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Public libraries and political participation, 1870-1940

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ABSTRACT: The public library movement of the late 19th and early 20th centuries fostered a rapid increase in the number and quality of public libraries in cities and towns across the United States. One important argument for libraries was that they would enhance American democracy by promoting virtues of citizenship and enabling access to information. This paper examines how voter turnout was affected, in the short-term, by the establishment of public libraries, using a county-by-election year panel. Our empirical strategy exploits the founding dates of public libraries as discrete events that should have influenced subsequent voting behavior. Over the wide range of specifications considered, the vast majority of regression results suggest that libraries had no significant short term impact on voter turnout. We discuss potential reasons for this finding, and compare it with recent work finding a positive impact of newspapers on political participation.

JEL classifications: H40, H75, N31, N32, N41, N42

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... It is of paramount importance that the means of general information should be so diffused that the largest possible number of persons should be induced to read and understand questions going down to the very foundations of social order which are constantly presenting themselves and which we as a people are constantly required to decide and do decide either ignorantly or wisely.

(Trustees of the Boston Public Library 1852, p. 15)

As truly as Daniel Webster had called the little red school house the 'sentry box of American liberty,' so could the public libraries be called the 'Arsenals of American Liberty.'

(Ditzion, 1947, p. 66)

1. Introduction

During the late nineteenth and early twentieth centuries, local public libraries emerged as widespread and landmark American institutions. Access to free community-based library services spread to a large share of the U.S. population. The institutional structure of local libraries underwent a transition from largely quasi-private, subscription "clubs" to the tax-supported public institutions familiar today. A determined movement led by local and national elites was instrumental in convincing public officials and philanthropists to prioritize library development over other local public services. A central argument was that libraries were essential to foster the informed and participatory citizenry required by democracy.

We estimate the magnitude of the short term effect of public libraries on one form of political participation—voter turnout—during the period 1870-1940. While this is only one measure of the civic benefits of libraries, and the civic benefits were only one part of a broad range of benefits ascribed to libraries, we believe it is an important and useful indicator for a variety of reasons. First, many political scientists and commentators think that voter turnout represents a key indicator of civic engagement.¹ Second, it is hard to imagine how libraries would have had other civic impacts without affecting turnout. That is, it seems unrealistic to think that a public library changed the political choices of citizens but did not affect their participation rates in the fundamental political activity of the polity. Third, supporters of public libraries in the 21st century continue to argue that the civic benefits of libraries are significant (Kranich, 2001; McCabe, 2001), and the American Library Association at various points in time has led efforts to promote voter turnout (Preer, 2008). So a study of the past might inform

¹ Turnout is one of the indicators included in the OECD "Better Life" index. See <http://www.oecdbetterlifeindex.org/topics/civic-engagement/>.

present-day policy choices. Moreover, the question is of great relevance to developing countries, where democratic institutions exhibit considerable fragility. China and India, for example, are rapidly approaching or have surpassed the average income levels of 19th century America, but their public investment in libraries remains minimal. Commentators frequently suggest that the two countries face significant risk of political instability because of the absence of an informed and engaged citizenry. Sub-Saharan Africa, the world's poorest region, is rapidly approaching 100% primary school enrolment, but access to reading materials through libraries (public or private) remains minimal, and few polities have been able to consolidate democratic institutions.

Identification of causal effects of public libraries on voter turnout is difficult. The historical record makes clear that various local and national changes influenced local support for establishing and improving public libraries. Identification is problematic because observed and unobserved factors that might explain why libraries were established, expanded, or institutionally transformed at particular dates might also explain changes in voter turnout. A county experiencing a sudden surge of politicized immigrant farmers might have a library established and turnout increased, but the immigrant surge caused the turnout, not the library.

Our identification strategy concentrates on the short-term effects of libraries and follows the lead of Gentzkow, Shapiro and Sinkinson (2011), who estimated the short term effects of entry of newspapers on voter turnout, across counties and over time (1868-1928). Their approach has been used in numerous explorations of the effects of information access on electoral outcomes. Drago, Nannicini, and Sobbrío (2014) analyzed the effects of newspaper entry and exit on political outcomes in Italy. Perlmana and Schusterb (2014) examined how the introduction of "rural free delivery" postal service affected early 20th century American elections. Others have examined the effects of the introduction of radio and television (Adena, Enikolopov, Petrova, Santarosa, & Zhuravskaya, 2014; Keefer & Khemani, 2015; Song, 2014)

Like the entry of a newspaper, radio station, or television station into a local media market, the establishment of a new public library was a discrete event that augmented access to information in a discontinuous fashion. We propose to identify the causal impact using a similar interrupted time series approach.

Our analysis makes use of three data sources on the establishment of public libraries in the United States, over the period 1870-1940. First, we make use of periodic U.S. Bureau of Education censuses of all public libraries in the country. These censuses significantly undercounted small libraries, however, because they used the number of books or volumes present as a cutoff for inclusion in the published statistics. The cutoff points changed over the course of the decades, ranging from 300 volumes to 5,000 volumes. Second, we digitized biennial state level reports by the state library commissions of Nebraska, South Dakota and Wisconsin. These reports are very comprehensive, providing detailed statistics on libraries in the state, with no cutoff thresholds. They were compiled by staff of the state library commissions, whose charge was to travel around the state promoting public libraries. Third, we take advantage of the largely exogenous timing of nearly 2,000 grants made by Andrew Carnegie, roughly over the 1895-1917 period. These grants were made to communities across the country that wanted to build new library buildings. Carnegie's grants were very large for the time (by some measures his library philanthropy is one of the largest philanthropic activities, by value, in human history). Small towns received grants of \$10,000 that enabled them to build large libraries that immediately were among the most significant town amenities. The timing of approval of Carnegie grants, by many accounts, was affected by all sorts of random influences of

town personalities, Carnegie's schedule, and the variable humor of Carnegie's personal secretary, James Bertram, who managed the (mail) correspondence with communities. These grants significantly changed the quality and salience of library services for about 1400 communities in the United States.

We assemble a county-by-election year panel data set and estimate a series of regressions to study the link between a library "event" in a county and voter turnout. The results of panel regressions depend on choices over a number of specifications. There is little theoretical reason to prefer one specification over the other, so we eschew presentation of a potentially post-hoc selection of a "preferred specification" and instead graphically summarize the results of 2,240 reasonable specifications. Our findings are largely negative: the t-statistics cover a range of values, but they are centered near zero and are generally well shy of the usual 1.96 in magnitude. The distribution of t-statistics casts doubt on the rhetoric of the period (as well as modern times) that the impact of libraries on civic engagement was self-evident. Moreover, the results contrast with the findings of Gentzkow, Shapiro, and Sinkinson (2011), who concluded that the establishment of a newspaper was associated with an increase in turnout of about one percentage point. Using their data to estimate a similar range of alternative specifications, we find a range of effects of newspaper entry on turnout, with significant effects (at the conventional 5 percent level) in more than half the cases. Thus there is more reason to think newspapers had short term effects on turnout than libraries.

This negative finding of no short term effects does not preclude the possibility that libraries had effects. The effect may have been present, but may have been very small. We argue that the econometric analysis we carry out has statistical power to estimate what would be reasonable effects. But we cannot rule out, of course, that actual small effects were present. Moreover, if libraries primarily affected the future civic engagement of child readers, then by definition (children being ineligible to vote) there might be no detectable short-term effect. Relatedly, it may well be the case that longer-term access to reading material transforms people, rather than short-term access of a year or two. Our negative finding suggests the relevance of generating and testing further hypotheses about how libraries affected civic life.

The plan of the paper is as follows. Section 2 describes the public library movement of the late-19th century. Section 3 motivates the paper by presenting the public library movement's rhetoric on the importance of libraries for democracy, and briefly reviews previous literature by library historians on the impacts of public libraries. Section 4 summarizes the data and estimation strategies employed. Section 5 presents the results and discusses the statistical power of the econometric approach. Section 6 concludes with further suppositions about why public libraries may not have had measurable effects, offers a brief recapitulation of the paper, and finishes with suggestions for further investigation.

2. The Public Library Movement

The public library movement was broadly diffused throughout the expanding territory of the United States. Outside of the northeastern states, in 1876 few communities had freely accessible reading materials, even though literacy, for whites, was on the order of 90%, and the postbellum reading public was very large by world standards. The expansion of public libraries largely happened after the spread of primary schools, which had enabled near universal primary enrolment by 1870, and somewhat in advance of the high school movement, which grew most rapidly after 1910 (Goldin, 1998).

The movement greatly benefitted from Andrew Carnegie's largesse. Starting around 1890, Carnegie made it known that he would grant communities \$10-20,000 for library buildings on the condition that public authorities commit tax revenues of 10% of the grant per year to support the variable costs of the libraries (Bobinski, 1969). City officials and civic leaders all over the country began lobbying their towns to approve the mandated tax, acquire a plot of land in a central location, and demonstrate that civic organizations would complement the Carnegie seed money. Almost 1700 libraries in 1400 communities benefitted from Carnegie grants over the period 1890-1920.

Figure 1 plots the total number of public libraries and Carnegie libraries in the United States for the period 1870-1930, as well as another indicator of the development of information and education during the period: the number of daily newspapers. The estimates of total libraries are derived from Bureau of Education library survey reports (discussed below). Because the size threshold for inclusion of a library in the published reports (and therefore in our data) increased over time, earlier reports captured many small libraries that would be missed in later years. Consequently the figure understates the growth rate of the number of libraries.

Figures 2-4 examine the regional pattern of library development and the spread of daily newspapers. Figure 2 shows the proportion of counties with a public library by region; the number or presence of libraries in a county will be our key independent variable in the event study regressions below. Figure 3 tracks the number of counties with Carnegie libraries by region, and Figure 4 does the same for daily newspapers. In the South, public libraries continued to be a rarity as late as 1930, and even after that the region's library development lagged far behind the rest of the country. As in the case of primary and secondary education, the Northeast led the way early on, but by the late 1920s the Midwest and West were catching up, thanks in part to Carnegie's largesse. The spread of daily newspapers shows a broadly similar pattern, though the number of counties with newspapers levels off in most regions soon after the turn of the century.

In addition to philanthropy, advocacy appears to have played an important role in library development. Library advocates established the American Library Association in 1876, and then starting in 1889 they established state library associations and at the same time began intense campaigns for state library commissions. The same advocates were often involved in both types of entities, and quite often the first priority of both commissions and associations was to help communities obtain Carnegie grants.

The public library movement dovetailed with the women's suffrage movement and the temperance movement, both largely led by women (McCammon, 2001). In many communities, small volunteer libraries had been established by local women's clubs. Fultz (2006, p. 338), in his discussion of the library movement in southern states, remarked that, "Especially influential were the widespread activities of women's groups, whose turn-of-the-century local organizing efforts and campaigns for traveling libraries stimulated library development generally and linked these drives with the school campaigns and other issues of social improvement." By the turn of the century, these clubs and their library activities were ubiquitous and entrenched in the civic consciousness. Leaders in many localities presumed that libraries were the natural province of women. Stauffer (2011, p. 142) reported a not atypical occurrence: in Utah "the Moab Commercial Club for men requested that the Women's Literary Club write to the Carnegie Corporation in 1912 'showing the needs of a library' in the mistaken belief that the corporation required that the public library be under the control of the local ladies' club." Women's clubs

emerged alongside the nascent suffrage movement and offered practical experience with local governance, including opportunities for interaction with male local and state officials. There was extensive correspondence between these library advocates and Carnegie and other philanthropists; they formed a powerful social network that appeared to have a strongly influenced public expenditures (Carmichael, 2005).

Kevane and Sundstrom (2014) used a state-year panel based on the U.S. library surveys to identify correlates of library development. The expansion of public library service was correlated positively with urbanization and percentage foreign-born, and negatively with percentage over 59 years old. Differences in observable state characteristics do not explain the slow pace of library development in the South, and in fact the unexplained gap between the South and the rest of the country widened over the period 1870-1930.

Despite the efforts of the library movement and philanthropists, by 1930 and the beginning of the Depression many communities still lacked library services, especially in the South. It was not until the Federal Library Services Act of 1956 that public libraries became a feature of practically every community. Today, the average American lives 2.0 miles from the nearest public library, with the average distance only a little greater (2.6 miles) in the South (Donnelly, 2015, p. 286). During the 1870-1930 period, though, there was considerable variation across counties in access to library services.

3. Impact of Public Libraries

Presumption of impact

The network of library advocates and philanthropists were persuaded that libraries would transform individuals and social groups. In towns across the country, the local bourgeoisie (and especially the wives and daughters of town elites) saw it as their business to make sure the poor had access to better lives, and they understood “betterment” to include reading books, both for self-education and moral improvement. They shared an understanding that reading widely and well was central to accomplishment in the rapidly transforming American economy. Carnegie, in public speeches and writings, attributed his success in life to his access as a teenager to the private library of his mentor, the railroad engineer James Anderson. Following Carnegie’s lead, library boosters initially argued that libraries would primarily serve young men intent on improving their skills and habits through self-education. The rhetoric of self-education persisted for decades. Johnson (1915, p. 8), in his evaluation of Carnegie libraries, noted, “The better part of education succeeds the formal schooling, and in this education it is hard to overestimate the importance of an accessible stock of books.”

The emphasis on self-improvement of young men (and then young women) eventually faded, and by the 1900s librarians and library boosters increasingly saw libraries as primarily oriented towards improving children’s capabilities and aspirations for success in schooling.²

A second common argument for public libraries was that they contributed to the formation of a citizenry capable of participating in a democracy. This argument for the civic benefit of libraries took several distinct forms: (1) libraries made available reading materials that would inform the public; (2) the reading engendered by the judicious selection and promotion of

² The increased schooling caused by the public school movement indeed yielded private and social returns. Parman (2012) estimates modest annual private returns to education of 2-5% and also spillover social returns, for a sample of Iowa farm owners in 1915.

“good books” would encourage critical thinking and democratic participation; (3) the very existence of a library, premised on equal access, would de-radicalize voters who were increasingly dissatisfied by the perceived excesses and corruption of urbanization and the Gilded Age;³ and (4) libraries offered an alternative to the saloon, source of much local social disharmony, and thus contributed, like churches, to developing the good civic habits of the citizenry. Libraries, in other words, would reinforce democratic virtues by cultivating conscientious voters who would take the time to learn about and evaluate the issues presented to the polity.

J.W. Thompson, president of the Illinois Library Association, presented the argument in a speech to the 1897 meeting of librarians and library boosters:

The circulation of good books means good reading and good reading contributes to good thinking, right acting, the broadening of appreciation, the quickening of perception, increased capability, and the awakening of new interest. It makes the best wisdom of the past and present a vital force in the life of every reader. People will read, and it is the mission of the librarian and director to see that the library provides good reading. The future welfare of every community is largely dependent upon the proper education of the masses. The stability and the development of the highest interests of our entire country depend upon the preserving, refining, broadening, and uplifting influences of mental illumination.

This is the great mission of the public library.

A short address to the California Library Association in 1898, by Edward Alsworth Ross, at the time a professor at Stanford University, laid out perhaps the clearest rationale for public libraries at the time, and is worth quoting at length. Ross started with the question most library boosters had (1898 p. 10):

The librarian is not unfrequently nonplussed by the proposition that it is unjust to tax property holders to provide free reading for those who can't buy books for themselves, and that the purveyance of literature is in no sense a public interest. Considering the enormous preponderance of fiction and poetry over books of knowledge in the reading of his patrons, he can hardly defend the free library as an educational aid. And if he dwells on the pleasure derived from acquaintance with Huck Finn or Sherlock Holmes, he lays himself open to the retort that free amusement is no worthier to claim public money than free lunches or free lemonade. It is well, therefore, to inquire. What is the scientific justification of free libraries? Can the library be shown to perform a function that is in any true sense an object of general and common concern?

He went on to answer the question:

Literature aims to arouse not sensations, but emotions, and these emotions are social in character... sympathy and comprehension, which are among the bonds which hold people together in orderly groups, do not come all of themselves. The taproot of selfishness is

³ Spencer (1902, p. 6), in a speech promoting libraries to women's clubs, observed: "The free library, like the public school, is a leveler of barriers and an exponent of true democracy, where the barefooted boy elbows the son of luxury, and poverty is for the moment the peer of wealth."

weakness of imagination. ... One feels with others because he has lived and because his life touches the lives of others. But most people have too narrow a range of and too limited a circle of contacts with others to develop an inclusive sympathy.... the literary artist is the magician who can lift into view what is below the horizon line and supply those imaginative contacts by which local groups cemented together and classes are held in mutual comprehension... This service of literature is most signal in a vast democratic state embracing many kinds of life and many interests.

Ross's argument is quite modern, in a sense, with its focus on the role of emotions in underlying civicness (Marcus, 2002) and the role of novels in creating the "imagined community" that was so important in the rise of nationalism (Anderson, 1983).

Many library historians have highlighted and debated this argument that public libraries would enhance democracy. Ditzion (1947) and Shera (1949) argued that early library founders firmly and sincerely believed that libraries would promote democracy and democratic values. Garrison (1979) and Harris (1974) distinguished between the idealistic or innocent rhetoric that was widespread amongst library boosters, and a more nuanced view where public libraries were one part of an arsenal of institutional weapons deployed in class and culture wars. New England and Midwestern towns and cities, at various moments, had potential to be wracked by conflicts pitting landed aristocracies and industrialists against the working classes and farm laborers of the rapidly industrializing country. These class conflicts often overlapped with immigrant issues, since immigrant groups often were more familiar and comfortable with ideologies of conflict brought over from Europe. According to Garrison (1979, p. xiii) a "fear of egalitarianism" led patrician elites to establish libraries as tools of social control. Harris (1974) criticized Ditzion's acceptance of the "arsenal of democracy" rhetoric, and argued instead that a less public but primary motivation of library boosters was assimilation of immigrant groups perceived as dangerous to the existing social order, dominated by a Protestant elite. Libraries promoted democracy, in this view, but in particular ways anticipated by the white, male, Anglo-Saxon, Protestant elite of the country. Well-read immigrant Americans would assimilate and vote the WASP way.

Civic outcomes included more than just democracy in the 19th century; they included the whole set of civic interpersonal relations amongst people who, in rural communities, interacted frequently in face-to-face settings. There was a widely shared perception in the late 1880s that alcohol led to considerable disruption of peaceable local social relations.⁴ Many library boosters viewed libraries as "secular churches": the dissolute would be morally transformed through exposure to good books. Libraries were an important complement to the prohibitions on alcohol pursued by the temperance movement, as well as the rise of other public institutions such as parks and public baths (Snape, 1995). Local chapters of the Woman's Christian Temperance Union, and related organizations, were quite often the founders of associational libraries and boosters of the eventual transformation into public libraries. For example, in 1885 women of the WCTU chapter of Brownsville, Pennsylvania met to establish a library with 800 volumes that opened in rooms furnished by the local post office. In 1899, the women transferred their library,

⁴There is some evidence confirming that these perceptions were valid. Bleakley and Owens (2010) estimate that counties in the South that prohibited the sale of alcohol during the 1890-1930 period reduced the incidence of lynching of African-Americans.

now holding 1,300 volumes, to a subscription public library association. Many other libraries of the county owned their initial collections to the reading rooms of WCTU chapters.

Wiegand's (2011) careful study of four Midwestern librarians documents the prevalence of this view of public libraries as instruments serving the purpose of local social harmony, among library trustees, librarians, and library users during the period 1880-1950. Trustees and librarians did not think that the libraries they established and managed were transforming people in any profound way, nor that they were vital to the functioning of democracy in some ideal or abstract sense. Rather, they viewed the public library in a modest and pragmatic way. The libraries were by and large established and managed by Protestant elites, and appeared to be clearly directed towards accomplishing a goal of maintaining and strengthening local "social harmony." It is perhaps important to recall that the environment on the farming frontier in the period 1880-1900 was one of fresh memories of the Civil War, slow migration northwards of recently freed slaves, echoes of urban tension from growing migrants from southern Europe, local uncertainty over property rights, and a lot of drinking of alcohol. In this atmosphere, the rapidly prospering local bourgeoisie sought to ensure harmony in local social relations. This aspiration for local order took a variety of forms, among them the temperance and library movements. Wiegand (p. 179) emphasizes that libraries were seen as places "local citizens used to model appropriate social behaviors, manifest civic participation, and celebrate citizenship."

Given the salience of women in library development, it should be noted that the effects of public libraries on women were not usually part of the explicit public discourse, but a number of writers have suggested that the social conditions and politics of the times would have made these effects of libraries obvious to many adults. It is likely that civically-engaged women believed that libraries were an effective mechanism for eroding the considerable barriers against women's participation in public life (Pawley, 2000; Stauffer, 2005; P. Watson, 1996; P. D. Watson, 1994). As Wiegand (2011, p. 177) observes: "...libraries were part of one of the few civic institutions where women were allowed to lead and encouraged to participate." Many of the leaders of the public library movement, especially at the local level, were leaders of the WCTU and also of the suffragist movement. But the motivations of many women leaders were multifaceted and complex. Pawley (2010, p. 57) follows the lead of Newman (1999) in noting that WCTU president Frances Willard and suffragist leader Elizabeth Cady Stanton believed it necessary to impose educational qualifications on the franchise to stanch the rise of "inferior races."

The educational and civic value of libraries touted by library advocates complemented the civic boosterism of the times. Towns had popped up all over the newly settled Midwestern and western United States, and began competing for population. Town leaders understood that there were significant benefits from early agglomeration and that the basic rules of economic geography meant that only one town in a region would likely thrive. Libraries were part of the portfolio of amenities that town leaders advertised when seeking to attract businesses and settlers. Swetman (1991) reviews campaigns to establish public libraries in twenty communities of Utah and Washington at the turn of the century. In the booming Inland Empire communities of Washington, libraries were promoted as markers of economic progress and enticements to settlers to take up residence in progressive "can-do" kinds of towns. In Utah, by contrast, public discourse treated libraries as places where the morals of wayward youth might be improved. Libraries were an amenity and signal of prosperity used in the competition between towns to attract new residents, even in cases where current residents did not place much value on library services.

Dearth of studies evaluating impact of public libraries

The rhetoric of the library movement suggested a wide range of benefits that would follow from appropriation of public monies. Libraries would foster reading, of course, and this would spark the imagination, discourage idleness, and encourage self-improvement through learning. Towns with superior libraries would thrive because libraries would signal civic effectiveness and success. Libraries would promote virtues of citizenship, local social harmony, and equality of opportunity.

There were contrary voices whispering that libraries might not generate large benefits, and many communities were opposed to libraries and on numerous occasions referenda to approve taxes for libraries ended in failure. Many communities rejected offers to establish libraries. Opposition to Carnegie grants for libraries, for instance, was fierce in some towns, where the money was seen as tainted by the violent repression of the Homestead Mill strike of 1892 (Martin, 1993). Other communities felt their towns had more urgent priorities, and balked at the longer-term fiscal implications of maintenance of libraries. Most communities in the South, as noted, did not establish public libraries until the 1930s.

What seems clear is that no careful systematic evaluation of the impact of public libraries ever informed the public debates of the times. Indeed, there appears to have been no statistically-oriented inquiry into the impact of public libraries ever, let alone during the 1870-1930 period as the movement spread. Some trustees of the Carnegie Corporation, created to continue Carnegie's philanthropy, began to doubt the impact of the public library grants, and commissioned the economist Alvin Johnson to visit a large number of Carnegie funded libraries and write a report. Possibly this was the first large sample evaluation of the functioning and impact of libraries, though non-random and with no control group. Johnson's comprehensive report praised the Carnegie library program, but recommended substantial changes and pointed out numerous examples where funding of library buildings had likely resulted in little effective library service (Johnson, 1915). Johnson recommended much more training of librarians and attention to communities as they established libraries. The Corporation responded in 1917, shortly before Carnegie's death, by suspending the building program.

Macleod (1968), in his iconoclastic evaluation of Wisconsin public libraries, offered a similar narrative review of the history and impacts of a large number of libraries. Two excerpts summarize the thrust of his conclusion:

"..lacking money, widespread popular interest, and often imagination, they were unable to create a great engine of democracy, leveling up cultural and educational opportunities for everyone." (p. 64)

"...opening a library had some of the characteristics of a patriotic ritual, for it was an action of undeniable importance whose meaning was too complex to be clear even to believers. Consequently it was possible for library enthusiasts to conduct a discussion of the library question that veered back and forth between high principles and petty advantages, but remained almost devoid of any consideration of what specifically the library would do." (p. 145)

Reviewing library performance during the interwar period, MacLeod offered a "continuing story of questionable impact." On the whole, MacLeod echoed the Johnson report, suggesting that a great many libraries catered to the clubwomen who had established them, and so had little appeal to the broad public.

Case studies do often conclude that the benefits of libraries were large (Pawley, 2001; Wiegand, 2011). But the very features that make the case studies so compelling make them potentially non-representative. Towns, libraries and readers that kept high-quality written records, and individuals who articulated the effects of reading on their lives, were likely to thrive even without libraries.

Moreover, these same case studies suggest that libraries often functioned in ways quite different from the intentions of the movement. Pawley (2001) analyzed circulation records from Osage Library in Iowa, for 1890-95, and found that the library was primarily used to read popular fiction. Wiegand likewise observes that the faith of small town librarians in the power of reading good books did not translate directly into acceptance of the “official” public library movement’s promotion of “good” books; all four libraries documented by Wiegand pursued collection development that was much more responsive to reader desires (for the “dependable pleasure” of light fiction) than to high culture lists of recommended titles (that heavily favored non-fiction). The public library movement did not believe that extensive reading of dime novels was the avenue through which libraries would deliver social benefits! So there is reason to ask whether libraries in general had many of the positive impacts hoped for by library boosters.

4. Estimating Impact of Public Libraries on Voter Turnout

Public libraries made accessible reading materials (books and newspapers) that would both inform the public and promote civic virtues, provided a public space for encountering neighbors, expressed a social sentiment of valuing reading, and exemplified a concern of the polity with providing public goods to residents (and in the case of many communities in the South, exemplified the race-based provision (or not) of public goods). Library boosters expected these immediate effects of libraries would have positive spillover on civic engagement (again, excepting the South where black residents might become more disengaged at another white-only public good paid for with color-blind tax revenues.) There were communities where the issue of public provision of libraries was controversial; communities that rejected measures to approve taxes for libraries and rejected offers of philanthropy for libraries. But these communities, by all accounts, were rare. Most thoughtful persons were convinced that libraries would generate the intended civic benefits, among the other benefits of libraries (self-education, enhanced schooling performance and aspirations).

Voter turnout has been used as a general proxy for civic engagement. There is a large literature in political science explaining trends and variation in voter turnout, as well as effects of changing voter turnout (Argersinger, 1985; Burnham, 1965, 1986; Clubb, Flanigan, & Zingale, 1990; Husted & Kenny, 1997; Jensen, 1971; Kleppner, 1979, 1982; Kousser, 1974; McDonagh, 1992; Sklar, 1995). Heckelman (1995), for example, estimated basic fixed-effects regressions at the state level (with no control for endogeneity) and concluded that women’s suffrage had no effects on turnout, while the secret ballot (by reducing vote-buying) and poll tax and literacy tests (through direct disenfranchisement) reduced turnout. A number of recent papers have carefully investigated the adoption of poll taxes and literacy tests, and their effects on turnout (Jones, Troesken, & Walsh, 2012; Naidu, 2012).

There has been considerable change in voter turnout over the regions of the United States and over time. Figures 5 and 6, showing turnout in presidential and congressional elections respectively, clearly illustrate the well-known decline in turnout after the presidential election of 1896, and the especially rapid decline in turnout in the South, as black and poor white voters

were disenfranchised. The Congressional turnout plot (6) exhibits similar trends, but a sawtooth pattern because of higher turnout during presidential election years.

Identification strategy

We seek to identify the extent to which an increase in library services in a county caused an increase in that county's voter turnout. Causal identification in this case faces the usual challenges of potential endogeneity due to simultaneous causation and omitted variable bias. For example, towns that established a new local library or applied for and obtained a Carnegie library grant may have shared unobserved traits correlated with voting turnout—e.g., greater civic-mindedness or educational attainment. Furthermore, the library “signal” must be disentangled from a large number of influences that changed voter turnout from year to year and over the decades. Figure 7 provides an illustration. The red lines track voter turnout in Congressional elections for two randomly selected counties in Nebraska that had public libraries at some point during the period, and the blue lines are for two counties that never established public libraries. As can be seen, county turnout levels were very closely correlated, and were driven primarily by state and national-level considerations. The same is true for other states.

Our identification strategy follows the lead of Gentzkow, Shapiro and Sinkinson (2011), who estimated the effects of entry of newspapers on voter turnout across counties and over time using a comparative interrupted time series or event study approach. The interrupted time series approach exploits the precise timing of the discrete event—in our case, the establishment of a library—to discern whether there is a corresponding sharp change in the outcome in the short period of time after the event. Identification of short-term effects comes from the assumption that the timing of the establishment of a public library or receiving a Carnegie grant is random relative to the underlying slow-moving trends in social forces favoring libraries (which might be correlated with voter participation). The identification strategy may be strengthened by restricting the samples to only counties that ever received libraries or grants; these counties are likely more similar in the underlying propensities to establish libraries, and hence the timing of actually getting a library more exogenous (Jacobson, LaLonde, & Sullivan, 1993).

The event study approach to identification is more or less compelling depending on the specific context. Gentzkow, Shapiro and Sinkinson (2011) proffered three reasons to interpret their estimated effects of entry of newspapers as causal effects. First, the likely direction of confounding bias would work against an estimate of positive effects of newspapers on turnout; specifically, in their view, higher population and income generally depress turnout while making newspapers more likely to be established. Second, consideration of the “fineness” of the timing and pre and post stickiness or irreversibility of newspaper entry and exit suggested that variation in confounding factors that might be correlated with newspaper entry would likely have low covariance with changes in turnout in the small window of time. Third, analysis of pre-event trends suggested that there was little movement in confounding factors prior to the entry of a newspaper.

Considering the case of libraries, it is clear that the establishment of a public library, like the entry of a newspaper into a market, was a “lumpy” and quasi-irreversible event, the timing of which we can pinpoint with some accuracy. We can also check for pre-event trends in voting turnout econometrically. Where the case of libraries may differ somewhat from newspapers is in the direction of confounding bias. To some extent libraries—like newspapers—would tend to be founded in areas with growing populations and incomes, trends that could depress turnout and

work against finding positive library impact. On the other hand, public libraries were partly the result of a political process, so rising voter turnout might have increased the likelihood of establishment of a library in a way that it would not have for the entry of a private entity like a newspaper. (A possible exception would be the case of rising political participation spurring the entry of partisan newspapers.)

The basic structure of the event-study model is captured in the following reduced-form specification:

$$(1) \quad Y_{ct} = \pi D_{ct} + \theta_c + \tau_t + X_{ct}'\beta + \varepsilon_{ct}$$

where Y_{ct} is voter turnout in county c in year t ; D_{ct} is a dummy variable equal to 1 if the county had a library or Carnegie grant by year t ; θ_c is a set of county fixed effects; τ_t is a set of year fixed effects, and X_{ct} is a column vector including a constant and time-varying census characteristics from the census.

To further control for potentially confounding unobserved changes in a county that could influence both voting behavior and public library development, in some specifications we include leads and lags of the library event dummy, as follows:

$$(2) \quad Y_{ct} = \sum_{k=-a}^a \pi_k D_c 1(t - T_c^* = k) + \theta_c + \tau_t + X_{ct}'\beta + \varepsilon_{ct}$$

where D_c is a dummy variable equal to one if the county ever established a library or received a Carnegie library grant, and the indicator function, $1(\cdot)$, is equal to one when the year of observation is $y = -a, \dots, 0, \dots, a$, years removed from the date T_c^* when county c 's library was founded (the number of leads and lags need not be symmetrical in practice). In our estimations we modify the lead-lag definitions to allow the most remote leads and lags ($-a$ and a) to include any events occurring beyond the lead-lag window. For example, π_{-a} will capture the (leading) effect of the establishment of a library in any time period $t+a$ or later. The pattern of coefficients on leading effects allows us to discern whether counties that were to get a library in the near future exhibited confounding pre-trends in voting turnout. Lagged effects may reveal a post-event change in trend.

Finally, we also run specifications in first-difference form, which is the core specification used by Gentzkow, et al (2011). Wooldridge (2002, Sec. 10.7.1) notes that the panel specification in first differences provides more efficient estimates than the specification in levels with fixed effects when the error terms are highly serially correlated within units. An advantage of using first differences is that by dispensing with estimating the county fixed effects as separate coefficients, we can include a full set of state-by-year fixed effects, which absorb potentially confounding state-level policy changes.

The basic specification in first differences is:

$$(3) \quad \Delta Y_{ct} = \pi \Delta D_{ct} + \gamma_{s(c)t} + \Delta X_{ct}'\beta + \Delta \varepsilon_{ct}$$

where $\Delta D_{ct} \equiv D_{ct} - D_{c,t-1}$ will be equal to 1 during the year when a county first obtained a library and 0 otherwise, and $\gamma_{s(c)t}$ is a set of state-by-year fixed effects. We can also include leads and lags of the event in this specification to capture pre- and post-treatment trends. In the first-difference specification, the leads and lags are also first differences.

In some specifications the “treatment” event is not a dummy variable for the presence of a library, but a count of the number of places with a library. In this case we identify from the exact timing of changes in the number of libraries in the county, which were also discrete events.

Leads and lags also reflect these changes in the number of libraries. All estimates report test statistics with standard errors clustered at the county level.

Data

Implementation of our identification strategy requires a panel data set with precise timing of library events—namely, the first year that a county had a public library, and changes in the number of towns in the county that had a public library. We estimate our model on three different data sets, each relying on different sources of information on individual local libraries. Our first source is a series of reports on libraries throughout the United States issued by the U.S. Bureau of Education over the period 1875-1929; the second relies on comprehensive reports of state library commissions as well as the U.S. reports for the states of Nebraska, South Dakota, and Wisconsin. The third is a comprehensive listing of libraries funded through grants from Andrew Carnegie. We aggregate these data to the county level and merge them with data on voter turnout for congressional and presidential elections, as well as additional county-level covariates.

Each of these sources has advantages and disadvantages. The U.S. Bureau data cover a long period and the nation as a whole; however, the listings are not comprehensive because only libraries above a certain size threshold were reported. The three-state sample is, in our judgment, quite complete in its coverage, but is obviously limited to counties in those three states, which are hardly representative of the country as a whole. Finally, the Carnegie grant data, although national in scope, include only libraries funded by Carnegie, and Carnegie was actively funding libraries for only a limited number of years. Still, as we note above, Carnegie grants were a quantitatively significant source of library development during our period, and Carnegie grants were substantial enough to have an impact on local library services. Given the tradeoffs, we estimate voter turnout regressions for all three data sources and compare the results.

Our data sources and methods are discussed in a summary online data appendix. We provide a brief sketch here.

Starting in 1875 the U.S. Bureau of Education conducted extensive surveys of public and other kinds of “quasi-public” libraries and issued reports based on the surveys; we use survey data from 1875, 1885, 1891, 1896, 1900, 1903, 1908, 1913, 1923, and 1929. The Bureau’s reports typically included tabulated information on individual libraries above a certain minimum size threshold, as measured in number of volumes in the collection. Data on libraries with at least 300 volumes were published for the 1875 and 1885 surveys; at least 1000 volumes in 1891-1903; at least 3000 volumes in 1923 and 1929; and at least 5000 volumes in 1908 and 1913.

The changing minimum volume thresholds in the published Bureau reports resulted in the omission of a large number of small public libraries during the later years, creating measurement error in the library variables. To the extent that very small libraries had limited impact on an entire county, this omission may not be of great consequence, but the potential problem was one motivation for our development of a more comprehensive library data set for a selected sample of states with extensive library reports: the Nebraska, South Dakota, and Wisconsin state library commissions were particularly thorough in printing biennial reports with listings of all libraries in the state. For these three states, we believe the listing of libraries over time is comprehensive through 1940.

Over the course of development of the public library system in the United States, truly public libraries, owned and operated by local governments, were often preceded by quasi-public

association or “social” libraries that offered library services to the public at large for free or for a modest subscription fee. Many of the U.S. and state reports included information on association libraries of various types, in addition to public libraries. We report regression specifications that restrict the library variables to public libraries, as well as specifications that include both association and public libraries.

Finally, we use data on Carnegie library grants, which started in the late 1880s and continued until 1917 when the program was discontinued. Bobinski (1969) published a list of all Carnegie grants, by town and year of the grant. The listing is thought to be comprehensive. Bobinski noted whether each Carnegie grant was to improve an already-existing library or was for a new library in a town that did not previously have one. As we discuss above, Carnegie grants were substantial, so a town or county that received a grant for a new library experienced a fairly substantial “positive shock” to local library services.

To create a panel of library events, we start with the reported founding dates of the individual libraries, which were recorded in many of the state library reports and in all but one (1923) of the U.S. Bureau of Education library survey reports. Not all the libraries reported their founding dates, so where possible we match libraries across survey years and impute missing founding dates using the founding date of a public library in the same town from another survey year. For the Carnegie grants, we simply use as a founding date the date of the Carnegie grant reported by Bobinski (1969). The completeness of the founding date information varies across survey years, but overall we can determine founding dates for nearly 97% of libraries. Thus we are able to identify the exact timing of changes in library services in towns and cities.

We proceed by assuming that each place (town or city) reporting a library had at most one public library at any point in time, and further assume that once a public library is reported in a community in any survey, that community continues to have a library from that point in time throughout our analysis period, even if it is not reported in a subsequent survey. Therefore, by construction, the number of communities reporting public libraries is constrained not to decrease over time. This accords with our reading of the library history literature; during the 1870-1930 period library closings appear to be quite rare. There are likely many reasons why libraries responding to earlier surveys did not respond to the later surveys, most likely because they merged with other, expanding, libraries, but also because of simple oversights.

From the panel of towns with libraries by year, we match library place names to counties to create a count of public libraries in each county at each date. County matching is done using the place name list from Federal Information Processing Standards (FIPS) 55 (U.S. Dept. of Commerce ICPSR 8346). We construct dummy variables that allow us to limit the sample to include only counties that had stable county boundaries after 1870 (or 1880, or 1890) in order to avoid challenges posed by changing county definitions over time. An alternative method, which we do not pursue here, is to adjust population and other attributes for counties that had changes in their borders by adjusting county data using data from the relevant border counties or newly split counties, weighting by the geographic area of the portions of counties that changed from time to time (Hornbeck, 2010). Our key county-level library variables are (1) a dummy variable equal to 1 if the county had at least one public library in a given year; and (2) a count of the number of distinct communities in the county with a library in a given year. These variables by construction allow us to identify the timing of discrete changes in access to library services in each county, but are limited to the extent that they do not measure the intensity of library access,

such as the percentage of the county population living in a town with a library or library volumes per capita in the county.

Data on voter turnout for counties in the United States are taken from ICPSR study 8611 (Clubb, Flanigan, & Zingale, 2006). The ICPSR study estimated turnout rates by dividing total votes cast by an estimate of the eligible population. We run separate regressions for presidential election turnout and turnout for congressional elections for members of the House of Representatives.

We use time-varying county-level control variables drawn from the U.S. Census, using ICPSR 2896, compiled and edited by Michael Haines (2010). The controls include total population and its composition by gender, race, and nativity, and two measures of urbanization: percent of population living in urban places (population at least 2,500), and percent living in urban places of at least 25,000. Interpolation of decadal census data between census years is by cubic spline interpolation.

Given the similarity in methodology between our study and Gentzkow, Shapiro, and Sinkinson (2011) on the impact of newspapers, we also use their newspaper data to replicate our specifications substituting newspapers as the event in place of libraries. This permits us to compare the magnitude and significance of the effects of library versus newspaper innovations on turnout.

Each of our three different library sources is limited to library development over a specific period of time. Hence the panel time frame is different for each source: for the U.S. Bureau data, we estimate regressions for elections over the period 1872-1928; for the three-state sample, 1872-1940; and for the Carnegie data, 1888-1920.

Table 1 provides summary statistics at benchmark dates, comparing counties with and without libraries, based on library data from the U.S. Bureau of Education. Several features stand out. First, counties with public libraries were substantially more populous, more urbanized, and more likely to have a newspaper than counties without libraries. Second, counties with libraries had higher rates of voter turnout. The key goal of this paper is to determine whether part of this correlation was causal. Finally, we note that by 1920, more than a third of the libraries enumerated in counties with libraries were Carnegie libraries. (Note that the table defines counties without libraries according to the Bureau of Education data, so the Nebraska-South Dakota-Wisconsin dataset reveals that a few towns had libraries that were not counted in the Bureau of Education surveys.)

5. Results

Although all of our regression specifications share the common structure of using county-by-election year panel data sets to estimate the impact of a library event on voter turnout in a county, the results depend on choices over a large number of potential specifications and samples. There is little theoretical reason to prefer one specification over another, so we fit a large number of plausible alternative regressions and then summarize the range of estimates of the key coefficients across all specifications, using box plots. Our agnosticism regarding preferred specification(s) is in the spirit of Gelman and Loken's (2013) warnings about the "garden of forking paths" in empirical work when there are multiple comparisons and specifications that are equally plausible a priori, with only some yielding significant coefficients.

We focus on the estimates of the coefficients on the library event variable (the parameter π in equations (1) – (3)). The library events consist of either the establishment of a county's

first library (from zero to one library in the dummy specification), or an increase in the number of libraries in the county—in the large majority of cases these changes involve an increase of exactly one library. Consequently, the coefficient magnitudes are comparable across all regressions, and can be interpreted as roughly the marginal impact of gaining a library on voter turnout, measured in percentage points. As it turns out, the coefficient estimates are generally centered near zero and quite small—typically well under 0.01 in magnitude. In most cases the coefficients are not statistically significant.

Tables 2 and 3 provide examples of some typical specifications, for presidential and congressional election turnout respectively. In each table, the first two specifications use as the event variable a dummy for any library in the county; the next two use the same event, but restrict the sample to the three states (Nebraska, South Dakota and Wisconsin) where we have carried out extra work to ensure a completely accurate record of the establishment of libraries. The third pair of specifications use as the event a dummy for a Carnegie grant in the county. For the Presidential election turnout in Table 2, the final two columns replicate (with different sample and covariates) the regressions of Gentzkow, Shapiro, and Sinkinson (2011) of the impact of newspapers. In each set of two specifications, the first regression does not include leading and lagging values of the event variable, while the second includes the leads and lags to capture pre- and post-trends. The regressions reported in these tables use a specification in first differences; results with a fixed effects specification are similar, as seen below. Time-varying covariates are included in the regressions in Tables 2 and 3.

It can be seen that there are some specifications in which a library event has a statistically significant effect. The first two columns of Table 3 suggest a library was associated with a reduction in turnout in Congressional elections; the final column suggests a Carnegie grant was associated with a somewhat statistically significant increase in turnout. But the effect is not distinguishable from zero for the other specifications. The specifications in Table 2 with the number of newspapers as the event, however, reveal a statistically significant effect on voter turnout of change in the number of newspapers in the county.

The covariates generally matter significantly in explaining changes in turnout (recall the regressions are estimated in first-difference). The population of the county is often positively associated with turnout. Urbanization is negatively associated with turnout. An increase in the non-white population and increase in the foreign-born population are both negatively associated with turnout during the time period of the sample.

We present the tables for illustrative purposes. As noted above, there are many choices to be made when estimating this apparently very simple relationship. We turn then to examine the distribution of estimated effects across a wide range of alternative specifications. Figures 8 through 11 display box plots summarizing the t-statistics on the library coefficient estimates, for turnout in the presidential (8-9) and congressional (10-11) elections respectively. Figures 8 and 10 use the national sample, which includes all states and is based on the Bureau of Education surveys and the Carnegie library data sets. Figures 9 and 11 use a sub-sample restricted to the states of Nebraska, South Dakota, and Wisconsin, for which we have much more complete library data. For specifications involving a single event variable, such as equations (1) and (3), the t-statistic is for the null hypothesis that the coefficient π on the event variable is equal to zero. For the lead-lag specifications (equation (2)), we test the null that there is no difference between the coefficients on the contemporaneous and one-period leading event variables: i.e.,

$\pi_0 - \pi_{-1} = 0$. That is, we test whether there is a significant jump between the last period of any pre-event trend and the event itself.

Consider Figure 8 for presidential election turnout. The plots in the top row are for samples restricted to counties that would ever have a library, whereas the bottom row includes all counties. The four box plots to the left are based on the Bureau of Education samples and thus include all kinds of libraries; in the three box plots to the right the events are restricted to Carnegie libraries only. Reading across the top row, the very first box plot shows the range of t-statistics for the library effect when the “treatment” is a dummy variable for the presence of any library (public or association); the next box plot is for the presence of a public library (not including quasi-public association libraries), and the third and fourth boxes for the number of libraries of these types. Continuing across the top row to the Carnegie plots, the first is for a dummy variable for the presence of any Carnegie; the second for the number of Carnegies, and the third for the number of “new” Carnegies—that is, Carnegie grants that established a library in town that had no public library prior.

The estimates portrayed in each box plot come from 80 different specifications. These constitute all the possible permutations of the following specification choices:⁵

- Sample of counties includes all counties regardless of changes in county borders, or is restricted to one of four consistent-county panels: unbalanced, or balanced starting in 1870, 1880, or 1890 (5 alternatives);
- Libraries founded in an election year assumed to have an immediate effect on that election, or an effect delayed to the subsequent election (2 alternatives);
- All variables are in first-differences and regression controls for state-year interactions, or variables are in levels with county fixed effects and year dummies (2 alternatives);
- Regressors include leads and lags of the library event, or not (2 alternatives);
- Regressors include no covariates, or include time-varying county level covariates (2 alternatives).

Readers may have their own favored specifications among these alternatives, but we believe there are tradeoffs across the board. Inclusion of time-varying covariates, for example, may sound unexceptionable, but in fact these variables are interpolated between census years and introduce measurement error. A balanced panel of consistent counties starting in 1880 has more years of data than one starting in 1890, but fewer counties due to changes in borders and county definitions between 1880 and 1890. And so forth.

The box plots show that these specification choices matter. In the case of the Carnegie libraries, for example, it is quite possible to find statistically significant coefficients both negative and positive. But the median estimate is centered quite close to zero.

Figures 9, 10, and 11 all tell the same tale of varying but predominantly null results. Whether presidential or congressional elections, and whether we use available data on larger libraries in all states or more comprehensive data on all libraries for selected states, there is very little evidence that public libraries affected voter turnout in the short run.

⁵ Needless to say, many additional permutations are possible. A variety of demographic covariates could be included in various combinations; the number of leads and lags could be varied, etc.

Figure 12 provides an alternative visualization, plotting kernel density functions for the t-statistics for all the samples of specifications represented in the box plots. That is, each individual curve in Figure 12 displays the same distributional information as one of the boxes (and whiskers) in the preceding figures. The peaks of these curves are generally close to zero, and seldom beyond the interval between -1 and +1.

The negative results here contrast with the effect of newspapers on turnout reported by Gentzkow, Shapiro, and Sinkinson (2011), who found that the establishment of the first newspaper in a county was associated with an increase in presidential turnout of about one percentage point. We note that although we are able to replicate their core results, we also find that when we estimate a similarly wide range of alternative specifications, the effect of newspapers is not significantly different from zero in a substantial minority of cases. These results are summarized in the box plots in Figure 13, where the left-hand box is for a sample restricted to counties that would ever have a newspaper, and the right-hand includes all counties.⁶ In the case of newspapers, the median t-stat is marginally greater than 2, but a large proportion of estimates would not pass the conventional 5% significance test, and roughly a quarter have negative coefficients. Still, the overall weight of the evidence provides more reason to think newspapers had effects on turnout than libraries.

One possible reason for a null result of no statistically significant short run effect of public libraries on voter turnout is that the statistical procedure lacks power to detect an effect of reasonable magnitude. With a standard error of approximately 0.003 in many of our estimates (see Tables 2 and 3), we have 80% power to reject an effect size of approximately 0.0074 with a one-sided test at 5% significance. This would be a .74 percentage point increase in turnout.

Is this effect small enough to be reasonable, in the sense that not finding an effect this big might lead to rethinking hypotheses about the effects of the establishment of public libraries on voter turnout? Suppose, for example, that the statistical test had 80% power to reject an effect size of approximately 0.074, ten times the magnitude we estimate, and equivalent to a 7.4 percentage point increase in turnout. No reasonable hypothesis suggests that libraries would have such a huge effect, so not finding evidence of such an effect would hardly be compelling. Is the effect we have power to detect—namely a .74 percentage point increase in turnout—reasonably small?

One approach to answering this question is to follow the lead of political scientists and think of the turnout effect as being due to an underlying “persuasion rate.” Gentzkow et al. (2011, p. 3003) and others define the persuasion rate as “the number of eligible voters who changed their voting behavior as a result of the introduction of the newspaper, as a fraction of all those who could have changed their behavior.” Mathematically, the persuasion rate p is:

$$p = \frac{\beta}{(1-t)e}$$

where β is the estimated coefficient, t is the turnout rate, and e is the “exposure” rate, measuring what percent of people who could be persuaded to change their behavior are “exposed” to the treatment. The estimated newspaper effect on turnout, an increase of one percentage point, is

⁶ In this figure each box plot represents 40 specifications, corresponding to the same permutations discussed above, with the exception that we did not have data on the exact timing of newspaper entry, so we assume that all newspaper events immediately affect elections held in the same year.

interpreted as follows: 69% turnout means 31% of eligible voters did not vote, and are thus at risk of changing behavior with persuasion; 25% of eligible voters (whether voting or not) might read newspapers if available; thus $.25 \times 31\% = 7.7\%$ of non-voting eligible voters read newspapers; so the causal increase in turnout rate of 1% means that $1\% / .077 = 12.8\%$ of the at-risk non-voters were persuaded to vote by the newspaper. Studies by political scientists of persuasion rates, using randomized controlled trials and other methods, find a 13% persuasion rate to be plausible (DellaVigna & Gentzkow, 2010).

What is e in our case? For our three-state sample with very complete library data (NE, SD, W), we can calculate the proportion of the county population that resided in the town that received the county's first library, at the time of the library's founding. This represents a lower-bound estimate of the proportion of the county "exposed" to our event, to the extent that some residents living outside the town might also have traveled into town to visit the county's only library. Figure 14 provides a histogram of the distribution of this proportion. For the entire period 1872-1928, the mean of this proportion across counties was 0.24, with a median of 0.18.⁷ In other words, the county's first library typically was in close proximity to about a fifth of the county's population. For example, Mitchell County, Iowa, home of Osage Public Library, had a population in the 1880s and 1890s of about 14,000 people. The population of Osage crossed the 2,500 threshold in the 1900 census. So the population of the town was somewhat under 20% of the population of the county. The remaining rural population was usually not terribly far away, on the order of ten miles on average, but we know little about the reading and book borrowing habits of these populations. So 20% is a conservative guess about the exposure rate.

As noted above, with a standard error of approximately 0.003 in many of our estimates (see Tables 2 and 3), we have 80% power to reject an effect size of approximately 0.0074 with a one-sided test at 5% significance. With a 20% exposure rate, and a 69% turnout rate, this would mean we have the power to reject a persuasion rate of 11.9% or greater. This seems then to be a reasonable effect size.

One other reason for a null effect might be that county-level pre-event trends that dampened turnout were associated with the arrival of a library, and thus dampened the turnout effect of the library. For example, county-level turnout in American elections over the time period of the public library movement was negatively correlated with rising urbanization and rising percentages of the population that was non-white and foreign-born. It may be that the establishment of public libraries was correlated with these trends. For example, growing urbanization might lead to the establishment of a library, or increases in foreign-born populations might lead "city fathers" to establish a library to "Americanize" the population. Thus the effects of the library are muted because their possible increase in turnout is associated with a decreasing trend in turnout.

As the regression results above suggest, the inclusion of leads and lags of the event do not change the overall finding of no significant effect of the establishment of a library on voter turnout. Figure 15 graphs the coefficients on the leads and lags of the library establishment event for two of the specifications of Table 2. As can be seen, in neither of the two cases is there a visible trend before the event or after the event. The confidence intervals around the estimated

⁷ This proportion did not change much over this period: The median was 0.19 for the period 1872-1900 and 0.17 for the period 1904-1928.

coefficients in the newspaper specification are very narrow, which the confidence intervals are quite wide for the library event. Nevertheless, in both cases the pre-event and post-event coefficients are largely equal to zero.

6. Discussion and conclusions

To our knowledge, ours is the first systematic econometric study that attempts to measure the effects of public libraries on an aspect of local community development—in this case political participation. Using data on library development from several sources, we use an interrupted time series methodology to estimate the short-run causal impact of libraries on voter turnout. Estimates from a large number of county-election year panel regressions show that in most cases libraries did not have a statistically or quantitatively significant impact on voting.

We have tried to triangulate our study using multiple data sources and careful consideration of alternative specifications. There are, nevertheless, a number of reasons why the effects might be difficult to estimate in the county-level panel data framework. First, a public library may have had a large impact on the residents of the town where it was located, but negligible impact on the county as a whole, which is our unit of analysis (voter turnout information is not available at the town level). Newspapers, by contrast, presumably circulated extensively across counties, and likely became widely available to practically anyone who wanted to read immediately after their establishment. Our calculation of the persuasion rate numbers suggests that we still might have expected to find reasonable effects even if library books circulated only amongst town residents.

Second, our event study methodology is not suited to identifying impacts that occurred over an extended period of time. Perhaps the salutary effects of libraries on civic engagement required the slow development of community knowledge and norms. Newspapers had immediate effects, libraries perhaps much slower effects over time. If so, there is considerable difficulty of identifying such effects from observational data. Short-term effects can be identified by timing, longer term effects cannot. This is seen with Carnegie libraries. The request by a community for a Carnegie library was clearly endogenous to local socio-economic variables. The short-term timing of the initial request, subsequent grant approval, and then building, however, was probably orthogonal to local socio-economic change. In other words, many communities received Carnegie libraries once the program was fully publicized. Some, however, received their grants in 1904, others in 1910, and others in 1916. The timing was probably fairly random. Identifying the longer-term effects of Carnegie libraries is more difficult precisely because the longer-term effects were not much affected by the 5-10 years differences in the timing of establishment.

Third, despite our efforts to develop accurate and comprehensive data on library development, it is possible that our estimates suffer from various sources of measurement error. Library data at the national level are incomplete, due to the poor coverage of smaller libraries; thus we miss changes in library services for some number of places; the exact timing of changes in library services may be subject to uncertainty regarding founding dates, which are based on the reports of librarians, sometimes many years later.

We also note that the estimated coefficients might suffer from omitted variable bias. But it seems likely that the bias would work in the direction of finding a correlation between libraries and voting, thus working against our negative finding: for example, both libraries and voting were probably correlated with educational attainment, a variable unavailable in our data.

Given the caveats, what does the finding of no effects of the establishment of public libraries on voter turnout signify? Historical narratives suggest that local educated elites were the driving force behind public libraries. A cynical reading of the findings is that perhaps these elites found public libraries a useful institution for funding their local reading clubs and literary associations with public dollars.

A more optimistic view is that libraries provided valuable public services in the form of free access to a wide range of popular reading materials that enhanced the utility of a highly literate population. Over time libraries contributed to an enhanced quality of literacy, and possibly changed civic participation, but did not necessarily spark a quick surge in civic engagement.

In future work, we intend to continue investigating hypotheses about positive benefits stemming from the establishment of public libraries. Important avenues of research are to pursue additional data sources on library development, including the development of libraries earlier in the nineteenth century; to explore potential alternative identification strategies, such as the impact of state laws promoting library development on voter and other behavior in adjacent counties across state lines; and to consider libraries not as exogenous causal events but as potentially useful indicators of civic engagement for studying patterns of other social and political phenomena across U.S. counties.

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Table 1: Means of library measures and covariates, for counties without libraries and counties with libraries, for various years

	Without library		With library		
	mean	st.dev.	mean	st.dev.	
1896, n=	2320		968		
Voter turnout, Presidential elections	0.71	0.23	0.78	0.24	***
Voter turnout, Congressional elections	0.71	0.33	0.78	0.39	***
Total population	13,287	11,770	48,278	107,778	
Percent of pop. in urban places >2,500	0.04	0.10	0.29	0.25	***
Percent of pop. in urban places >25,000	0.00	0.04	0.09	0.23	***
Number of daily newspapers	0.13	0.53	1.66	2.39	***
Number of libraries	0	0	2.62	4.70	***
Is there a Carnegie library?	0	0	0.00	0.06	***
Number of Carnegie libraries	0	0	0.01	0.11	
Number of libraries, NE-SD-WI only	0.01	0.07	0.12	0.48	***
Volumes in libraries, NE-SD-WI only	3	57	397	3500	***
1908, n=	2056		1232		
Voter turnout, Presidential elections	0.53	0.27	0.66	0.28	***
Voter turnout, Congressional elections	0.53	0.27	0.66	0.29	***
Total population	14,731	10,303	52,617	138,044	
Percent of pop. in urban places >2,500	0.052	0.12	0.31	0.26	***
Percent of pop. in urban places >25,000	0.0014	0.031	0.10	0.24	***
Number of daily newspapers	0.14	0.52	1.60	2.34	***
Number of libraries	0	0	2.62	4.59	***
Is there a Carnegie library?	0.031	0.17	0.51	0.50	***
Number of Carnegie libraries	0.032	0.18	0.66	0.87	***
Number of libraries, NE-SD-WI only	0.018	0.18	0.20	0.83	***
Volumes in libraries, NE-SD-WI only	18	250	854	6503	***
1920, n=	1834		1452		
Voter turnout, Presidential elections	0.45	0.24	0.56	0.26	***
Voter turnout, Congressional elections	0.45	0.23	0.55	0.23	***
Total population	14,996	11,256	56,536	154,071	
Percent of pop. in urban places >2,500	0.062	0.14	0.33	0.26	***
Percent of pop. in urban places >25,000	0.0016	0.035	0.10	0.25	***
Number of daily newspapers	0.12	0.45	1.35	2.10	***
Number of libraries	0	0	2.59	4.39	***
Is there a Carnegie library?	0.05	0.22	0.63	0.48	***
Number of Carnegie libraries	0.053	0.24	0.97	1.14	***
Number of libraries, NE-SD-WI only	0.038	0.26	0.25	1.02	***
Volumes in libraries, NE-SD-WI only	58	424	1495	12552	***

Note: Asterisks indicate whether significant statistical difference between counties without libraries and counties with libraries, respectively * p<0.10 ** p<0.05 *** p<0.01. Means and standard deviations and differences between means are calculated for each variable with data available for that variable; some variables, had missing observations. Maximum number of counties is indicated for each year.

Table 2: The effect of libraries and newspapers on voter turnout in Presidential elections

	Number of libraries	Number of libraries	Number of libraries	Number of libraries	Get a Carnegie library?	Get a Carnegie library?	Number of newspapers	Number of newspapers
Event (libraries or newspapers)	0.003 (0.003)	0.007 (0.007)	0.007 (0.009)	-0.061 (0.051)	-0.001 (0.002)	-0.003 (0.002)	0.002** (0.001)	0.002*** (0.001)
Total population (in 10,000s)	0.001*** (0.000)	0.001*** (0.000)	-0.002 (0.001)	-0.001 (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.000 (0.000)
Prop population living in cities 2,500+	-0.072*** (0.021)	-0.070*** (0.021)	-0.161** (0.074)	-0.153** (0.077)	-0.081*** (0.019)	-0.081*** (0.019)	-0.075*** (0.021)	-0.071*** (0.022)
Prop population living in cities 25,000+	-0.018 (0.013)	-0.016 (0.013)	-0.019 (0.039)	-0.010 (0.038)	-0.011 (0.012)	-0.010 (0.012)	-0.018 (0.013)	-0.018 (0.013)
Prop population non-white	-0.182 (0.142)	-0.184 (0.142)	0.193 (0.616)	0.173 (0.623)	-0.309*** (0.102)	-0.313*** (0.103)	-0.180 (0.142)	-0.174 (0.142)
Prop population foreign-born	-0.497*** (0.109)	-0.498*** (0.110)	-0.094 (0.195)	-0.088 (0.190)	-0.743*** (0.084)	-0.738*** (0.084)	-0.498*** (0.110)	-0.492*** (0.110)
Constant	-0.007*** (0.001)	-0.006* (0.003)	0.007** (0.003)	0.041* (0.021)	-0.027*** (0.001)	-0.027*** (0.001)	-0.007*** (0.001)	-0.006*** (0.001)
Observations	18,469	18,469	2,095	2,095	12,076	12,076	18,469	18,469
R-squared	0.556	0.557	0.606	0.611	0.552	0.553	0.556	0.557
Region	All	All	NE-SD-WI	NE-SD-WI	All	All	All	All
Sample years	1872-1928	1872-1928	1872-1940	1872-1940	1888-1920	1888-1920	1872-1928	1872-1928
Leads and lags	no	yes	no	yes	no	yes	no	yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses are clustered by county. Sample is all counties that ever had a library in the 1872-1928 period. All models in the table are estimated in first differences, include control variables as reported, and include state-year fixed effects (not reported). Some models include leads and lags of the event, as indicated, and coefficients are not reported.

Table 3: The effect of libraries and newspapers on voter turnout in Congressional elections

	Number of libraries	Number of libraries	Number of libraries	Number of libraries	Get a Carnegie library?	Get a Carnegie library?
Event (libraries or newspapers)	-0.006** (0.003)	-0.007** (0.003)	0.003 (0.008)	-0.007 (0.009)	0.004 (0.003)	0.004* (0.003)
Total population (in 10,000s)	0.001*** (0.000)	0.001*** (0.000)	-0.003 (0.002)	-0.002 (0.002)	0.002*** (0.000)	0.001*** (0.000)
Prop population living in cities 2,500+	-0.072*** (0.022)	-0.072*** (0.022)	-0.083 (0.053)	-0.078 (0.050)	-0.078*** (0.021)	-0.079*** (0.021)
Prop population living in cities 25,000+	-0.031** (0.015)	-0.029* (0.015)	-0.021 (0.032)	-0.016 (0.029)	-0.016 (0.017)	-0.016 (0.017)
Prop population non-white	0.021 (0.073)	0.020 (0.074)	0.152** (0.069)	0.150** (0.069)	0.140 (0.111)	0.135 (0.112)
Prop population foreign-born	-0.290*** (0.093)	-0.298*** (0.092)	-0.291** (0.141)	-0.285** (0.137)	-0.339*** (0.089)	-0.332*** (0.089)
Constant	-0.004*** (0.000)	-0.003*** (0.001)	-0.001 (0.001)	0.007* (0.004)	-0.008*** (0.000)	-0.008*** (0.001)
Observations	35,975	35,975	4,213	4,213	22,296	22,296
R-squared	0.746	0.747	0.795	0.796	0.753	0.753
Region	All	All	NE-SD-WI	NE-SD-WI	All	All
Sample years	1872-1928	1872-1928	1872-1940	1872-1940	1888-1920	1888-1920
Leads and lags	no	yes	no	yes	no	yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses are clustered by county. Sample is all counties that ever had a library in the 1872-1928 period. All models in the table are estimated in first differences, include control variables as reported, and include state-year fixed effects (not reported). Some models include leads and lags of the event, as indicated, and coefficients are not reported.

Figure 1: Number of libraries and daily newspapers

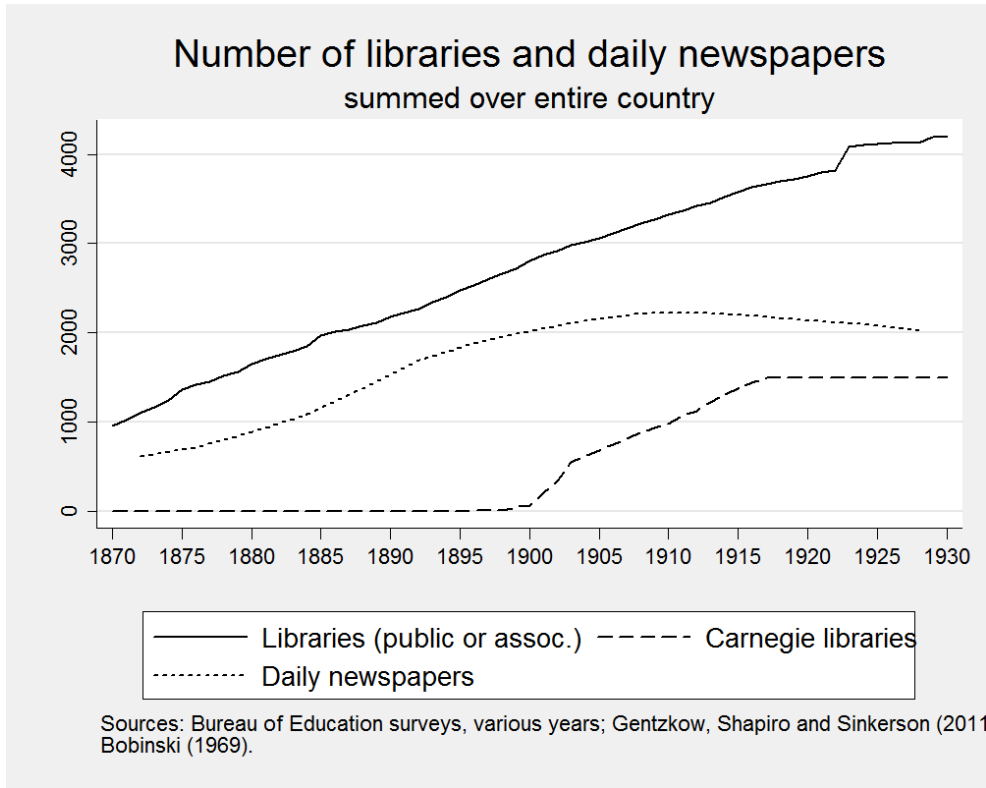


Figure 2: Libraries by region

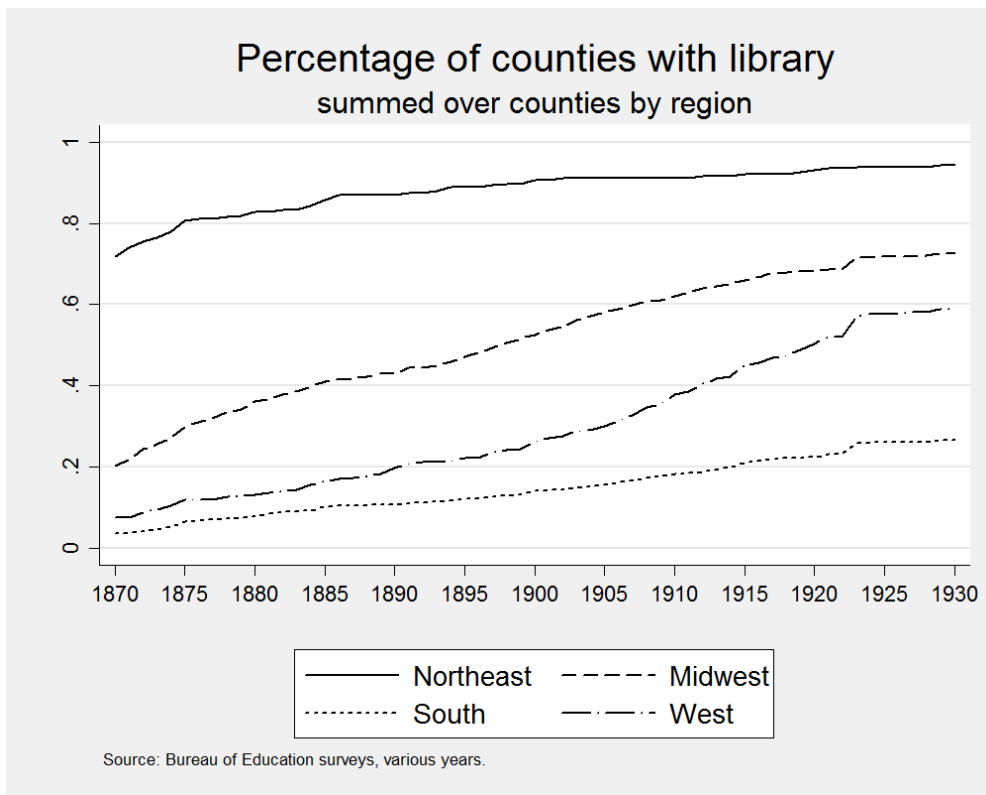


Figure 3: Carnegie libraries by region

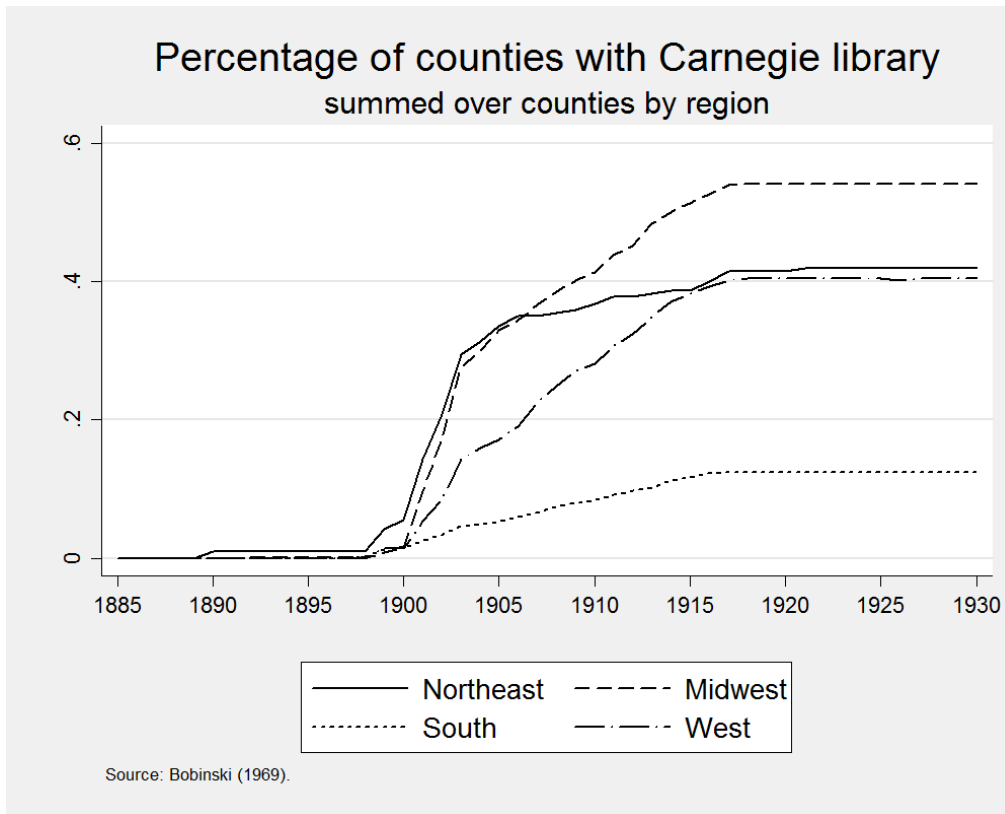


Figure 4: Daily newspapers by region

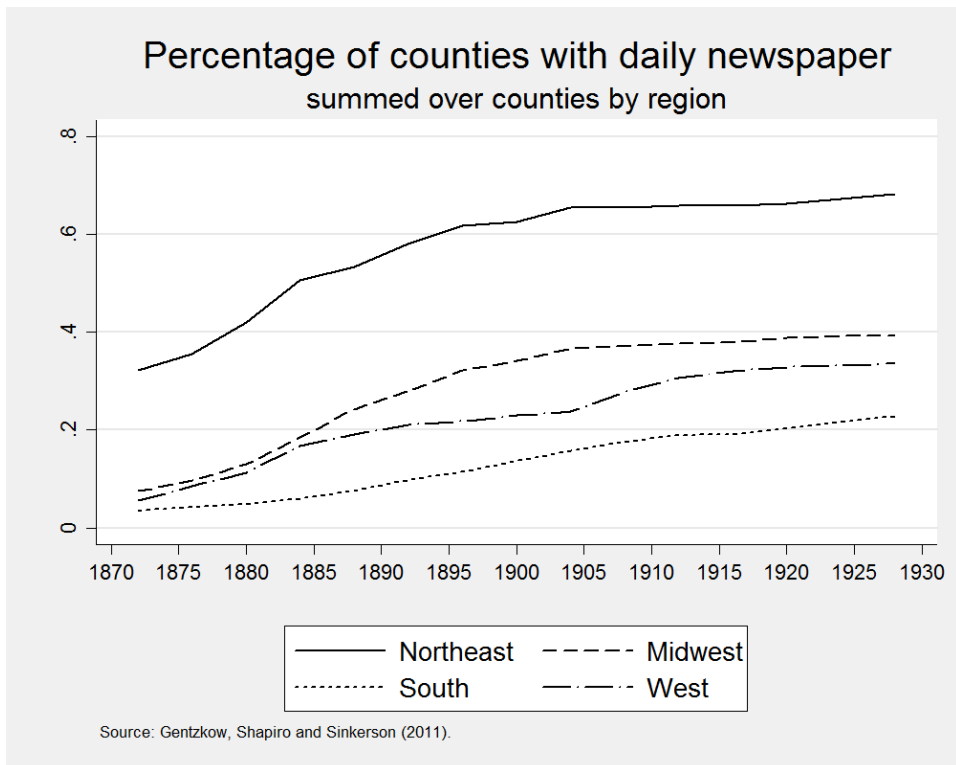


Figure 5: Presidential turnout

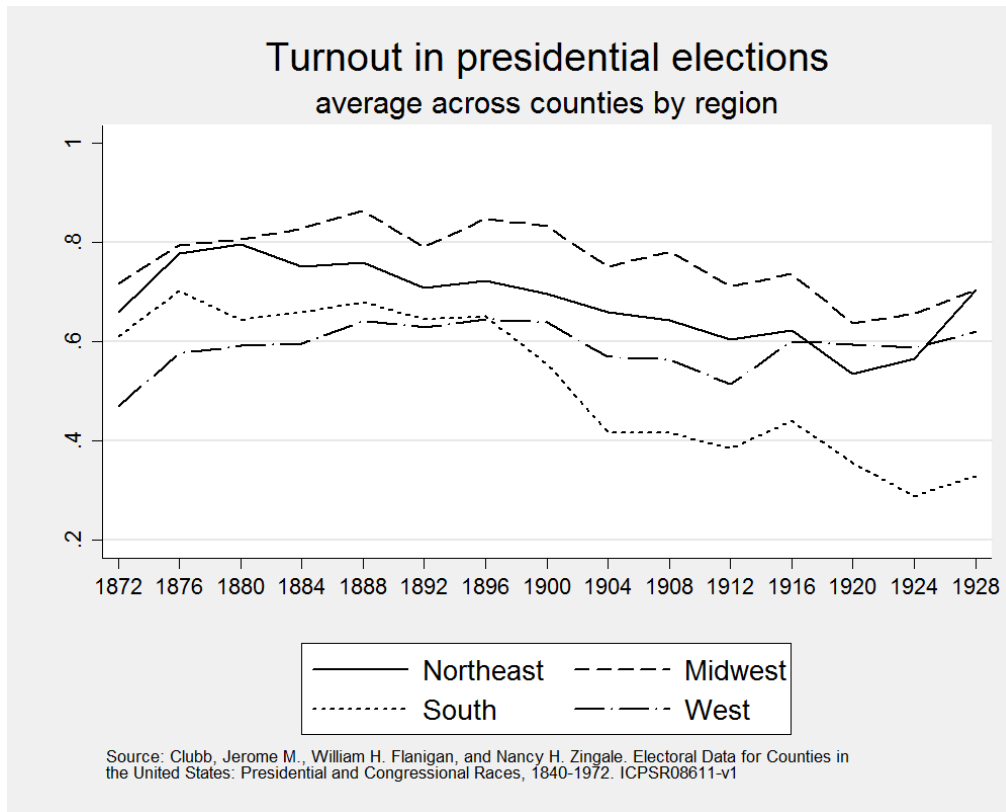


Figure 6: Congressional turnout

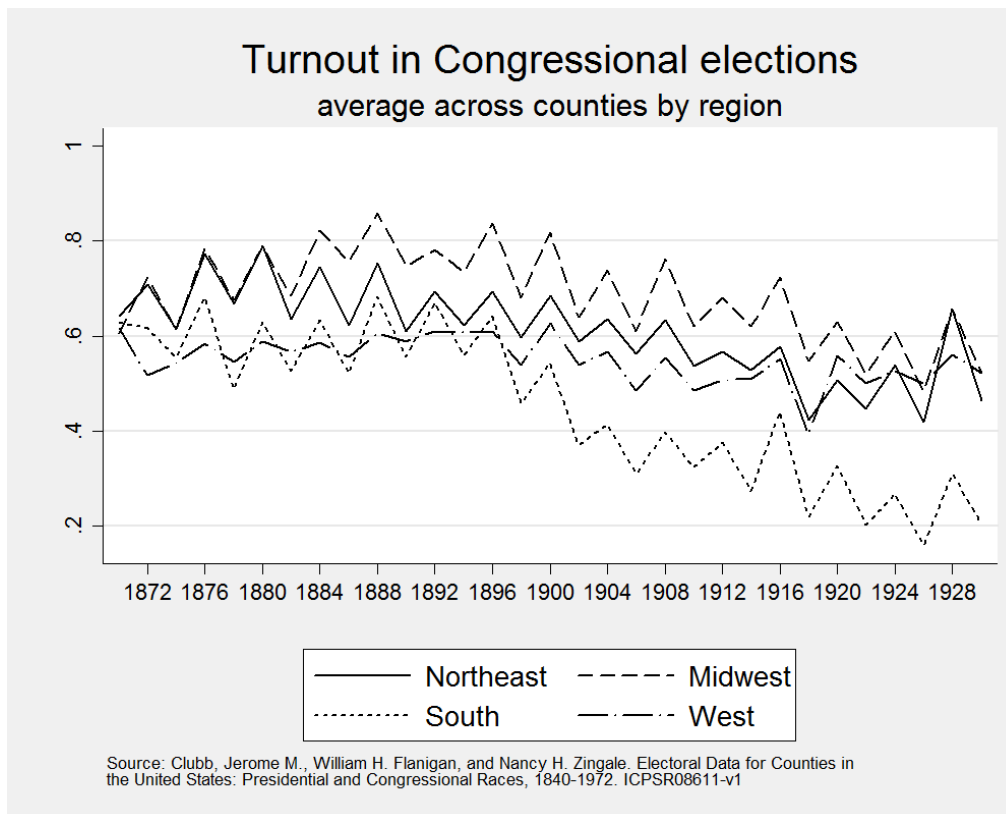


Figure 7: Example of counties and turnout

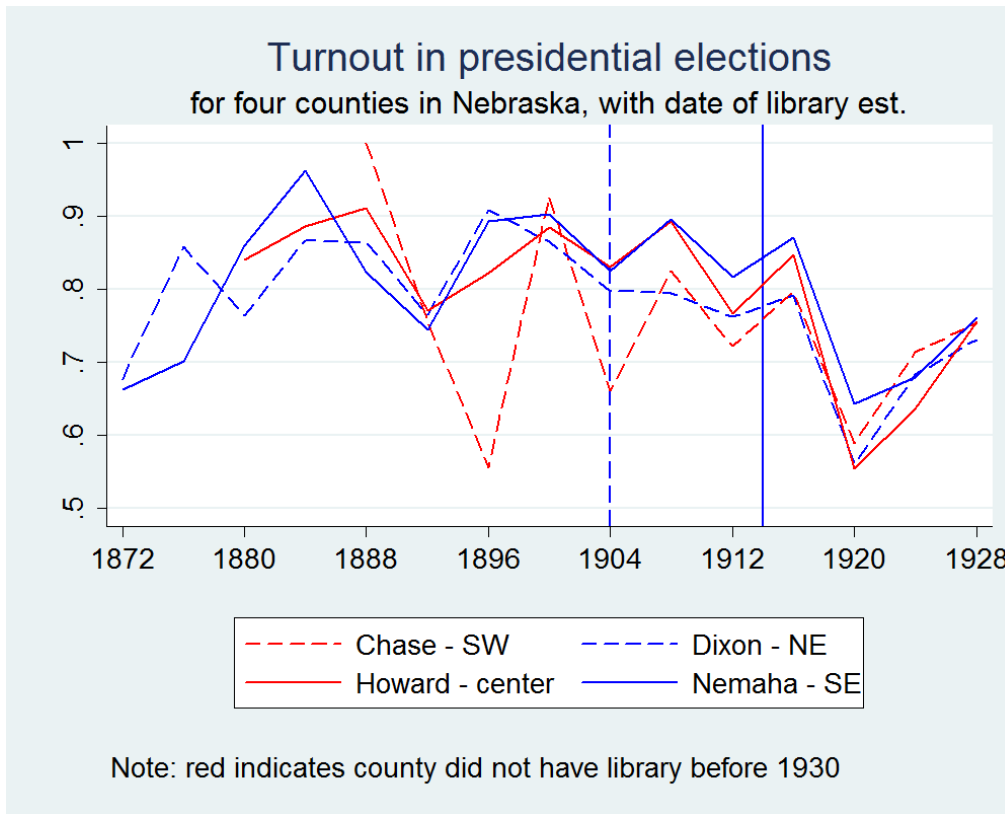


Figure 8: Effect of libraries on presidential turnout, national sample

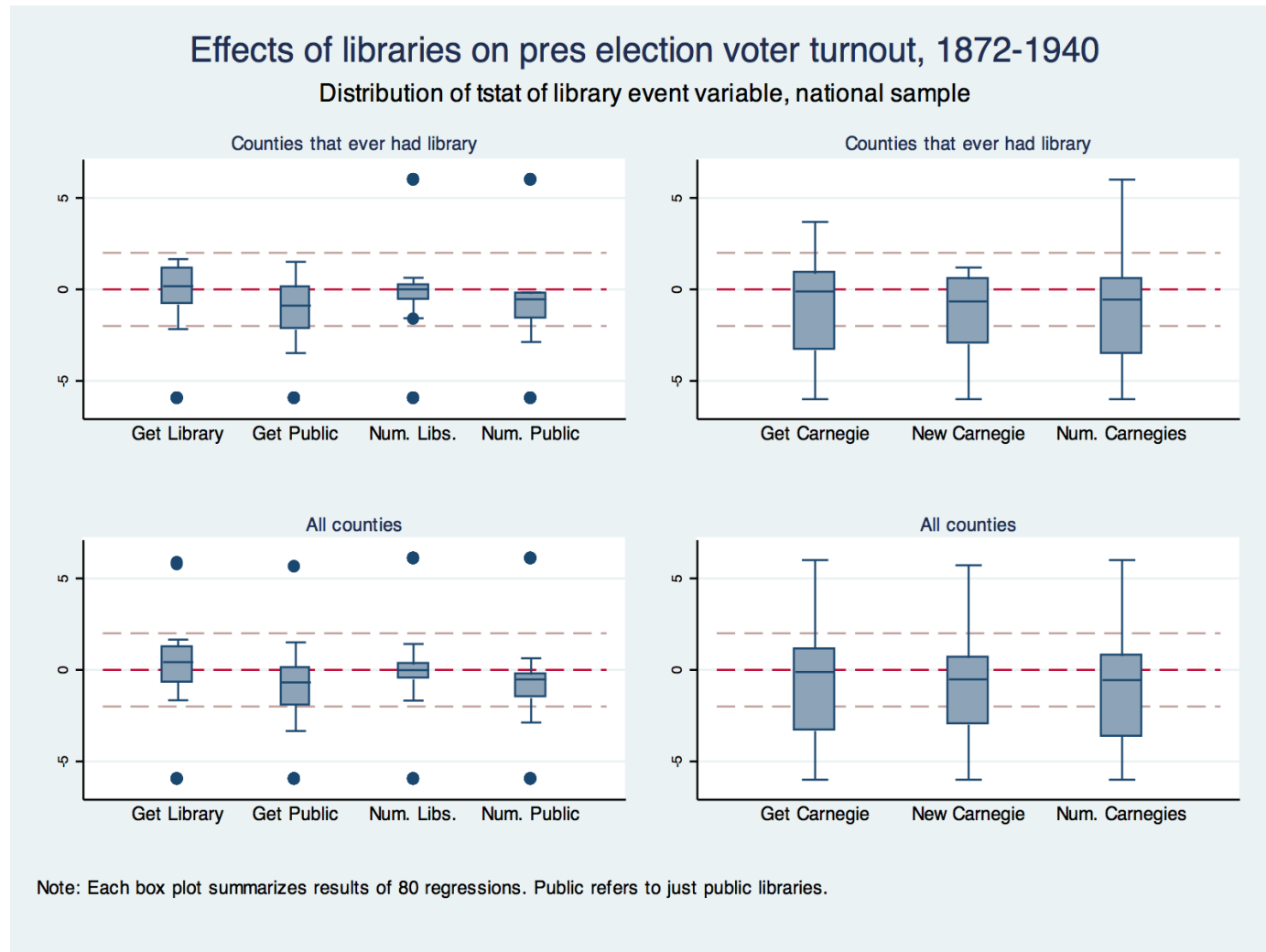


Figure 9: Effect of libraries on presidential turnout, 3-state sample

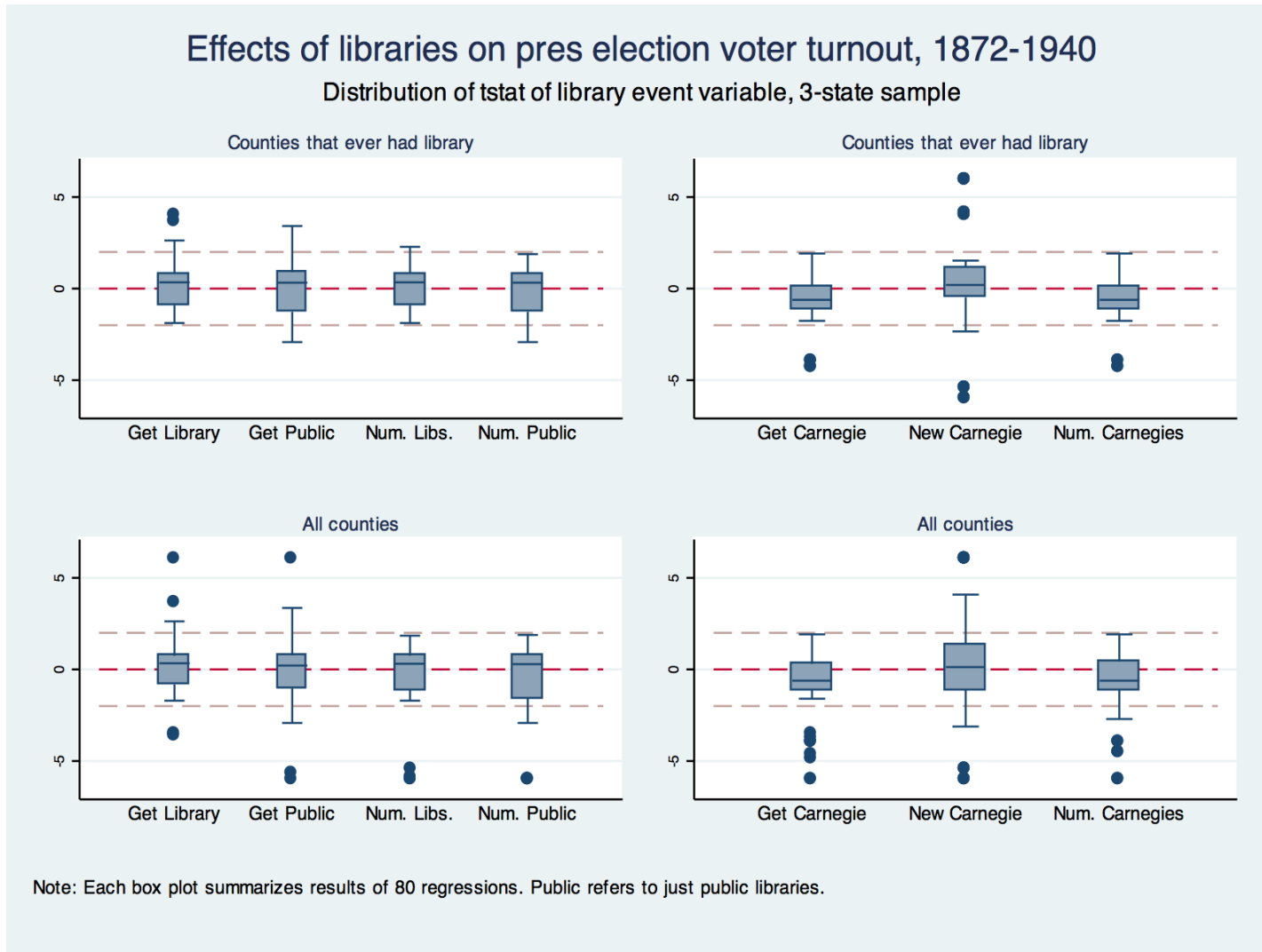


Figure 10: Effect of libraries national sample on congressional turnout

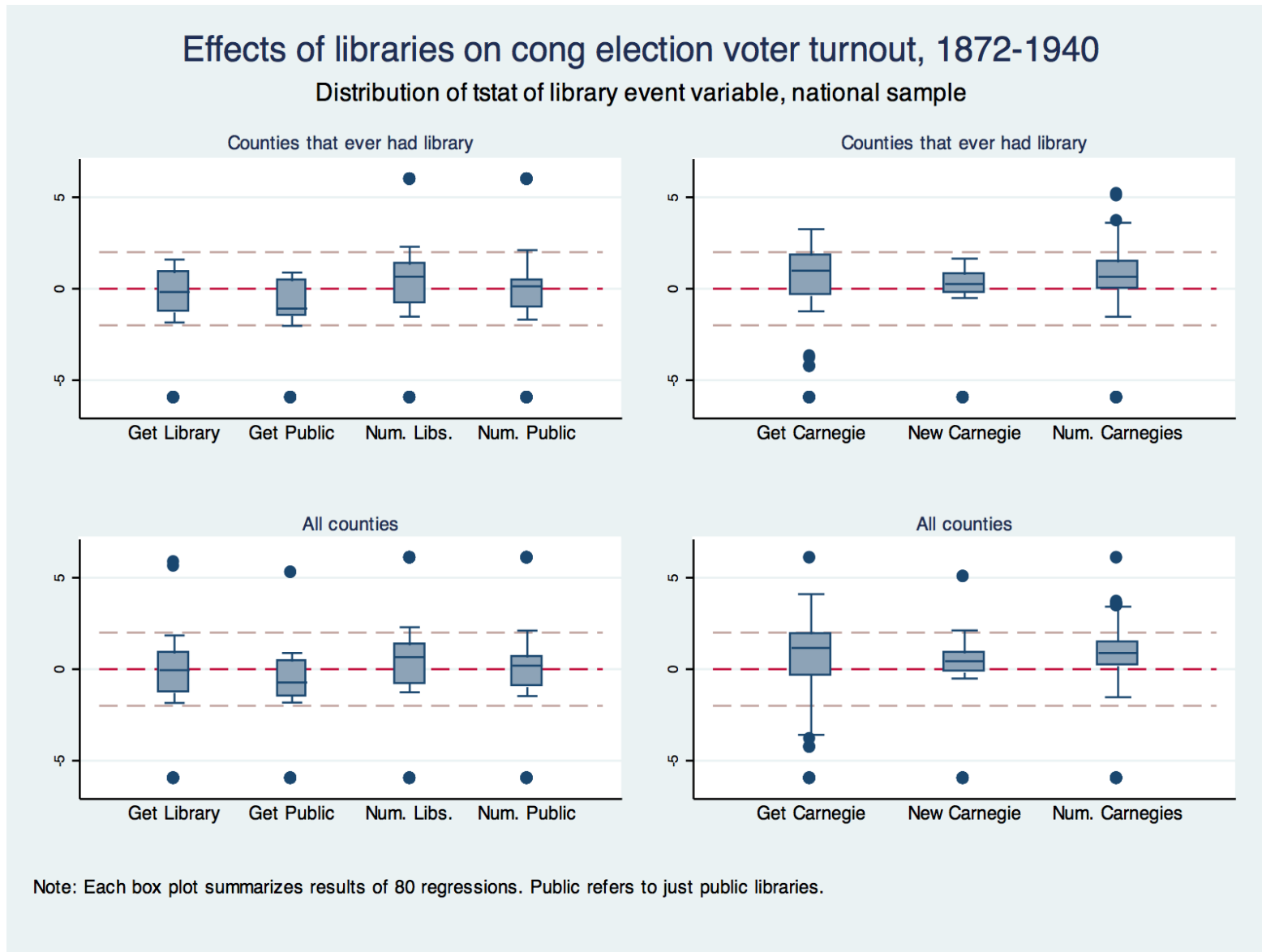


Figure 11: Effect of libraries on congressional turnout, three-state sample

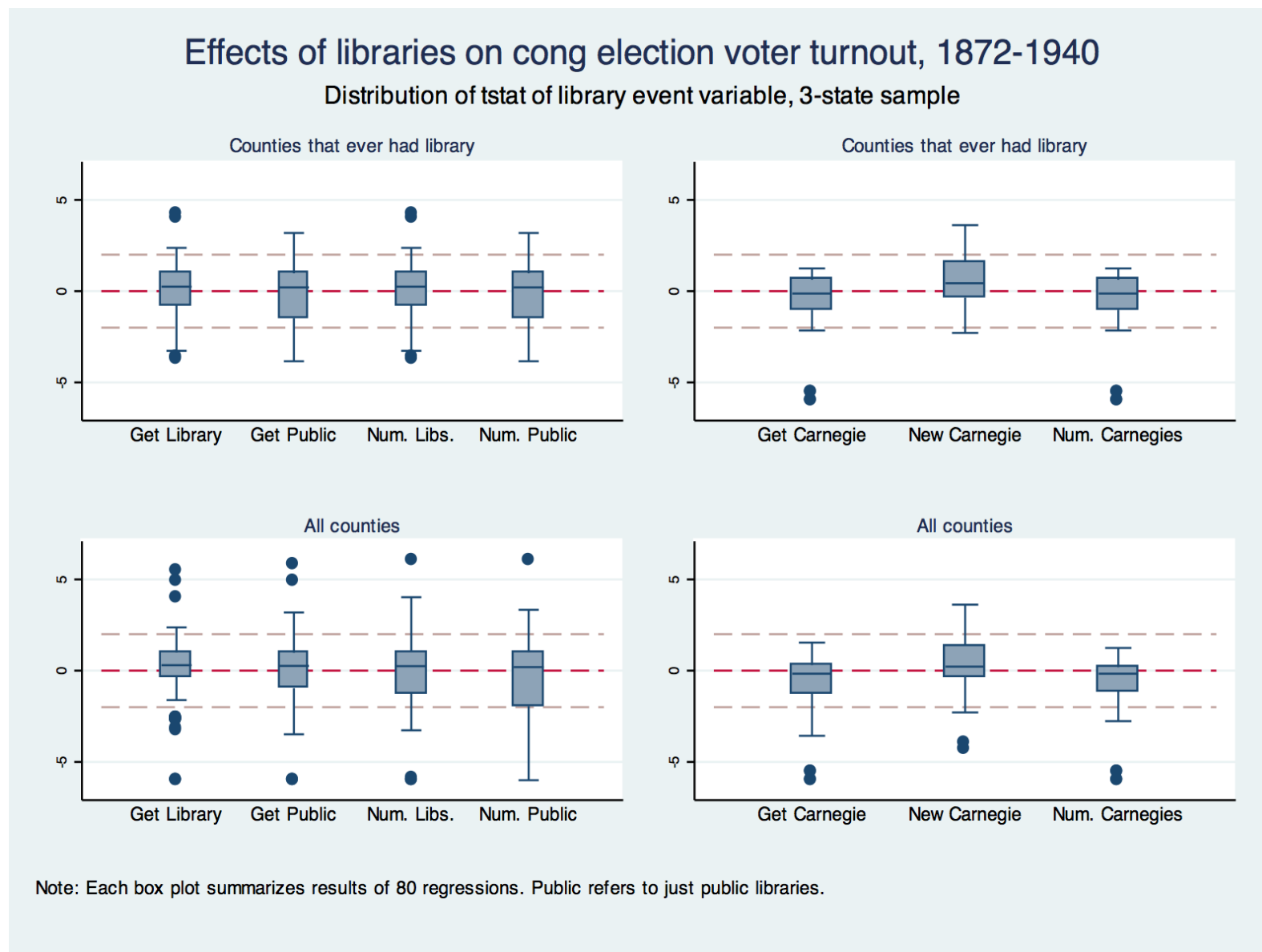


Figure 12: Effect of libraries on turnout, kernel density functions for t-statistics

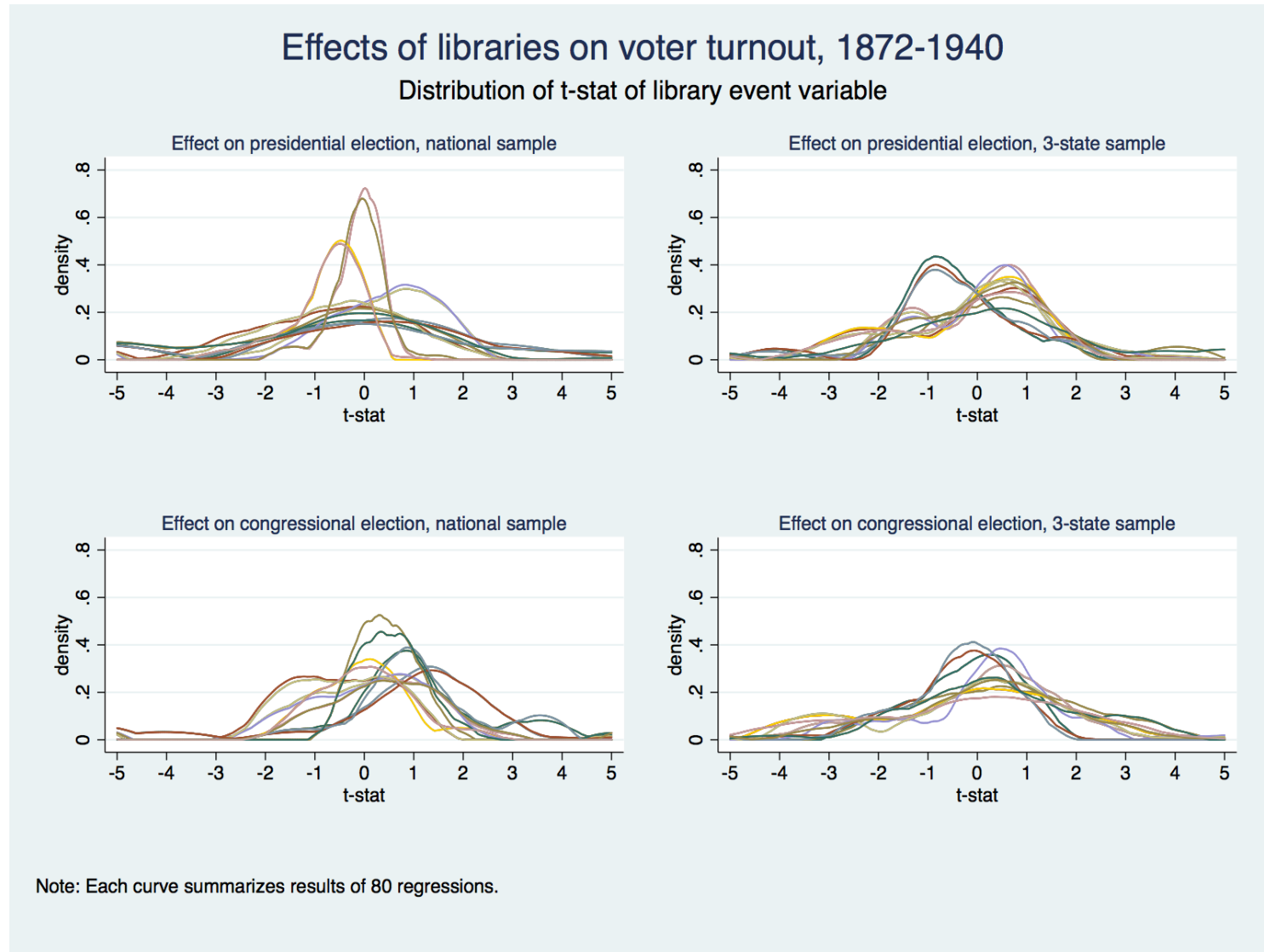


Figure 13: Effect of newspapers on presidential turnout, national sample

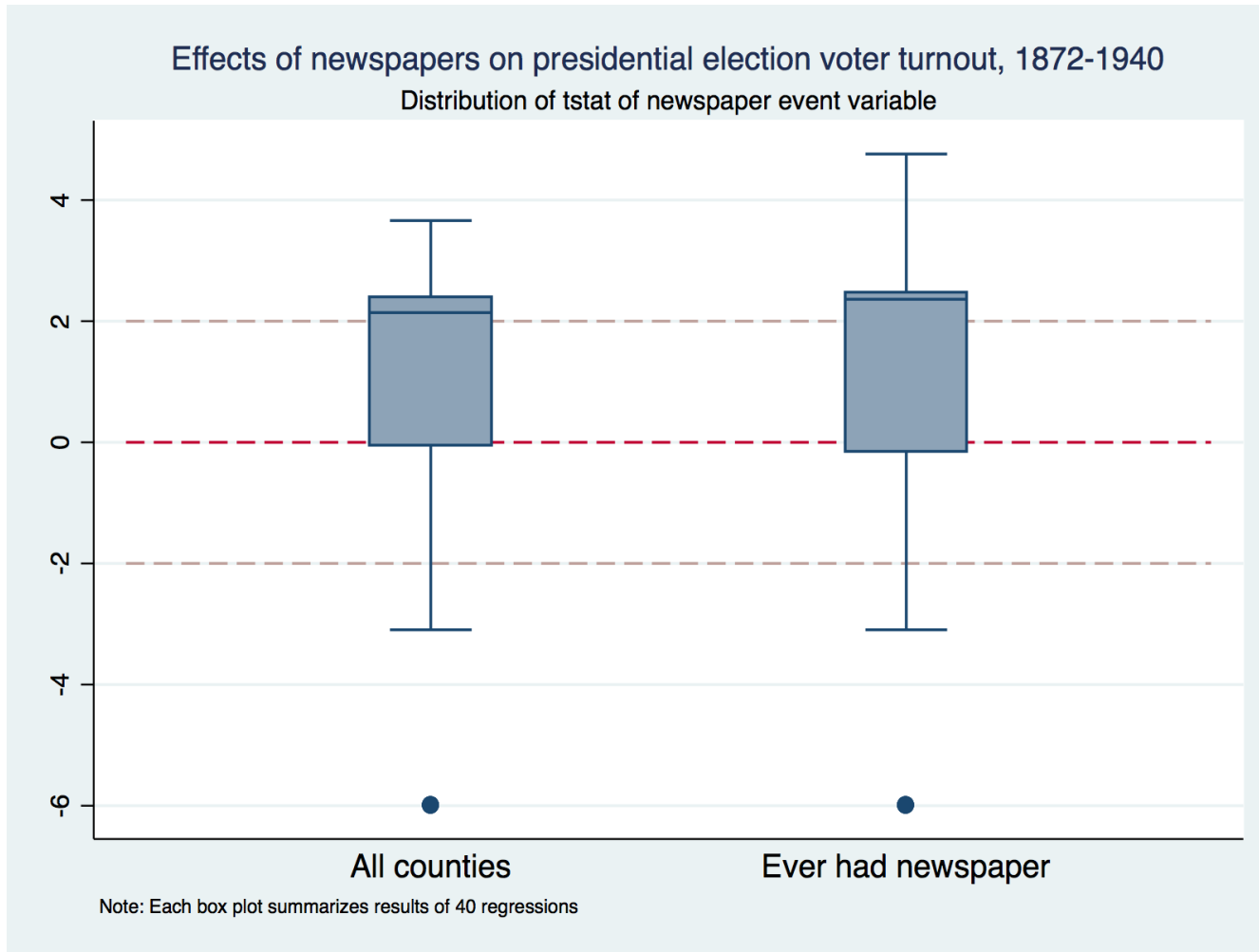


Figure 14: Distribution of counties by proportion of county population living in town with county's first library, Nebraska, South Dakota, and Wisconsin only, 1872-1928

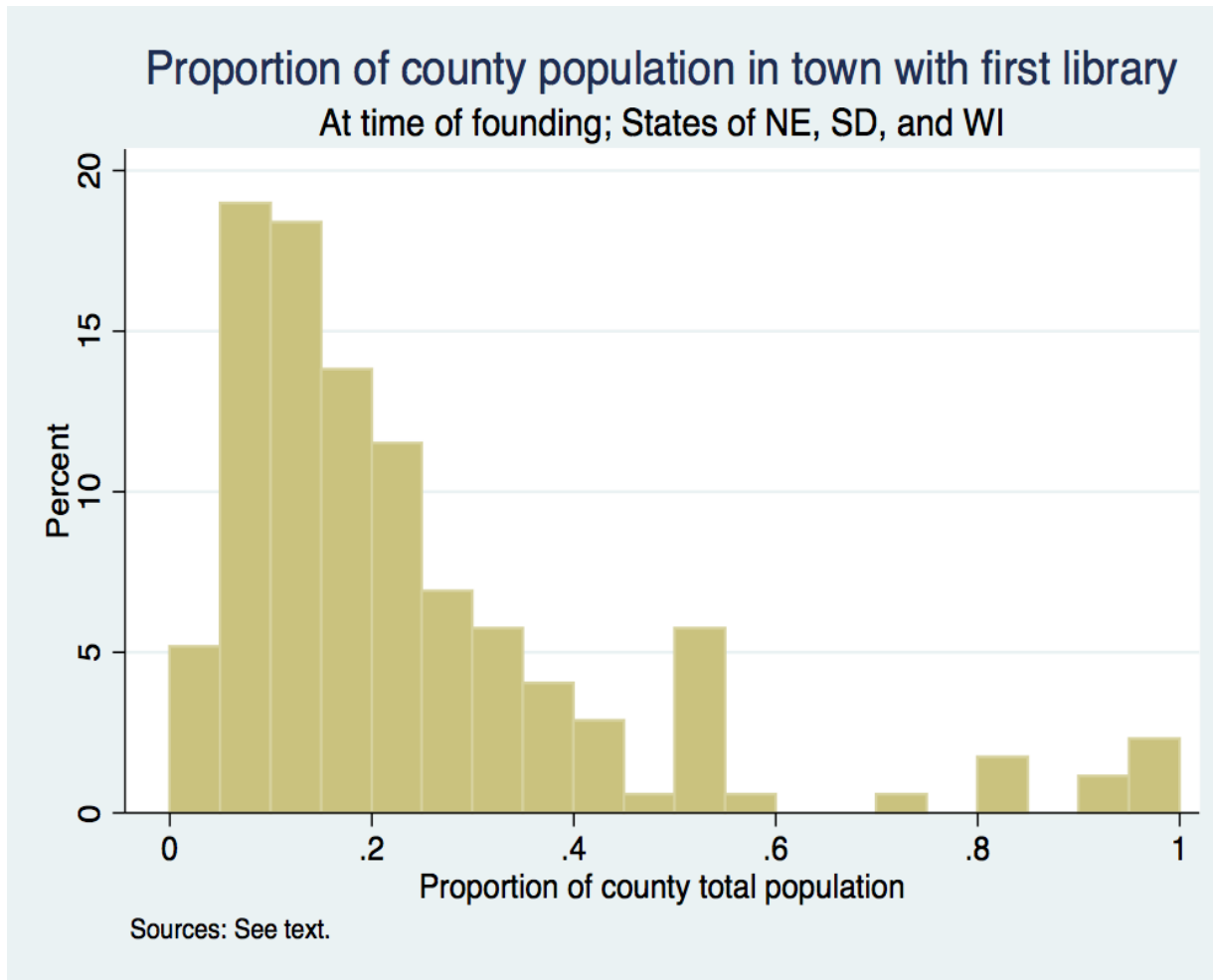


Figure 15: Change in voter turnout in Presidential elections: Coefficients on leads and lags of library event

