

Online Appendix: “Fiscal Centralization: Theory and Evidence from the Great Depression”

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A Data Appendix and Definitions

A.1 Summary Statistics and Source Summary

Table A.1 contains summary statistics for all variables used in the regressions of Section II. Table A.2 summarizes the data sources for these variables.

A.2 Additional Details on Selected Variables

In this section we provide additional detail on a selected number of variables mentioned in the main text of the paper.

A.2.1 State Budget Shares

State revenue and expenditure shares were both derived from the 1932 and 1942 Census of Governments, which were collected by Sylla, Legler, and Wallis (1995). State revenue shares in our analysis are defined *own* revenue shares, i.e. they only include revenue raised by the government directly and do not include intergovernmental grants. The data that we used, instead, includes intergovernmental grants in the total revenue figure. Thus, some adjustments were necessary. Suppose R_L and R_S represent total revenues for local and state governments, respectively. Denote intergovernmental grants to local governments (by state governments) and to state governments (by the federal government) by I_L and I_S . Then, the state's share of combined state and local own revenues, R_S^O , is given by

$$R_S^O \equiv \frac{R_S - I_S}{(R_S - I_S) + (R_L - I_L)}.$$

In constructing the state expenditure shares we attribute intergovernmental grants to the *granting* government. The data that we used counts grants to other governments as a part of total expenditures but we still need to subtract out expenditures paid for by grants from other levels of government to avoid double counting. Let E_L and E_S denote expenditures by state and local governments, respectively, and use the same notation for intergovernmental

Table A.1: Summary Statistics for All Variables

	Mean	Std. Dev.	Min	Max
<i>Outcome Variables</i>				
Blanket Tax Limit	0.167	0.377	0.000	1.000
Sales Tax (Jacoby)	0.583	0.498	0.000	1.000
Permanent Sales Tax	0.479	0.505	0.000	1.000
Temporary Sales Tax	0.104	0.309	0.000	1.000
Difference State Rev. Share, 1932-42	0.230	0.080	0.084	0.402
Difference State Exp. Share, 1932-42	0.224	0.088	0.078	0.464
Difference Log Local Expenditures, 1932-42	-0.503	0.211	-0.926	-0.050
<i>Regressors of Interest</i>				
% Growth in Per Capita Income, 1929-32	-0.364	0.101	-0.595	-0.166
% Manuf. Employment Growth, 1929-32	-0.445	0.120	-0.675	-0.221
Log Federal Aid to State	4.974	0.428	3.995	6.175
Difference Log Transfers to Local, 1932-42	0.838	0.729	-0.864	2.705
<i>Covariates</i>				
% Families Renters, 1930	0.494	0.085	0.361	0.679
Share of White Popn. Ages 10-19 in High School, 1927-28	0.193	0.063	0.102	0.335
% Pop. Urban, 1930	0.460	0.199	0.166	0.924
Log Per Capita Real Income, 1929	6.347	0.377	5.583	7.048
% Democrat Votes, 1928	0.434	0.125	0.271	0.914
Non-White Population, 1930	0.106	0.132	0.002	0.503
Initiative State	0.438	0.501	0.000	1.000
State Debt limit (Heins)	0.833	0.377	0.000	1.000
Unified Gov't	0.729	0.449	0.000	1.000
Unified Republican Gov't	0.125	0.334	0.000	1.000
Log Income Per Capita, 1929	6.347	0.377	5.583	7.048
<i>Instruments</i>				
Federal Land Per Capita	0.039	0.148	0.000	0.998
Non-Federal Land Per Capita	0.043	0.056	0.002	0.246
Electoral Votes Per Capita	0.006	0.004	0.004	0.033
SD Dem. Vote, 1896-1932	10.175	4.326	2.500	18.100

Table A.2: Source Summary

Variable	Source
Blanket Tax Limit	Mott and Suiter (1934)
Sales Tax	Jacoby (1938), SFFF (1993)
Temporary Sales Tax	Jacoby (1938), SFFF (1993)
Difference State Rev. Share, 1932-'42	Sylla, Legler, and Wallis (1995) [ICPSR 6304]
Difference State Exp. Share, 1932-'42	Sylla, Legler, and Wallis (1995) [ICPSR 6304]
Difference Log Local Expenditures, 1932-42	Sylla, Legler, and Wallis (1995) [ICPSR 6304]
% Growth in Per Capita Income, 1929-32	Bureau of Economic Analysis, Regional Data Table SA1
% Manuf. Employment Growth, 1929-32	Wallis (1989)
Log Federal Aid to State (Treasury)	U.S. Treasury (various years)
Log Federal Aid to State (Reading)	Reading (1973)
% Renters, 1930	Haines (2010) [ICPSR 2896, part 29]
% School, 1927-'28	U.S. Office of Education (1930, pp. 984ff.)
% Pop. Urban, 1930	Haines (2010) [ICPSR 2896, part 26]
% Democrat Votes, 1928	Leip (2014)
Non-White Population, 1930	Haines (2010) [ICPSR 2896, part 28]
Initiative State	Matsusaka (2000)
Debt Restriction	Heins (1963), Shawe (1936)
Unified Gov't	Burnham (1985) [ICPSR 00016, DS4]
Unified Republican Gov't	Burnham (1985) [ICPSR 00016, DS4]
Log Income Per Capita, 1929	Bureau of Economic Analysis, Regional Data Table SA1
Federal Land Per Capita	Fleck (2008) from Rand McNally (1992) and United States Committee on Appropriations (1939)
Non-Federal Land Per Capita	Fleck (2008) from Rand McNally (1992) and United States Committee on Appropriations (1939)
Electoral Votes Per Capita	Fleck (2008) from Wallis (1998)
SD Dem. Vote, 1896-1932	Fleck (2008) from Wright (1974)

grants as above. Then the state expenditure share, E_S^O is given by

$$E_S^O \equiv \frac{E_S - I_S}{(E_S - I_S) + (E_L - I_L)}.$$

The 1932 Census of Government reports expenditure and revenue figures for states, counties, cities and towns, school localities, other civil divisions, and townships. We sum expenditures, revenues, and grants across counties, cities and towns, school districts, other civil divisions, and townships to generate E_L , R_L , and I_L , respectively. State expenditures, revenues, and grants only include the state government figures. The ISO codes used by Sylla, Legler, and Wallis (1995) for each of these variables for 1932 is given in appendix Table A.3.

The 1942 Census of Government only reports total local government and state government figures. The total expenditure figure includes “Provision for Debt Repayments”, an item not included in other years. Sylla, Legler, and Wallis (1995) advise that this item be removed from expenditure totals for 1942 in order to make them comparable across years. We follow this advice in computing expenditures for 1942. The 1942 Census also provided more detail on intergovernmental grants received. In particular, it includes total grants and grants from state governments. This is reported in Sylla, Legler, and Wallis (1995) as aid “From Federal Government” (ISO = 2350) and “Aid From State Government Only” (ISO = 2361). The data providers assume that the states only received aid from the federal government, which - in their words - is “an inaccurate assumption, but not too far wrong” (Sylla, Legler, and Wallis, 1995, page 26). For our purposes this does not present a problem since aid “From Federal Government” is the same as total aid for states and it is total aid that we are after. These details are documented in appendix Table A.3.

A.2.2 Debt Limitations and Single Party Control Variables

We count only constitutional debt limitations. There are two conflicting sources for this data. Shawe (1936) reports that all states except Delaware, Mississippi, Vermont, Massachusetts, Tennessee, Maryland, New Hampshire, Con-

Table A.3: ISO Codes for Computing Variables From Legler, Sylla, Wallis (1995)

Variable	Year	ISO Code
E	1932	0003
	1942	0003
R	1932	0001
	1942	0001 – 4100
I	1932	2300
	1942	2350 + 2361

For state governments ISO = 2361 (“Aid From State Government Only”) is always equal to zero in 1942.

necticut, North Carolina, and North Dakota had a tax limitation. Heins (1963) presented a list equivalent to Shawe but also counted North Carolina and North Dakota as having a tax limitation. This discrepancy might be attributed to differing opinions of what constitutes a debt limit.¹ North Carolina was limited to borrowing 7.5% of its assessed valuation but borrowing below that limit could be authorized by the legislature, a far less stringent process than the constitutional amendment required by other states. The North Dakota legislature was also allowed to issue debt but “Not in excess of \$2,000,000 unless secured by a first mortgage” (Shawe 1936, 125). Rueben (1994) uses the list provided by Heins (1963). Our results are similar using either list.

Single party control variables are computed from data provided by Burnham (1985). Following Rueben (1994), we say that a state exhibits single party control if a majority of both houses of the legislature and the governorship are occupied by politicians from the same party in 1932. The majority of states hold elections on even years and, therefore, report the relevant figures in 1932. Three states - Mississippi, Kentucky, and Virginia - held elections in odd years and only report the relevant figures in those years. When this is the case we use the figures from 1931. One state - Maryland - only reported the relevant figures for 1930; the unified variable for Maryland is constructed from this

¹Heins (1963) also reports the year of adoption of tax limitation so the discrepancy is not attributable to a change in the law between the thirties and the sixties.

data. Finally, Nebraska and Minnesota had non-partisan legislatures during this period. These states are counted as not having single party control.

A.2.3 Alternative Measure of Federal Aid to the States

Our variable for federal aid to states is taken from the *Report of the Secretary of the Treasury* for the years 1933 to 1939.² For all years and for each state we collect the grand total of all federal aid to the state. We then correct the figure for inflation (using 1932 as a base year). We sum the annual aid figures over all years. Finally, to put the variable in per capita terms, we divide total aid by the total population of the state over the same period.

The decision to count *all* federal aid rather than only those that were explicitly for New Deal programs was prompted by this observation from Reading (1973, 793):

Some New Deal Programs were established to meet a specific emergency; others were directed toward aiding depressed areas for the duration of the depression; still others were permanent and lasting. Some programs were the creation of New Deal planners; others were holdovers from the previous administrations. The Roosevelt Administration viewed many well-established programs (the Bureau of Public Roads, the Veterans' Administration, the Bureau of Reclamation) as vehicles for and methods of increasing employment.

Reading followed this reasoning in constructing his own set of federal aid figures from a report by the Statistical Section of the Office of Government Reports entitled *Federal Loans and Expenditures* (1940). Subsequent work on New Deal Aid has used Reading's data, generally dividing the total aid figure by each state's 1930 population to get a per capita figure. This work includes Wright (1974), Wallis (1984, 1987, 1998), Anderson and Tollison (1991), and Fleck (2001, 2008). Wallis (1998) provides an insightful and entertaining overview of the history of this data.

²The exact name and table number differs by year. We provide the table numbers here: 1933: 49, 1934: 47, 1935: 48, 1936: 52, 1937: 54, 1938: 59, 1939: 61.

Table A.4: Federal Aid Variables

Source	Construction	Mean	SD	Min	Max
Office of Government Reports	Sum of federal aid to state (1933-39, nominal) divided by 1930 population.	293.44	178.14	147.31	1130.76
U.S. Treasury	Sum federal aid to state (1933-39, real 1932 dollars) divided by weighted average 1930/1940 population.	159.7	82.73	54.33	480.8

Our decision to use a slightly different aid variable was prompted by a few concerns. First, by collecting yearly data we are able to account for the wide swings in prices that occurred during the Depression. The Reading data are in nominal terms. Yearly data also allows us to correct for population growth. Finally, we were unable to locate the original document used by Reading (only aggregate figures are reported in the 1973 paper). Thus, a key advantage of the Treasury data is that we can see the breakdown of federal aid by program. Wallis (1984) used the same Treasury data used here to supplement Reading's data.

It should be noted that our federal aid data are not merely a transformed version of Reading's. It was not possible to replicate the Reading figures by varying the process we used to generate total per capita federal aid. Each variable is summarized in Table A.4.

The correlation between these two variables is strong (0.9333) but the Treasury data has consistently smaller means. If we exclude Nevada - a consistent outlier - the estimated fitted line between these two variables is

$$Aid_{Reading} = 17.36 + 1.34 \cdot Aid_{Treasury}.$$

The robust 95% confidence interval on the slope coefficient is [1.04, 1.65]; the difference in the aid variables is larger for states that received large amounts of aid.³

Although these differences in federal aid variables are important they do not affect our results. The general finding that the amount of federal aid provided by the government was not significantly correlated with the change in centralization in a state holds whether we use our preferred variable, Reading's variable, or New Deal spending only.

A.3 Maps and Figures

In this section we present maps displaying the decline in income from 1929 to 1932 (Figure A.1), the adoption of sales taxes by states (Figure A.2), and the growth in the states' revenue share from 1929 to 1932 (Figure A.3). We also present state-level scatterplots of the change in centralization measures against our measure of income decline.

Figure A.1 reinforces the point that there was a large amount of variation in income growth across states from 1929-1932. While—under ordinary circumstances—the 16.57% income decline in Massachusetts would be rightly viewed as a calamity, Massachusetts was actually the most fortunate state in terms of income growth. Mississippi's 59.46% income decline was the greatest. The figure also suggests that income growth was correlated within regions. The Northeast, in particular, stands out as an area where income declines were relatively modest. In the regressions reported in the main text we included region dummies in certain specifications and found that our results were robust to their inclusion.

Table A.2 is a graphical representation of sales tax adoption by state. We previously noted that northeastern states tended to experience smaller income declines. From this figure we can see that few of these states adopted a sales tax and those that did adopted them only temporarily. This, of course, is consistent with our predictions.

³The coefficient is larger if Nevada is included.

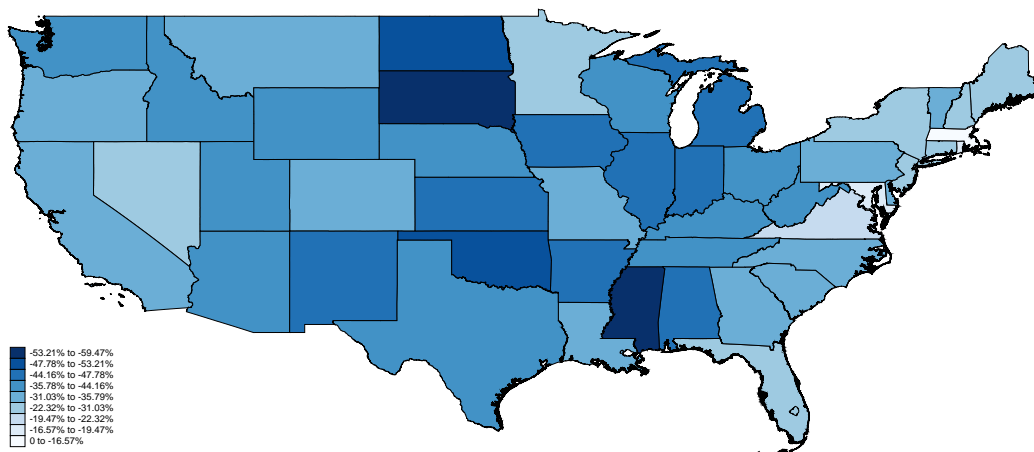


Figure A.1: Income Growth by State, 1929-1932

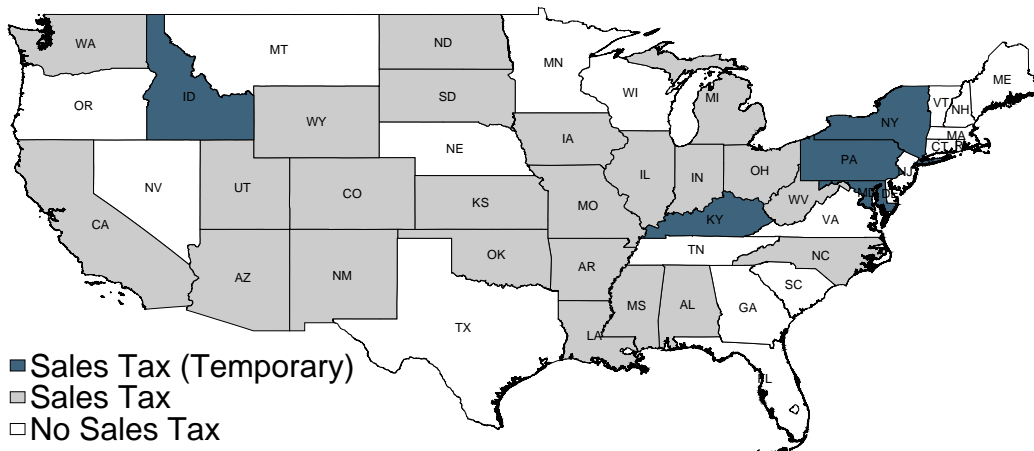


Figure A.2: Sales Tax Adoption by State, 1929-1942

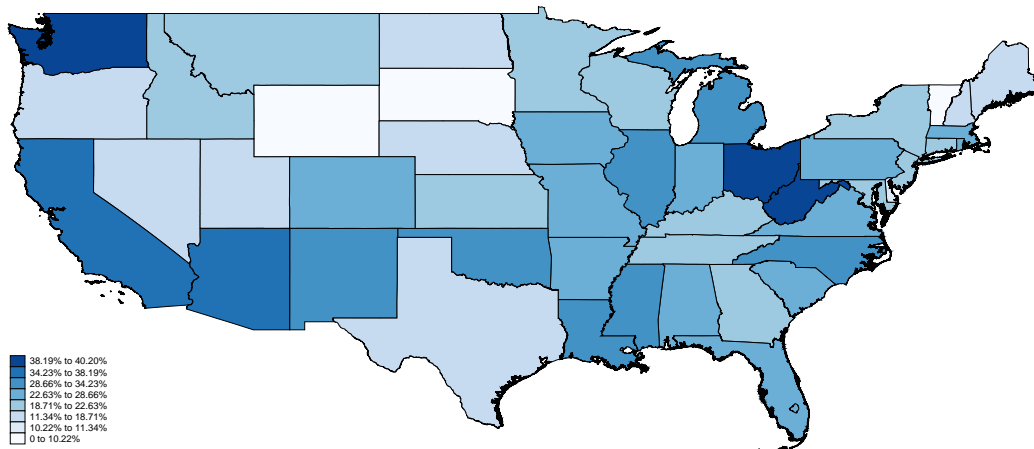


Figure A.3: Change in States' Revenue Share, 1932-1942

Our revenue centralization measure is mapped in Figure A.3. One important feature that sticks out in this map is that centralization in South Dakota was rather modest even though it adopted a sales tax and experienced a severe income decline. In fact, centralization in most of the plains states was quite modest. One possible explanation for this finding is that retail sales were not nearly as important in these sparsely-populated states; people either made their own goods or traded informally among themselves. If the governments of these states could not raise revenue through the sales tax as efficiently as governments in other states then we would expect that centralization would be lower than expected.

Below we report scatterplots of the change in states' shares of revenue (Figure A.4) and expenditure (Figure A.5) against the percent growth in income from 1929 to 1932. The unit of observation is a state. A bivariate regression of the revenue and expenditures shares variables on income growth yields estimates of -0.14 and -0.17 respectively. These are somewhat smaller, in absolute value, than those reported in Table 5. The latter results are obtained from regressions that control for federal aid, a variable which both the literature and our model suggest is critical for understanding the determinants of centralization.

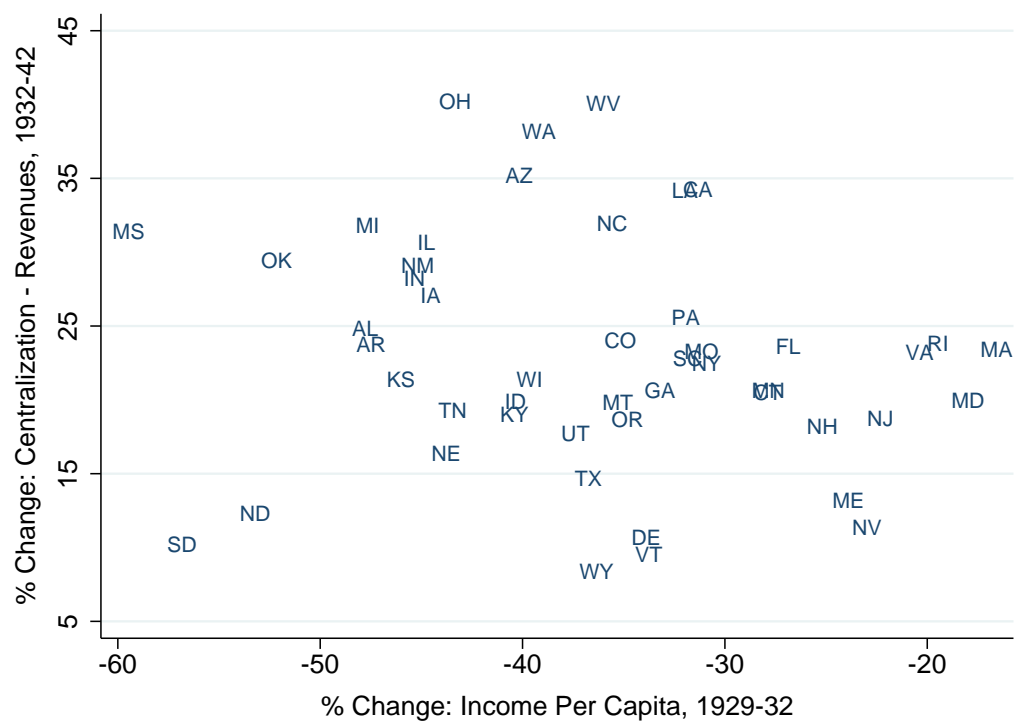


Figure A.4: Scatterplot of State Revenue Share against % Growth in Income, 1929-32

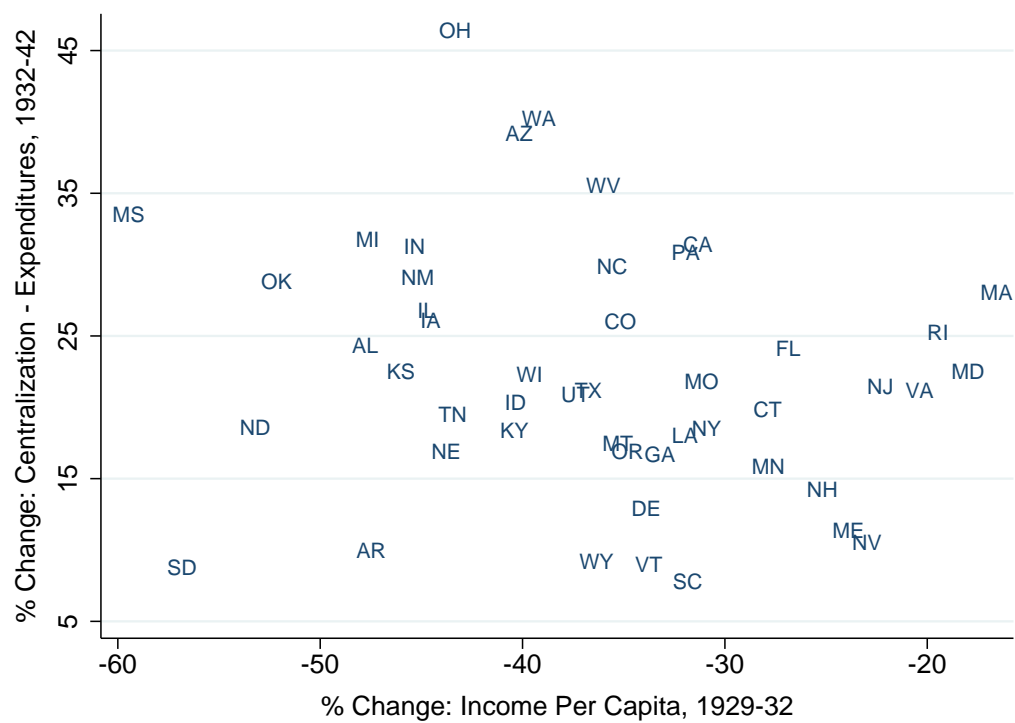


Figure A.5: Scatterplot of State Expenditures Share against % Growth in Income, 1929-32

A.4 First-Stage of Sales Tax IV Probit Regressions

Table A.5 displays the first-stage regression results associated with columns (5) and (6) (respectively) of Table 3.

Table A.5: Sales Tax IV Probit Regressions, First-Stage

	(1)	(2)
Electoral Votes Per Capita	35.802 (5.084)	
SD Dem. Vote, '96-'32	0.024 (0.010)	
Federal Land Per Capita		0.629 (0.174)
Non-Federal Land Per Capita		3.191 (1.036)
% Growth in Per Capita Income, '29-'32	-1.057 (0.461)	-1.016 (0.428)
Observations	48	48
Covariates	Yes	Yes
Census Region Dummies	Yes	Yes
F-Stat (First-Stage)	34.13	81.29

Covariates: debt restriction, same party control, Republican control, Southern state, log income per capita 1929. Instruments for federal aid: electoral votes per capita, standard deviation Democratic vote share, 1896-1932, federal land per capita, non-federal land per capita. Standard errors reported in parentheses. The F-Statistic in the last row tests the null hypothesis that the coefficients on the excluded instruments in the first stage are jointly equal to zero. *Variable definitions:* see text and data appendix.

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