1899 to 1938. Following an act of Congress, this series was initially compiled by the Bureau of Labor Statistics from 1899 to 1938, and then continued by the U.S. Census Bureau until 1938. These publications aggregated information on municipal finance from the book of accounts of city governments (U.S. Census Bureau (1948, 2006)). They contain detailed annual statistics on property taxes, including rates, revenues, property valuation, and assessment ratios. The cities covered in these reports were all cities with population over 30,000 people (311 cities overall), and for cities with population higher than 100,000 for the years 1932-1938 (95 cities). We also have a cross-section of 259 smaller cities with population between 8,000 and 25,000 in 1903. The data are harmonized for all municipal governments so that they are comparable across cities (U.S. Census Bureau, 1899-1931, 1932-1938).

The city-level assessment ratio was provided annually in the *Financial Statistics of Cities*. The ratios were based on self-reported estimates by assessors and city officials and have not been subject to a critical investigation by the Census, which considered these ratios "only approximately correct" (U.S. Census Bureau (1919) p.101). It appears indeed that self-assessed ratios are overestimates of the actual assessment ratios. Nevertheless, they offer some useful additional information regarding heterogeneity in practice across local assessors. We therefore rescale these self-reported assessment ratios so that the population-weighted average city assessment ratio corresponds to the average state-level ratio

### 3.2.4 National wealth.

We construct national wealth by aggregating our state-level wealth estimates described in Section 3.2.1. For the period starting in 1850, this aggregation is immediate. Before 1850, the data is scarcer. We therefore interpolate wealth in between years where we have data points for each state. Furthermore, to account for the fact that in some years we only observe some but not all states, we rescale the wealth aggregate for these years

before 1850 by the share of national wealth held by these states in 1850. Appendix II.6 describes these procedures in detail and presents multiple sensitivity checks (see Appendix Figure A10). Alternative assumptions do not substantially change our wealth series at the national level, except for the very early period 1800-1820, where data is much scarcer and the estimates are, hence, more sensitive to omitting particular states or to the weighting. We also compare our estimates to existing ones in Figure 9.

## 4 Wealth in the US: Growth and Spatial Inequality

In this section, we provide new evidence on the evolution of wealth in the US since the early 19th century.

### 4.1 The Growth in US Wealth 1800-1935

**A rapid wealth accumulation since the early 1800s.** Panel A of Figure 8 shows our estimates of US private wealth as a share of GDP over the period 1800-1935. The US started out at relatively low wealth-to-GDP ratios of around 300% in the early part of the 19th century. Between 1850 and 1860, the wealth-to-GDP ratio increased to 400% before plummeting to 200% during the Civil war. After the Civil war, a spur of growth led the wealth-to-GDP ratio to increase to almost 500%. World War I led to a steep decline of the wealth-to-GDP ratios to 300%. The wealth-to-GDP ratio then rose to almost 600% at the Eve of the Great Depression, before crashing back to around 300%.

What drives the evolution of the US wealth-to-GDP ratio? To answer this question, Panel B of Figure 8 separately depicts the numerator (US wealth per capita, expressed in 2012 prices) and the denominator (GDP per capita in 2012 prices).<sup>22</sup> It highlights that wealth per capita started from a low level and grew slowly until the Civil war but took off drastically starting in 1870 and until the crash induced by the first World War. Wealth per capita grew much more rapidly than GDP per capita. As a result, starting from a low ratio of wealth-to-GDP, the US essentially doubled its wealth-to-GDP ratio from the early 1800s to right before the Great Depression.

**Comparison with existing national wealth estimates.** Figure 9 compares our wealth series to existing ones from [Gallman and Rhode \(2019\)](#), [Goldsmith \(1952\)](#), and [Piketty and Zucman \(2014\)](#).

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<sup>22</sup>The GDP series come from [Williamson \(2008\)](#) for the period pre 1929 and from the Bureau of Economic Analysis for post 1929 <https://www.bea.gov/resources/learning-center/what-to-know-gdp>.

We describe these alternative sources in detail in Appendix II.8. In brief, the “Goldsmith-Piketty-Zucman” series (Goldsmith, 1951; Piketty and Zucman, 2014), are based on a combination of Census IPUMS data, national accounts, and balance sheet data and builds on Goldsmith (1952) (as well Jones (1977), Hoenack (1964), and ultimately U.S. Census Bureau (1870)). The “Gallman-Rhode” series (Gallman and Rhode, 2019) uses capital stock estimates from national accounts and land values from the Census to compute national wealth. These series are significantly sparser and of lower frequency (typically, decadal) than ours over the period 1800 to 1870. This finer granularity allows us to, for instance, measure the big dip in wealth-to-GDP during the Civil war, which is completely missed by the two data points in 1860 and 1870.

For the overlapping years, we can see that our series are well-aligned with these existing estimates that come from different data sources. For 1885-1890 and 1893-1910, our series are below the Goldsmith-Piketty-Zucman series, likely due to the fact that they include net foreign assets, while the property tax data only counts property located in the US. We also find higher wealth in 1880 (and, to a lesser extent in 1890 and 1900) than Gallman-Rhode.

**The US versus Europe.** The US experience in wealth accumulation seems quite unique when compared to other countries. Making cross-country comparisons is of course difficult given the importance of historical price and exchange rates data. However, we can compare wealth-to-GDP ratios, which indicate the wealth accumulation relative to the country’s income. Figure 10 depicts the wealth-to-GDP ratios in the US to those in France and the UK. While data from Bolt and Van Zanden (2020) shows that the US overtook Europe in the 19th century already in terms of GDP per capita, the US appears much poorer in wealth relative to the European countries over the whole course of the 19th century and until the end of WWI. The convergence in wealth per capita is driven by European countries’ wealth per capita dropping sharply following World War I.

Mechanically, the different experience of wealth accumulation in the US is driven by both quantity and price effects, both peculiar due to its history. Early in the 19th century, the main source of wealth in the US was land, which was abundant and cheap. In fact, policies were specifically put in place to maintain a low price of land and allow people to buy it and settle in the US.<sup>23</sup> Immigrants and settlers arriving in the US

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<sup>23</sup>These include the “Act to Graduate and Reduce the Price of the Public Lands to Actual Settlers and Cultivators” (1854), which “reduced the purchase or preemption price of lands opened for settlement that remained unsold for long periods” (Chused, 1984, p. 53); the Bounty Act of 1847 (Lebergott, 1985, p. 194); and the Homestead Act of 1862 (1862) which “lowered the price of surveyed tracts of 160 acres or less to zero, contingent on a \$10 entry fee, and five years of continuous residence on the property.” (Allen, 1991, p. 8).

were usually not bringing large amounts of physical property or capital, but they had human capital which yielded income flows.

**Regional wealth evolution** Our data allows us to also construct wealth series by region in the US. Panel A of Figure 11 shows the wealth per capita in each of the four major regions – Northeast, South, Midwest, and West – normalized by the US GDP per capita. This measure captures how wealthy a given region is relative to the average national GDP per capita. The South, Midwest, and Northeast were similarly wealthy until the Civil war, although the Northeast experienced the largest fluctuations over time. After the Civil war, the South diverged from the other three regions and remained poorer in wealth until 1940. The West quickly became the region with the highest wealth per capita to US GDP per capita ratio and remained so until WWI.

## 4.2 The Civil War and Southern Wealth

At first glance, the Civil war seems to have fundamentally altered the distribution of wealth in the US. However, we can zoom in on the structure of wealth in the South to better understand the decline in wealth after the Civil war. Wealth from enslaved people played a major role and Southern economies were sustained by this abject mode of production. As explained in Section 3.2.1, even though they were included in the assessed property, enslaved people should not be counted as property.

At the regional level, Panel A of Figure 12 shows the decomposition of wealth per capita as a share of GDP per capita in the South into real property, personal property, and the value of enslaved people (for a detailed breakdown of the shares by state, see Appendix Figure A18 ). Wealth from enslaved people accounted for roughly one half of total wealth in Southern States. In states such as Missouri, Alabama or Florida it was above 50% in 1850 according to Ruggles et al. (2021a) data. After the Civil War, real property gained in importance as the economy was restructured, while personal property became less important. Panel B of Figure 11 compares the evolution of private wealth across the four US regions but excluding wealth from enslaved people. The South now appears poorer than the other regions and not accumulating wealth at the rate witnessed in the other regions even before the Civil war. While other regions' wealth-to-income ratios grew post Civil war, the South' stagnated. This pattern appears at the state and county levels as well, as we show next.

Focusing on the state level, Figure 13 shows the evolution of wealth around the Civil war. Panel A depicts the rank of states in 1860 and 1870 (on the vertical axis) against their rank in 1850 (on the horizontal axis). The top figure shows this relationship for all wealth, including wealth from enslaved people, while the bottom figure shows it

excluding wealth from enslaved. The difference between the two figures is striking. Without wealth from enslaved people, there was a strong persistence in the rank of states even after the Civil war. In fact, the persistence is essentially identical between 1850 and 1860 (rank-rank correlation of 0.67) and between 1860 and 1870 (rank-rank correlation of 0.65). Including wealth from enslaved people reduces the rank-rank correlation to 0.15. Panel B depicts per capita wealth at the state level for the three decades encompassing the Civil war: 1850, 1860, and 1870 including wealth from enslaved people. Panel C shows the map of wealth per capita excluding wealth from enslaved. In states such as Missouri or Florida, where enslaved people represented almost 60% of all property, the Civil war led to a steep decline in property per capita but that decline is much less drastic if we rightfully take out enslaved people from the wealth measure before the Civil war.

Figure A20 shows a very similar picture at the county level. Figure A21 in the Appendix illustrates the difference between the evolution of wealth (from the IPUMS USA Full Count) and property (from our tax data).

### 4.3 The persistence of spatial inequality 1870-1930

In this section, we study how spatial inequality in the US has persisted after the Civil war. Figure 14 shows property per capita as a fraction of US GDP per capita at the state level for each decade between 1850 and 1930. Figure 15 shows the equivalent statistics at the county level. The figures highlight a high degree of spatial inequality and persistence. For instance, Southern counties and states remained persistently poorer than those in the Northeast, Midwest, or West. The persistence is remarkably strong especially if we compare the spatial distribution of wealth in the 1920s, at the fine-grained county level, to that of household income today from the Opportunity Atlas Data (see Figure 16).<sup>24</sup> To document this persistence formally, we perform several additional analyses.

**Rank-rank correlations at the county and state levels.** First, Panel A of Figure 17 depicts the correlations in rank at the county level between 1870 and subsequent decades (1880 to 1930). The rank-rank correlation is 0.78 over a ten-year period and remains high (0.66) over a 60-year period.

**Speed of  $\beta$ -convergence.** Second, we study the speed of convergence between poor and rich counties and states over time. For this, we first construct three groups of vari-

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<sup>24</sup>The correlation between log household income today and log total property at the county level in 1920 is 0.6.

ables: i) *Geography* variables taken from [Allen and Donaldson \(2020\)](#), [Bazzi, Fiszbein and Gebresilasse \(2020\)](#), [Atack \(2015\)](#), [Atack \(2017\)](#), [National Oceanic and Atmospheric Administration \(2021\)](#) capture the geographical characteristics of a county or state, in terms of climate, soil, topography, and distance to waterways; ii) *Demographics* variables from [Ruggles et al. \(2021b\)](#) and [Haines et al. \(2010\)](#) that measure the population, change in population, literacy rate, share of foreigners, gender composition, and the share white; iii) *Occupation shares* in public administration, production, mining, commerce, and agriculture from [Ruggles et al. \(2021b\)](#). These variables and their sources are defined more precisely in [Appendix II.10](#).

To estimate the speed of convergence, we regress the change in total private property value in county  $i$  between 1870 and 1930 on initial property (in 1870), a constant, and a growing number of controls measured in 1870. We infer the speed of so-called “ $\beta$ -convergence” from [Barro et al. \(1991\)](#), i.e., the correlation between initial levels and growth, from the relation:

$$\log \left( \frac{W_{i,1930}}{W_{i,1870}} \right) = \alpha - (1 - \exp(-\beta)) \cdot \log(W_{i,1870}) + \gamma \mathbb{X}_{i,1870} + u_i$$

Panel B of [Figure 17](#) reports the estimated  $\beta$  for different sets of controls: i) no controls; and adding progressively ii) *Geography* controls; *Demographics* controls; *Occupational shares* controls. The persistence we find without any controls corresponds to  $\beta = 0.011$ , which is a relatively slow rate of convergence as compared to the literature discussed in the introduction. Note that the scatter plot represents Southern counties in red. It is clear that these counties stagnate at overall lower wealth levels and lower growth rates: the  $\beta$  excluding Southern counties is 0.028. Furthermore, by adding controls for geography, which essentially filters out a lot of the differences by region,  $\beta$  increases to 0.018 and the  $R^2$  increases from 0.39 from the regression without controls to 0.55 in the one with controls for geography. Adding controls for *Demographics* and *Occupational Shares* further increases  $\beta$  to 0.025 and  $R^2$  to 0.62. Thus, regional and geographical factors have strong explanatory power and convergence is relatively fast except for Southern counties which start and remain poorer in terms of property.

Convergence has usually been studied in terms of income per capita. Panel C of [Figure 17](#) shows that income per capita exhibits much faster convergence that is not sensitive to the inclusion of geography controls and that does not look very different in Southern counties. Thus, the speed of convergence appears very different with income versus wealth data. While we cannot definitively explain the different patterns by income versus wealth, measurement issues in income—which is imputed from occupational ranks and thus very noisy—are likely to be at least partially a cause.

[Appendix Figure A12](#) replicates this same analysis at the state level, and yields an even

smaller  $\beta = 0.007$  over the period 1870-1939. In particular, this speed of convergence is much slower than the one found in [Barro et al. \(1991\)](#) using income data across U.S. states.

**Speed of  $\sigma$ -convergence.** Third, we consider the so-called “sigma-convergence” or “ $\sigma$ -convergence, which refers to the change over time in the dispersion of wealth across counties or states. As [Young, Higgins and Levy \(2008\)](#) outline,  $\sigma$ -convergence need not accompany  $\beta$ -convergence. Using county level data on income in the US, [Higgins, Levy and Young \(2006\)](#) and [Young, Higgins and Levy \(2013\)](#) find high rates of  $\beta$ -convergence but little  $\sigma$ -convergence across counties from 1970 to 2010. Thanks to our wealth measures, we can show that there is also no  $\sigma$ -convergence in wealth over an earlier period. Panel D of [Figure 17](#) plots the yearly standard deviation of log wealth and income per capita across counties in our data. While the dispersion of log income per capita has declined steadily, the dispersion of wealth remains roughly constant, unless we exclude Southern counties. Panel B of [Figure A12](#) shows a similar pattern for the evolution of wealth dispersion across states, benchmarked against the series of income per capita from [Barro and Sala-i Martin \(2004\)](#).

Thus, while earlier evidence on income per capita shows both  $\sigma$  and  $\beta$  convergence at the state level, our new wealth per capita measure shows slower  $\beta$  and  $\sigma$  convergences at the county and state levels.

## 5 The Correlates of Capital Accumulation

The previous analysis shows that, in spite of the massive shock of the Civil War, the US experienced limited spatial convergence over the period 1870 to 1930, leading to persistent inequality in terms of property per capita across places. We now turn to the reasons for such limited convergence. We first want to understand why some places started poorer after the civil war than others. Our data allows us to shed light on this question by analysing the correlates of initial wealth levels in 1870. But we also want to understand what drives capital accumulation if not convergence. In other words, we ask: why did some places do better than others, conditional on their initial conditions? For this purpose again, we can use the richness of our data to investigate what correlates with growth in the local stock of property over time.

The section proceeds in two steps. In a first exercise, we focus on US counties, for which we have comprehensive data from 1870 to 1930, to look at the determinants of wealth and capital accumulation over that long time period. In a second step, we turn

to the municipality level, to further explore the specific role of local public policies and taxation.

## 5.1 Correlates of initial property per capita and of capital accumulation

We start our analysis at the county level, and link back to our previous convergence analysis, where we specified the growth of property per capita as:

$$\log \left( \frac{W_{i,1930}}{W_{i,1870}} \right) = \alpha - (1 - \exp(-\beta)) \cdot \log(W_{i,1870}) + \mathbb{X}'_{i,1870} \gamma + u_i \quad (2)$$

The  $\beta$ -convergence analysis from Figure 17B shows that there is a lot of variance in growth of the capital stock that is not explained by initial wealth  $W_{i,1870}$  but by other observables in the vector  $\mathbb{X}$ . It also shows that these  $\mathbb{X}$ s are correlated with initial  $W_{i,1870}$ , and therefore affect the speed of convergence.

We therefore ask: which of the individual variables in  $\mathbb{X}$  are correlated with property levels in 1870. For this, we simply run a regression of the following form:

$$\log W_{i,1870} = \mathbb{X}'_{i,1870} \gamma_0 + u_i \quad (3)$$

Results of the estimated coefficients in  $\gamma_0$  are presented in Panel A of Figure 18. In Panel B of the same figure, we ask instead: which of the individual variables in  $\mathbb{X}$  are correlated with the growth in total household property value per capita over the period 1870-1930? We plot there the estimated coefficients  $\gamma$  from specification (2).<sup>25</sup> Note that we include in  $\mathbb{X}$  the same set of variables related to *Geography* (which are time-invariant at the county-level), *Demographics*, and *Occupational Shares* as in the previous section. To this list of potential determinants in  $\mathbb{X}$ , we also add initial conditions in terms of inequality and investigate to what extent slavery and local inequality in wealth shaped future economic development.

**Geography, demography and economic structure** Results from Figure 18 show that characteristics related to *Geography* are strongly correlated with initial wealth in 1870 and less so with subsequent growth (controlling for initial wealth). Climate is an important predictor of wealth in 1870. For instance, a one standard deviation higher temperature in July – characteristic of Southern counties– is associated with a 25% lower

<sup>25</sup>Tables A1-A2 show more detailed regression results at the county level, including for wealth growth over 10 years and adding state fixed effects. For completeness, we also show in Appendix Figure A13 and Appendix Table A3 the results from similar regressions, at the state level. These estimates reveal similar patterns in terms of the role of geography, demography and occupational structure.

initial wealth, but not with growth over 1870-1930. More abundant winter precipitations –indicating harsher winter conditions– are associated with significantly lower initial wealth as well as with lower growth. Topography– as captured by elevation and ruggedness – is negatively related to wealth in 1870, but not significantly correlated with growth in wealth over the long run. Soil productivity is associated with significantly higher initial wealth and long-run wealth growth.

Among *Demographics* variables, higher literacy rates have the highest correlation with both initial wealth and subsequent long-run wealth growth. Places that were richer in 1870 had on average a somewhat smaller share of foreigners, but a higher share of foreigners is significantly positively associated with higher long-run growth. In 1870, wealthier counties had somewhat higher population levels, and initial population levels in 1870 are positively associated with growth over the long-run. The Appendix Table A1 also shows that systematically, over the whole period, lagged higher population growth is associated with lower wealth growth over each next decade. This is suggestive of some of the convergence being driven by migration flows: richer places see inflows of migrants moving in (Allen and Donaldson (2020)), but on average, these newcomers have lower wealth and dilute the wealth per capita over the next decade.

The structure of the local economy, as captured by the share of the population working in different occupations, is also strongly correlated with initial property levels, as well as with local capital accumulation. Counties with a large fraction of the working population in the manufacturing and mining sectors, or in commercial occupations were significantly richer in 1870. But these counties did not grow much faster. More agricultural counties, to the contrary, tended to accumulate property at a significantly slower rate between 1870 and 1930.

**The legacy of inequality** What role did slavery and the unequal distribution of wealth play in the strong persistence of inequality across space in the US over the period 1870 to 1930? To explore this, we introduce in specification (3) the fraction of enslaved property in total property of each county  $i$  in 1860 in the vector initial wealth determinant  $\mathbb{X}_i$ . Results in panel A of Figure 18 show that counties in which enslaved property represented a larger share of total property were significantly poorer in 1870. Importantly, panel B indicates that these counties also accumulated property at a significantly lower rate in the 60 following years, even conditional on the rich set of other observables in  $\mathbb{X}$ . To further investigate the role of extractive institutions on long term growth, we take advantage of the availability of wealth measures at the individual level in the full-count US Census of 1870 to create county-specific measures of the local concentration of wealth. We focus for simplicity on the share of total wealth in the county held by the top 10% of richest households, and we add these measures in

specification (2). Results in panel B point to a large negative effect of a county's top 10% share of wealth in 1870 on local long-run capital accumulation, even after having controlled for the specific role of slavery.

Figure 19 gives a visual representation of the magnitude of this relationship between local inequality and long-term property growth. It is a "binscatter" plot, using 25 equally-sized bins of counties ranked according to their top 10% wealth share in 1870, showing the correlation between initial wealth inequality and long-term growth, and residualizing this relationship on a sequence of controls. Very unequal counties, with top 10% shares close to one in 1870, such as Baton Rouge (LA) or Charleston (SC) had almost 70% lower growth of property per capita over the next 60 years than counties like Douglas (NE) or Larimer (CO) where the initial top 10% wealth share was about 75%. This strong relationship remains highly significant, even after residualizing on the full sequence of other controls in  $X_i$ : a 10 p.p. increase in the top 10% wealth share of a county is correlated with 20% lower growth over the next 60 years.

## 5.2 The role of public policies and taxation

The results from the previous subsection suggest that wealth accumulation differed markedly across space in the US over the period 1870 to 1940, and that demography, the economic and social structure of places and the initial allocation of wealth all contribute significantly to explaining this spatial variation in the growth rate of the local stock of property. But what about taxation and public policies? Did they also affect capital accumulation? And if so, how? To understand the role of policies and taxation, we now turn our analysis to the municipality level for two reasons. First, because among all local jurisdictions (states, counties, municipalities, school districts), municipalities are the level at which local expenditures and taxation are the most likely to matter. This is because, as explained in section 2, during this historical period, most public goods are locally provided, and locally funded. This also means that among all jurisdictions that rely on the general property tax base to levy revenues, municipalities are the ones that impose by far the largest tax rate, as shown in Figure 1. Second, we have data at an annual frequency across a large number of municipalities and over a long time period on both municipal tax structure and government expenditures. This allows us to exploit the large variation in policies and in municipal tax rates over time to study their impact on capital accumulation.

### 5.2.1 Variance Decomposition

To gauge the importance of public policies and property taxation in explaining local capital accumulation, we start with a variance decomposition exercise. We focus on the

153 municipalities for which we have consistent and continuous data, for the period 1900 to 1931, on property valuations, property tax rates and assessment ratios, on municipal finances, as well as on all correlates of wealth described in the previous subsection.

For these municipalities, we try to explain the dispersion in property value per capita in 1931 with the same rich set of regressors as in Tables A1-A2, now also adding to the model 19 variables capturing property tax history and the structure of municipal revenues and expenditures over the period 1900 to 1931. We group these additional variables into four categories. First, *Government Expenditures*, which comprises the average yearly total municipal government expenditures over the period 1920 to 1930, as well as the average structure of these expenditures in 9 categories, and the average interest rate on municipal bonds.<sup>26</sup> Second, *Tax Enforcement*, which consists in a dummy for the existence of a State tax commission, a dummy for the presence of tax ferrets, and an indicator for property tax classification. Finally, we split property tax history variables between *Assessment Ratios* and *Tax Rates*, the latter consisting in the average log net of tax rate on property for each of the periods 1900-1910, 1910-1920 and 1920-1930.

We start with a simple linear model estimated using OLS, adding each variable sequentially, and computing the corresponding adjusted  $R$ -squared. Because the order in which the variables are entered can affect the share of the variance they explain, we use random draws of the sequential orders in which the variables are introduced in the model. Then, for each variable, we average their partial  $R$ -squared over all models. Panel A of Figure 21, which reports the results, shows the important role played by geography, demography and the occupational structure of the economy. Together, these variables explain around a quarter of the total variance in per capita municipal wealth. But the graph also suggests that public policy variables are key determinants of the geographical allocation of per capita property. They account for about 25% of total variance. In particular, the sequence of past property tax rates from 1900 to 1930 explains about a tenth of the variance across municipalities in 1931. This is as much as the share explained by total municipal government expenditures and their structure.

We confirm this diagnosis that local public finances matter for the spatial allocation of property using more sophisticated prediction models. In panel B of Figure 21, we report a “variable importance” plot for a random forest model that allows for more complex interactions between all determinants of total property per capita.<sup>27</sup> While

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<sup>26</sup>Expenditures categories are: Health, Sanitation, Highways, Public Assistance, Education, Recreation, Public Order, General Government, and a residual.

<sup>27</sup>We show the importance of the ten most important variables in the model, normalized to the strongest variable. In practice, we grow 1000 trees with a training sample (40The remaining observation for each tree constitute our out-of-bag samples. After growing each tree, we pass along the out-of-bag

geography and the structure of government expenditures matters, the average tax rates for both the past ten and past eleven to twenty years appear among the ten most important variables of the model. Overall this evidence suggests that the past dynamics of property taxes may be an important determinant of the geographic dispersion of wealth across US cities.

## 5.2.2 Elasticity of the Local Capital Stock

To better understand the relationship between property taxes and the long run evolution of per capita wealth in the US at the beginning of the twentieth century, and shed light on the mechanisms underlying this relationship, we now turn to measuring the elasticity of the local capital stock, leveraging the rich variation in property tax rates observed across US cities in our data.

**Empirical strategy & elasticity estimates** Our strategy exploits within-municipality variation in property tax rates over time. We start with a fully distributed leads and lags model with two-way fixed effects, where the conditional expectation of outcome  $Y$  in municipality  $i$  in year  $t$  is:

$$Y_{it} = \sum_{k=-10}^{k=5} \gamma_k \tau_{i,t+k} + \mathbf{X}'_{it} \gamma + \eta_i + \zeta_t \quad (4)$$

where  $\tau_{i,t}$  is the effective property tax rate in municipality  $i$  in year  $t$ . That is, we allow for five leads of the tax rates, to identify pre-trends, and ten lags, to measure dynamic effects up to ten years after a property tax change.

The vector of controls  $\mathbf{X}$  includes the same set of demographic and occupational covariates as in the previous decomposition analysis. Note that we use the average value of these covariates in the ten years before  $t$  (i.e. from  $t - 10$  to  $t - 1$ ). To account for potential confounders, we also include in  $\mathbf{X}$  a series of additional variables. First, we use a full set of state  $\times$  year fixed effects, which capture any spatially correlated shocks at the state level that may affect property accumulation. We further include the full leads and lags of total local government expenditures. By doing so, we account for the fact that changes in tax rates may be endogenous to local public expenditure needs, which may themselves be correlated with the evolution of local property values. This means that we identify the effect of property taxation conditional on local amenities,

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samples down the tree, and at each split of the tree, the improvement in RMSE is recoded and attributed to the variable that is used for the split. At the end, we sum up all the improvements in RMSE within a tree and across all trees per variable. Hence, each variable contributes in total to a certain amount of RMSE improvement. For each variable, we then normalize the contribution to RMSE improvement to that of the variable with the highest contribution.

or equivalently of shifting the burden of financing local expenditures towards property. We finally add the full leads and lags of local assessment ratios in order to focus only on the variation in effective tax rates that come from effective decisions of the local authorities rather than on the discretionary behavior of local assessors.

Appendix Figure A24 shows the underlying variation in effective tax rate that contributes to our identification. Panel A shows the distribution of tax rate across cities and Panel B displays the residual variation in the first difference of effective tax rates across cities over time. More than 20% of our fully residualised tax changes are larger than .13 p.p., which is large relative to an average effective tax rate of around .9% in our estimation sample of municipalities. In Appendix Figure A25, we further show that residualised tax changes exhibit very little serial correlation.

The dynamic impact of the effective property tax rate on the local stock of property can be seen on Figure 22. The graph plots the impulse response to a tax rate change in  $t = 0$  accounting for potential anticipation up to 5 years before, as estimated from specification (4) where we use the log of total property value as an outcome.<sup>28</sup> Estimates confirm that a tax increase event triggers a significant decline in total property values, which stabilizes after about five years. To get a sense of the magnitude of the effect, we can translate the response in terms of the elasticity of the total stock of property with respect to the net-of-average tax rate on wealth. Because the average tax rate  $\tau$  is small,  $d \ln W / d \ln(1 - \tau) \approx -d \ln W / d \tau$ , and this elasticity can also be interpreted as the impact of a 1 p.p increase in the effective tax rate on property. As can be immediately read off the graph, the elasticity is large, around 20. That is, increasing the tax rate on the local stock of property by 1 p.p. reduces the value of the stock of property by 20% after ten years. This elasticity appears twice smaller than the estimates from Brülhart et al. (2019b) in Switzerland, but very close to the estimates from Jakobsen et al. (2020) in Denmark. By construction, the elasticity of the stock of wealth with respect to the net of tax rate on wealth is extremely large, and hard to interpret. Instead, we can express the result in terms of the implied elasticity of the flow of capital income  $r \cdot W$  with respect to the net-of-tax rate on capital income  $t = \tau/r$  where  $\tau$  is the average effective tax rate on property, and  $r$  is the interest rate. This makes the result easily comparable to elasticities of taxable income used in the public finance literature. In Table 1, we focus on this long-term implied elasticity of capital income flow by reporting estimates from the following specification:

$$Y_{it} = \varepsilon \ln(1 - \bar{\tau}_{i,t-10}/\bar{r}) + \sum_{k=1}^{k=5} \gamma_k \ln(1 - \tau_{i,t+k}/\bar{r}) + X'_{it} \gamma + \eta_i + \zeta_t \quad (5)$$

<sup>28</sup>For each year  $j$  relative to the tax change, we plot the estimated coefficient  $\hat{\alpha}_j = \sum_{k=-j}^5 \hat{\gamma}_k$ , which corresponds to the cumulated estimated effect of the tax change up to year  $j$ .

This specification differs from (4) because we replace the tax rate by the log of implied net-of-tax rate on capital income  $\ln(1 - \tau_{i,t}/\bar{r})$ , where  $\bar{r}$  is the average risk free interest rate. We use  $\bar{r}=2.5\%$ , corresponding to the average 1-year US Treasury bond yields over this period. . Note also that we use the average of the net-of-tax rate in city  $i$  from  $t - 10$  to  $t$  ( $\bar{\tau}_{i,t-10}$ ), so that the coefficient  $\varepsilon$  identifies the average elasticity over a ten year period following a tax change.

Our estimated elasticity of the implied capital income flow reported in Panel A of Table 1 is large: .56 (.13). In panel B and C, we further decompose the effect in terms of extensive and intensive responses. Panel B shows the elasticity of the population size and reveals a significant increase in population in response to an increase in the implied next-of-tax rate on capital income. This indicates that a significant part ( $\approx 40\%$ ) of the response of local property is driven by the extensive margin of in and out migration, in a context where property taxation is highly local. The implied elasticity of the population stock with respect to the net-of-tax rate on capital income is  $\varepsilon_N = .20(.07)$ , which is in line with estimates in the migration literature.<sup>29</sup> Panel C shows the response of log property per capita. The graph confirms the presence of a significant response at the intensive margin as well, with an implied elasticity of per capita capital income with respect to the net-of-tax rate on income equal to .36 (.12).

We now investigate whether the large response of local property per capita is driven by **capitalization** of tax variations into the prices of local assets. In panel D of Table 1, we estimate the evolution of per capita real estate property, and find a strong response, with an implied elasticity of the flow value of real estate property of  $\approx .35$ . Furthermore, the dynamics of the response of real estate values, displayed in Appendix Figure A27, suggests that the bulk of the effect happens immediately after the tax change. This large and immediate response in the stock cannot be driven so quickly by changes in savings flows or investments into real estate. It is *prima facie* evidence of significant capitalization of local property taxes into prices of local real estate assets.

**The role of local tax competition** The presence of large mobility responses and of strong capitalization of tax changes into local asset prices like real estate suggests that the institutional environment of the general property tax was especially conducive to tax competition. Can we indeed identify the existence of significant tax competition across municipalities?

We start by showing in Figure 23 panel A that the elasticity  $\varepsilon$  of total property decreases with the initial population size of the city. In panel B, we show that this gradient is almost entirely driven by the gradient in the population size elasticity: municipalities

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<sup>29</sup>The estimates appear a bit larger than estimates of Jakobsen et al. (2022) who study the impact of wealth taxation on migration patterns of the very wealthy in Scandinavia.

in the bottom quintile of the size distribution of cities are seeing a much stronger percentage reduction in their population size than the largest cities. This is what would be expected in a model of tax competition, where initial municipality size matters.

To model spillovers and tax competition more formally, we consider specifications of the form:

$$Y_{it} = \beta \ln(1 - \bar{\tau}_{i,t-10}/\bar{r}) + \rho \ln(1 - \bar{\tau}_{-i,t-10}/\bar{r}) + X'_{it}\gamma + \eta_i + \zeta_t \quad (6)$$

where  $\bar{\tau}_{-i,t-10}$  is the average effective tax rate in all neighboring cities of city  $i$ . We can define “neighboring” cities as those being within a given distance in miles in planar measure. In our benchmark use, we use cities within 100 miles.

We first estimate this regression using as outcome the log of total property value. Table 3 shows that a city’s own net-of-tax rate is significantly positively correlated with its own tax rate. It is also negatively correlated with the average effective tax rate in neighboring cities. We then estimate this regression using as outcome the average log effective net-of-tax rate from  $t$  to  $t + 5$ . We find that, as expected, there is positive correlation in tax rates within a city over time. Furthermore, there is also a positive (and mostly significant) correlation with the net-of-tax rate of neighboring cities. These patterns between a city and its neighbors are strongly suggestive of the presence of tax competition.

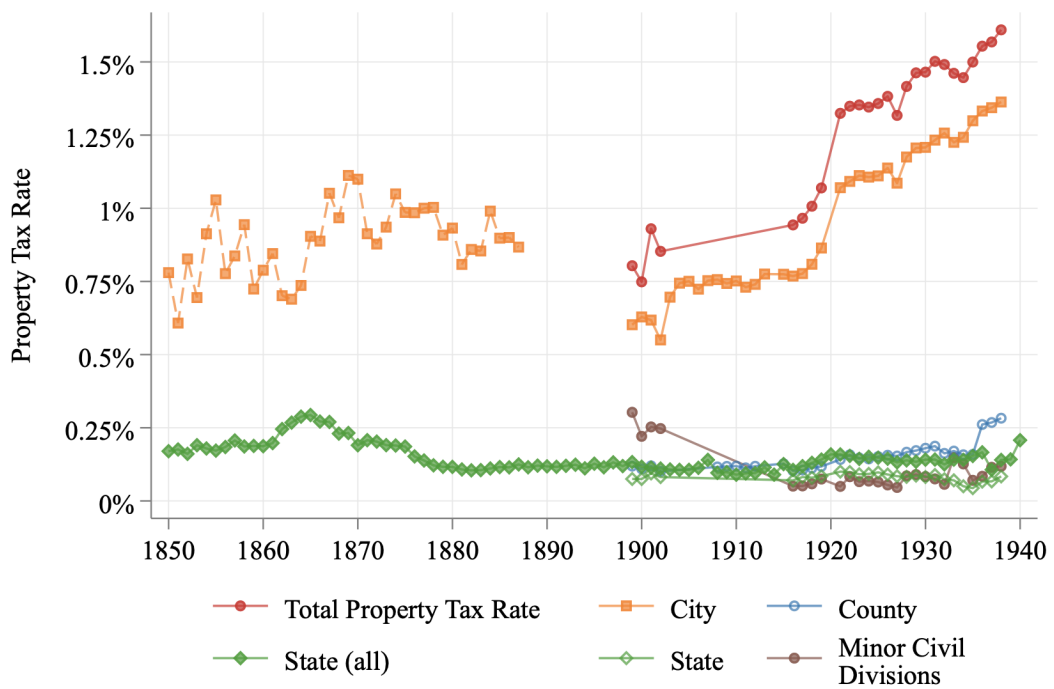
## 6 Conclusion

The general property tax was one of the first wealth taxes. It was a comprehensive tax that applied mostly uniformly to many kinds of property, such as real estate, personal property, and financial wealth. Thanks to the paper trails left by the administration of this tax, we can construct new fine-grained and high-frequency wealth series of household property in the US. This new data allows us document the evolution of wealth and spatial inequality over time. At the national level, US wealth grew extraordinarily rapidly after the Civil war. From 1800 to 1930, the US multiplied its wealth per capita by a factor of 8 and its wealth-to-GDP ratio by 2. Spatial inequality is highly persistent and strongly correlated with factors related to geography, demographics, and inequality. We also study the impacts of the property tax on wealth accumulation, using the abundant variation of tax rates across municipalities over a long period of time. We find that, given the very localized nature of the tax, the implied elasticities of capital income are relatively large at around 0.6. Around 40% of it is accounted for by migration responses (extensive margins) which represents a spillover to neighboring jurisdictions. Another 60% are driven by responses of per capita wealth (intensive

margin). We also show evidence for tax competition across jurisdictions. For instance, migration elasticities are significantly higher in smaller jurisdictions and a city's tax rates are positively correlated with the tax rates of its neighbors.

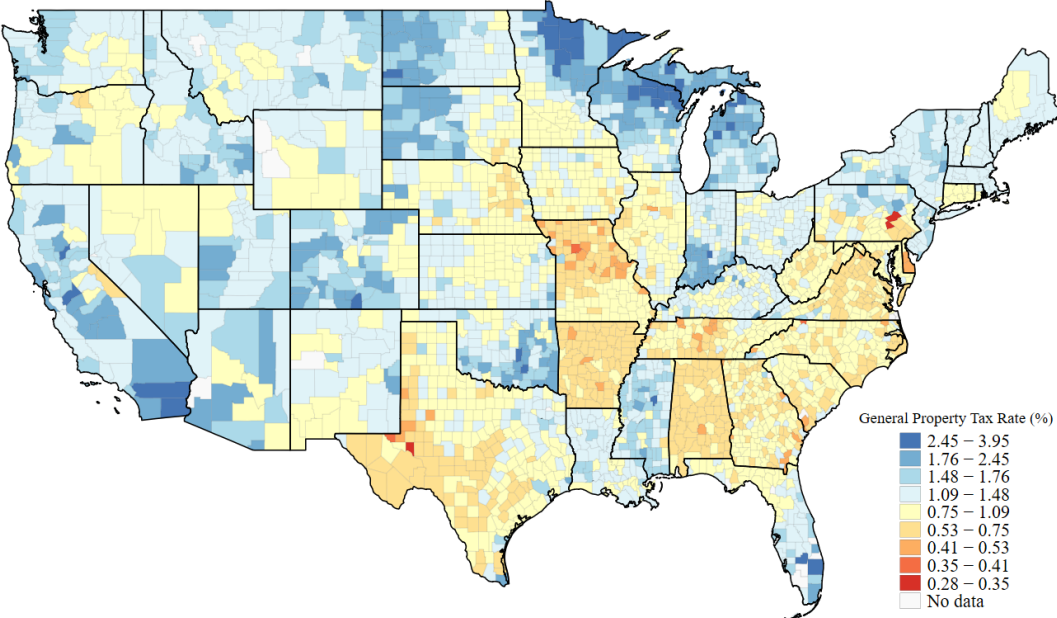
Future work can leverage the exhaustive wealth and property data to compare and contrast to the results from earlier work on the determinants of economic activity that uses income data. We showed that results on convergence for instance look very different in terms of wealth and income. It would also be interesting to consider the effects of local wealth on an array of other economic outcomes, such as innovation or education. Finally, it may be interesting to perform a finer analysis by different types of wealth, leveraging the additional information in the data.

Figure 1: Average Effective Rates of Taxation



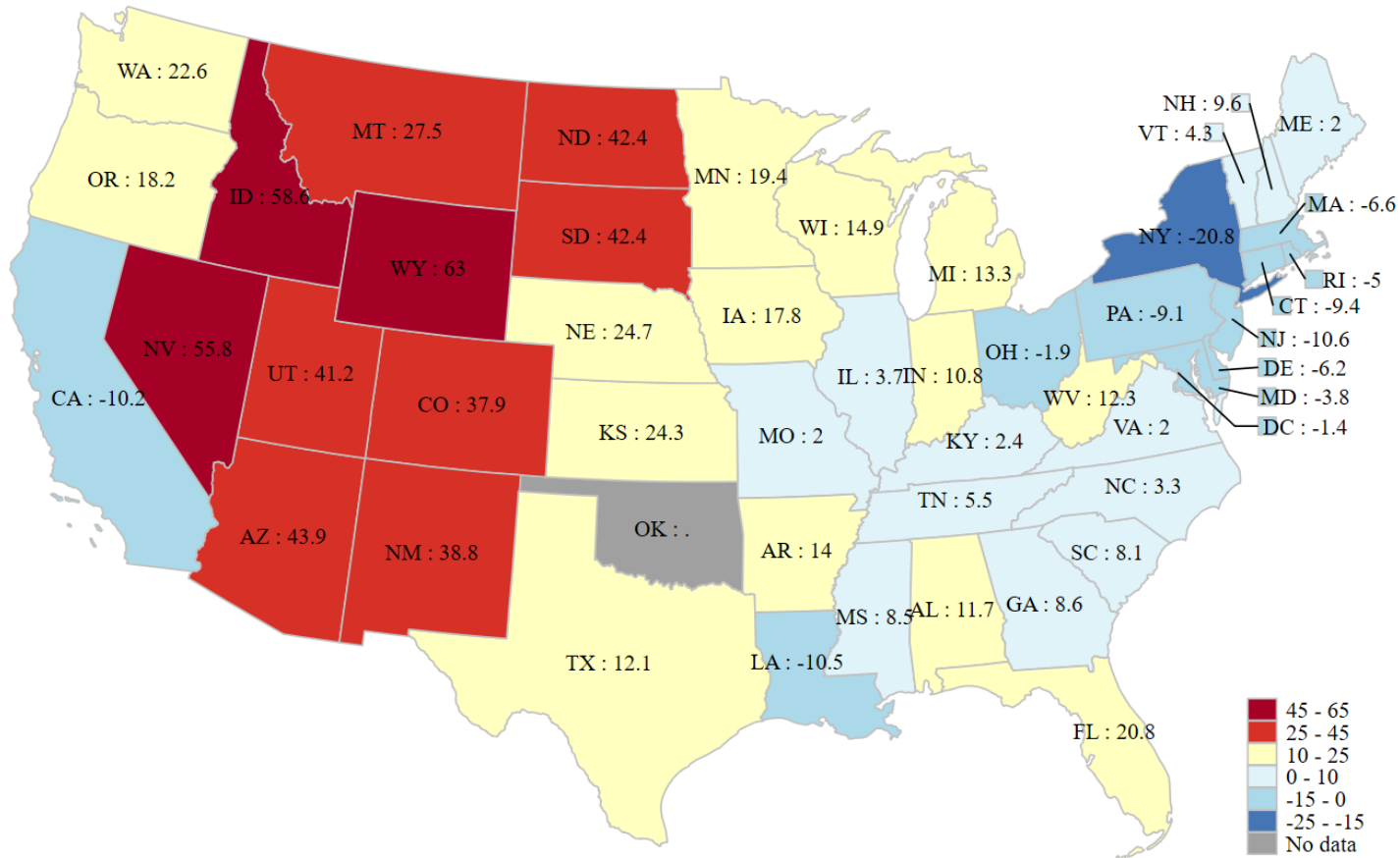
Notes: The time series for the period 1899-1938 are from [U.S. Census Bureau \(1899-1931, 1932-1938\)](#), and from Baltimore, Boston and Cincinnati prior to 1899. Sources for the state and county time series for the remaining period are listed in Appendix Table [A6](#). Finally, Minor Civil Divisions are the primary divisions of a county (see [Census](#)).

Figure 2: Total Effective Property Tax Rate - 1920



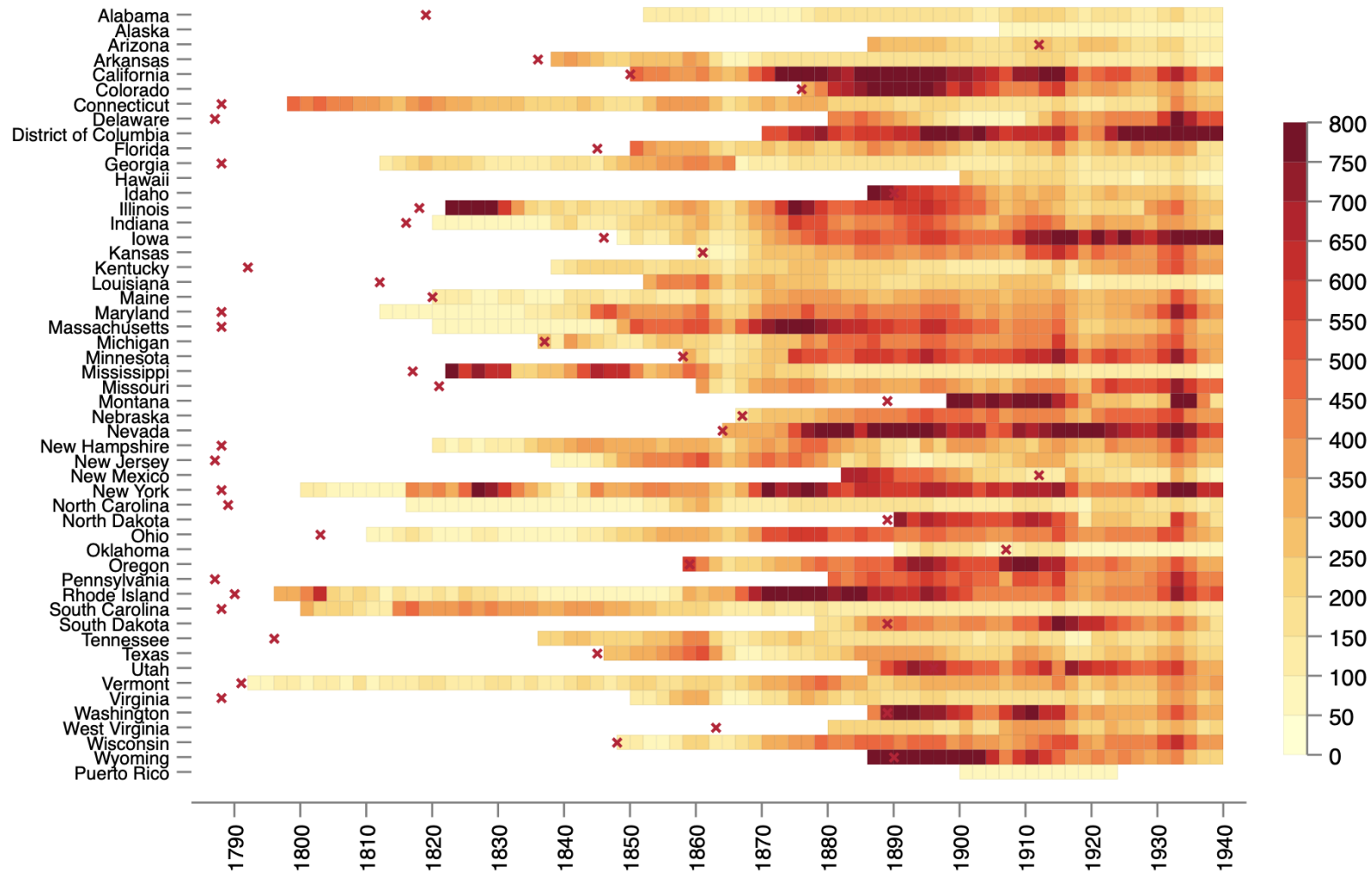
Notes: This figure shows the effective general property tax rate, including property taxes at the district, city, county and state level. It is computed as the ratio between the tax levy and the total value of property.

Figure 3: Net Cross-State Position Map



Notes: The Figure shows the net cross-state position of each state for year 1880, in percentage. A higher position means that the state's value is higher than the state's ownership. Data from the Census 1880: Report on Valuation, Taxation, and Public Indebtedness in the United States. (U.S. Census Bureau (1880))

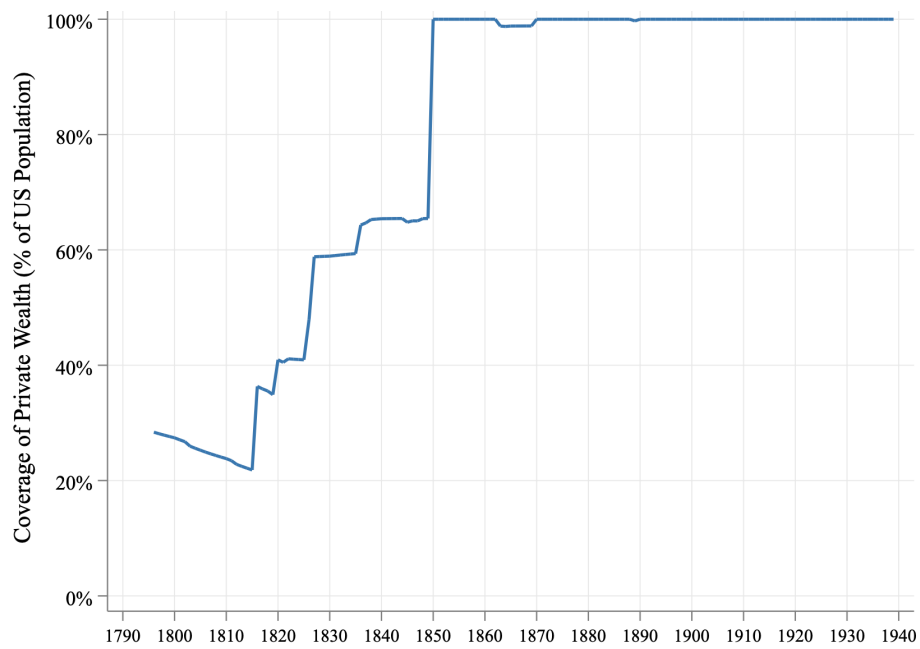
Figure 4: Private Wealth as Share of GDP (%) in all States



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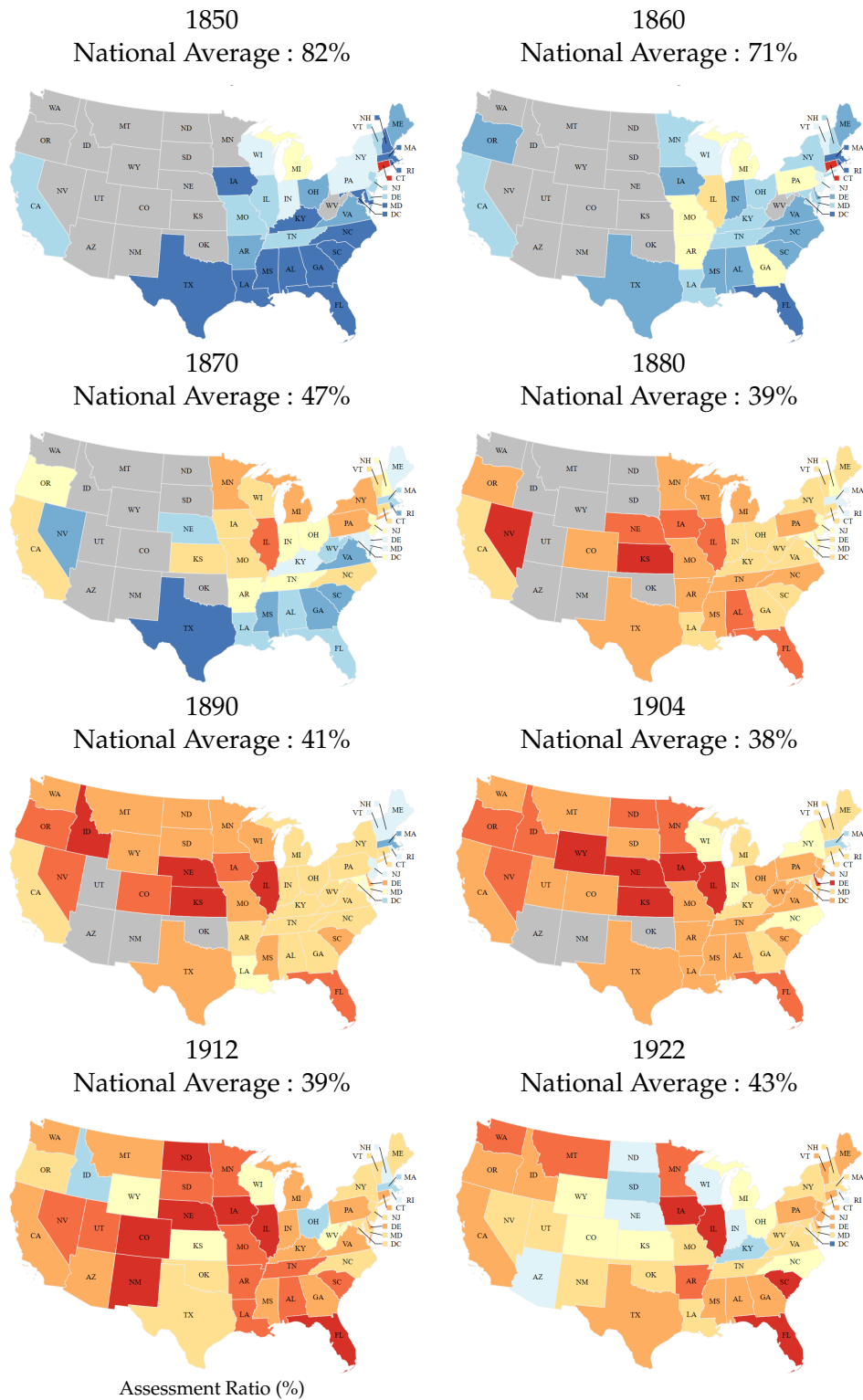
Notes: This figure shows the coverage and trends in wealth share for all 50 states, the District of Columbia and Puerto Rico. Wealth shares are measured as the ratio of Wealth per capita in the state over national GDP per capita. Red crosses indicate the year of the state admission in the Union. Wealth is winsorized for 5<sup>th</sup> and 95<sup>th</sup> percentile.

Figure 5: Data Coverage of Overall Population of Private Wealth Data



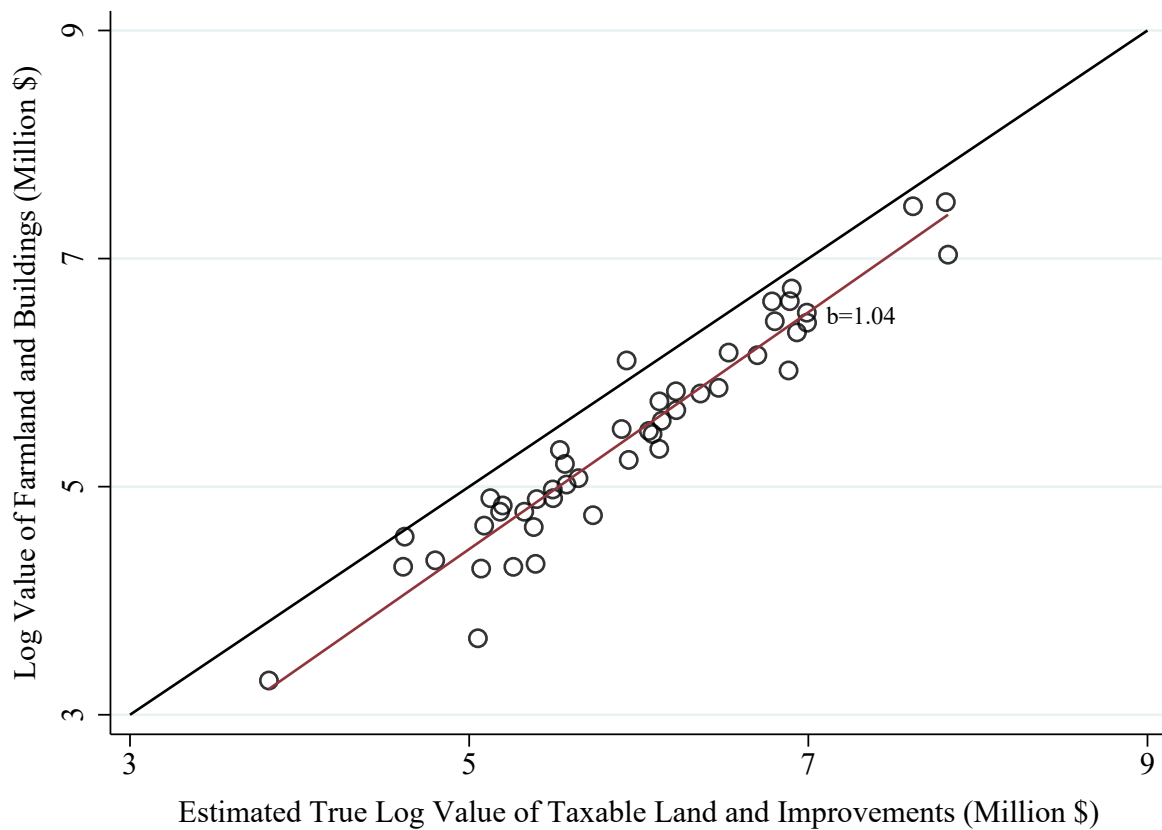
Notes: This figure shows the fraction of population for which data on private wealth is available.

Figure 6: Assessment Ratios



Notes: This figure displays the average assessment ratio of assessed to true value of all property at the state-level for each state for 1850-1922. Data for states in US territories prior to admission in the Union are not shown.

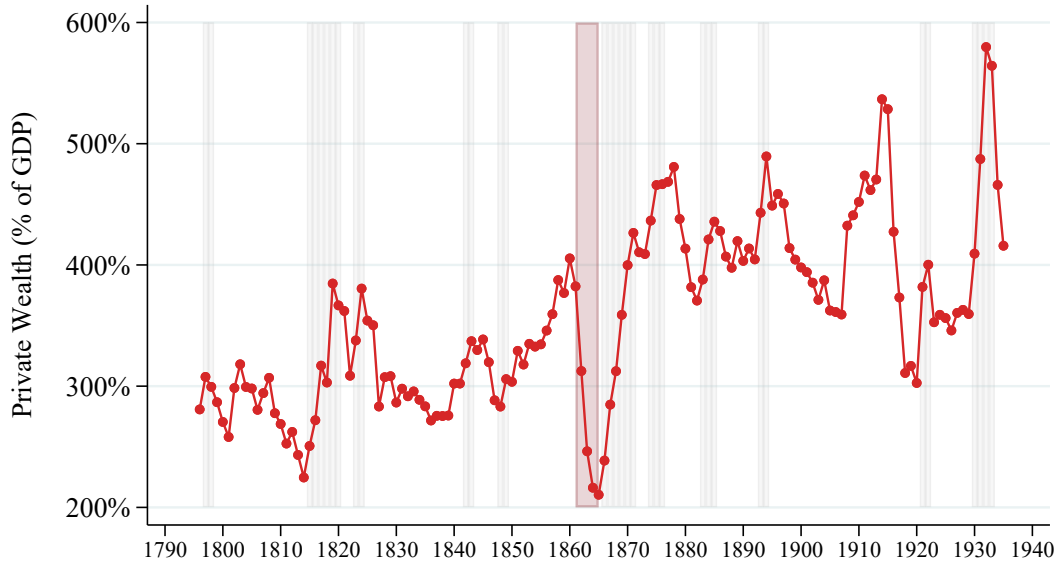
Figure 7: Estimated Value of Taxable Land vs Census of Agriculture Value of Land (1860-1910)



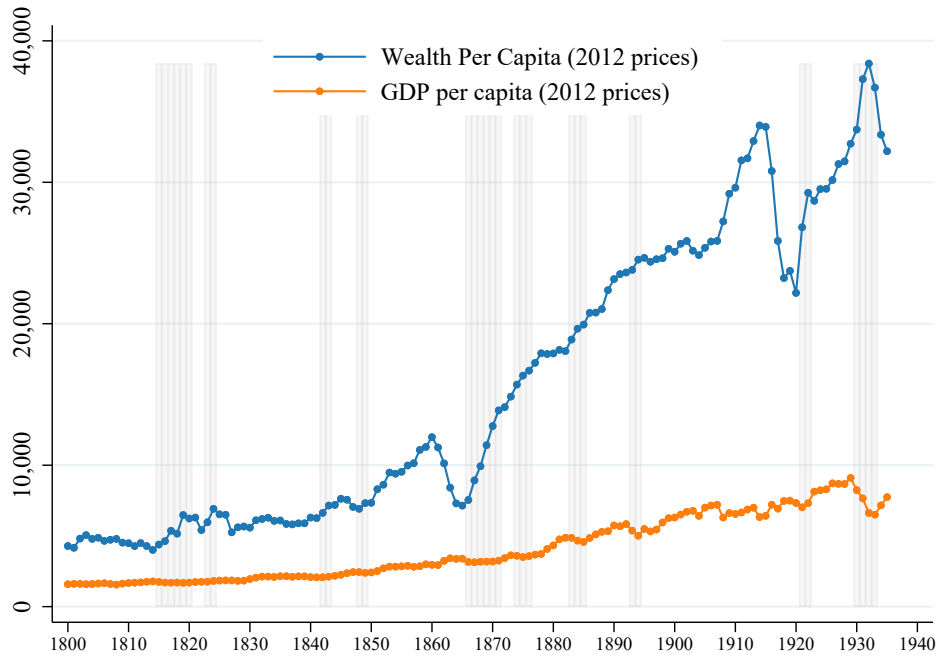
*Notes:* This figure compares the estimated value of taxable land from state reports and the estimated value of land from the Census of Agriculture. Data from the Census of Agriculture is derived from ICPSR 35206. The value of taxable land is a subset of the assessed value of real property as reported in 13 state reports from 1860 to 1910: Alabama, Arkansas, Florida, Georgia, Indiana, Kansas, Kentucky, Minnesota, North and South Carolina, Tennessee, Texas and Wisconsin.

Figure 8: US National Wealth Baseline Series 1800-1935

A. Baseline Private Wealth per Capita

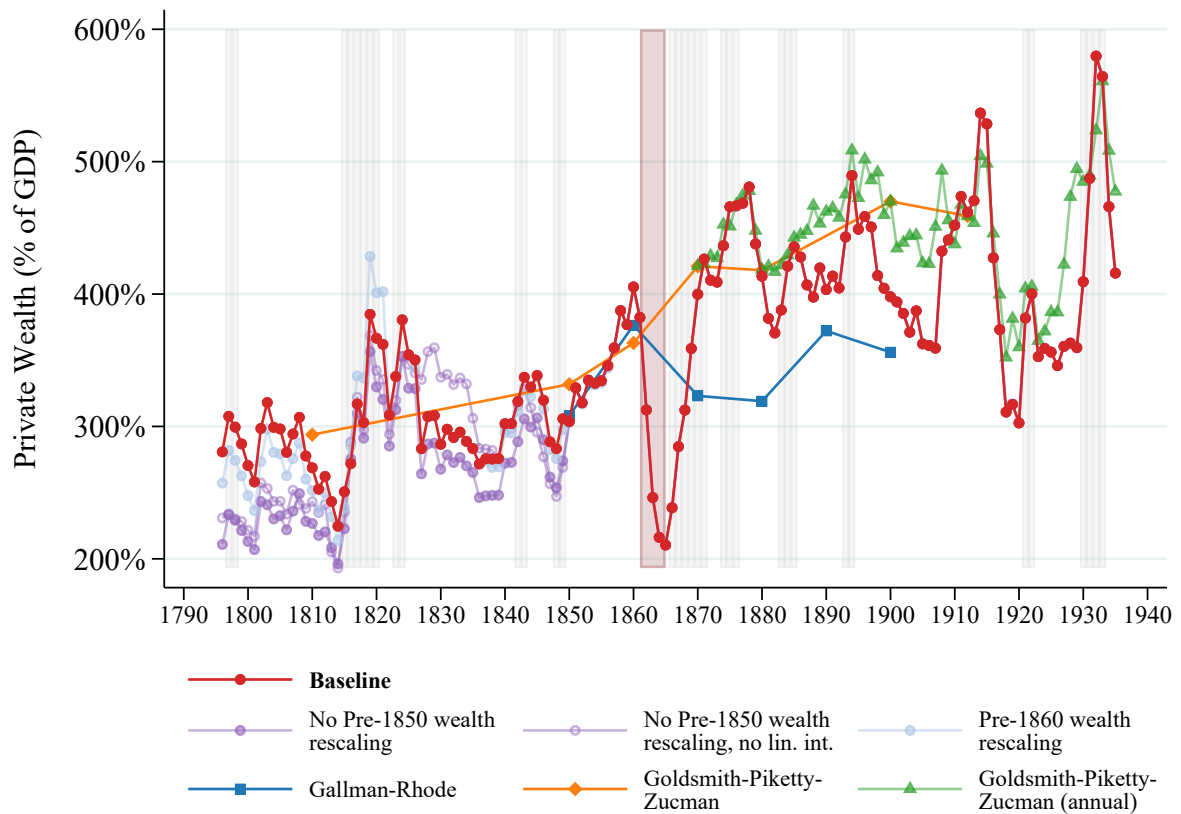


B. Private Wealth & GDP Per Capita: US (1800-1935)



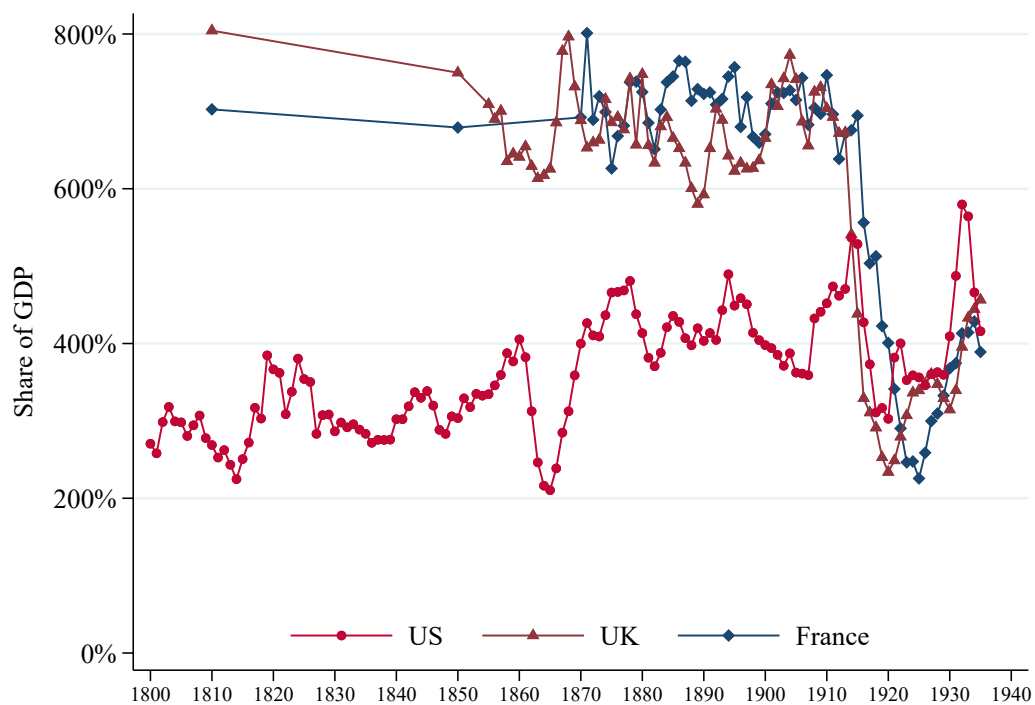
Notes: Panel A displays our Baseline wealth series: total wealth as a fraction of US GDP. Panel B displays both Wealth and GDP for 1800-1935. Grey lines indicate recessions. Red area indicates the Civil War.

Figure 9: US National Wealth 1800-1935



Notes: This figure compares the different Wealth Estimates. Baseline is Pre-1850 wealth-rescaling+IL. IL=Pre-1850 imputation from property tax levy. Gray lines indicate recessions. Red area indicates the Civil War.

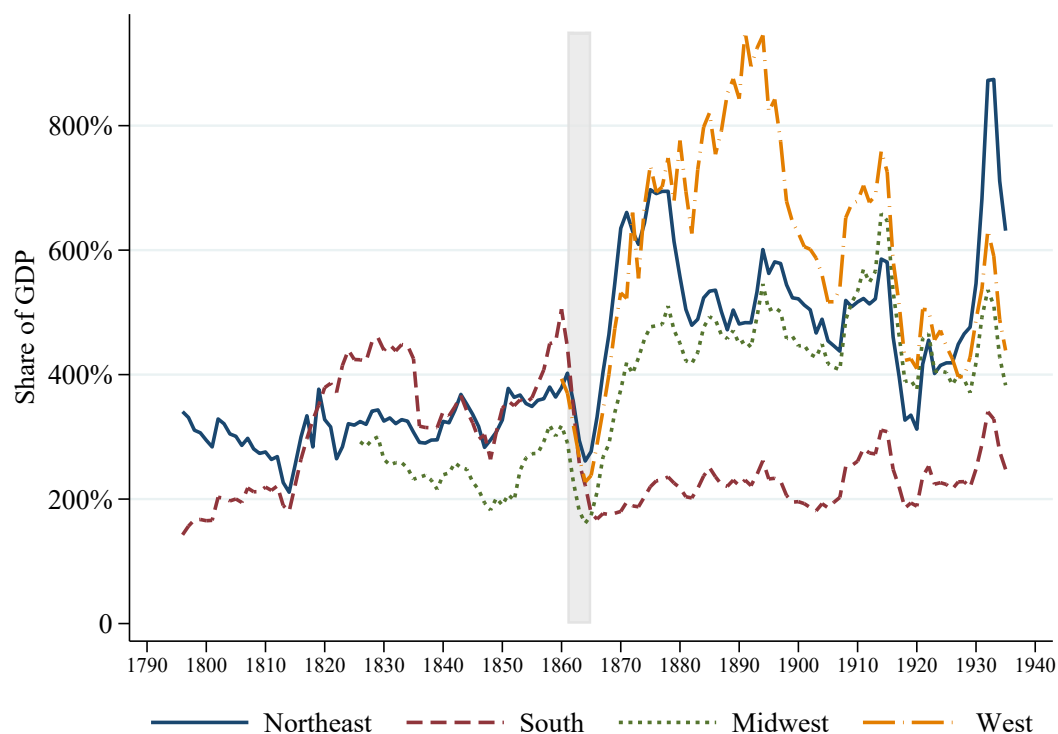
Figure 10: Wealth-to-GDP Ratios in the US vs. France & UK



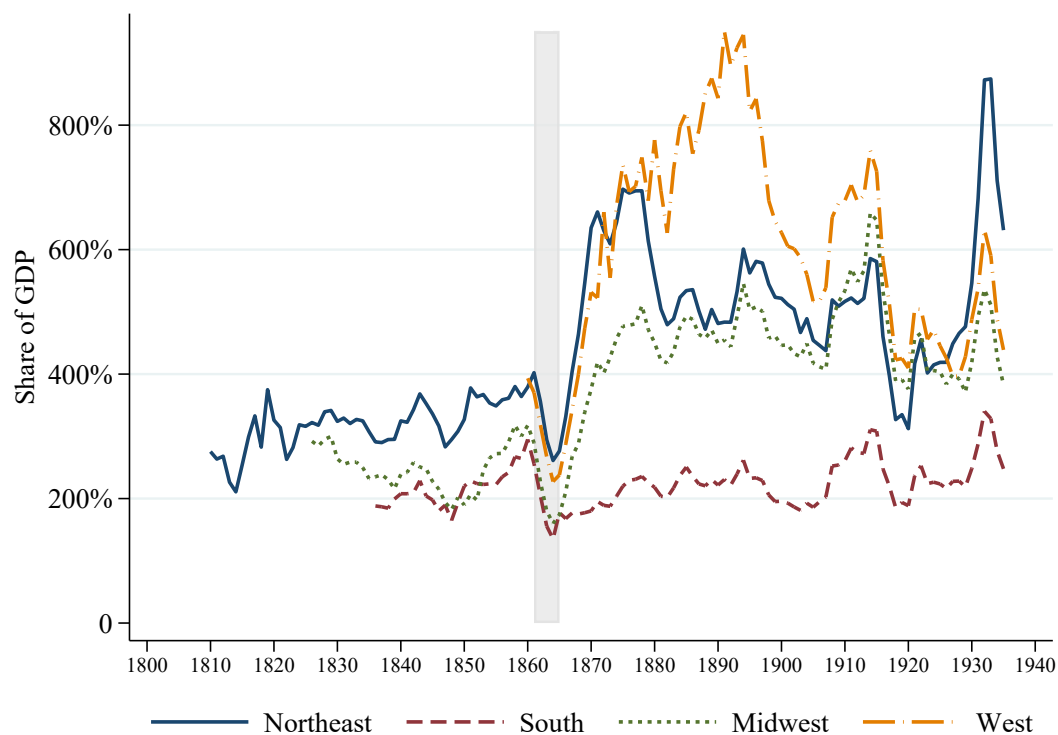
Notes: Figure shows the evolution over the same period of the private wealth to GDP ratio. Data for the United Kingdom and France come from the World Inequality Database and [Piketty \(2014\)](#).

Figure 11: Wealth per Capita as Fraction of US GDP per Capita by Regions in the US

A. All Private Wealth



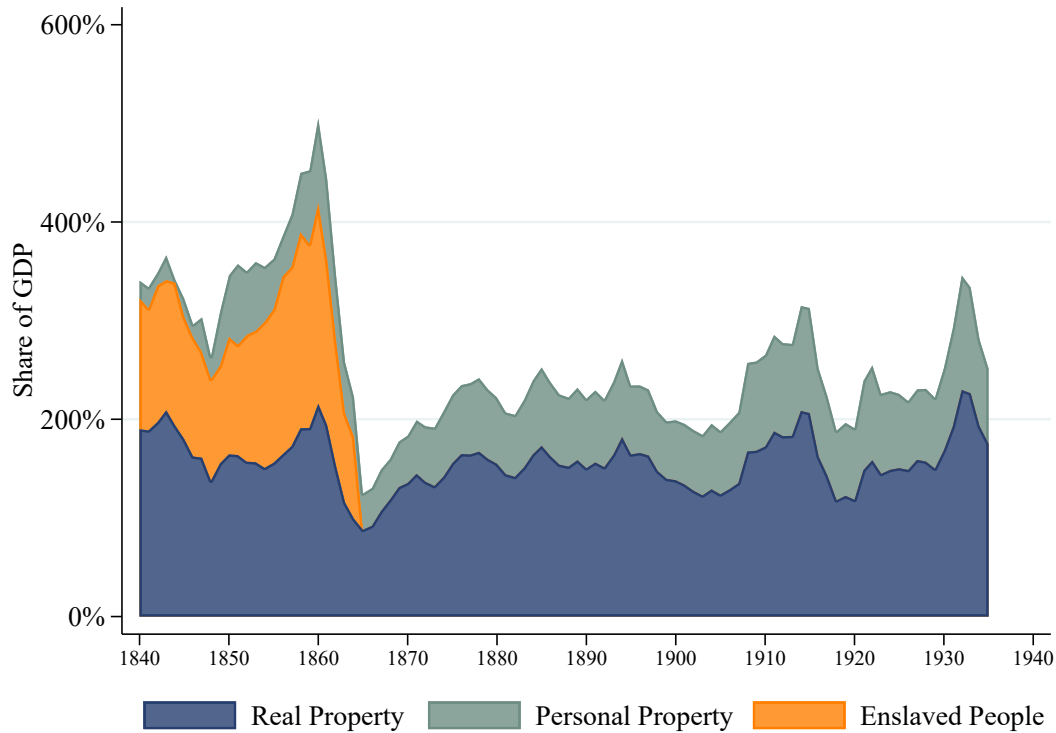
B. Excluding Enslaved People from Private Wealth Computation



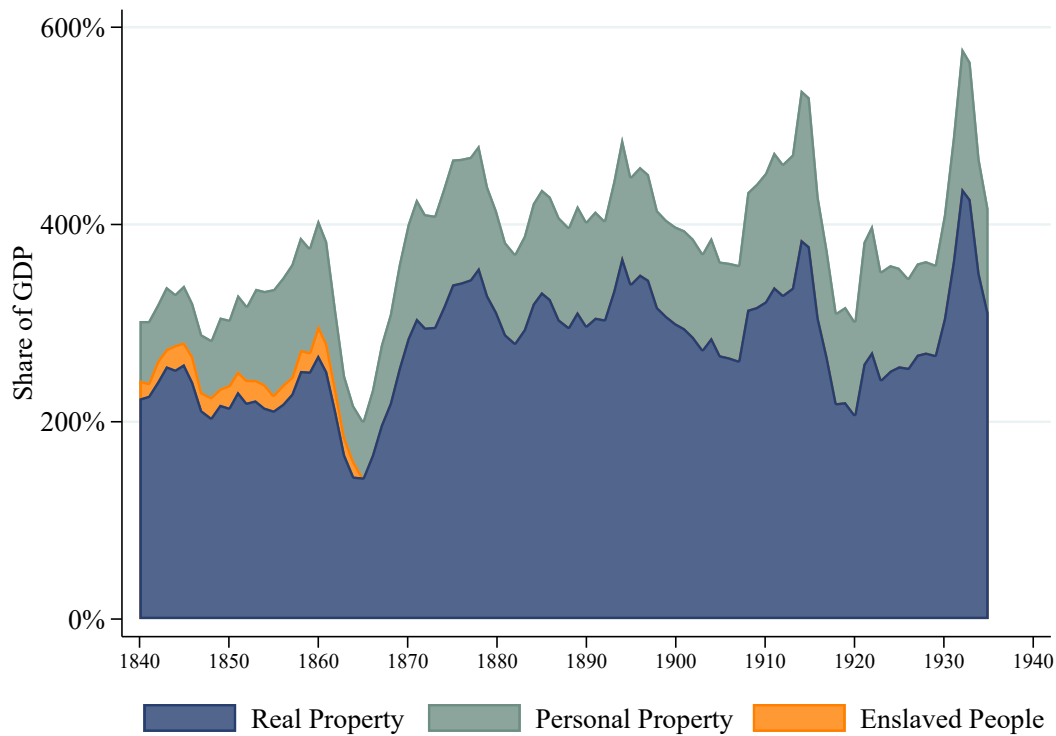
Notes: Panel A shows the average ratio of wealth to GDP by regions in the United States. Values are shown as a moving average over two years and winsorized at the 5th and 95th percentile. Panel B shows the average value of wealth per capita as a share of US GDP per capita in US regions, excluding the value of enslaved people in Southern States. Enslaved people are always counted in the denominator for population.

Figure 12: Decomposition of Wealth Per Capita(1830-1935)

A. Southern States only



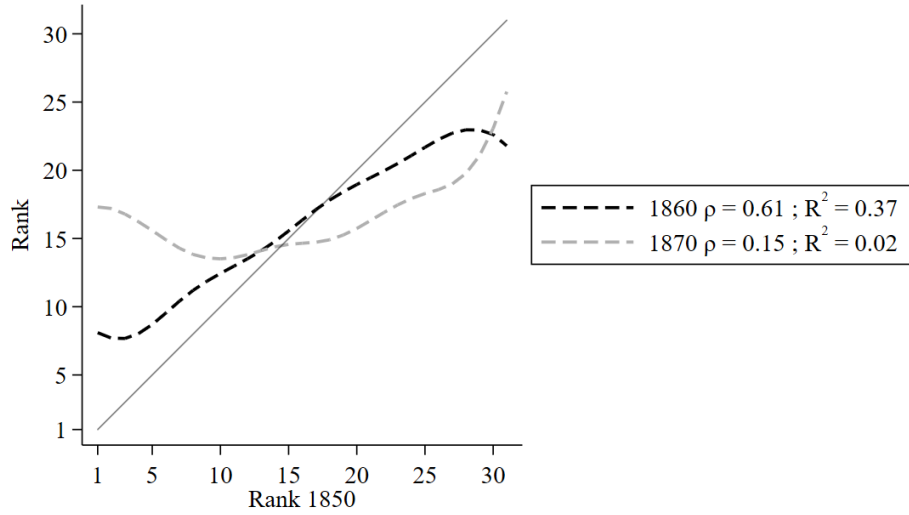
B. All States



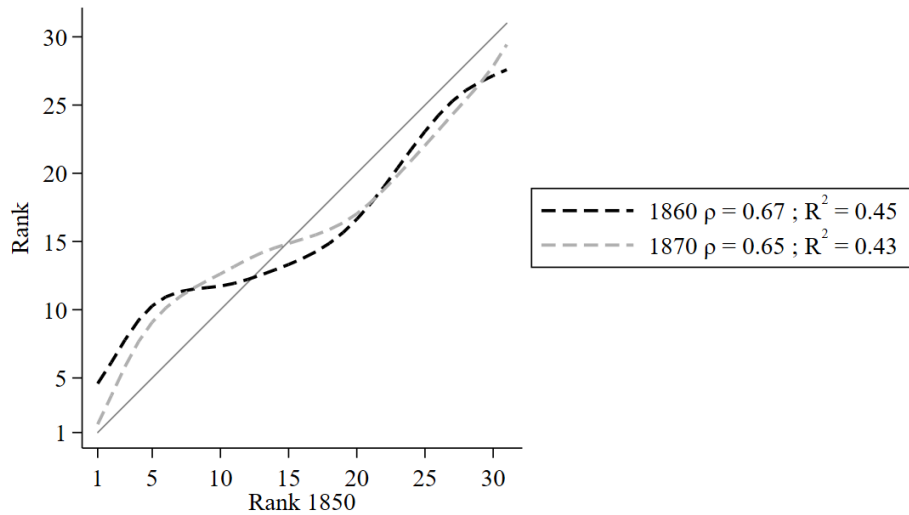
Notes: Panel A shows the decomposition of wealth per capita between real property, personal property, and the value of enslaved people in Southern States. Panel B shows the decomposition of wealth per capita between real property, personal property, and the value of enslaved people in all States. The value of enslaved people is derived from [Einhorn \(2001\)](#) and state reports. Southern states are classified using Census region classification.

Figure 13: Effects of the War and Role of Enslaved Wealth at the State Level

A - Persistence of Wealth  
Including Wealth from Enslaved



Excluding Wealth from Enslaved

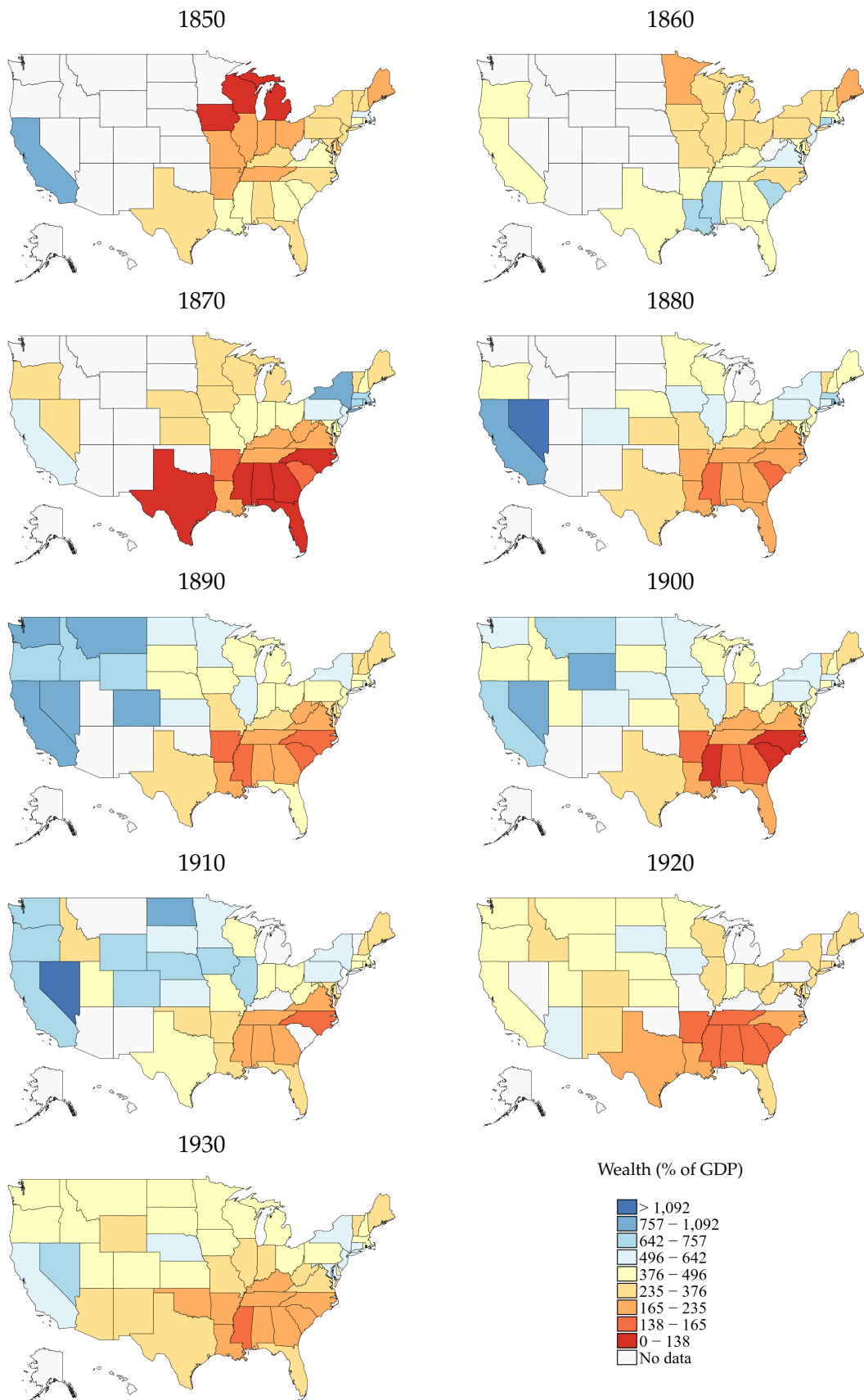


Notes: Panel A displays the persistence of state wealth rank between 1850 and 1860/1870, taking [Rugles et al. \(2021a\)](#) series. We successively include or exclude wealth from enslaved people using [Einhorn \(2008\)](#) prices. Wealth is compared in current US dollars.

*Continued to the next page*

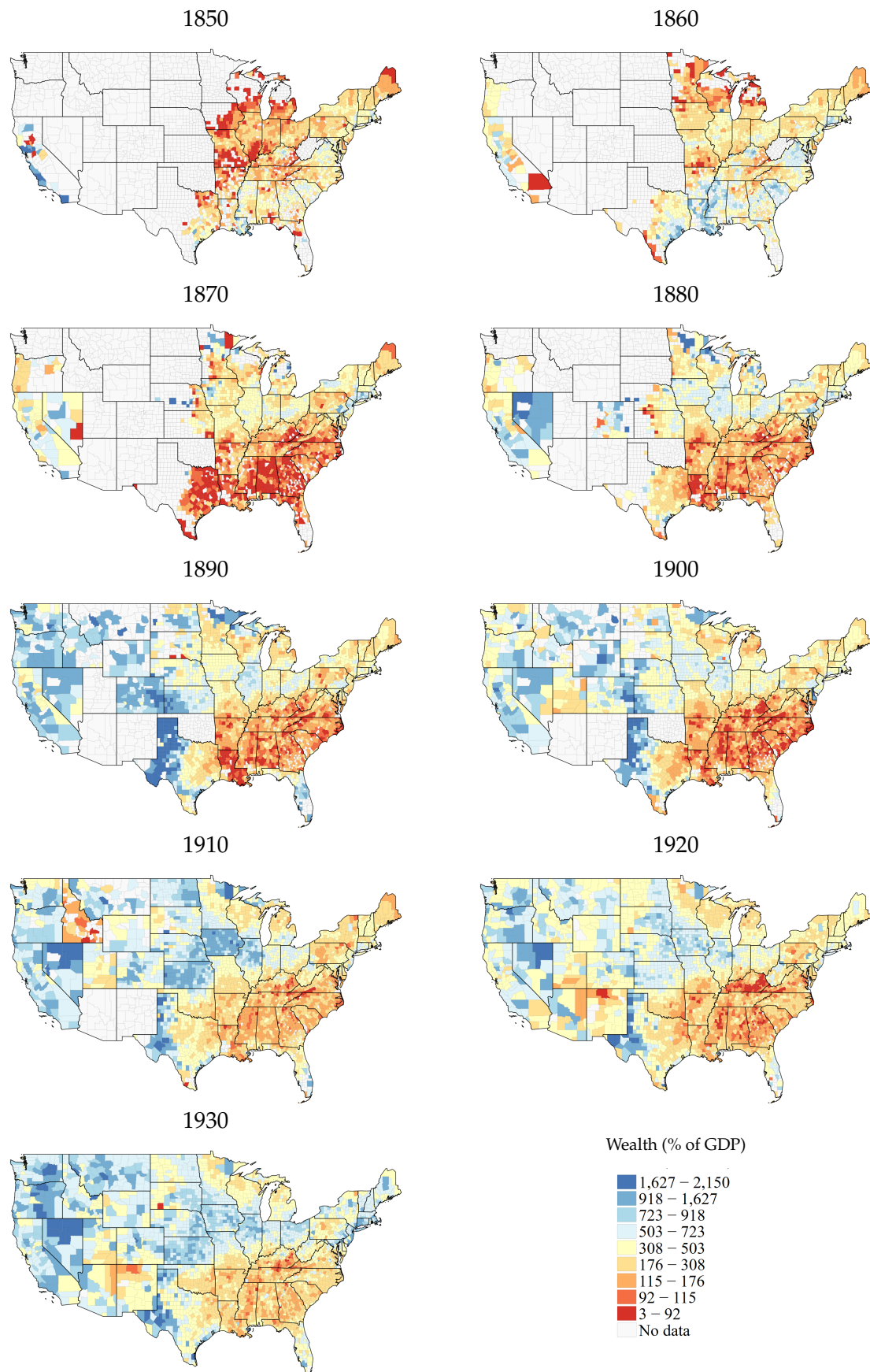


Figure 14: Wealth Per Capita As Fraction of US GDP Per Capita By State



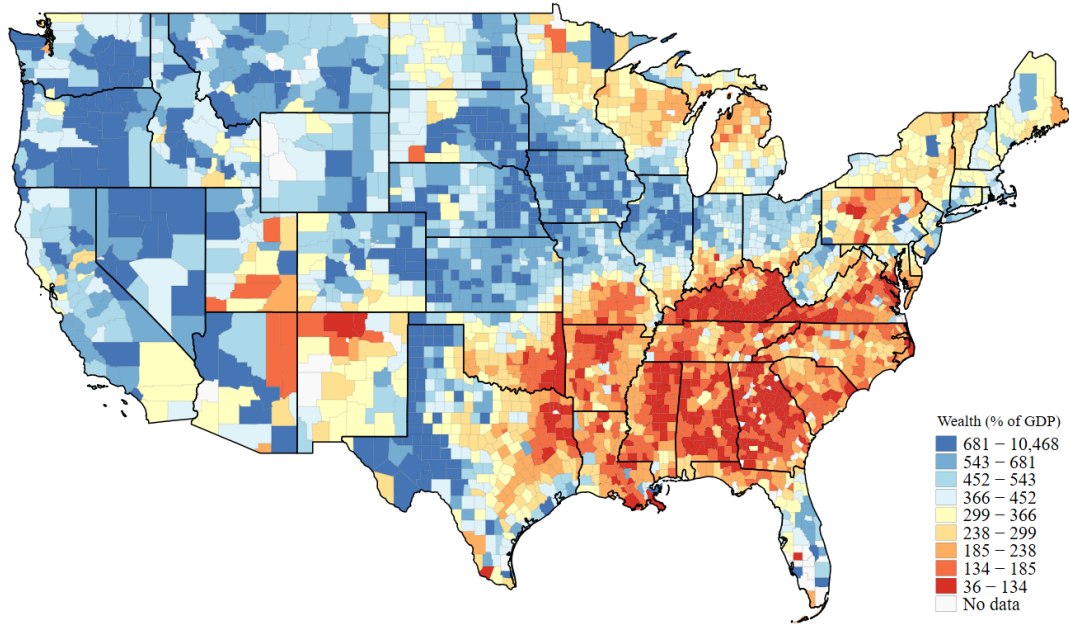
Notes: This figure shows the value of wealth per capita in states as a share of national GDP per capita in each decade between 1850-1930. Data for states in US territories prior to admission in the Union are not shown.

Figure 15: Wealth Per Capita As Fraction of US GDP Per Capita By County

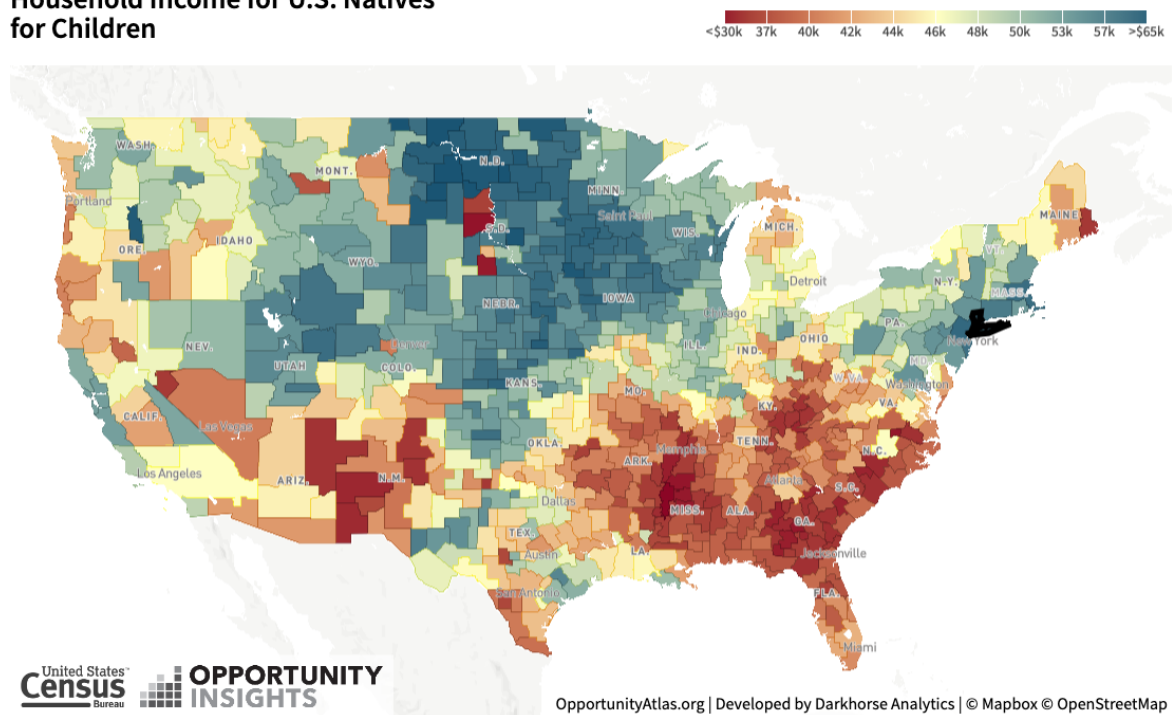


Notes: This figure shows the value of wealth per capita in counties as a share of national GDP per capita in each decade between 1850-1930. Data for counties in US territories prior to admission in the Union are not shown.

Figure 16: County Level Wealth in 1920 vs Opportunity Atlas Income Data



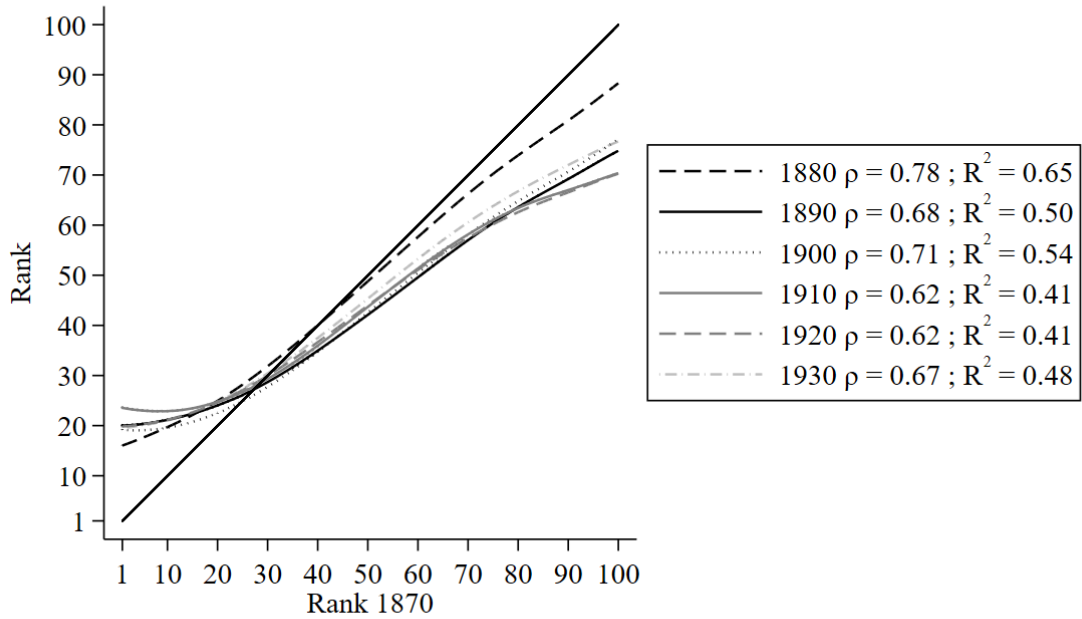
**Household Income for U.S. Natives for Children**



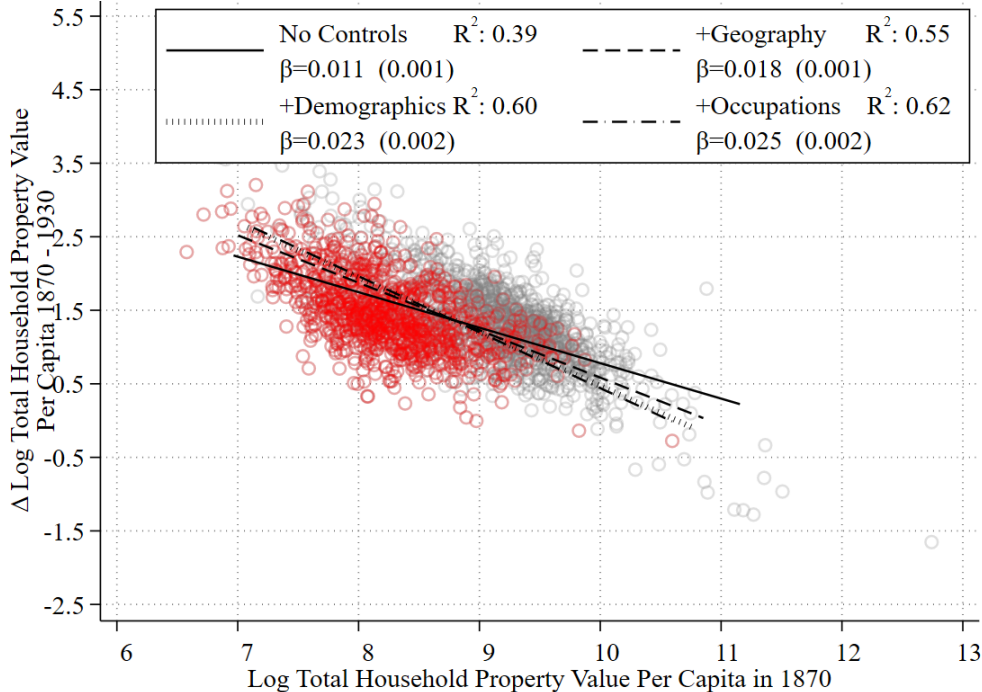
Notes: This figure compares the share of county wealth per capita as a share of national GDP per capita in 1920 to the distribution of average annual household income in 2014-15 for children whose mother grew up in the United States from the Opportunity Atlas.

Figure 17: County Persistence

A. Wealth Rank Persistence for Counties



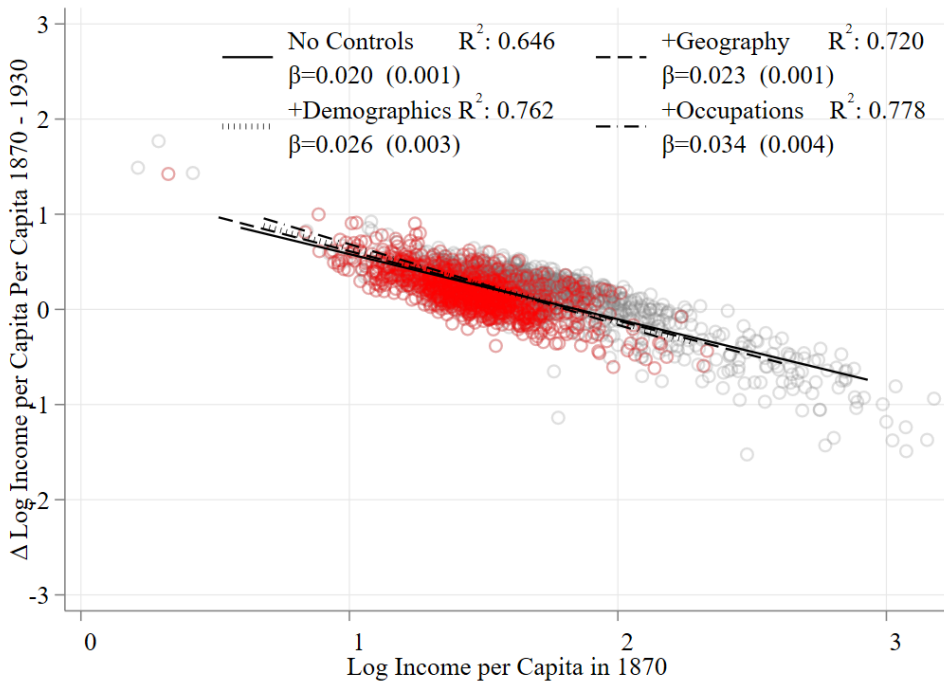
B.  $\beta$ -Convergence - Initial Wealth vs Growth Rate of Wealth By County



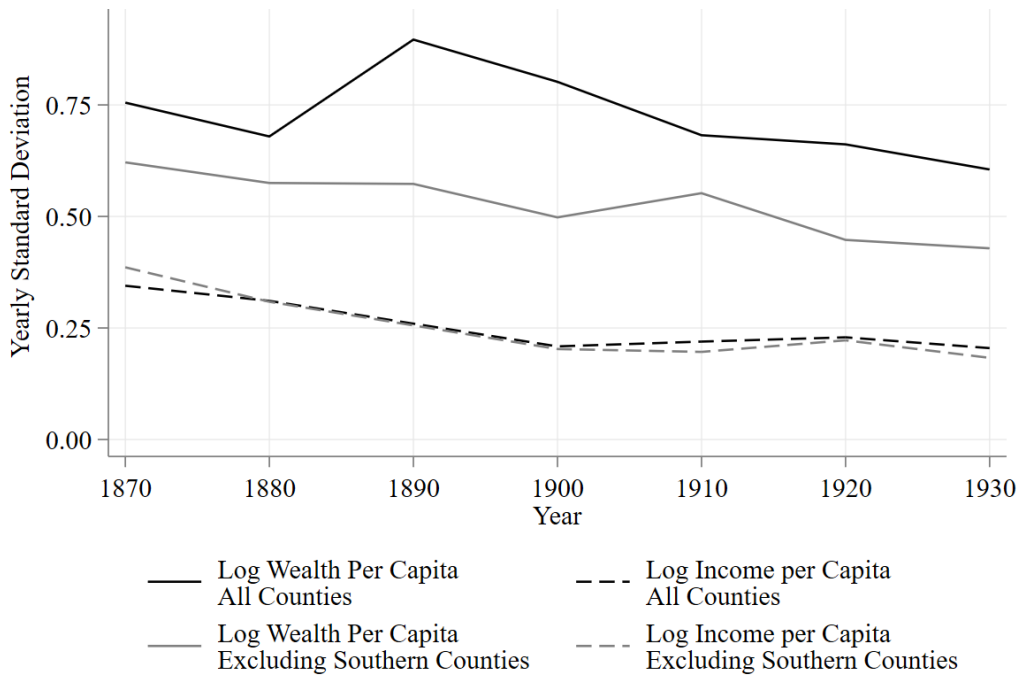
Notes: Each line in panel A compares county wealth percentile in 1870 with county wealth percentiles in the subsequent decade, as described by the legend. Wealth is measured as per capital wealth in 2012 prices, and both correlation coefficients and  $R^2$  are reported for each time frame. Panel B shows the relationship between change in log wealth between 1870 and 1930 and wealth in 1870. Groups of controls, i.e. geography, demographics, and occupation shares are progressively added. Geographic variables are time-constant and standardized, while demographic variables are standardized. Moreover, Southern counties are coloured in red in the latter panel.

Figure 17: County Persistence

C.  $\beta$ -Convergence - Income per Capita



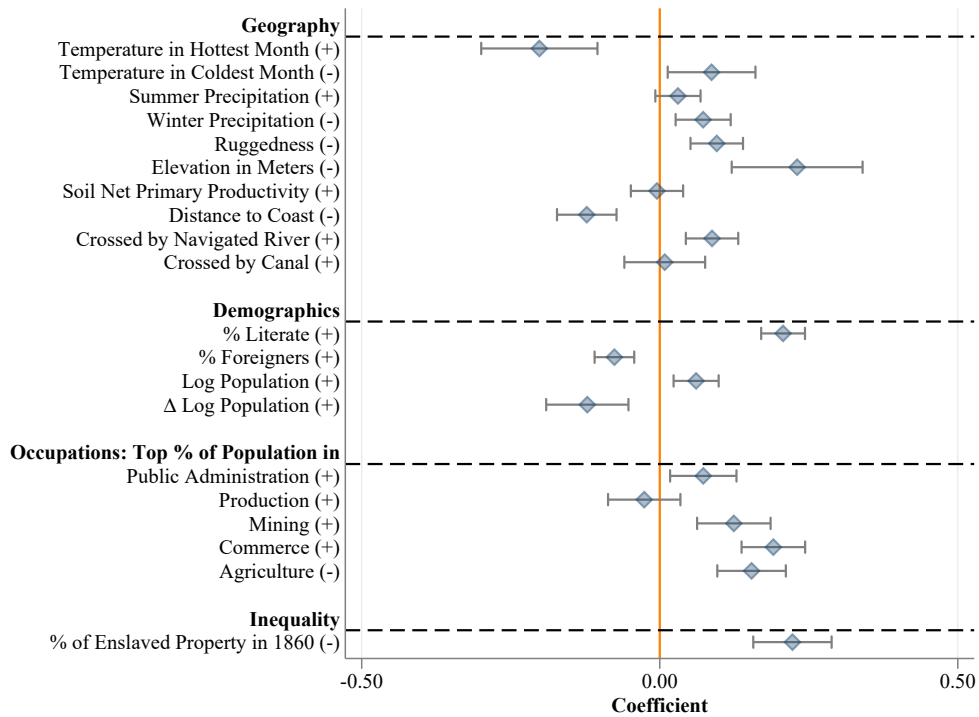
D.  $\sigma$  - Convergence



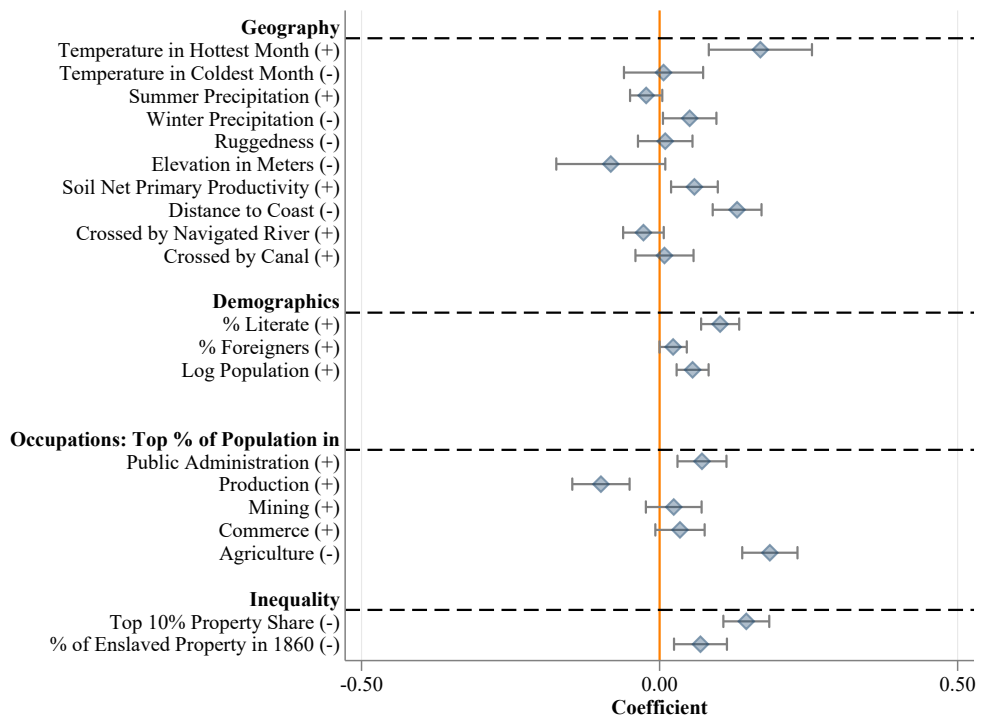
Notes: Panel C shows the relationship between change in log income per capita between 1870 and 1930 and income per capita in 1870. Income per Capita is measured by the County-average Occupational score as defined by [Ruggles et al. \(2021b\)](#), excluding counties for which such a variable is zero. Groups of controls, i.e. geography, demographics, and occupation shares are progressively added. Geographic variables are time-constant and standardized, while demographic variables are standardized. Moreover, Southern counties are coloured in red in the latter panel. Panel D provides the evolution of US counties' wealth dispersion and the dispersion in income, again measured as the county-average Occupational score.

Figure 18: Correlates of Wealth - County Level Estimates (1870-1930)

A. Log Total Household Property Value per Capita in 1870

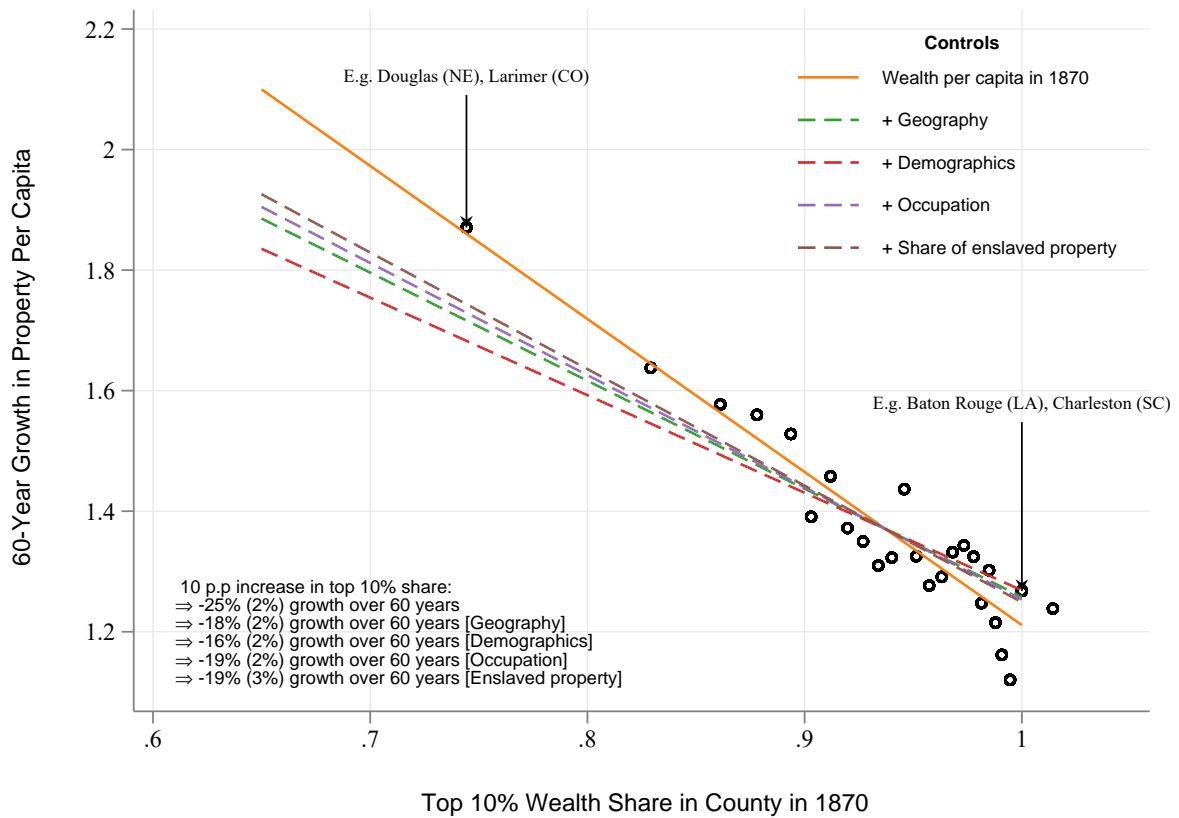


B. 60-Year  $\Delta$  log Total Household Property Value per Capita



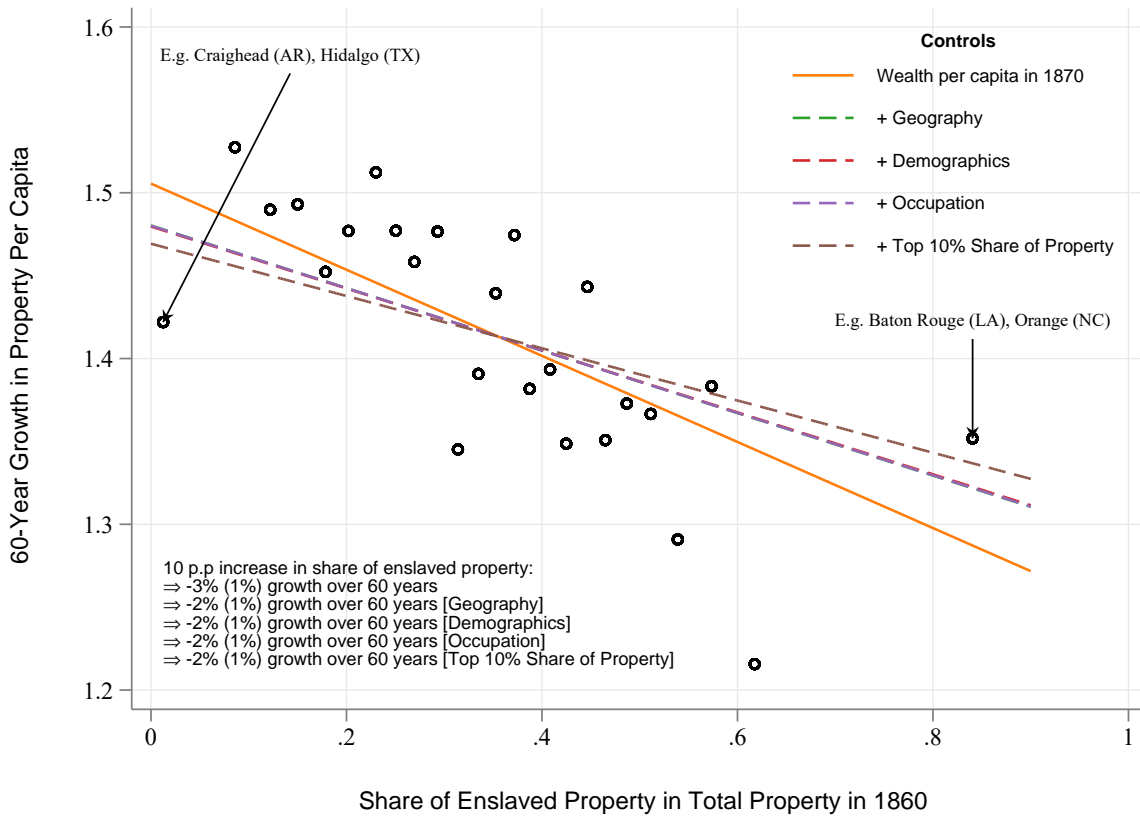
Notes: Panel A presents the set of coefficients coming from the regression of log wealth in 1870 on 1870's determinants. Panel B presents the set of coefficients coming from the regression of the change in log wealth between 1870 and 1930 on 1870's wealth and controls. Geography is time-constant and standardized, Demography is standardized, and every coefficient is shown with its 90% confidence interval. Furthermore, the minus sign tells that the sign of the coefficient was switched for graphical purposes. Year fixed effects, % of white and % of male individuals are included in this specification.

Figure 19: Growth and Inequality



Notes: The figure displays a binscatter of the relationship between 60-year growth in property per capita between years 1870 and 1930 and the share of wealth held by the top 10% in a county, residualizing the relation by a sequence of controls. We sequentially add geography, demographics, and occupational controls and the share of enslaved people in total property. The controls are as defined in Figure 18. There are 25 equally-sized bins.

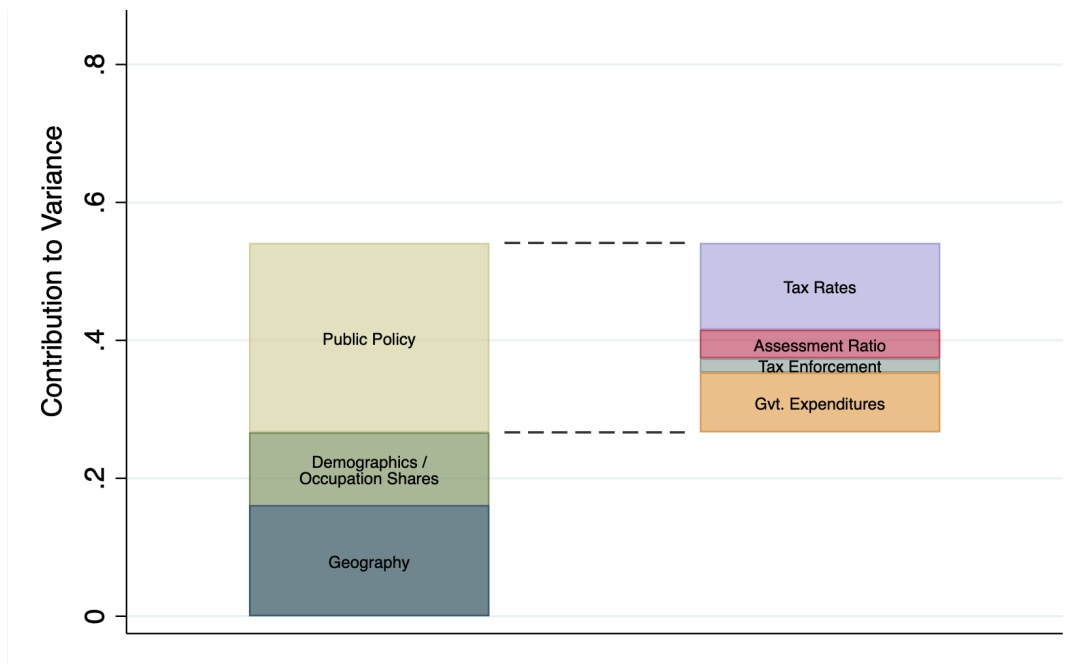
Figure 20: Growth and Inequality: Enslavement



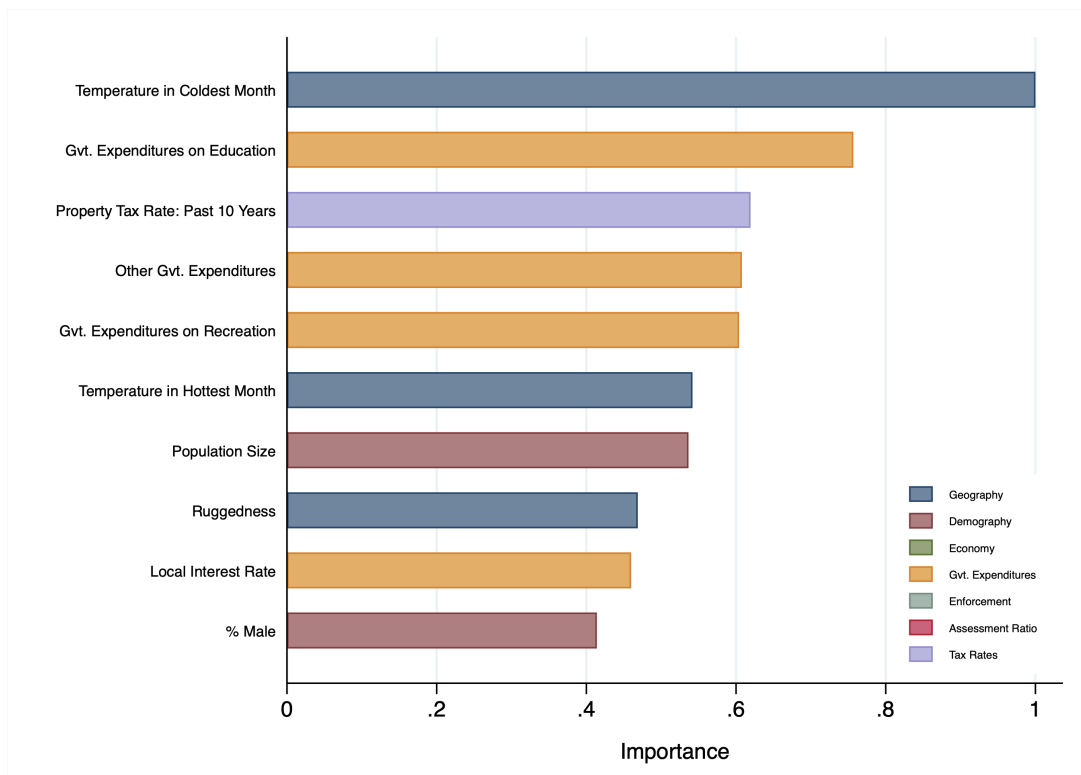
*Notes:* The figure displays a binscatter of the relationship between 60-year growth in property per capita between years 1870 and 1930 and the share of property from enslaved people in total property in 1860 in a county, residualizing the relation by a sequence of controls. We sequentially add geography, demographics, and occupational controls and the share of wealth held by the top 10%. The controls are as defined in Figure 18. There are 25 equally-sized bins.

Figure 21: Variance Decomposition of Municipal Property Per Capita in 1931

A. Fraction of Total Variance Explained by Each Group of Variables - OLS Model

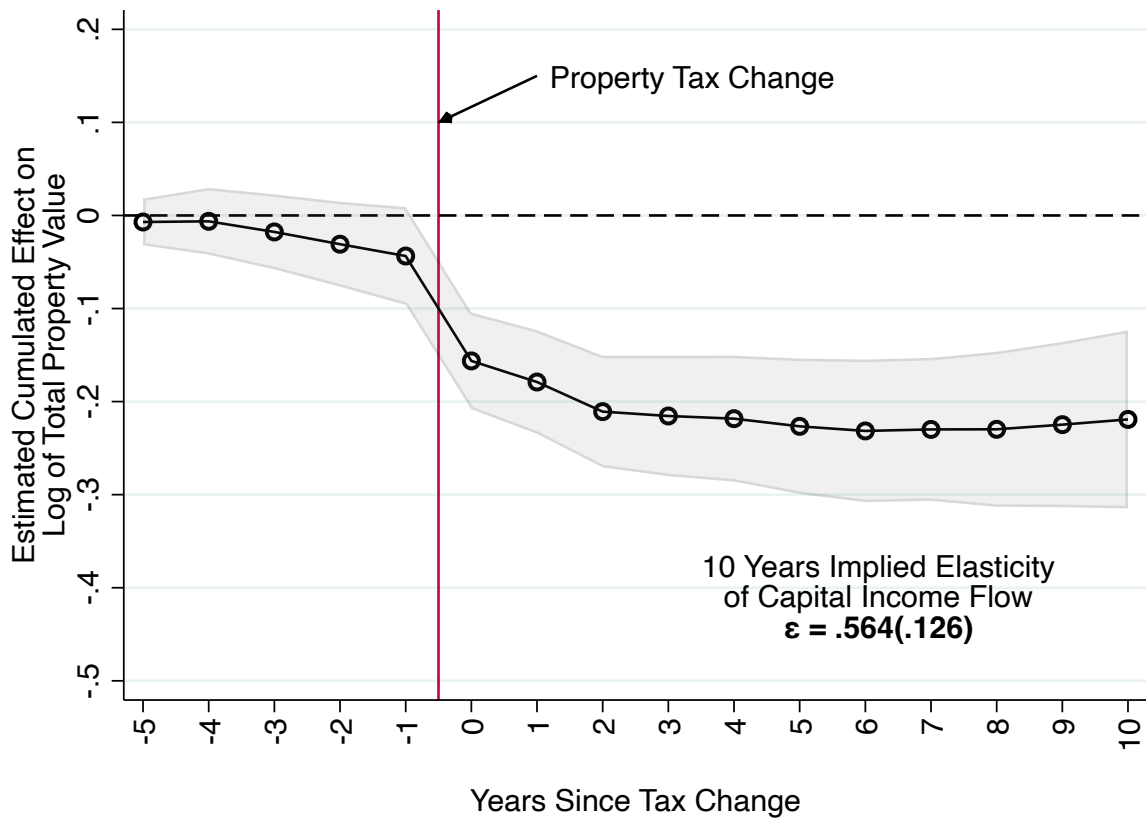


B. Variable Importance Plot - Random Forest Model



Notes: This figure reports two “variance decomposition” exercises of municipal total (i.e. real and personal) property per capita in 1931. In panel A, we estimate via OLS a linear model of per capita wealth at the municipal level using the same set of explanatory variables as in Figure 18, to which we add a set of variables capturing the past dynamics of property taxes and local government finances. We use random draws of the sequential orders in which the variables are introduced in the model. Then, for each variable, we average their partial  $R$ -squared over all models. We finally sum the average partial adjusted  $R^2$  of covariates belonging to the same group of variables. See text for details. In panel B, we predict municipal wealth in 1931 using random forests and report a variable importance plot.

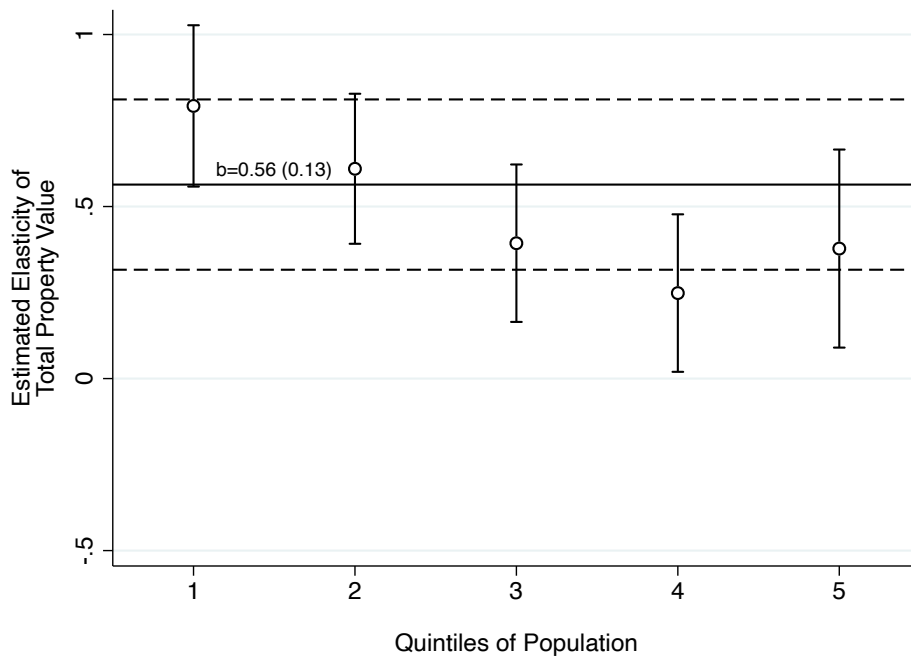
Figure 22: Elasticity of Total Property, Dynamic Leads and Lags Model



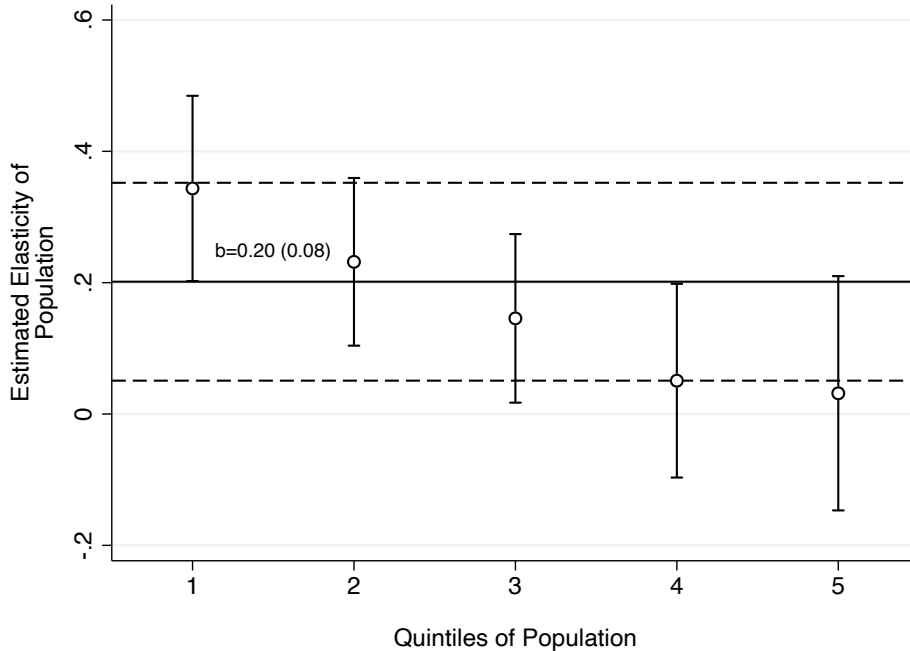
Notes: The Figure shows the estimated cumulative effect on the log of total property of a tax change. The horizontal axis plots the years since the tax change. We estimate equation (4) and plot the coefficients for each year  $t = j$ ,  $\alpha_j = \sum_{k=-j}^5 \hat{\gamma}_k$ . Controls include city fixed effects, state times year fixed effects, demographic and economic characteristics, measures of enforcement, assessment ratios, and municipal government expenditures.

Figure 23: Evidence for Tax Competition

A. Wealth Elasticity



B. Population Elasticity



*Notes:* This figure reports estimated elasticities by city size. Panel A displays the estimated flow elasticity of capital income with respect to the implied net-of-tax rate on capital income. Panel B shows the estimated population elasticity with respect to the implied net-of-tax rate on capital income. Both panels show heterogeneous elasticity estimates and corresponding 95 percent confidence intervals by population quintiles. The overall estimated elasticity and its corresponding 95 percent confidence interval are shown by the dashed and solid lines. Standard errors are clustered at the city level.

Table 1: Elasticities of Capital along the Intensive and Extensive Margins

	(1)	(2)	(3)
<b>A. Log of Total Property Value</b>			
Estimated Elast. $\hat{\epsilon}$	0.516*** (0.108)	0.776*** (0.123)	0.564*** (0.126)
<b>B. Log of Population</b>			
Estimated Elast. $\hat{\epsilon}$	-0.141 (0.088)	0.161** (0.074)	0.201*** (0.077)
<b>C. Log Total Property Per Capita</b>			
Estimated Elast. $\hat{\epsilon}$	0.669*** (0.104)	0.615*** (0.119)	0.362*** (0.123)
<b>D. Log Real Property Per Capita</b>			
Estimated Elast. $\hat{\epsilon}$	0.709*** (0.117)	0.591*** (0.114)	0.339*** (0.117)
<b>E. Log Personal Property Per Capita</b>			
Estimated Elast. $\hat{\epsilon}$	0.498* (0.293)	0.727** (0.303)	0.226 (0.273)
5 Leads Net-of-Tax Rate	X	X	X
Year + City FE	X	X	X
Economic Covariates		X	X
Demographic Covariates		X	X
Assessment Ratio		X	X
Tax Enforcement		X	X
Expenditures		X	X
State-Year FE			X

Notes: The table shows the estimates of elasticities of the implied flow income of total property value from specification 5 in panel A. This elasticity is further decomposed between an extensive margin (Panel B. Log of Population) and intensive margin (line C. Log of Total Property Value Per Capita). Panel D and E decompose the elasticity of property per capita between real and personal property responses. Controls include city fixed effects, year fixed effects, 5-year leads of the net-of-tax rate in column 1. The other columns sequentially include the other controls listed. Standard errors are clustered at the municipality level.

Table 2: Tax Competition: Own Tax Rate as function of Past Own Tax Rate and Neighbors' Tax Rates

<i>Dependent variable: Average log of eff. net of tax rate from t+1 to t+5</i>				
	(1)	(2)	(3)	(4)
$\text{Log}(1 - \frac{\tau}{r})$	0.581*** (0.145)	0.323*** (0.111)	0.103 (0.146)	0.064 (0.183)
<i>Neighbors'</i> $\text{Log}(1 - \frac{\tau}{r})$	0.321** (0.143)	0.354** (0.163)	0.459** (0.190)	0.537** (0.213)
Observations	6573	5985	4290	3670
Number of cities	273	272	263	220
Adjusted $R^2$	0.710	0.710	0.715	0.725
Year Fixed Effects	X	X	X	X
City Fixed Effects	X	X	X	X
Public Policy Covariates	X	X	X	X
Economic Covariates		X	X	X
Demographic Covariates			X	X
Assessment Ratio				X
Own and Close Expenditures				X

Notes: The table shows regression results from specification (6) where the dependent variable is the average of the log of effective net of tax rate of a municipality in the next five years. Standard errors clustered at the city level.

Table 3: Spillovers: Elasticity of Property Value at City-Level to Own & Neighboring Cities' Tax Rates

(a) Full Sample: Small and Large Cities

---

*Dependent variable: Log Total Property Value*

	(1)	(2)	(3)
$\text{Log}(1 - \frac{\tau}{r})$	0.496** (0.203)	0.620*** (0.184)	0.461*** (0.136)
$\text{Neighbors}'\text{Log}(1 - \frac{\tau}{r})$	-0.226 (0.172)	-0.093 (0.152)	-0.064 (0.144)
Observations	5596	4995	4234
Number of cities	252	250	244
Adjusted $R^2$	0.967	0.967	0.977
Year fixed effects	X	X	X
City fixed effects	X	X	X
Public Policy Covariates	X	X	X
Economic Covariates		X	X
Demographic Covariates			X

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(b) Small Cities (Population < 25,000)

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*Dependent variable: Log Total Property Value*

	(1)	(2)	(3)
$\text{Log}(1 - \frac{\tau}{r})$	0.739* (0.428)	0.998** (0.398)	0.976*** (0.356)
$\text{Neighbors}'\text{Log}(1 - \frac{\tau}{r})$	-0.861* (0.437)	-0.851* (0.442)	-0.521* (0.312)
Observations	1047	1019	1019
Number of cities	76	76	76
Adjusted $R^2$	0.895	0.887	0.900
Year fixed effects	X	X	X
City fixed effects	X	X	X
Public Policy Covariates	X	X	X
Economic Covariates		X	X
Demographic Covariates			X

Notes: The table shows regression results from specification (6) with dependent variable log of total property value. Panel A considers the full sample, while Panel B restricts the sample to small cities. Standard errors clustered at the city level.

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# ONLINE APPENDIX

## for “Wealth and Property Taxation in the United States”

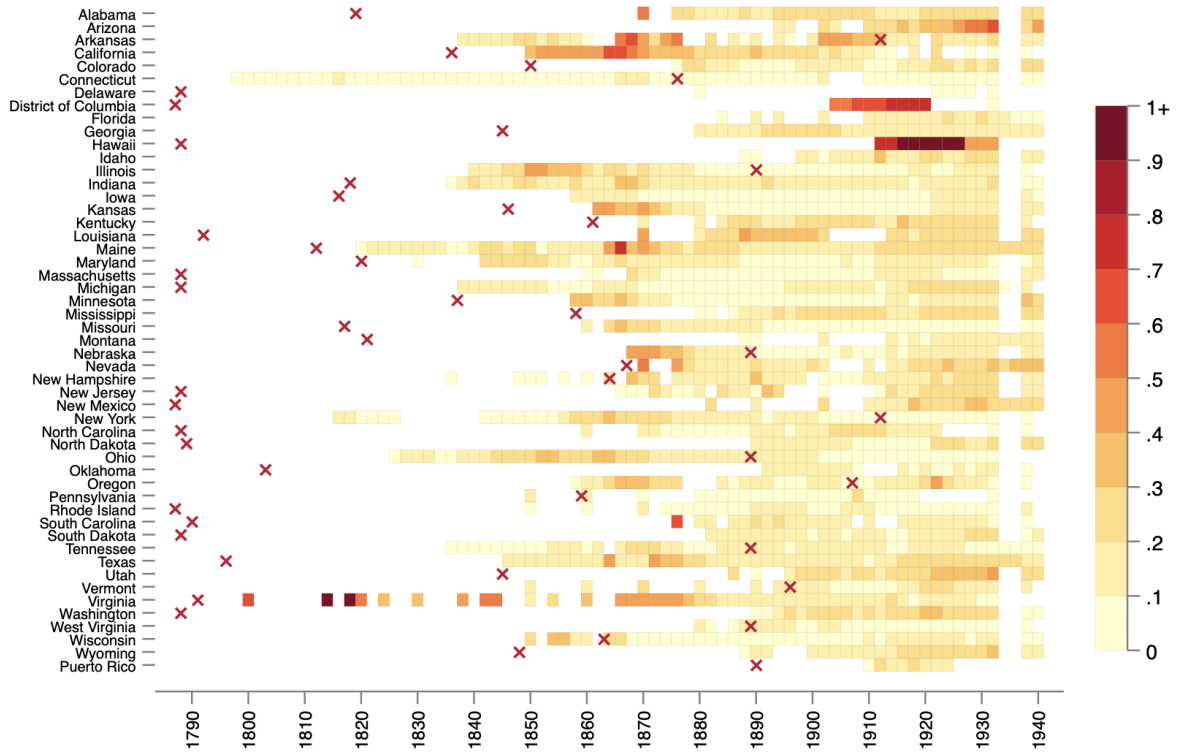
by Sacha Dray, Camille Landais, and Stefanie Stantcheva

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# I. Additional Tables and Figures

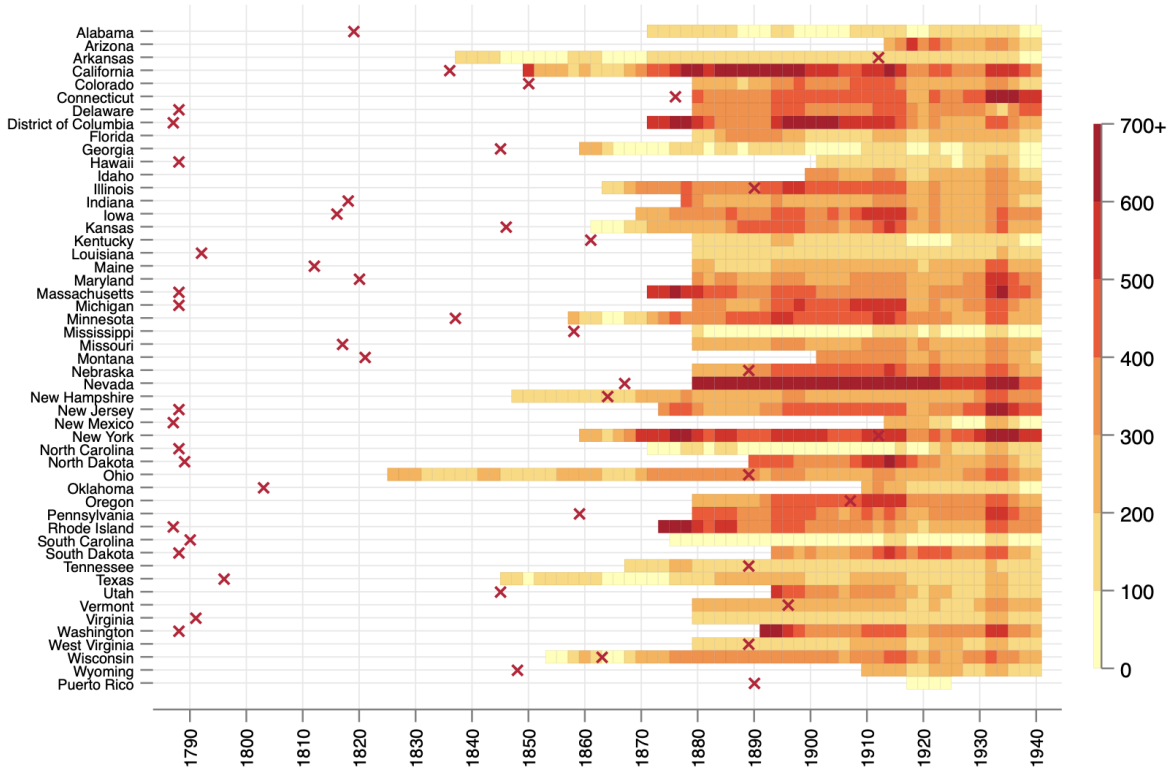
Figure A1: State Rate of Property Tax



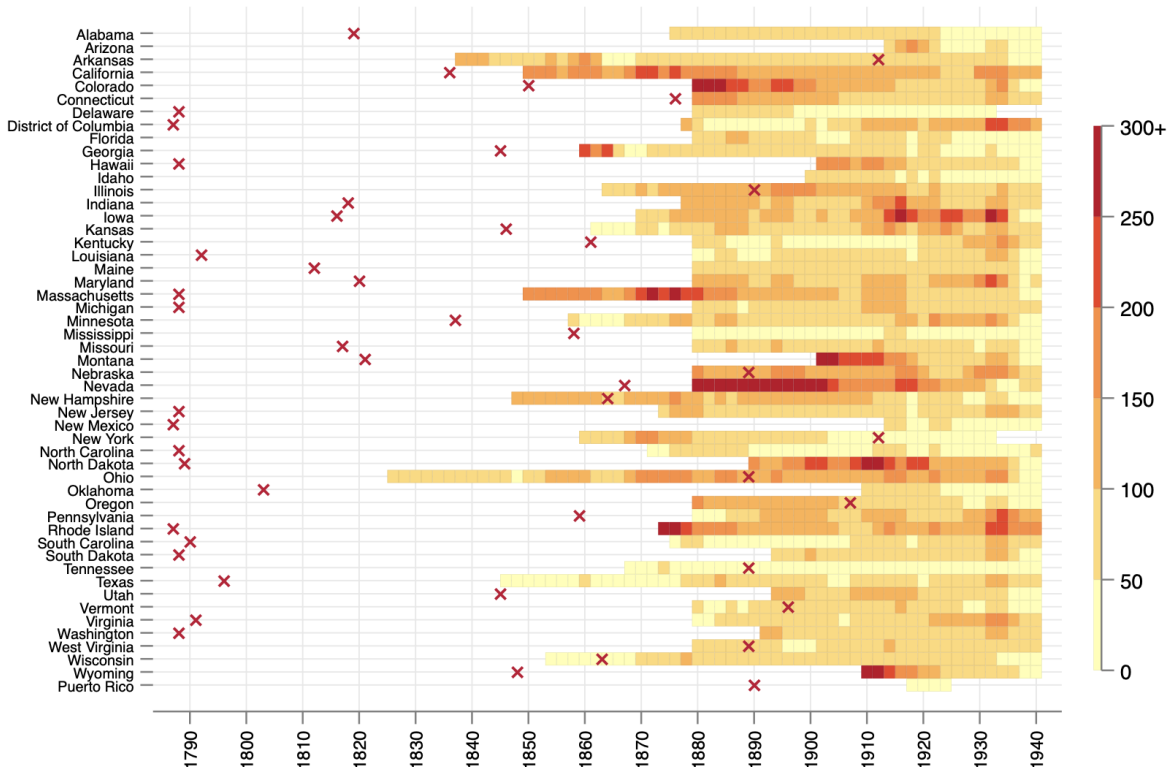
Notes: Winsorized for 5th and 95 percentile. Red cross indicates year of admission to the Union.

Figure A2: Private Property as Share of GDP (%)

A. Real Property

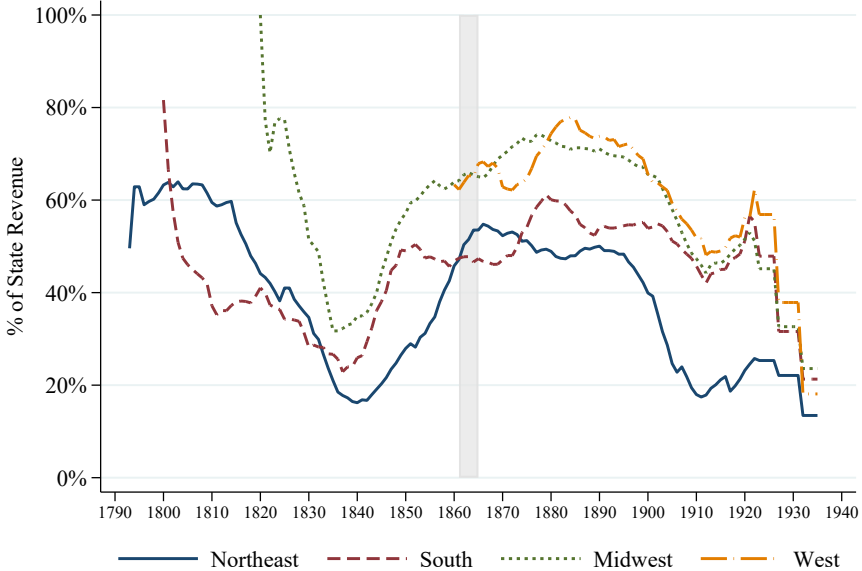


B. Personal Property



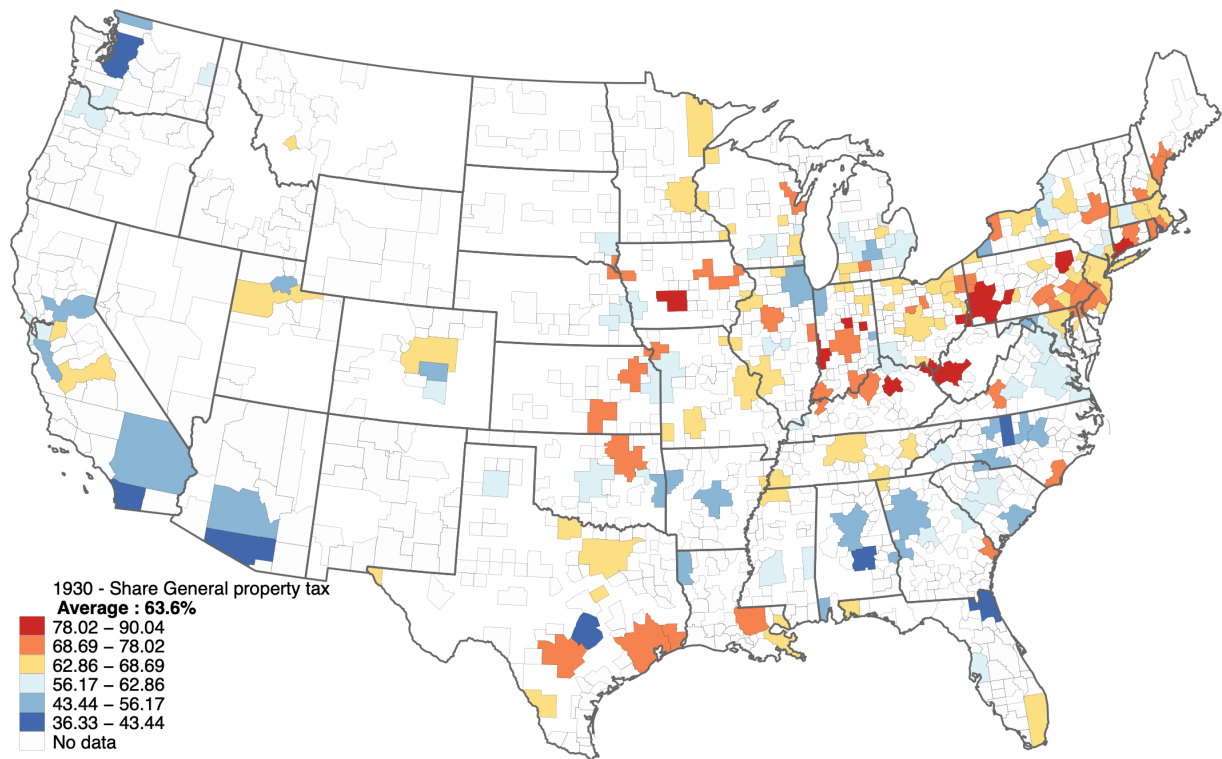
Notes: Winsorized for 5th and 95 percentile. Red cross indicates year of admission to the Union.

Figure A3: Property Tax Revenue as a Share of State Revenue



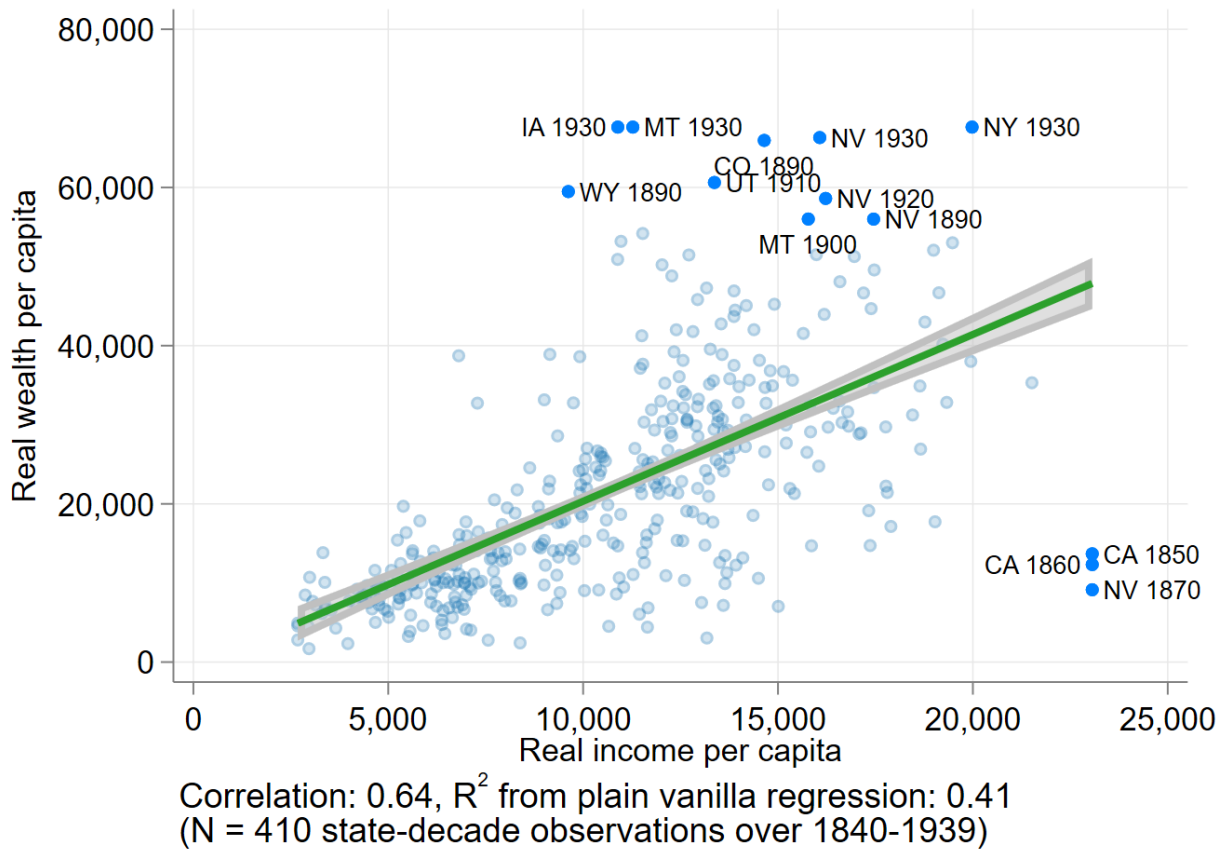
Notes: This figure shows the average share of state revenue (both tax and non-tax revenues) from property tax.

Figure A4: The Property Tax as Backbone of City Revenue



*Notes:* This figure shows the share of municipal revenue derived from the general property in 1930. The sample of cities are those with a population above 30,000 population. The shares are averaged and displayed on core-based statistical areas for readability.

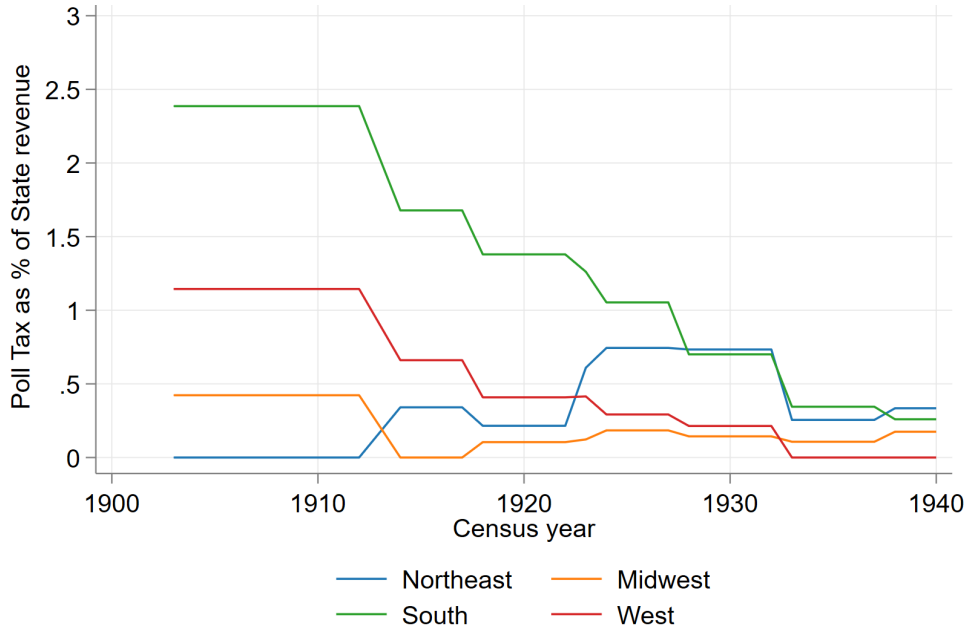
Figure A5: Wealth and Income Per Capita



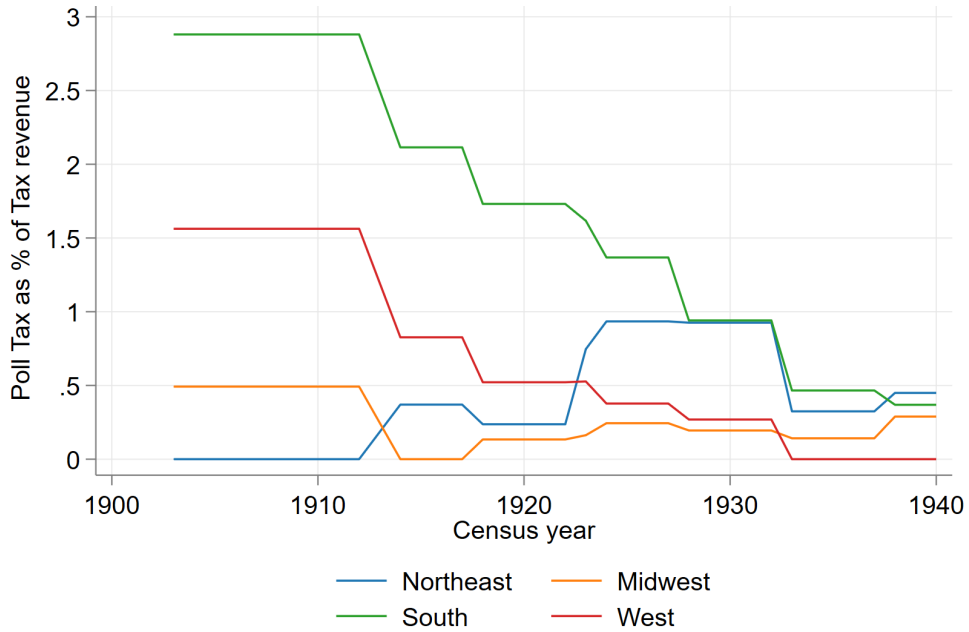
Notes: This graph plots the relationship between real wealth per capita and real income per capita. Both variables are winsorized at 1% and 99%.

Figure A6: Revenue from the Poll Tax

A. As a Share of Total State Revenue



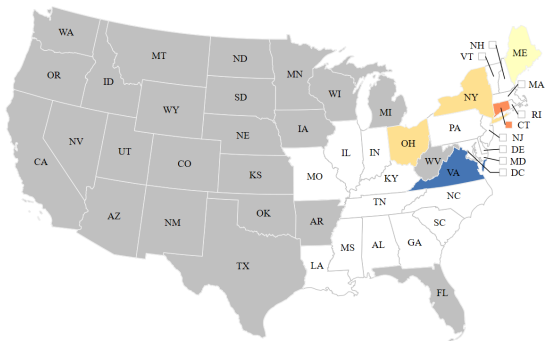
B. As a Share of State Tax Revenue



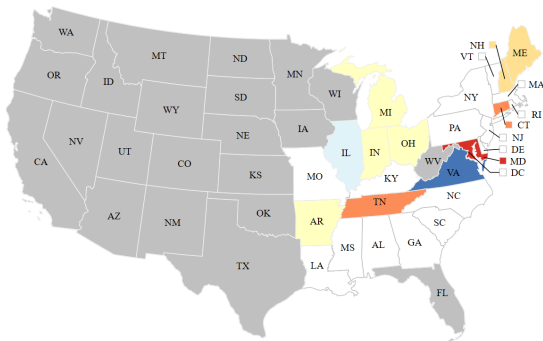
Notes: Panel A shows the average share of state revenue from the poll tax by region. Panel B shows the average share of state tax revenue from the poll tax by region. The values depicted are 10-year moving averages (because poll tax revenues is not reported every year in most states).

Figure A7: State Property Tax Rate: 1820-1940 (%)

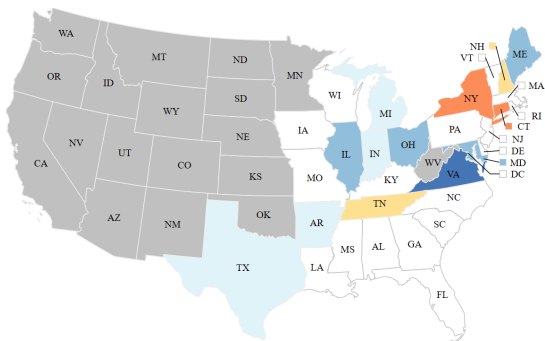
1820-1829



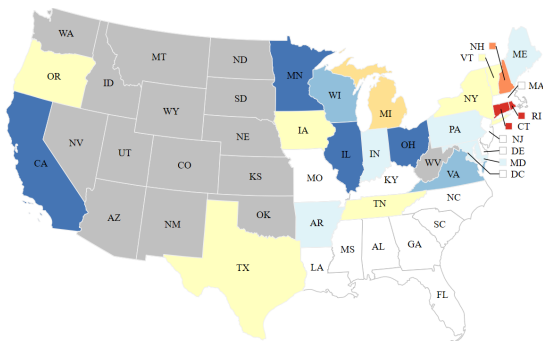
1830-1839



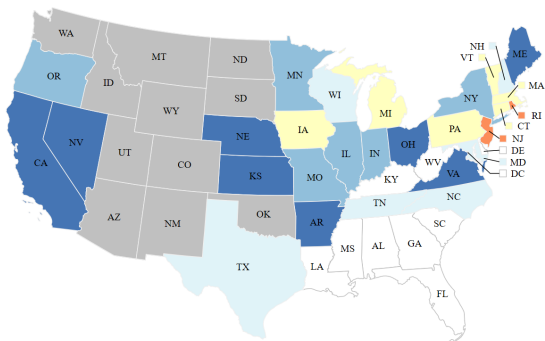
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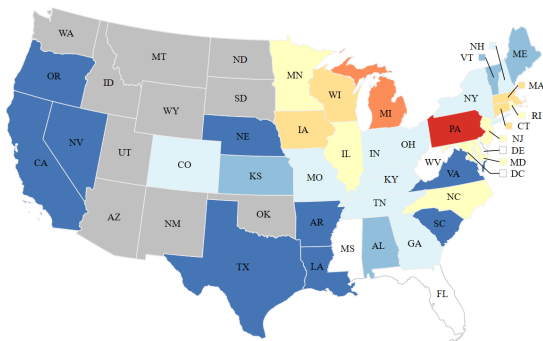
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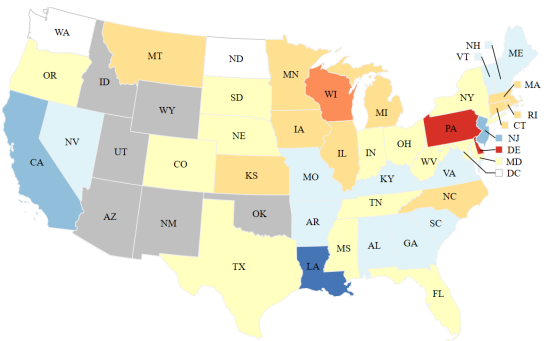
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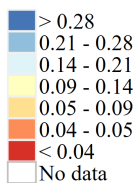
1870-1879



1880-1889

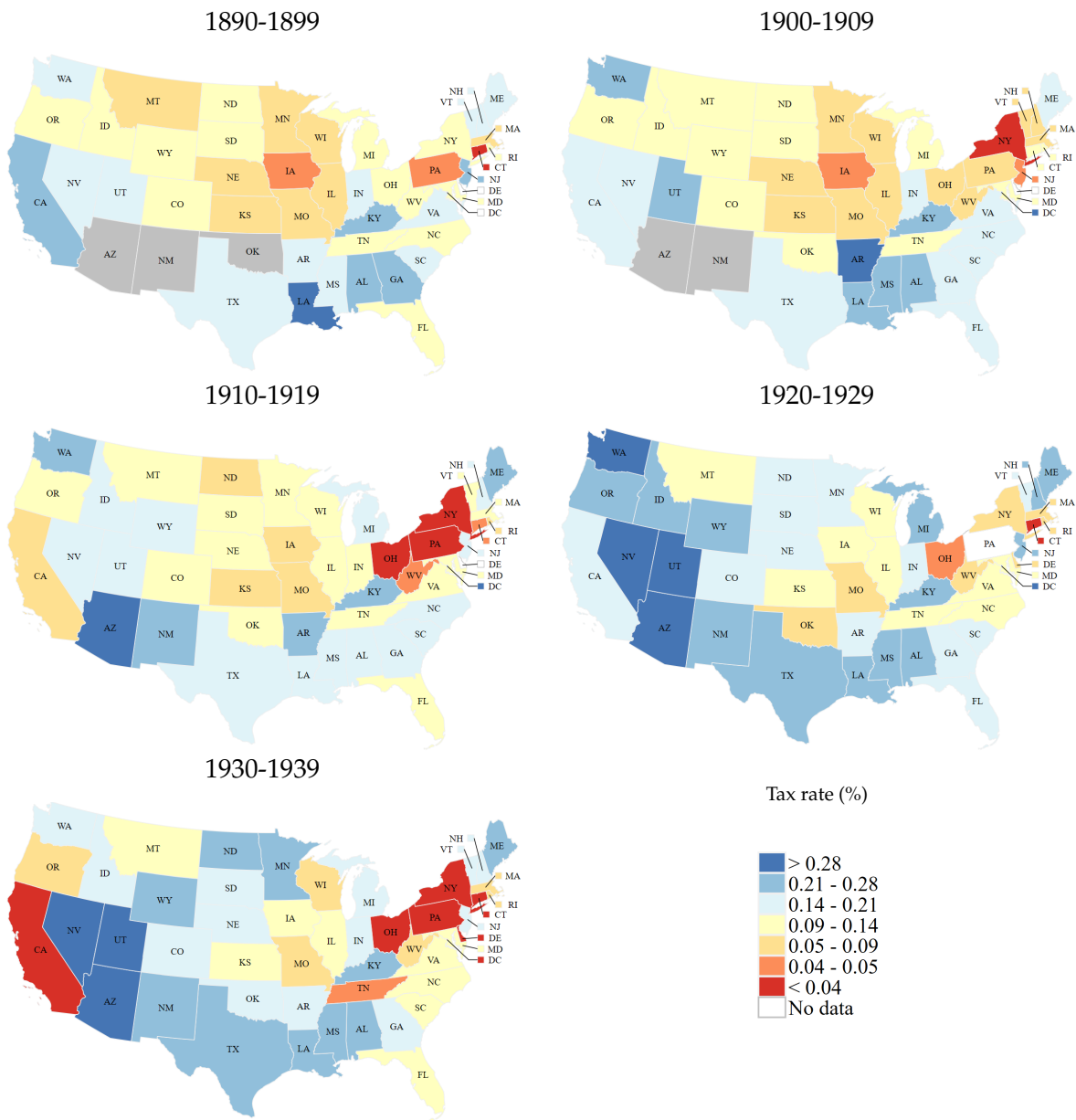


Tax rate (%)



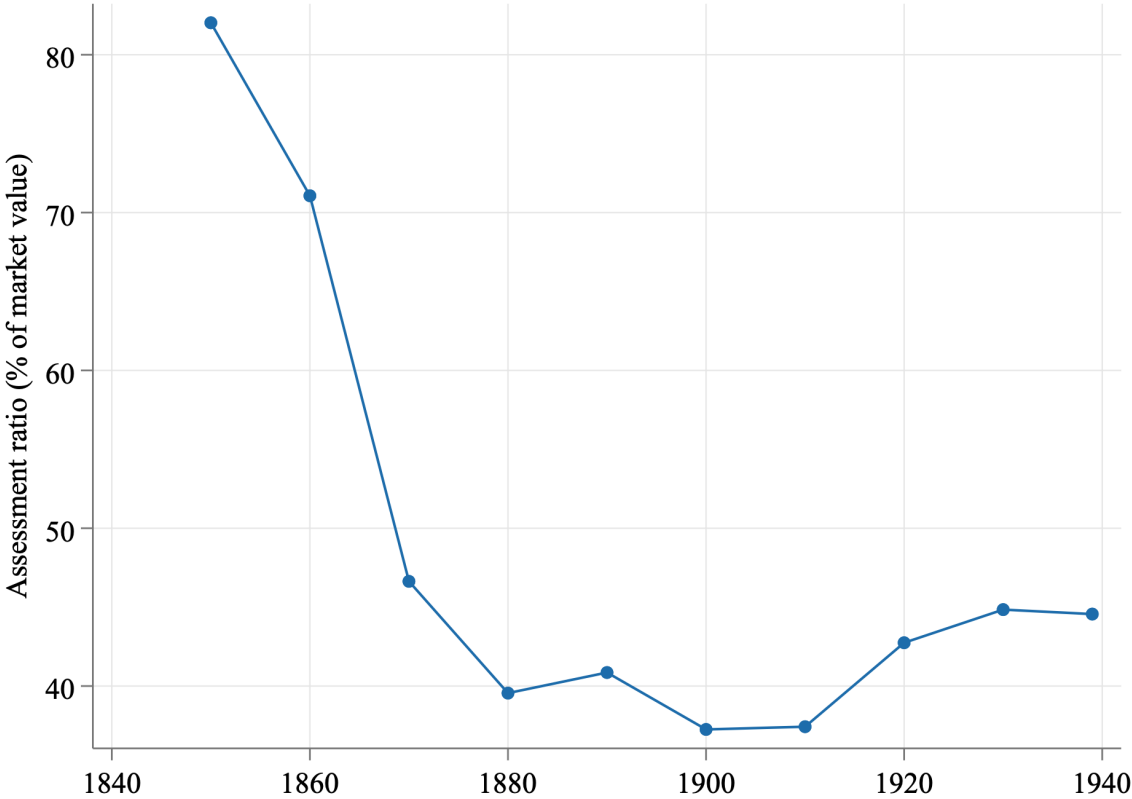
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Figure A7: State Property Tax Rate: 1820-1940 (%)



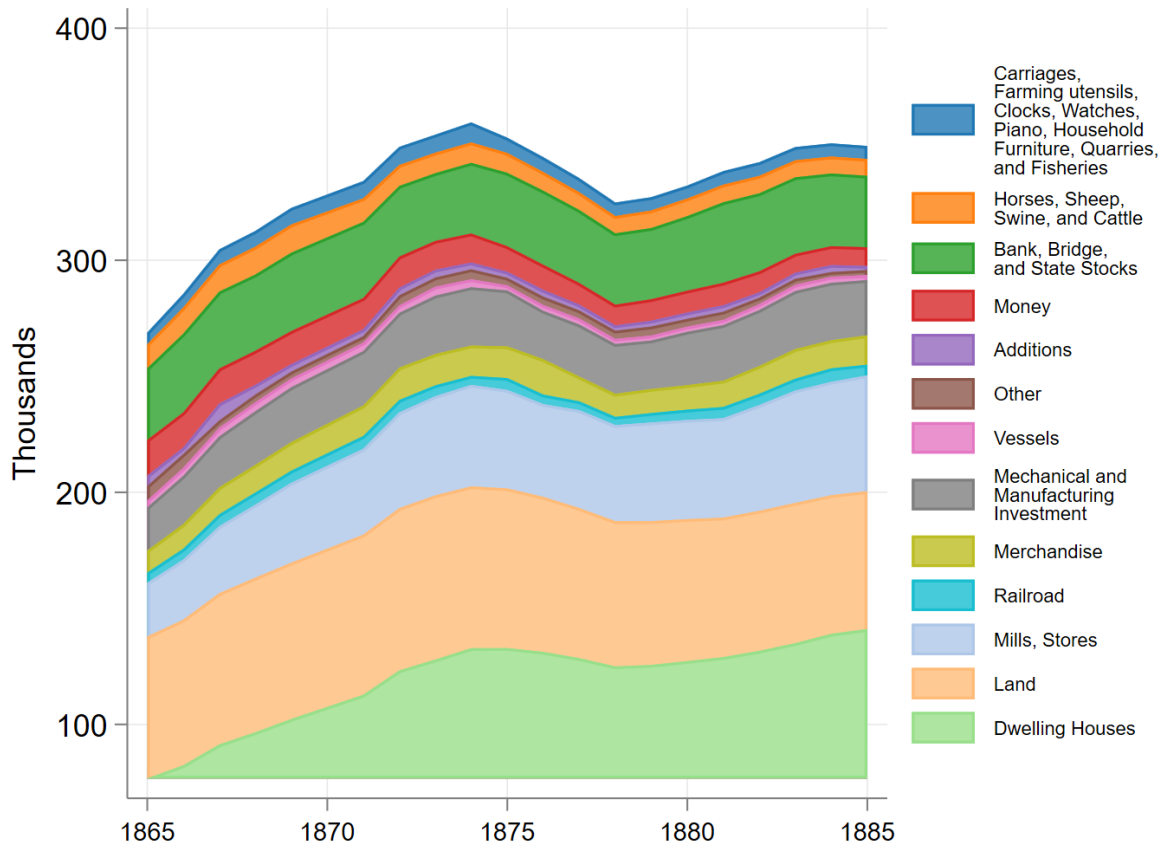
Notes: These maps show the average state property tax rate by state between 1820-1940. Values are averaged for every decade. The state property tax rate does not include property tax rates from other jurisdictions, such as city and county. The cutoffs for the legend represent the minimum, 5th, 10th, 25th, 50th, 75th, 90th percentile and maximum values across all years. The average tax rate is generally lower than 0.3%.

Figure A8: Assessment Ratio



Notes: The figure shows the average effective ratio of assessed to true value of all property used for state property taxation. Decline in 1850-1880 happens as intangible property gained in importance during the industrialization (share of personal property in tax base is stable), increase from 1910 is due to adoption of state tax commissions and increased enforcement (average year of adoption: 1908).

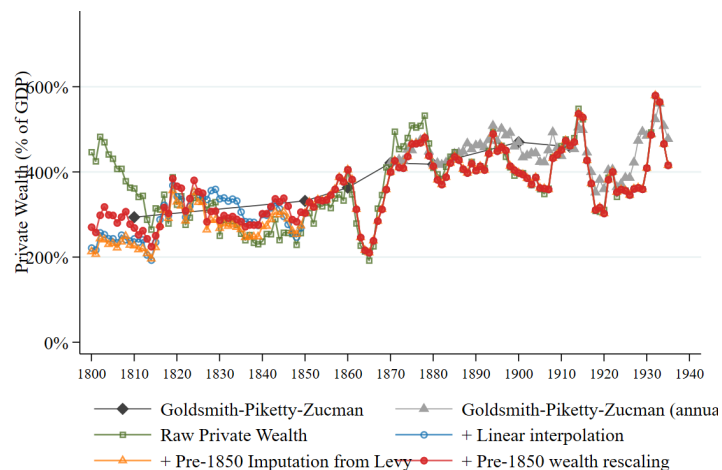
Figure A9: Categories of Personal Wealth



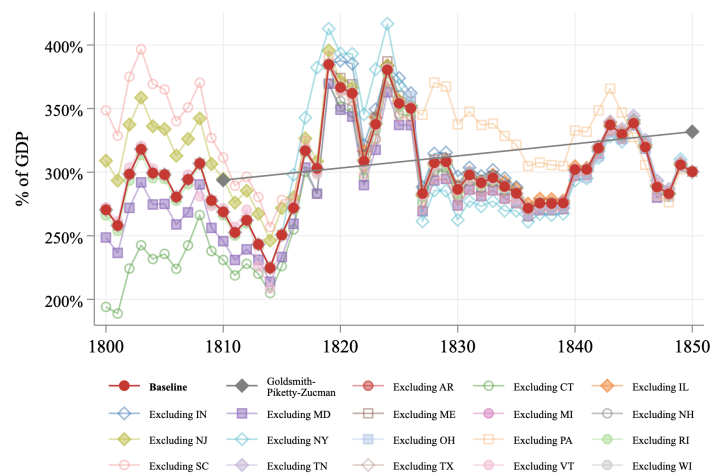
Notes: This figure shows the trends in the value of categories of personal property subject to the general property tax in Connecticut. Source: Grand List of Connecticut as presented by Ely (1888) in Taxation in American States and Cities, p. 503-506

Figure A10: Sensitivity of National Wealth Estimates to Various Assumptions

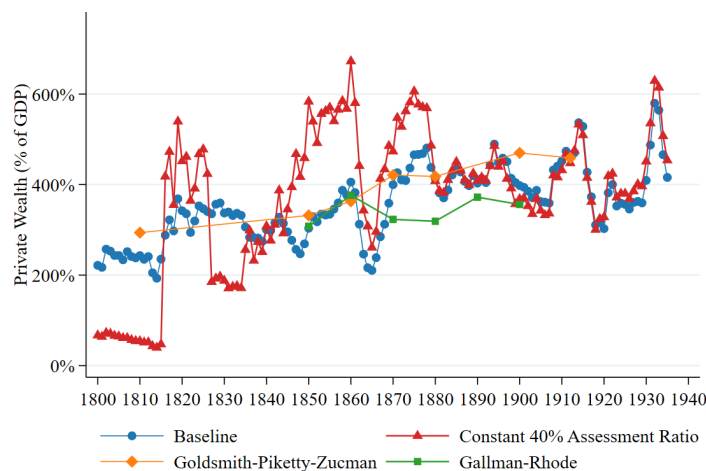
A. Comparison of Private Wealth Estimates



B. Robustness of US Wealth Estimates

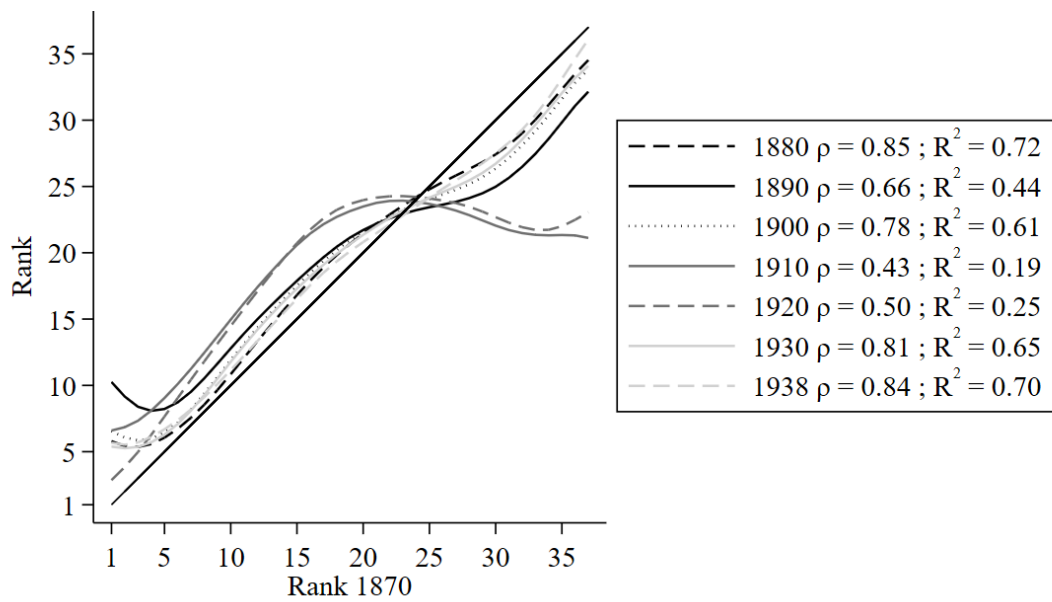


C. Sensitivity to Assessment Ratio



Notes: Panel A compares the different Wealth estimates. Panel B compares different wealth estimates excluding certain states. Baseline is Pre-1850 rescaling and imputation from Levy. Panel C compares the different Wealth Estimates with those of (Goldsmith, 1951) and (Piketty and Zucman, 2014).

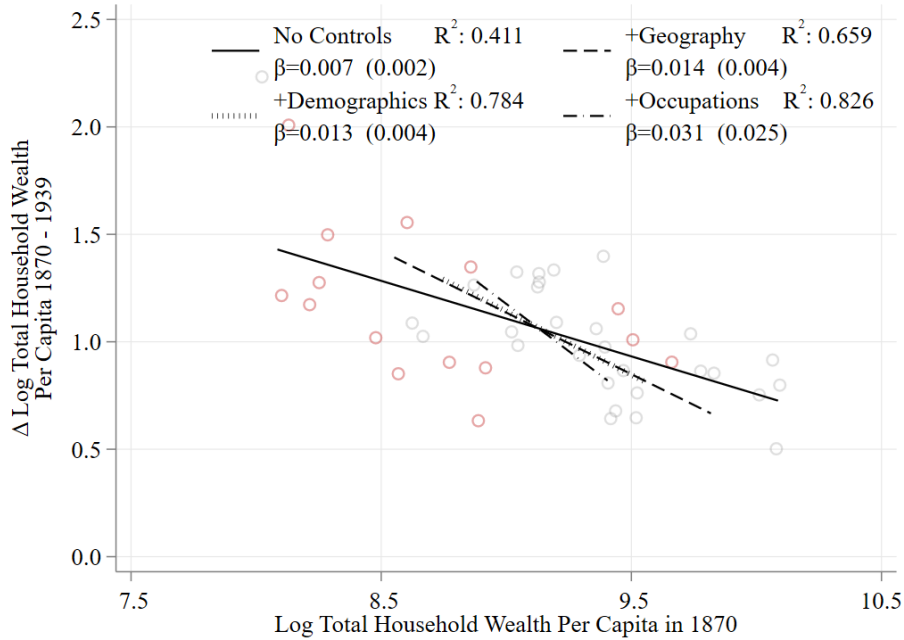
Figure A11: State Persistence



*Notes:* Each line compares state wealth percentile in the baseline year with state wealth percentiles in the subsequent decade, as described by the legend. Figure's baseline year is set to 1870 and it involves 37 states. Wealth is measured as per capital wealth in 2012 prices, and both correlation coefficients and  $R^2$  are reported for each time frame.

Figure A12: State Convergence

A.  $\beta$  - Convergence - Wealth per Capita from 1870



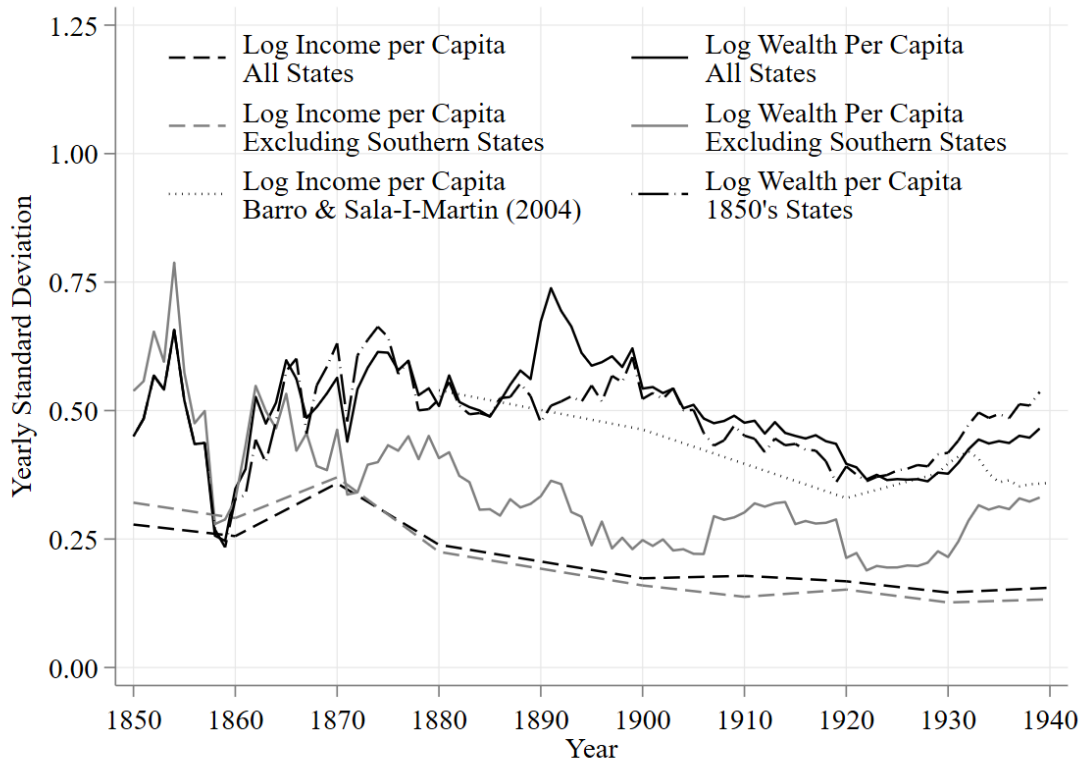
B.  $\beta$  - Convergence - Income Per Capita from 1870



Notes: Panel A shows the relationship between change in log wealth between 1870 and 1939 and wealth in 1870. Groups of controls, i.e. geography, demographics, occupation shares are progressively added. Panel B shows the relationship between change in log income per capita between 1870 and 1940 and wealth in 1870. Southern states are shown in red. In Panel B, Log Income per capita is measured as the state average of Log Occupational Income score for all the states available whose occupational score is non-zero in [Ruggles et al. \(2021b\)](#).

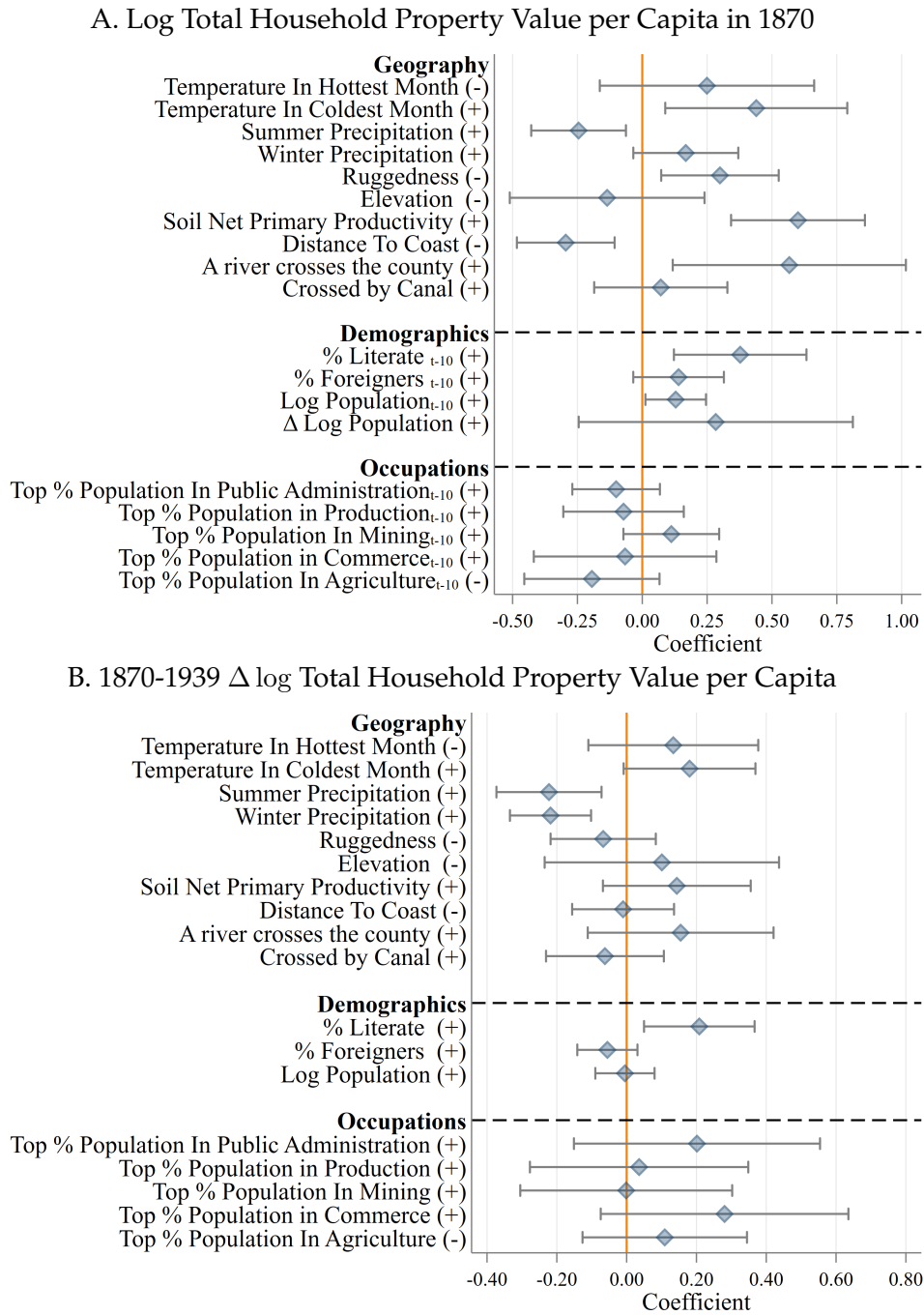
Figure A12: State Convergence

C.  $\sigma$  - Convergence



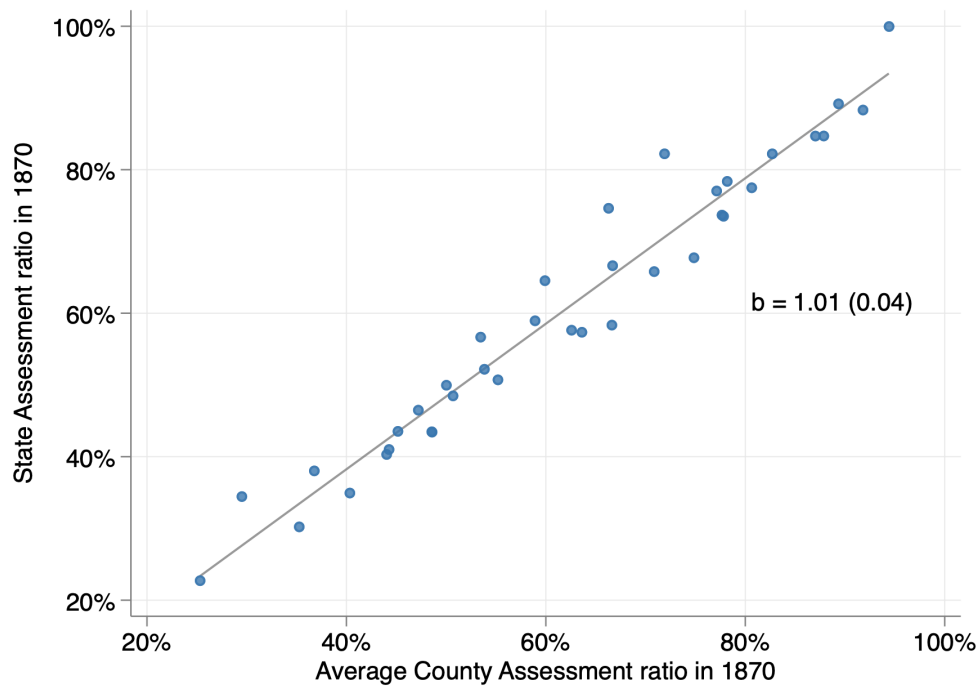
Notes: Panel C plots the yearly standard deviation for wealth and income. Solid lines show the evolution of wealth over time for all states available, while the time series for 1850's states keeps the sample of states fixed to 25 over time. Dashed lines use as a measure of Log Income per capita the state average of Log Occupational Income score, and span the period 1850-1940 for all the states available whose occupational score is non-zero in [Ruggles et al. \(2021b\)](#). Lastly, the dotted line is derived from [Barro and Sala-i Martin \(2004\)](#) and starts in 1880.

Figure A13: Correlates of Wealth Growth - State Level Estimates (1870-1939)



Notes: Panel A presents the set of coefficients coming from the regression of log wealth in 1870 on 1860's determinants. Panel B presents the set of coefficients coming from the regression of the change in log wealth between 1870 and 1939 on 1870's wealth and controls. Geography is time-constant and every coefficient is shown with its 90% confidence interval. Furthermore, the minus sign tells that the sign of the coefficient was switched for graphical purposes. Year fixed effects are included in this specification.

Figure A14: Comparison of State and Counties Assessment Ratios in 1870



Notes: This figure displays the average assessment ratio of assessed to true value of all property at the state-level. Each dot plots the ratio in the state compared to the average ratio of each county in that state weighted by county population.

Figure A15: Private Wealth at the State Level 1850-1870 based on IPUMS USA Full Count

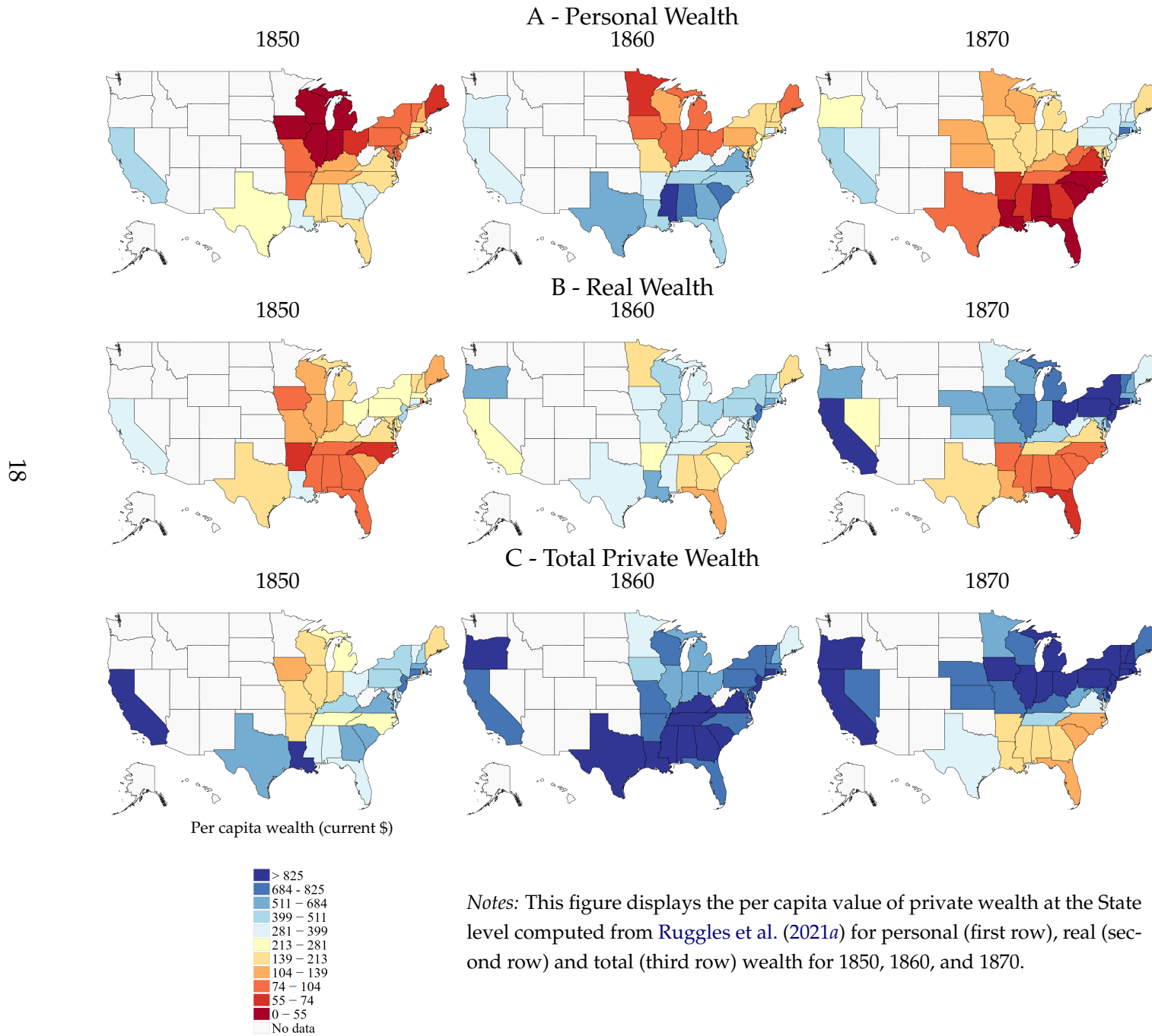
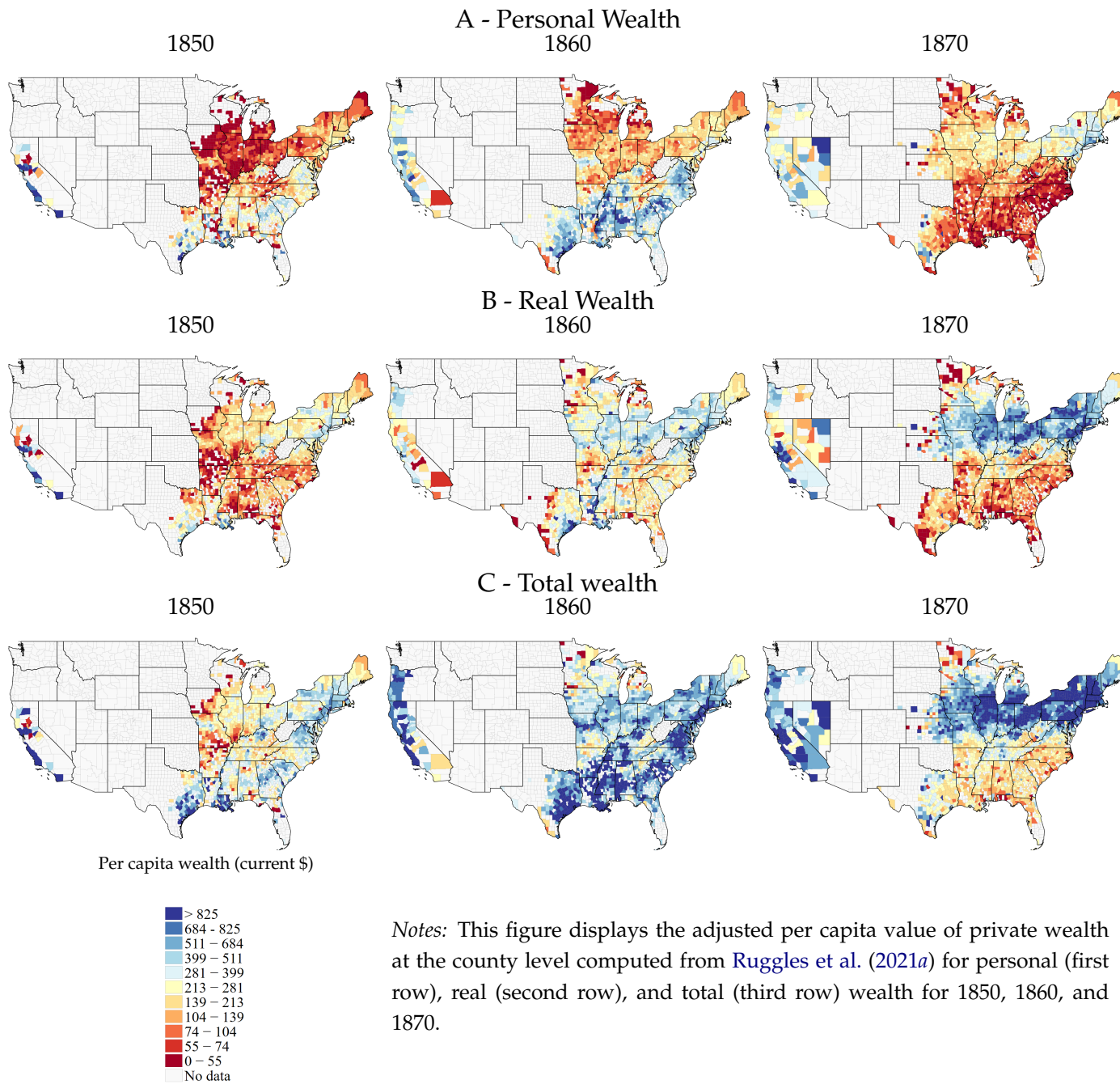


Figure A16: Private Wealth at the County Level 1850-1870 based on IPUMS USA Full Count

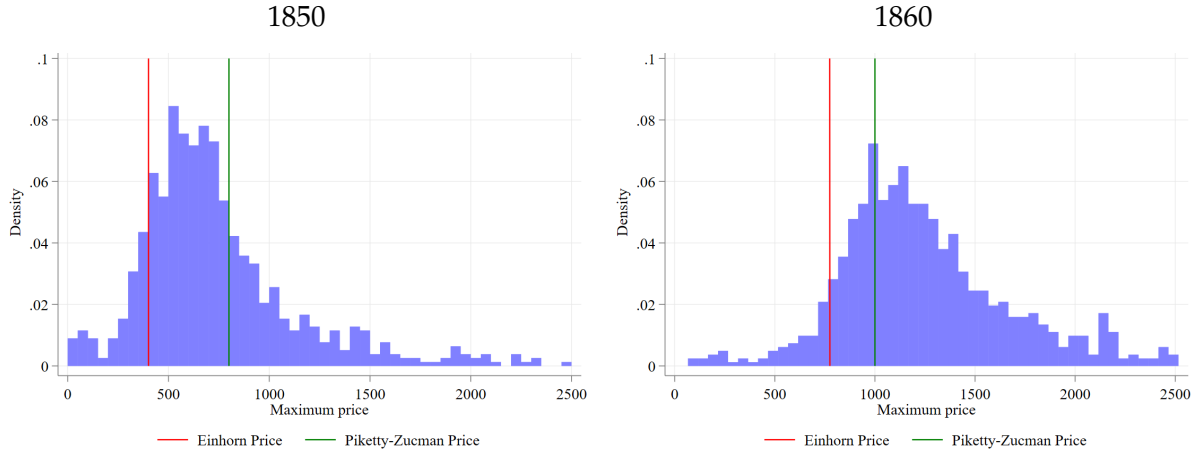
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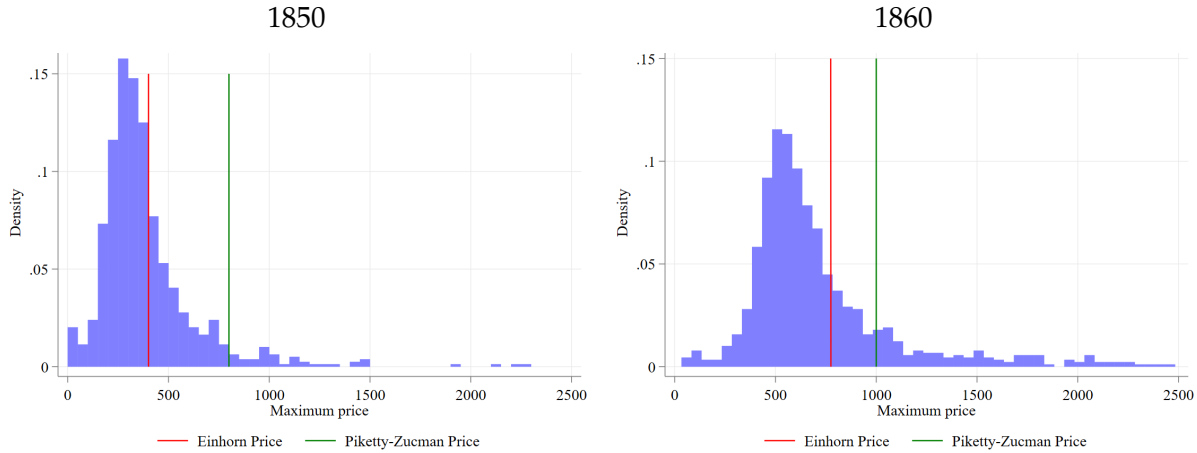
Notes: This figure displays the adjusted per capita value of private wealth at the county level computed from [Ruggles et al. \(2021a\)](#) for personal (first row), real (second row), and total (third row) wealth for 1850, 1860, and 1870.

Figure A17: Distribution of the Upper Bounds on Prices of Enslaved People

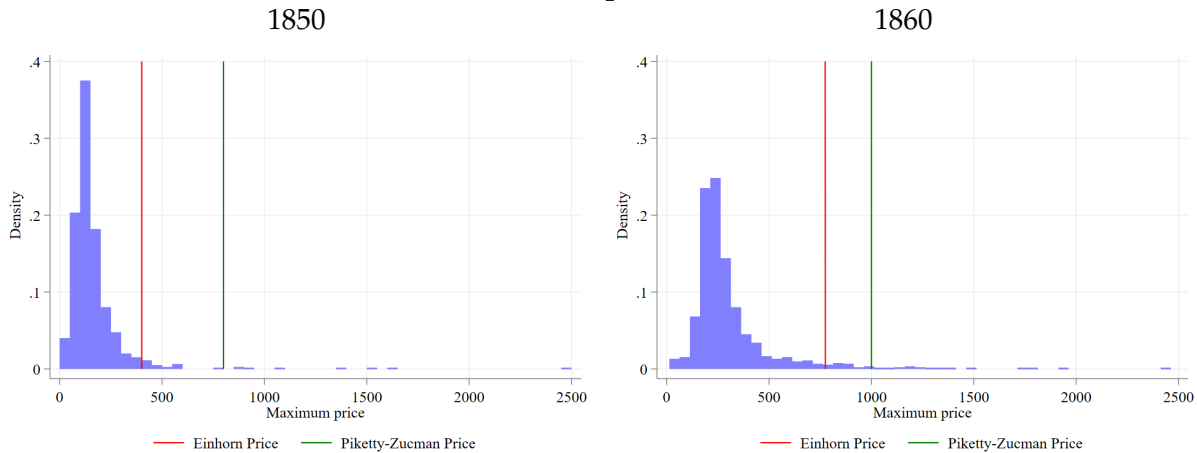
A - Wealth from Enslaved People = 100% of Personal Wealth



B - Wealth from Enslaved People = 50% of Personal Wealth



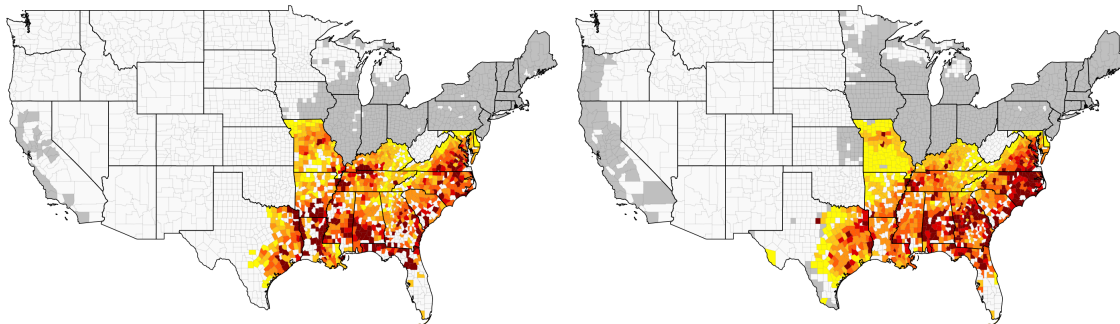
C - Wealth from Enslaved People = 20% of Personal Wealth



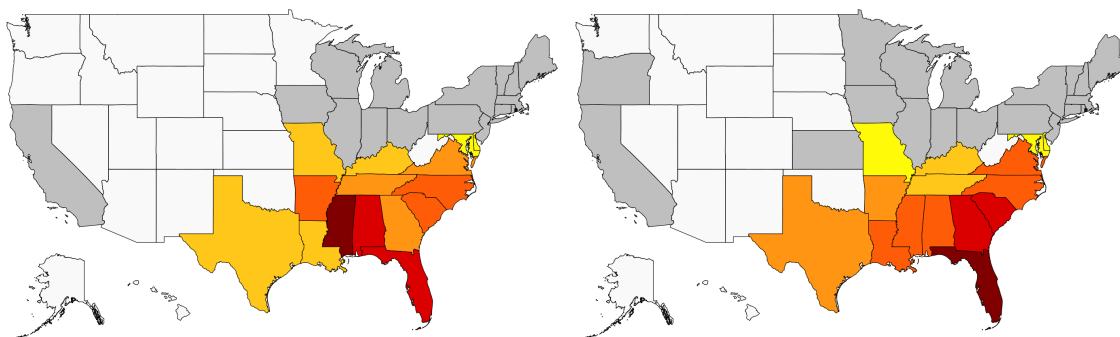
Notes: The figure represents the distribution of the upper bounds on prices of enslaved people by county. The prices are obtained by assuming that wealth from enslaved people represents a share X of Personal Wealth in Southern states in 1850 and 1860 and dividing by the number of enslaved people in the county. Panel A assumes the share X is 100%; Panels B assumes it is 50%; and Panels C assumes it is 20%. The vertical lines are prices from [Einhorn \(2008\)](#) and [Piketty and Zucman \(2014\)](#).

Figure A18: Share of Wealth from Enslaved People in Total Wealth

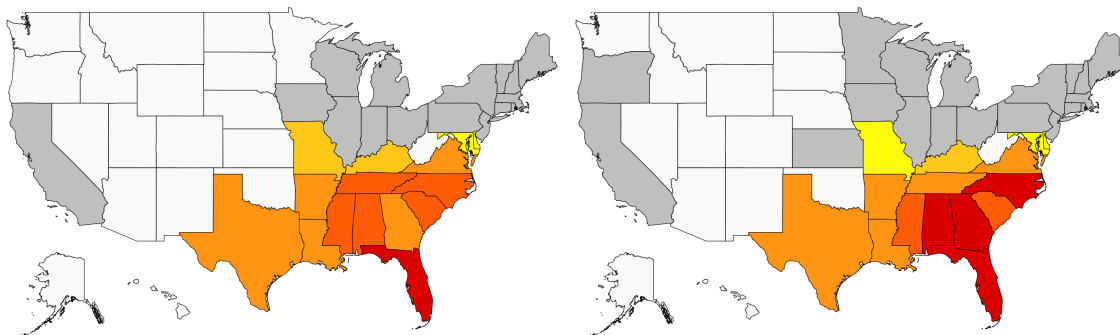
A - County Level, IPUMS USA Full Count Series  
1850 1860



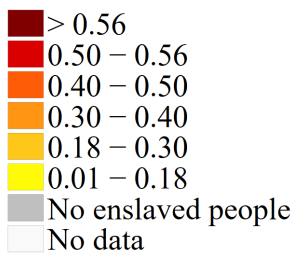
B - State Level, IPUMS USA Full Count Series  
1850 1860



C - State Level, Tax-derived Series  
1850 1860



Share of Wealth from Enslaved People in Total Wealth

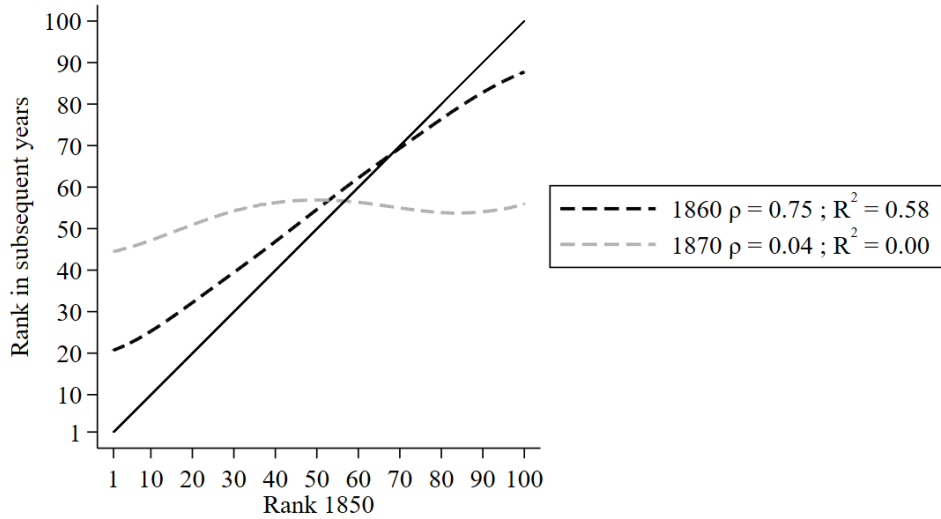


Notes: The figure shows wealth from enslaved people at the county level (Panel A) and state level (Panels B and C) as a share of total private wealth in 1850 and 1860. Panels A and B use the IPUMS USA Full count data. Panel C uses the property tax data. The construction of wealth from enslaved people is described in Section II.2.

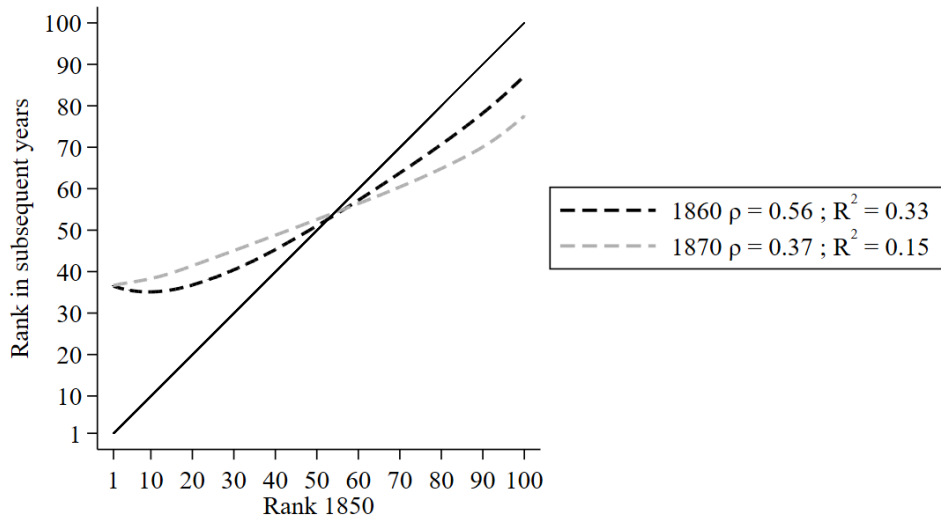


Figure A20: Effects of the War and Role of Enslaved Wealth at the County Level

A - Persistence of Wealth  
Including Wealth from Enslaved People

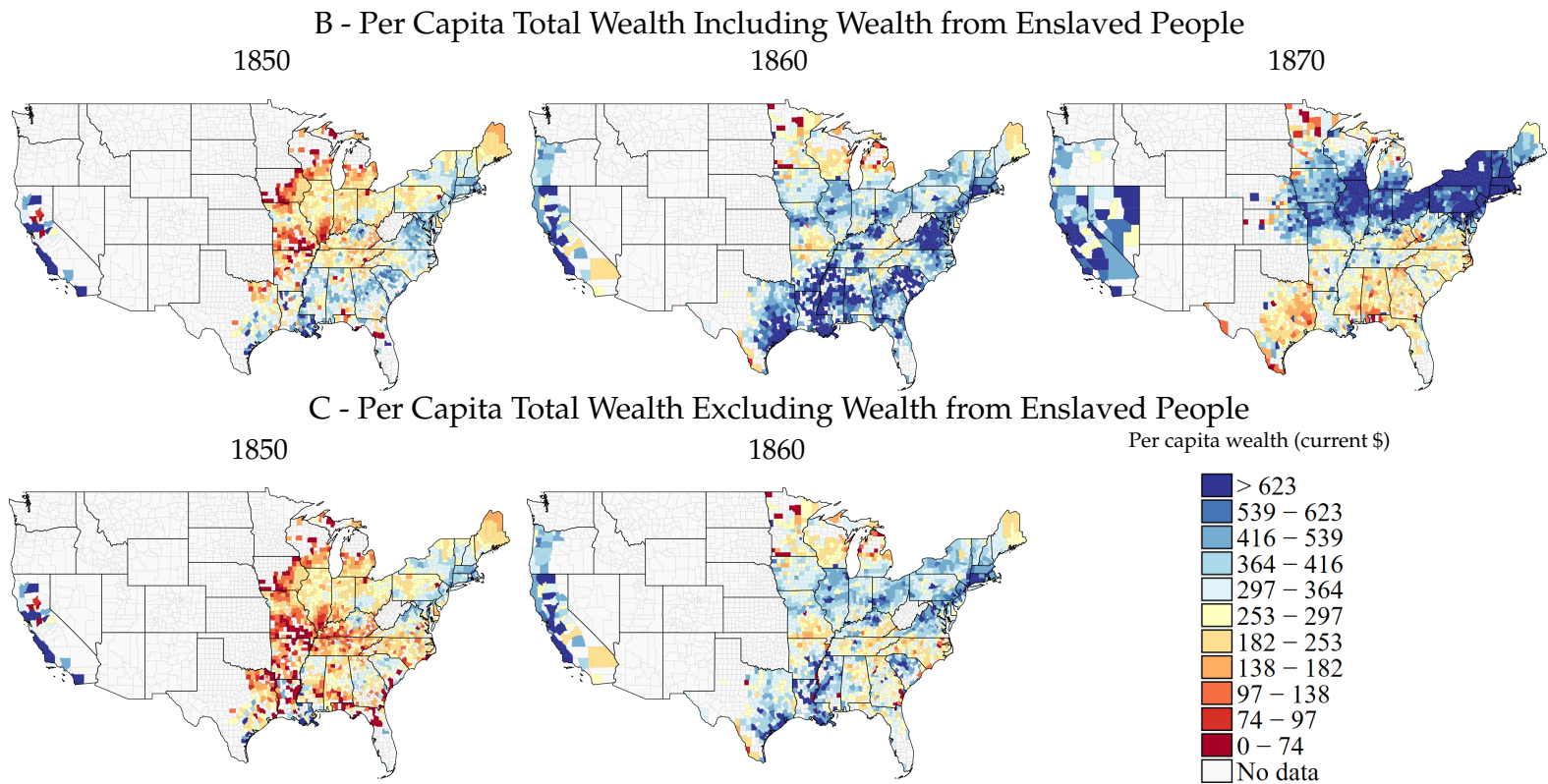


Excluding Wealth from Enslaved People



Notes: Panel A displays the persistence of county wealth quantile between 1850 and 1860/1870, taking [Ruggles et al. \(2021a\)](#) series. We successively include or exclude wealth from enslaved people using [Einhorn \(2008\)](#) prices. Wealth is compared in current US dollars.

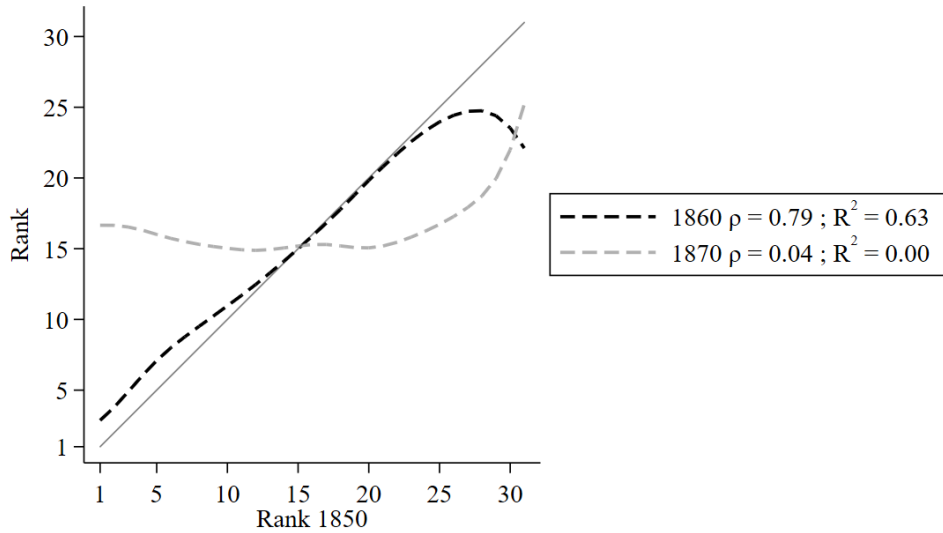
Figure A20: (continued)



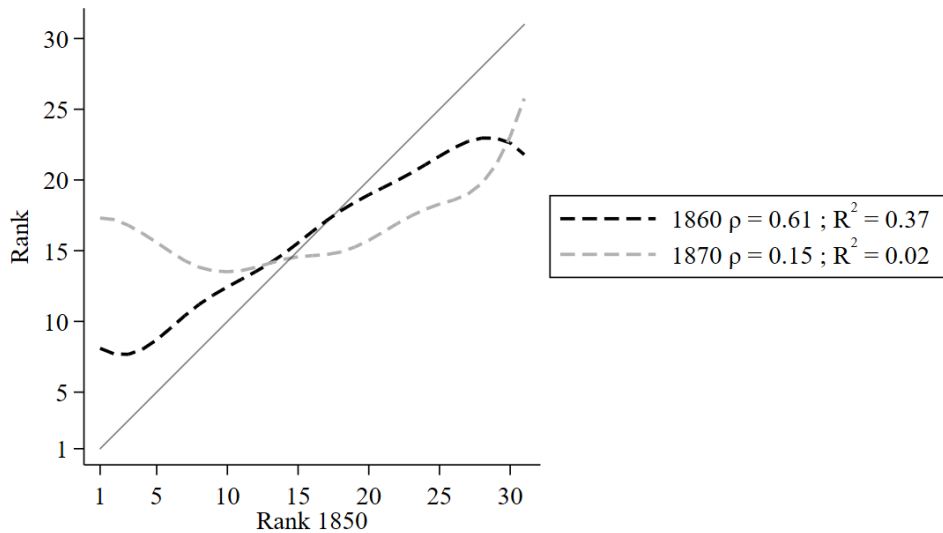
Notes: Panel B displays the average per capita wealth at the county level from [Ruggles et al. \(2021a\)](#) series, including wealth from enslaved people. Panel C displays the average per capita wealth at the county level from [Ruggles et al. \(2021a\)](#) series, excluding wealth from enslaved people, with [Einhorn \(2008\)](#) prices. Panel C year 1870 would be identical to Panel B because there were no enslaved person in 1870. Wealth is compared in current US dollars.

Figure A21: Effects of the War at the State Level : Property and Wealth

A - Persistence of Wealth and Property  
Property - Tax-based series



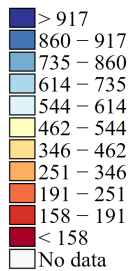
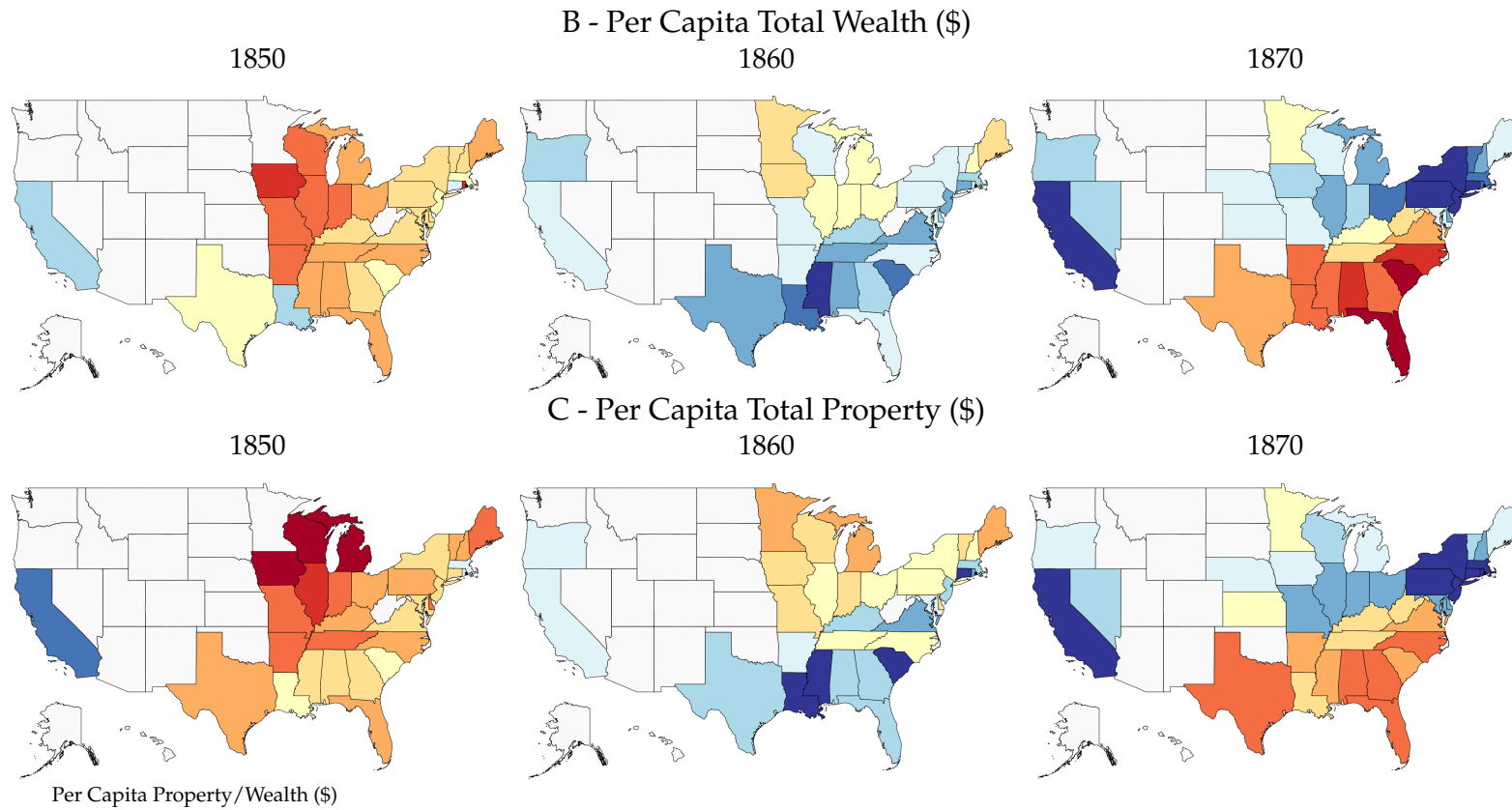
Wealth - Ruggles et al. (2021a) series



Notes: Panel A displays the persistence of state wealth and property rank between 1850 and 1860/1870, taking Ruggles et al. (2021a) and our Tax-based series. Wealth is compared in current US dollars.

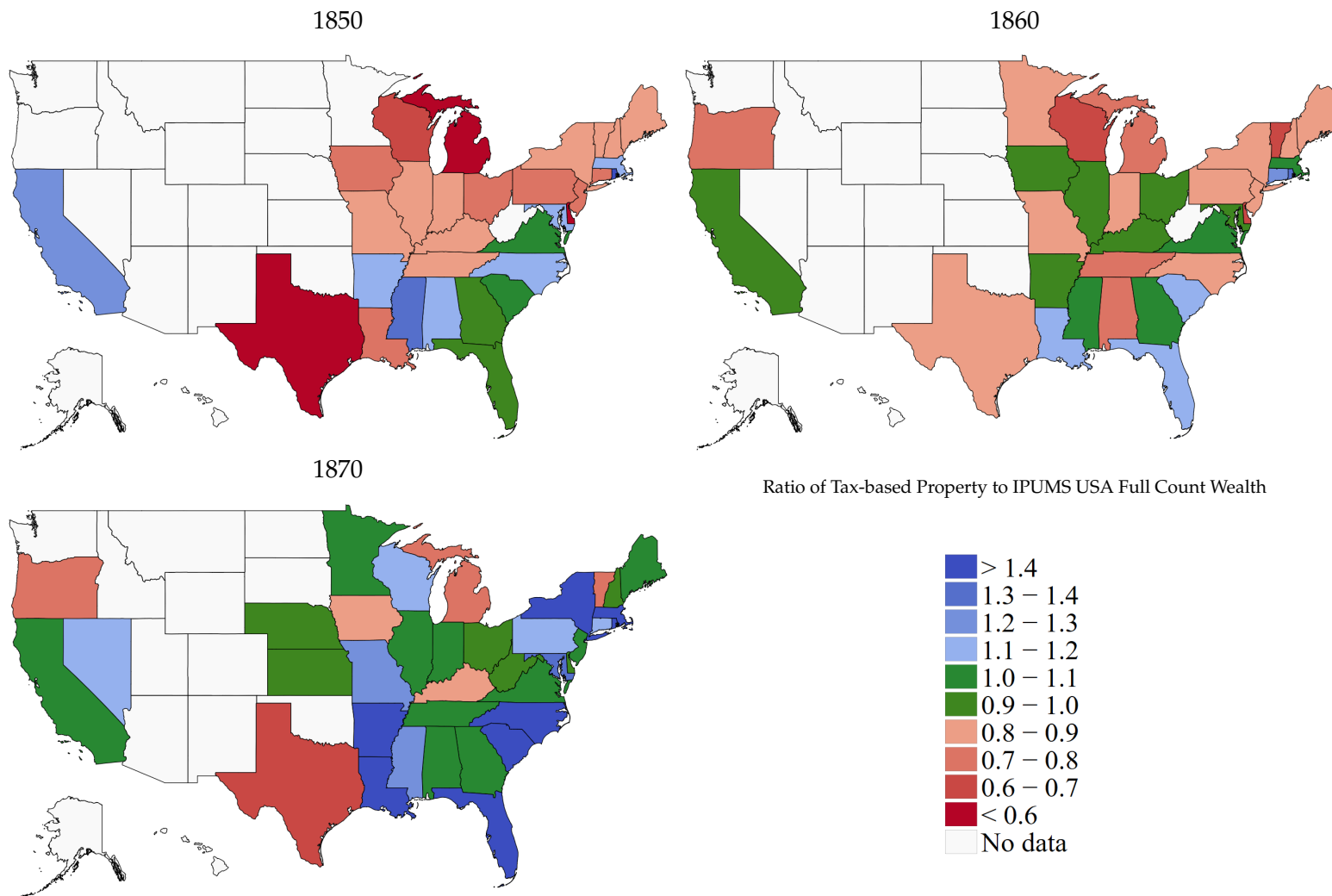
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Figure A21: Effects of the War at the State Level



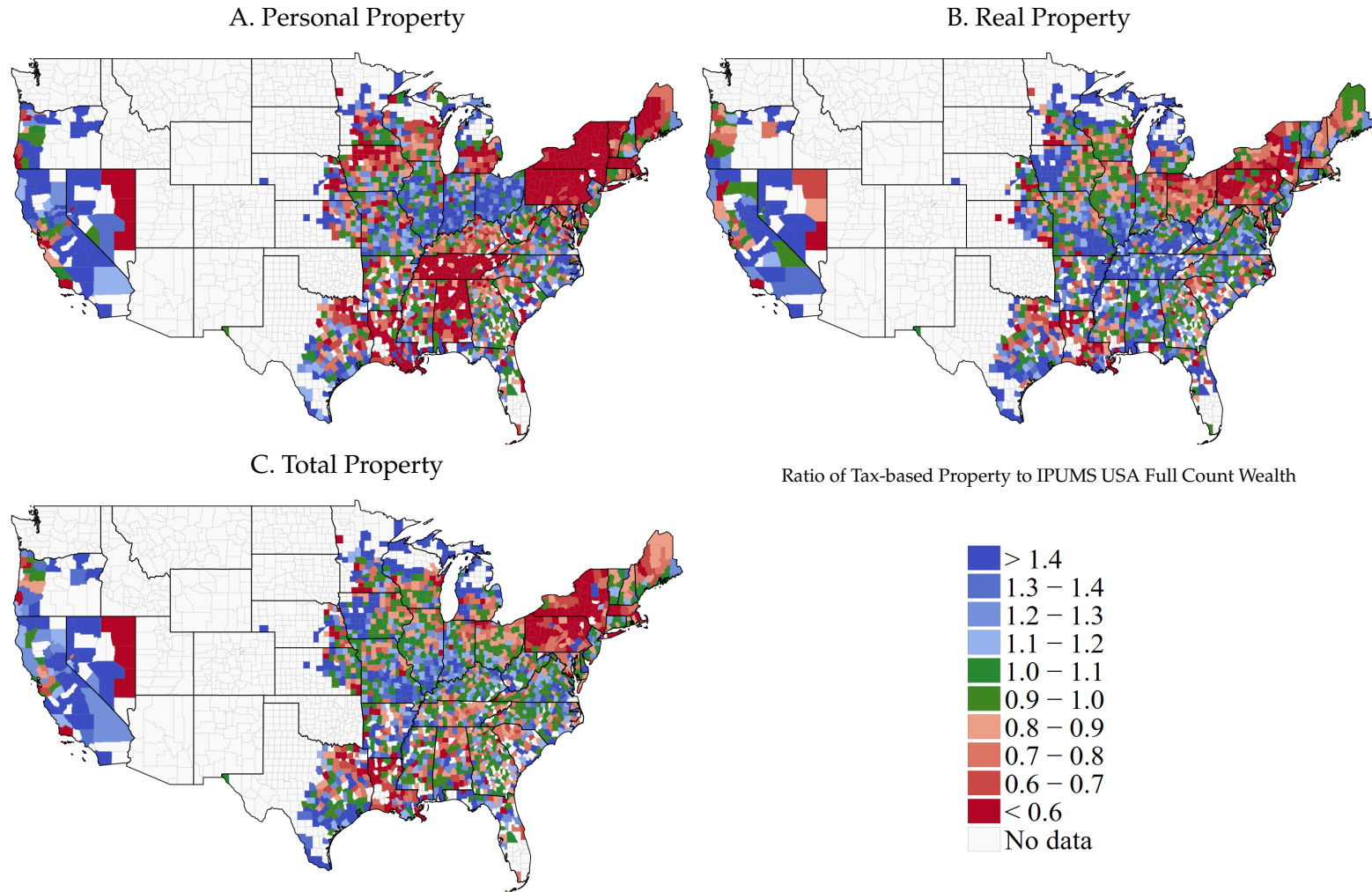
*Notes:* Panel B displays the average per capita wealth at the state level from [Ruggles et al. \(2021a\)](#) series, including wealth from enslaved people. Panel C displays the average per capita property at the state level from our baseline series, including enslaved people in property. Values are compared in current US dollars.

Figure A22: Ratio of Tax-based Property and IPUMS USA Full Count Wealth Measures at the State Level 1850-1870



Notes: The figure shows the ratio of the tax-based property measure and the IPUMS USA Full Count wealth measure at the state level.

Figure A23: Ratio of Tax-based Property and IPUMS USA Full Count Wealth Measures at the County Level in 1870

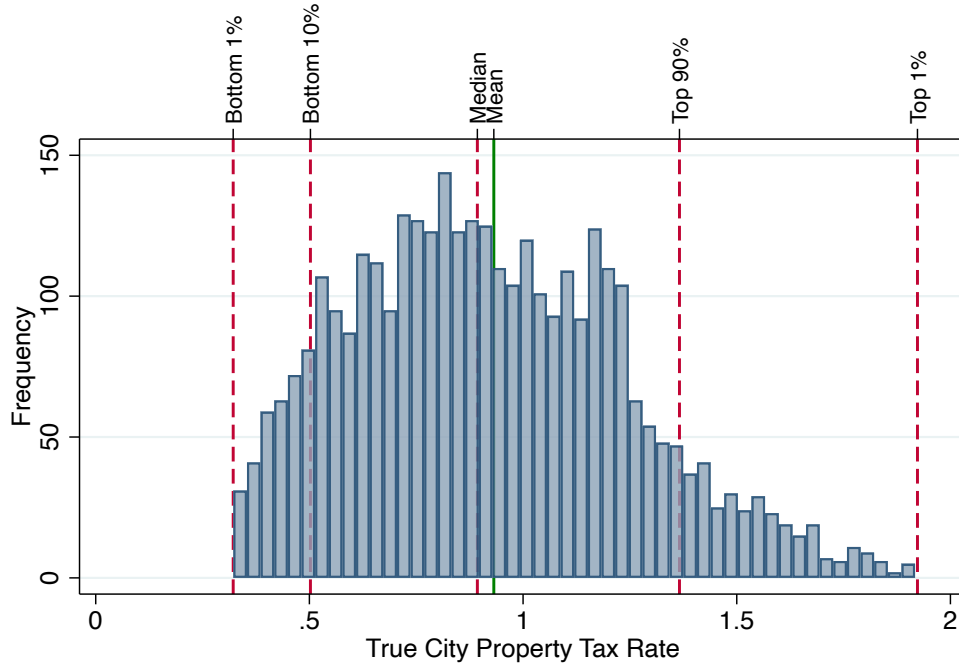


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*Notes:* The panels represent the ratio between the tax-based and the IPUMS USA Full Count wealth measure at the county level. Many counties in New York, Pennsylvania (as well as Tennessee and Alabama for personal property) under-estimate their tax-based personal and real property compared to the IPUMS USA Full Count wealth.

Figure A24: Distribution of Effective Tax Rates Across Municipalities

A. Histogram of Effective Tax Rates



B. Histogram of Residual Tax Rates Changes

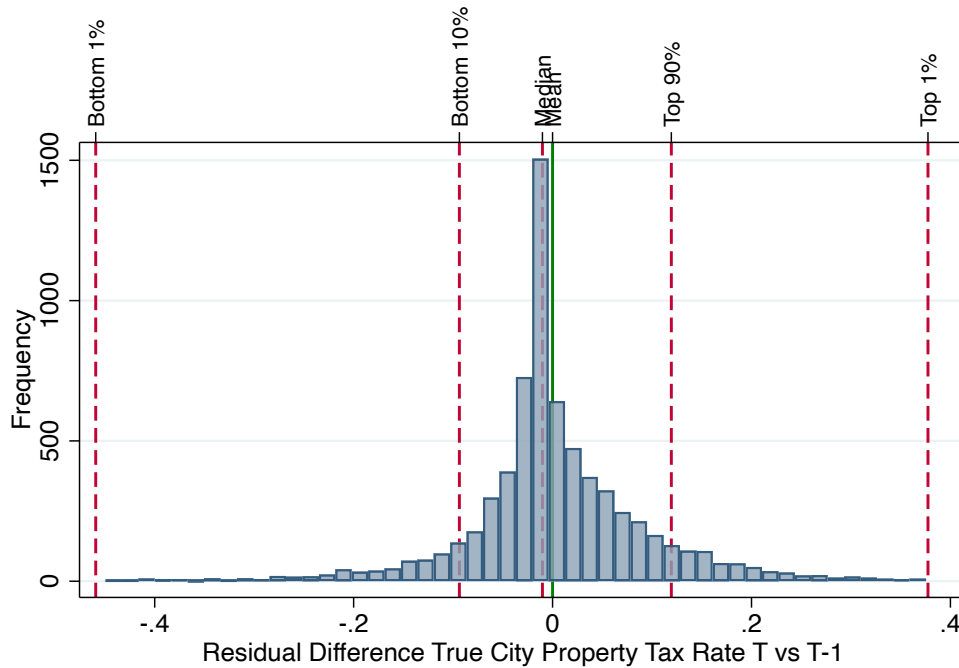


Figure A25: Serial Correlation of Residual Tax Rates Changes

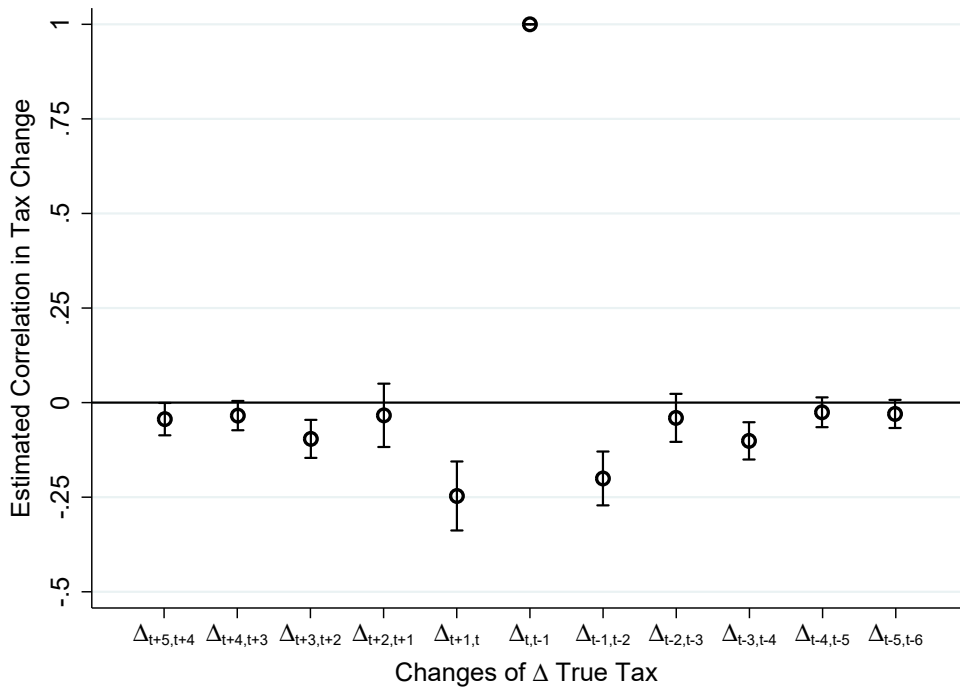


Figure A26: Estimates of Migration Elasticities in Literature

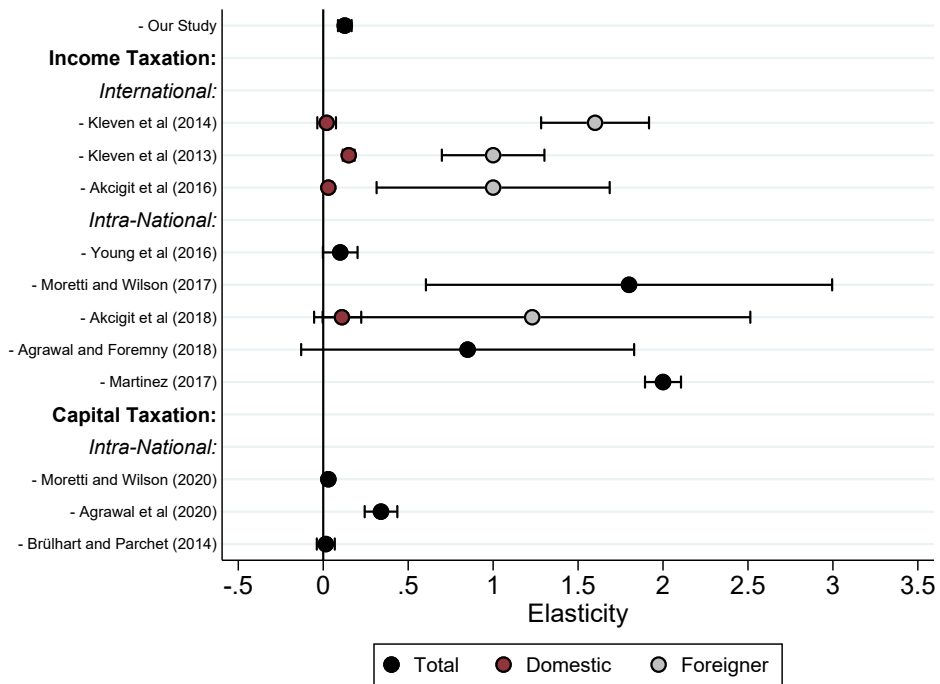


Figure A27: Capitalization Into Real Estate Values: Dynamic Impact of Tax Change on Total Value of Real Estate Property



Notes: The Figure shows the estimated cumulative effect of a tax change on the log of total real property value. The horizontal axis plots the years since the tax change. We estimate equation (4) and plot the coefficients for each year  $t = j$ ,  $\alpha_j = \sum_{k=-j}^5 \hat{\gamma}_k$ . Controls include city fixed effects, state times year fixed effects, demographic and economic characteristics, measures of enforcement, assessment ratios, and municipal government expenditures.

Table A1: Correlates of Property - County Level

	Dependent variable: Log Total Household Property Value Per Capita					
	(1)	(2)	(3)	(4)	(5)	(6)
	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	60-Year $\Delta$	in 1870
Log Total Household Property Value Per Capita	-0.261*** (0.008)	-0.410*** (0.011)	-0.503*** (0.013)	-0.519*** (0.012)	-0.719*** (0.025)	
<b>A. Geography</b>						
Temperature in Hottest Month		-0.062*** (0.017)	-0.032* (0.017)	-0.023 (0.017)	0.168*** (0.053)	-0.315*** (0.060)
Temperature in Coldest Month		-0.001 (0.015)	0.038*** (0.014)	0.024* (0.014)	-0.005 (0.040)	0.061 (0.043)
Summer Precipitation		-0.107*** (0.007)	-0.063*** (0.008)	-0.070*** (0.007)	-0.022 (0.016)	0.028 (0.022)
Winter Precipitation		-0.081*** (0.012)	-0.094*** (0.012)	-0.087*** (0.012)	-0.051* (0.027)	-0.148*** (0.030)
Elevation		-0.003 (0.014)	-0.030** (0.013)	-0.038*** (0.013)	0.082 (0.056)	-0.344*** (0.068)
Ruggedness		-0.042*** (0.009)	-0.010 (0.009)	-0.010 (0.009)	-0.010 (0.028)	-0.127*** (0.028)
Soil Net Primary Productivity		0.061*** (0.009)	0.082*** (0.010)	0.074*** (0.010)	0.058** (0.024)	0.031 (0.027)
Distance to Coast		0.006 (0.009)	0.053*** (0.009)	0.058*** (0.008)	-0.128*** (0.025)	0.238*** (0.029)
Crossed by Navigated River		0.014 (0.010)	-0.003 (0.010)	-0.006 (0.010)	-0.025 (0.021)	0.089*** (0.026)
Crossed by Canal		0.077*** (0.019)	0.098*** (0.022)	0.096*** (0.023)	0.074** (0.036)	0.007 (0.039)
<b>B. Demographics</b>						
% Literate			0.197*** (0.011)	0.178*** (0.011)	0.103*** (0.019)	0.377*** (0.038)
% Foreigners			0.061*** (0.008)	0.054*** (0.007)	0.023* (0.014)	-0.069*** (0.018)
Log Population			-0.033*** (0.008)	-0.048*** (0.009)	0.053*** (0.016)	0.082*** (0.024)
$\Delta$ Log Population			-0.092*** (0.022)	-0.092*** (0.021)		-0.073 (0.055)
% Males			0.029*** (0.011)	0.023** (0.009)	0.088*** (0.027)	0.087*** (0.033)
% White			-0.097*** (0.008)	-0.094*** (0.008)	-0.050*** (0.019)	-0.343*** (0.054)
<b>C. Occupations: Top % of Population in:</b>						
Public Administration				0.026*** (0.010)	0.068*** (0.025)	-0.032 (0.033)
Production				0.015 (0.011)	-0.100*** (0.029)	0.118*** (0.033)
Mining				0.009 (0.012)	0.022 (0.028)	0.097*** (0.031)
Commerce				0.023** (0.011)	0.031 (0.025)	0.092*** (0.031)
Agriculture				-0.092*** (0.011)	-0.187*** (0.028)	-0.040 (0.032)
<b>D. Inequality</b>						
Fraction of the Total Property of the County Owned by the Top 10%					-0.147*** (0.023)	
% of Enslaved Property in 1860					-0.068** (0.027)	-0.257*** (0.034)
Observations	18,128	15,033	12,742	12,730	1,568	1,583
Number of units	3,080	2,519	2,518	2,518	1,568	1,583
Period Dep. Variable	1870-1930	1870-1930	1870-1930	1870-1930	1930	1870
Adjusted $R^2$	0.37	0.47	0.52	0.52	0.57	0.61
Implied Convergence	0.030	0.053	0.070	0.073	0.021	

Notes: Columns 1-4 report the coefficients obtained by regressing the 10-year change in log wealth on lagged property, geographical variables, demographics, occupation shares and public policy variables. Geography is taken as time-constant. Occupation shares are represented by indicator variables taking value 1 if the county is in the top quartile for such an occupation category. This specification includes year fixed effects. Column 5 reports the set of coefficients coming from the regression of the change in log wealth between 1870 and 1930 on 1870's wealth and controls. Geography is time-constant. Column 6 presents the set of coefficients coming from the regression of log wealth in 1870 on 1860's controls.

Table A2: Correlates of Property - County Level - State FEs

	Dependent variable: Log Total Household Property Value Per Capita					
	(1)	(2)	(3)	(4)	(5)	(6)
	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	60-Year $\Delta$	in 1870
Log Total Household Property Value Per Capita	-0.489*** (0.010)	-0.523*** (0.011)	-0.573*** (0.013)	-0.589*** (0.012)	-0.728*** (0.026)	
<b>A. Geography</b>						
Temperature in Hottest Month		0.027 (0.022)	0.033 (0.024)	0.043* (0.024)	0.060 (0.066)	-0.046 (0.080)
Temperature in Coldest Month		-0.018 (0.019)	-0.009 (0.020)	-0.023 (0.020)	-0.037 (0.056)	0.085 (0.062)
Summer Precipitation		-0.005 (0.013)	0.005 (0.013)	-0.003 (0.012)	0.001 (0.029)	0.014 (0.031)
Winter Precipitation		-0.073*** (0.011)	-0.102*** (0.013)	-0.101*** (0.013)	-0.070** (0.032)	-0.196*** (0.034)
Elevation		0.084*** (0.019)	0.050** (0.021)	0.047** (0.021)	0.091 (0.060)	-0.124* (0.072)
Ruggedness		-0.052*** (0.009)	-0.017* (0.009)	-0.016* (0.009)	-0.020 (0.029)	-0.084*** (0.028)
Soil Net Primary Productivity		0.031*** (0.012)	0.052*** (0.013)	0.048*** (0.013)	0.034 (0.026)	0.028 (0.028)
Distance to Coast		-0.053*** (0.013)	-0.001 (0.014)	0.007 (0.014)	-0.228*** (0.030)	0.062 (0.039)
Crossed by Navigated River		0.024** (0.010)	-0.000 (0.010)	-0.005 (0.010)	-0.015 (0.019)	0.065*** (0.024)
Crossed by Canal		0.101*** (0.021)	0.112*** (0.024)	0.106*** (0.024)	0.071* (0.039)	0.017 (0.037)
<b>B. Demographics</b>						
% Literate			0.125*** (0.011)	0.107*** (0.011)	0.055*** (0.018)	0.396*** (0.037)
% Foreigners			0.052*** (0.009)	0.045*** (0.009)	0.028* (0.016)	-0.052*** (0.017)
Log Population			-0.032*** (0.009)	-0.049*** (0.009)	0.077*** (0.016)	-0.012 (0.027)
$\Delta$ Log Population			-0.100*** (0.020)	-0.105*** (0.020)		-0.144** (0.057)
% Males			0.014 (0.012)	0.007 (0.010)	0.068** (0.033)	-0.009 (0.036)
% White			-0.115*** (0.008)	-0.113*** (0.008)	-0.043** (0.021)	-0.198*** (0.069)
<b>C. Occupations: Top % of Population in:</b>						
Public Administration				0.016* (0.010)	0.032 (0.024)	0.035 (0.030)
Production				0.049*** (0.011)	-0.054** (0.027)	0.164*** (0.029)
Mining				0.003 (0.011)	-0.011 (0.026)	0.081*** (0.027)
Commerce				0.032*** (0.010)	0.033 (0.023)	0.086*** (0.028)
Agriculture				-0.073*** (0.011)	-0.153*** (0.026)	-0.057** (0.027)
<b>D. Inequality</b>						
Fraction of the Total Property of the County Owned by the Top 10%					-0.097*** (0.022)	
% of Enslaved Property in 1860					-0.061** (0.029)	-0.140*** (0.031)
Observations	18,128	15,033	12,742	12,730	1,568	1,583
Number of units	3,080	2,519	2,518	2,518	1,568	1,583
Period	1870-1930	1870-1930	1870-1930	1870-1930	1930	1870
Adjusted $R^2$	0.53	0.55	0.59	0.59	0.67	0.71
Implied Convergence	0.067	0.074	0.085	0.089	0.022	

Notes: Columns 1-4 report the coefficients obtained by regressing the 10-year change in log wealth on lagged wealth, geographical variables, demographics, occupation shares and public policy variables. Geography is taken as time-constant. Occupation shares are represented by indicator variables taking value 1 if the county is in the top quartile for such an occupation category. This specification includes both state and year fixed effects. Column 5 reports the set of coefficients coming from the regression of the change in log wealth between 1870 and 1930 on 1870's wealth and controls. Geography is time-constant. Column 6 presents the set of coefficients coming from the regression of log wealth in 1870 on 1860's controls.

Table A3: Correlates of Property - State Level

	Dependent variable: Log Total Household Property Value Per Capita					
	(1)	(2)	(3)	(4)	(5)	(6)
	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	10-Year $\Delta$	69-Year $\Delta$	in 1870
Lagged Log Total Household Property Value Per Capita	-0.210*** (0.038)	-0.415*** (0.031)	-0.518*** (0.039)	-0.536*** (0.040)	-0.883*** (0.201)	
<b>A. Geography</b>						
Temperature In Coldest Month		0.049 (0.070)	0.034 (0.037)	0.028 (0.039)	0.180 (0.115)	0.440* (0.213)
Temperature In Hottest Month		-0.016 (0.074)	0.029 (0.054)	0.026 (0.055)	-0.134 (0.148)	-0.249 (0.251)
Soil Net Primary Productivity		0.168*** (0.038)	0.117*** (0.043)	0.115** (0.046)	0.144 (0.129)	0.600*** (0.157)
Elevation		0.113 (0.099)	0.098 (0.068)	0.085 (0.069)	-0.101 (0.204)	0.135 (0.228)
Ruggedness		-0.085** (0.034)	-0.039 (0.028)	-0.039 (0.029)	0.067 (0.092)	-0.300** (0.138)
Winter Precipitation		-0.002 (0.055)	-0.013 (0.033)	-0.014 (0.031)	-0.218*** (0.071)	0.168 (0.123)
Summer Precipitation		-0.120*** (0.030)	-0.040* (0.020)	-0.044* (0.022)	-0.222** (0.092)	-0.246** (0.111)
Distance To Coast		-0.011 (0.042)	0.008 (0.033)	0.011 (0.033)	0.010 (0.089)	0.295** (0.115)
Crossed by Canal		-0.038 (0.035)	-0.004 (0.033)	-0.010 (0.034)	-0.062 (0.103)	0.071 (0.156)
A river crosses the county		0.209*** (0.071)	0.154** (0.059)	0.153** (0.060)	0.155 (0.162)	0.567* (0.273)
<b>B. Demographics</b>						
Lagged Log Population			0.007 (0.014)	0.003 (0.014)	-0.005 (0.052)	0.129* (0.071)
Lagged % Literate			0.168*** (0.039)	0.148*** (0.040)	0.208** (0.096)	0.378** (0.155)
Lagged % Males			0.008 (0.044)	0.018 (0.045)	-0.161** (0.073)	-0.087 (0.074)
Lagged % White			-0.062* (0.034)	-0.056 (0.034)	-0.128 (0.089)	-0.464* (0.262)
Lagged % Foreigners			0.094*** (0.028)	0.084*** (0.030)	-0.055 (0.052)	0.140 (0.106)
$\Delta$ Log Population			0.062 (0.074)	0.042 (0.079)		0.283 (0.321)
<b>C. Occupations</b>						
Lagged Top % Population In Agriculture				-0.037 (0.027)	-0.109 (0.143)	0.194 (0.158)
Lagged Top % Population In Mining				-0.021 (0.045)	-0.001 (0.185)	0.112 (0.112)
Lagged Top % Population in Production				-0.016 (0.046)	0.036 (0.190)	-0.072 (0.141)
Lagged Top % Population in Commerce				0.040 (0.039)	0.281 (0.216)	-0.066 (0.214)
Lagged Top % Population In Public Administration				0.017 (0.038)	0.201 (0.214)	-0.101 (0.103)
Observations	2,715	2,627	2,500	2,500	43	41
Number of units	52	48	48	48	43	41
Period Dep. Variable	1826-1940	1826-1940	1860-1940	1860-1940	1939	1870
Adjusted $R^2$	0.52	0.61	0.66	0.66	0.65	0.80
Implied Convergence	0.024	0.054	0.073	0.077	0.031	

Notes: Columns 1-4 report the coefficients obtained by regressing the 10-year change in log wealth on lagged wealth, geographical variables, demographics, occupation shares and public policy variables. Geography is taken as time-constant. Occupation shares are represented by indicator variables taking value 1 if the county is in the top quartile for such an occupation category. This specification includes year fixed effects. Column 5 reports the coefficients presents the set of coefficients coming from the regression of the change in log wealth between 1870 and 1939 on 1870's wealth and controls. Geography is time-constant. Column 6 presents the set of coefficients coming from the regression of log wealth in 1870 on 1860's controls.

Table A4: Dates of admission in the Union, Constitution requirement and actual practice of universality and uniformity

State	Admission to Union	First observed practice of universality in assessment of property	First observed practice of uniformity for taxation of property	First appearance of universality requirements in State Constitution	First appearance of uniformity requirements in State Constitution
Alabama	1819	1850	1870		
Alaska	1959	1906			
Arizona	1912	1870	1893		
Arkansas	1836	1838	1838	1868	1836
California	1850	1850	1850	1849	1849
Colorado	1876	1870	1876		
Connecticut	1788	1808	1795		
Delaware	1787	1776	1776		1897
District of Columbia	N/A	1850	1903		
Florida	1845	1850	1884	1868	1838
Georgia	1788	1755	1796		1868
Hawaii	1959	1881	1912		
Idaho	1890	1870	1887		
Illinois	1818	1839	1839		
Indiana	1816	1835	1835	1851	1851
Iowa	1846	1850	1858		
Kansas	1861	1860	1861	1858	1855
Kentucky	1792	1795	1795	1890	1890
Louisiana	1812	1850	1870		1845
Maine	1820	1820	1820		1819
Maryland	1788	1793	1793		
Massachusetts	1788	1792	1792		
Michigan	1837	1838	1838		
Minnesota	1858	1850	1858		1857
Mississippi	1817	1850	1880	1868	1868
Missouri	1821	1850	1860		1820
Montana	1889	1870	1888	1889	1868
Nebraska	1867	1860	1867		
Nevada	1864	1865	1869	1864	1864
New Hampshire	1788	1772	1793		
New Jersey	1787	1794	1794		1844
New Mexico	1912	1850	1882		
New York	1788	1788	1788		
North Carolina	1789	1868	1868	1868	1868
North Dakota	1889	1890	1890	1889	1868
Ohio	1803	1826	1826	1851	1851
Oklahoma	1907	1890	1891		
Oregon	1859	1850	1858	1857	1857
Pennsylvania	1787	1788	1788		
Puerto Rico	N/A	1901	1909		
Rhode Island	1790	1796	1769		
South Carolina	1788	1794	1794	1868	1868
South Dakota	1889	1879	1881	1889	1868
Tennessee	1796	1836	1836		1834
Texas	1845	1846	1846	1845	1845
Utah	1896	1850	1886	1895	1895
Vermont	1791	1796	1796		
Virginia	1788	1793	1793	1850	1850
Washington	1889	1860	1890	1889	1868
West Virginia	1863	1870	1880	1863	1863
Wisconsin	1848	1848	1850		1848
Wyoming	1890	1870	1887	1889	1868

*Notes:* This table shows for each state the date of first appearance of the general property tax principles of universality in the assessment of property and the use of a uniform rate of taxation for all property types. The data are given both as a first appearance of universality and uniformity requirements in state constitutions, as well as the first observed appearance of these practices in state reports. The practice of universal assessment of property refers to the assessment of real and personal property with limited exemptions. The practice of uniformity refers to using a single tax rate or apportionment system on the aggregate value of all property instead of different rates by type of property.

*Source:* Jensen (1931) and Benson et al. (1965) for the first appearance in State constitutions ; State reports for the first observed practices (see Appendix table on State coverages and Sources); Wolcott (1796) and Rabushka (2008) for additional information on practice of assessment and uniformity prior to 1800 in the Thirteen Colonies , Kentucky, Tennessee and Vermont.

## II. Data Appendix

### II.1. Census (IPUMS USA Full Count) Data at the County and State Level

We construct wealth series at the county and state levels using the IPUMS USA Full Count data (Ruggles et al., 2021a) for 1850, 1860, and 1870. In these years the Census asked about real estate and Personal Wealth (only in 1860 and 1870) of households. In 1870, Marshalls were instructed to include “all bonds, stocks, mortgages, notes, live stock, plate, jewels, or furniture” in ersonal wealth, but exclude “wearing apparel”. Real estate was supposed to be reported “without any deduction on account of mortgage or other incumbrance, whether within or without the Census subdivision or the county. The value meant is the full market value, known or estimated.” In 1860, the instructions were similar for personal wealth: it was meant to include “all the property, possessions, or wealth of each individual which is not embraced in the column previous [real estate], consist of what it may; the value of bonds, mortgages, notes, slaves, live stock, plate, jewels, or furniture; in fine, the value of whatever constitutes the Personal Wealth of individuals.” In 1860 and 1870, the elicited measures of wealth are thus supposed to encompass most of real and Personal Wealth. In 1860, Personal Wealth also includes wealth from enslaved people (which is not reported as a separate category).

**Censoring and top-coding.** Personal wealth is censored from below at \$100 in 1870. There is no such bottom censoring in 1850 and 1860. In 1850, 1860, and 1870 there is top-coding at \$999997 for both personal and real wealth separately.

**Imputing personal wealth in 1850.** In 1850, only real wealth is reported. We thus need to impute Personal Wealth. We do this by assuming that the ratio between personal wealth and real wealth is constant between 1850 and 1860 at the county level. If  $c$  is a county and  $W_{c,1860}^{real}$  is the real wealth in the county in 1860,  $W_{c,1860}^{pers}$  is the personal wealth in the county in 1860, we consider the ratio between personal and real wealth:

$$\rho_{c,1860} = \frac{W_{c,1860}^{pers}}{W_{c,1860}^{real}}, \quad \rho_{c,1850} = \frac{W_{c,1850}^{pers}}{W_{c,1850}^{real}} \quad (1)$$

We consider that this ratio is constant over time :  $\rho_c = \rho_{c,1860} = \rho_{c,1850}$ . With available IPUMS USA full count data, we are able to compute  $\rho_c = \rho_{c,1860}$ , and then to retrieve:

$$W_{c,pers}^{1850} = \rho_{c,1850} * W_{c,real}^{1850} = \rho_c * W_{c,real}^{1850}$$

This allows us to impute personal wealth at the county level in 1850. To obtain state-level wealth, we simply aggregate county-level wealth up to the state level.

**Appending IPUMS USA Full count data data to the assessed property data at the county level.** The IPUMS USA Full count-derived wealth data at the county level for 1850 and 1860 is appended to our tax series which start in 1870 at the county level (see Section 3). We thus rescale these series in order to be consistent with the state-level tax derived data. If  $s$  is a state and  $c$  is a county in state  $s$ , we write  $w_{c,t}$  the total wealth in county  $c$  in year  $t$ , and  $W_{s,t}$  the total property in state  $s$ . We define the ratio

$$\rho_{s,t} = \frac{W_{s,t}}{\sum_{c \in s} w_{c,t}} \quad (2)$$

Which is the correction ratio. If it is greater than 1 it means that state level property is greater than the aggregation of its counties wealth, and that we have to correct our IPUMS USA Full Count county series upwards. We hence define

$$\widetilde{w}_{c,t} = \rho_{s,t} * w_{c,t} \quad (3)$$

The corrected wealth at the county level. Now if we add up  $\widetilde{w}_{c,t}$  for all counties in state  $s$ , we find  $W_{s,t}$  which makes the series consistent. We therefore consider our new series  $\widetilde{w}_{c,t}$  as our base series for 1850 and 1850.

Figure A15 shows private wealth from the IPUMS USA Full Count raw data series at the state level and Figure A16 shows private wealth at the county level between 1850 and 1870.

## II.2. Value of wealth from enslaved people

**Prices of enslaved people.** The literature provides a wide range of estimates for the market price of an enslaved person. [Piketty and Zucman \(2014\)](#) use prices of \$800 for 1850 and \$1000 for 1860. [Einhorn \(2008\)](#) estimates the prices to be \$401 in 1850 and \$774 in 1860, based on three-year moving average of the estimations of [Ransom and Sutch \(1988\)](#), p. 150, who give a close estimate of \$377 and \$778. [Philipps \(1966\)](#) estimates a higher price of \$958 in 1860. Our tax-derived data series which comes from [U.S. Census Bureau \(1870\)](#) gives an average price of \$250 for 1850 and \$420 for 1860. Those values were estimated by [Goldsmith \(1952\)](#), p. 317 and [U.S. Census Bureau \(1870\)](#) (Nota Bene p.

8). There are good reasons to believe that those prior estimations of wealth from enslaved people were under-estimated ([U.S. Census Bureau \(1870\)](#), p. 8, and [Piketty and Zucman \(2014\)](#), p. 63 of Appendix).

Table A5: Prices Estimates of Enslaved Persons 1810-1860

Series	U.S. Census Bureau (1870)	Piketty and Zucman (2014)	Einhorn (2008)	Ransom and Sutch (1988)
1810	-	500	265	277
1850	250	800	401	377
1860	420	1000	774	778

Notes: Column 3 ([Einhorn, 2008](#)) corresponds to a 3-year average of [Ransom and Sutch \(1988\)](#).

States do not typically separately report their wealth from enslaved people in their annual state reports. The exceptions are Georgia (from 1860 to 1864) and Texas (from 1846 to 1861 and in 1864). Those wealth values imply an enslaved person price of \$306 and \$584 in Texas in 1850 and 1860, and \$655 in Georgia in 1860. The figures are higher than the enslaved price estimates from [U.S. Census Bureau \(1870\)](#), but still somewhat lower than those in [Einhorn \(2008\)](#).

To get a sense of possible bounds on the price of enslaved people, Figure [A17](#) shows the distribution of the implied price per enslaved person in 1850 and 1860 under three hypothetical scenarios, namely that wealth from enslaved people represents i) 100%, ii) 50%, or iii) 20% of Personal Wealth measured in the Census for Southern states. The prices by [Einhorn \(2008\)](#) which we use seem reasonable given these distributions. The prices implied in the tax data of \$250 for 1850 and \$420 for 1860 appear indeed too low, given that wealth from enslaved people was a significant share of Personal Wealth in Southern states.

**Computing wealth from enslaved people.** We will generically use the number of enslaved people from [Haines et al. \(2010\)](#) and multiply it by a given price for each year (1850 and 1860). We call this variable *Val. Enslaved*. To obtain the series of private wealth excluding wealth from enslaved people, we do the following for years 1850 and 1860:

1. For the state IPUMS USA Full Count series: we subtract the value of enslaved people at the state level from reported private wealth.
2. For the state tax-based data: we first subtract an estimate of the value of enslaved people as given by tax assessors before adding back the value of enslaved people *Val. Enslaved*.

3. For the county IPUMS USA Full Count series (which are our only data for 1850 and 1860), we subtract *Val. Enslaved*.

In some counties, sometimes, total Personal Wealth is below value of enslaved wealth, if we use the Einhorn prices of enslaved people. In 1860, this occurs in 3.2% of counties, or 6.0% of counties that held enslaved persons. In a total of 4.9% of counties, wealth from enslaved people is more than 90% of Personal Wealth using the Einhorn prices. Those counties are mainly located along the Mississippi river and South Carolina. We cap *Val. Enslaved* at the total value of Personal Wealth in each county. Figure A18 shows the share of wealth from enslaved people at the county and state levels obtained for each of the three series (1-3).

## II.3. State Level wealth data

### II.3.1. General approach for the construction of assessment ratios and market value of wealth

**Assessed value of property.** For each state, we start from a harmonized series measuring the total assessed value of property compiled from State reports (mainly reports from the Auditor, the Board of Equalization, or the State Tax Commission), the Census *Wealth, Debt, Taxation* publications, and *Financial Statistics of States* series. Table A7 provides a list of the sources for the assessed wealth measures for each state. We reconstructed a measure of total assessed property value typically since around after statehood to 1930. When multiple sources were available, we prioritized assessed values reported in the Financial Statistics of States and State reports.

In very few cases (128 observations out of 3,409), when no other information was available, we estimated the assessed value of property using information on the tax rate and the revenue of the general property tax. More precisely, we use the identity:  $\tilde{W}_{it} = \frac{R_{it}}{\tilde{\tau}_{it}}$  where  $\tilde{W}_{it}$  indicates the assessed value of property in state  $i$  and year  $t$ ,  $R_{it}$  the property tax revenue, and  $\tilde{\tau}_{it}$  the tax rate on assessed property value. We excluded estimates of assessed value of property coming from this computation for the following States and years, as we could not cross-verify their accuracy and they were an order of magnitude different from valuations provided by either State reports or Census reports in neighboring years: Iowa (1919), Indiana (1904), Maryland (1841 - 1844, 1899), Missouri (1920), New Jersey ( 1891 - 1894), New Mexico (1913), New York (1842 - 1845), Rhode Island (1878-1879), Utah (1911), Virginia (1866). We also excluded the assessed value for Vermont in 1920 (from State reports, inconsistent with the series from the Financial

Statistics of States for 1915 - 1939 ).

Next, we estimate the total value of private wealth by constructing an annual assessment ratio for each state. This assessment ratio is the ratio of assessed to market value of property. We systematically collected information on the assessment ratio using (i) the assessment ratio calculations done by the Census Bureau over the period 1850 - 1922 in the *Wealth, Debt, Taxation* reports; (ii) State reports; (iii) secondary sources (especially [Jensen \(1931\)](#)) and the proceedings of the National Tax Association conferences from 1907 to 1925).

**Assessment ratios.** Importantly, we collected information on assessment ratios given by state tax officials between 1915-1930, but given their self-reported nature and the Census characterization of these ratios as being “only approximately correct” (Census 1921, p. 21), we only use them in special cases to validate our estimates from other sources, as detailed for each state in Section [II.3.2](#).

Our approach to construct annual assessment ratios for each state from this information is the following

1. Start from the Census ratios available about one year every decade from 1850 to 1920, and linearly interpolate in between them.<sup>1</sup>
2. Add information on assessment ratios used in practice provided by State reports, in the legislation, and secondary sources, which are due to changes in the assessment basis used by assessors. This information helps us better identify the timing of changes in assessment ratios. For instance, suppose that for state  $s$ , the Census provides an assessment ratio of value  $a_1^s$  in 1890 and of value  $a_2^s$  in 1900. We check the legislation and secondary sources for state  $s$  and find out that there was a legislation related to property tax enforcement in 1896. We will thus be able to infer that the value of the assessment ratio changed from  $a_1^s$  to  $a_2^s$  in 1896 (rather than assuming that this change happened in 1900, the first year in which we see the new assessment ratio). Many times, we can validate the timing by noting that there are sharp breaks in the assessed values of wealth exactly in the same year as the legislation.
3. If there are remaining breaks in the time series of assessed wealth per capita for which we cannot find any explanation in State reports, legislations and secondary

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<sup>1</sup>For 1880 and 1902, the Census did not construct an estimated true value of property from which we can obtain an implicit assessment ratio. Rather, they only provide a tax rate on the true property value. As this number is less precise, we only use it for states in 1880 and 1902 where we have no other information available. This is detailed for each state in Section [II.3.2](#).

sources used in (2), we adopt the following procedure. Suppose the assessment ratios constructed by the Census are different in  $t$  and  $t + 1$  (i.e., in the decadal publications) and equal to  $a_t = a_1$  and  $a_{t+10} = a_2$  respectively. If we see a break in the series of assessed wealth in  $t + x$  where  $x \leq 10$ , we assume that the change in assessment ratio from  $a_1$  to  $a_2$  happened in year  $t + x$ , so that we set  $a_n = a_1$  for  $t \leq n < t + x$  and  $a_n = a_2$  for  $t + x \leq n \leq t + 10$ .

4. For the remaining breaks in the assessed values, when we observe a break in the assessed wealth series, but find no other information, we apply state-by-state adjustments based on information from self-reported assessment ratios by tax assessors in the Census *Financial Statistics of States*. However, given the self-reported nature of this information, we only use it to infer changes in assessment ratio trends, but do not trust the levels reported.

**Computing wealth from enslaved people and correcting for the under-valuation of wealth from enslaved people at the state level.** There is evidence that the assessments of wealth from enslaved people for property tax purposes were under-estimate (U.S. Census Bureau (1870), p. 8, and Piketty and Zucman (2014), p. 63 of Appendix.). Therefore, we want to correct these assessed values using actual market prices. We use the prices from Einhorn (2008) which are \$401 in 1850, \$774 in 1860. We multiply these by the number of enslaved people at the county level from (Haines et al., 2010) and at the state level from (Gibson and Jung, 2002). Section II.1 describes these constructions in more detail.

We also need to first subtract the (underestimated) value of wealth from enslaved people from the tax-assessed wealth. To do so, we use an estimate of the implicit price per enslaved person at the Federal level. More precisely, we use the total federal values of enslaved person derived from Goldsmith (1952), p. 317 for 1850 and U.S. Census Bureau (1870), p. 8 for 1860. Goldsmith (1952) provides an estimate of wealth from enslaved people of \$0.8 billion in 1850, which implies an averages price of \$250 per enslaved person, using enslaved people counts from (Gibson and Jung, 2002). For 1860, the implied price is \$420 in U.S. Census Bureau (1870).

This approach assumes that the price of enslaved people was the same across states in a given year. This is not the case in practice. For Georgia in 1860 and Texas in 1850 and 1860, the tax data contains the wealth from enslaved people separately. If we use the actual number of enslaved people in these two states from the Census, we obtain an implicit price used by tax of \$306 and \$584 in Texas in 1850 and 1860, and \$655 in Georgia in 1860, which is lower than the estimates from Einhorn. Yet, it seems important to correct for the undervaluation of wealth from enslaved people in the tax assessment data.

We also have alternative sources of prices, as described in Appendix Section II.2, especially on Table A5 which we can use for robustness instead of the prices in Einhorn (2008). Figure A19 shows the state-level wealth using these alternative prices. The picture remains similar in terms of the spatial distribution and time trends.

### II.3.2. State-by-state information on assessment ratios

This section describes in more detail the construction of assessment ratios for each state. We also depict the time series of assessed wealth, assessment ratios, and the market value of wealth in each state.

#### Alabama

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, and 1904 - 1912
- Use 1880 Census ratio for 1871 - 1886
- Use 1890 Census ratio for 1887 - 1893
- Use 1900 Census ratio for 1894 - 1900
- Use 1912 Census ratio for 1912 - 1919
- Use 1922 Census ratio for years 1920 and later

#### Alaska

- Use 60% assessment ratio indicator in State records (Survey of Taxation 1938, page 31)

#### Arizona

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, and 1890 - 1900
- Use 1900 Census ratio for 1900

- Use average of 1900 and 1904 Census ratio for 1901 - 1903
- Use 1904 Census ratio for 1904
- Use 25% assessment ratio for 1905 - 1911
- Use 1912 Census ratio for 1912
- Use 1922 Census ratio for 1913 - 1922
- Use 1922 Census ratio for years post 1922

### **Arkansas**

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, and 1904 - 1912
- Use 1912 Census ratio for 1912 - 1921
- Use 1922 Census ratio for years 1922 and later

### **California**

- Use 1860 Census ratio for years 1860 and earlier.<sup>2</sup>
- Linearly interpolate between Census ratios for 1860 - 1870, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1870 Census ratio for 1870 - 1871
- Use higher assessment basis from the 1860 Census ratio in 1872 to account for changes in assessment methods following the creation of the Board of Equalization as noted in the reports of the Board of Equalization in 1873 (p. 4-5) and 1880 (p.10).
- Linearly interpolate between 1872 and 1880 Census ratio
- Use 1922 Census ratio for years 1922 and later

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<sup>2</sup>We rely on the 1860 Census ratios instead of 1850 as the wealths estimates of 1850 underestimated the value of wealth in California compared to the assessed valuation.

## Colorado

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios between 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1902 - 1904, and 1904 - 1912
- Use 1900 Census ratio for 1900 - 1901
- Use 1922 Census ratio for 1913 - 1922
- Use 1922 Census ratio for years 1922 and later

## Connecticut

- Use 6% assessment ratio used in 1808 to report full assessed values in the tax list<sup>3</sup> for year 1790 - 1820.
- Use 4.4% assessment ratio for 1821 - 1827, Use 4% for 1828 - 1844, and 3.6% for 1845<sup>4</sup>
- Use 1850 Census ratio for 1850 and linearly interpolate assessment ratio between 1846 and 1850
- Linearly interpolate between 1850 and 1861 using 1850 and 1860 Census ratios, and following the same trend for 1861
- Use 1870 census ratio for 1862 - 1870, following change to the legal basis of assessment (reporting of full value of property in the grand list in 1862)
- Linearly interpolate between Census ratios for 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for years 1922 and later

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<sup>3</sup>Connecticut had a particular system whereby assessors were asked to estimate property at its full cash value, but report a percentage of this value into a grand list to be used as tax base. The 1808 Statutes of Connecticut, Title 102, Chapter 1, Section 14, reports that 6% of the full cash value of intangible were to be reported in the grand list (as quoted in the State Tax Commission of 1922, p.54).

<sup>4</sup>We chose these ratios to account for (i) discontinuous drops in aggregate valuation of property in the grand list at these threshold years, (ii) the decline in assessment ratios between 1808 (6% as indicated by State records) and 1850 (3% as estimated in Census reports).

## Delaware

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1904 - 1912<sup>5</sup>, and 1912 - 1922
- Use 1904 Census ratio for 1901 - 1911
- Use 1922 Census ratio for years 1922 and later

## District of Columbia

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1904, and 1904 - 1912
- Use 1912 Census ratio for 1912 - 1921
- Use 1922 Census ratio for years 1922 and later

## Florida

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1904 - 1912, and 1912 - 1922
- Use 1900 Census ratio for 1900 - 1901, 1902 Census ratio for 1902, and 1904 Census ratio for 1903 - 1904
- Use 1922 Census ratio for years 1922 and later

## Georgia

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922

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<sup>5</sup>We ignore the 1902 Census ratio as it is inferred from tax rates therefore less precisely estimated, and its value is widely different from the 1904 Census ratio

- Use 1860 Census ratio for 1860 - 1864
- Use 1870 Census ratio for 1865 - 1874
- Use 1880 Census ratio for 1875 - 1880
- Use 1921 ratio in the Financial Statistics of States for 1921
- Use 1922 Census ratio for years 1922 and later

### **Hawaii**

- Use 1930 ratio in the Financial Statistics of States throughout (the Census Wealth, Debt, Taxation reports did not estimate the wealth of Hawaii)

### **Iowa**

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 - 1932, and 40% ratio for years 1933 - 1940

### **Idaho**

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, and 1912 - 1922
- Use 1890 Census ratio for 1890 - 1898
- Use 1900 Census ratio for 1899 - 1900
- Use 1904 Census ratio for 1901 - 1906
- Use 30% assessment ratio for 1907 - 1910
- Use 1912 Census ratio for 1911 and 1912
- Use 1922 Census ratio for years 1922 and later

## Illinois

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1880 - 1890, 1890 - 1900, 1900 - 1902, and 1902 - 1904
- Use 1870 Census ratio for 1870 - 1872
- Use 50% assessment ratio in 1873 and a linear interpolation with the 1880 Census ratio for 1874 - 1880 (to match the sudden jump in assessed valuation in 1873)
- Use 1904 Census ratio for 1904 - 1908
- Use 1912 Census ratio for 1909 - 1919
- Use 22% assessment ratio for 1920 - 1921
- Use 1922 Census ratio for 1922 - 1927
- Use 40 % assessment ratio for 1928 - 1921, and 33% for 1932 - 1940

## Indiana

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1900 - 1902, 1902 - 1904, and 1904 - 1912
- Use 1900 Census ratio for 1891 - 1900
- Use 1912 Census ratio for 1912
- Use 25% ratio in 1918 based on State reports<sup>6</sup> and linear interpolation between 1912 and 1918
- Use 1922 census ratio for 1919 - 1922
- Use 1922 Census ratio for years 1922 and later

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<sup>6</sup>The State Tax Commission of 1918 estimated that the assessment of property varied across the State, but gave plausible estimates ranging from 10%, 25%, and 40% for real property. We use the middle range estimate of 25%. See for reference the discussion p. 122-123.

## Kansas

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, and 1890 - 1900
- Use 1900 Census ratio for 1900, 1902 Census ratio for 1901 - 1902, and 1904 Census ratio for 1903 - 1904
- Use 16.5% ratio for 1905 - 1907<sup>7</sup> and 80% assessment ratio for 1908<sup>8</sup>
- Use 1922 Census ratio for 1922 - 1932, and 40% ratio for years 1933 - 1940

## Kentucky

- Use 1850 Census ratio for years 1850 and earlier
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1904 - 1912
- Use 1880 Census ratio for 1880 - 1886
- Use 1890 Census ratio for 1887 - 1899
- Use 1900 Census ratio for 1900 - 1901, 1902 Census ratio for 1902, and 1904 Census ratio for 1903 - 1904
- Use 1912 Census ratio for 1912 - 1914, 55% for 1915 - 1917, and 66% for 1918
- Use 1922 Census ratio for 1912 - 1922 and later years

## Louisiana

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Use 1912 Census ratio for 1912 - 1919
- use 50% ratio for 1920 - 1921 (in line with Financial Statistics of States)
- Use 1922 Census ratio for 1922 and later years

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<sup>7</sup>cf Proceedings of 1908 National Tax Association conference reported in its digest, p. 225.

<sup>8</sup>Reform of the basis of assessment in 1908 cf Jensen (1931) p. 473, the Wealth Debt Taxation 1912 estimated the new assessment ratio to be around 80% (see p. 20)

## **Maine**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Maryland**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Massachusetts**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Michigan**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Use 1850 Census ratio for 1850 - 1852
- Use 1860 Census ratio for 1853 - 1860
- Use 1912 Census ratio for 1912 - 1916
- Use 1922 Census ratio for 1917 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Minnesota**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1860 - 1870, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Continue 1860 - 1870 trend in assessment ratio for years 1870-1872
- Use 1890 Census ratio for 1874 - 1890
- Use 1900 Census ratio for 1900 -1901
- Use 1912 Census ratio for 1912 - 1920
- Use 1922 Census ratio for 1921 and later years

## **Mississippi**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 25% assessment ratio for 1915 - 1916 (Financial Statistics ratio for 1915)
- Linearly interpolate between 1912 - 1915
- Use 1922 Census ratio for 1917 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Missouri**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Use 1870 Census ratio for 1861 - 1870
- Use 1912 Census ratio for 1912 - 1920, 33.6% ratio for 1921 (Financial Statistics 1918), and 1922 Census ratio for 1922
- Use 1922 Census ratio for 1922 and later years

## **Montana**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1912
- Use 1922 Census ratio for 1920 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Nebraska**

- Use 1860 Census ratio for 1860 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1904 - 1912
- Use 1900 Census ratio for 1900 - 1903
- use 1912 census ratio for 1912 - 1919
- Use 16% ratio in 1920
- Use 1922 Census ratio for 1921 and later years

## **Nevada**

- Use 1870 Census ratio for 1870 and earlier years
- Linearly interpolate between Census ratios for 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1921 - 1922
- Use 1922 Census ratio for 1922 and later years

## **New Hampshire**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, and 1912 - 1922
- Use 1904 Census ratio for 1901 - 1911
- Use 1922 Census ratio for 1922 and later years

## **New Jersey**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **New Mexico**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1890 - 1900, 1904 - 1912
- Use 1880 Census ratio for 1880
- Use 1870 Census ratio for 1870 - 1879 and 1881 - 1882
- Use 1890 Census ratio for 1883 - 1890
- Use 1904 Census ratio for 1901 - 1904
- Use 1912 Census ratio for 1912 - 1915 and 55% for 1916 - 1921
- Use 1922 Census ratio for 1922 and later years

## **New York**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1904 - 1912, and 1912 - 1922
- Use 1902 Census ratio for 1902 - 1902
- Use 1922 Census ratio for 1922 and later years

## North Carolina

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902
- Use 1904 Census ratio for 1903 - 1904
- Linearly interpolate between 1904 - 1912, and continue trend until 1919, use 80% ratio in 1920 instead of full value basis in State reports.
- Use 1922 Census ratio for 1920 - 1922
- Use 1922 Census ratio for 1922 and later years

## North Dakota

- Use 1890 Census ratio for 1890 or earlier years
- Linearly interpolate between Census ratios from 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Use 1912 Census ratio for 1912 - 1919
- Use 1922 Census ratio for 1920 - 1922
- Use 50 % ratio for 1923 or later years (ratio estimated by the Board of Equalization in 1932, page 95)

## Ohio

- Use 1850 Census ratio for 1847 - 1849, and 33% ratio for 1846 or earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1902 - 1904, 1904 - 1910<sup>9</sup>, and 1912 - 1922
- Use 1900 Census ratio for 1901
- Use 1912 Census ratio for 1911
- Use 1922 Census ratio for 1922 and later years

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<sup>9</sup>One-third valuation basis cf WDT 1912 Assessed Valuation 1860 - 1912.pdf p. 28.

## **Oklahoma**

- Use 1890 Census ratio for 1890 and earlier years
- Linearly interpolate between Census ratios for 1890 - 1900, 1900 - 1904
- Continue trend of decline in assessment between 1890 - 1900 during 1905 - 1907: 17% in 1905, 14.5% in 1906, 11% in 1907
- Continue trend of decline in assessment between 1890 - 1900 during 1908 - 1912 after reform towards use full cash basis for assessment: 51.5% in 1908, 49% in 1909, 46.5% in 1910, 44% in 1911
- Use 1912 Census ratio for 1912 - 1918
- Use 1922 Census ratio for 1919 and later years

## **Oregon**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1904, and 1912 - 1922
- Use 40% ratio for 1905 - 1908
- Use 1912 Census ratio for 1909 - 1912
- Use 1922 Census ratio for 1922 and later years

## **Pennsylvania**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **Puerto Rico**

- No information on assessment ratio: use conservative estimate of full assessment ratio.

## **Rhode Island**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1880 - 1890, 1890 - 1900, 1900 - 1904, and 1912 - 1922
- Use 1880 Census ratio for 1871 - 1880
- Use 1912 Census ratio for 1909 - 1912 and 60% ratio for 1905 - 1908
- Use 1922 Census ratio for 1922 and later years

## **South Carolina**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1922 Census ratio for 1922 and later years

## **South Dakota**

- Use 1890 Census ratio for 1890 and earlier years
- Linearly interpolate between Census ratios for 1890 - 1900, 1900 - 1904, 1904 - 1912
- Use 75% ratio for 1913 - 1918 (Financial Statistics ratio for 1915), and 80% ratio for 1919 - 1920 (Financial Statistics ratio for 1918)
- Use 1922 Census ratio for 1921 and later years

## **Tennessee**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- uUse 1860 Census ratio for 1860 - 1864
- Use 1870 Census ratio for 1865 - 1870

- Extrapolate declining trend 1904 - 1912 for 1913 - 1919
- Use 60% ratio in 1920 - 1921 (Tax Commission 1922, p. 28 about Legislation of 1919)
- Use 1922 Census ratio for 1922 and later years

### **Texas**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, 1890 - 1900, 1900 - 1902, 1902 - 1904
- Use 1904 Census ratio for 1904 - 1907
- Use 1912 Census ratio for 1908 - 1921
- Use 1922 Census ratio for 1922 and later years

### **Utah**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1900 - 1904, and 1904 - 1912
- Use 1880 Census ratio for 1880 - 1886
- Use 1890 Census ratio for 1887 - 1893
- Use 1900 Census ratio for 1894 - 1900
- Extrapolate trend 1904 - 1912 during 1913 - 1915
- Use 50% assessment ratio for 1916 - 1920 (Financial Statistics 1915)
- Use 1922 Census ratio for 1921 and later years

## **Vermont**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912, and 1912 - 1922
- Use 1870 Census ratio for 1870 - 1889
- Use 1890 Census ratio for 1890
- Use 1922 Census ratio for 1922 and later years

## **Virginia**

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1880 - 1890, 1890 - 1900, 1904 - 1912, and 1912 - 1922
- Use 1870 Census ratio for 1870 - 1877
- Use 1880 Census ratio for 1878 - 1880
- Use average of 1900 and 1904 Census ratios for 1901 - 1903
- Use 1912 Census ratio for 1912 - 1921
- Use 1922 Census ratio for 1922 and later years

## **Washington**

- Use 1860 Census ratio for 1860 and earlier years
- Linearly interpolate between Census ratios for 1860 - 1870, 1870 - 1880, 1880 - 1890, 1900 - 1902, 1902 - 1904, and 1912 - 1922
- Use 1900 Census ratio for 1891 - 1900
- Use 1904 Census ratio for 1904 - 1905
- Use 1912 Census ratio for 1906 - 1912
- Use 1922 Census ratio for 1922 and later years

## West Virginia

- Use 1870 Census ratio for 1870 and earlier years
- Linearly interpolate between Census ratios for 1870 - 1880, 1890 - 1900, and 1900 - 1904.
- Use 1880 Census ratio for 1880 - 1884
- Use 1890 Census ratio for 1885 - 1890
- Extrapolate 1900 -1904 trend for 1905
- Linearly interpolate between 1905 (60% following creation of a Tax Commission<sup>10</sup>) and 1912 Census ratio
- Use 1912 Census ratio for 1912 - 1917
- Use 1922 Census ratio for 1918 and later years

## Wisconsin

- Use 1850 Census ratio for 1850 and earlier years
- Linearly interpolate between Census ratios for 1850 - 1860, 1860 - 1870, 1870 - 1880, 1880 - 1890, and 1890 - 1900, 1900 - 1902, 1902 - 1904, 1904 - 1912
- Use 55% ratio for 1913-1921 and 1922 Census ratio for 1916 - 1922
- Use 1922 Census ratio for 1922 and later years

## Wyoming

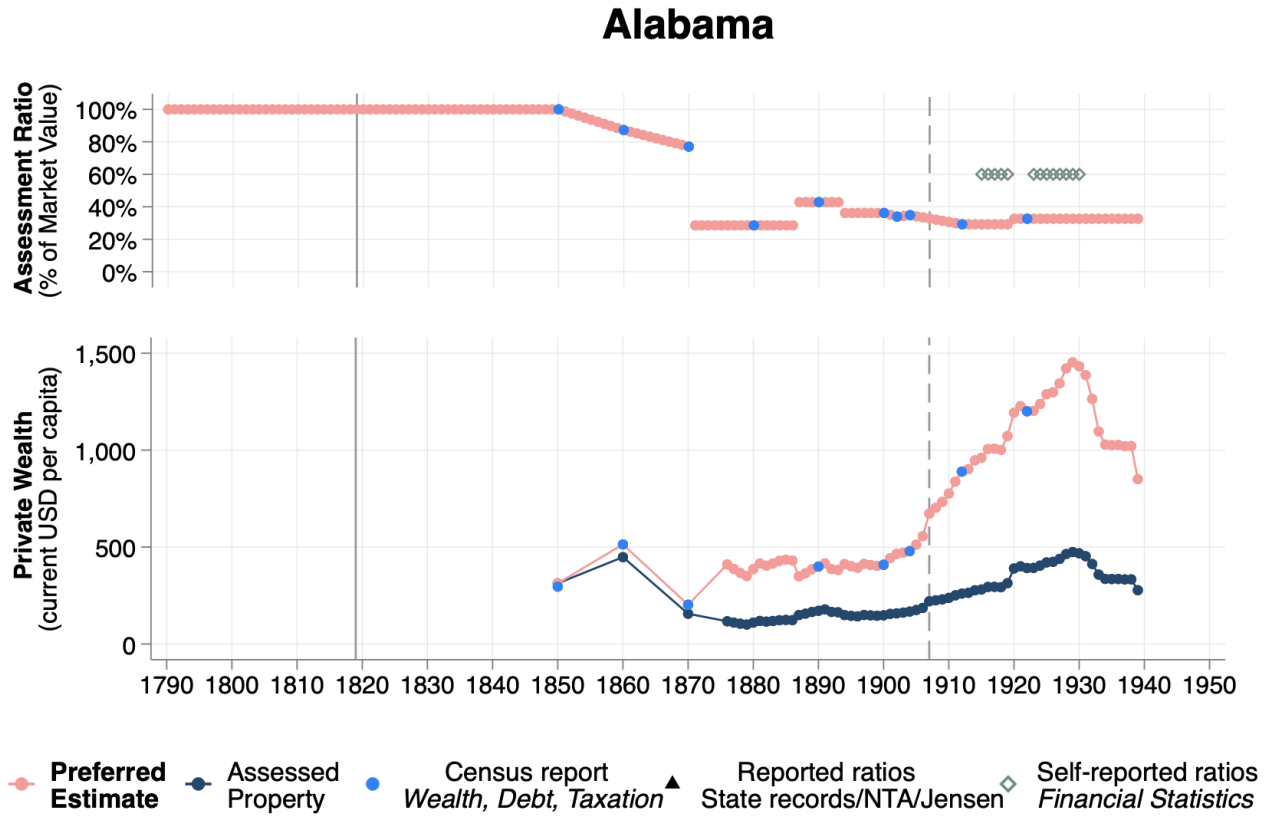
- Use 1870 Census ratio for 1870 and earlier years
- Linearly interpolate between Census ratios for 1890 - 1900
- Use 1870 Census ratio for 1870 - 1880
- Use 1890 Census ratio for 1881 - 1890
- Use 1900 Census ratio for 1900 - 1904

---

<sup>10</sup>Digest NTA p. 17

- Use 1904 Census ratio for 1905 - 1908
- Use 1912 Census ratio for 1909 - 1913
- Use 1922 Census ratio for 1914 - 1919 and 1922
- Use 60% ratio for 1920 - 1921 and 70% ratio for 1923 - 1940 (Financial Statistics of States for 1921 and 1923 - 1930 respectively)

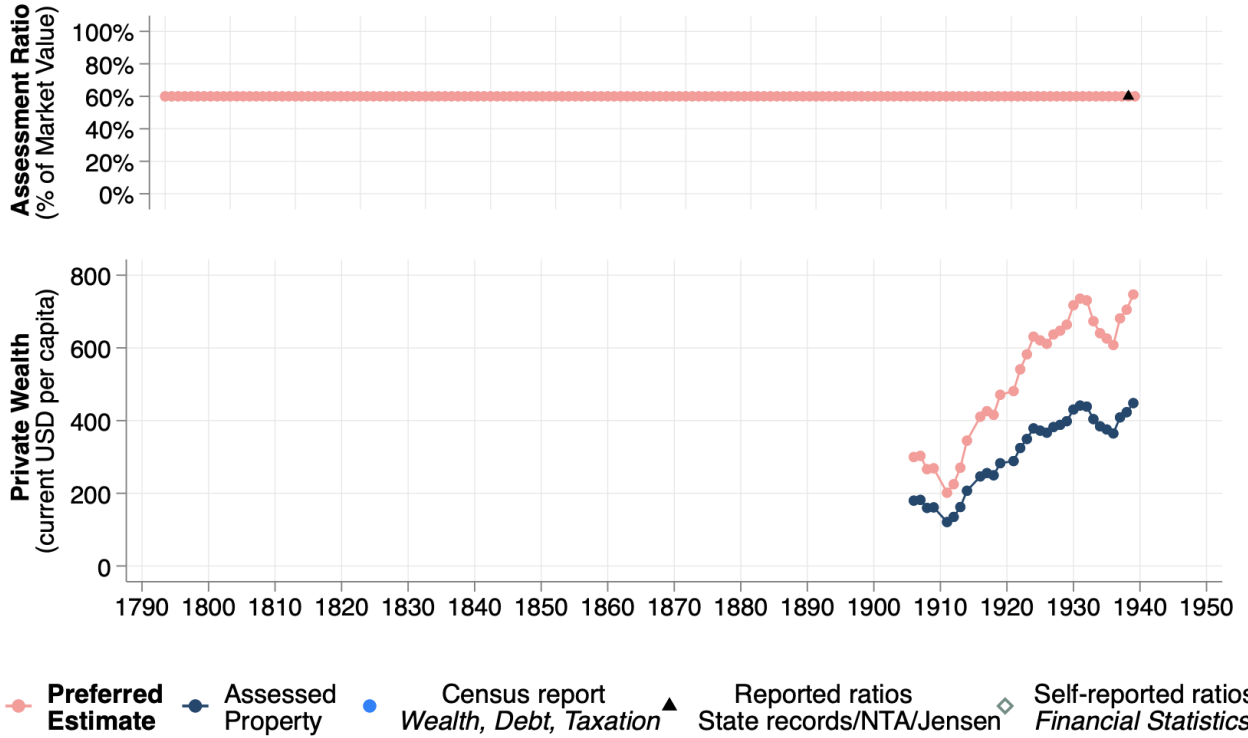
# Assessed Property Value, Assessment Ratio and Private Wealth Alabama



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Alaska

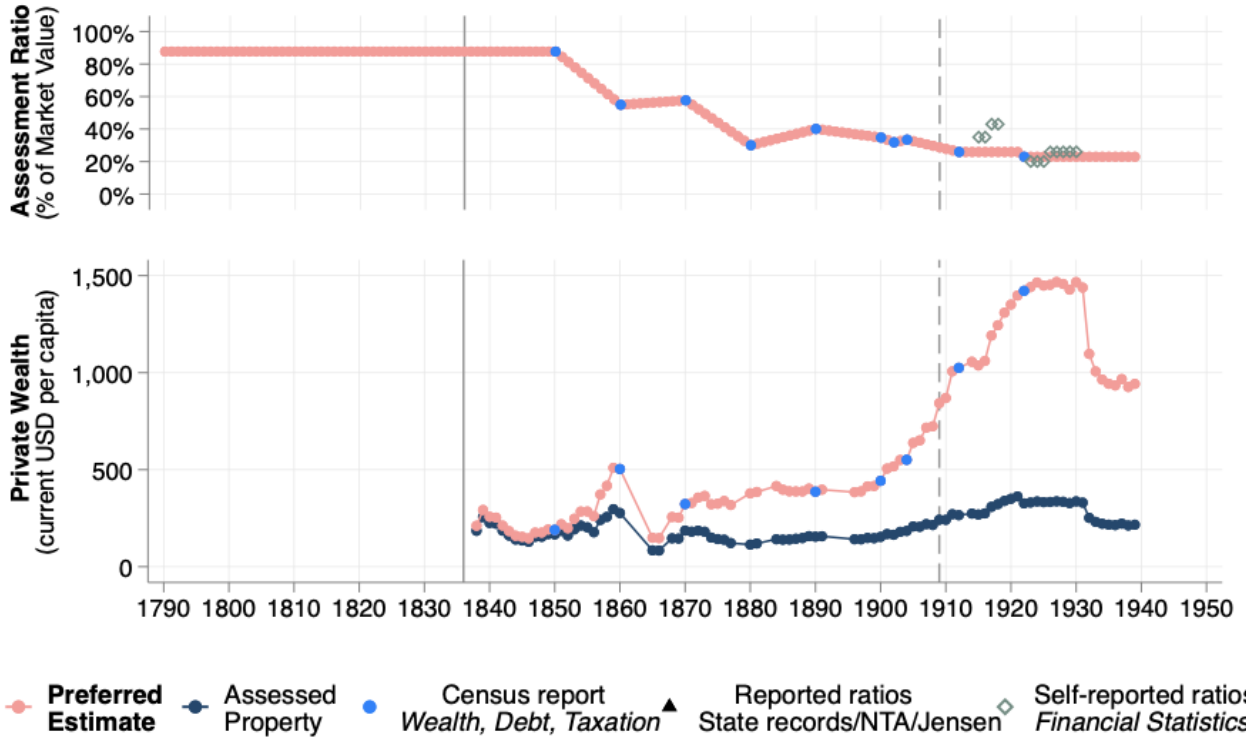
## Alaska



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Arkansas

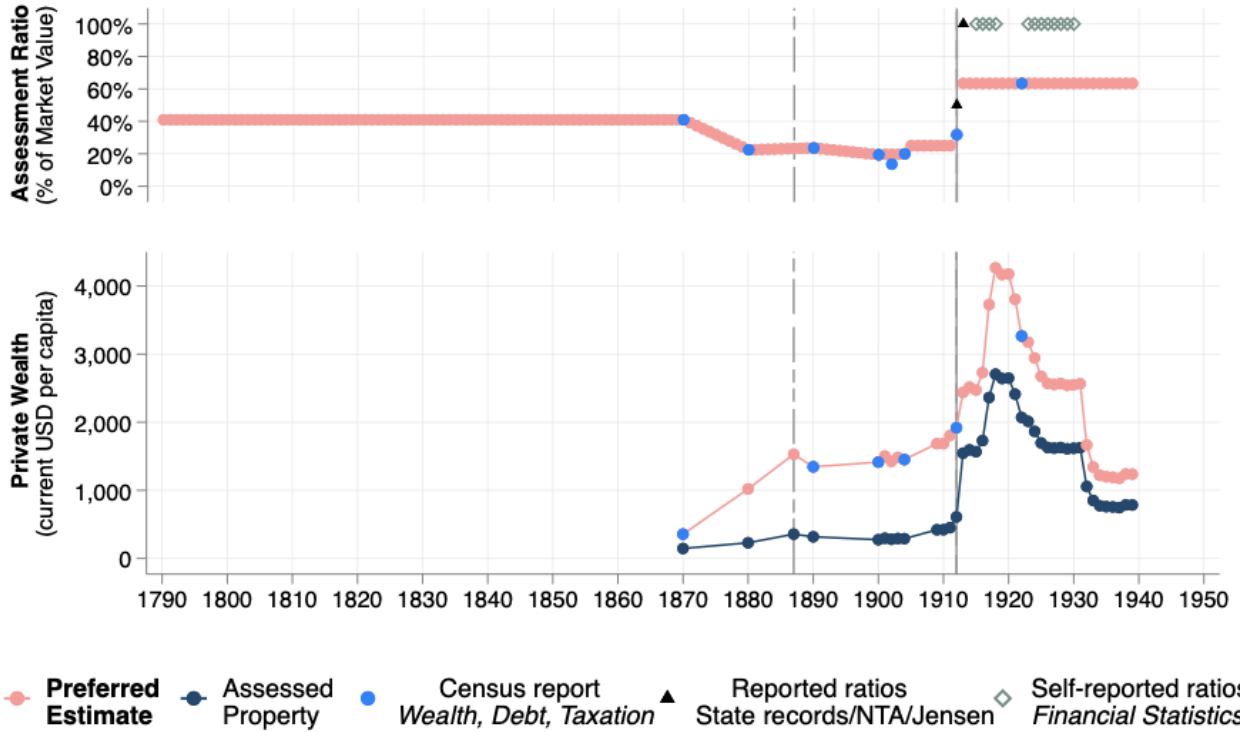
## Arkansas



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Arizona

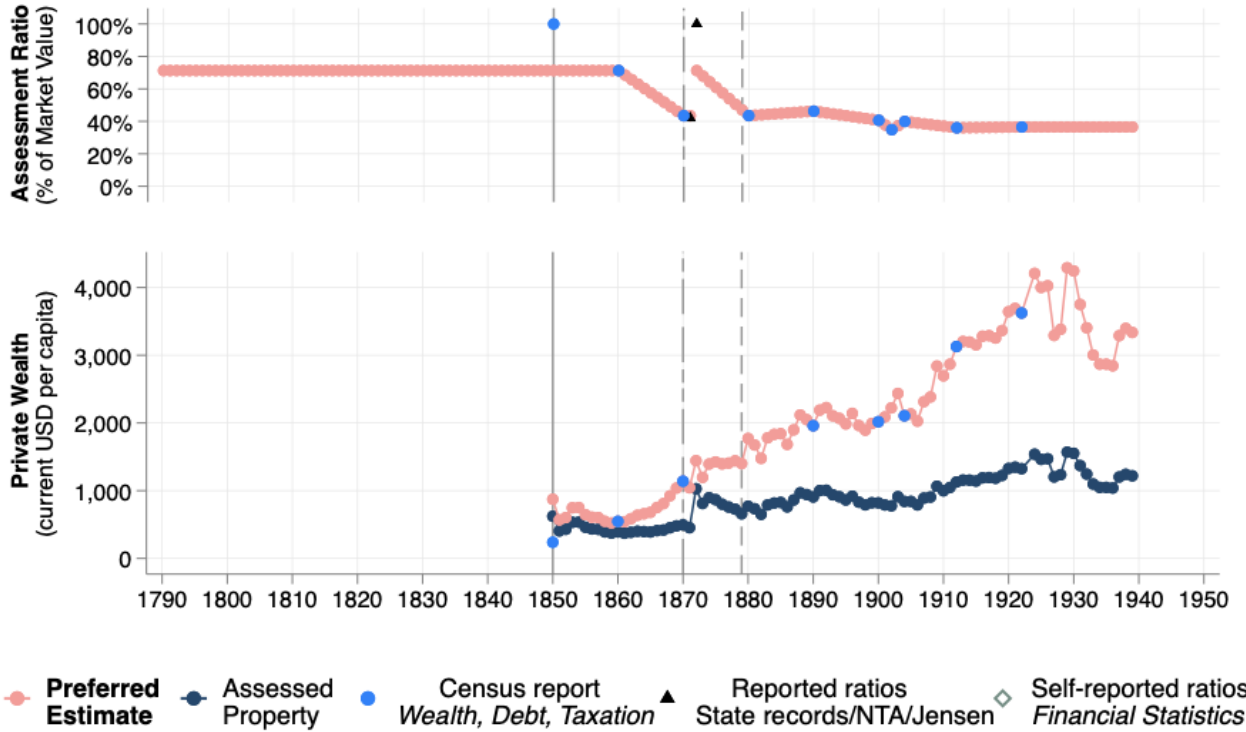
## Arizona



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# California

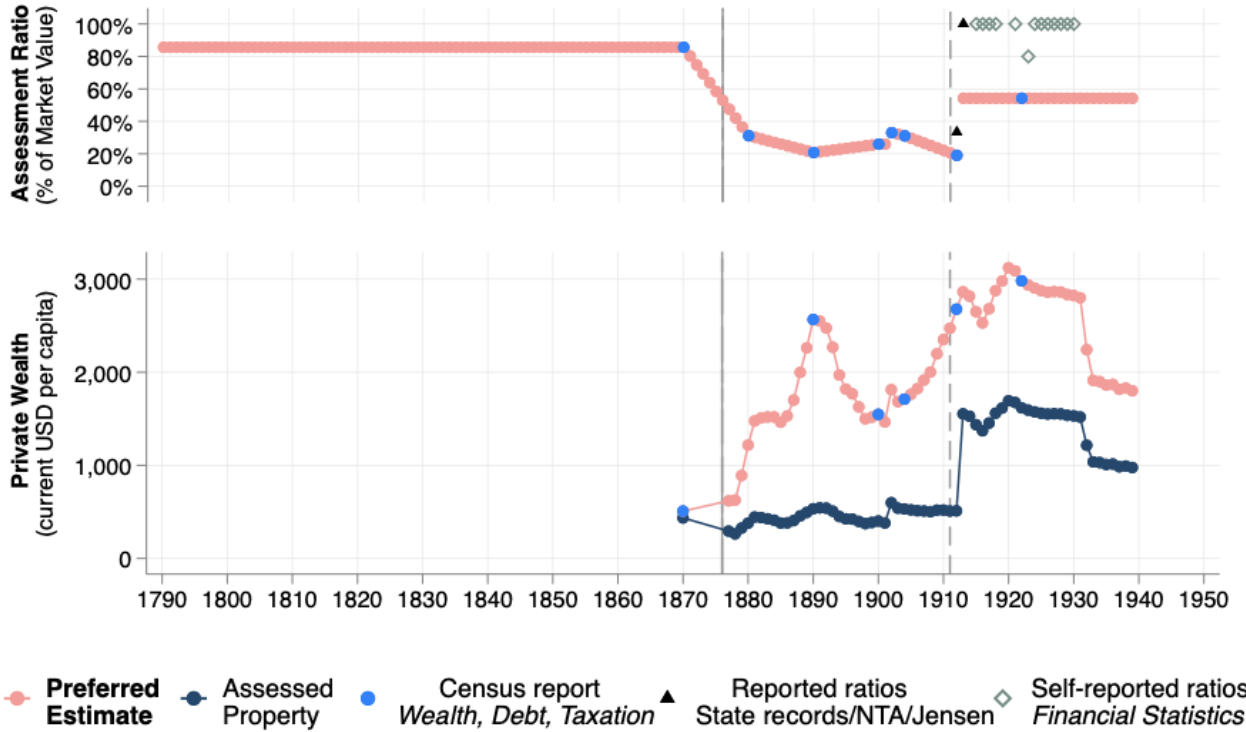
## California



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Colorado

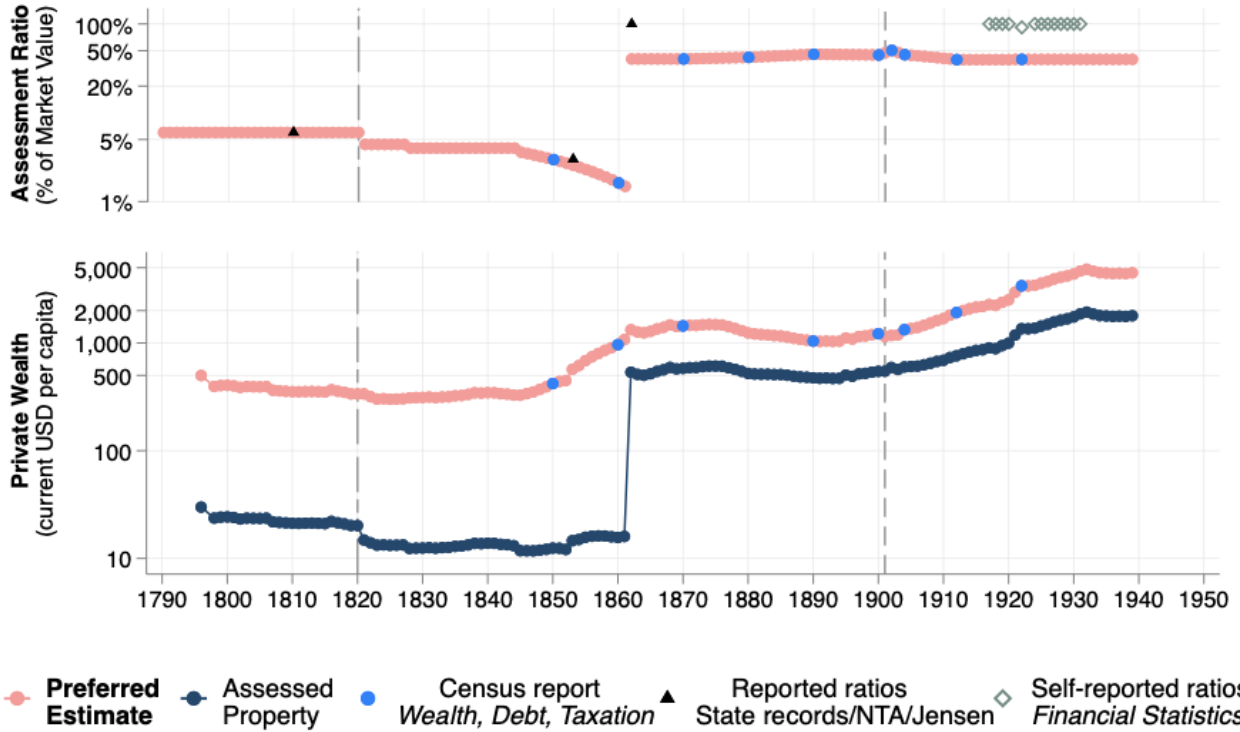
## Colorado



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Connecticut

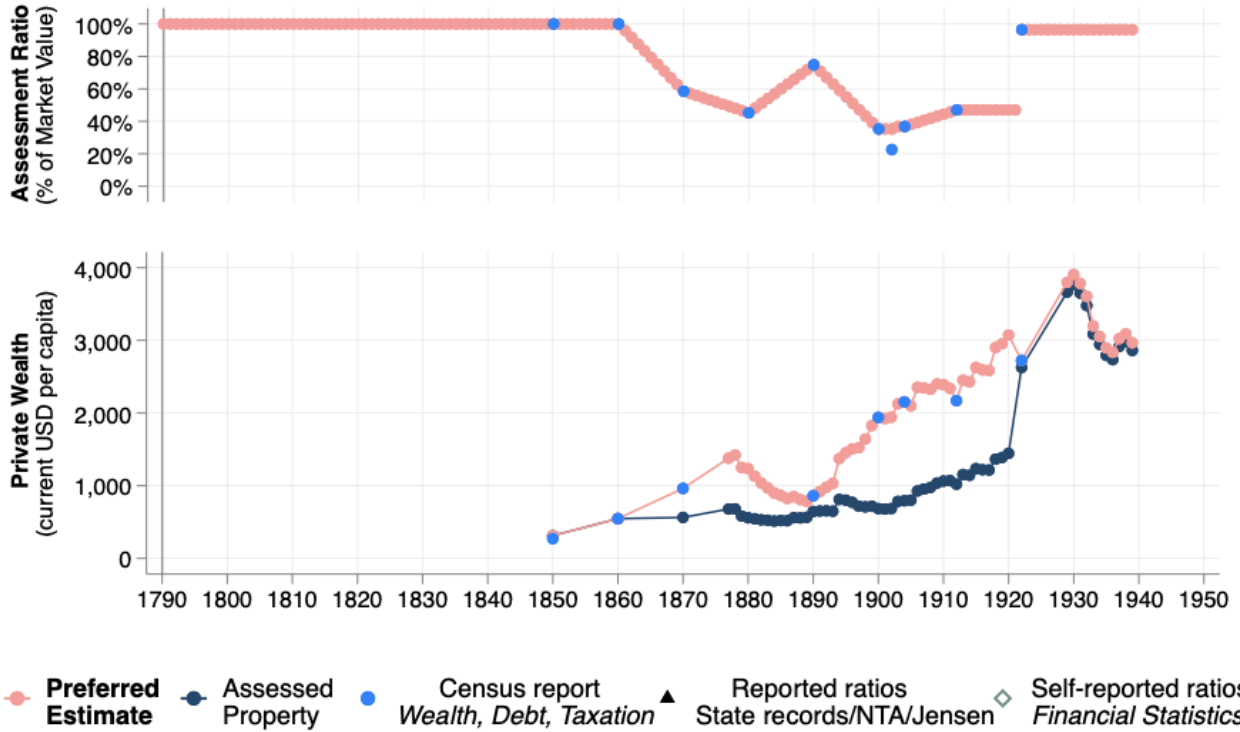
## Connecticut



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# District of Columbia

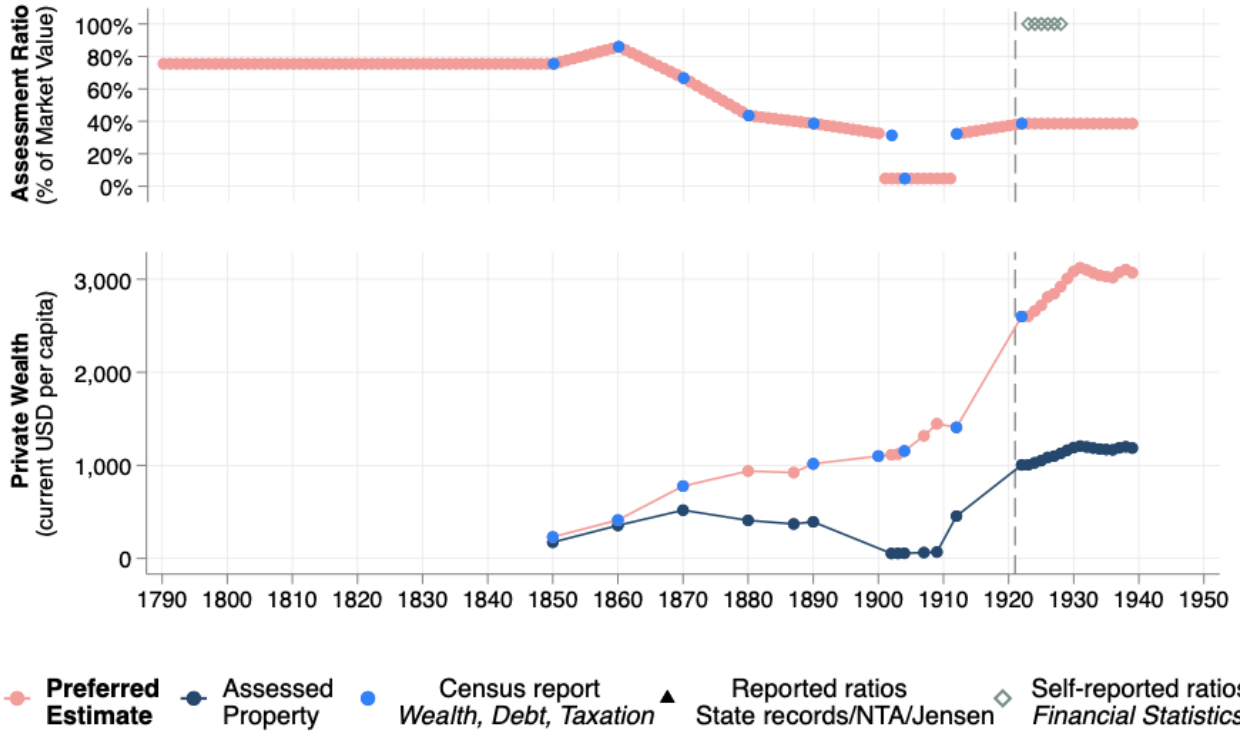
## District of Columbia



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Delaware

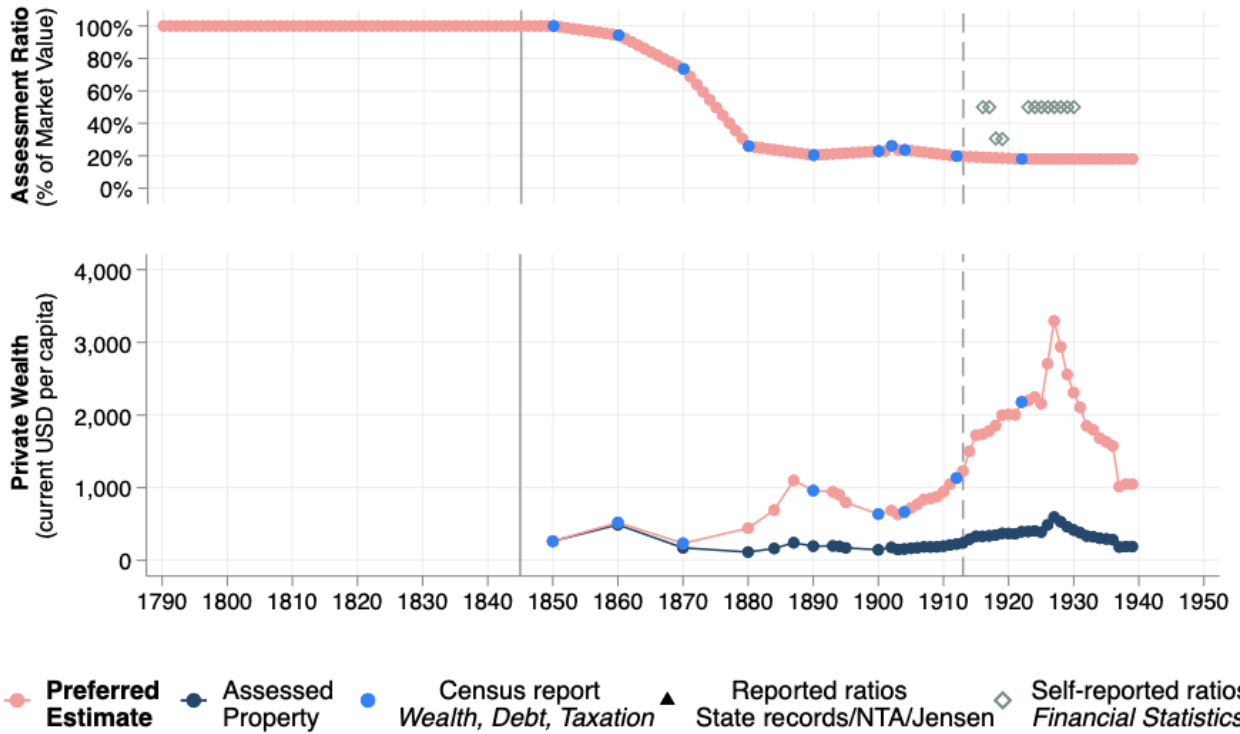
## Delaware



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

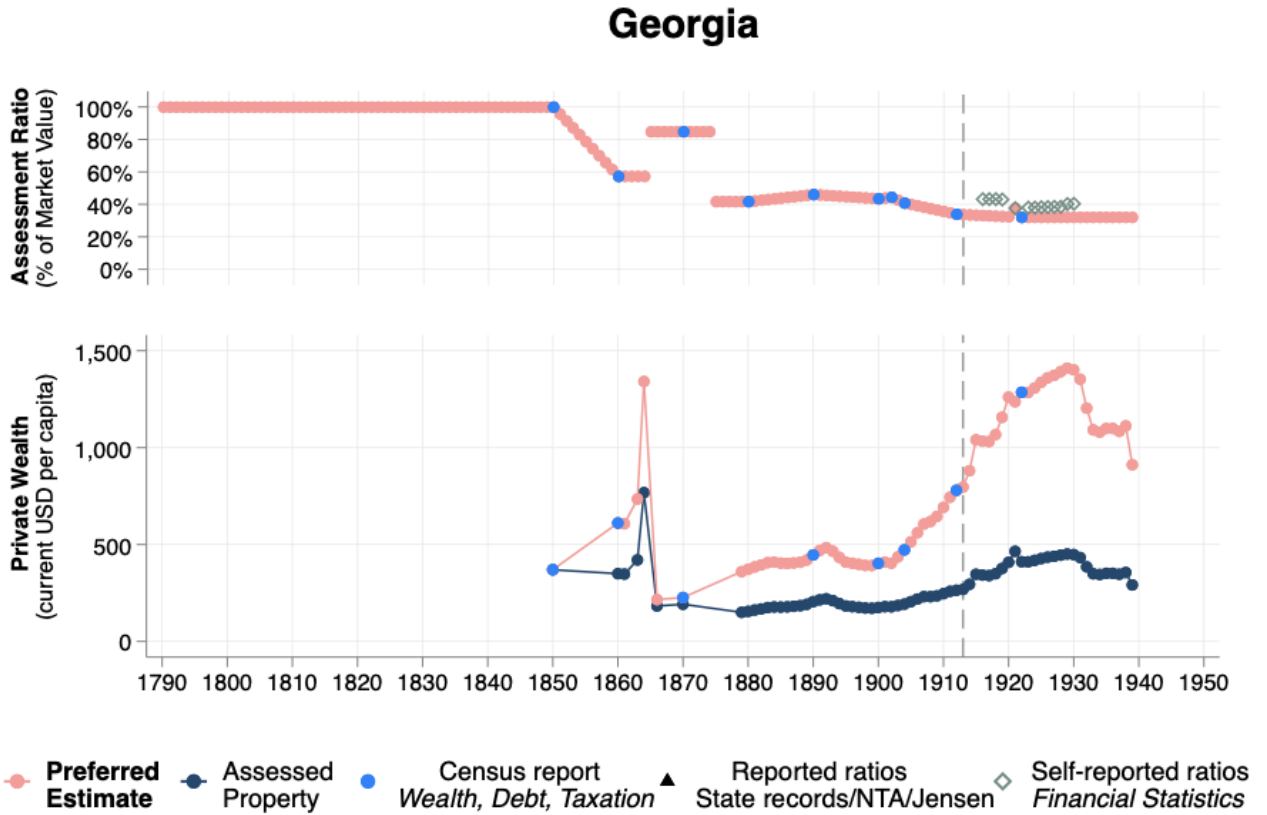
# Florida

## Florida



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Georgia

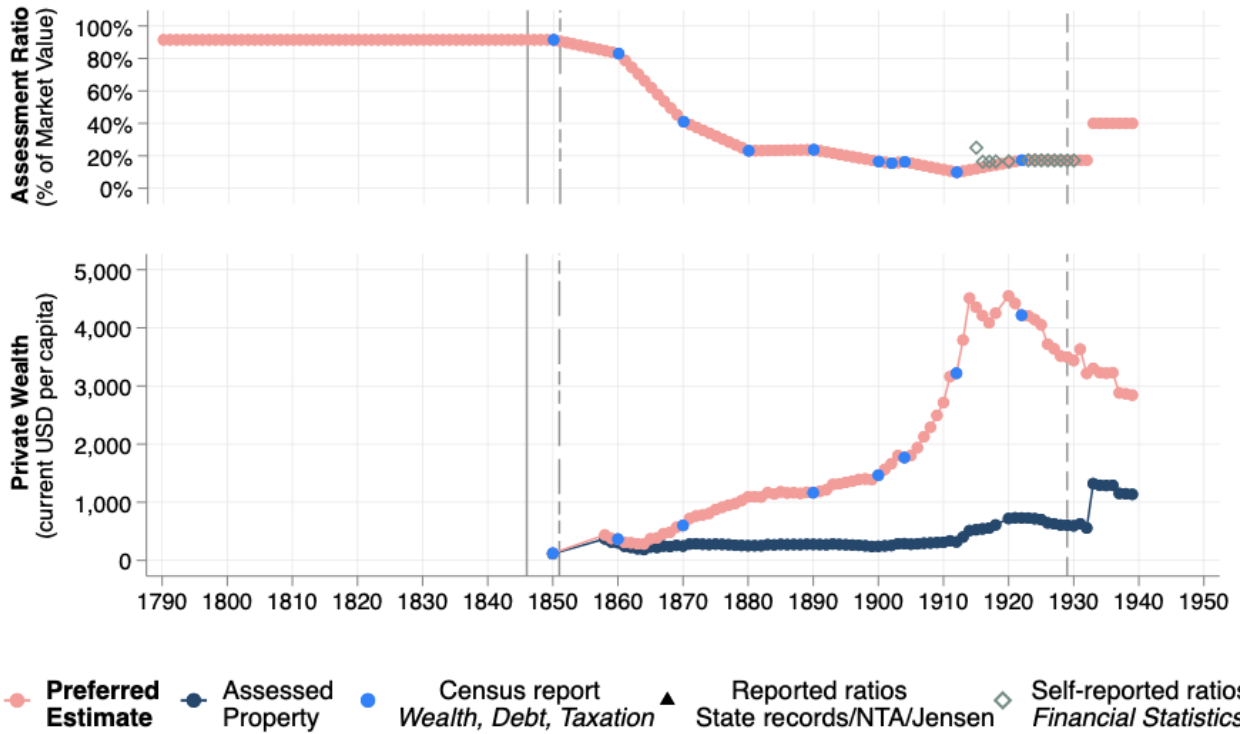


Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.



# Iowa

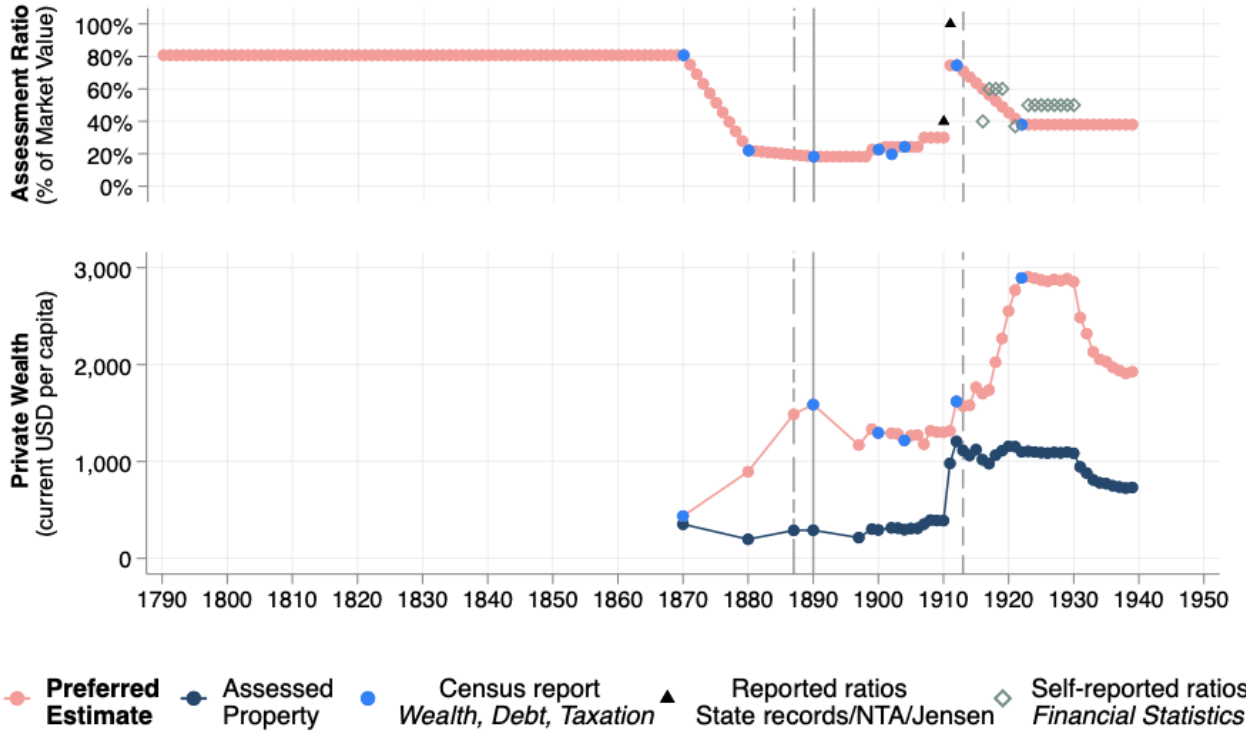
## Iowa



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Idaho

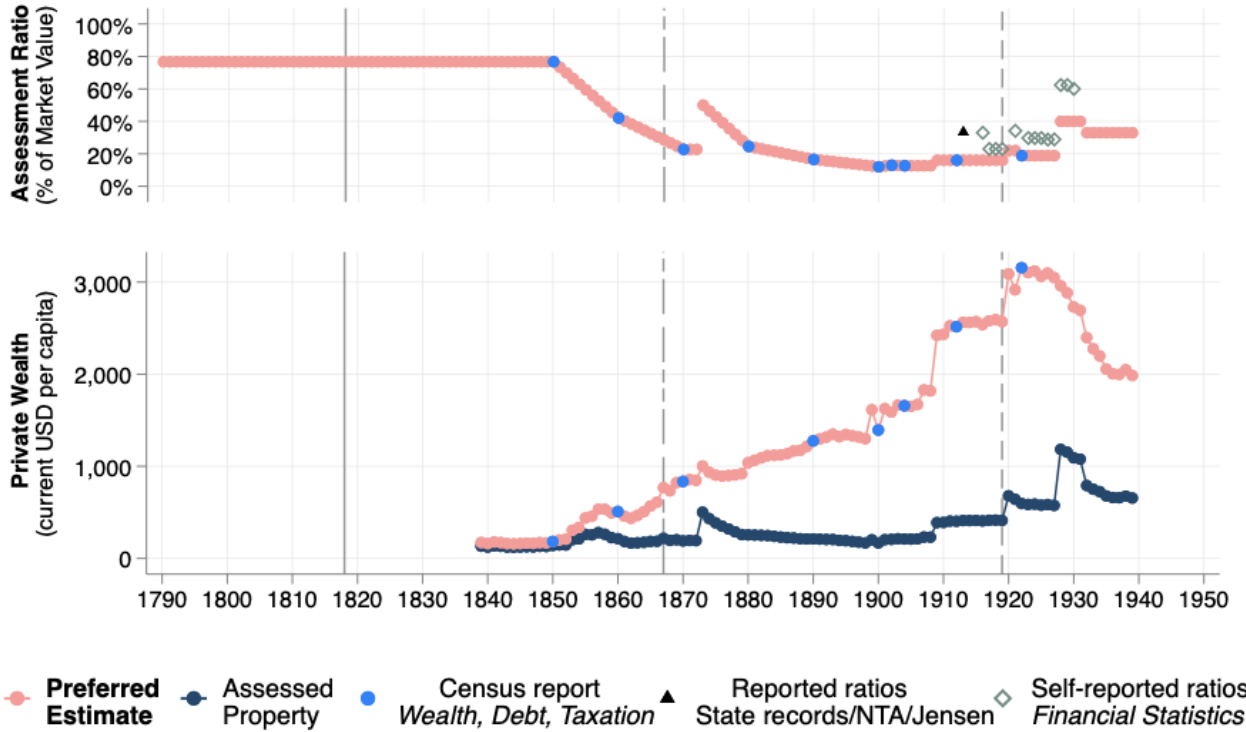
## Idaho



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Illinois

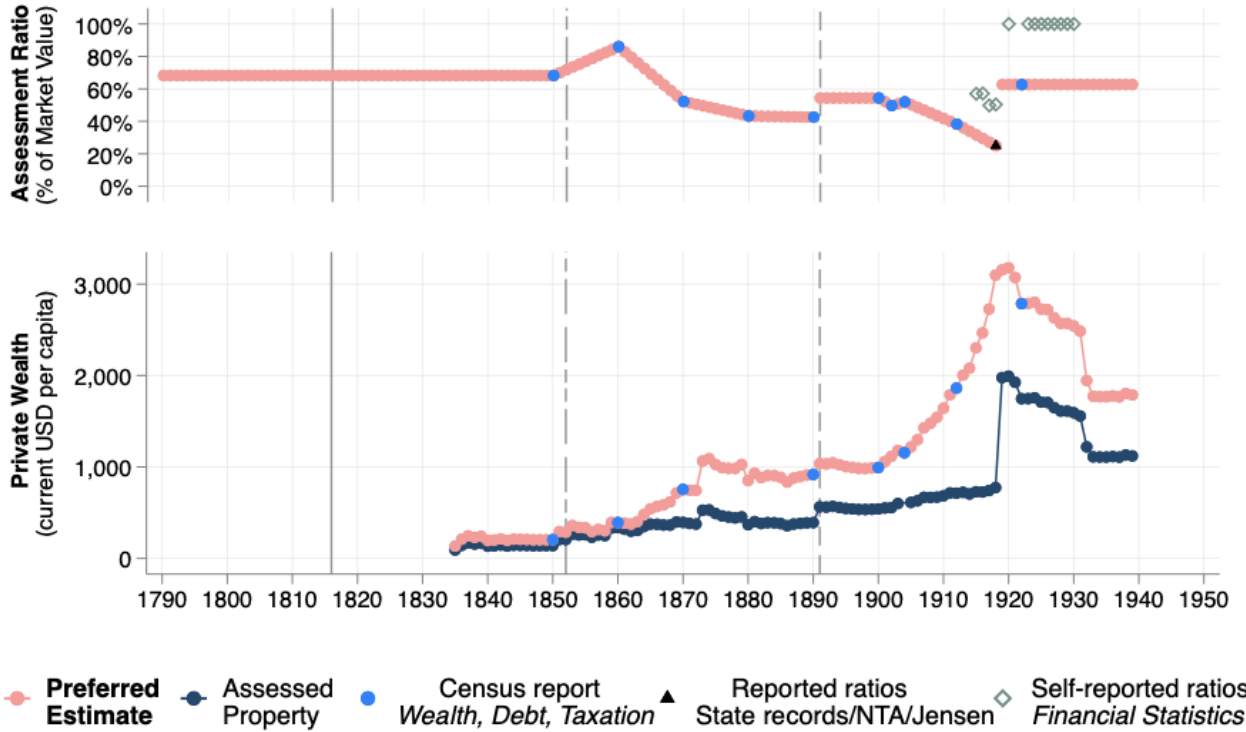
## Illinois



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association.  
 Census ratios for 1880 and 1902 are inferred from tax rates.

# Indiana

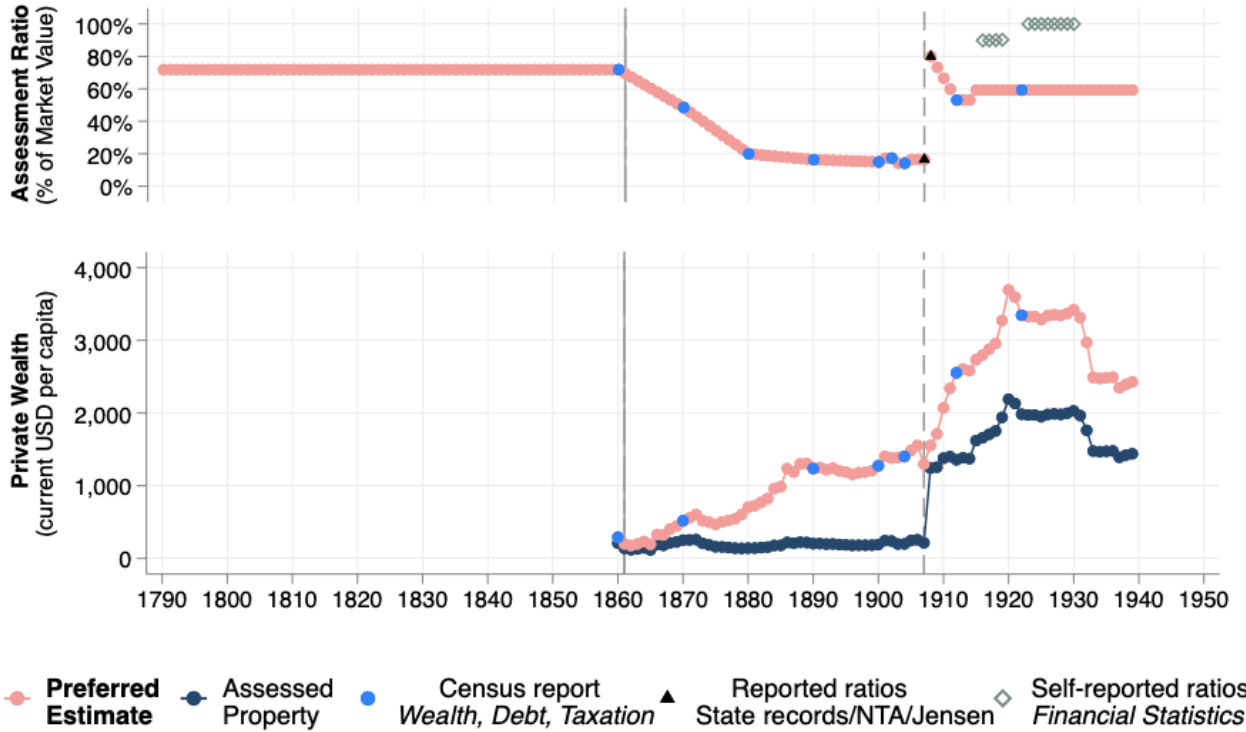
## Indiana



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Kansas

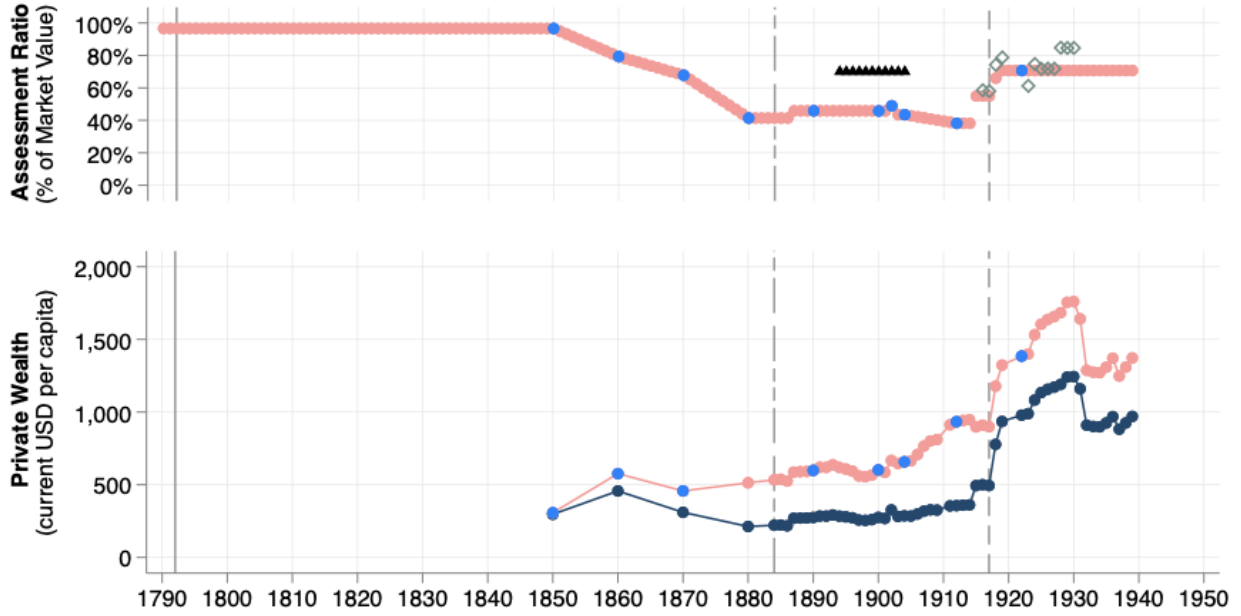
## Kansas



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Kentucky

## Kentucky

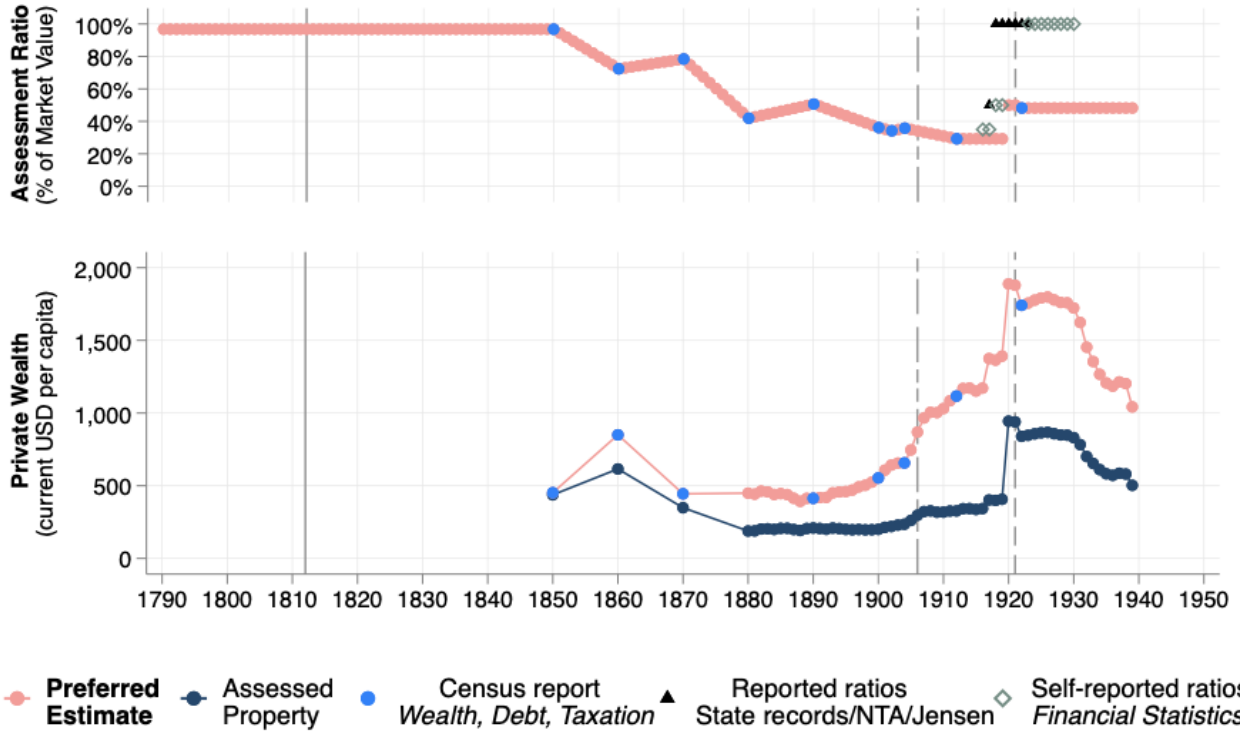


● Preferred Estimate   
 ● Assessed Property   
 ● Census report Wealth, Debt, Taxation   
 ▲ Reported ratios State records/NTA/Jensen   
 ◇ Self-reported ratios Financial Statistics

Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association.  
 Census ratios for 1880 and 1902 are inferred from tax rates.

# Louisiana

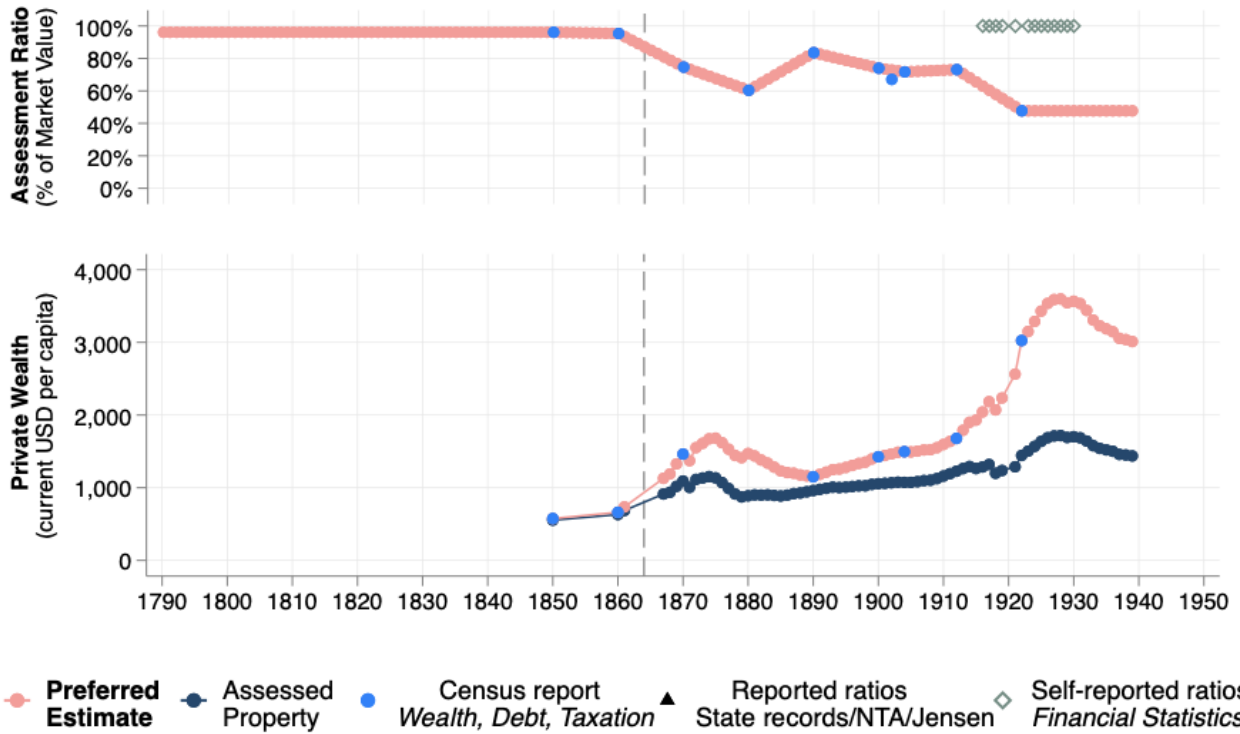
## Louisiana



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Massachusetts

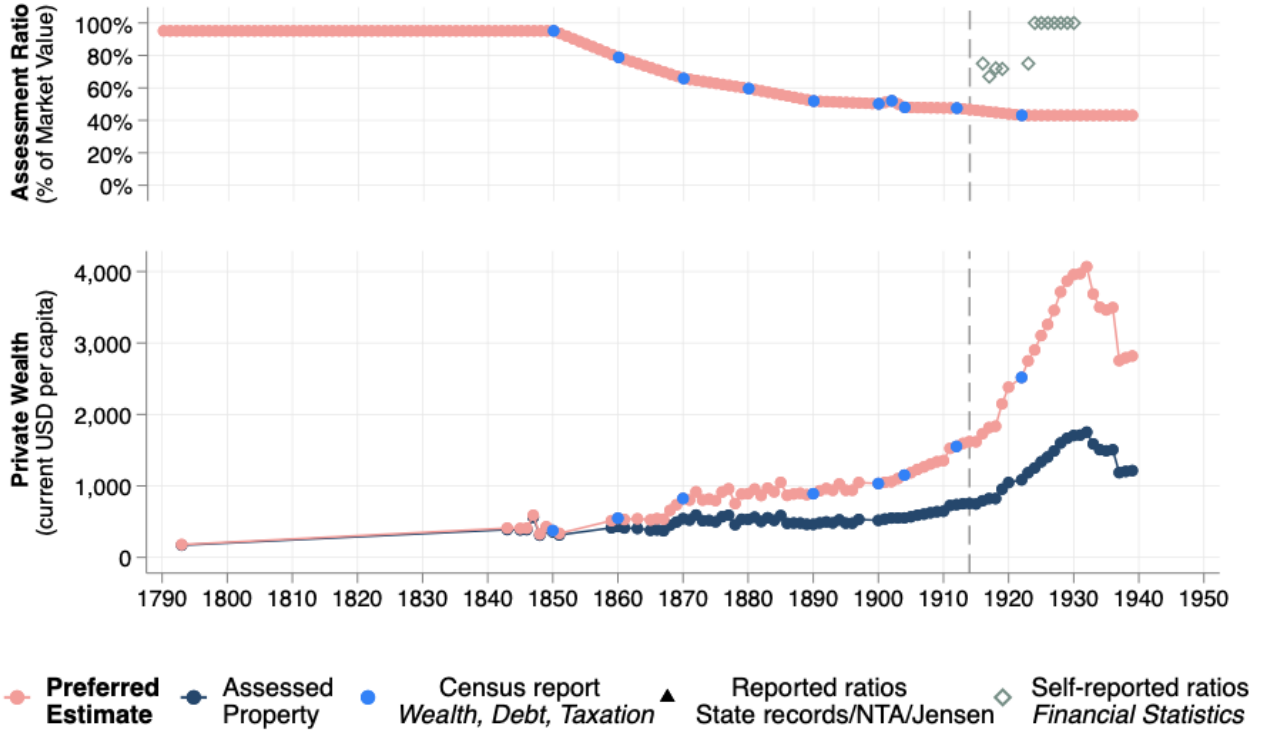
## Massachusetts



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

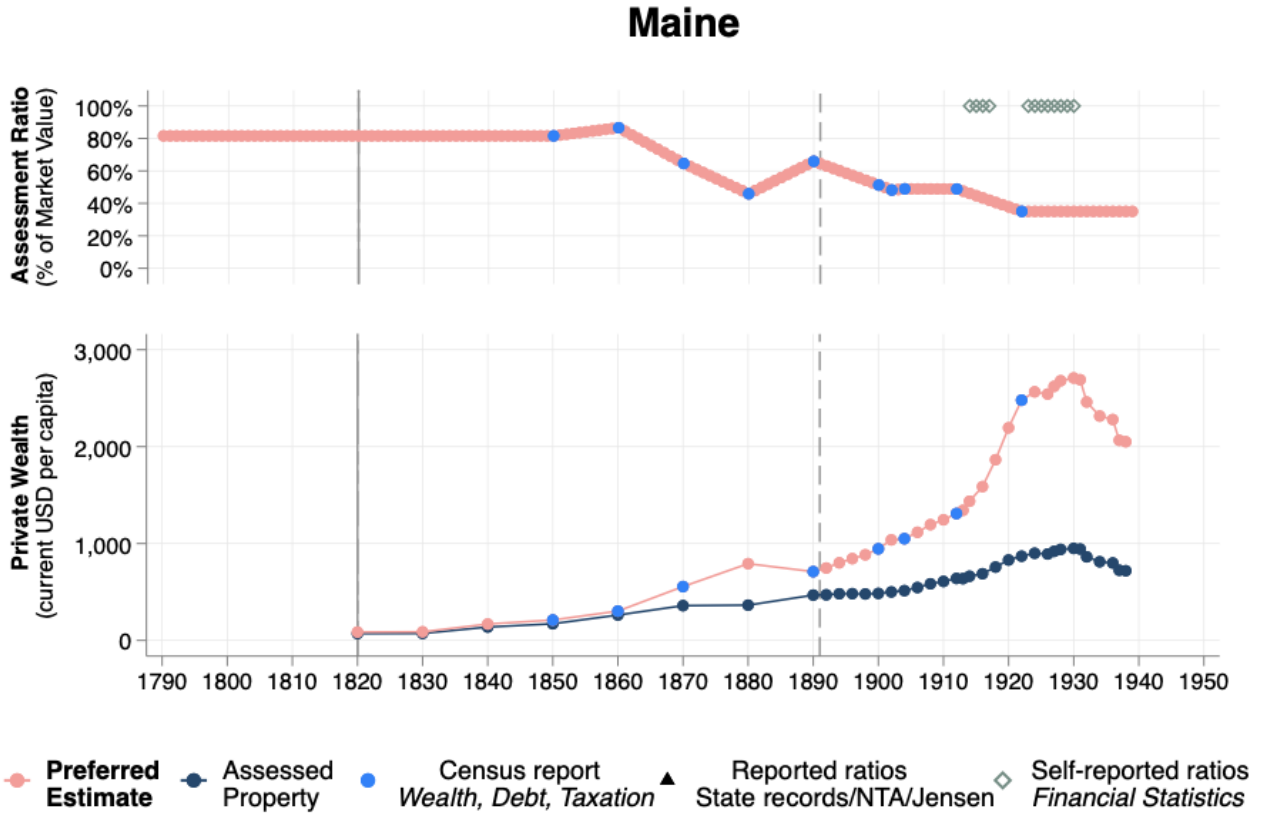
# Maryland

## Maryland



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

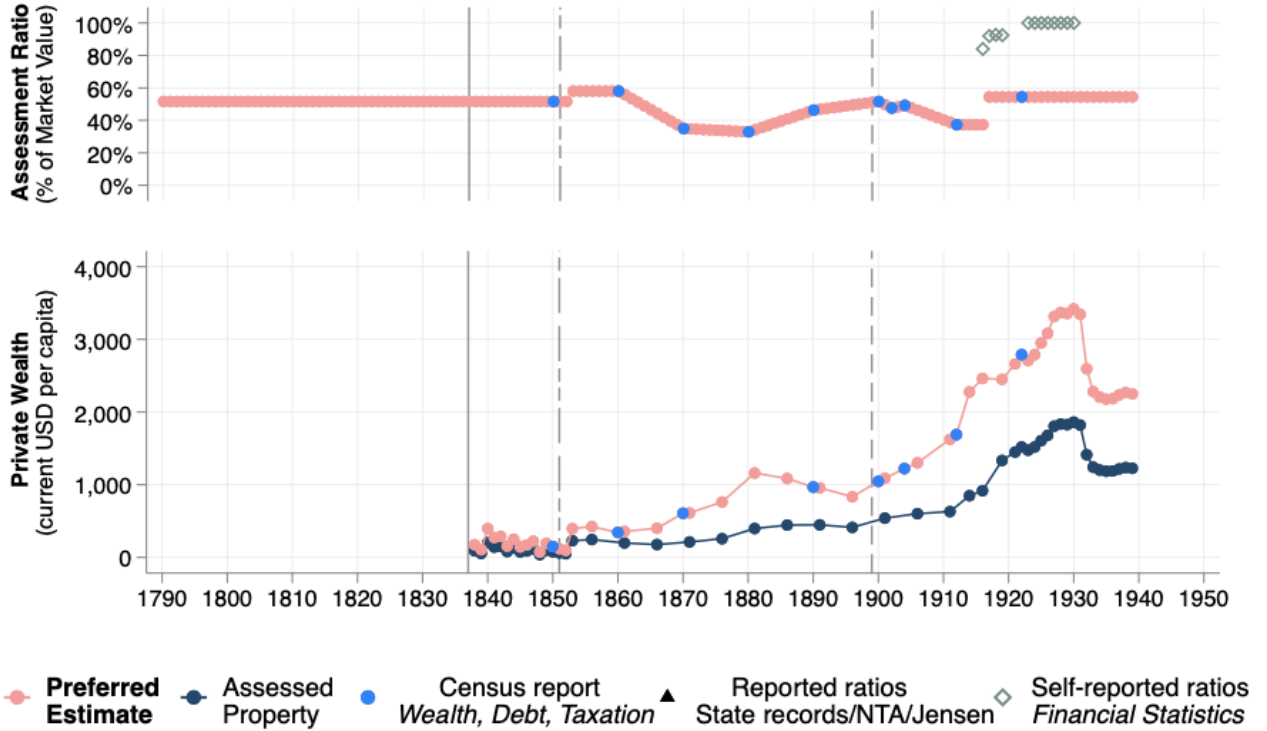
# Maine



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Michigan

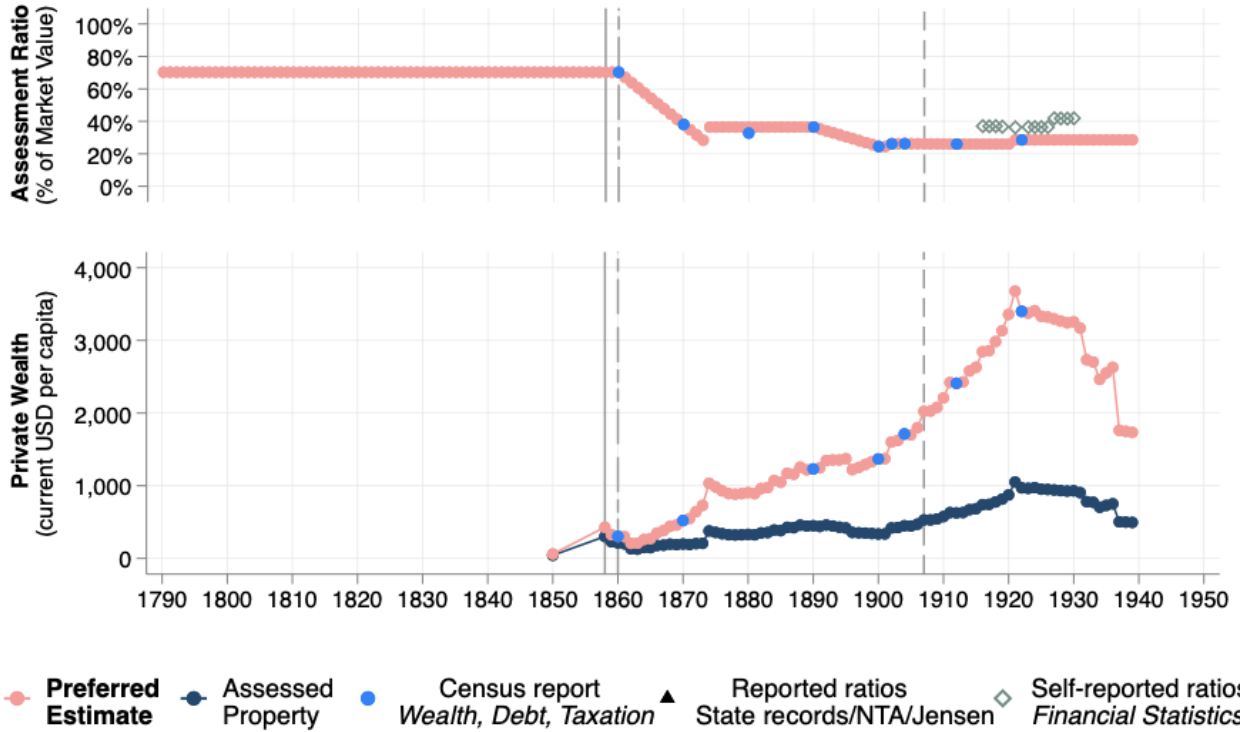
## Michigan



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Minnesota

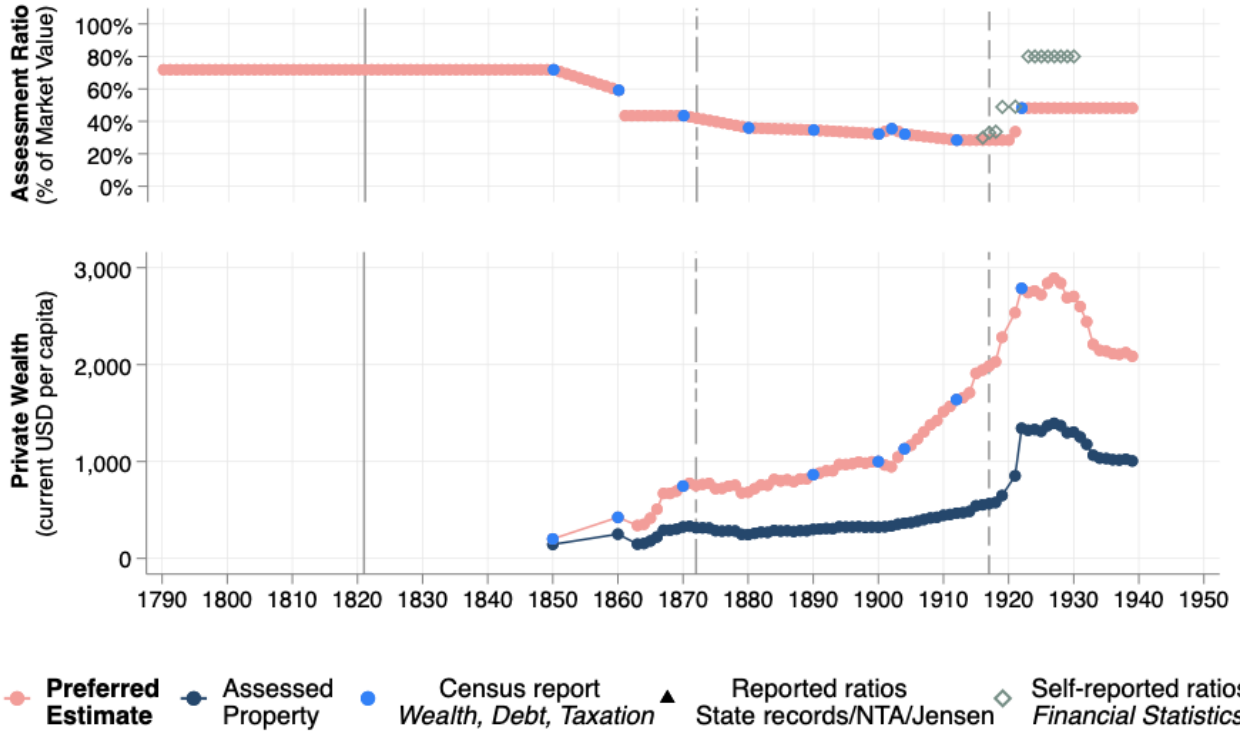
## Minnesota



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Missouri

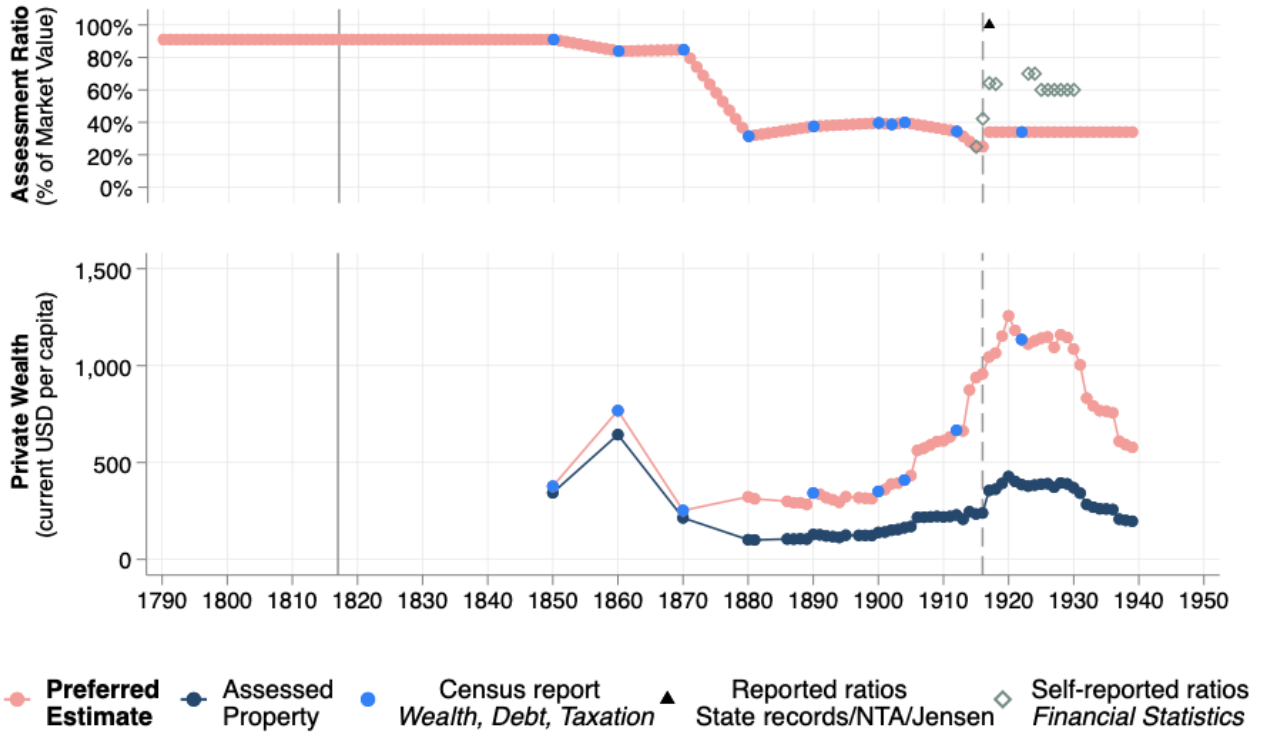
## Missouri



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Mississippi

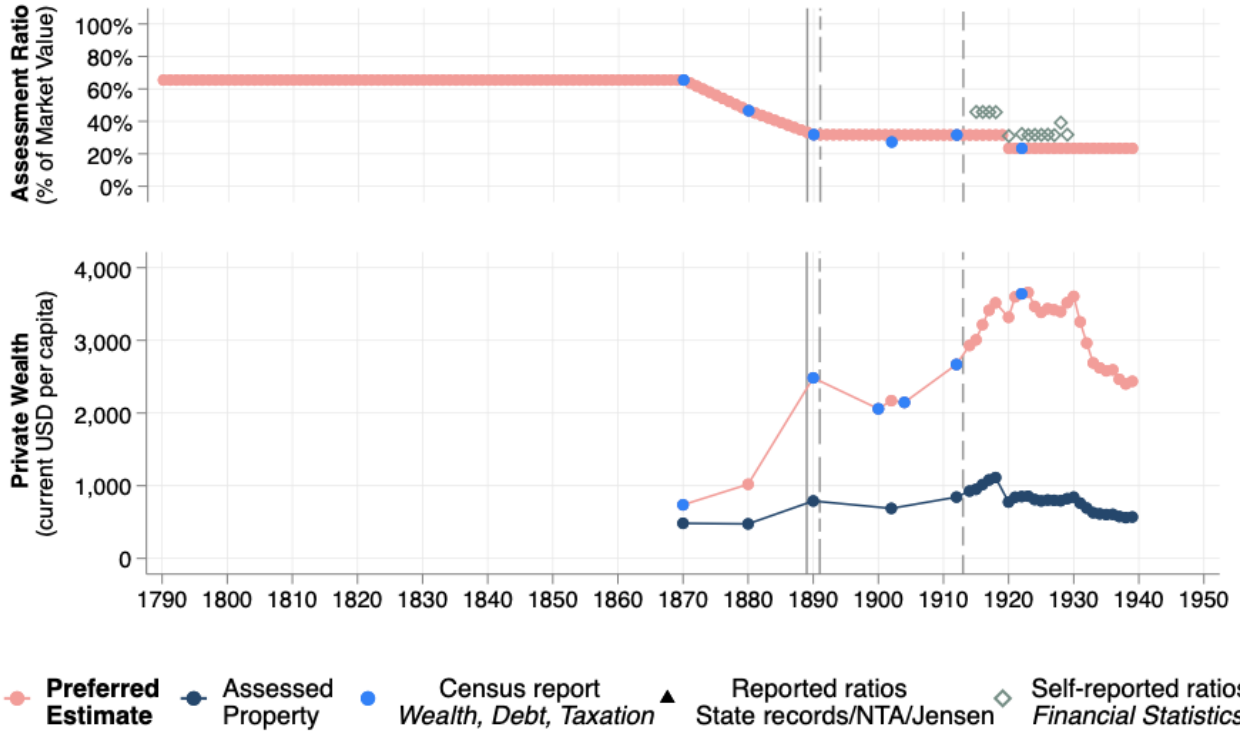
## Mississippi



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Montana

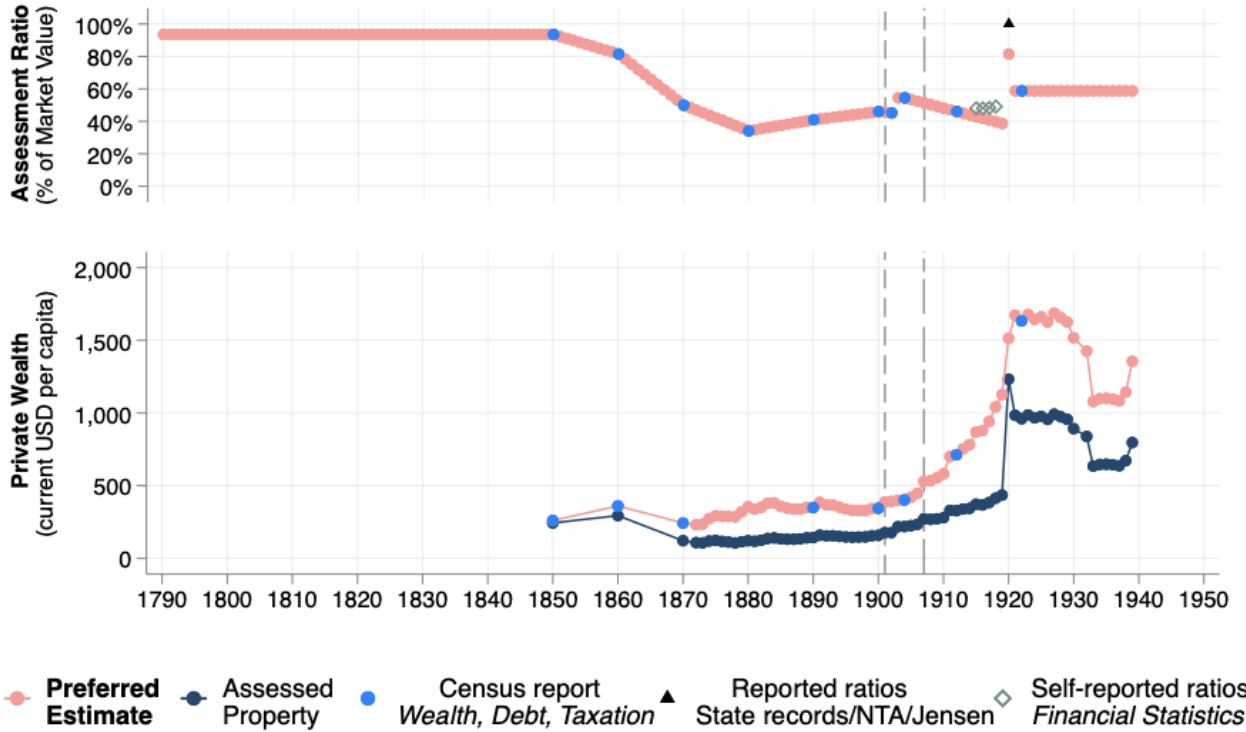
## Montana



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# North Carolina

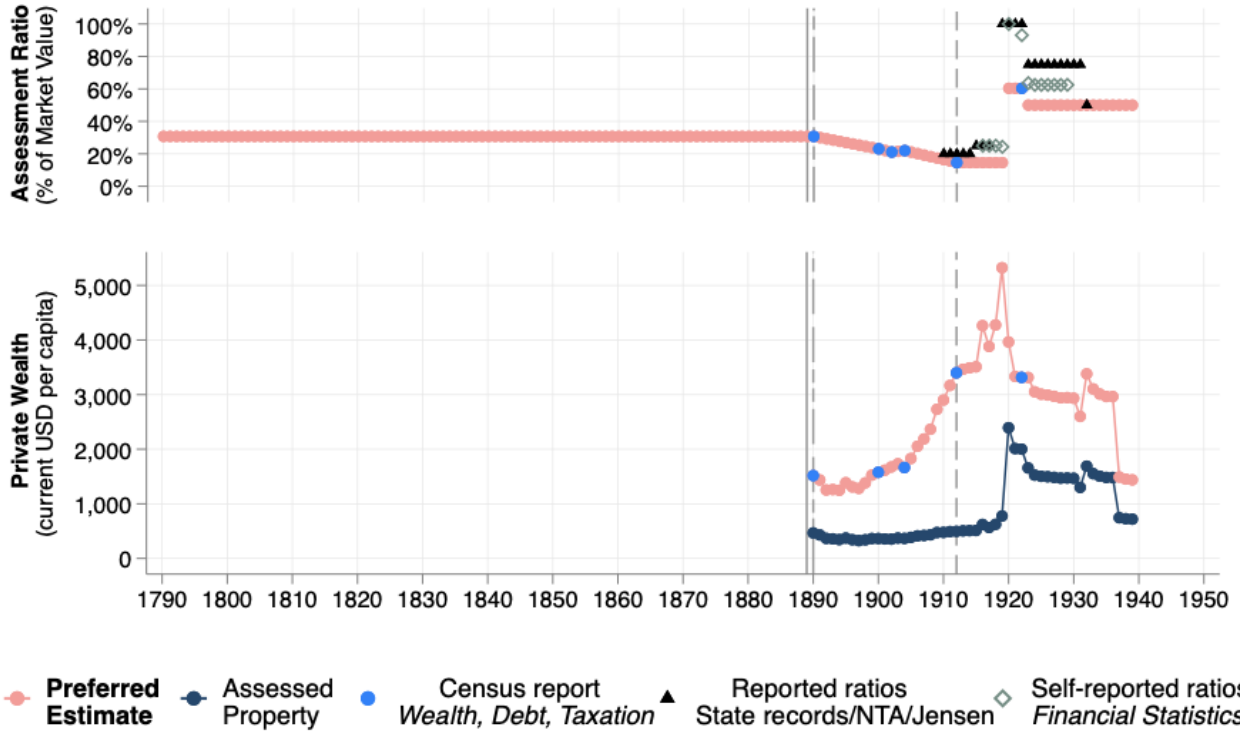
## North Carolina



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# North Dakota

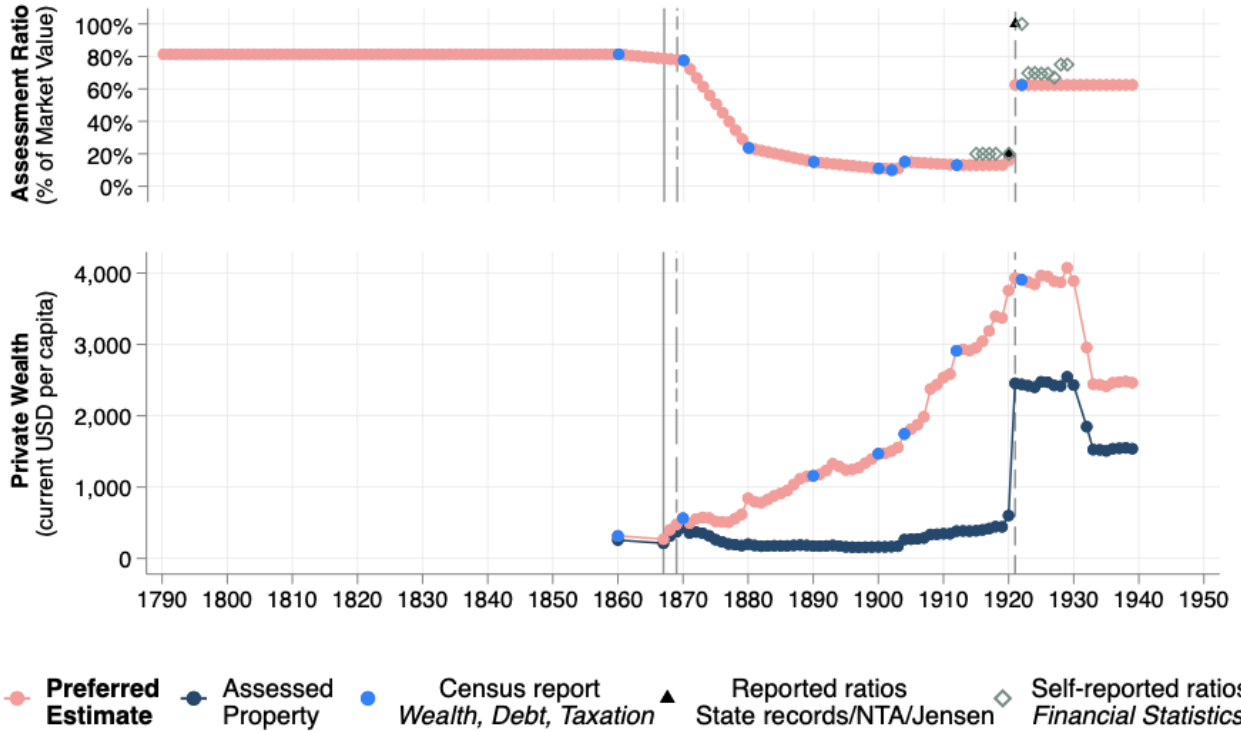
## North Dakota



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Nebraska

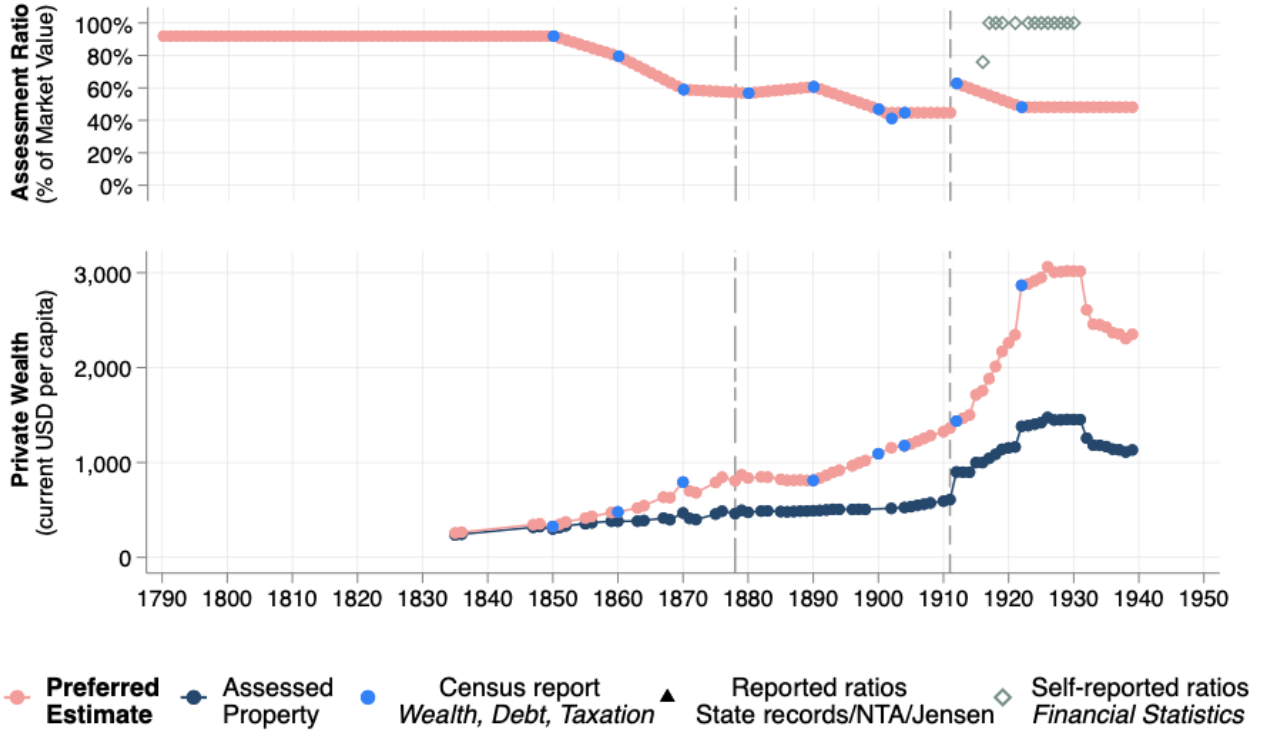
## Nebraska



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# New Hampshire

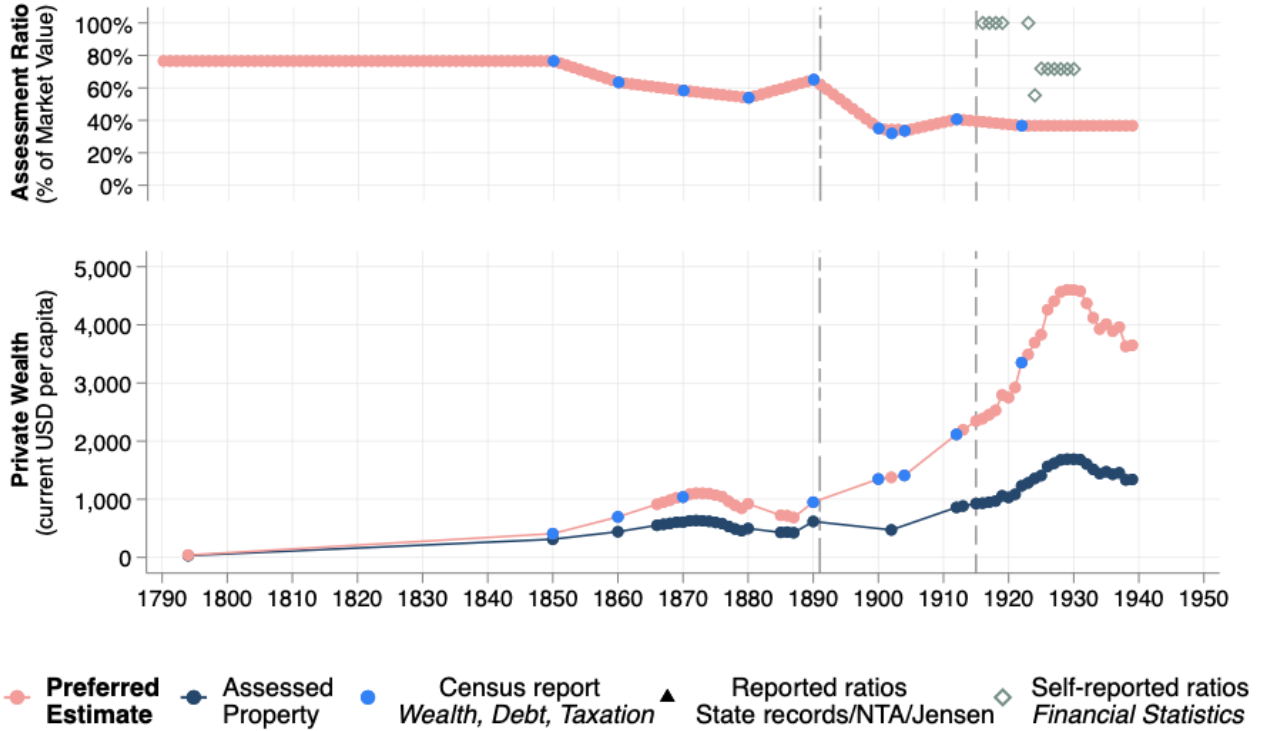
## New Hampshire



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# New Jersey

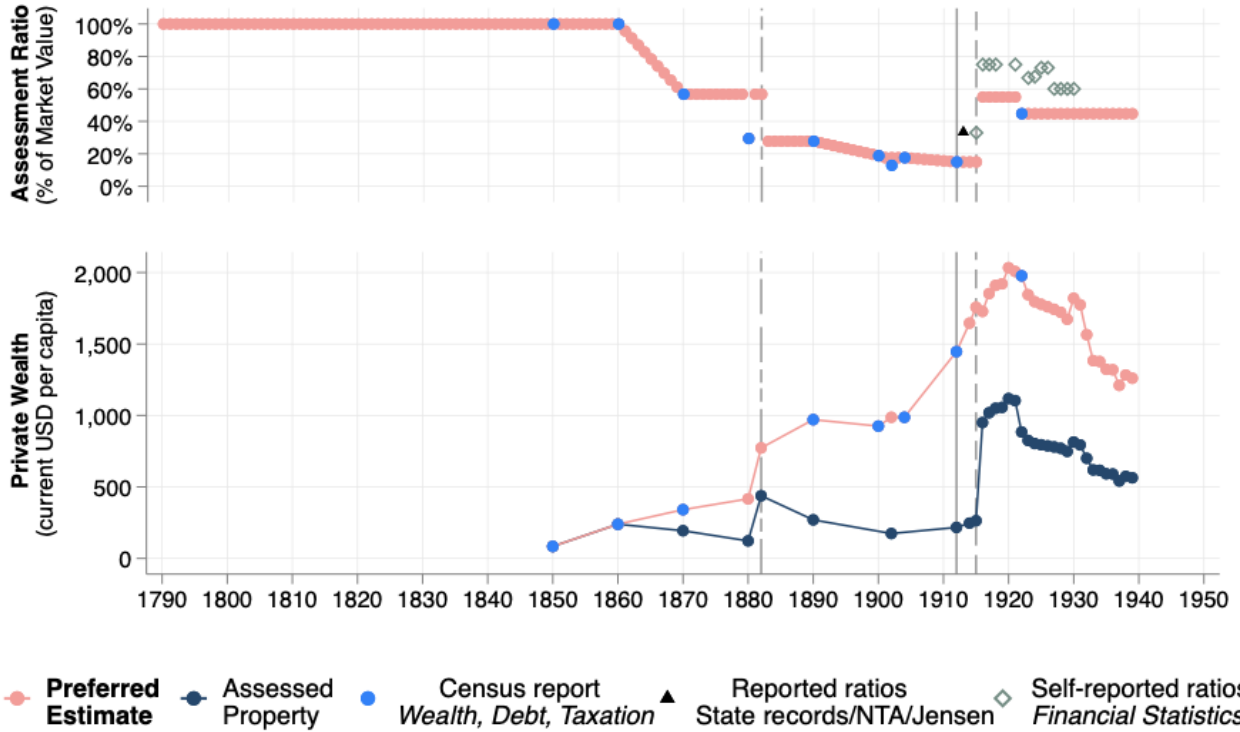
## New Jersey



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# New Mexico

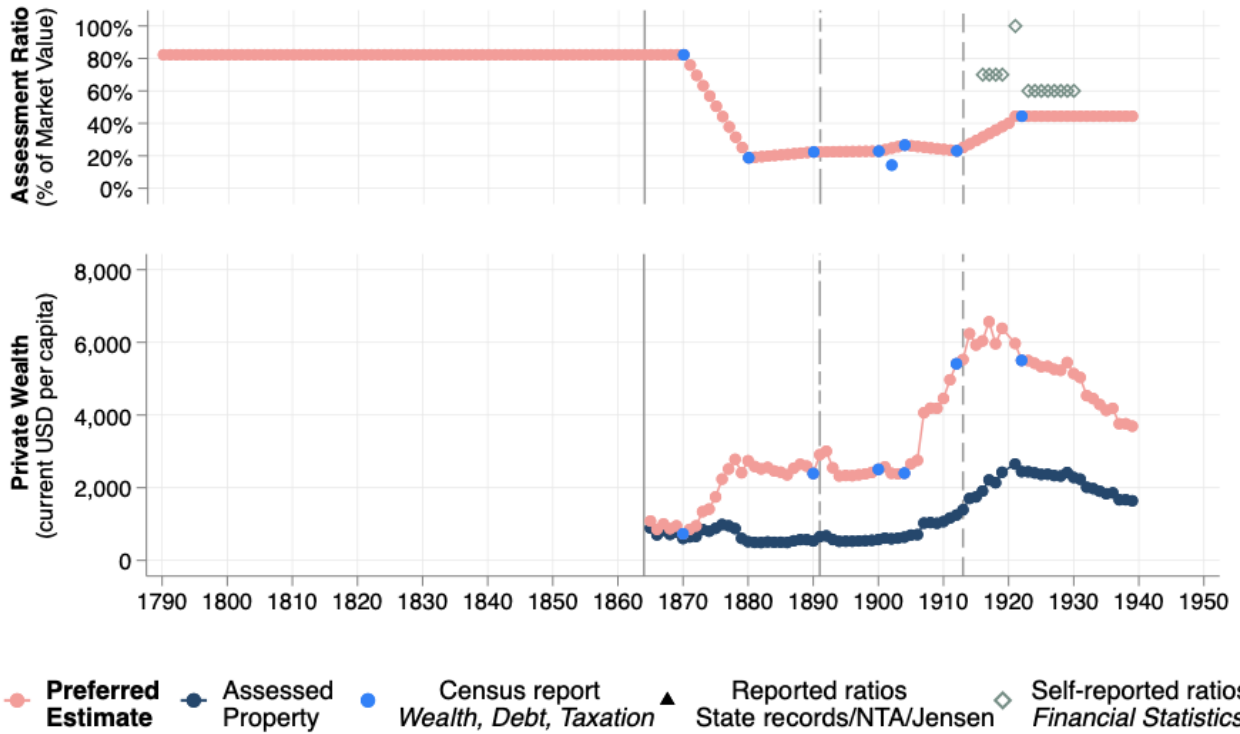
## New Mexico



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Nevada

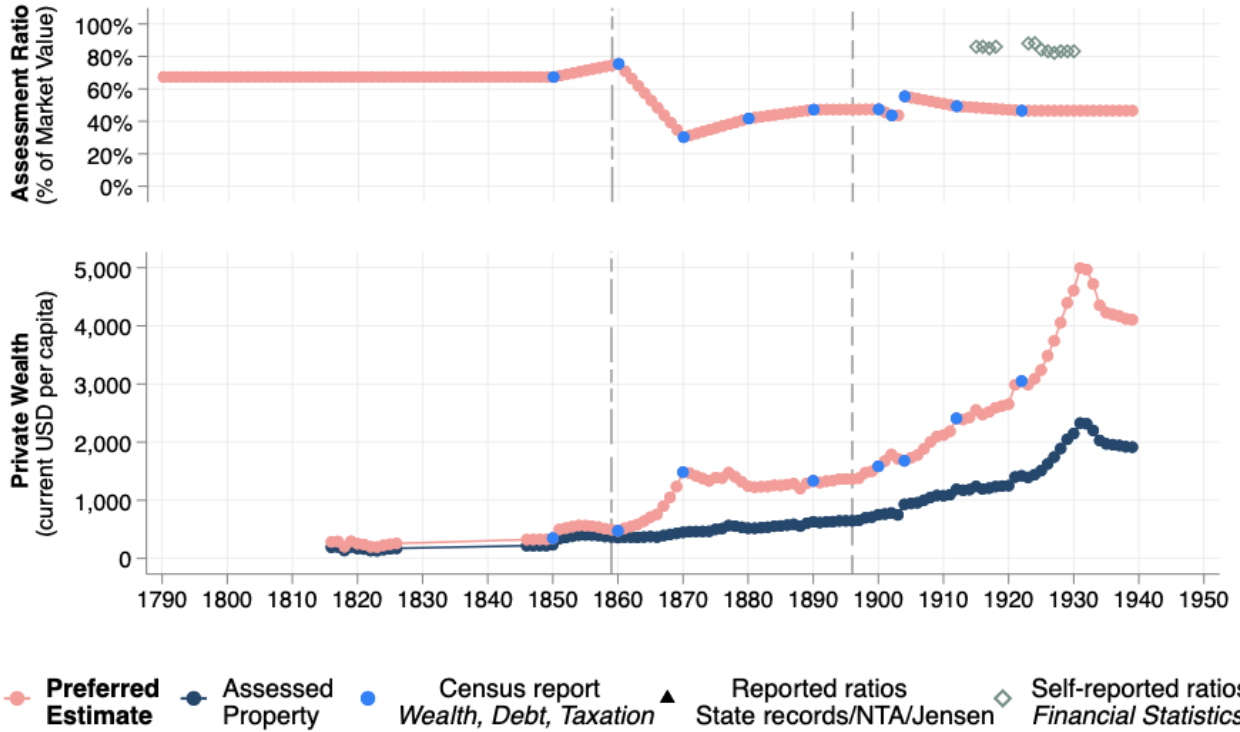
## Nevada



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# New York

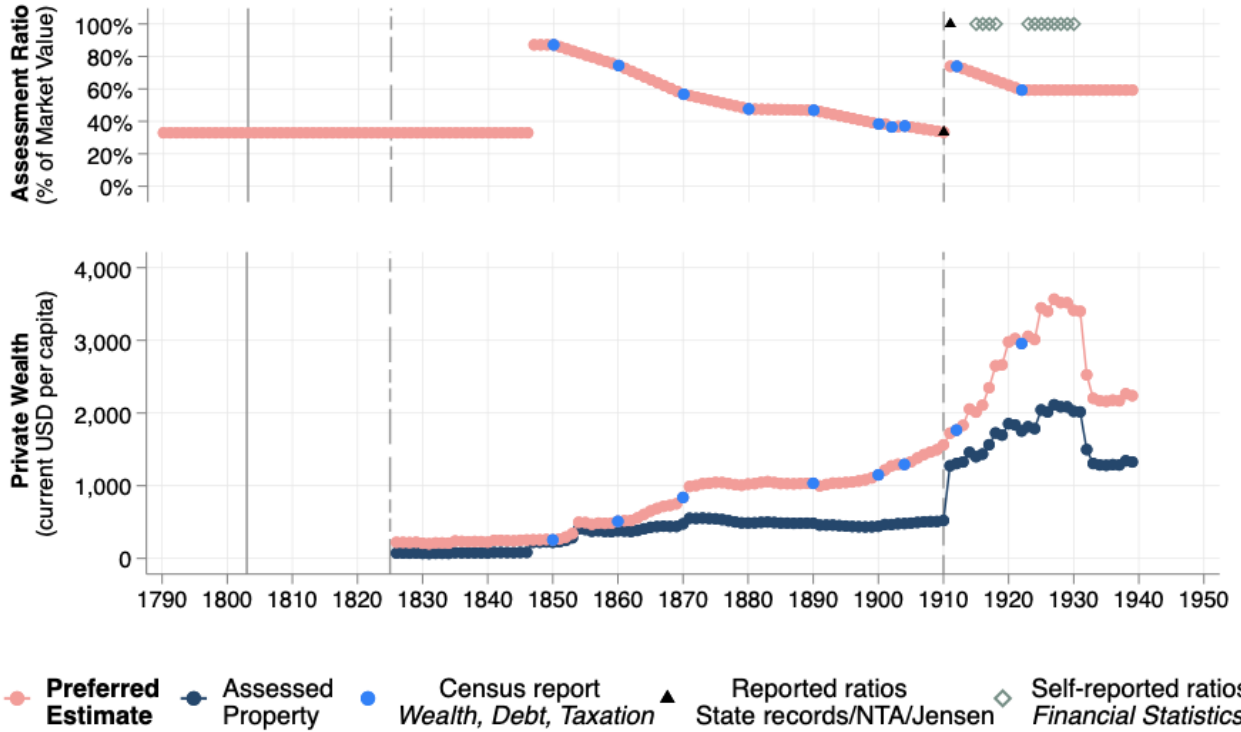
## New York



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Ohio

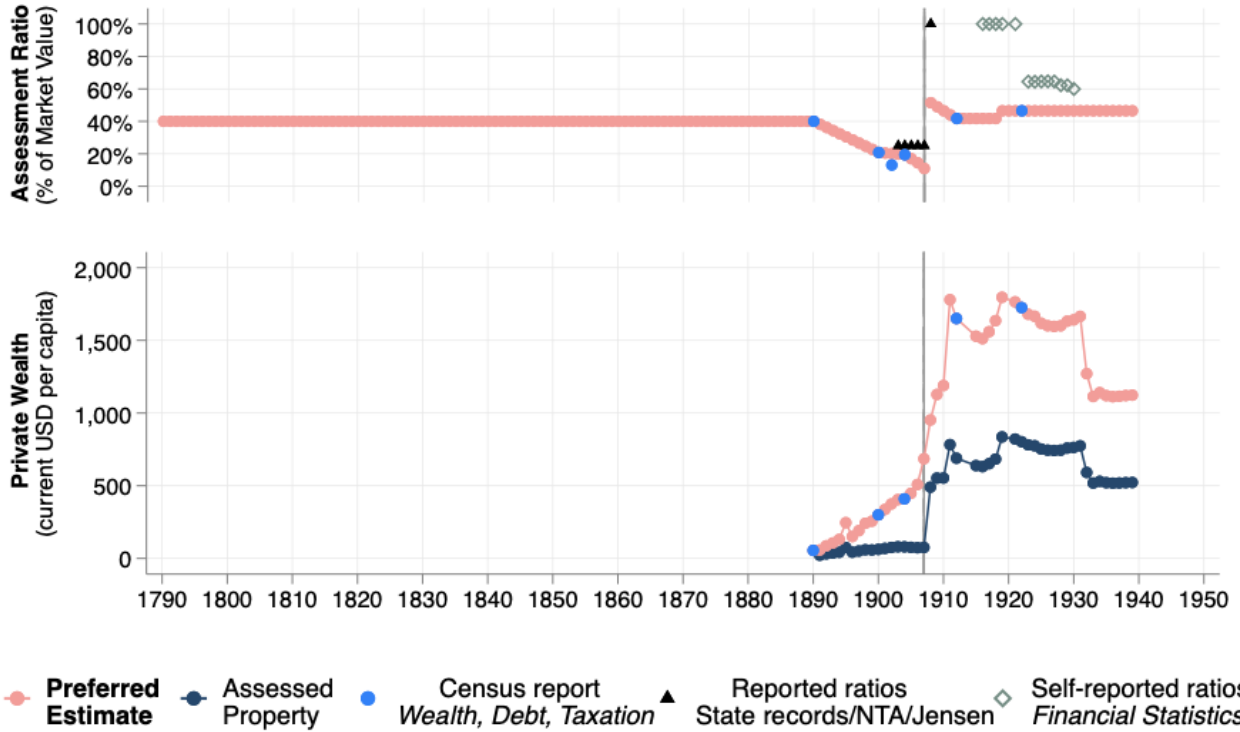
## Ohio



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Oklahoma

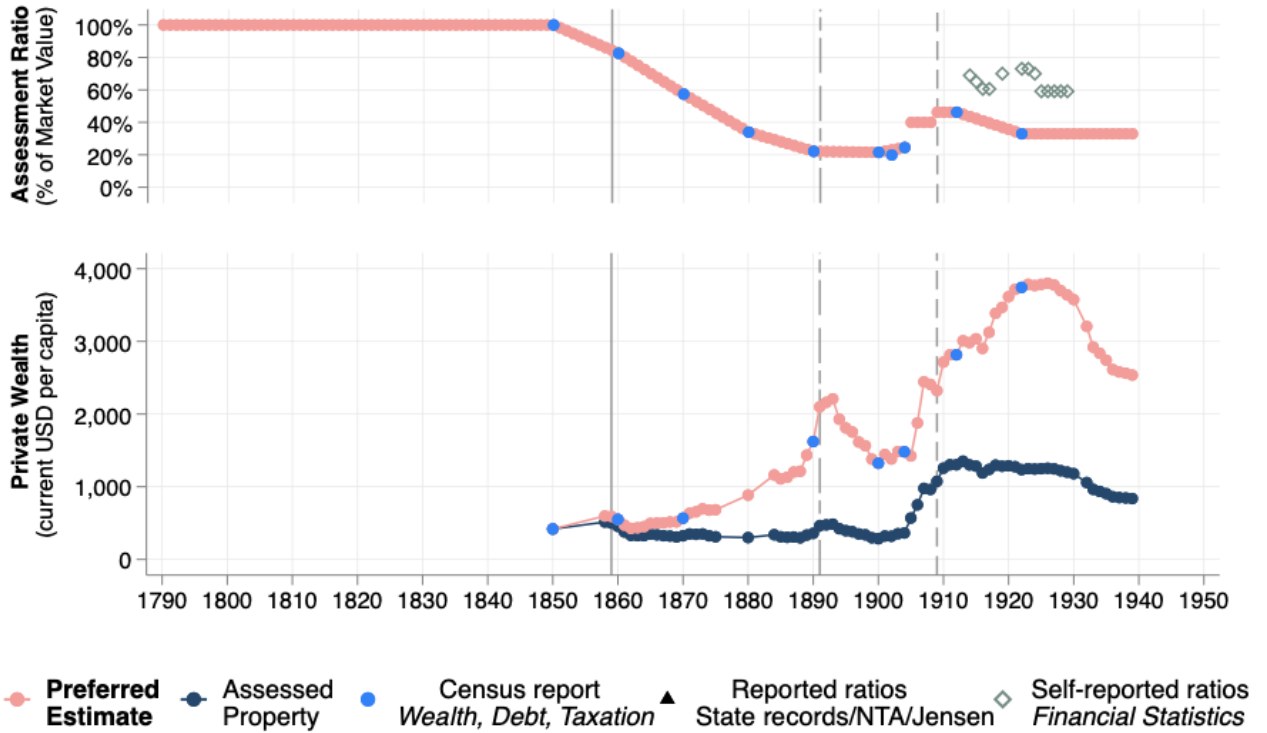
## Oklahoma



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Oregon

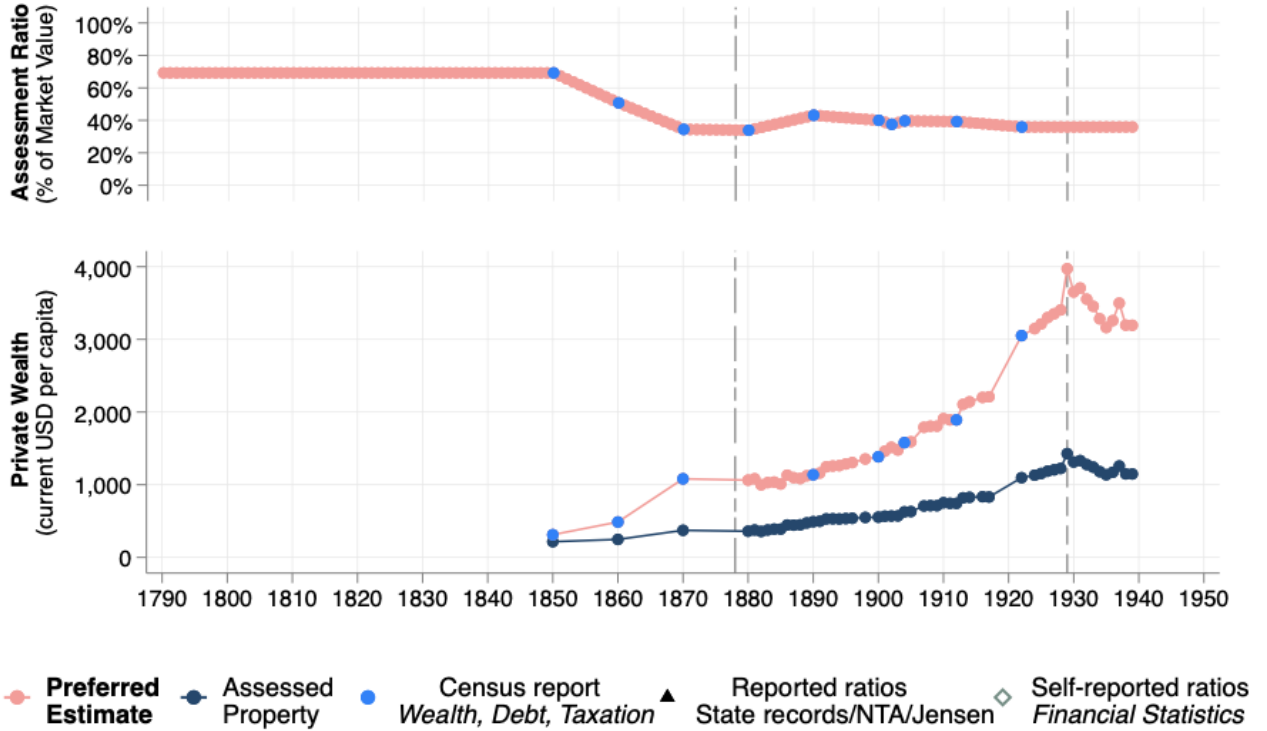
## Oregon



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Pennsylvania

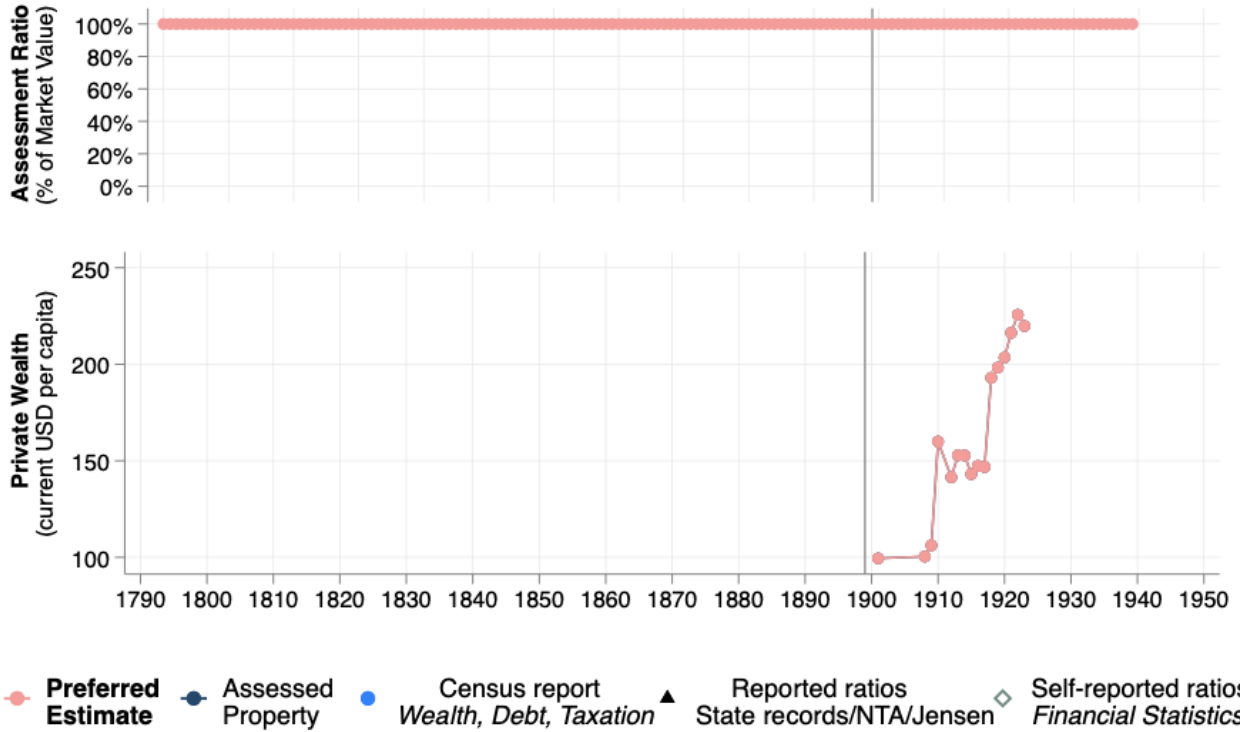
## Pennsylvania



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Puerto Rico

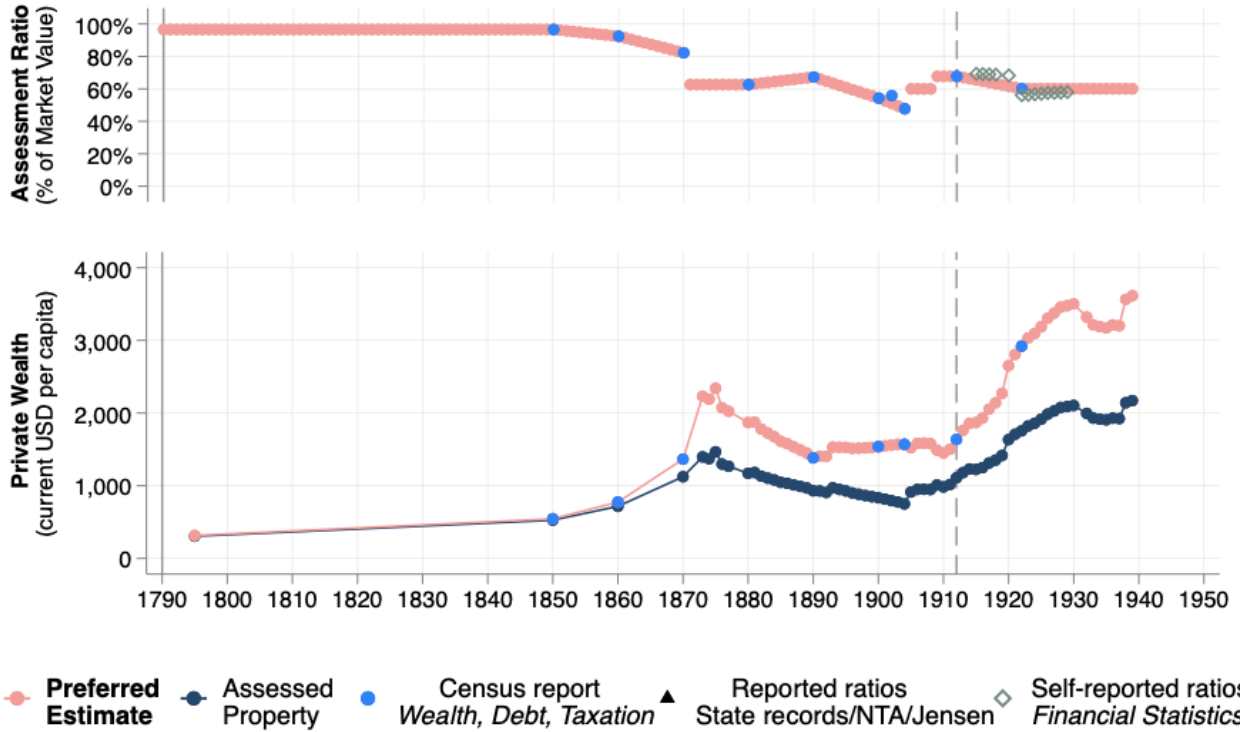
## Puerto Rico



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Rhode Island

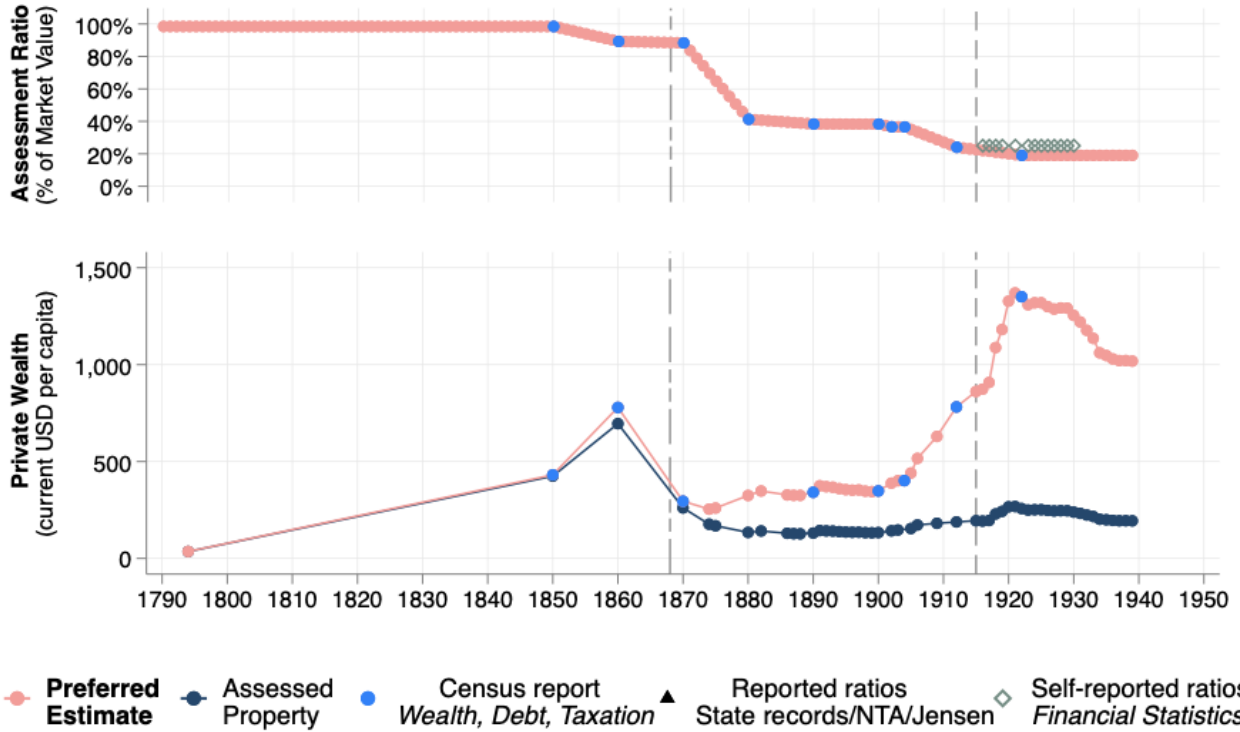
## Rhode Island



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# South Carolina

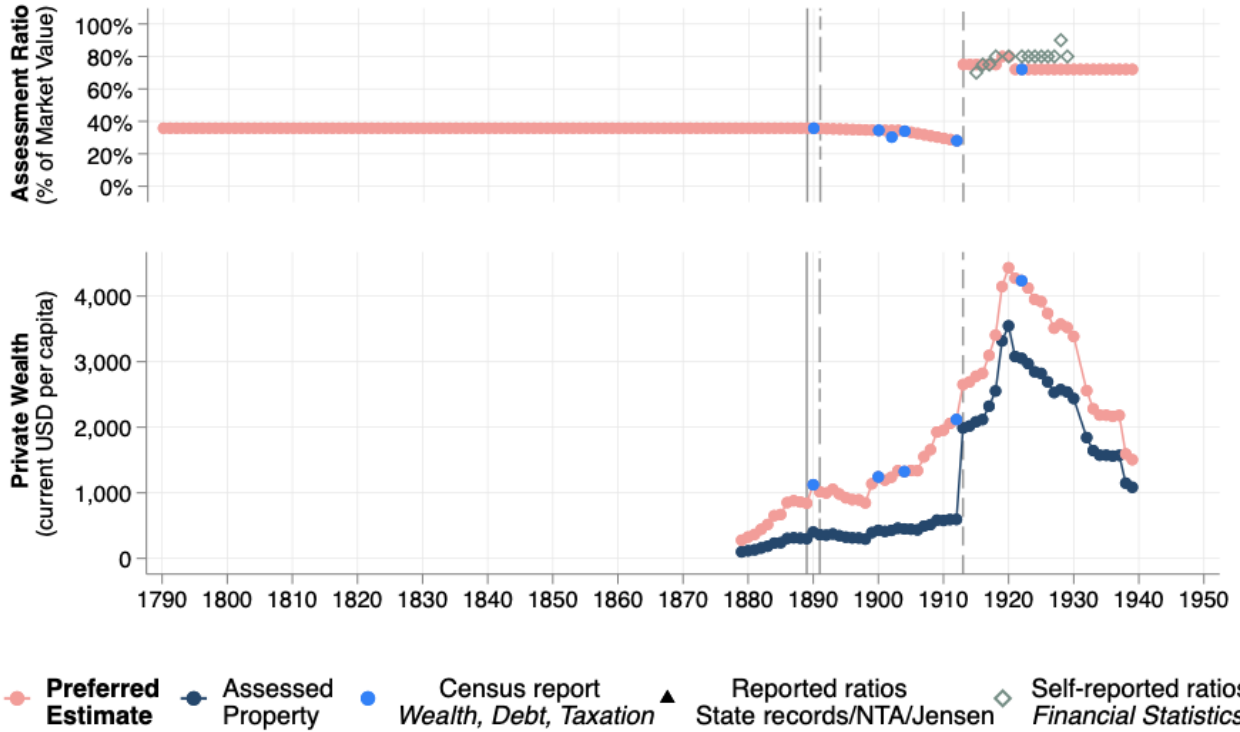
## South Carolina



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# South Dakota

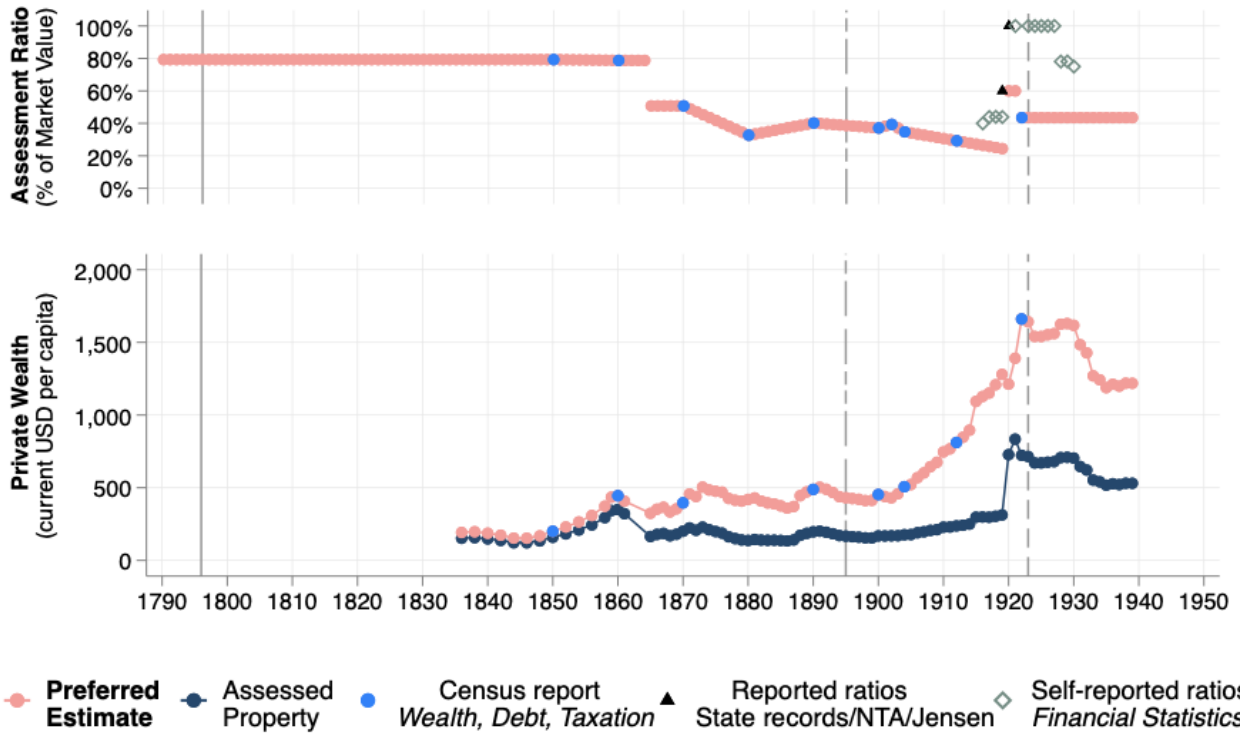
## South Dakota



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

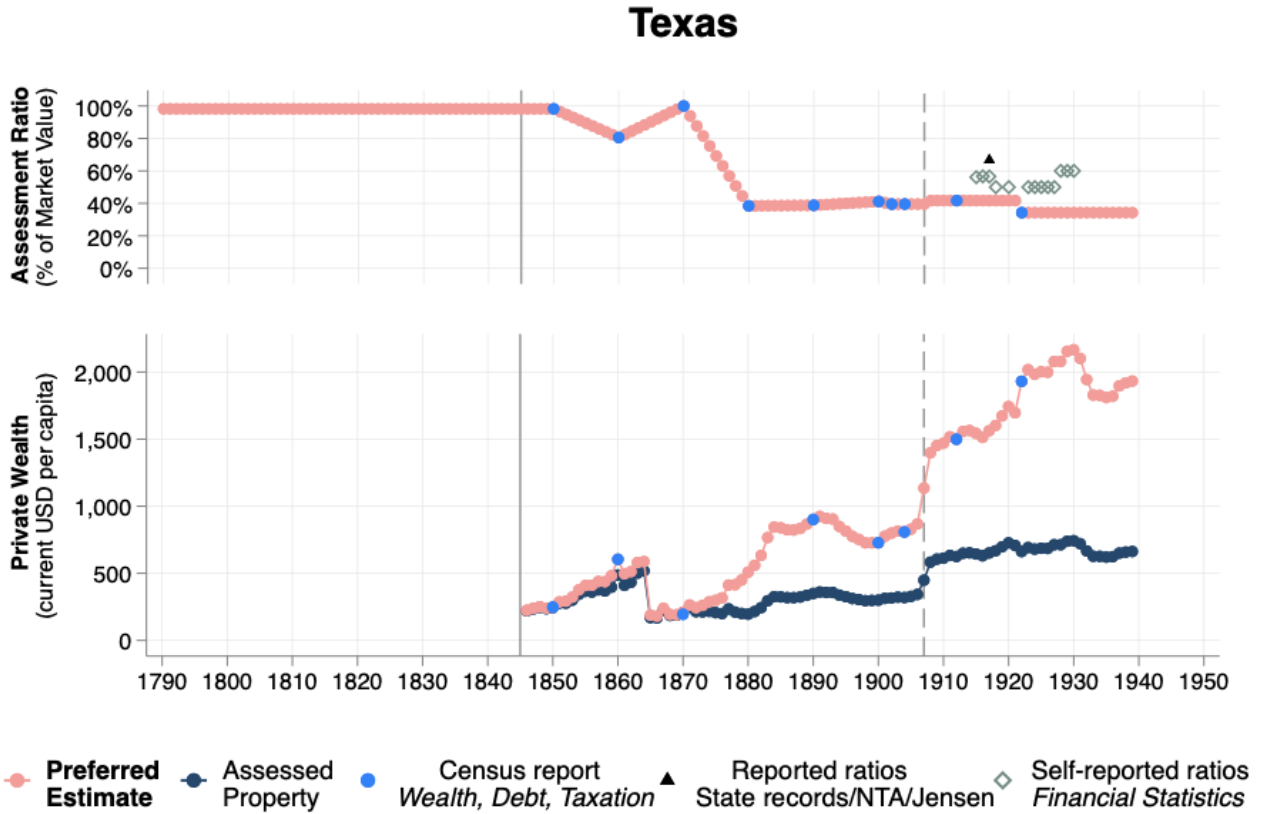
# Tennessee

## Tennessee



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

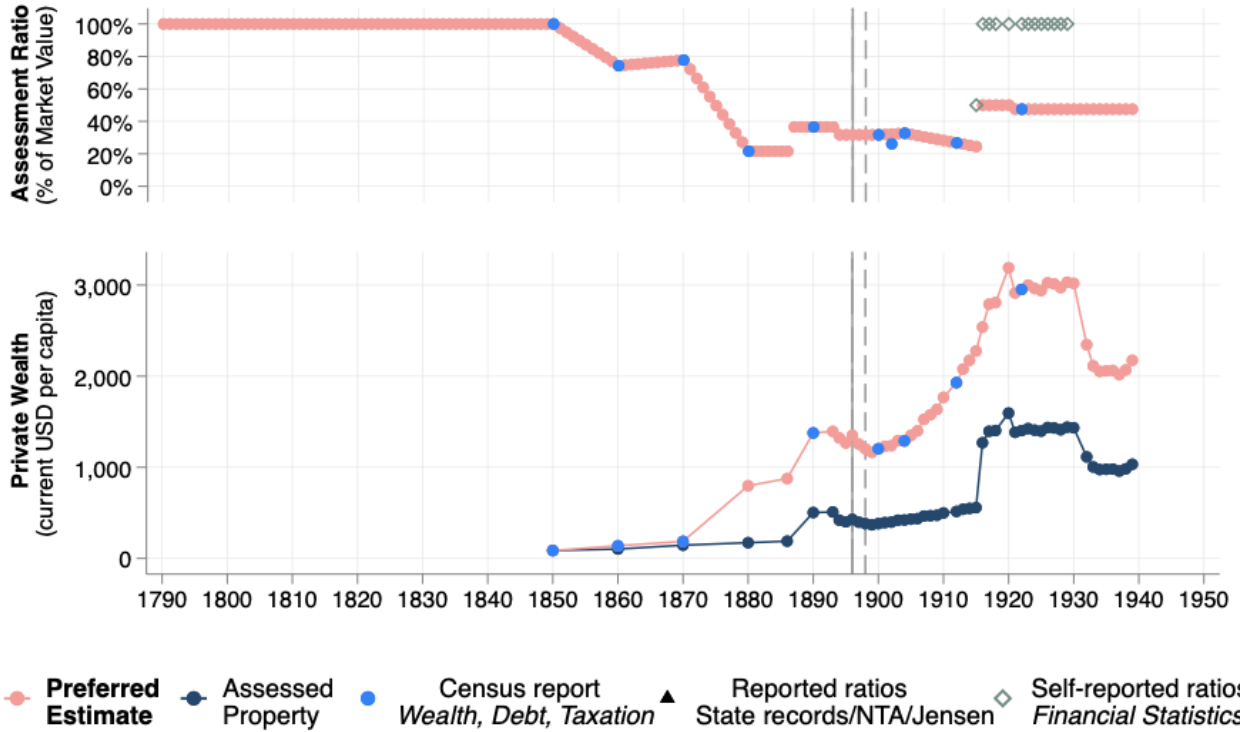
# Texas



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Utah

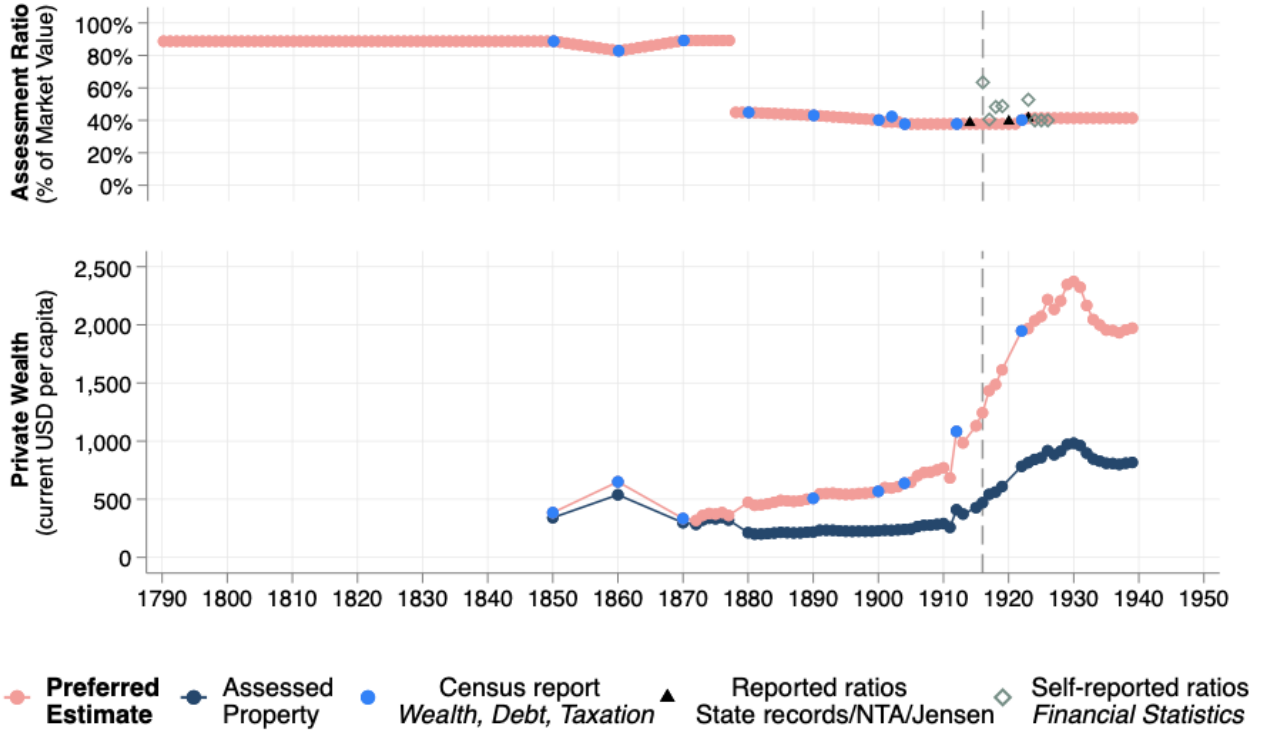
## Utah



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Virginia

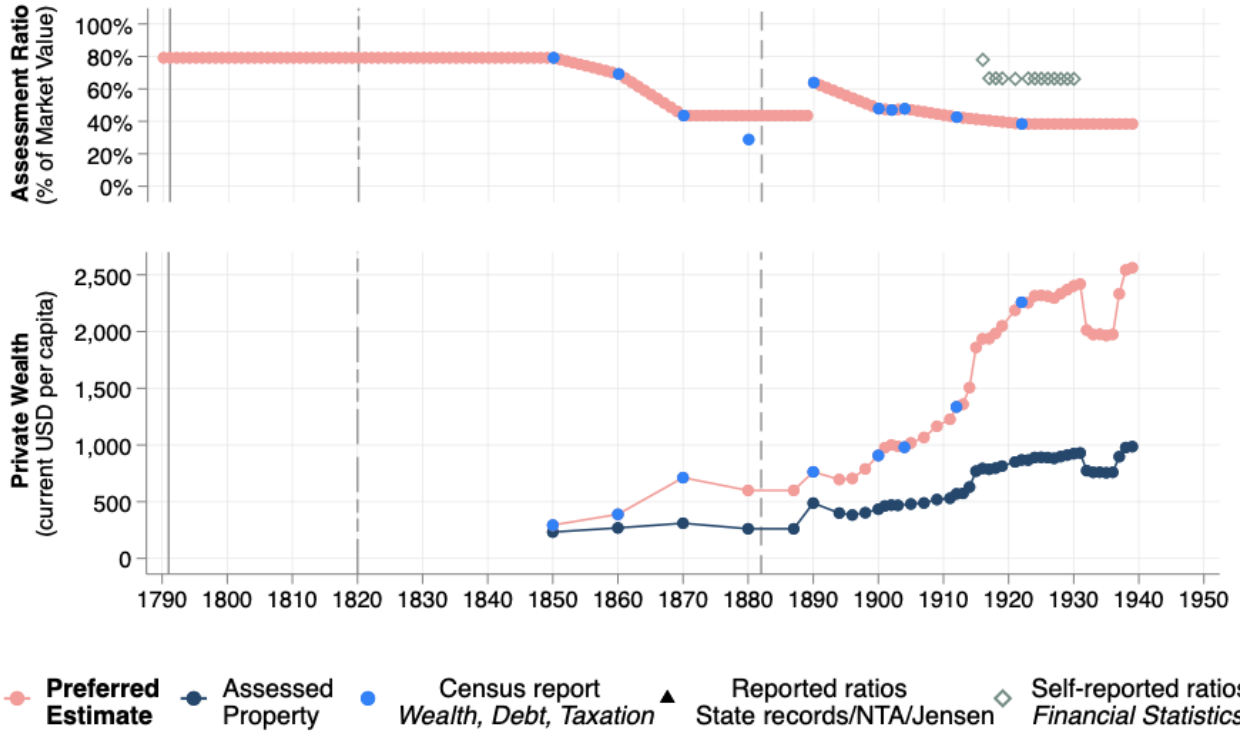
## Virginia



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Vermont

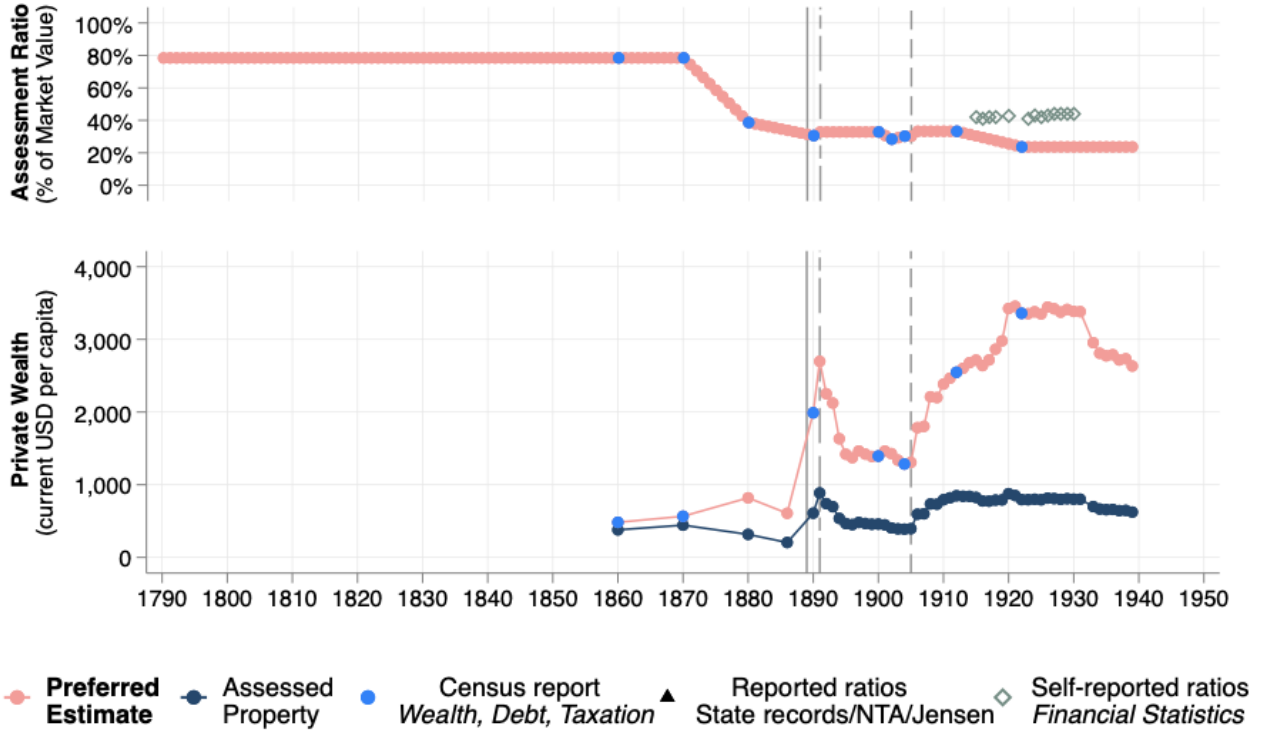
## Vermont



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Washington

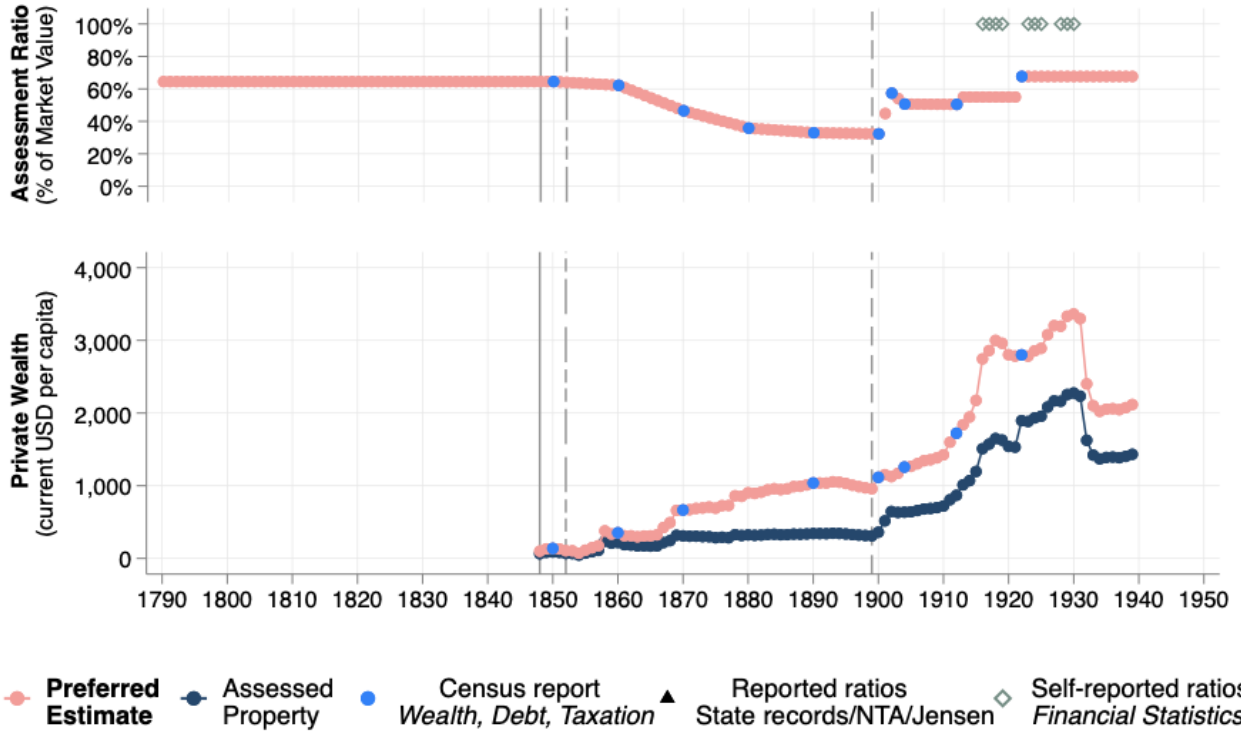
## Washington



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

# Wisconsin

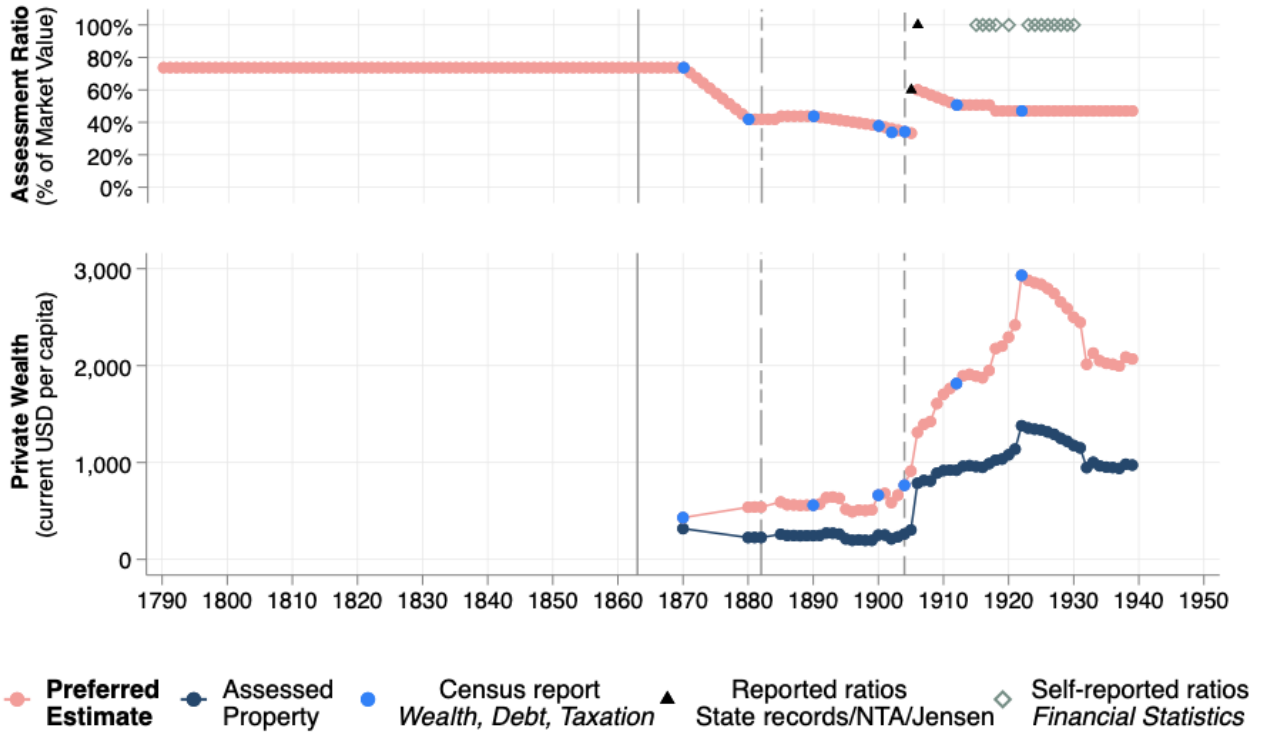
## Wisconsin



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

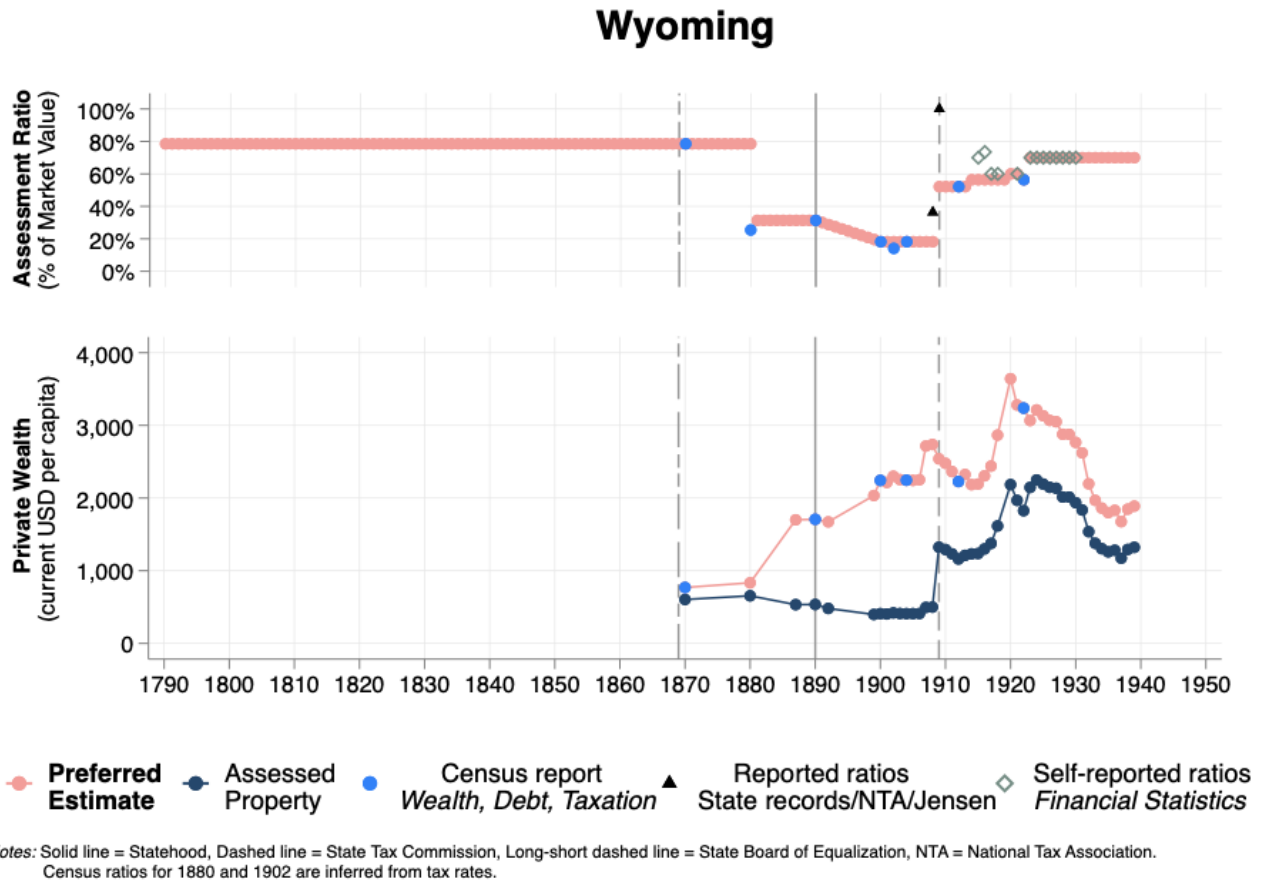
# West Virginia

## West Virginia



Notes: Solid line = Statehood, Dashed line = State Tax Commission, Long-short dashed line = State Board of Equalization, NTA = National Tax Association. Census ratios for 1880 and 1902 are inferred from tax rates.

## Wyoming



### II.4. County Level wealth data

**1870-1930 decadal data.** We measure county-level property by using measures of assessed property for property tax purposes compiled in the Census Wealth Debt Taxation for 1870-1930 every decade. We obtain a measure of the actual property by using state-level assessment ratios obtained from state reports, as described in Appendix Section II.3. We separately observe real and personal property. As detailed in the 1870 report, both real and personal property values were measured as assessed values used for the purpose of property taxation in State and local governments. There was no harmonisation to account for differences in exemption, assessment practices or differences in what counts as real vs personal property across States. However, these statistics were compiled with great care. For instance, in 1870 the collection of these statistics were devoted to members

of the US marshal service that were specially commissioned for this task, with extensive training and access to all the existing official data available at the time.

For 1870, we have county-level assessment ratios from the Census report on Wealth, Debt, and Taxation<sup>11</sup>. We can thus compare the state assessment ratios described in Section II.3 to the average county-level assessment ratios. Figure A14 shows that these values are broadly quite similar, so that our assumption of using the state-level assessment ratio for the counties is well-justified.

**1850 and 1860 wealth estimation based on Census data.** For 1850 and 1860, we obtain county-level wealth data from the Census, as described in Section II.1. In order to have consistency between the county-level data and the state-level data, we rescale county-level wealth by multiplying it by factor (fixed at the state-level) equal to the ratio of state-level wealth to the sum of county-level wealth for each state.

To obtain series of wealth excluding the value of wealth from enslaved people, we subtract the series of wealth from enslaved people *Val. Enslaved*, the construction of which was described in Section II.2.

## II.5. City Level wealth data

Municipal wealth series come from the Census *Annual Financial Statistics of Cities* that compile statistics on assessed property values, tax rates, and assessment ratios from tax assessment records for the largest US cities between 1899 and 1938<sup>12</sup>. Prior to 1899, city tax rates for Baltimore, Boston, and Cincinnati were obtained from Ely (1888).

## II.6. National wealth series

The national wealth series that we constructed is based on the aggregation of state-level wealth series. We explained the construction of these series in Section II.3. It is worth distinguishing the method used before and after 1850.

**Post-1850** We measure the national wealth per capita as the population-weighted average of wealth per capita in each state, where state-level property is constructed as explained in Section II.3.

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<sup>11</sup>See Ninth Census-Volume III, Tables 2 on wealth, taxation, and public indebtedness giving both assessed and true valuation of property for each county, from which we extract an assessment ratio.

<sup>12</sup>Sampled cities had a population above 30,000 for 1899-1931, and above 100,000 for 1932-1938. This corresponds to 311 and 95 cities in 1931 and 1938 respectively.

**Pre-1850** Prior to 1850, we lack systematic information on wealth per capita for all states in the Union. The coverage for wealth at the state level can be seen in Figure 4. Therefore, we estimate national wealth using two additional approaches:

(1) When assessed property value is missing for a state before 1850 but we observe the revenues (or levy) from property taxes, we impute property valuation using the first observed tax rate before 1850 and tax levy, such that:

$$\tilde{W}_{it} = \frac{R_{it}}{\tilde{\tau}_{it_{first}}} \quad (4)$$

where  $\tilde{W}_{it}$  indicates the assessed value of property in state  $i$  and year  $t \leq 1850$ ,  $R_{it}$  the property tax revenue, and  $\tilde{\tau}_{it_{first}}$  the first-observed tax rate on assessed property value.

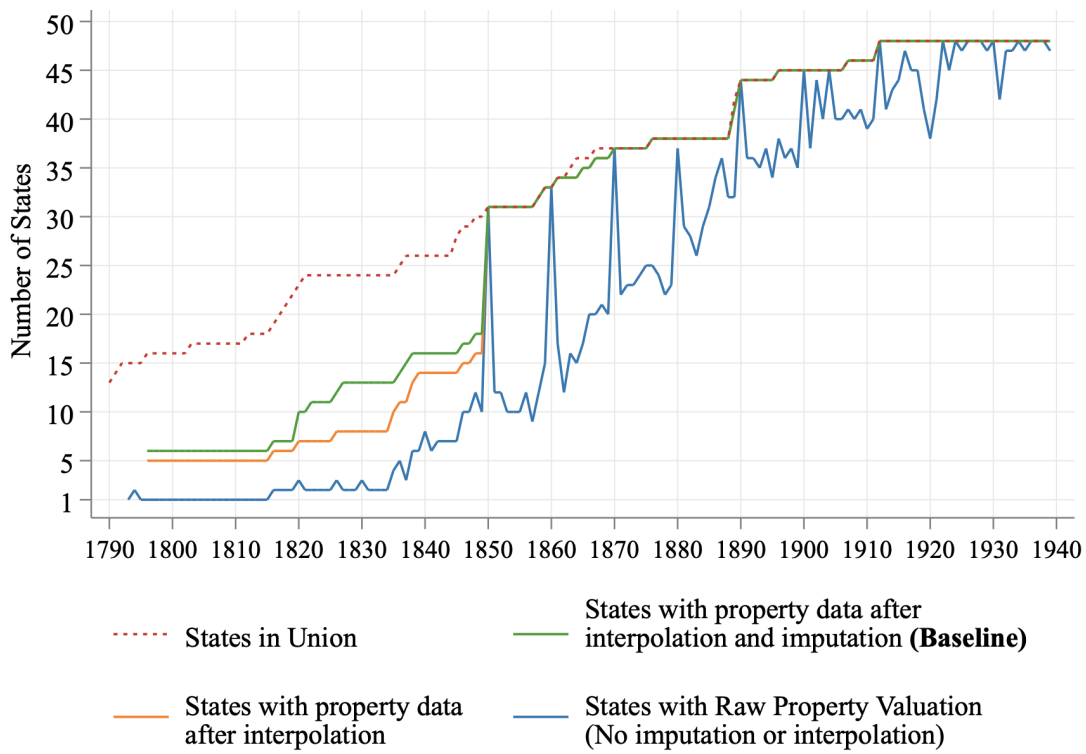
(2) We obtain a national wealth estimate for each year by rescaling the sum of total wealth from states with observed wealth in that year (either directly, or through the imputation in equation (4) by the share of national wealth from these states in 1850 (1850 is the first year when wealth is observed for all states in the Union). Specifically, for years  $t \geq 1850$ , national wealth is simply the aggregate of state-level wealth:  $W_t^{nat} = \sum_i W_{it}$ . For years  $t < 1850$ , let  $I_t$  be the set of states for which we have an estimate of wealth in year  $t$ . Our estimate of national wealth is then

$$W_t^{nat} = \sum_{i \in I_t} W_{it} \cdot \frac{W_{1850}^{nat}}{\sum_{i \in I_t} W_{i,1850}} \quad (5)$$

**Robustness and sensitivity analysis.** We also construct national wealth series under alternative assumptions.

First, we examine how national wealth series change if we use fewer imputations. Panel A of Figure A10 reports these alternative methods that range from the least to the most imputations. The line “raw private wealth” shows the national series based on the property tax data from state-reports with no imputations for missing wealth estimates pre-1850 (the blue series in Figure A10A). We then show national series that impute missing wealth using linear interpolations in state series (line “Linear interpolation”) and also imputing missing wealth from property tax revenue pre-1850 following formula (4) (line “Pre-1850 Imputation from Levy”). In the final series, we also rescale pre-1850 national wealth series using formula (5) (line “Pre-1850 wealth rescaling”). As we can see in the Figure, these alternative assumptions only affect our estimates of national wealth for the very early years 1800-1818, for which the data is significantly scarcer and noisier. For

Figure A28: Data Coverage at the State Level



Notes: Panel A shows the number of state admitted to the Union for which data on private wealth is present in our database of state-level wealth.

the period 1800-1818 in which the uncertainty of our estimates is highest, our preferred estimates show a relatively constant national wealth at around 300% of GDP, while the alternative methods without imputations show a decline of wealth from about 500% to 300% of GDP between 1800 and 1818.

Second, we show an alternative method to rescaling wealth pre-1850 in Panel B of Figure A10. Our preferred rescaling in formula (5) uses all the available wealth data from states with non-missing property tax data. We can, however, test how sensitive the national wealth estimates are if we exclude one state at a time. Similar to the previous alternative method, we find that most of the changes in national wealth estimates are concentrated in the first decades of our series, here between 1796-1816. Our preferred estimates of national wealth around 300% of GDP during this period is a medium estimates, with alternative methods varying from 150-400% of GDP depending of which state is excluded.

Third, we show in Panel C of Figure A10 the values of national wealth using a constant assessment ratio of 40%. As explained in Section II.3, assessment ratios were not uniform across State or time, and these estimates should only be seen as providing some bounds on uncertainty arising from assessment ratios. The value of 40% assessment ratio was chosen as this is the average ratio in our sample. As shown in the figure, these are some differences between our preferred national wealth estimates and national wealth obtained with a constant assessment ratio for the period 1880-1940. Using a state-specific assessment ratios based on all the data available leads to national wealth substantially below that predicted by a constant 40% assessment ratio prior to 1880, as the average assessment ratio for that period was on average 78% (see the evolution of assessment ratios by state and on average at the state level in Figure 6).

## II.7. Existing wealth data in the U.S. 1770-1939

In addition to the assessed property tax data that we use, there exist limited other sources for wealth. These are typically only available at the national level and not at more disaggregated levels, such as state or county. Over the historical period we consider, there are four alternative methods, to which we compare our estimates in Section II.8:

1. **Measures based on individual-level Census questions.** The Census directly asked individuals about the value of their their real wealth (in 1850, 1860, and 1870) and personal wealth (in 1860 and 1870), as described in Section II.1. It has the advantage of directly measuring wealth that can be aggregated at city, county and state-level, but is only available for two years (since 1850 really only measures real wealth). We

compare this data to our estimates at the state level, as detailed in Section II.8, and use it with some modifications to extend our county-level data to 1860 and 1850 (see Section II.4).

2. **Measures based on the perpetual inventory method.** This method indirectly estimates capital by cumulating past investment flows into a measure of the stock of capital, while also accounting for changes in relative prices. These national-level estimates are constructed by Goldsmith (1952) for almost every decade from 1850 to 1950, using capital expenditures provided in national accounts. They are used by Piketty and Zucman (2014), along with other estimates, to produce a long-term wealth series. We describe the data constructed by Piketty and Zucman (2014) in more detail in Section Section II.8.
3. **Measures of wealth based on national balance sheets data from national accounts.** Such balance sheets information becomes available only in 1916 for the US, so it does not cover most of our period of study. This data was used by Goldsmith (1952) to estimate national-level wealth from 1916 to 1945. it also forms the basis of wealth estimates in Piketty and Zucman (2014) for that period.
4. **Measures of wealth based on national accounts and Census data on the value of land.** This method relies on national accounts to measure the stock of capital in each sector and of Census data on the value of land. It was used in Gallman and Rhode (2019) to construct national-level wealth for every decade from 1850 to 1900.

There are some other methods for wealth estimation, but these are not available on a consistent basis. Garmon Jr (2014) studies the 10 most populous states in 1785-1815. Jones (1970) uses probate records for 1774 for some counties in Pennsylvania, New Jersey, and Delaware. Jones (1972) estimates the wealth of the Middle Colonies and New England in 1774. Soltow (1984) estimates wealth for 10-20% of counties in Maine, Massachusetts, Connecticut, New York, Pennsylvania, Maryland, North Carolina, Georgia, and Tennessee for the period 1798-1860.

## II.8. Comparison with Other Sources

In this section, we compare our database on wealth to the other historical sources described in Section II.7.

### II.8.1. Comparison with the Census of Agriculture Data at the state level

In Figure 7, we compare our measure of taxable land and improvements, for states that separately reported this, to the average value of farmland and buildings in the Census of Agriculture, as compiled by Haines (2014). We compile data on thirteen states (Alabama, Arkansas, Florida, Georgia, Indiana, Kansas, Kentucky, Minnesota, North and South Carolina, Tennessee, Texas and Wisconsin) between years 1860 and 1910.

### II.8.2. Comparison with the IPUMS USA Full Count

At the state level, Figure A22 shows that for many states, the ratio of our property-tax based measure and the IPUMS USA Full Count measure is between 80% and 120% for all years. In 1850, this is the case for 18 out of 30 states; in 1860 24 out of 33 states, and in 1870 22 out of 37 states. There are some states with large discrepancies between the tax-based and IPUMS USA Full Count data in 1850: Texas and Michigan, (where the tax-data significantly underestimates wealth relative to the Census). In 1870, there are some states where the tax data yields higher wealth levels than in the IPUMS USA Full Count. These are Arkansas, Louisiana, South and North Carolina, Florida, New York, Rhode Island and Massachusetts.

At the county level, Figure A23 shows the ratio between tax-based property measures and the IPUMS USA Full Count measures in 1870 (which is the only year in which we can compare these data sources at the county level). There are, again, more discrepancies between these two data sources in terms of Personal Wealth rather than real wealth, but there is no clear systematic over- or undervaluation by any of these data. As alluded to multiple times, the definition of Personal Wealth is not streamlined in the property tax assessments and could vary across and within states. The comparisons by type of wealth are thus much noisier.

### II.8.3. Piketty and Zucman (2014)

Piketty and Zucman (2014) constructed a harmonized series of ratios of private wealth / national income approximately every decade for 1850-1910 as well as for 1770 and 1810, and annual ratios for the period 1870-1940.

Below are data sources and adjustments for each estimates of private wealth for the Piketty and Zucman (2014) harmonized series :

- **1770:** Estimates of private wealth from probate records in 1774 from Jones (1970) after (i) converting current pounds into current dollars (1 pound sterling = 4.44 US

dollar) (ii) converting “per free capita” into “per capita” assuming that enslaved people made up about 20% of the total population of the Thirteen Colonies in 1774 (iii) upgrading 1770 per capita national income by 5% to take into account real and nominal growth between 1770 and 1774.

- **1810:** Estimate of private wealth from [Blodget \(1806\)](#) based on the compilation of national statistics on the value of real and personal wealth.
- **1850:** Estimates from [Goldsmith \(1952\)](#) inflated by 20%.
- **1860:** Estimates from [Hoenack \(1964\)](#).
- **1870:** Estimates from [Goldsmith \(1952\)](#) inflated by 20%.
- **1880:** Estimates from [Hoenack \(1964\)](#).
- **1900:** Estimates from [Goldsmith \(1952\)](#).
- **1912:** Estimates from [Goldsmith \(1952\)](#).
- **1870-1916 (annual estimates):** Annual estimates of private wealth using decade-level estimates above, private saving flows from [Kutznets \(1961\)](#), and assuming a constant annual rate of real capital gains of 1.8% for 1870-1880, 1.0% for 1880-1900, 0.7% for 1900-1912, and 1.0% for 1912-1916.
- **1916-1945 (annual estimates):** Mid-year household wealth estimates from [Kopczuk and Saez \(2004\)](#), based on balance sheets of [Goldsmith \(1952\)](#) and [Edward N. Wolff \(1898\)](#). [Piketty and Zucman \(2014\)](#) make two adjustments: (i) they exclude consumer durables<sup>13</sup> (ii) they upgrade household net wealth by 7% for consistency with their post-1945 data. [Kopczuk and Saez \(2004\)](#) estimates also exclude non-transmissible wealth.

#### II.8.4. [Gallman and Rhode \(2019\)](#)

([Gallman and Rhode, 2019](#)) wealth estimates for 1850-1900 are based on Gallman’s capital stock measures by two-digit industrial sector estimated from national accounts, and a measure of the value of land. The series used here for comparison comes from Rhode’s completion and compilation of these estimates into a consistent national wealth series presented in ([Gallman and Rhode, 2019](#)), Table 2.4. For comparison, we use the series

<sup>13</sup>They use series from the BEA for 1925-1945, linear interpolation based on [Goldsmith \(1952\)](#) estimates for 1901, 1913 and 1923, then assume a constant fraction of durables before 1901 (33%, the 1901 value).

on domestic wealth, measured as the sum of capital stock and the value of land. As detailed in (Gallman and Rhode, 2019), this wealth concept excludes paper claims, consumer durables, and human capital.

## II.9. Data Appendix Tables

Table A6: Overview of wealth data series constructed

Variable	Unit	Period	Frequency	Sample	Sources	Note
<b>Total Private Property</b>	City	1899-1938	Annual	1899-1931: All cities >30,000 population 1932-1938: All cities >100,000 population	<i>Financial Statistics of Cities</i>	$N = 7,026, n = 327, \bar{T} = 21.5$ 139 cities in 1899, 311 cities in 1931, 95 cities in 1938
	County	1860-1930	Decennial	All counties	Census (1860-1870) <i>Wealth, Debt, Taxation</i> (1870-1930)	$N = 18,242, n = 3,159, \bar{T} = 5.8$
	State	1793-1940	Annual	All States + Alaska, Washington DC and Puerto Rico	State reports, <i>Ely</i> (1888), <i>Census</i> (1941) <i>Financial Statistics of States</i> (1915-1939)	$N = 4,583, n = 52, \bar{T} = 88.1$
	City	1899-1938	Annual	1899-1931: All cities >30,000 population 1932-1938: All cities >100,000 population	<i>Financial Statistics of Cities</i>	$N = 6,998, n = 327, \bar{T} = 21.4$ 139 cities in 1899, 311 cities in 1931, 95 cities in 1938
<b>Real Property</b>	County	1860, 1870, 1910, 1920, 1930	Decennial	All counties	Census (1860-1870) <i>Wealth, Debt, Taxation</i> (1870-1930)	$N = 10,200, n = 3,089, \bar{T} = 3.3$
	State	1826-1940	Annual	All States + Washington DC and Puerto Rico	State reports, <i>Ely</i> (1888), <i>Census</i> (1941) <i>Financial Statistics of States</i> (1915-1939)	$N = 2,227, n = 51, \bar{T} = 43.7$
	City	1899-1938	Annual	1899-1931: All cities >30,000 population 1932-1938: All cities >100,000 population	<i>Financial Statistics of Cities</i>	$N = 6,453, n = 322, \bar{T} = 20$ 139 cities in 1899, 311 cities in 1931, 95 cities in 1938
	County	1860, 1870, 1910, 1920, 1930	Decennial	All counties	Census (1860-1870) <i>Wealth, Debt, Taxation</i> (1870-1930)	$N = 10,160, n = 3,092, \bar{T} = 3.3$
<b>Personal Property</b>	State	1826-1940	Annual	All States + Washington DC and Puerto Rico	State reports, <i>Ely</i> (1888), <i>Census</i> (1941) <i>Financial Statistics of States</i> (1915-1939)	$N = 2,161, n = 51, \bar{T} = 42.4$
	City	1899-1938	Annual	1899-1931: All cities >30,000 population 1932-1938: All cities >100,000 population	<i>Financial Statistics of Cities</i>	$N = 6,963, n = 327, \bar{T} = 21.9$ 139 cities in 1899, 311 cities in 1931, 95 cities in 1938
	County	1870-1930	Decennial	All counties	<i>Wealth, Debt, Taxation</i> (1870-1930)	$N = 16,243, n = 3,204, \bar{T} = 5.1$
	State	1816-1940	Annual	All States + Washington DC and Puerto Rico	State reports, <i>Ely</i> (1888) <i>Financial Statistics of States</i> (1915-1939)	$N = 2,753, n = 51, \bar{T} = 54$
<b>Property tax rate</b>	City	1899-1938	Annual	1899-1931: All cities >30,000 population 1932-1938: All cities >100,000 population	<i>Financial Statistics of Cities</i>	$N = 7,027, n = 327, \bar{T} = 21.5$ 139 cities in 1899, 311 cities in 1931, 95 cities in 1938
	County	1860-1930	Decennial	All counties	State reports <i>Wealth, Debt, Taxation</i>	$N = 23,071, n = 3,368, \bar{T} = 6.7$
	State	1798-1940	Annual	All States + Washington DC and Puerto Rico	State reports <i>Wealth, Debt, Taxation</i>	$N = 5,289, n = 52, \bar{T} = 101.7$
	County	1860-1930	Decennial	All counties	State reports <i>Wealth, Debt, Taxation</i>	$N = 23,071, n = 3,368, \bar{T} = 6.7$

Table A7: State Coverage and Sources

State	Admission	Sample period	Sources
Alabama	1819	1850 - 1939	Reports of the State Auditor Reports of the Treasurer
Alaska	1959	1906 - 1940	Reports to the Secretary of the Interior Reports of the Governor Revenue and Taxation in Alaska (1962) Survey of Taxation in Alaska (1938)
Arizona	1912	1870 - 1939	Reports of the State Tax Commission of Arizona Reports of the Territorial Auditor, Reports of the Territorial Treasurer Reports of the Bank Comptroller Reports of the Treasurer
Arkansas	1836	1838 - 1939	Biennial Reports of the Auditor Biennial Reports of the Secretary of State Biennial Reports of the Treasurer of State Biennial Reports of the Arkansas Tax Commission
California	1850	1850 - 1939	Reports of the State Board of Equalization Biennial Reports of the State Comptroller Biennial Reports of the State Treasurer
Colorado	1876	1870 - 1939	Biennial Reports of the Auditor of State Reports of the State Board of Equalization Annual Reports of the Colorado Tax Commission Annual Reports of the Public Examiner

Table A7 continued from previous page

State	Admission	Sample period	Sources
Connecticut	1788	1796 - 1940	Biennial Reports of the Tax Commissioner Reports of the Comptroller Reports of the Treasurer Assessment and Collection of Taxes by Town Officials Report of the Connecticut Tax Study Commission (1959)
Delaware	1787	1850 - 1939	Annual Reports of the State Auditor Biennial Reports of the Treasury Department Reports of the Delaware State Revenue and Taxation Commission
District of Columbia	N/A	1850 - 1939	Reports of the Assessor Reports of the Auditor
Florida	1845	1850 - 1939	Reports of the Comptroller Reports of the State Treasurer Biennial Reports of the Tax Commission
Georgia	1788	1850 - 1939	Annual Reports of the Comptroller General Instructions of the Comptroller-General to Tax Collectors Annual Reports of the State Tax Commissioner
Hawaii	1959	1881 - 1939	Reports of the Auditing Department Reports of the Minister of Finance Annual Reports of the Governor of Hawaii Statement of the Revenues and Expenditures

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State	Admission	Sample period	Sources
Idaho	1890	1870 - 1939	Proceedings of the State Board of Equalization Biennial Reports of the Department of Finance Biennial Reports of the Territorial Treasurer Biennial Reports of the State Treasurer
Illinois	1818	1822 - 1939	Biennial Reports of the Auditor of Public Accounts Biennial Reports of the Treasurer Proceedings of the Illinois State Board of Equalization <a href="#">Haig (1914)</a>
Indiana	1816	1820 - 1939	Annual Reports of the Auditor of State Annual Reports of the Treasurer Proceedings of the Indiana State Board of Tax Commissioners
Iowa	1846	1850 - 1939	Biennial Reports of the Auditor of State Biennial Reports of the Treasurer of State Reports on Municipal Finances
Kansas	1861	1860 - 1939	Biennial Reports of the Auditor of State Reports of the Treasurer of State Reports to the Legislature by the Tax Commission
Kentucky	1792	1850 - 1939	Annual Reports of the Auditor of Public Accounts Reports of the Kentucky Tax Commission Biennial Reports of the State Treasurer Reports of the Comptroller Reports and proceedings of State Board of Equalization

Table A7 continued from previous page

State	Admission	Sample period	Sources
Louisiana	1812	1850 - 1939	Annual Reports of the Louisiana Tax Commission Annual Reports of the Commissioner of the Department of Public Finance Biennial Reports of the Auditor of Public Accounts Reports of the State Board of Equalization
Maine	1820	1820 - 1940	Reports of the State Auditor Annual Reports of the Board of the State Assessors Reports of the Commissioners on the valuation of the State of Maine (1881) Maine State Valuation Reports Reports of the Treasurer Reports of the Tax Commission
Maryland	1788	1793 - 1939	Annual Reports of the Comptroller Reports of the State Tax Commissioner
Massachusetts	1788	1850 - 1939	Reports of the Auditor of Accounts Aggregates of Polls, Property, Taxes, Etc Reports of the Treasurer and Receiver-General Reports of the Tax Commissioner <a href="#">Bullock (1916)</a>
Michigan	1837	1837 - 1939	Reports of the Auditor General Annual Reports of the Board State of Auditors
Minnesota	1858	1850 - 1939	Reports of the Auditor of State Annual Reports of the State Treasurer Minnesota Tax Commission Report
Mississippi	1817	1850 - 1939	Biennial Reports of the Auditor of Public Accounts

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State	Admission	Sample period	Sources
Missouri	1821	1850 - 1939	Reports of the State Auditor Journals of the State Board of Equalization Biennial Reports of the State Treasurer Biennial Reports of the Missouri State Tax Commission
Montana	1889	1870 - 1940	Annual Reports of the Auditor Annual Reports of the Treasurer Annual Reports of the State Board of Equalization Annual Reports of the State Examiner Biennial Reports of the Montana State Tax Commission.
Nebraska	1867	1860 - 1939	Annual Reports of the State Tax Commissioner Biennial Reports of the State Board of Equalization and Assessment Biennial Reports of the State Treasurer Biennial Reports of the Auditor of Public Accounts
Nevada	1864	1865 - 1940	Reports of the State Board of Assessors and Equalization Annual Reports of the State Treasurer Reports of the Nevada Tax Commission <a href="#">Adams (1918)</a>
New Hampshire	1788	1820 - 1939	Annual Reports of the State Tax Commission Reports of the Board of Equalization Reports of the State Auditor
New Jersey	1787	1794 - 1939	Annual of the Comptroller of the Treasury Annual Reports of the State Board of Assessors

Table A7 continued from previous page

State	Admission	Sample period	Sources
New Mexico	1912	1850 - 1940	Reports of the Auditor Reports of the Traveling Auditor and Bank Examiner Reports of the Treasurer Biennial Reports of the State Tax Commission
New York	1788	1816 - 1939	Annual Reports of the State Tax Commission Annual Reports of the State Treasurer Annual Reports of the Comptroller
North Carolina	1789	1850 - 1939	Reports of the Commissioner of Revenue Biennial Reports of the Treasurer Reports of the Comptroller of Public Accounts Annual Reports of the Auditor Annual Reports of the State Board of Assessment <a href="#">Forster et al. (1942)</a> <a href="#">Lewis (1951)</a>
North Dakota	1889	1890 - 1939	Biennial Reports of the State Auditor Proceedings of the State Board of Equalization Reports of the North Dakota Tax Commission
Ohio	1803	1826 - 1939	Annual Reports of the Auditor of State Annual Reports of the Tax Commission Comparative Statistics Counties of Ohio (1906)

Table A7 continued from previous page

State	Admission	Sample period	Sources
Oklahoma	1907	1890 - 1939	Biennial Reports of the State Treasurer Biennial Reports of the State Auditor Annual Reports of the State Examiner Annual Reports of the Inspector of the State Reports of the Governor of Oklahoma Governor's messages to the Legislature
Oregon	1859	1850 - 1939	Reports of the Board of Commissioners Biennial Reports of the Secretary of State Biennial Reports of the State Treasurer
Pennsylvania	1787	1827 - 1939	Reports of the Auditor General Receipts and expenditures in the Treasury of Pennsylvania Annual Reports of the Secretary of Internal Affairs Reports of the State Treasurer Reports of the Tax Commission
Puerto Rico	N/A	1901 - 1923	Reports of the Auditor Reports of the Treasurer
Rhode Island	1790	1795 - 1939	Reports of the Auditor Assessor's valuation of taxable property Reports of the Board of State Valuation Reports of the Governor Reports of the State Treasurer Reports of the Tax Commission
South Carolina	1788	1794 - 1939	Annual Reports of the South Carolina Tax Commission

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State	Admission	Sample period	Sources
South Dakota	1889	1879 - 1939	Reports of the Auditor
Tennessee	1796	1836 - 1939	Reports of Department of Finance and Taxation Biennial Reports of the State Tax commissioner Biennial Reports of the Comptroller
Texas	1845	1846 - 1940	Annual Reports of the Tax Commissioner Annual Reports of the Treasurer <a href="#">Miller (1916)</a>
Utah	1896	1850 - 1939	Biennial Reports of the State Auditor Biennial Reports of the State Treasurer County financial Reports Reports of the State Board of Equalization
Vermont	1791	1796 - 1939	Biennial Reports of the Commissioner of Taxes Biennial Reports of the Treasurer Biennial Reports of the Auditor of Accounts
Virginia	1788	1850 - 1939	Reports of the State Tax Commission Reports relative to the Assessment of Taxes on Property of Corporations Tax Bulletins Annual Reports of the Treasurer Annual Reports of the State Accountant Reports of the Second Auditor Annual Reports of the Auditor of Public Accounts <a href="#">Sydenstricker (1915)</a>

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State	Admission	Sample period	Sources
Washington	1889	1860 - 1939	Biennial Reports of the State Tax Commissioner Biennial Reports of the State Treasurer Biennial Reports of the State Auditor Comparative Statistics by the Department of Auditor of State Minutes and official proceedings of the State Equalization Committee
West Virginia	1863	1870 - 1939	Biennial Reports of the Auditor of State Annual Report, Audit of the Finances Biennial Reports of the Treasurer of West Virginia Public Hearings of West Virginia Tax Commissions <a href="#">Armentrout and Haygood (1953)</a>
Wisconsin	1848	1848 - 1940	Biennial Reports of the State Treasurer Biennial Reports of the Wisconsin Tax Commission Proceedings of the meeting of the Supervisors of Assessments <a href="#">Rosa (1925)</a>
Wyoming	1890	1870 - 1939	Biennial Reports of the State Board of Equalization Biennial Reports of the Treasurer Biennial Reports of the Commissioner of Taxation

## II.10. Additional variables: geography, weather, occupations, and demographic characteristics

### II.10.1. County level

#### Geography

Most of the geographical variables used were obtained from [Allen and Donaldson \(2020\)](#). The authors divided the U.S. into 570 sub-county spatial grid cells, each approximately 125km by 125km and attributed to them several geographical characteristics, whose sources and units of measurement are listed below.

- Average Minimum January Temperature
  - Unit: Celsius Degrees
  - Source: [WorldClim.org](http://WorldClim.org)
- Average Maximum July Temperature
  - Unit: Celsius Degrees
  - Source: [WorldClim.org](http://WorldClim.org)
- Average January Precipitation
  - Unit: millimeters
  - Source: [WorldClim.org](http://WorldClim.org)
- Average July Precipitation
  - Unit: millimeters
  - Source: [WorldClim.org](http://WorldClim.org)
- Average Soil Net Primary Productivity
  - Unit: Original Index: -1.0 grams of carbon per square meter per day (tan) to 6.5 grams per square meter per day
  - Source: [http://neo.sci.gsfc.nasa.gov/view.php?datasetId=MOD17A2\\_M\\_PSN](http://neo.sci.gsfc.nasa.gov/view.php?datasetId=MOD17A2_M_PSN)
- Average Elevation
  - Unit: meters

- Source: <http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/harmonized-world-soil-database-v12/en/>

- Average Ruggedness

- Unit: Terrain Ruggedness Index, in millimetres

- Source: <http://diegopuga.org/data/rugged/>

Starting from the grid elaborated by the authors we used QGIS to map spatial units to counties. In particular, geographic characteristics were averaged within each county's borders and across time, so as to have time-constant variables.

Furthermore, we complemented such a subset of variables with the following:

- Distance to the coast: time-constant variable computed directly on QGIS using the minimum distance from a county to the shoreline ([National Oceanic and Atmospheric Administration, 2021](#)) (Source: [here](#)).
- Canal crossing: time-varying indicator variable coming from [Bazzi, Fiszbein and Gebresilasse \(2020\)](#) that takes value 1 if a canal crossed the county.
- Steamboat-navigated river crossing: time-constant indicator variable obtained through QGIS from [Atack \(2015\)](#) taking value 1 if a steamboat-navigated river crossed the county.

## Demographics

Demographic variables were obtained from [Ruggles et al. \(2021b\)](#) and consist of population, fraction of foreigners living in a county, fraction of males living in a county, fraction of white people living in a county, and fraction of the county population that is literate.

## Occupation Shares

Occupation shares were obtained from [Ruggles et al. \(2021b\)](#) and were combined as follows:

- Agriculture (code 100)
- Mining (code 200)
- Production: sum of Manufacturing (code 300), and Non-durable production (code 400)

- Commerce: sum of Transportation (500), Retail/Trade (code 600), Finance (code 700), and Business (code 800)
- Public Administration (code 900)

For each of these economic sectors we created an indicator variable taking value 1 if a county in a specific year belongs to the top quartile in the fraction of the population working in such a sector and zero otherwise.

### **II.10.2. State level**

All geography variables are from [Allen and Donaldson \(2020\)](#) and averaged at the state level. For distance to the coast, we used the minimum distance between the coast and any county in the state.

Finally, Demographics and Occupation shares are from [Ruggles et al. \(2021b\)](#) and as described for the county level.

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