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Inequality, Property Taxes, and Public Debt: The United States, 1880-1920

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Abstract: The provision of public goods conducive to economic growth requires taxation, debt, or both. Historical and theoretical research has suggested that agricultural inequality, in terms of land ownership and/or farm size distribution may be of great importance in determining the ability of governments to levy taxes or incur debt. This paper provides empirical support for this connection of inequality, taxation, and public debt by examining a panel of U.S. states over the period from 1880 to 1920. Data from U.S. Census special reports on government finances provides measures of property taxes levied by all levels of government within states, as well as their debt holdings, while Agricultural Census data provides measures of farm size inequality and the breadth of farm ownership. I find evidence that farm size inequality lowers property tax rates and overall wealth, as well as shifting taxation and debt encumberance away from counties and onto municipal governments (e.g. cities or school districts). This evidence provides support for theories that link agricultural inequality to the development of public goods that support economic growth, and suggests that this effect is more empirically relevant than the theoretical link of inequality and redistribution.

JEL Codes: O13, N51, Q15
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1 Introduction

The institutions of taxation are of potentially great importance in determining the development of an economy. Despite the potential distortionary microeconomic effects of taxes, it is the case today that developed countries collect a far greater proportion of GDP in taxes than do developing countries (Tanzi, 1987; Burgess and Stern, 1993). Developed countries also tend to raise a larger share of tax revenue from progressive income taxes and collect more taxes at sub-national levels than do developing countries that rely on national-level consumption taxes and customs duties.

A common explanation of the broad variation in taxation rates observed is economic inequality. Persson and Tabellini (1994), Alesina and Rodrik (1994), Bourguignon and Verdier (2000), and Acemoglu and Robinson (2000) propose positive links between inequality and public spending due to a desire (or need) for redistribution. In a dynamic model of institutional choice, Galor, Moav, and Vollrath (2006) show that the incentive of land owners is to oppose the funding of public goods through taxation, and that this incentive increases with the size of land holdings. Inequality and taxation rates are then negatively related, as opposed to the positive relationship described by the redistribution literature. However, evidence regarding the direct link of inequality to taxation or fiscal policy in general is hard to find, with Perotti (1996) being the most detailed test of this hypothesis. He finds no significant relationship of inequality and the marginal tax rate across countries, but some evidence that inequality leads to higher spending on social security and welfare.[1]

This paper attempts to add to the existing knowledge on the link between inequality and fiscal policy by examining the institutions of property taxation and public debt in U.S. states over the period 1880 to 1920. Data on property tax levies and public debt at the state, county, and municipal level is gathered from various U.S. Census sources and combined with data on inequality in farm sizes and ownership from the U.S. Agricultural Census. Fixed-effects and dynamic panel

[1] More generally, the literature has inconclusive results regarding the relationship of inequality with income levels or growth in general. Benabou (2000) offers critiques of several assumptions used by the political economy theories. Persson and Tabellini (1994), Perotti (1996), Forbes (2000), and Barro (2000) provide varying results regarding the sign on inequality in different specifications of growth regressions. Banerjee and Duflo (2003) suggest that the relationship is in fact non-linear and argue that changes in inequality in any direction are associated with lower growth. Their work appears to support the general class of redistributive political economy models of inequality and growth. Easterly (2001, 2007) finds significant negative effects of inequality on development levels, using an instrumental variables approach to control for endogeneity.

specifications show that there is a distinct negative relationship between inequality and property tax rates, measured as total property tax revenues relative to assessed property values. The effect of inequality is found to be much stronger on tax *rates* (taxes per assessed value) than on actual taxes *per person*, and this distinction is because of a positive relationship of inequality with the assessed value of property relative to its true value. The effect on tax rates is particularly strong at the more heavily agricultural county level of government. Finally, inequality in farm land is associated with a shift of taxes and public debt away from counties and onto the municipalities who were primarily responsible for the provision of public goods such as schools and roads.

The results here support the negative relationship of inequality and public goods proposed by Galor, Moav, and Vollrath (2006), and are consistent with the pattern of inequality and taxation across the Western Hemisphere. Sokoloff and Zolt (2005), as part of the broad study of institutions by Engerman and Sokoloff (2002, 2005), document significant differences in taxation between the U.S. and Canada on one hand, and Central and South America on the other. They find that the Latin American governments were more inclined to impose national level taxes, such as tariffs, customs, and excise taxes than their northen neighbors. In addition, taxation at the municipal level was much less important in Latin America than in the U.S. or Canada, where municipal governments in the period had the primary responsibility for building schools, roads, and other public goods. Their hypothesis is that these taxation patterns developed early on as a result of differential patterns of inequality across the Western Hemisphere, where this pattern of inequality was based on initial factor endowments in the countries.

In addition to evidence regarding the political economy of inequality and tax *rates*, the results of this paper show that a large part of the variation in property taxes *per capita* is due to the effect of inequality on property values. As land becomes more concentrated total property values fall within U.S. states. This is consistent with several strands of literature that deal with inequality and overall development. Binswanger, Deininger and Feder (1995) and Tomich, Kilby, and Johnston (1995) both discuss the many ways in which concentrated land holdings in agricultural economies may lead to stagnation of development. Both works suggest that this concentration is responsible for limited spending on public projects (such as irrigation systems or roads) that may increase labor mobility

and raise wages. Inequality, and agricultural inequality in particular, has been cited within the development literature as a drag on wealth by Dasgupta and Ray (1986) and Banerjee and Newman (1993, 1994). Galor and Zeira (1993), Piketty (1997), and Aghion and Bolton (1997) suggest a negative link of inequality and income levels operating through credit-market imperfections. Galor and Moav (2004) offer a model in which the role of inequality is ambiguous, as it enhances physical capital accumulation while retarding human capital accumulation.

Widespread land ownership and equitable farm size distributions within states during the period 1880-1920 are associated with higher effective property tax rates, particularly at the county level.[2] The results of this paper also support the general predictions of the development literature that inequality is associated with lower overall wealth and development levels.[3] The paper is organized as follows. Section 2 discusses the data on property taxes, public debt and farm distribution that has been collected for this paper. Section 3 explores the empirical relationship of inequality, property taxes, and public debt. Section 4 concludes.

2 Property Taxes, Public Debt, and Farm Distribution: 1880-1930

The period of 1842-1933 has been described as "The Era of Property Finance and municipal Government" by Wallis (2000, 2001). Defaults by state governments following the depression that began in 1839 led states to adopt new limits on state borrowing and state investment in the corporations that had provided much of government revenue and infrastructure investment up to that point (Goodrich, 1950). With states losing this ability, county and municipal governments took the lead in raising funds for infrastructure investment and improvement, a trend that would con-

[2] Work by Ramcharan (2007) finds similar results in a purely cross-sectional study of U.S. counties during the same historical era. His analysis focuses more on government expenditures per person, and incorporates a geographic instrument for inequality to control for endogeneity. His analysis is persuasive in showing that the relationship of inequality and public finance is robust, but does not allow one to distinguish the channels by which inequality is operating.

[3] Other papers have documented an empirical relationship of land inequality and agggregate development levels, such as Deininger and Squire (1998), Birdsall and Londono (1997), and Frankema (2006). However, these papers do not offer any evidence that this relationship operates through public finance.

tinue into the twentieth century.[4]. In 1840 county and municipal governments in the United States collected $1.23 per capita in revenues, 39% higher than the per capita amount collected by state governments. By 1900 county and municipal goverments were collecting 263% more in revenues per capita than state governments, and 38% more in revenues per capita than the national goverment (Legler, Sylla, and Wallis, 1988).

The dominant form of revenue following 1840 for states and their subdivisions was the general property tax. This general tax was different from previous specific property taxes in several respects. First, it was supposed to be uniform. Not all property had to be taxed, but all taxed property had to be taxed at the same rate. Between 1840 and 1900 twenty-two states inserted uniformity provisions into their state constitutions, which added to the five states with existing provisions in force in 1840 (Benson, 1965). Uniformity was often seen as symbolizing something beyond property taxation, and was linked to the very concept of democracy itself and the urge for equality of all citizens (and their property) before the law (Benson 1965).

The second significant feature of the general property tax was universality, which was the idea that all property should be taxed. The main intention of these clauses was to include personalty or intangible property (e.g. financial assets and industrial capital) in the tax base alongside realty (e.g. land). Benson (1965) notes that this universality movement was primarily a phenomenon of the South and West, areas in which real estate was the dominant form of wealth and landowners were anxious to find other sources of revenue. Twenty-one states added constitutional provisions for universality into their constitutions between 1840 and 1900, many of them specifically identifying bank notes, money, investments, and personal property as objects of the general property tax.

The result of this was that the general property tax became the dominant means of taxation within the U.S. in this period. In 1890 72% of all state level revenues , and 92% of combined county and municipal revenues came from the general property tax. The receipts of this tax were predominantly used for the purchase of public goods such as roads and schools. Between 1902 and 1932 these two categories of expenditure accounted for half of all growth in expenditure (Wallis, 2001). Direct redistribution accounted for only 7% of total state, county, and municipal

[4]Here and in the rest of this paper I will refer to county and municipal governments as distinct entities. Municipal government is intended to include all municipal, town, village, and school district levels of government.

expenditures in 1890 (U.S. Dept. of the Interior, 1895).[5] Some public goods may be considered redistributive, of course, such as education. However, as Wallis (2001) points out clearly, the success and longevity of the property tax at the local level is mainly due to the fact that it carefully matches the beneficiaries of public goods with the those paying for them. For many states and localities, the implicit redistribution involved in many projects led to political objections that could only be overcome by a clear assignment of taxes to those who would benefit from the projects (Wallis, 2003).

In 1922 county and municipal governments still derived nearly 97% of their revenue from the property tax, but the share of state revenue had fallen to only 36.7% (McClelland, 1965). This decline of the property tax at the state level was the result of several factors that led Seligman (1969), originally writing in 1895, to describe the general property tax as "one of the worst taxes known in the civilized world," (p. 62) and led him to conlude that, "It is the cause of such crying injustice that its alteration or its abolition must become the battle cry of every statesman or reformer." (p. 62) The defects of the general property tax, as argued at the time, included the following: a) a lack of uniformity, or an inequality of assessment across individuals and counties, b) a lack of universality, primarily the failure to reach personal property, and c) regressivity,because wealthier individuals tended to hold a greater proportion of personalty as opposed to realty, and so their total wealth was taxed at a lower rate than poor individuals (Seligman, 1969; Leland, 1928; Fisher, 1996).

The ultimate source of these objections was the increasing share of personalty in total wealth as the economy developed and the capital stock rose in proportion to the value of land. While capital and financial goods were generally easy to value given market prices, they were extrodinarily easy to hide. Thus Benson (1965) notes that in 1850 the total assessed value of all property in the U.S. was equal to 84.4% of the estimated true value of property. By 1870 already this share was down to 47.2% and in 1890 it was only 39.2%. In fact, while the assessed value of real estate more than doubled between 1860 and 1880, the assessed value of personalty actually decreased by 24% over the same period. Some of this could be attributed to the Civil War, but Benson suggest this is hardly

[5] The category of expenditure is reported as "Charities and Gratuities".

sufficient to explain the entire amount. In 1884, Cook County, Illinois (consisting of Chicago and environs) reported a total of less than $383,000 in personal property, despite bank deposits reported well into the tens of millions of dollars (Benson, 1965). By 1911 the reported value of all real estate in New York City was over nine and half billion dollars, while the total reported value of all personal property (which included all financial assets as well as household goods) was well under 1/2 of a billion dollars (Seligman, 1969).

The response to this situation was known as classification, and this was simply a reversal of of the uniformity and universality clauses adopted earlier. New classification amendments and clauses allowed states, counties, and municipalities to categorize property by type and legalized the taxing of this property at different rates (Leland, 1928). Prior to 1900, ten states allowed classification of property, and by 1924 another nineteen had added classification. However, twelve more states had attempted to pass classification laws during this period and failed, so the move to amend the earlier uniformity and universality clauses did have complete support across the nation, (Leland, 1928). The end result of the classification movement was to drop property tax rates on personalty significantly, as governments attempted to increase the reporting of these assets by lowering the marginal tax rate on them. Iowa introduced a new lower rate on intangible property in 1909 and saw the assessed value of these rise by over 280% by 1921. In Minnesota, the assessed value of personalty increased from 14 million to 116 million in the year following the imposition of a lower tax rate. States with classification generally were able to achieve assessments on intangible property of around 30% of true value, while non-classified states were closer to 10% (Leland, 1928).

The evolution of property taxes over time can be seen in figure 1. This plots the mean effective property tax rate by level of government. As can be seen, the property tax rate charged by states is just under 50 cents for every $100 dollars of value for this whole period. In contrast, county level property tax rates jump to about 75 cents per $100 in 1870 and then fluctuate around this value for the rest of the time frame. Municipal taxes take off explosively in 1890, reaching $1 per $100 in value in that year and get to nearly $1.75 per $100 in value by 1920. Municipal governments, which include school districts, city governments, and "special" districts such as irrigation systems, were the dominant source of property taxation by the early 20th century.

While the property tax at the local level in the U.S. survives to this day, it is now exlusively a tax on real estate, and personalty is no longer included. With the onset of the Depression and World War II states dropped their property taxes almost completely, relying instead on income and sales taxes which were better able to tax the wealth inherent in intangible property. By 1950 property taxes provided less than 4% of all state government revenues (McClelland, 1965).

An additional issue related to the problem of intangible or personal property was the inequality in assessements that existed across individuals. It was generally true that, "the property of the small owner, as a rule, is valued by a far higher standard than that of his wealthy neighbor," (Seligman, 1895, p.29). Leland (1928) documents that in Wisconsin in 1912, farms valued at under $1000 were assessed at 100% of their market value, and that this asssessment decreased steadily by the size of estate until estates of more than $500,000 in value were assessed at only 28%. Similarily in Virginia in 1914, the assessment to sales price of rural properties was 46.7% for those under $500, but only 28% for those greater than $10,000. This type of pattern held for personal property as well, and there was also a distinction between rural and urban areas. In cities, assessements were closer to the sale value of real estate in both Virginia and Kansas (Leland, 1928). These features of the property tax are informative for the current study, in that they imply a relationship between the assessed value of real estate and the distribution of the same. The evidence from Leland shows that the relationship of assessment rates and the size of estates is convex to the origin. In this case increasing inequality will actually raise the average assessement rate, something that will be confirmed in the empirical section below.

Inequality in land distribution during this period varies widely across states, but there are also distinct time trends in many regions. To measure inequality, two separate measures are constructed. The first is a farm Gini coefficient, which measures the distribution of farm sizes across states, using data from the U.S. Agricultural Census. The second is the proportion of farms that are owned, again from the U.S. Agricultural Census. Details on the source data and methods of constructing these variables can be found in appendix A. Looking at the Gini, figures 2 and 3 plot its variation across regions and time. For the northeast and midwestern states represented in figure 2, the Gini is relatively low and other than a distinct drop in the West North Central region between 1870 and

1880, quite stable over time.[6] The midwestern states are particularly equal in their distribution of farm sizes, with Gini coefficients at or near only 0.30. This is not terribly surprising given that much of the land in these states was settled under the provisions of the Homestead Act of 1862, which surveyed unclaimed land into 40 acre portions and gave them away essentially for free.[7]

This constrasts with farm size inequality in the rest of the U.S., which in 1860 saw Gini coefficients closer to 0.50 and climbing to close to 0.60 for the southern states.[8] In the west, the Pacific and Mountain regions saw massive increases in the Gini coefficient during this period, reaching values of around 0.70 by 1930. Part of this is likely due to the fact that higher average farm sizes in the western U.S., due to lower land quality and the prevalence of herding rather than cultivation, raised the variation in farm sizes within states. So the Gini coefficient may not be fully indicative of inequality in the agricultural sector during this period.

This is borne out in figures 4 and 5, which plot the proportion of farms owned over time by region. As can be seen, the Pacific and Mountain regions have extremely high ownership rates, especially compared to the southern regions also found in figure 4. The southern region of the U.S. had ownership rates of only about 60% in 1880, and this then fell over time to closer to 40% in the East and West South Central regions. These regions were the primary cotton growing regions of the U.S. and were most heavily inhabited by former slaves who took up sharecropping following the Civil War. Figure 5 shows that the midwest and northeast of the U.S. each had generally high ownership rates, but for the East and West North Central regions ownership was declining as well by 1930. New England and the Mid-Atlantic held relatively steady at 80-90% ownership rates during this period.

This variation in inequality is similar to that seen in property tax rates in this period. Figures 6 and 7 show the effective property tax rate, by region of the U.S., over the years 1860-1930. The effective property tax rate is measured by the total property tax levy (state, county, and municipal) relative to the total assessed value of real estate and personal property. Details on the sources of this data, which come from various U.S. Census special reports, can be found in Appendix B.

[6] The specific states included in each region can be found in Appendix C.

[7] See Gates (1968) for a full discussion of public land policy during this period.

[8] The finding of high inequality in the south relative to the rest of the country is in line with the research of Wright (1970), Soltow (1971) and Niemi (1977).

Figure 6 shows the general increase in property tax rates over this period for the southern and far western regions of the U.S.. Here we see that during the middle of this period the Mountain and Pacific regions were charging higher rates on assessed property than the southern states.

Figure 7 plots similar data for the northeastern and midwestern regions of the U.S.. These places show a slower increase in rates, but a higher initial rate in 1860 relative to the south and west. The midwest of the U.S. (the West and East North Central regions) had significantly higher property tax rates than either New England or the Middle Atlantic states. The difference in rates is over two-fold between the West North Central and New England, similar to the two-fold difference between the Mountain region and the East South Central region seen in figure 6. These figures suggest that variation between regions and states in property tax rates was significant during this period.

Alongside the increasing importance of the property tax is the increasing debt burdens held by all levels of government from the state down to the municipalities during this period. Figures 9 and 10 present the size of the total public debt relative to total assessed property value by region for the period 1870-1930. Note that this does not include any national debt, just state, county and local debts. Despite wide variation in 1880 among the southern and western regions, as seen in figure 9, most regions have debts of just under 10% of the assessed value of all property by 1900. There is a significant take-off in debt between 1920 and 1930 in all regions, with the West South Central and South Atlantic regions reaching values of nearly 30% by 1930. While this surge in debt levels in 1930 is mirrored in the northeast and midwest regions in figure 10, the levels of debt are not nearly as great relative to property values. The higher value seen here is only about 13% (in the Middle Atlantic in 1930). For most of the period under consideration the debt to property value ratio stays under 8%.

A similar story is told in the paths of public debt relative to property values by level of government. Figure 8 plots the ratio of debt to property values for the years 1870-1930. At the beginning, all three levels of government have similar shares, between 1-3%. By 1900 local goverments are holding 4% of the value of property in debt, while states and counties are holding slightly more than 1%. By 1930 localities hold debt of nearly 10% the assessed value of property, while both

counties and states are only approaching 3%. Again the local goverments are responsible for the majority of government activity during this period.

Overall, this period of U.S. history provides an ideal test bed for theories regarding the relationship of land inequality and property taxation. We have a nation that is developing from an agricultural into an industrial nation, and variation within the U.S. in this process offers us a chance to identify the factors important for development. The property tax is directly related to the provision of growth enhancing public goods, and is the dominant source of revenue for nearly the whole period. In addition, we have some additional information regarding the expected relationship between inequality and assessements that we can use to validate our empirical results.

3 Empirical Analysis of Property Taxes and Public Debt Levels

The relationship between land distribution and property taxes can take several forms. Overall, we may be interested in the size of tax revenues per person, as this will determine the level of public goods that can be provided, and ultimately our interest is likely to be in how inequality affects income per person. However, identifying a relationship between inequality and taxes per person does not offer any clear evidence for or against any theories relating inequality and taxation because it confounds two separate elements of taxation. To see this, note that property taxes are *ad valorem*, and so taxes per person may fluctuate because of differences in the tax rate, or differences in the stock of wealth being taxed.[9]

Political economy theories generally make predictions regarding the tax *rate*, with the stock of wealth taken as given; the redistributive models suggest that tax rates should rise with inequality while a dynamic institution model predicts that tax rates should fall with inequality. Development

[9] In addressing these issues, a factor that could be driving the results is variation in suffrage institutions across states or across time. However, the historical evidence shows that property requirements for suffrage were essentially non-existent by 1860. Literacy requirements were in place over this period, mainly affecting black voters in the South in practice. This effect will be controlled for by inclusion of a black population percentage in the regressions. Overall, though, suffrage rights were similar across states and property was certainly not a barrier to voting. See appendix D for a full discussion of this topic.

theories focus on the effect of inequality on productivity, and predict that inequality will adversely affect the tax *base*. So while taxes *per person* may be of interest, they do not offer us the ability to distinguish between the various predictions made by theory.

To address these distinctions more clearly, it will be useful to decompose property taxes (T_{it}) per person (L_{it}) as follows

$$\frac{T_{it}}{L_{it}} = \frac{T_{it}}{A_{it}} \times \frac{A_{it}}{V_{it}} \times \frac{V_{it}}{L_{it}} \tag{1}$$

where A_{it} is the assessed value of all property in state i at time t, and V_{it} is the true value of all property. Taxes per person can be seen as the combination of three different elements: the tax rate T_{it}/A_{it}, the assessment ratio A_{it}/V_{it}, and the value of property per person, V_{it}/L_{it}. We can now ask which of these elements land inequality operates through to affect total taxes per person.

If we write equation (1) in logs, we can then perform the following individual regressions

$$\ln \frac{T_{it}}{L_{it}} = \beta^1 g_{it} + \gamma^1 f_{it} + \phi^1 X_{it} + \theta_i^1 + \delta_t^1 + \varepsilon_{it}^1 \tag{2a}$$

$$\ln \frac{T_{it}}{A_{it}} = \beta^2 g_{it} + \gamma^2 f_{it} + \phi^2 X_{it} + \theta_i^2 + \delta_t^2 + \varepsilon_{it}^2 \tag{2b}$$

$$\ln \frac{A_{it}}{V_{it}} = \beta^3 g_{it} + \gamma^3 f_{it} + \phi^3 X_{it} + \theta_i^3 + \delta_t^3 + \varepsilon_{it}^3 \tag{2c}$$

$$\ln \frac{V_{it}}{L_{it}} = \beta^4 g_{it} + \gamma^4 f_{it} + \phi^4 X_{it} + \theta_i^4 + \delta_t^4 + \varepsilon_{it}^4 \tag{2d}$$

where g_{it} is the Gini coefficient, f_{it} is the percentage of farms owned, and X_{it} is a matrix of other control variables. Each regression includes state level fixed effect θ, a period fixed effect δ, and an error term ε. Given the decomposition in (1), it must be the case that $\beta^1 = \beta^2 + \beta^3 + \beta^4$, $\gamma^1 = \gamma^2 + \gamma^3 + \gamma^4$, and $\phi^1 = \phi^2 + \phi^3 + \phi^4$ (see Wong, 2007). Thus, given a relationship of land inequality and taxes per person $\left(\beta^1 \text{ and } \gamma^1\right)$, we can evaluate the relative importance of the role of inequality on tax rates $\left(\beta^2 \text{ and } \gamma^2\right)$, assessments $\left(\beta^3 \text{ and } \gamma^3\right)$, and the value of property $\left(\beta^4 \text{ and } \gamma^4\right)$.

3.1 Aggregate Property Taxes

To begin the analysis we consider the aggregate property tax collected within a state, combining the actual state-level tax with county taxes and municipal taxes. The sources for the values of aggregate taxes (T_{it}), total assessments (A_{it}), and true property value (V_{it}) are described in appendix B. Population size (L_{it}) is from the Census in the relevant year. The Gini coefficient (g_{it}) and percent farm ownership (f_{it}) are described in detail in appendix A. The remaining control variables (X_{it}) include the log of real income per capita (1920 dollars) from Baier, Mulholland, Tamura, and Turner (2007), the percent urban (i.e. proportion of those living in cities greater than 25,000 people), the percent black, and the percent of population that is made up of children. The three population percentages are all from the U.S. Census and are described in more detail in appendix C. The final control variable is the log of total farm value per person, included to control for economic structure and the relative importance of land in total valuations, something which the historical evidence reviewed previously showed had great significance for property taxes. Combining these disparate sets of data yields a sample of 224 observations across 45 states. Each state is observed beginning in either 1880 or 1890 and each state has observations from 1900, 1910 and 1920. The excluded states are Alaska, Hawaii, North Dakota, Oklahoma, and South Dakota, each because of a lack of reliable data during this period. Table 1 reports summary statistics for all variables used in the analysis.[10]

Table 2 reports the regressions matching the equations in (2) in columns (1) through (4). Column one shows that taxes per person do not have a significant relationship to either the Gini coefficient or the percentage of farms owned. However, they are very strongly associated with higher income per capita and higher values of total farmland per capita. In addition, as the proportion of children increases, taxes per capita fall dramatically, perhaps contrary to an expectation of taxes rising

[10] Almost all data from 1930 are available for this analysis (except for true valuations), but this year is excluded for several reasons. First, looking at figures 1, 7, and 6 , one can see a distinct drop in tax rates in 1930 relative to the rising trend up to this point. One concern is that this reflects a change in assessments following the classification movement (see Leland, 1928) of the 1920's and so is not comparable to earlier periods. A second issue is that the taxation and assessment statistics are actually from 1932, following the onset of the Great Depression. During this period governments at all levels were under fire to lower property taxes to help struggling workers and farmers (Wallis, 2001). Time fixed effects should pick up some of this cross-state shock, but the historical evidence seems to suggest not just a singular shock, but rather that the relationship between variables was changing distinctly in 1930 relative to prior periods.

with the share of children as governments increased the size of the school system.[11] If we move to a consideration of the actual tax rate in column (2), though, we do see a significant negative relationship with the Gini. This negative relationship is consistent with the dynamic institutions model of Galor, Moav, and Vollrath (2007), and contrary to the predictions of redistributive models that expect inequality to lead to higher tax rates. The size of the relationship is quite significant as well. A one-standard deviation fall in the Gini (a value of about 0.142) is associated with a 15% increase in the tax rate, equivalent to raising the property tax rate from 2.4% of assessed value to 2.8% of assessed value. Evaluated at the sample mean, this would have meant an increase of $4 per person in property taxes. The only other significant correlation with tax rates is from the percentage urban, reflecting the greater number of public goods required (e.g. sewers and public transport) by urban areas. Noticably, income per capita and farm values have no significant relationship to property tax rates.

Column (3) shows a complete reversal of sign for the Gini coefficient and its relationship with the the assessed value of property relative to its estimated true value. Now, increases in land inequality, as measured by either a rising Gini or a falling ownership percentage of farms, actually increase the assessment rate. This is counteracting the effects of inequality on tax rates, and is a large part of the reason we find no significant relationship of land inequality and property taxes per capita. This positive relationship accords well with the historical record reviewed previously. There it was noted that assessment rates were especially heavy on small landowners, and that as estate size increased assessment rates fell dramatically. This creates a mechanical positive relationship between the Gini and assessment rates. A similar story may be at work with farm ownership, as rented farms were more likely to be assessed at high rates because the renters themselves had no incentive to influence

[11] The insignificance of the Gini coefficient in this panel regression is in contrast with the strongly significant relationship of the Gini to tax revenues per capita found by Ramcharan (2007). Several factors lead to this difference. First, Ramcharan's work is cross-sectional only. The fact that time variation within states does not show the same relationship suggests that the cross-sectional results may be driven by some omitted variable affecting both the Gini and taxes. Second, his work considers total tax revenues, as well as several categories of government expenditure, while the current paper focuses on property taxes exclusively. Third, Ramcharan's uses 1932 tax data for his analysis, and given the start of the Depression, this may have skewed his results is in fact the 1930's represented the beginning of a new paradigm in property taxation as suggested by Leland (1928) and Benson (1965). Finally, while Ramcharan uses county-level variation, this paper uses state level aggregates and the smaller sample size may have decreased the power of the regressions to detect the significant relationship.

the assessment process.[12]

An additional consideration from column (3) is that inequality may be limiting the amount of personal property relative to real estate in states. As noted before, assessment rates for intangible property were quite low, while real estate was much more fairly assessed to true value. The relationship in column (3) may reflect the fact that unequal states were not accumulating intangible property such as financial assets, and so their assessment rates remained high. This would fit with the development models of inequality that stress the drag on accumulation that inequality creates, as well as the limitations on the development of the financial system that land inequality may create. This relationship of development and assessment rates is supported by the pattern of sign and significance on the other control variables that show assessment rates dropping as income per capita, farms value per capita, and urbanization went up. So while inequality in land may have led to a political situation that lowered tax rates, as seen in column (2), this did not necessarily lower actual taxes per capita as this same inequality left states with a much higher rate of assessment due to their reliance on real estate and the bias against small landowners.

Column (4) completes the regression decomposition of taxes per capita by looking at the results for true value of property relative to population. Here we have a negative relationship of inequality and total value, significant at about 12%. More strongly we see that as farm ownership increased, so did total property value. This again accords with the development view that inequality, and in particular ownership, is an important factor in the overall wealth of a society. Combined with columns (2) and (3), the results here show why we arrive at such an ambiguous result for taxes per capita in column (1). Comparing columns (3) and (4), though, one notes that the sign of the coefficients is opposite in every case except for the percent of children. Column (5) shows the combined results, the equivalent of regressing $\ln A_{it}/L_{it}$ on the control variables. We see that the effects of inequality on assessments in, on net, positive, but not quite significant at standard levels.

While inequality was associated with reduced tax rates (the political economy effect) and wealth

[12] Of course, the existence of the positive correlation of the land inequality and assessment rates does not explain why assessment rates were so high on small farms in the first place. One explanation may be that the assessors themselves were likely wealthier members of the community who could afford to take on public office, and they were more lenient on their own and their peers estates. It may also have been the case that in states with high land inequality, the large landowners had influenced the assessment system to load the tax burden on small landowners specifically.

(the development effect), this is counteracted greatly by the increased assessment rates that these unequal states faced due to their underdevelopment and reliance on real estate. If in fact it is property taxes per capita that are important in determining the provision of public goods (as opposed to the total size of tax revenues), then it is not clear that inequality will necessarily lower this provision.

3.2 Property Taxes by Level of Government

The results of table 2 showed how inequality was related to total property taxation within a state over time, but this clouds over the distinction between the levels of government within states. As discussed in the historical section, municipal and county government relied much more heavily on property taxes than did state governments during this period. Do taxes at these lower levels relate to inequality in the same manner as aggregate taxes do?

The answer can be found in table 3, which shows the regressions of taxes per person ($\ln T_{it}/L_{it}$) and tax rates ($\ln T_{it}/A_{it}$) for each level of government, controlling for identical variables as before. The size of the sample decreases by a few observations in each case because there were several states for which no property taxes were collected by specific levels of government in some years. Regressions of assessment rates and true values per person are not reported as each level of government relied on identical assessments and estimate of true valuation.

Columns (1) and (2) show the results for state property taxes, and there is no relationship of inequality with either taxes per person or tax rates. This is not surprising given that state property taxes were relatively small to begin with and were declining rapidly over time during this period. As Wallis (2001) points out, states could not match the benefits of these taxes to those who were paying, and states found sales and income taxes to be more politically appetizing. This is in contrast with county governments, shown in columns (3) and (4). Here taxes per person are very clearly related to inequality, measured by either the Gini coefficient or the percent of farms that are owned. This increased significance is driven completely by the strong negative relationship of land inequality and tax rates, as seen in column (4). A one standard deviation increase in the Gini (0.142) is associated with a fall in the tax rate of nearly 23%, equivalent to a drop in the rate from

2.4% to under 2%. A fall in the ownership percentage of one standard deviation (0.161) implies a 32% fall in the tax rate, or a drop from 2.4% to only 1.8%. At the county level we have very strong evidence in support of dynamic insitutional models of inequality that predict land inequality will lower support for taxes and public goods. It is perhaps not surprising that counties show the strongest relationship here, as counties during this period represented the main level of government overseeing rural areas in which agricultural land holders would have retained a strong influence.

Following this line of reasoning, we see in columns (5) and (6) of table 3 that municipal government taxes had no significant relationship with inequality during this period. These units of government were, almost by definition, urban in nature. The influence of agricultural land holders was limited if not excluded entirely, and so land inequality was not instrumental in their taxation policies. States with high land inequality may have been less urbanized and developed than equal areas (recall the results of columns (4) from table 2), but those urban areas that did exist were not influenced by the inequality present.

Property tax rates were not made in a vacuum at any level of government, and so it is interesting to consider whether the taxes levied by different levels were influenced at all by the overall rates of taxation. Table 4 shows similar regressions as in table 3, but includes as controls either the aggregate level of taxes per capita or the aggregate tax rate. Columns (1) and (2) again show that state taxes were not significantly related to inequality, controlling for aggregate tax rates. However, county taxes continue to show a negative relationship to inequality in columns (3) and (4). Taking the overall tax burden as given, counties were more likely to have low taxes per person or low tax rates if they possessed high Gini coefficients or low percentages of farms owned. This contrasts with the results for municipal taxes in columns (5) and (6) which show a distinct positive relationship with inequality, as measured by the Gini coefficient.

It appears that inequality was not just lowering taxes within counties, but was shifting the tax burden onto municipalities. Speculating, it may be that urban areas were pressed into raise tax rates in high inequality states because the necessary public goods were not forthcoming from the counties these urban areas resided in. So not only did land inequality act to lower aggregate tax rates, as seen in table 2, but land inequality also shifted what taxation did occur onto the

municipalities. This would have meant that the agricultural population of these unequal states was not being asked to subsidize the development of urban infrastructure, in contrast to more equal states. Whether this subsidy was fair to the agricultural sector or not, it suggests that part of the development process in America in this period was the ability to extract some kind of surplus from agriculture and use it to develop the public goods necessary for industrialization.

3.3 Public Debt by Level of Government

Another aspect of public finance important to the provision of public goods is the ability to issue debt. We can analyze a set of equations regarding debt levels per capita and the debt to wealth ratio similar to those used for property taxes. Write

$$\frac{D_{it}}{L_{it}} = \frac{D_{it}}{V_{it}} \times \frac{V_{it}}{L_{it}} \tag{3}$$

and we have that debt (D_{it}) per capita is simply the debt to total value of property (V_{it}) ratio, times the value of property per capita. In table 5 we perform regressions on the both D_{it}/L_{it} and D_{it}/V_{it} by level of government. Regressions of V_{it}/L_{it} are not necessary as they are identical to column (4) of table 2.

The results show that state debt per capita and debt to value are not significantly related to inequality. There is some weak evidence of an inverse county-level relationship of inequality and debt levels, but the significance is too low to make any serious inferences. However, at the municipal level we see a very distinct positive relationship of debt and inequality. As the Gini increased, the debt to value ratio (column 6) increased, leading to a distinct rise in the debt per capita measure (column 5). A one standard deviation increase in the Gini (0.142) was associated with an increase in the debt to value ratio of nearly 72%. Evaluated at the sample mean, this implies that a debt to value ratio of 1.3% would rise to 2.3%. This effect seems likely to be the result of a similar mechanism to the shift of property taxes onto municipal governments in unequal states. With high inequality and low levels of county taxation on agricultural land, muncipalities needed to raise funds for public goods on their own. They turned to higher property taxes, as seen previously,

and apparently also to increased borrowing to make up their shortfall. In states with more equal distributions of land, municipal areas were able to fund these public goods directly from property taxes, and kept debt levels much lower, leaving more funds available for future public goods and/or the lowering of taxes as the economy developed further.

3.4 Dynamic Panel Estimation

The basic specifications of equation (2) presume that current taxes per person, tax rates, assessment rates, or total value per person are determined by the current state of farm inequality and the other control variables. A concern with this may be that this overlooks the dynamic nature of property taxes that arises because they are used primarily to fund public goods. If property taxes per person are high in period t and they are used to build public goods that enhance economic development, then this should raise the value of property in period $t+1$, and therefore actual taxes per person in period $t+1$ should be higher. Lagged values of property taxes per person would be a valid explanatory variable, and their omission may be biasing the fixed effects regressions.

Similar stories could be told for the components of taxes per person. If tax rates in period t are high, the increased public spending this allows raises property values and so may allow for lower tax rates in the future. For assessment rates, the historical record establishes that they fall with development so high assessment rates today may lead to lower assessment rates tomorrow. Finally, one would expect that high property values per person today would lead to higher property values tomorrow as public goods spending increased. Additionally, there is likely great political inertia across periods, so that high tax states today may be high tax states tomorrow simply because legislatures are unable or unwilling to enact radical shifts in tax policy.

To account for dynamic effects on taxes, equation (2) is modified to include the lagged value of the dependent variable as an explanatory variable. This creates an endogeneity problem by construction, and the dynamic panel techniques of Arellano and Bond (1991) are used to control for this issue. The main idea of the Arellano and Bond method is to take first differences of the primary specification, and then use lagged levels of the dependent variable as instruments for these first differences. The same instrumenting strategy used for the dependent variable can be adopted

for the inequality variables as well, allowing for some control of endogeneity with taxes.

This estimation is implemented in table 6, with the coefficient estimates of the X variables, identical to those included in table 2, suppressed for space reasons. Both the Gini coefficient and the percentage of farms owned are presumed to be endogenous and are instrumented for using lagged levels. Column (1) shows that there is a distinct positive relationship between lagged taxes per capita and current taxes per capita, providing evidence consistent with these taxes funding public goods that raise property values over time. The inequality variables, though, are not significant. The Gini is insignificant, but negative, while the percentage of farms owned is estimated at almost zero. The specification itself appears robust. The Sargan test of over-identifying restrictions cannot reject the null hypothesis that the instruments are uncorrelated with the residual. The Arellano and Bond technique depends on there being no second-order autocorrelation in the errors, and their test of this fails to reject the null of no autocorrelation.

Column (2) reports the results for the tax rate (total taxes divided by assessed property value), and we again find a positive association over time in this tax variable. High tax rates today are indicative of high tax rates tomorrow, which may be evidence of political inertia or perhaps of the ongoing cost of public goods that were produced in a prior period. The Gini coefficient on agricultural land is highly significant and has a coefficient estimate higher than that found in the fixed effects estimates. The percentage of farms owned is not significant, but is estimated with a positive sign. The specification tests again support the assumptions necessary to estimate the model in this manner.

The final two columns of table 6 perform similar regressions for both the assessment rate and for property value per capita. Now the lagged values are no longer significant, suggesting that all the dynamics present in taxes per capita (column 1) are due to the dynamic persistence of the tax rate (column 2). The Gini and percent of farms owned are both significant in these final regressions, with a pattern of signs matching the fixed effects regressions of table 2. These suggest that assessment rates in unequal areas were much higher, due likely to both the lower average assessment rates applied to large farms and to the relative underdevelopment of unequal areas. In addition, we have confirmation again of the development theories in which unequal distributions of land lead to lower

overall productivity and wealth.

The dynamic panel shows that there is certainly some persistence in taxes per capita and tax rates over time, a subject that seems to merit further exploration. In addition, the technique provides evidence that the observed relationships of inequality on tax rates, assessment rates, and property values per capita are not simply the result of endogeneity, but further work on this would be necessary to be completely confident in this conclusion.

4 Conclusion

Taxation and the provision of public goods are one of the most important elements of institutional structure. Growth and development is closely correlated with the size of government and its ability to deliver schooling and industrial infrastructure to the economy. This paper has examined the role of agricultural inequality, namely farm ownership and farm size distribution, in determining the ability of U.S. states to fund these public goods through both taxation and debt.

State, county, and municipal property tax rates, assessed property values, true property values, and levels of debt were collected from a set of U.S. Census reports on governmental finances. These were combined with farm distribution data from the U.S. Agricultural Census to create a panel of 45 states at decadal intervals between 1880 and 1920. From this fixed effects and dynamic panel estimations were performed that suggested several conclusions. First, while inequality in land distribution within states was not clearly significant in determining property taxes *per person*, it was highly significant in determining the actual tax *rates* applied, supporting the general predictions of dynamic models of institutions that predict public good provision will suffer in the face of agricultural inequality. This runs counter to the predictions of the redistribution literature that has linked inequality to higher tax rates. A further finding was that land inequality was linked to higher assessment rates on property, likely due to the underdevelopment of unequal states and their greater share of real estate in total wealth. Inequality was also shown to be negatively associated with total true wealth per capita, a finding in line with the broader development literature.

A third finding was that both the concentration of farm sizes within state and breadth of farm

ownership were significant in determining the distribution of tax rates and public debt across the various levels of government. As land became more concentrated, county level taxation and county level public debts both decreased, while municipal (e.g.. city, town, and school district) taxation and debt both increased. As counties encompass the agricultural areas, this appears consistent with the theories linking agricultural inequality and public goods provisions, and shows that municipal areas in unequal states were unable to extract as much surplus from agriculture to fund public goods.

Overall, the results indicate the potentially powerful effects of agricultural inequality in determining paths of development over long stretches of time. Property taxes and public debt were instrumental during this period of U.S. history in funding schools, roads, and a variety of other growth enhancing projects. By limiting the resources of governments, inequality slowed down growth for many states well into the 20th century.

Appendices

A Land Distribution Measures

Farm Land Distribution

The method of measuring land inequality follows the methodology used by Deininger and Squire (1998) in their study of cross-country inequality. For each state reporting data in the Agricultural Census of a given year, the distribution of farms by size is available. The census lists the number of farms in size categories that vary census to census. To make calculations comparable, each states distribution of farms is aggregated into the following common size categories: less than 20 acres, 20-50 acres, 50-100 acres, 100-500 acres, 500-1000 acres, and greater than 1000 acres. This distribution, combined with assumptions about the average area of farms within each category, allows for the estimation of a Gini coefficient.

A more formal definition is as follows. There are eight size categories, including a category that measures farms of size zero, numbered from 1 to 6 in order of increasing size of farms. Let f_i be the share of all farms that are in category i. Let a_i be the share of all acreage that is in category i. Now let $F_i = \sum_{s=1}^{i} f_s$, which denotes the share of farms that are of size i or smaller. Similarily, $A_i = \sum_{s=1}^{i} a_s$. By definition, $F_6 = A_6 = 1$. It can be shown that the Gini coefficient, G, can be calculated as follows

$$G = 1 - \sum_{i=1}^{5} (F_{i+1} - F_i)(A_{i+1} + A_i). \tag{4}$$

This method requires data on the share of acreage in each farm size category, which is not reported in most census reports. However, in 1920 information on the size of a_i is available for each category. Using this information, the average size of a farm in each category i can be found. These state-specific 1920 farm sizes are then applied to each other year for which the f_i data is available. Thus each state has unique observations on the average size of a farm in in each category. This is primarily useful for the largest category (i.e. greater than 1000 acres), as the average farm size in this category varies greatly across states. The minimum value of this in 1920 is 1113 acres in Delaware and the maximum is 11,233 acres in Arizona.

Farm Ownership

Farm ownership is reported in the Agricultural Census in various ways depending on the year. In 1860 and 1870, no distinction is made whatsoever. In 1880 and 1890, the census counts the number of farms that are owned, that are rented, and that are sharecropped. For these years, the percent of farms owned is simply the number of owned farms over the total number of farms. For 1900, 1910, and 1920, the number of farms owned and the number of farms held by tenants (both cash and sharecroppers) are reported. In addition, the number of farms run by managers is reported. For the purposes of the calculations in this paper, the percent of farms owned is the sum of farms owned and farms run by managers, divided by the total number of farms.

In 1930 and 1940, the categories are the same as in 1900-1920, but also include a count of the number of farms of "part owners". This distinguishes farms in which some land is rented in from

those in which all land is owned outright. For the calculation of the percent of farms owned, the total of full owners, part owners, and managed farms is divided by the total number of farms.

B Public Finance Data

1860. Data comes from the U.S. Department of the Interior (1866). The assessed value of both real estate and personal property was recorded by state in Table 1 of the Miscellaneous section. In this table, as is the case for all subsequent years, the value of property belonging directly to the United States or to an individual state itself is not counted. Tax values are reported in an unnumbered table (page 511) in the Miscellaneous section. The values reported are total taxes received, and it is not specified what amount is accounted for by property taxes. Taxes are distinguished by purpose or level of collection: state, county, city, town, school, poor, road, and miscellaneous. For the purposed of this paper, state and county taxes are exactly as reported, while municipal taxes is the sum of all other categories reported. For a variety of observations, no number is reported. For example, in Florida no poor taxes or road taxes are reported. This does not mean that taxes were not collected for these purposes, only that Florida did not distinguish these funds from more general categories like state, county, city or town taxes.

1870. Data is again from the U.S. Department of the Interior (1872) in the subsection "Wealth, Taxation and Public Endebtedness in the United States." Table 1 of this section lists the assessed value of both real estate and personal estate, as well as an estimate of the true valuation of total real and personal estate. The true valuation is an estimate by the marshals assigned to conduct the census of the market value of the property being censused. Taxes are not specifically reported as property taxes, but the total values for 1870 match the aggregates reported in later Census publications that refer to ad valorem taxation of property, so it is assumed that this report reflects property taxation. Breakdowns are given by state, county, and "town, city, etc.". This final category is treated as municipal taxes in this paper. Finally, public debt is calculated from similar categories to taxation. However, within each category debt is broken down into that for which bonds have been issued, and "all other" debt. These two subcategories are summed together to arrive at total debt for each governmental category.

1880. The U.S. Deparment of the Interior, Census Office (1884) reports in Table II a summary of the assessed valuation and taxation by level of government. Assessed valuation is given for real estate and personal property. Taxation is reported for state, county, and "minor civil divisions less than counties exclusive of school districts" and school districts. For state, count, and the minor divisions, a distinction is made between taxes levied for schools and taxes levied for other purposes. Similar to 1870, taxes are not denoted as property taxes, but later reports of the Census suggest that these totals are in fact ad valorem property taxes. In each case, both the minor division and school taxes are combined to arrive at municipal taxes.

There are several adjustments necessary given notes to Table II. In particular, the values in Table II do not include amounts of tax collected in several states (Indiana, Illinois, Wisconsin, Iowa, Minnesota, and Kansas) that were reported by townships but included school taxes. Footnotes to the table report the total value of these taxes, and these are added to the municipal tax category used in this paper. Table XVI of the same report lists estimated true valuation of property by state, which is taken directly for use in this paper.

For debt values, the report from the U.S. Department of the Interior, Census Office (1895) is utilized, which reports gross debt minus the sinking fund at the state level, county level, municipal level, and school level for each state. These values differ slightly from those that can be obtained

in the 1884 report, and I have chosen to use these on the assumption that they contain a more accurate statement of debt positions in 1880, given the possibility that the Census office would have received further information from governmental entitites.

1890. U.S. Department of the Interior, Census Office (1895) in table 3 reports the true valuation of real and personal property by state. In an unnumbered table (page 77), a summary of debt by governmental level, by state is offered. This debt is gross debt minus any sinking fund available. This is used directly to measure the size of debts held by each level of government.

Table 5 of the same report offers the assessed value of real estate and personal property. In addition, it contains data on the ad valorem taxation done on property. The total levy, except for schools, is reported for state, county, and municipal units of government. For schools, a state total and a "county and minor division" total is reported. For this paper, state taxes are the total state taxes levied, county taxes are the non-school county taxes levied, and municipal taxes are the municipal taxes levied exclusive of schools combined with the county and municipal taxes levied for schools. The combination of the county school taxes with municipal taxes is felt to be acceptable given the generally low level of county school taxation that took place across states during this period.

1900. U.S. Department of Commerce, Bureau of the Census (1907) is a similar report to that of 1890. The major note to this data is that it is from 1902, not from 1900. Table 8 reports the assessed value of real property, personal property and "other" property. For the purposes of this paper, personal property and "other" property are lumped together as personal property. This table also reports a breakdown of ad valorem taxes on property similar to that found in 1890. Levies other than for school purposes are reported by state, county, and municipal levels. Levies for schools are reported for state and "county and minor civil divisions". The total state tax is the sum of the state values, county tax is solely the non-school county taxes, and municipal taxes are the sum of municipal non-school levies and the "county and minor divisions" school taxes. Similar to 1890, the combination of county school taxes in the municipal aggregate is not felt to be significant given the small size of county school taxes at this time.

Table 15 reports the estimated true valuation of all property, broken down by real and personal. Table 65 provides data on the amount of state debt, calculated as gross debt minus sinking funds. Table 73 provides data on county debt, defined similarly, as well as debt of "cities, villages, townships, precincts, etc." and school districts. municipal debt is the combination of these final two categories.

1910. The U.S. Deparment of Commerce, Bureau of the Census (1915) reports on public finances for the year of 1912. Table 7 in the section on the assessed value of property reports the value of real property, personal property, and "other" property. For several states (Ohio, Indiana, Alabama) the total of other property is included with personal property. As this is how personal property is calculated in this paper for all states, this does not create an issue. For Maryland, personal property is included with real property. All results in the paper are robust to the exclusion of Maryland in 1910 from the sample. For Arkansas, other property is divided up between real and personal property categories. The results are not affected by the exclusion of Arkansas from the sample either. This same table also includes ad valorem taxation on property for states (both school and non-school), counties (both school and non-school) and other civil division (both school and non-school). These fall directly into the categories used in this paper: state, county and municipal.

In the section regarding state indebtedness, table 6 lists the state level public debt by state. To match previous values, the "debt less sinking fund assets" is used for state level data. In the section on county and municipal indebtedness, the value of county debt is found in table 1, reported

as gross debt less sinking funds. municipal debt is the summation of "cities, villages, townships, precincts, etc." debt and school district debt reported in the same table. One note is that debt for West Virginia is not reported in this year because a resolution of a division of the debt with Virginia was not settled at this time. Thus the value of state debt for Virginia is likely exaggerated while that of West Virginia is unavailable. This does not appear to affect the results.

1920. The report of the U.S. Deparment of Commerce, Bureau of the Census (1924) is for 1922. The report on Taxation lists in table 4 the estimated true value of real property and improvements by state. Table 1 lists gross debt less sinking funds at the state level, county level, and the "all other civil divisions" level, which is taken to be municipal for this paper. Assessed valuation of real, personal, and other property is found in table 7, along with levies of property taxes for states, counties, and all other civial divisions. No distinction is made here regarding school versus non-school taxation. The other civil divisions category includes school districts. True value of property is from the National Wealth report, table 7.

1930. From the Statistical Abstract of the U.S. (1935), which obtained data from the U.S. Department of Commerce, Bureau of the Census (1933) and has values for 1932. Table 212 lists the assessed value of real and personal property by state. Table 214 lists the revenue receipts of counties, from which I select the totals for "general property taxes". From the same table a similar value can be obtained for municipal governments, defined as "cities, towns, villages, and boroughs". Table 215 allows for the collection of the same variable at the state level. Table 216 reports gross debt minus sinking funds for states. Table 219 reports similar debt values for counties, as well as for "cities, villages, towns, and boroughs" as well as "other municipal". These last two are combined into a value for municipal debt. Data on the true valuation of property was not available.

C Census Data

Farm Value: The Agricultural Census in respective years reports a measure of the value of farms. This refers to a current market value of farms, which refers to the value of land and improvements to land (such as fences, irrigation ditches, roads, etc.). This value is consistently reported across all Census years used in this paper.

Percent Urban: From the U.S. Census, the number of people living in cities larger than 25,000 people is reported. This number relative to total population is reported as the percent urban.

Percent Black: From the U.S. Census. This is the number of people reported as Negro, or in some cases the total of Negro and "Other Coloured", relative to the total population.

Percent Child: From the U.S. Census. The age ranges vary by year. 1860, it is 5-19, in 1870, 5-18. For 1880, 5-17, in 1890, 5-20. For 1900, 5-20, and in 1910 it is 6-20. For 1920, 1930, and 1940 the values are 7-20.

Regions: Regions are coded as follows:

1. New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
2. Middle Atlantic: New Jersey, New York, Pennsylvania
3. South Atlantic: Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia
4. East South Central: Alabama, Kentucky, Mississippi, Tennessee
5. West South Central: Arkansas, Louisiana, Texas

6. Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
7. Pacific: California, Oregon, Washington
8. West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska
9. East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin

D Suffrage and Property Requirements

For the period under consideration, suffrage was not universal, but neither was it limited extensively by property rights. Williamson (1960) documents that by 1860 property tests had essentially disappeared, and that the demise of these rules was an outgrowth of the Jacksonian democracy movement of the early 1800's. The tension between the mass of the citizenry and the aristocracy over these rules flared up at various times across the states, with a near violent overthrow of property requirements in Rhode Island in 1841-1842 during the Dorr Rebellion. In place of strict property requirements, many states instituted some kind of tax qualification or literacy requirement because it "would keep the most undesirable elements from the polls." (Porter 1918).

This led to a wide array of suffrage restrictions during this late 19th century - early 20th century period. Keyssar (2000) presents a detailed assessment of the various restrictions in force and they can be summarized into several main categories. By 1855 all states had some requirement of U.S. citizenship in order to vote in all levels of elections. In addition residency requirements were for six months or one year of continuous residence in the state, with most counties and towns requiring less time to qualify. Remaining property restrictions existed in New York, which required "men of color" to own some property in order to vote; Rhode Island required non-natives to own $134 in real estate or to rent land for at least $7 per annum; South Carolina retained a stricter requirment of 50 acres of holdings, or owning a town lot for six months, but both of these could be exempted by six continuous months of residence. Interestingly, the property requirement in Rhode Island is technically still in force.

More extensively, states required some tax payments to qualify to vote. In 1870, the states of Delaware, Georgia, Massachusetts, New Hampshire, New York, North Carolina, Pennsylvania, and Rhode Island had some requirement that voters had paid "all taxes" or a specific poll tax. In the period 1870 to 1900 the following states instituted a poll tax, most of them in the South and generally part of an attempt to disenfranchise black voters: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Nevada, New Hampshire, North Carolina, Rhode Island, South Carolina, Tennessee, Texas, and Virginia. An overlapping group of states passed laws requiring the payment of taxes: Georgia, Kansas, Maryland, Mississippi, Pennsylvania, South Carolina, Vermont. Another group made tax payments a requirement for voting on bond issuance: Arizona, New York, Oklahoma, Rhode Island, and Utah.

The other large category of restrictions involved literacy. Only Arkansas, Florida, Illinois, Kentucky, Missouri, New Mexico, North Dakota, and Ohio had no literacty requirments whatsoever. Of the remaining states, most had a literacy test that took place at the polling place. These generally consisted of a request to read a section of the state constitution out loud to the poll officials. This left the requirement open to interpretation and corruption, and in practice most southern states allowed white voters to pass the test through memorization or deliberate ignorance. In many states, exemptions existed for property owners: Alabama, Georgia, Lousiana, South Carolina, and Virginia. Other exemptions existed for veterans or the disabled, but the major exemptions consisted

of lineal descent rules which allowed those who could show descent from a legal voter in the pre-1860 era to vote regardless of literacy or property. This effectively excluded blacks and these laws were enacted in Alabama, California, Colorado, Connecticut, Delaware, Georgia, Louisiana, Maine, Massachussetts, Missouri, New Hampshire, New York, North Carolina, Oklahoma, Washington, and Wyoming.

In practice the literacty requirements were the most onerus and did the most to limit black voting. McGovney (1949) examines the voting rolls in 1940 in Louisiana and finds that 79.3% of adult whites were registered to vote, while only 0.35% of adult blacks were registered. The absolute number of voters was 701,659 white voters and only 886 black ones. This was not due to vast literacy differences between whites and blacks, but rather to the many exemptions granted to whites ("good character" or being a lineal descendant of a voter in 1860). Similar evidence from North Carolina, Georgia, Mississippi, and South Carolina shows the exclusion of black voters on identical grounds.

Overall, while great barriers to black suffrage existed in the South and even in many states in the North during this period, there were essentially no property requirements for voting during this period. Those rules had been phased out well before the period 1880-1930 and so variation in voting rules across states is unlikely to play a role in the analysis of this paper.

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Table 1: Summary Statistics

Variable	**Obs**	**Mean**	**SD**	**Min**	**Max**
Total property taxes per capita	224	24.30	14.04	2.32	65.47
State property taxes per capita	215	4.05	2.96	0.21	15.99
County property taxes per capita	219	6.70	5.95	0.08	38.74
Municipal property taxes per capita	223	13.93	10.12	0.35	46.20
Total property taxes / Assessed value	224	0.024	0.011	0.009	0.076
State property taxes / Assessed value	215	0.004	0.003	0.001	0.015
County property taxes / Assessed value	219	0.007	0.005	0.001	0.030
Municipal property taxes / Assessed value	223	0.013	0.008	0.001	0.052
Assessed value per capita	224	1090.25	656.46	207.81	3509.06
Assessed value / True value	224	0.381	0.142	0.106	0.810
True value per capita	224	3077.23	1865.08	548062	12057.34
Farm Gini Coefficient	224	0.467	0.142	0.123	0.846
Proportion of Farms Owned	224	0.745	0.161	0.334	0.971
Value of farms per capita	224	340.84	442.04	27.66	3546.14
Real income per capita	224	10987.23	3873.88	2870.05	20492.23
Percent Urban	224	0.192	0.182	0	0.728
Percent Black	224	0.120	0.171	0.001	0.607
Percent Children	224	0.309	0.053	0.171	0.436
State debt per capita	224	5.803	6.926	0	51.04
County debt per capita	224	6.481	8.457	0	60.11
Municipal debt per capita	224	23.771	25.076	0	139.76
State debt / True value of property	224	0.005	0.008	0	0.056
County debt / True value of property	224	0.004	0.004	0	0.023
Municipal debt / True value of property	224	0.013	0.009	0	0.043

Sources: Property tax, assessed value, debt and true value data are from reports of the U.S. Census , as described in the appendix to this paper. All are in 1920 dollars. Urban population, black population, and child population are from the U.S. Census, details of their calculation is in the appendix. The farm Gini and percent farms owned are from the Agricultural Census of the U.S., and their calculation is described in the appendix.

Table 2: **Panel Regressions for Property Taxes, Assessments, and Values, 1880-1920**

	Dep Variable:				
	(1)	(2)	(3)	(4)	(5)
	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln A_{it}/V_{it}$	$\ln V_{it}/L_{it}$	$\ln A_{it}/L_{it}$
Exp Variables	(Taxes pc)	(Tax rate)	(Assess Rate)	(Prop. Val pc)	(Assess pc)
Farm Gini (g_{it})	-0.287	-1.016**	1.148**	-0.419	0.728
	(1.11)	(2.04)	(2.26)	(1.57)	(1.51)
% Farms Owned (f_{it})	0.669	0.876	-1.626***	1.420***	-0.206
	(1.18)	(1.48)	(3.08)	(3.17)	(0.44)
Log of income per capita	0.466***	0.244	-0.461***	0.683***	0.223
	(3.68)	(1.56)	(2.79)	(5.91)	(1.10)
Log of farm value per capita	0.231***	0.077	-0.215***	0.369***	0.154***
	(4.15)	(1.34)	(3.97)	(8.90)	(3.20)
% black population	-0.406	-0.477	-1.473	1.544***	0.071
	(0.53)	(0.38)	(1.59)	(2.91)	(0.07)
% urban population	0.623	1.389***	-1.392**	0.626*	-0.766
	(1.64)	(3.02)	(2.61)	(1.79)	(1.39)
% child population	-3.287***	2.406	-3.773**	-1.920*	-5.693***
	(3.23)	(1.35)	(2.34)	(1.64)	(3.11)
Within R-squared	0.878	0.390	0.248	0.802	0.606

Notes: Absolute values of t-statistics are given in parentheses. Standard errors are clustered by state. * denotes significance at 10%, ** denotes 5%, and *** denotes 1%. All regressions are estimated with fixed-effects and include period dummies. Total sample size is 224, with 45 states each having either 4 and 5 observations. T_{it} is aggregate property taxes, L_{it} is population, A_{it} is the aggregate assessed value of property, and V_{it} is the estimated true value of property. Property taxes are the aggregate of all state, county, and municipal level property taxes collected. Total assessed value is the sum of the assessed value of real estate and personal property. True value is the estimated market value. Source is various U.S. Census reports. Note that by definition, the coefficient estimates in columns (2) through (4) add up to the coefficient estimate on $\ln T_{it}/L_{it}$ in column (1). The Gini coefficient is calculated from the U.S. Agricultural Census data, see appendix. % Farms Owned is from the U.S. Agricultural Census, see appendix. Log real income per capita is from Baier et al (2007). Log of farm value is from U.S. Agricultural Census. % Urban, % Black, and % Children are all from the U.S. Census, see text.

Table 3: **Panel Regressions for Property Taxes and Assessments, 1880-1920, by Level of Government**

	Dep Variable, by level of government:					
	(1)	(2)	(3)	(4)	(5)	(6)
	State		County		Municipal	
Exp Variables	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$
Farm Gini (g_{it})	-0.495	-1.420	-0.756**	-1.483***	0.716	-0.085
	(0.58)	(1.44)	(2.30)	(2.96)	(1.29)	(0.11)
% Farms Owned (f_{it})	-0.260	-0.122	1.537**	1.745**	1.413	1.792
	(0.28)	(0.12)	(2.13)	(2.29)	(1.24)	(1.56)
Log of income per capita	0.347	0.236	0.560***	0.337*	0.445*	0.256
	(1.17)	(0.74)	(3.05)	(1.76)	(1.93)	(1.11)
Log of farm value per capita	0.158	0.021	0.190***	0.043	0.599***	0.461***
	(1.20)	(0.15)	(2.88)	(0.59)	(5.96)	(4.59)
% black population	1.860	1.736	-2.192**	-2.278	-1.446	-1.359
	(1.61)	(1.15)	(2.06)	(1.32)	(1.28)	(0.84)
% urban population	1.071	1.997	0.214	0.970*	1.211	1.921**
	(0.88)	(1.50)	(0.40)	(1.72)	(1.58)	(2.20)
% child population	2.350	8.878**	-4.272***	1.289	0.214	5.796**
	(0.68)	(2.43)	(2.70)	(0.57)	(0.10)	(2.41)
Government Level	State	State	County	County	Municipal	Municipal
Observations	215	215	219	219	223	223
Within R-squared	0.267	0.123	0.640	0.315	0.822	0.583

Notes: Absolute values of t-statistics are given in parentheses. Standard errors are clustered by state. * denotes significance at 10%, ** denotes 5%, and *** denotes 1%. All regressions are estimated with fixed-effects and include period dummies. Total sample size is 224, with 45 states each having either 4 and 5 observations. T_{it} is aggregate property taxes, L_{it} is population, A_{it} is the aggregate assessed value of property, and V_{it} is the estimated true value of property. Property taxes are total state level property taxes in columns (1) and (2), total county level property taxes in columns (3) and (4), and total municipal property taxes in columns (5) and (6). Total assessed value is the sum of the assessed value of real estate and personal property in the state as a whole. The Gini coefficient is calculated from the U.S. Agricultural Census data, see appendix. % Farms Owned is from the U.S. Agricultural Census, see appendix. Log real income per capita is from Baier et al (2007). Log of farm value is from U.S. Agricultural Census. % Urban, % Black, and % Children are all from the U.S. Census, see text.

Table 4: **Panel Regressions for Property Taxes and Assessments, 1880-1920, by Level of Government, Controlling for Overall Taxes**

	Dep Variable, by level of government:					
	(1)	(2)	(3)	(4)	(5)	(6)
	State		County		Municipal	
Exp Variables	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$
Farm Gini (g_{it})	-0.237	-0.098	-0.527*	-0.564*	0.841*	0.916**
	(0.32)	(0.13)	(1.75)	(1.83)	(1.83)	(2.03)
% Farms Owned (f_{it})	-1.073	-1.087	1.016*	0.958*	1.135	1.160
	(1.32)	(1.34)	(1.77)	(1.65)	(1.54)	(1.40)
$\ln T_{it}/L_{it}$ (taxes pc)	1.162***		0.784***		1.576***	
	(6.97)		(8.34)		(11.65)	
$\ln T_{it}/A_{it}$ (tax rate)		1.153***		0.902***		1.138***
		(6.72)		(13.12)		(16.30)
Government Level	State	State	County	County	Municipal	Municipal
Observations	215	215	219	219	223	223
Within R-squared	0.392	0.420	0.731	0.676	0.907	0.825

Notes: Absolute values of t-statistics are given in parentheses. Standard errors are clustered by state. * denotes significance at 10%, ** denotes 5%, and *** denotes 1%. All regressions are estimated with fixed-effects and include period dummies. Total sample size is 224, with 45 states each having either 4 and 5 observations. T_{it} is aggregate property taxes, L_{it} is population, and A_{it} is the aggregate assessed value of property. Property taxes are total state level property taxes in columns (1) and (2), total county level property taxes in columns (3) and (4), and total municipal property taxes in columns (5) and (6). Total assessed value is the sum of the assessed value of real estate and personal property in the state as a whole. The Gini coefficient is calculated from the U.S. Agricultural Census data, see appendix. % Farms Owned is from the U.S. Agricultural Census, see appendix. All regressions include controls for the log of real income per capita, the log of farm value per capita, the percent black, percent urban, and percent children in the population.

Table 5: **Panel Regressions for Debt Levels and Assessments, 1880-1920, by Level of Government**

	Dep Variable, by level of government:					
	(1)	(2)	(3)	(4)	(5)	(6)
	State		County		Municipal	
Exp Variables	$\ln D_{it}/L_{it}$	$\ln D_{it}/V_{it}$	$\ln D_{it}/L_{it}$	$\ln D_{it}/V_{it}$	$\ln D_{it}/L_{it}$	$\ln D_{it}/V_{it}$
Farm Gini (g_{it})	0.909	1.307	-1.532	-1.120	3.486***	3.822***
	(0.64)	(0.88)	(1.46)	(1.03)	(3.02)	(3.14)
% Farms Owned (f_{it})	3.863	2.817	2.499	1.092	0.063	-1.162
	(1.51)	(1.07)	(1.31)	(0.56)	(0.03)	(0.64)
Log of income per capita	0.328	-0.276	1.122***	0.438	0.090	-0.556
	(0.60)	(0.54)	(3.65)	(1.40)	(0.23)	(1.58)
Log of farm value per capita	-0.051	-0.380	0.151	-0.211	0.877***	0.526***
	(0.18)	(1.28)	(0.86)	(1.23)	(5.42)	(3.19)
% black population	7.522**	6.423**	-2.176	-3.707*	-0.168	-0.1533
	(2.63)	(2.22)	(1.04)	(1.81)	(0.09)	(0.79)
% urban population	1.939	1.345	2.938**	2.270	2.461	1.772
	(0.66)	(0.46)	(1.95)	(1.62)	(1.60)	(1.28)
% child population	16.889**	18.795***	-2.342	-0.562	-0.323	1.471
	(3.25)	(3.41)	(0.44)	(0.11)	(0.07)	(0.37)
Government Level	State	State	County	County	Municipal	Municipal
Observations	223	223	219	219	223	223
Within R-squared	0.332	0.345	0.590	0.269	0.789	0.516

Notes: Absolute values of t-statistics are given in parentheses. Standard errors are clustered by state. * denotes significance at 10%, ** denotes 5%, and *** denotes 1%. All regressions are estimated with fixed-effects and include period dummies. Total sample size is 224, with 45 states each having either 4 and 5 observations. D_{it} is the aggregate debt level by level of government, L_{it} is population, and V_{it} is the estimated true value of all property. Debt levels are nominal total state level debt in columns (1) and (2), total nominal county level debt in columns (3) and (4), and total nominal municipal debt in columns (5) and (6). Total assessed value is the sum of the assessed value of real estate and personal property in the state as a whole. The Gini coefficient is calculated from the U.S. Agricultural Census data, see appendix. % Farms Owned is from the U.S. Agricultural Census, see appendix. Log real income per capita is from Baier et al (2007). Log of farm value is from U.S. Agricultural Census. % Urban, % Black, and % Children are all from the U.S. Census, see text.

Table 6: **Dynamic Panel Regressions for Property Taxes, Assessments, and Values, 1880-1920**

	Dep Variable:			
	(1)	(2)	(3)	(4)
	$\ln T_{it}/L_{it}$	$\ln T_{it}/A_{it}$	$\ln A_{it}/V_{it}$	$\ln V_{it}/L_{it}$
Exp Variables	(Taxes pc)	(Tax rate)	(Assess Rate)	(Prop. Val pc)
Dep Var_{t-1}	0.345***	0.283***	0.124	-0.120
	(4.55)	(3.17)	(1.14)	(1.50)
Farm Gini (g_{it})	-0.560	-1.422**	2.781***	-1.401*
	(1.16)	(2.00)	(2.67)	(1.83)
% Farms Owned (f_{it})	-0.080	0.172	-1.555***	1.965***
	(0.13)	(0.33)	(2.69)	(3.64)
Sargan test statistic	28.35	27.64	31.11	33.65
Sargan test p-value	0.34	0.38	0.22	0.14
Autocorrelation(2) z-statistic.	-0.02	-0.99	-1.60	-1.45
Autocorrelation(2) p-value	0.99	0.32	0.11	0.15

Notes: Absolute values of robust t-statistics are given in parentheses. * denotes significance at 10%, ** denotes 5%, and *** denotes 1%. All regressions are estimated using the Arellano and Bond (1991) dynamic panel methodology and include period dummies. The first explanatory variable is the lagged value of the dependent variable. Total sample size is 178, with 45 states each having either 4 and 5 observations (one observation per state is lost due to first differencing). T_{it} is aggregate property taxes, L_{it} is population, A_{it} is the aggregate assessed value of property, and V_{it} is the estimated true value of property. Property taxes are the aggregate of all state, county, and municipal level property taxes collected. Total assessed value is the sum of the assessed value of real estate and personal property. True value is the estimated market value. Source is various U.S. Census reports. Note that by definition, the coefficient estimates in columns (2) through (4) add up to the coefficient estimate on $\ln T_{it}/L_{it}$ in column (1). The Gini coefficient is calculated from the U.S. Agricultural Census data, see appendix. % Farms Owned is from the U.S. Agricultural Census, see appendix. All regressions include controls for log real income per capita from Baier et al (2007), log of farm value from U.S. Agricultural Census and % Urban, % Black, and % Children from the U.S. Census. The Sargan test has a null hypothesis that the excluded instruments (lagged levels) are uncorrelated with the error term and is distributed $\chi^2(38)$. The test statistic is calculated using the two-step estiamtion procedure of Arrelano and Bond (1991) assuming homoskedastic errors. The autocorrelation(2) test has a null hypothesis that autocorrelation of the residuals of order 2 is zero and is distributed $N(0,1)$.

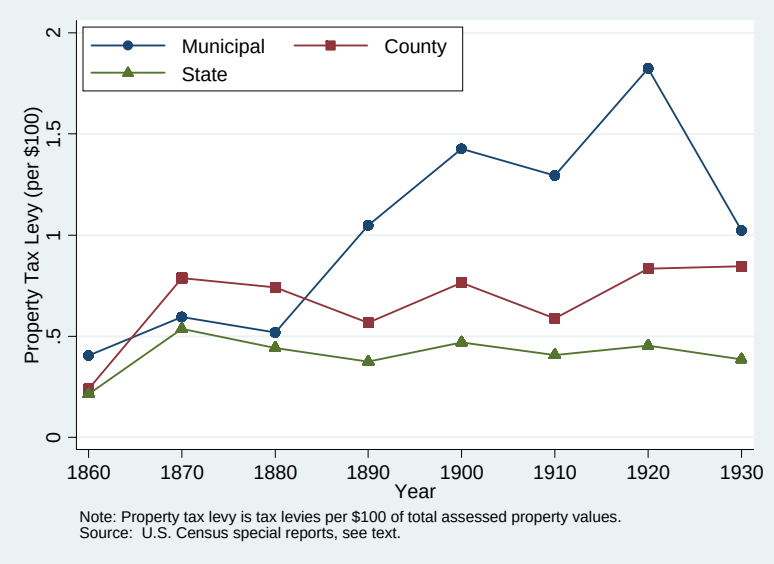

Figure 1: Property Tax Levies, by Level of Government, 1860-1930.

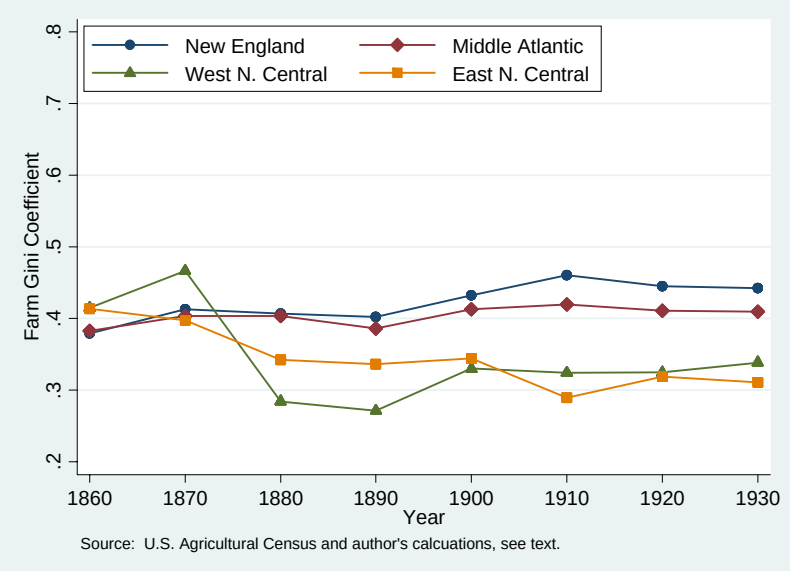

Figure 2: Farm Gini Coefficient, by Region, 1860-1930.

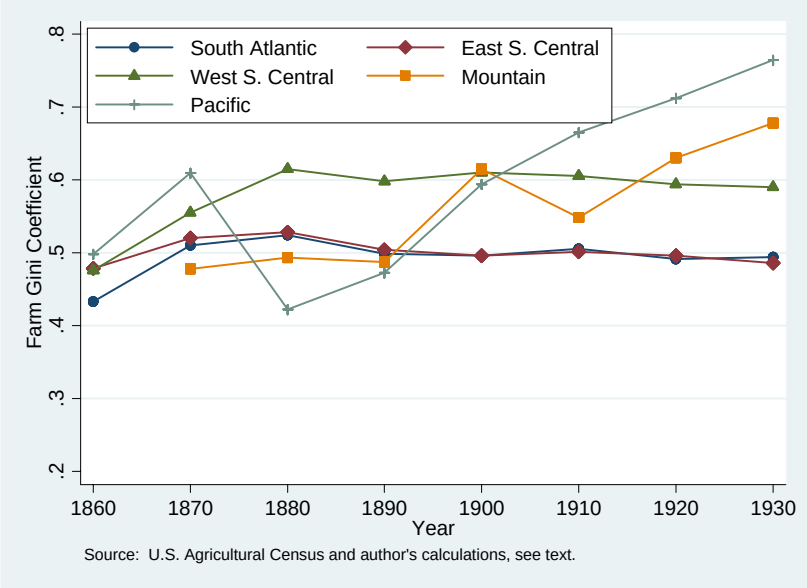

Figure 3: Farm Gini Coefficient, by Region, 1860-1930.

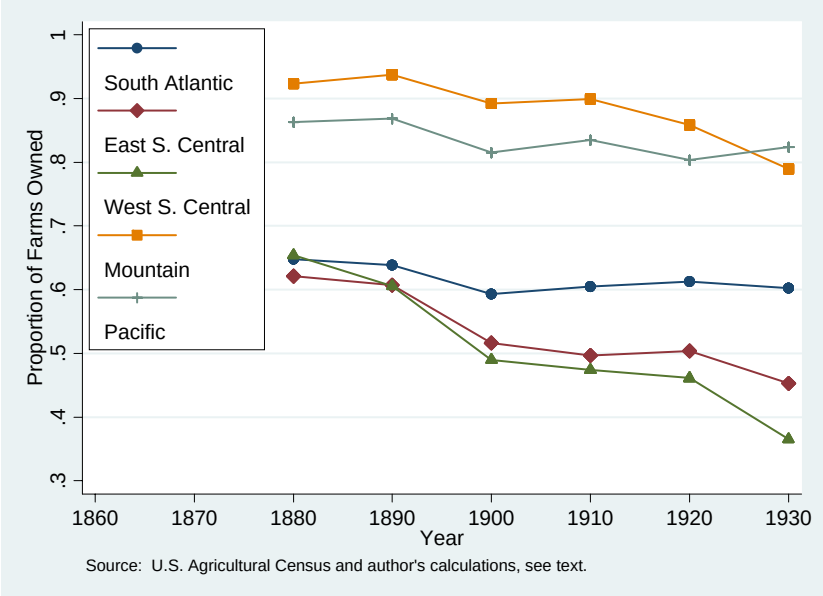

Figure 4: Proportion of Farms Owned, by Region, 1880-1930.

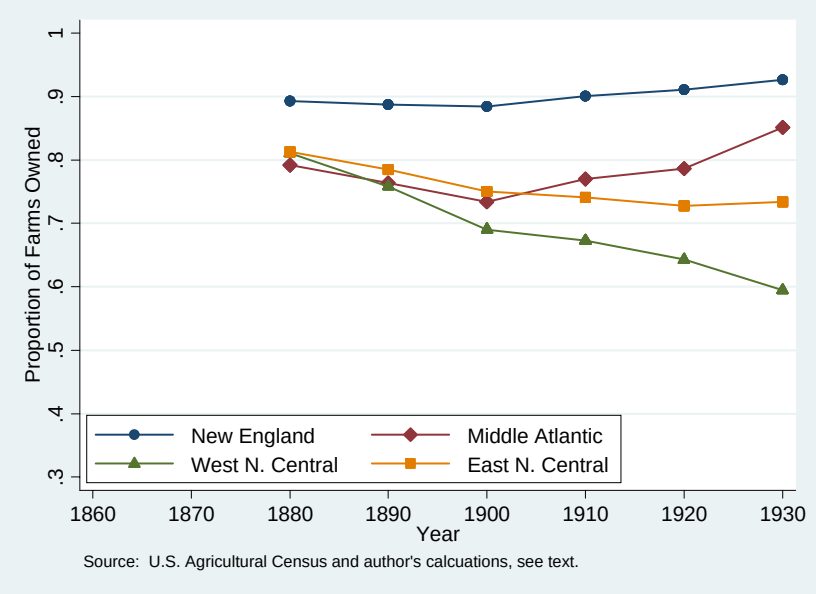

Figure 5: Proportion of Farms Owned, by Region, 1880-1930.

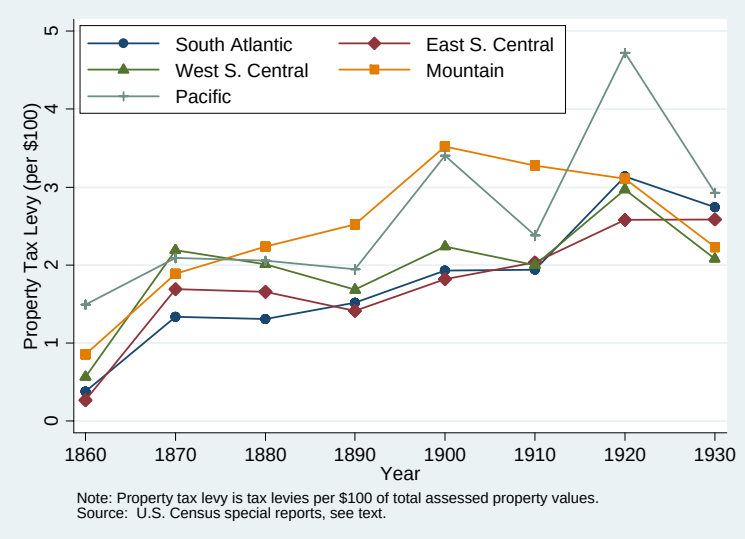

Figure 6: Property Tax Levies, by Region, 1860-1930.

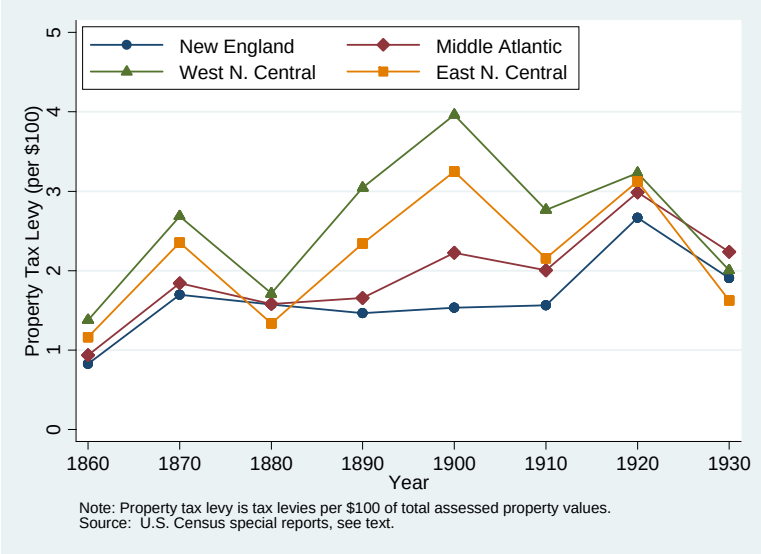

Figure 7: Property Tax Levies, by Region, 1860-1930.

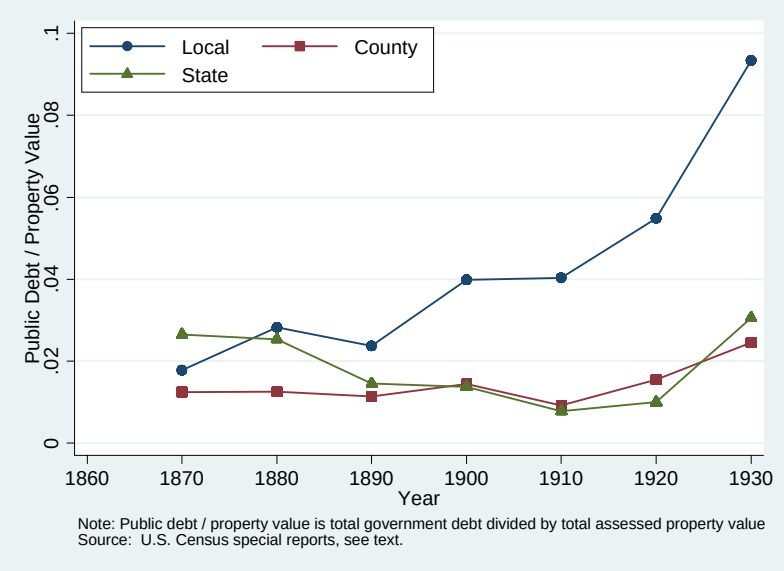

Figure 8: Public Debt Relative to Property Values, by Level of Government, 1870-1930.

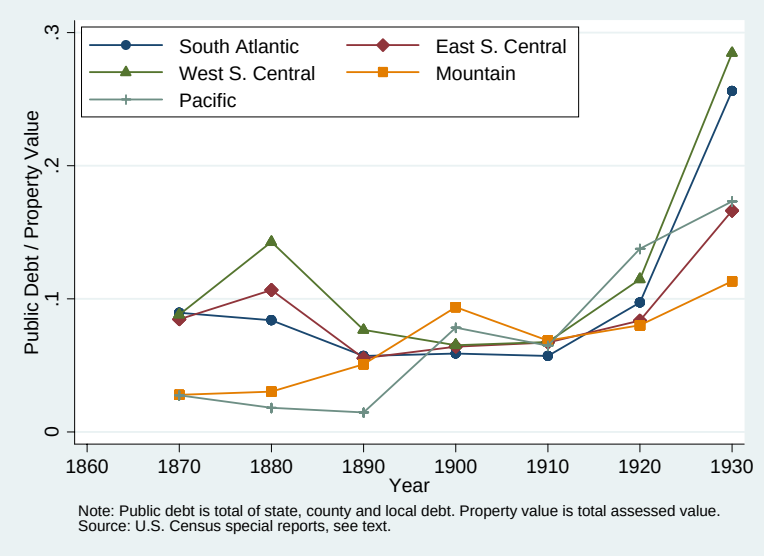

Figure 9: Public Debt Relative to Property Values, by Region, 1870-1930.

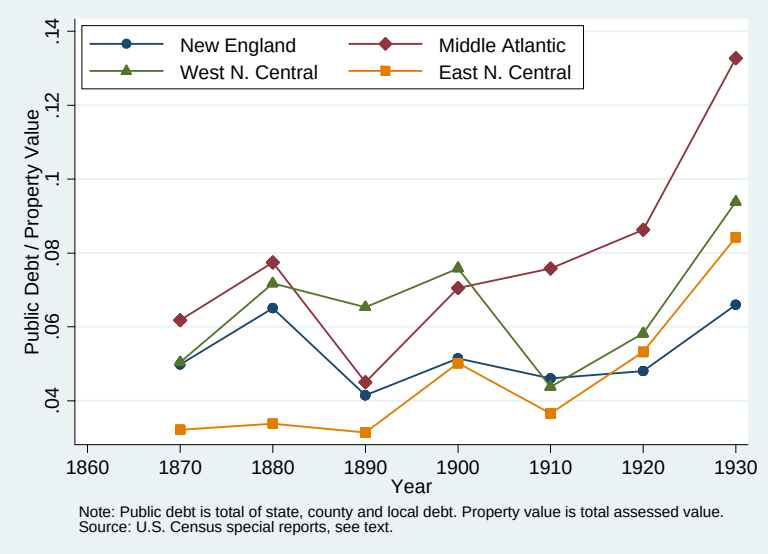

Figure 10: Public Debt Relative to Property Values, by Region, 1870-1930.