Hospitals, Health, and Growth: The Local Impacts of Public Investment in Health Infrastructure

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Abstract

This study examines how large-scale public investment in the health care capital stock shapes local health and economic outcomes. I exploit the Hill-Burton Act of 1946–the largest federal program to expand and modernize United States medical facilities–as a quasi-experimental setting. Using newly digitized archival data, I show that Hill-Burton causally increased both the capacity and quality of local hospitals, leading to higher patient utilization and greater physician staffing. Expanded access to care improved mortality rates among the general and infant populations. This investment generated broader spillovers, fostering growth in non-medical employment, patenting, and academic publications. These results demonstrate that public investment in health care capital can improve population health and promote local economic development, highlighting the policy relevance of efforts to improve healthcare infrastructure.

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Hospitals in the U.S. produced $129 billion in community benefits in 2020 (Ernst and Young, 2024).[1] The sixth-largest employer in the U.S., hospitals supported 6.9 million jobs in 2024 (BLS, 2024). Hospitals also sustain substantial local purchases and vendor activity, leading to $4.8 trillion in economic activity, roughly one-sixth of U.S. GDP (AHA, 2025). Yet, despite hospitals' central role in local communities, we know little about how public investment in hospital capital affects local economic and health outcomes. I bridge that gap by asking: What is the causal effect of public investment in hospital capital on local health and economic outcomes?

Hospital placement and expansion respond to community characteristics like politics, baseline health, growth, density, and affluence that also shape local outcomes. To address the endogeneity of hospital placement, I use a quasi-experimental variation from the Hospital Survey and Construction Act of 1946–better known as the Hill-Burton Act. Hill-Burton (HB) was the first large-scale federal program to expand and modernize health infrastructure in the United States. Between 1947 and 1974, the Act funded more than 10,000 projects and over half a million new hospital beds, spending roughly $38.2 billion in 2023 dollars (Hill-Burton Project Register, 1971). The significant investment of public funds into the health care capital stock extended unprecedented health facility access to minorities and low- and middle-income individuals (Starr, 2017). Few policies in U.S. history were as consequential in modernizing the physical public health infrastructure. Despite the magnitude of its influence and lasting imprint on modern U.S. health infrastructure, HB remains understudied. HB serves as a context for understanding how public investment in health facilities shapes communities at a time when modern policy makers confront similar concerns to those faced by Congress in 1946.[2]

I estimate baseline effects of health facility capacity growth using a difference-in-differences design with staggered treatment adoption. To address the endogeneity of hospital siting, I then construct an instrumental variable based on plausibly exogenous variation embedded in the program's allocation mechanism. To construct my instrument, I collected and digitized administrative records from HB state surveys (i.e., "State Plans"), which provide detailed annual data on hospital facilities and bed quality across the country. Funding allocation occurred in two stages. The federal government annually distributed funding to the states using a deterministic formula. The states then distributed funding to hospital service areas in the state using priority for funding rankings from a state-compiled report. These priority rankings were based on observable area characteristics and should have been deterministically defined. However, the data show that, conditional on the relevant observables, realized ranks vary idiosyncratically. I leverage the variation between

[1] The American Hospital Association sponsored the study. The estimate for community benefits came from IRS Form 990, by which hospitals file their financial and charitable activities. The reported total includes bad debt; Medicaid, Medicare, and government means-tested shortfalls; self-pay discounts; and contractual adjustments with third-party payers. I reference these figures to illustrate scale, not to comment on accounting conventions.

[2] For example, hospitals face fiscal pressures in the 2025 policy climate. Federal medical expenditure cuts, projected rises in uncompensated care costs, and uncertainty have led to widespread hospital staffing layoffs (Euhus et al., 2025; Blavin and Simpson, 2025; Blavin et al., 2025; Nelb, 2025; Gooch and Kuchno, 2025). Rural communities experience the strain most acutely with reports suggesting one-third of rural hospitals are at risk of closure (CHQPR, 2025).

predicted and realized priority rankings to provide a plausibly exogenous source of variation in health facility expansion.

First, I show that HB causally increased hospital capacity, particularly the stock of beds suited to contemporary medical demands. The increase was concentrated in non-profit and public facilities with evidence of contemporaneous closure of for-profit facilities, consistent with previous literature (Chung et al., 2017; Figinski and Troland, 2025). Counties that received HB subsidies experienced improved health among the general and infant populations. I find that the improvement in general health coincides with an increase in the number of patients admitted to hospitals and an increase in the local supply of physicians, which act as mechanisms.

Next I consider downstream effects of investment in hospital facility construction on the real economy. I show that HB increased employment in non-health industries. I also show that hospitals act as engines of local innovation by growing patenting and academic publications. Although the medical field experienced the largest growth in innovation, activity in other STEM fields also increased.

I contribute to several strands of literature. First, I add new evidence on how investment in health care capital affects health outcomes. Prior work on the topic focuses on either smaller-scale interventions (Hollingsworth et al., 2024; Figinski and Troland, 2025) or more recent public health policies like certificate of need laws (Chiu, 2021; Bailey, 2018) and community health centers (Bailey and Goodman-Bacon, 2015). HB offers a unique setting complemented by rich, detailed data. The nationwide nature of the policy allows me to explore hospital expansion applied to a wide array of geographic settings. Although smaller scale hospital construction and modernization projects existed before HB, many communities were still without a hospital in 1947. Therefore, in much of the U.S., HB acted as a type of "first treatment."

Second, I contribute directly to the literature on HB, which to this point has focused mainly on the expansion of beds (Lave and Lave, 1974; Chung et al., 2017) and employment (Hochban et al., 1981; Komarek et al., 2025). My work improves on these earlier papers by vastly expanding the data available on hospital facilities and accounting for the complexities of HB funding allocation.

Third, I add to our understanding of how expanding the health care capital stock affects the labor market for medical and non-medical professionals. Understanding the drivers of medical labor supply is especially important as policymakers face shortages: Projections from the Association of American Medical Colleges estimate a shortage of between 37,800 and 124,000 physicians between 2019 and 2034 (2021). The U.S. was experiencing a similar conundrum during the mid-20th century. Medical professionals demonstrated a strong preference for locating near a hospital, creating a supply shortage in communities without hospitals.[3] HB helped to alleviate the shortage of medical labor supply by incentivizing the redistribution of labor.

Fourth, I complement the growing literature on the causal effect of knowledge-generating

[3]Hrg. S. 191 (79th Cong., 1st Sess.), pp. 44–45, 54, 160, 165, 194, 251–253, 275, 293, Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 39, 101, 113, 118–119, 135–136, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, p. 93, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 4, p. 2115

institutions, such as universities and libraries, on innovation (e.g., Kantor and Whalley, 2019; Andrews, 2023; Berkes and Nencka, 2024). I consider how "health-generating" institutions, like hospitals, contribute to both the scale and direction of innovation in a locale. The recent literature uncovering the causal foundations of knowledge production in the health care economy is expanding,(Azoulay et al., 2019; Sampat and Williams, 2019; Azoulay et al., 2025) but the role of hospitals in innovation remains underexplored (Thune and Mina, 2016). My study aids in bridging this gap in the literature using insights from HB.

The findings have direct policy relevance. HB offers historical precedent for the returns to large-scale public investment in local health infrastructure, especially in communities where baseline capacity is low. Because HB funding was often allocated to communities without facilities, these lessons can inform current policy debates on rural closures and health facility investment in low-resource settings.

1 The Hill-Burton Program

1.1 Origin and Motivation

Congress passed the Hospital Survey and Construction Act of 1946 (i.e., Hill–Burton Act or Hill-Burton Program, P.L. 79-725) to subsidize the construction and modernization of medical facilities nationwide. The Act originated from widely recognized weaknesses in the U.S. health care system. States largely deferred health facility construction during the Great Depression, wartime restrictions further atrophied capacity, and postwar construction costs left an underprovision of privately financed projects.[4] A lack of coordination among existing facilities exacerbated gaps and redundancies in services, limiting the efficiency of the existing capital stock.[5] The result was crowded, outdated facilities that offered substandard care and long waits.[6]

Congress also perceived the distribution of facilities as inefficient, with the most severe deficits in rural, low-income, and minority communities.[7] Rural communities faced especially acute shortages in medical personnel driven, in part, by developments in medicine.[8] Advances in medicine and increased specialization shifted care toward hospitals.[9] Medical personnel, therefore,

[4] Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 228–229; Hrg. S. 191 (79th Cong., 2nd Sess.), p. 188

[5] Hrg. S. 191 (79th Cong., 1st Sess.), p. 245, Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 15–16, 113, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 4, p. 2228

[6] Hrg. S. 191 (79th Cong., 1st Sess.), pp. 37–38, 90, 177, 268, Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 15, 80, 229, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, pp. 62, 157, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 4, pp. 2227–2228

[7] Hrg. S. 191 (79th Cong., 1st Sess.), pp. 278–279, Hrg. S. 191 (79th Cong., 2nd Sess.), p. 229, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, p. 355; Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 701–702, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 3, p. 1185; Hrg. S. 191 (79th Cong., 1st Sess.), pp. 186, 263, 302–303

[8] Hrg. S. 191 (79th Cong., 1st Sess.), pp. 49, 54, 164–165, 186, 208, 260–262, 273–275; Hrg. S. 191 (79th Cong., 1st Sess.), pp. 113, 118–119, 135–136, 142–143, 145

[9] Hrg. S. 191 (79th Cong., 1st Sess.), p. 47; Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 77–78, 142; Hrg. S. 191 (79th Cong., 1st Sess.), p. 47; Hrg. S. 191 (79th Cong., 2nd Sess.), p. 14; Hrg. S. 191 (79th Cong., 1st Sess.), pp. 43, 47; Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 14, 77–78; Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, p. 93

primarily located in communities with a hospital, even if those communities offered less earning potential, amplifying place-based disparities.[10]

Hill-Burton addressed these circumstances through a grant-in-aid program. Congress annually appropriated $3 million ($45 million in 2023 dollars) for statewide surveys of existing medical facilities and $75 million ($1.129 billion in 2023 dollars) for hospital construction and modernization. The statute set state-level hospital bed targets, funding new capacity to meet them.[11] The federal bed goals represented a substantial expansion relative to the existing stock of hospital beds. In 1946, only 13 percent of counties met their federal target for beds and only 17 percent of counties exceeded one hospital bed per thousand in population. Furthermore, approximately 40 percent of counties were without a registered hospital (Hoge, 1946). To achieve the considerable expansion in health care capital, the Act funded construction and modernization projects for public and nonprofit health facilities. Funds supported new buildings; the expansion, remodeling, or alterations of existing facilities; and initial equipment and technology.

1.2 Secondary Goals

In addition to reducing hospital bed shortages, the Act included secondary aims. First, Congress sought to encourage medical professionals to practice in poor and rural areas. Although Congress could not mandate a redistribution of medical personnel, it adopted a pragmatic "build it and they will come" approach grounded in the observed co-location of medical professionals with hospitals. Second, to improve access for indigent and minority patients, the Act required recipient hospitals to provide a "reasonable volume" of free or reduced-cost care to patients of all backgrounds, creeds, and races. Although imprecisely defined and weakly enforced until 1965, the provision signaled a federal commitment to access as "a matter of rights" and foreshadowed later policies like Medicare, Medicaid, and the Emergency Medical Treatment and Active Labor Act (Parran, 1935, p. 545).[12] Third, Hill-Burton promoted a coordinated, tiered health facility network, anchored by metropolitan health centers linked to auxiliary district and community facilities.[13] Appendix A recreates an illustration depicting the envisioned network.

[10] Hrg. S. 191 (79th Cong., 1st Sess.), pp. 44–45, 54, 160, 165, 194, 251–253, 275, 293; Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 39, 101, 113, 118–119, 135–136; Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, p. 93; Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 4, p. 2115; Hrg. S. 191 (79th Cong., 1st Sess.), p. 160; Hrg. S. 191 (79th Cong., 2nd Sess.), p. 101

[11] The Act stipulated that the number of beds in a state should be between 4.5 and 5.5 per thousand in population, depending on the population per square mile. In states with $x \geq 12$ persons per square mile, the goal was 4.5 beds per thousand. In states with $6 < x < 12$ persons per square mile, the goal was 5 beds per thousand. In states with $0 < x \leq 6$ persons per square mile, the goal was 5.5 beds per thousand (P.L. 79-725, Sec.622a).

[12] In a 1935 speech, Thomas Parran declared, "A relatively small increase in public expenditures would provide hospital care to all in the lower income group. The present lack of system in giving hospital care degrades the patient and degrades the service. I would propose hospital care, without the frills of special nurses and private rooms when unnecessary from a medical standpoint, be given as a matter of right at public expense for the lower economic groups without making it necessary for them to cheat or beg for it."

[13] Thomas Parran believed, "[The hospital] should be an instrument for total community health, an institution prepared to promote health and prevent disease as well as to treat the sick" (1946, p. 16).

1.3 Implementation.

The Hill-Burton Act employed a complex allocation process that consisted of three main components: the State Plan, the Federal allocation of funding to the States, and the State allocation of funding to intrastate regions.

1.3.A The State Plans.

States annually detailed how the HB program would be organized and executed locally. These reports were called State Plans.[14] The main components of these State Plans were (i) a description of the single state agency selected to oversee HB-related administrative details and a related state Hospital Advisory Council (HAC) of non-governmental advisors; (ii) a division of the state into HB regions, which were similar to hospital service areas; (iii) a survey of existing health facilities in the state; (iv) a report of each region's relative need for more hospitals and hospital beds. Section 2 provides a detailed description of the data collected from the State Plans. The states submitted the State Plans to the Surgeon General for annual approval.[15]

1.3.B Federal Allocation to the States

After the Surgeon General approved the State Plans, the federal government distributed funding to the states using a formula. The formula disproportionately directed funds to less-populated, lower-income states.[16] Appendix B provides a full statement of the federal-to-state allocation formula and an example of funding distribution. Figure 1 compares income per capita in 1946 and total HB funding per capita received by each state over the program's 28-year lifespan, providing evidence that the allocation formula directed funding to states with lower per capita income.

1.3.C State Allocation to the Regions

Once the state received its federal allotment of funding, the HAC solicited applications for construction projects from the State, any political subdivision of the State, or any public or non-profit agency authorized to construct and operate a hospital. The HAC held a public hearing for every application submitted. The HAC prioritized funding for proposals from regions with the greatest unfulfilled need as measured in the State Plan.[17] The approval of an application was an administrative process: if an application included the requisite information and funding remained, the HAC approved the project according to the region's priority for funding. The HAC enumerated

[14] The actual title of these surveys varied by state and year.

[15] Congress sought to remove politics from the approval process by ensuring the Surgeon General did not have political or personal agency when deciding whether to approve or deny a state application. The Surgeon General approved State Plans that adhered to the administrative process outlined in the legislation. The literature surrounding Hill-Burton has generally upheld the assumption that the approval process was indeed apolitical (Feshbach, 1979).

[16] Perlstadt (1995) summarizes both the history and interested parties in the formula's development.

[17] The definition of "unfulfilled need" and the measurement thereof is provided in more detail in Section 3.

approved construction projects in a Project Construction Schedule, which it sent to the federal government for approval. The Public Health Service reviewed the state's Project Construction Schedule, and approved the project if it included the correct administrative documents and followed procedure. The time between construction project approval by the Public Health Service and the disbursement of funding varied from one to four years (Cronin et al., 1950; Almond et al., 2011). Construction began when the federal government disbursed funds.

1.4 Rollout of Hill-Burton Funds

Panel (a) in Figure 2 shows the share of counties that received a first HB appropriation by year. Funding began in 1947. By 1956, a majority of counties had received at least one HB appropriation. When Congress discontinued HB in 1974, 78 percent of counties had received HB support. Panel (b) presents the spatial exposure to HB funding. Darker counties received their first appropriation early, resulting in longer total exposure.

2 Data

I constructed a novel dataset from the Hill-Burton State Plans, which contain data at the hospital and hospital service area levels and complements these core data with other publicly available administrative data. I provide a brief description of the content, construction, and sources of the data. The appendix contains a more complete treatment of the data.

2.1 Medical facilities and health capital stock

My analysis of medical facilities and health care capital stock relies on newly collected and digitized data from 307 Hill-Burton State Plans, which include comprehensive surveys of existing medical facilities. These State Plans contain facility-level surveys divided by facility type. The surveyed health facilities include a variety of hospitals (i.e., short-term, long-term, chronic disease, and tuberculosis) as well as mental-health facilities, nursing homes, diagnostic and treatment centers, and public health centers. For each of these facility types, the surveys include facility-level variables like the facility name, location, control (e.g., state, county, non-profit), and type (e.g., general, maternity); the number of "suitable" and "unsuitable" hospital beds according to federally determined, contemporary standards; the number of bassinets; the facility occupancy rate; the total number of patient days; and the number of patients admitted. The surveys also include projects under construction with flags for whether the construction project is a new facility or an addition, replacement, or modernization of an existing facility. While more complete data exist for modern facilities, the Hill-Burton State Plans serves as the most comprehensive and detailed surveys for the 1940s to the 1970s. These data complement data from the American Hospital Association's

Annual Survey (AHA data).[18] The HB data offer a few new components, including new variables, health facilities missing from the AHA data, priority for funding rankings for each hospital service area, and rich administrative detail.

I focus on general hospitals, excluding other facility types from the analysis. General hospitals received roughly 75 percent of total Hill-Burton funding. I aggregate these facility-level data to the county-year level. I separate the hospital facilities into two groups based on their controls: (i) for-profit hospitals and (ii) church-run, non-profit, and public hospitals, creating a sum for each groups.

2.2 Pre-1947 medical capital stock

I collect and digitize data on hospital capital before the Hill-Burton Act was enacted. I rely on facility-level survey data from the American Medical Association (AMA) from 1940 to 1946. I kept only general hospital facilities with church, non-profit, and public ownership and aggregated the data to the county level for each year. I then took the average of these years to create a measure for the mean existing general hospital beds. These data are the best currently available measure of medical capital stock before 1947.

2.3 Hill-Burton funding

Published by the U.S. Department of Health, Education, and Welfare, the Hill-Burton Project Register (1971) enumerates all the hospital and medical facility projects approved under Hill-Burton between 1947 and 1971. It contains project-level variables on the control (e.g., city, county), facility type (e.g., general hospital, nursing home), construction type (e.g., new construction, addition, modernization), the number of beds provided, the Hill-Burton funding provided for the project, the project's total cost, the month and year the project was approved, and the facility's status (i.e., approved but not under construction, under construction, and in use). I filter the project-level data to include only projects for general hospitals. I then aggregate the projects to create counts of the number of general hospital facilities, HB beds received, and HB funds received at the county-year level.

2.4 Hill-Burton priority scores

The Hill-Burton priority score data are vital for the identification strategy presented in Section 3. My research design relies on exogenous variation in the HB priority score to address the endogeneity of capital stock distribution. These priority score data are reported at the HB region level (i.e., hospital service area) and are time-varying. To suit my level of analysis, the region-level priority scores were reweighted to the county-level using HSA maps provided with each State Plan

[18]I am grateful to Amy Finkelstein (2007) for graciously sharing the AHA data from 1948-1975, which she digitized from the AHA's annual publication *Hospitals* with the assistance of award P01AG005842 from the National Institute on Aging of the National Institute of Health.

and a population-weighted average calculated using data from Berkes et al., 2023. More details on this reweighting are available in Appendix F.

2.5 Demographic controls

Demographic characteristics are taken from Haines (2010) and include county-level housing and population statistics. These data are reported at the decennial frequency. I select total population and the percent of the population that is urban, non-white, under five, and over 65 from 1940 to 1980 as covariates. Following method described in Cao and Richardson (2024), I create intercensal values for the population variables. Unlike the population variables, the median family income measure in the 1940 census is binned. Therefore, instead of linearly interpolating between 1940 and 1950, I use the county's 1950 median family income value for 1947-1949.

2.6 General and infant mortality

To measure county-level health outcomes, I use Bailey et al. (2018), which include counts of county-level mortality. I follow a standard practice of creating measures of crude mortality rate per thousand in population for deaths at their place of occurrence and also according to the deceased's place of residence. I do the same for infant mortality by place of residence.[19] For infant mortality, I create a rate per one thousand in population and, separately, per one thousand births.

2.7 Employment

The count of physicians relies on the Bureau of Health Professions Area Resource File (ARF, 1994). The ARF is a county-level dataset composed of data from myriad administrative sources. It includes counts of health professionals and socio-economic variables. For a count of local physicians, I use the ARF's count of non-federal, active doctors of medicine (MDs). The frequency of the data improve as the panel progresses. I select the available years that overlap with my sample period: 1940, 1950, 1958, 1960, 1968, 1969, 1970, and 1971. Because it is an outcome of interest, I do not interpolate missing county-years in the physician supply. Employment totals and total non-medical employment by sector are taken from the County Business Patterns for 1947-1971 (Eckert et al., 2023). These include county-level counts of employment by major sectors in each county.

2.8 Patenting and Publications

I use two measures of innovation output: patents and academic publications. County-level patent counts are taken from Marco et al. (2015) and Petralia et al. (2016). These provide the universe of U.S. patent applications from the U.S. Patent and Trademark Office (USPTO). I used fractional assignment to address patent applications with multiple inventors where the inventors

[19] Counts of infant mortality by place of occurrence is not reported in these data until after the sample period.

originated from different counties. I rely on publication data collected and standardized by OpenAlex. OpenAlex (2025) is an open source project that combines sources like the Microsoft Academic Graph (MAG), Crossref, and other publication repositories to create a single, harmonized database.

2.9 Sample selection

These data sources described above are combined to create an unbalanced panel at the county-year level. The panel includes 15 states from 1947 to 1971.[20] State Plans for many state-years were not preserved. To be included in the sample, I require that a state have at least 65 percent of the state-years between 1947 and 1971 preserved to avoid issues from a highly unbalanced panel. I further restrict the sample to end in 1971 because not all states continued the HB survey after 1971. The sample states represent 45 percent of the total U.S. population in 1947 and 48 percent in 1971. Figure 3 shows the states in the sample.[21]

2.10 Descriptive statistics

Table 1 reports summary statistics separately for counties that received HB funding at least once and never received funding. Column (1) and (3) reports the mean and columns (2) and (4) report the standard deviation. Column (5) reports the difference in means. Column (6) reports the standard errors for the differences in means from a two-sample t-test comparing the control and treatment groups. The t-test results reveal significant differences between counties that received HB support and those that did not.

3 Empirical Approach

My analysis relies on a linear two-way fixed effects (TWFE) regression and an instrumental variable (IV) approach. I consider the TWFE approach as a baseline and use an instrumental variable model to address concerns of endogeneity in HB funding allocation.

3.1 Two-Way Fixed Effects

3.1.A Difference-in-Differences:

I first use a difference-in-differences (DiD) estimator with staggered treatment timing:

[20] States include are AZ, CA, CT, FL, IA, IL, LA, MI, MN, OR, PA, SC, TN, TX, WI.

[21] I compare the distribution of Hill-Burton funding per capita for in-sample and out-of-sample counties using a Kolmogorov-Smirnov test. I also compare the measures of central tendency using a t-test and a Wilcoxon test. The results of each yield no statistically significant difference at conventional significance levels. My findings suggest the 15 in-sample states form a broadly representative cross-section of the 48 contiguous states on the dimension of Hill-Burton activity.

$$Y_{it} = \beta_0 + \beta_1 \mathbb{1}(t \geq \text{First year of HB funds})_{it} + \mathbf{X}'_{it}\beta_2 + \gamma_i + \tau_t + \overline{ExistingBeds}_{i,\ 1940-1946} \times \tau_t + \varepsilon_{it} \quad (1)$$

where i indexes county and t indexes year. I report the outcomes of interest, Y_{it}, in rates per 1,000 in population. To avoid small counties driving results, I weight by population.

The treatment indicator, $\mathbb{1}(t \geq \text{First year of HB funds})_{it}$, equals 1 the year in which the county first received HB support and for all subsequent years.[22] The effect of Hill-Burton funding on the outcome is captured by β_1 and represents the average difference between treated and untreated counties. The vector $\mathbf{X}_{it}$ includes a variety of county-level control variables. I include median family income and the percent of the county's population living in an urban area because these variables were of particular interest to Hill-Burton policy makers and directly determined how much funding was allocated to each state (See Appendix B). I also include controls for the percent of the population that was non-white, below the age of five, and above the age of 65. I include county fixed effects, γ_i, to capture unobserved, time-invariant characteristics that drove bed stock before, during, and after the HB intervention. Year fixed effects, τ_t account for potential correlation of shocks across counties in each year. Finally, I include $\overline{ExistingBeds}_{i,\ 1940-1946} \times \tau_t$ to control for differential trends across time based on the pre-treatment bed stock in a county. I define the existing bed stock as the average number of existing hospital beds reported in American Medical Association (AMA) surveys between 1940 and 1946. I use the average rather than only 1946 to smooth some of the noise present in the AMA surveys.[23]

The Hill-Burton program rolled out at different times across counties. I therefore use a DiD design that, in each period, compares counties that receive funding to counties that have not yet received funding but may be funded later. My design depends on a parallel trends assumption for untreated outcomes and a no-anticipation assumption. I use modern estimators that (i) avoid using already-treated units as controls, (ii) allow treatment effects to vary by cohort and over time, and (iii) aggregate cohort- and event-time-specific effects with transparent weights (Callaway and Sant'Anna, 2021; Gardner, 2022; de Chaisemartin and D'Haultfœuille, 2024).

3.1.B Event Study

To better understand the evolution of the effect over time, I also report an event study model:

[22] I adopted such a treatment definition for simplicity and comparability to previous work (Chung et al., 2017; Hollingsworth et al., 2024).

[23] The average of pre-existing bed stock has two primary limitations. First, while the AMA surveys are the most comprehensive pre-HB data available, they measured hospitals with AMA membership only. Given the AMA reached the height of its power in the mid-20th century, the AMA survey included a fair portion of the facilities at the time. Second, the AMA surveys report the total number of beds in a facility, fail to differentiate (i) quality from obsolete beds and (ii) beds used for different purposes, like acute and chronic patients, in the same facility. The result is an overstatement of the local hospital capacity. The limitations in surveys before 1946 motivated the survey component of the Hill-Burton Program.

$$Y_{it} = \beta_0 + \sum_{\substack{j=-15 \\ j\neq -1}}^{15} \beta_j \, \mathbb{1}\left(t - \text{First year of HB funds}_{it} = j\right) + \mathbf{X}_{it}'\beta_2 + \gamma_i + \tau_t + \overline{ExistingBeds}_{i,\ 1940-1946} \times \tau_t + \varepsilon_{it} \tag{2}$$

where the same set of controls is included as before. I omit the year before first treatment, $t = -1$. I weight the regression by population and check robustness with the same estimators as in the DiD design.

3.2 Instrumental Variable

The DiD analysis assumes no selection on unobservable county-level characteristics. In other words, the DiD design assumes there are no time-varying unobservable factors that systematically influence the exact timing of when counties received Hill-Burton funding or if counties received funding at all. Although some authors assert the HB funding process was apolitical (Feshbach, 1979; Chung et al., 2017), the institutional details suggest selection into treatment is still a significant concern for two reasons. First, counties did not receive Hill-Burton (HB) funds at random; the program prioritized lower-income and rural areas. Second, and more importantly, HB required a county to submit a conforming construction proposal before it could be considered for funding. Without a construction proposal, even otherwise meritorious counties went unfunded. Therefore, the DiD model must assume that both a county's decision to submit an application and the quality of the application is entirely unrelated to both treatment and the outcome of interest. These features create selection on observed (e.g., income, rurality) and unobserved factors (e.g., project proposal submission/quality, administrative capacity, local political buy-in, health preferences). Places ready to expand beds absent HB or facing unusually high unobserved construction costs may differentially self-select (Chung et al., 2017). The selection in treatment means a two-way fixed effects DiD that treats funding as conditionally random can yield biased estimates.

To address the potential endogeneity, I exploit HB's allocation mechanism to instrument for treatment using variation in the annual priority for funding rankings. The annual State Plans reported each region's relative need for funding. The reports compared the existing beds in the region to the federally determined bed target. Areas closer to meeting their federal target were ranked as lower in priority for HB funding whereas areas further from the target were higher in priority. States allocated funding in priority order. Given the priority ranking's importance in treatment outcome, a more complete discussion of the priority ranking's components is merited.

A region's priority ranking was the inverse of its relative need. The relative need was quantified as the proportion of existing quality beds to the estimated number of beds needed, termed the "percent of need met." Formally,

$$Percent\ Need\ Met_{it} = \frac{(Existing\ Acceptable\ Beds)_{it}}{(Estimated\ Number\ of\ Beds\ Needed)_{it}} \tag{3}$$

$$= \frac{\overbrace{(Existing\ Acceptable\ Beds)_{it}}^{\text{Deterministic}}}{\underbrace{\left(\frac{(Population)_{it}}{1{,}000}\right)(Bed\ Need\ Ratio)_{it}}_{\text{Deterministic}} + \underbrace{(Bed\ Pool\ Allotment)_{it}}_{\text{Discretionary}}} \tag{4}$$

where *Existing Acceptable Beds* was a mechanical result from the survey in the State Plan. Impartial, state-level evaluators classified each bed in a region as either acceptable or unacceptable, according to federal standards.[24] The *Estimated Number of Beds Needed* can be decomposed as shown in Equation 4.

The *Bed Need Ratio* refers to the federal bed target per thousand in population and took values of 2.5, 4, and 4.5 beds per thousand in population. The maximum *Bed Need Ratio* was determined by the population density in the state (see P.L. 79-725, Sec 622(a)). The denser the state's population, the smaller the allowed maximum for the state.[25] A region's *Bed Need Ratio* (i.e., 2.5, 4, 4.5) depended on whether it was classified as "Rural," "Intermediate," or "Base" (urban). "Rural" areas were assigned the smallest bed ratio whereas the "Base" areas were assigned the largest.[26] The classification of Rural, Intermediate, and Base relied on the maximum hospital size and population in the region.[27] Like the *Existing Acceptable Bed* value, the *Bed Need Ratio* was mechanically determined at the federal level.

The *Bed Pool Allotment* consisted of beds to be distributed at the discretion of the state Hospital Advisory Council (HAC) to meet special area needs. The determinants of how the bed pool was distributed were often unspecified. In instances when a State Plan justified why a region would

[24] The federal standards primarily assessed whether the bed caused a fire or health hazard or was in a facility that was itself a fire or health hazard. For example, the California State Plan of 1948 explains that Dorris Hospital of Siskiyou County was unacceptable because of fire and health concerns: "No fire clearance; sanitation poor; sterilization poor; 2-story frame building." McCloud Hospital of Siskiyou County was also described as unacceptable due to fire and health concerns: "No covering, stairs outside unsafe, slippery when wet; no fire clearance; frame building 2-stories; sanitation poor, wooden floors cracked." Of the 104 California hospitals listed as unacceptable that year, 89 (85 percent) were denied fire clearance, among their other concerns like improper sanitation, antiquated buildings, tight corridors, leaky roofs, poor plumbing, inadequate kitchens, overcrowding, and stair-only exits.

[25] For example, most states (23 of the 28 for which these data are preserved) had a maximum of 4.5 beds per thousand. AZ and NV had *Bed Need Ratio* $\in \{3, 4.5, 5.0\}$. AL, MT, and WY had *Bed Need Ratio* $\in \{3.5, 5.0, 5.5\}$

[26] For example, states with a maximum of 4.5 beds per thousand had *Bed Need Ratios* of Rural = 2.5 beds per thousand, Intermediate = 4.0 beds per thousand, and Base = 4.5 beds per thousand.

[27] The classification scheme was as follows: Base areas were those with 100,000 in population and at least one hospital with a complement of 200 or more beds. Additionally, any area with a medical center was a Base area. Invariably, these were large cities. Intermediate areas had at least 25,000 in population and at least one hospital with a complement of 100 or more beds. Remaining areas were Rural.

receive beds from the bed pool, the criteria were poorly defined and lacked the formulaic precision or deterministic measure in the rest of the *Percent Need Met* equation. Thus, conditional on the statute-driven *Bed Need Ratio* and federally audited *Acceptable Beds*, only the *Bed Pool Allotment* injects discretion into the *Percent Need Met*.

The region's *Percent Need Met* was summarized in a priority score. The priority score was inversely proportional to the region's *Percent Need Met*.[28] If two regions had the same *Percent Need Met*, then population, income, and rurality acted as tiebreakers for the priority ranking.[29] In theory, states should have assigned the same priority ranking to regions with the same observed characteristics. In practice, there was variation in the realized priority score, conditional on the observed characteristics. The variation stems from differences in the *Bed Pool Allotment*. I illustrate the variation from the *Bed Pool Allotment* using an abbreviated table of real data from the Florida State Plan of 1958 in Appendix G.

3.2.A Instrument Description:

I use the realized priority ranking as an instrument for HB funding, focusing on the residual component that remains after conditioning on the observables that deterministically enter the rank (i.e., percent need met ingredients, income, and rural classification). Intuitively, among otherwise similar regions, small quasi-random deviations in rank push projects earlier/later in the queue, shifting funding exposure.

I make the two conventional IV assumptions: relevance and exclusion. Relevance requires the region's priority ranking to be positively correlated with the region's Hill-Burton funding. I test relevance empirically with an F-test. Exclusion requires the priority ranking to be uncorrelated with the outcome of interest except through the channel of Hill-Burton funding. While not empirically testable, administrative detail and empirical analysis support the validity of the exclusion assumption. The policy stipulated that the only things that should affect a region's priority score are the percent of hospital beds need met in the region, the region's income, and whether the region was rural. These variables are all observable and can be directly included in the model. Given the otherwise mechanical nature of the instrument, the variation remaining after the inclusion of the controls should be exogenous to the outcome of interest.

3.2.B Instrumental Variable Specification:

To analyze the effect of HB funding on the stock of beds, I will employ an instrumental variable model (IV) with the following specification:

[28] To illustrate how states used the *Percent Need Met* formula to determine priority scores, consider California. In 1948, California assigned regional priority rankings as A if 0% of the need for acceptable beds was met. The scale continued: B if 1-24%, C if 25-49%, D if 50-74%, E if 75-99%, and F if 100% of needs were met.

[29] See the State Plans, especially California.

$$Treated_{it} = \delta_0 + \delta_1 Priority_{it} + \mathbf{X}'_{it}\delta_2 + \gamma_i + \tau_t + \overline{ExistingBeds}_{i,\ 1940-1946} \times \tau_t + \mu_{it} \quad (5)$$

$$Y_{it} = \pi_0 + \pi_1 \widehat{Treated}_{it} + \mathbf{X}'_{it}\pi_2 + \gamma_i + \tau_t + \overline{ExistingBeds}_{i,\ 1940-1946} \times \tau_t + \varepsilon_{it} \quad (6)$$

In Equation 5, treatment for region i in year t ($Treated_{it}$) is defined as the stock of general hospital beds. $Priority_{it}$ is the instrument and measures the priority score for county i in year t. The remaining variables are the same as in the previous specifications. The outcome of interest is Y_{it}. The second stage, Equation 6, includes the estimate for treatment from the first stage (i.e., $\widehat{Treated}_{it}$) and the same set of controls and fixed effects as the first stage. π_1 is the parameter of interest and captures the local average treatment effect, meaning I estimate the effect of treatment on complying counties for whom treatment varied because of the priority rank. Both regressions are weighted by population.

3.2.C Threats to Identification

There are two primary threats to the exclusion restriction. First, the states might have gamed the system by improperly reporting the number of acceptable beds in a community. While theoretically possible, it is highly unlikely in practice. Beds were considered acceptable or unacceptable, for HB measures, based on federal standard.[30] The State Hill-Burton agency was required to assign an impartial evaluation team to conduct the survey, meaning hospital administrators could not inflate their facility's numbers for monetary benefit. The teams were provided with a standardized checklist that evaluated whether beds conformed to the minimum federal standards. The standardized nature of the survey and federal standards were designed to mitigate surveyor discretion in the evaluation process.

A second possible concern is that HAC board members directed funding to suit their own interests by either prioritizing their affiliated institutions or city of origin. For HAC board membership influencing funding to be a threat to identification, there must be evidence of rent-seeking by members of the HAC board. The legislation explicitly prohibited HB benefits from directly or indirectly reaching affiliates of the HAC board members.[31] To test whether the prohibition was binding, I separately regressed HB funding and priority score in county i in year t on the controls outlined above, adding a dummy for whether county i had representation on the HAC. I repeated

[30] The early federal standard was that the bed did not constitute a health or fire hazard. In 1964, the Hill-Harris amendments further clarified the delineation between acceptable and unacceptable beds by listing four categories for evaluation: (a) fire resistance; (b) safety with respect to electrical and mechanical systems, the suitability of exits and fire alarm systems; (c) design and structural factors like room size, hallway width, and other details that affected patient care, and (d) design and structural factors like ventilation, location, and adequacy of space and equipment (United States Department of Health, Education, and Welfare, Public Health Service, Division of Hospital and Medical Facilities, 1967, p. 11)

[31] "No full-time officer or employee of the State Agency, or any firm, organization, corporation, or partnership which such officer or employee owns, controls, or directs, shall receive funds from the applicant, directly, or indirectly, in payment for services provided in connection with planning, design, construction, or equipping of the project. (PHS Regulation 53.12(b))."

the process at the hospital level, adding a dummy for whether hospital h had an affiliated board member on the HAC. In each case, the estimated coefficient on HAC membership was small and statistically indistinguishable from zero (see Appendix H). The institutional detail and empirical findings that the HAC board members did not engage in rent-seeking support the assumption that the remaining variation in the priority score is plausibly random, conditional on the relevant observables.

4 Local Effects of Hill-Burton Investment on the Health Capital Stock

I begin by addressing the first order question of whether the Hill-Burton Program materially affected the nation's stock of health care capital.

4.1 Effect on Beds

Two Way Fixed Effects & Event Study. Figure 4 plots the average treatment effect (ATT) obtained from estimating Equation 1 for two outcomes: the stock of total general hospital beds and the acceptable (i.e., Hill-Burton-compliant) general hospital beds. Panel (a) shows that, on average, counties receiving Hill-Burton assistance experienced an increase of one additional bed per thousand in population after their first allocation of program funds. Panel (b) indicates a larger increase in acceptable beds of about 1.3 per thousand in population, suggesting a meaningful share of program funds supported the replacement and modernization of existing beds. These estimates are robust to alternative estimators that account for the staggered nature of Hill-Burton funding distribution.

To evaluate the staggered roll out of Hill-Burton funding, I next turn to an event-study specifications using the estimating equation Equation 2. Figure 5 presents dynamic treatment effects of Hill-Burton funding on the number of total and acceptable general hospital beds at the county level. Estimates are reported for both the classic two way fixed effects estimator and more recent methods for addressing staggered treatment timing.[32] The pre-treatment coefficients from all four estimators are statistically indistinguishable from zero, supporting the assumption of parallel trends. Post-treatment, each estimator shows a statistically significant increase in total general hospital beds per thousand in population that peaked within the first few years of capital appropriations. The increase in total hospital beds is consistent with Chung et al. (2017). Unlike the data used in Chung et al. (2017), these data allow me to separately identify the effect on total hospital beds and quality hospital beds. The effect on acceptable hospital beds is more persistent than on total hospital beds. The results suggest HB caused a net increase in hospital beds and a recomposition of the capital stock to quality beds.

[32] Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfœuille, 2024; Gardner, 2022

Instrumental Variable. In these estimations, treatment is defined as the sum of HB beds received by county i between 1947 and year t. Table 2 provides evidence of a strong first stage. Table 3 and Table 4 report two-stage least squares (2SLS) estimates of HB's effect on total beds per thousand and acceptable beds per thousand. Both outcomes are lagged by 3 years to accommodate construction time. The lag of 3 years was empirically determined by the average time between a HB bid and project completion.[33] Panel A and Panel B report the estimated treatment effect for separate regressions. In Panel A, the treatment is defined as the cumulative sum of HB beds received by county i between 1947 and year t. The treatment in Panel B is defined as the cumulative sum of HB funds received by county i from 1947 to year t. The reported coefficient is the effect of a \$10,000 (adjusted to 2023\$) increase in Hill-Burton funding. All models include county and year fixed effects and weight the results by county population. Columns (1) and (2) control for median family income and the percent of the population that lives in an urban area. These two controls are necessary for the instrument to satisfy the exclusion restriction. Columns (3) and (4) add demographic controls to account for differences in pre-existing demand for hospital beds. Columns (5) and (6) add a control for the pre-1947 stock of hospital beds interacted with a time dummy to allow counties with different levels of pre-existing capital stock to evolve along separate paths. Adding the full battery of controls attenuates the effect on beds but provides more precise standard errors.

In each model, the IV results exceed their OLS counterparts, suggesting that OLS understates the program's true effect. One explanation for why OLS understates the effect is because treated counties might have expanded their capital stock more slowly in the absence of HB funds due to local conditions like higher construction costs or weaker administrative capacity, biasing OLS downward. The presence of downward bias in OLS is expected given how HB targeted low-income and rural counties. In each model, HB had a statistically significant and positive effect on the bed stock.

Table 5 reports the effect on total beds; non-profit, public, and church beds; and for-profit beds. HB did not fund for-profit beds, meaning estimating HB's effect on for-profit beds acts as a convenient placebo test. Columns (5) and (6) report the effect of HB on for-profit beds. The coefficient is negative, suggesting government crowd-out: for-profit hospital capacity shrank as more HB beds entered the market. The effect on non-profit and public beds is moderately larger than that of total beds, which is consistent with crowd-out and previous studies (Chung et al., 2017; Hollingsworth et al., 2024).

4.2 Magnitudes

The sizes of the coefficients in Panel A are smaller than those in Panel B. I include both measures because, occasionally, HB projects would include funding but no additional beds. Such

[33] The sign and significance of the coefficient is unaffected by the choice of lag between $t+0,\ldots,t+5$. The coefficient's size shrinks over time.

projects would either be for funding equipment only, adding nurse or student housing, or building a new hospital wing. Specifically in the case of adding nurse or student housing, total hospital beds would increase without the addition of HB beds because the nurses and students would move from existing hospital beds to the new lodging, freeing up existing hospital beds for patients. Therefore, the effect of funding being somewhat larger fits the policy's context.

The effects of HB on total bed stock corroborate Chung et al. (2017) while extending their analysis in three ways. First, I use modern estimators that address staggered treatment timing. Second, I assemble a richer data set with facility-level detail that distinguishes total from "quality" beds. Third, I employ a time-varying IV that recovers effects over the program's full life cycle, whereas Chung et al. (2017) use a cross-sectional IV design. Consistent with these differences, my IV estimates for beds per thousand are smaller than the 1.5 beds per thousand reported by Chung et al. (2017). Part of the gap reflects their focus on early HB treatment (1947-1953) when early rural construction produced large per-thousand gains. My full-panel estimates include later years when HB shifted toward replacement/modernization and more urban facilities where an additional bed moves the per-thousand metric less.[34] Finally, Chung et al. (2017) use a binary treatment indicator, whereas I use a continuous treatment measure that better captures the heterogeneity in treatment intensity across counties and years.

Taken together, the DiD and IV estimation results provide evidence that Hill-Burton causally affected local health capital stock. It both expanded capacity and improved quality of the composition of hospital facilities nationwide.

5 Local Effects of Health Capital Stock on Hospital Usage and Staffing

Section 4 demonstrates that HB was successful in growing hospital capacity, but improved capacity was just the mechanism for the program's goal: improved access to health care. Next I consider whether the policy successfully increased hospital utilization and the supply of local physicians. I consider these as mechanisms for other downstream effects.

5.1 Effect on Patients Admitted

Two Way Fixed Effects & Event Study. Figure 7 displays the results of estimating Equation 2 with the outcome of total patient admissions per thousand in population. After an initial decrease, possibly explained by construction lags, hospital utilization experienced a persistent increase after the first receipt of Hill-Burton appropriations. My results align with those from Chung et al. (2017), who find that HB increased total utilization. They do not, however, report an IV estimate.

Instrumental Variable. The results of the IV estimates of Hill-Burton's effect on admissions to general hospitals are reported in Table 7. The effect reported is a semi-elasticity. Columns (1) and

[34] When I restrict my sample to 1947-1953, I estimate an increase of 1.7 beds per thousand.

(2) report the estimation results without controlling for demographics or pre-existing bed stock. Columns (3) and (4) add demographic controls. Columns (5) and (6) report the results with the full battery of controls. Because pre-existing bed stock is an important feature in the development of future bed stock, my preferred specification is Column (6). These results are robust to different treatment definitions.[35]

In each model, a comparison of the OLS and IV results suggest a downward bias in the OLS measurements. This could be explained by the lower pre-existing availability of general hospitals in areas that received HB funding compared to those that did not. Each model suggests HB had a statistically significant and positive effect on the total admissions. In my preferred specification reported in column (6), increasing the number of total beds per thousand increases the number of patients admitted by 7.3 percent, translating to approximately 9 additional patients per thousand. The increase in patient usage corroborates congressional testimony from 1945 claiming there was excess demand for medical services.[36] The effect of adding an acceptable bed per thousand is smaller than adding a bed of any quality, indicating the admissions to general hospitals was determined by the hospitals total capacity more than the hospitals overall quality.

5.2 Effect on Physicians

I extend the findings of Chung et al. (2017) by exploring the effects on total physicians.

Two Way Fixed Effects & Event Study. Figure 8 shows the event-study estimates from Equation 2 where the outcome is the number of non-federal, active MDs per thousand in population. As in the case of admissions, the effect took a few years to manifest before steadily increasing over time.

Instrumental Variable. Table 8 reports the results from the IV estimates. The table considers two definitions of treatment. Panel A shows estimates for the effect of total beds per thousand in population. Panel B shows estimates for acceptable beds per thousand in population. Panel A and Panel B provide evidence that the number of MDs per thousand increased sizably due to changes in the capital stock. In my preferred specification reported in column (6), an additional bed per thousand in population increased the number of non-federal, active MDs by 12.7 percent. The effect is somewhat smaller when adding an acceptable bed per thousand in population. The larger estimates in Panel A suggest MDs responded more to the total number of beds than to the quality of those beds, implying hospital capacity was a more important factor in increasing the number of MDs in a local. These results are robust to various definitions of treatment.[37] Data limitations prohibit separately identifying the stock and flow effects of HB on physicians.

[35] For example, the results are similar when defining treatment as the cumulated sum of HB beds.

[36] Hrg. S. 191 (79th Cong., 1st Sess.), pp. 37–38, 90, 177, 268, Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 15, 80, 229, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 1, pp. 62, 157, Hrg. S. 1606 (79th Cong., 2nd Sess.) Pt. 4, pp. 2227–2228

[37] For example, the results are similar when defining treatment as the cumulated sum of HB beds.

6 Local Effects of Hospital Bed Stock on Health Outcomes

I now turn to how the improvement and growth of the health capital stock affected local health outcomes. Specifically, I examine the effect on both the mortality rates in the general and infant populations and compare these estimates to related literature.

6.1 Effect on General Mortality

Two Way Fixed Effects & Event Study. I use two measures of the general mortality rate: deaths by their place of occurrence and death by the deceased's place of residence. Mortality by place of occurrence measures the deaths that occurred in County A, regardless of where the deceased usually lived. Mortality by place of residence measures the number of residents of County A, regardless of whether that death occurred in County A or County B. Figure 9 and Figure 10 depict the results of estimating Equation 2 on the general crude mortality by place of occurrence and by place of residence respectively. The estimates show that deaths by place of occurrence increased after HB treatment whereas deaths by place of residences decreased. While seemingly contradictory, the estimates relate a coherent story: hospitals are magnets for the unhealthy, creating mortality hot spots, and simultaneously improve overall population health. The event study estimates exhibit evidence of significant pre-trends, suggesting a failure of the parallel trend assumption. In other words, some underlying variable systematically causes the control and treatment groups to differ. Given the political nature of HB funding allotment from the state-to-county level, the endogeneity is unsurprising and motivates the use of an IV approach.

Instrumental Variable. To disentangle the possible endoegenity, I estimate a model using an IV. Table 10 summarizes the results of estimating Equation 8. Columns (1) and (2) include only base controls necessary for the IV model. Columns (3) and (4) add controls for the county's age, specifically controlling for the more vulnerable populations of less than 5 and over 65. Age controls are helpful because age-adjusted mortality rates are typically more informative than crude mortality rates when comparing different areas (Curtain and Klein, 1995).[38] Columns (5) and (6) add a control for pre-existing bed stock. Column (6) is my preferred specification and shows that adding an additional bed per thousand in population modestly decreases mortality by place of residence. The effects are larger for total hospital beds than acceptable hospital beds, implying health outcomes were more influenced by total capacity than quality.

[38] While using age-adjusted mortality as the outcome is possible, age-adjustment imposes more structure and assumptions on the relationship between age and mortality. To maintain flexibility, I include age bins as separate regressors. The estimated coefficients are robust in sign, magnitude, and significance to including separate age controls or using age-adjusted mortality rates directly as the outcome variable. For the age-adjusted mortality rates, I use the standardized mortality ratio age adjustment method.

6.2 Effect on Infant Mortality

Two Way Fixed Effects & Event Study. Figure 11 shows the TWFE and robust TWFE estimates for the effect of the first year of HB appropriations on the infant mortality rate. The estimates are noisy for the TWFE and de Chaisemartin and D'Haultfœuille (2024) estimators. The Callaway and Sant'Anna (2021) and Gardner (2022) estimators Callaway and Sant'Anna estimator provide suggestive evidence that HB decreased the infant mortality rate. As with the general mortality rate, evidence of pre-trends in the TWFE estimator indicates the DiD estimates are biased from endogeneity, like the general mortality rates.

Instrumental Variable. Table 12 reports the effect of the bed stock on mortality among infants. The columns are set up in the same way as for the general mortality rate results. Column (6) shows an increase in the hospital bed stock decreased infant mortality. The decrease was more acute for total beds than acceptable beds. Evaluated at the mean of total beds and acceptable beds per thousand respectively, the estimates imply a decrease of 6.5 percent and 1.8 percent. Like with the general mortality rates, the effect of the total bed stock is more pronounced than the stock of acceptable beds. The effect of total beds is comparable to the findings from (Hollingsworth et al., 2024), who find that counties receiving private funds for the improvement of medical facilities experienced roughly 6 to 8 percent decrease in infant mortality.

7 Local Spillover Effects of Hospital Bed Stock

Conventional wisdom holds that hospitals generate jobs within the local health sector (Hiles, 1992; Alexander and Richards, 2023). My analysis in Section 5.2 confirms this expectation, showing clear growth in local medical staffing following new hospital investment. Yet the implications of such investment plausibly extend far beyond health care employment. A large literature on local multipliers and agglomeration spillovers demonstrates that new jobs in one sector often stimulate demand for other local goods and services, thereby creating jobs in unrelated industries (Moretti, 2010). Similarly, research on capital investment more broadly highlights how physical infrastructure can generate productivity and efficiency spillovers in other sectors (Greenstone et al., 2010). Moreover, physical capital and the amenities it creates attracts human capital (Diamond, 2016; Diamond and Suárez Serrato, 2025) and promotes knowledge spillovers. Hospitals are particularly likely to exhibit these spillover effects. They attract patients and workers; reshape demand for housing, retail, and services (Mandich and Dorfman, 2017); and can stimulate local innovation ecosystems. Understanding the downstream effects of health care capital investment is therefore central not only to assessing the returns to public health policy, but also to understanding how hospitals shape local labor markets across the broader economy.

7.1 Employment

Table 13 gives the IV estimates for total employment. Columns (1) and (2) report the effect of an additional total bed per thousand in Panel A and an additional quality bed per thousand in Panel B. Columns (3) and (4) add controls for the local age distribution. Columns (5) and (6) add a control for the pre-intervention stock of beds. In each case, there is a statistically significant and economically meaningful effect on overall employment. Table 14 decomposes the total employment effect into the major sectors reported in the County Business Patterns. The estimates reported in each column are an IV specification and includes the full battery of controls. The effect on employment is strongest in manufacturing (column 5), whole sale (column 7) and financial services (column 9).

7.2 Research & Development

Today, hospitals are hubs of innovation, organizing myriad sources of scientific, clinical, technical, and commercial knowledge; bridging basic and applied research, experimentation, and technological adaptation; and connecting public and private actors. Despite their integral role in the innovation process, studies have focused on hospitals as consumers, rather than producers, of new knowledge. Studying hospitals as consumers is natural. As hospitals adopt, test, and implement new technology in clinical practice, they influence the demand for medical innovation. Their role extends beyond consumption, however. Hospitals also influence the supply of medical innovation, directly through research and perhaps indirectly by encouraging innovators to co-locate near the demand for their ideas. If hospitals contribute to the supply of innovation, then the growth in health care capital supply stimulated by HB investment should result in an increase in local innovation.

To measure innovation, I follow the literature and use patent applications and academic publication output. The structure of patent and publication outcomes poses challenges when used as the outcome in a regression. The key challenge is that the sometimes-zero nature of the outcome makes transforming the outcome to log scale problematic (Correia et al., 2020; Mullahy and Norton, 2022; Chen and Roth, 2024). Therefore, for this section, I adopt a different but conceptually equivalent empirical strategy. I use a Poisson pseudo-maximum likelihood (PPML) model for my OLS regressions and a control function approach in place of a 2SLS regression. The control function approach is an extension of 2SLS to non-linear models and is equivalent in the linear case (Hausman, 1978; Wooldridge, 1999; Green, 2003; Wooldridge, 2010; Wooldridge, 2015; Lin and Wooldridge, 2019, January 1). Specifically, I estimate the following models:

$$Treated_{it} = \delta_0 + \delta_1 Priority_{it} + X_{it}'\delta_2 + \delta_3 \overline{\text{Existing Stock}}_{i,\ 1940-1946} \times t + \delta_4 TopUniversity_{it} + \tau_t + \gamma_i + \mu_{it} \quad (7)$$

$$Y_{it} = \exp\Bigg(\pi_0 + \pi_1 Treated_{it} + X'_{it}\pi_2 + \pi_3 \overline{\text{Existing Stock}}_{i,\ 1940-1946} \times t + \pi_4 TopUniversity_{it} + \pi_3 \widehat{\mu}_{it} + \tau_t + \gamma_i\Bigg) + \varepsilon_{it} \quad (8)$$

where the variables are defined as before in Section 3. The primary difference is in the second stage, where I instead include both the endogenous regressor, $Treated_{it}$, and the residuals take from the first stage regression, $\widehat{\mu}_{it}$. Such an approach effectively handles the count nature of the outcome variable while maintaining the IV structure. The outcome of interest, Y_{it} is the natural log of patent applications or academic publications. I interact the average pre-existing stock of patents/publication between 1940 and 1946 with a time dummy to allow for differential trends associated with pre-policy levels of innovation output. I also control for the presence of a top-40 university, as defined in Gross and Sampat (2023). Because there is no closed form method for obtaining standard errors, I use a bootstrapping method with 10,000 iterations to calculate robust standard errors. As before, these are clustered at the county level.

The process of invention to patent application takes time. Based on the findings of a recent research study Munari et al., 2022, I adopt a four-year lag between changes in hospital capacity and the outcome.[39]

Table 15 gives the IV estimates for the effect of changes in a county's bed stock on total patents. Estimates are presented as percent changes in patenting output given a one-unit change in the beds per thousand in population, conditional on the control variables included. The first-stage residual is also included. A significant first-stage residual suggests there is endogeneity between treatment and outcome. Including the residual in the second stage corrects for this endogeneity. Columns (1) and (2) report the effect of total beds per thousand on patent applications filed. Columns (3) and (4) add the control for pre-existing patent stock, the inclusion of which attenuates the effect. It might be the case that total beds appear to drive innovation simply because hospitals are co-located with top research universities. To address this concern, columns (5) and (6) report the effect with a full set of controls, including controls for the presence of a top-40 university or college. The list of top-40 universities is taken from Gross and Sampat, 2023. The results are mostly unchanged, providing evidence that universities are not the underlying driver of the estimated treatment effect.

Table 16 decomposes the total patent effect into the major sectors from the NBER categorization of patents (Wang, 2020). The results are reported using the same estimation method as in column (6) in Table 15. My findings suggest that hospitals influence patent applications strongly in medical field. The magnitude is greater than that of total patents. Non-medical fields are also affected, which could be explained by the coarseness of the patent categories. For example, the "Medical" category includes drugs, surgery and medical instruments, and biotechnology. Com-

[39] My findings are sensitive to the lag used. For lags t + 1, t + 2, and t + 3, the estimated coefficients are positive but imprecise. A lag of four years is the most conservative, precisely estimated coefficient. The effect size grows when a five-year lag is chosen.

puters contain electronic business methods and information storage. Electrical and Electronics contain, among other things, X-rays. It could also be explained by an increase in demand for technology from hospitals during this era. Finally, it could reflect how hospitals influence the demand for non-medical goods and services (AHA, 2025).

Because not all research results in a patent, I also proxy for innovation with academic publications. Table 17 and Table 18 provide results. I find that changes in the hospital bed stock increases publications, both in total and in the medical industry. I conduct a placebo test using publications in non-STEM fields as the outcome. These should not experience the same response to hospital expansion as STEM fields. Table 19 reports the results. As expected, the effect in non-STEM fields is statistically noisy.

8 Conclusion

This paper has examines how public investment in hospitals affects local health and economic outcomes. Using the Hill-Burton Act of 1946 as a quasi-experimental setting, I address the endogeneity of hospital siting and investment with an instrumental variable design that exploits variation in the political tinkering of priority rankings across hospital service areas. This approach allows me to provide the first causal evidence on how large-scale expansion and modernization of health care infrastructure shaped communities in the mid-twentieth century United States.

The results demonstrate that Hill-Burton funding causally increased the number and quality of hospital beds in treated counties. This effect is stronger for beds suited to contemporary medical standards. The growth in hospital capacity generated a marked increase in patient admissions and physician staffing, showing that the infusion of physical capital was accompanied by a complementary growth in human capital. These results confirm the long-standing view that hospitals are not only physical anchors but also labor-intensive institutions that draw skilled professionals into local markets.

Improved availability of hospital services had measurable consequences for health outcomes. Counties that received Hill-Burton assistance experienced significant reductions in mortality for both the general population and for infants, underscoring the critical role of access to modern medical facilities in improving population health. Importantly, these effects remain robust after accounting for changes in population composition and pre-intervention bed stock, suggesting that the observed health gains stem directly from the supply-side expansion in capacity rather than from selective migration of healthier populations.

The analysis explores important spillovers into the broader local economy. Consistent with the concept of hospitals as anchor institutions, Hill-Burton investment stimulated employment growth outside of health care, particularly in manufacturing, wholesale trade, and finance. This pattern aligns with the literature on local multipliers and agglomeration, which shows that investment in one sector can generate positive demand shocks and productivity spillovers in others. Moreover, I find evidence that hospital construction and modernization spurred innovation, measured through

growth in patenting and academic publications. While much of this innovation was directly related to medicine and medical technology, the effects also extended into fields such as computers and electronics, which were increasingly relevant for diagnostic and therapeutic technologies in the postwar period. These results suggest that hospitals may play a more central role in regional innovation systems than previously recognized.

The policy implications are equally important. The COVID-19 pandemic exposed the fragility and uneven distribution of the United States' health care infrastructure, particularly in rural and underserved communities. At the same time, projections of physician shortages highlight the continuing importance of aligning investments in physical infrastructure with investments in human capital. Hill-Burton provides a historical precedent for the scale of public investment that may be required to address such challenges. The results suggest that modern infrastructure programs not only have the potential to improve access to care and health outcomes, but also to stimulate local economies through job creation and knowledge spillovers. These dual returns strengthen the case for considering health care infrastructure as a form of economic development policy, not solely as a health policy.

The analysis provide evidence that investments in hospitals and health care capital have meaningful and measurable effects that extend beyond the walls of the hospital. By improving health outcomes, supporting skilled employment, and fostering innovation, hospitals serve as key anchors of local development. The Hill-Burton program offers a rare natural experiment in the large-scale provision of health care infrastructure, and the evidence presented here demonstrates that its legacy was not only to heal, but also to grow communities. Understanding this dual role is essential as policymakers confront new challenges of health equity, infrastructure modernization, and economic revitalization in the twenty-first century.

9 Tables

Table 1: Summary Statistics

	Never Treated (N=6,082)		Treated (N=17,487)			
	Mean	SD	Mean	SD	Diff	SE
Hill-Burton						
Hill-Burton Beds	0.00	0.00	6.94	37.64	6.94	0.28
Hill-Burton Funds ($2023, thousands)	0.00	0.00	535.68	2,614.09	535.68	19.77
Hospitals						
Total Beds (per 1,000)	2.73	12.61	3.90	3.59	1.17	0.17
Acceptable Beds (per 1,000)	1.92	10.85	3.09	3.40	1.17	0.14
General Hospitals	1.13	1.72	3.46	8.22	2.33	0.07
MDs (per 1,000)	0.46	0.31	0.74	0.69	0.28	0.01
Hospital Admissions (per 1,000)	121.69	85.46	129.34	77.46	7.65	1.65
Population						
Total	16,210.85	15,281.71	93,443.39	323,664.50	77,232.53	2,455.43
% Non-White	8.66	14.13	9.54	14.20	0.88	0.21
% Urban	22.30	24.35	40.77	26.11	18.47	0.37
% Under 5 years old	10.22	1.96	10.41	1.83	0.19	0.03
% Over 65 years old	10.82	3.83	10.33	3.47	-0.49	0.06
Median Family Income (Nominal)	4,442.88	2,138.58	4,976.31	2,257.59	533.42	32.37
Vitality						
Mortality (place of occurrence, per 1,000)	7.63	3.63	9.38	3.01	1.75	0.05
Mortality (place of residence, per 1,000)	10.03	2.93	9.87	2.22	-0.16	0.04
Infant Mortality (place of residence, per 1,000)	0.59	0.45	0.59	0.35	-0.00	0.01
Births	343.18	350.65	2,041.08	6,869.05	1,697.89	52.19

Data Sources: Hill-Burton data are taken from Hill-Burton Project Register (1971). Hospital data are taken from the annual State Plans. Population, Housing, and Income data are taken from Haines (2010). Vitality data are taken from Bailey et al. (2018).

TABLE 2: FIRST STAGE RESULTS

Dependent Variable =	$\sum_{j=1947}^{t}$ Hill-Burton Beds per thousand$_{i,j}$		
	(1)	(2)	(3)
Hill-Burton Priority	0.0781***	0.0797***	0.0758***
	(0.0105)	(0.0111)	(0.0104)
Observations	22,831	22,831	16,179
Cragg-Donald F-stat	561.89	580.54	379.50
Wald F-stat	55.52	51.18	53.55
HB Controls	Y	Y	Y
Demo Controls	Y	Y	Y
Age Controls		Y	Y
Bed Stock Controls			Y
Weighted by Population	Y	Y	Y
County Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y

Table 3: Treatment Effect on Total Beds per Thousand

Dependent Variable =	Total Beds per Thousand$_{i,t+3}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
$\sum_{j=1947}^{t}$ Hill-Burton Beds per Thousand$_{i,j}$	0.041	1.058**	0.073	0.971***	0.093*	0.648***
	(0.052)	(0.429)	(0.054)	(0.295)	(0.053)	(0.204)
Observations	16,186	16,129	11,284	11,237	11,284	11,237
Mean of DV	2.89	2.89	2.89	2.89	2.89	2.89
Panel B						
$\sum_{j=1947}^{t}$ Hill-Burton Funds per Thousand$_{i,j}$	-0.029	1.555**	0.054	1.402***	0.096*	0.908***
	(0.078)	(0.720)	(0.058)	(0.450)	(0.050)	(0.286)
Observations	16,186	16,129	11,284	11,237	11,284	11,237
Mean of DV	2.89	2.89	2.89	2.89	2.89	2.89
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Bed Stock Controls			Y	Y	Y	Y
Population Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white, the percent of the population under five, and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 4: Treatment Effect on Acceptable Beds per Thousand

Dependent Variable =	Acceptable Beds per Thousand$_{i,t+3}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
$\sum_{j=1947}^{t}$ Hill-Burton Beds per Thousand$_{i,j}$	0.191***	1.308***	0.231***	1.019***	0.252***	0.856***
	(0.056)	(0.354)	(0.049)	(0.242)	(0.047)	(0.196)
Observations	16,188	16,120	11,268	11,211	11,268	11,211
Mean of DV	2.20	2.20	2.20	2.20	2.20	2.20
Panel B						
$\sum_{j=1947}^{t}$ Hill-Burton Funds per Thousand$_{i,j}$	0.157**	1.851***	0.225***	1.422***	0.260***	1.168***
	(0.070)	(0.566)	(0.054)	(0.354)	(0.048)	(0.270)
Observations	16,188	16,120	11,268	11,211	11,268	11,211
Mean of DV	2.20	2.20	2.20	2.20	2.20	2.20
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Bed Stock Controls			Y	Y	Y	Y
Population Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white, the percent of the population under five, and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 5: Treatment Effect on Total Beds by Type

Dependent Variable =	Beds per Thousand$_{it}$					
	Total		Non-Profit		For-Profit	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Total Beds						
$\sum_{j=1947}^{t}$ Hill-Burton Beds per Thousand$_{i,j}$	0.324	1.027***	0.422**	1.206***	-0.098**	-0.179**
	(0.207)	(0.279)	(0.166)	(0.232)	(0.044)	(0.076)
Observations	15,272	15,272	15,272	15,272	15,272	15,272
Acceptable Beds						
$\sum_{j=1947}^{t}$ Hill-Burton Beds per Thousand$_{i,j}$	0.410**	2.759***	0.463***	2.871***	-0.053*	0.024
	(0.183)	(0.340)	(0.154)	(0.265)	(0.032)	(0.039)
Observations	16,179	16,179	15,272	15,272	15,272	15,272
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Age Controls	Y	Y	Y	Y	Y	Y
Bed Stock Controls	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white, the percent of the population under five, and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

TABLE 6: FIRST STAGE: HOSPITAL BEDS

Dependent Variable =	Total Beds per Thousand			Acceptable Beds per Thousand		
	(1)	(2)	(3)	(4)	(5)	(6)
Hill-Burton Priority	0.137***	0.140***	0.130***	0.365***	0.368***	0.370***
	(0.031)	(0.029)	(0.026)	(0.030)	(0.029)	(0.028)
Observations	22,831	22,831	16,179	22,831	22,831	16,179
Cragg-Donald F-stat	46.72	48.73	27.97	410.92	414.76	276.83
Wald F-stat	19.30	23.81	25.31	143.64	163.24	177.66
HB Controls	Y	Y	Y	Y	Y	Y
Demo Controls	Y	Y	Y	Y	Y	Y
Age Controls		Y	Y		Y	
Bed Stock Controls			Y			Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y

Table 7: Hill-Burton's Effect on Hospital Admissions Per Thousand in Population

Dependent Variable =	$\log(\text{Admissions})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.196	6.406*	0.184	6.249*	0.164	7.325**
	(0.139)	(3.423)	(0.132)	(3.381)	(0.117)	(3.606)
Observations	16,393	16,393	16,393	16,393	13,754	13,754
Mean of DV	128.05	128.05	128.05	128.05	128.05	128.05
Panel B						
Acceptable Beds (per thousand)	0.288*	2.135**	0.281*	2.096**	0.256*	2.44**
	(0.172)	(0.969)	(0.17)	(1)	(0.154)	(1.012)
Observations	17,371	17,371	17,371	17,371	14,621	14,621
Mean of DV	128.05	128.05	128.05	128.05	128.05	128.05
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by transforming the raw β using $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average existing general hospital beds from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 8: Treatment Effect on Non-Federal MD's (per thousand)

Dependent Variable =	$\log(\text{Non-Federal MD's Per Thousand})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.06	18.807**	0.054	12.715***	0.046	12.662***
	(0.081)	(7.578)	(0.06)	(4.417)	(0.055)	(4.227)
Observations	6,497	6,497	6,497	6,497	4,758	4,758
Mean of DV	0.66	0.66	0.66	0.66	0.66	0.66
Panel B						
Acceptable Beds (per thousand)	0.067	5.351***	0.067	4.012***	0.049	4.001***
	(0.091)	(1.368)	(0.074)	(1.105)	(0.063)	(1.008)
Observations	6,433	6,433	6,433	6,433	4,646	4,646
Mean of DV	0.66	0.66	0.66	0.66	0.66	0.66
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white, the percent of the population under five, and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 9: Treatment Effect on Mortality Rate by Place of Residence

Dependent Variable =	$\log(\text{Mortality Rate by Place of Residence})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.114**	0.361	0.066***	-0.151	0.06***	-0.339
	(0.058)	(1.127)	(0.024)	(0.626)	(0.019)	(0.672)
Observations	21,638	21,638	21,638	21,638	15,272	15,272
Mean of DV	9.91	9.91	9.91	9.91	9.91	9.91
Panel B						
Acceptable Beds (per thousand)	0.075***	0.128	0.05***	-0.056	0.045***	-0.12
	(0.023)	(0.369)	(0.011)	(0.212)	(0.011)	(0.211)
Observations	22,831	22,831	22,831	22,831	16,179	16,179
Mean of DV	9.91	9.91	9.91	9.91	9.91	9.91
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white and the percent of the population in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 10: Treatment Effect on Mortality Rate by Place of Residence

Dependent Variable =	$\log(\text{Mortality Rate by Place of Residence})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.065**	-0.457	0.041***	-0.587	0.042***	-1.194***
	(0.027)	(0.551)	(0.012)	(0.41)	(0.009)	(0.46)
Observations	21,638	21,638	20,799	20,799	14,689	14,689
Mean of DV	9.91	9.91	9.91	9.91	9.91	9.91
Panel B						
Acceptable Beds (per thousand)	0.049***	-0.371*	0.036***	-0.401**	0.03***	-0.539***
	(0.012)	(0.209)	(0.008)	(0.165)	(0.008)	(0.144)
Observations	22,831	22,831	21,992	21,992	15,596	15,596
Mean of DV	9.91	9.91	9.91	9.91	9.91	9.91
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	N	N	N	N	N	N
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\left(100 \times (\exp(\beta) - 1)\right)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white and the percent of the population in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 11: Treatment Effect on Mortality Rate by Place of Occurrence

Dependent Variable =	$\log(\text{Mortality Rate by Place of Occurrence})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.147*	0.346	0.098*	-0.58	0.078**	-0.802
	(0.088)	(1.104)	(0.052)	(0.749)	(0.037)	(0.855)
Observations	21,638	21,638	21,638	21,638	15,272	15,272
Mean of DV	8.93	8.93	8.93	8.93	8.93	8.93
Panel B						
Acceptable Beds (per thousand)	0.095**	0.092	0.068**	-0.219	0.05**	-0.289
	(0.042)	(0.367)	(0.029)	(0.261)	(0.021)	(0.274)
Observations	22,831	22,831	22,831	22,831	16,179	16,179
Mean of DV	8.93	8.93	8.93	8.93	8.93	8.93
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white and the percent of the population in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 12: Treatment Effect on Infant Mortality Rate

Dependent Variable =	$\log(\text{Infant Mortality Rate})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	0.042***	-3.187***	0.035***	-1.868***	0.032***	-2.367***
	(0.013)	(0.992)	(0.013)	(0.723)	(0.011)	(0.824)
Observations	21,638	21,638	21,638	21,638	15,272	15,272
Mean of DV	0.59	0.59	0.59	0.59	0.59	0.59
Panel B						
Acceptable Beds (per thousand)	0.033**	-0.967***	0.031***	-0.54***	0.024*	-0.656***
	(0.014)	(0.224)	(0.011)	(0.207)	(0.013)	(0.204)
Observations	22,831	22,831	22,831	22,831	16,179	16,179
Mean of DV	0.59	0.59	0.59	0.59	0.59	0.59
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white and the percent of the population in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average of general hospital bed counts from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 13: Bed Stock Effect on Total Employment

Dependent Variable =	$\log(\text{Total Employment})_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	-0.088	13.469**	-0.061	9.685**	-0.059	11.577**
	(0.096)	(5.056)	(0.082)	(3.831)	(0.071)	(4.427)
Observations	13,284	13,284	12,445	12,445	8,769	8,769
Mean of DV	19643.02	19643.02	19643.02	19643.02	19643.02	19643.02
Panel B						
Acceptable Beds (per thousand)	0.07	4.382***	0.076	3.426***	0.059	3.831***
	(0.065)	(1.199)	(0.06)	(1.055)	(0.056)	(1.105)
Observations	13,542	13,542	12,703	12,703	8,991	8,991
Mean of DV	19643.02	19643.02	19643.02	19643.02	19643.02	19643.02
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Age Controls			Y	Y	Y	Y
Bed Stock Controls					Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by transforming the raw β using $\big(100 \times (\exp(\beta) - 1)\big)$. HB Controls include median family income and the county's population that lives in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average existing general hospital beds from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 14: Bed Stock Effect on Employment by Sector

Dependent Variable =	$\log(\text{Total})_{it}$	$\log(\text{Agg.})_{it}$	$\log(\text{Mine})_{it}$	$\log(\text{Cons.})_{it}$	$\log(\text{Manu.})_{it}$	$\log(\text{Trans.})_{it}$	$\log(\text{WS})_{it}$	$\log(\text{Retail})_{it}$	$\log(\text{Fin.})_{it}$	$\log(\text{Ser.})_{it}$
	IV									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A										
Total Beds (per thousand)	11.575**	-4.731	2.319	-5.738*	20.956***	10.685**	11.327***	10.916***	11.296**	8.284*
	(4.427)	(6.139)	(17.554)	(3.411)	(6.839)	(4.563)	(4.185)	(3.688)	(4.557)	(4.727)
Observations	8,769	6,152	4,843	8,615	9,175	8,664	8,648	8,768	8,653	6,897
Mean of DV	19643.02	108.17	632.19	1294.48	7452.32	1415.61	1482.32	3889.08	1197.16	3489.04
Panel B										
Acceptable Beds (per thousand)	3.83***	-1.705	0.697	-1.622	6.824***	3.261***	3.306***	3.439***	3.325***	2.826**
	(1.105)	(1.873)	(5.158)	(1.1)	(1.703)	(1.163)	(1.069)	(0.885)	(1.159)	(1.369)
Observations	8,991	6,281	4,882	8,835	9,854	8,883	8,870	8,990	8,874	6,963
Mean of DV	19643.02	108.17	632.19	1294.48	7452.32	1415.61	1482.32	3889.08	1197.16	3489.04
Hill-Burton Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Age Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bed Stock Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Weighted by Population	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by transforming the raw β using $\left(100 \times (\exp(\beta) - 1)\right)$. HB Controls include median family income and the county's population that lives in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Bed Stock Controls include the average existing general hospital beds from 1940 to 1946 interacted with a year indicator. These hospital beds data are from the AMA's annual statistical report. Standard errors are clustered at the county level and reported in parentheses.

Table 15: Treatment Effect on Total Patents

Dependent Variable =	Total Patents$_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	-0.131	16.9**	-0.128	13.713**	-0.128	13.713**
	(0.35)	(6.587)	(0.324)	(6.299)	(0.324)	(6.299)
Residuals (First Stage)		-14.656***		-12.246**		-12.246**
		(6.34)		(6.103)		(6.103)
Observations	19,234	19,156	19,234	19,156	19,234	19,156
Panel B						
Acceptable Beds (per thousand)	0.268	6.648***	0.289	5.477***	0.289	5.477***
	(0.308)	(1.806)	(0.307)	(1.832)	(0.307)	(1.832)
Residuals (First Stage)		-6.235***		-5.115***		-5.115***
		(1.745)		(1.836)		(1.836)
Observations	19,234	19,156	19,234	19,156	19,234	19,156
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Patent Stock Controls			Y	Y	Y	Y
Top University Control					Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. The sample includes counties with at least one patent prior to 1947. HB Controls include median family income and the percent of the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white. Patent Stock Controls include the average of total patent applications from 1940 to 1946 interacted with a year indicator. Top University Control is a binary indicator for whether the county has a top 40 university as measured by the level of Ph.D. graduates in physical and biological sciences between 1950 and 1969 (see Gross and Sampat, 2023). Standard errors are clustered at the county level and reported in parentheses.

Table 16: Treatment Effect on Medical Patents

Dependent Variable =	Patents by Type$_{it}$					
	Chem.	Comp.	Elec.	Mech.	Med.	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	12.157	31.651**	19.42**	9.626	24.881**	9.447*
	(8.573)	(12.397)	(9.261)	(6.504)	(11.942)	(5.614)
Residuals (First Stage)	-10.363	-23.035**	-16.331**	-9.408	-19.924**	-9.172*
	(8.716)	(12.752)	(9.047)	(6.262)	(11.732)	(5.259)
Observations	15,921	9,490	14,836	18,471	9,714	18,942
Panel B						
Acceptable Beds (per thousand)	5.087*	11.007***	7.967***	3.843*	9.585**	3.828**
	(2.895)	(3.823)	(2.842)	(2.093)	(3.631)	(1.806)
Residuals (First Stage)	-3.651	-11.27***	-6.427**	-4.105**	-8.586**	-3.77**
	(2.969)	(4.386)	(2.864)	(2.138)	(3.659)	(1.747)
Observations	15,921	9,490	14,836	18,471	9,714	18,942
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Patent Stock Controls	Y	Y	Y	Y	Y	Y
Top University Control	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\left(100 \times (\exp(\beta) - 1)\right)$. Medical patents are defined following NBER nominclature (see Wang, 2020). The sample includes counties with at least one patent prior to 1947. HB Controls include median family income and the percent of the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white. Patent Stock Controls include the average of total patent applications from 1940 to 1946 interacted with a year indicator. Top University Control is a binary indicator for whether the county has a top 40 university as measured by the level of Ph.D. graduates in physical and biological sciences between 1950 and 1969 (see Gross and Sampat, 2023). Standard errors are clustered at the county level and reported in parentheses.

Table 17: Treatment Effect on Total Publications

Dependent Variable =	Total Publications$_{it}$					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	1.872	34.636***	1.87	31.829***	1.87	31.829***
	(1.231)	(10.639)	(1.234)	(10.538)	(1.234)	(10.538)
Residuals (First Stage)		-24.61***		-22.996**		-22.996**
		(11.074)		(11.012)		(11.012)
Observations	9,453	9,415	9,453	9,415	9,453	9,415
Panel B						
Acceptable Beds (per thousand)	2.829***	13.11***	2.844***	12.01***	2.844***	12.01***
	(0.692)	(2.605)	(0.682)	(2.707)	(0.682)	(2.707)
Residuals (First Stage)		-9.611***		-8.668***		-8.668***
		(3.115)		(3.263)		(3.263)
Observations	9,453	9,415	9,453	9,415	9,453	9,415
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Patent Stock Controls			Y	Y	Y	Y
Top University Control					Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. The sample includes counties with at least one patent prior to 1947. HB Controls include median family income and the percent of the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white. Patent Stock Controls include the average of total patent applications from 1940 to 1946 interacted with a year indicator. Top University Control is a binary indicator for whether the county has a top 40 university as measured by the level of Ph.D. graduates in physical and biological sciences between 1950 and 1969 (see Gross and Sampat, 2023). Standard errors are clustered at the county level and reported in parentheses.

Table 18: Treatment Effect on Publications by Field

Dependent Variable =	Publications by Type$_{it}$					
	Bio.	Chem.	Comp.	Engi.	Med.	Phys.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	26.37*	33.942**	54.802**	10.287	36.543**	30.558*
	(14.581)	(14.227)	(21.528)	(12.097)	(14.229)	(16.673)
Residuals (First Stage)	-19.152	-25.712**	-35.279**	-0.738	-27.274**	-23.06*
	(15.192)	(14.362)	(21.641)	(12.828)	(14.449)	(16.73)
Observations	6,344	6,216	7,204	4,143	7,201	5,443
Panel B						
Acceptable Beds (per thousand)	10.197**	12.646***	19.674***	5.697	13.365***	11.614**
	(4.595)	(4.017)	(5.914)	(4.859)	(4.279)	(5.254)
Residuals (First Stage)	-6.888	-11.387***	-15.038***	3.921	-11.744***	-9.404**
	(5.311)	(3.967)	(5.869)	(6.409)	(4.359)	(5.112)
Observations	6,344	6,216	7,204	4,143	7,201	5,443
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Patent Stock Controls	Y	Y	Y	Y	Y	Y
Top University Control	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

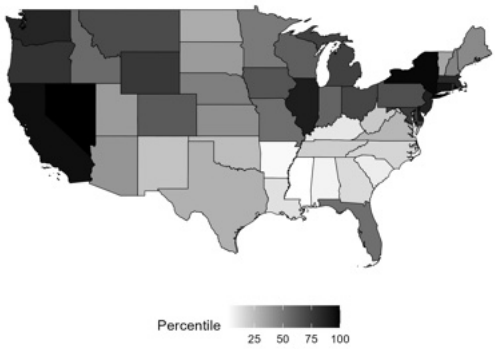
Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. Medical patents are defined following NBER nominclature (see Wang, 2020). The sample includes counties with at least one patent prior to 1947. HB Controls include median family income and the percent of the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white. Patent Stock Controls include the average of total patent applications from 1940 to 1946 interacted with a year indicator. Top University Control is a binary indicator for whether the county has a top 40 university as measured by the level of Ph.D. graduates in physical and biological sciences between 1950 and 1969 (see Gross and Sampat, 2023). Standard errors are clustered at the county level and reported in parentheses.

Table 19: Treatment Effect on Publications by Field

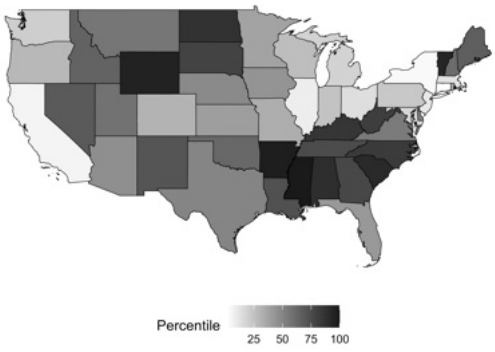
Dependent Variable =	Publications by Type$_{it+4}$					
	Art	Econ.	Hist.	Phil.	Psyc.	Soci.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total Beds (per thousand)	-3.077	14.056	9.145	-6.641	-3.273	2.769
	(9.676)	(13.158)	(7.65)	(10.074)	(6.962)	(8.373)
Residuals (First Stage)	4.612	-6.511	-9.427	7.684	4.402	-1.236
	(9.742)	(13.771)	(7.748)	(10.198)	(7.259)	(8.772)
Observations	5,805	3,338	6,371	5,269	7,724	5,800
Panel B						
Acceptable Beds (per thousand)	-1.011	5.997	3.538	-2.736	-1.411	1.05
	(3.546)	(4.849)	(2.649)	(3.684)	(2.588)	(3)
Residuals (First Stage)	2.289	0.718	-4.001	3.363	2.987	1.106
	(3.81)	(6.157)	(2.709)	(4.07)	(2.917)	(3.368)
Observations	5,805	3,338	6,371	5,269	7,724	5,800
Hill-Burton Controls	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y
Patent Stock Controls	Y	Y	Y	Y	Y	Y
Top University Control	Y	Y	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The reported estimates are marginal effects obtained by the transformation $\big(100 \times (\exp(\beta) - 1)\big)$. Medical patents are defined following NBER nominclature (see Wang, 2020). The sample includes counties with at least one patent prior to 1947. HB Controls include median family income and the percent of the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white. Patent Stock Controls include the average of total patent applications from 1940 to 1946 interacted with a year indicator. Top University Control is a binary indicator for whether the county has a top 40 university as measured by the level of Ph.D. graduates in physical and biological sciences between 1950 and 1969 (see Gross and Sampat, 2023). Standard errors are clustered at the county level and reported in parentheses.

10 Figures



(a) Income per Capita, 1946

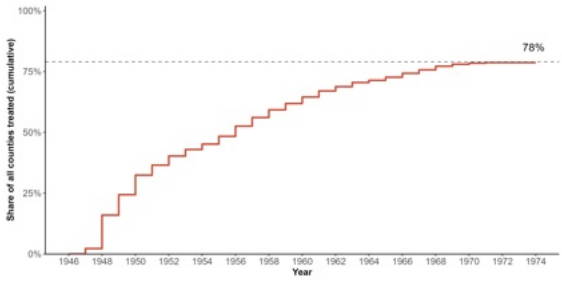


(b) Funding per Capita, 1947-1974

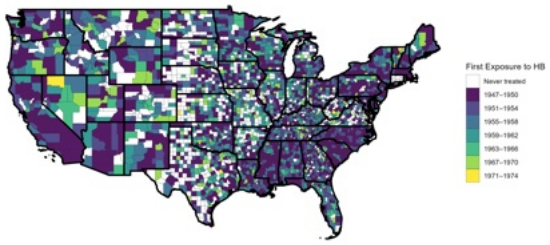
FIGURE 1: INCOME PER CAPITA COMPARED TO HILL-BURTON ALLOCATION BY STATE

Notes. Panel (a) shows the percentile for each state with respect to the income per capita in 1946. Panel (b) shows the percentile for each state with respect to the total amount of Hill-Burton funding per capita received between 1947 and 1974. Both counts include projects for all types of facilities.

Source. Data are from FRED, 1946 and Hill-Burton Project Register, 1971, Volumes 1 and 2.



(a) Percent of Counties Treated by Year



(b) Years of Exposure to Hill-Burton

FIGURE 2: HILL-BURTON ACTIVITY BY COUNTY, 1947-1974

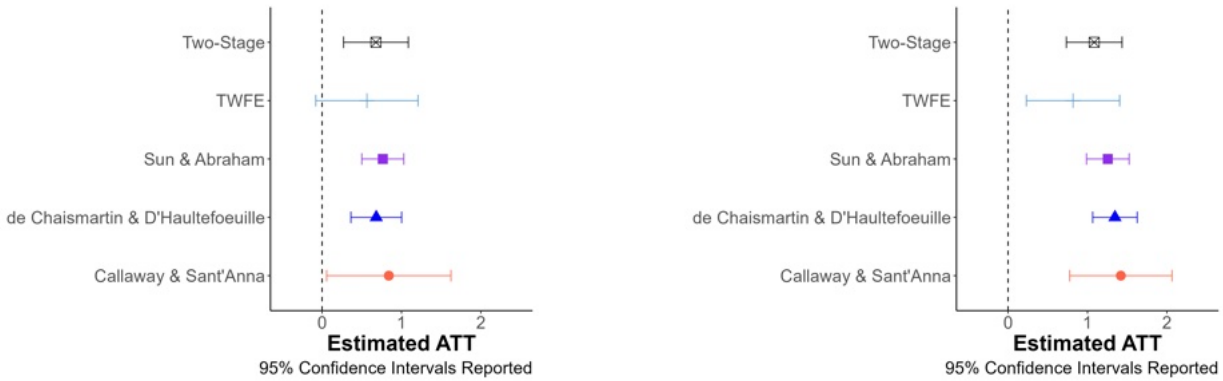
Notes. Panel (a) shows the cumulative percentage of all U.S. counties treated by Hill-Burton in each year. Alaska, Hawaii, and the U.S. territories are excluded. Panel (b) shows the geography of first Hill-Burton appropriations.

Source. Data are from Hill-Burton Project Register, 1971, Volumes 1 and 2.



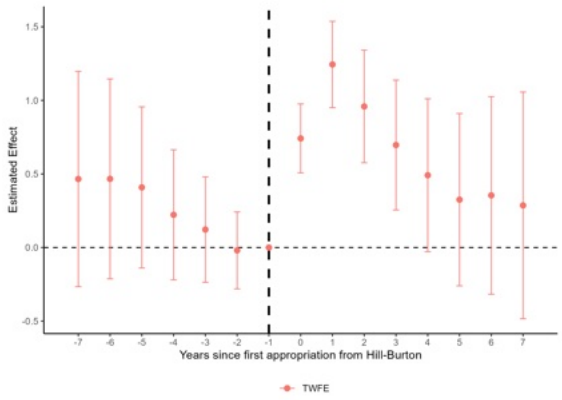
FIGURE 3: STATES IN THE SAMPLE

Notes. The map displays states included in the sample. These states are AZ, CA, CT, FL, IA, IL, LA, MI, MN, OR, PA, SC, TN, TX, WI. These 15 states were selected based on the share of available Hill-Burton State Plans preserved in public records between 1947 and 1971.

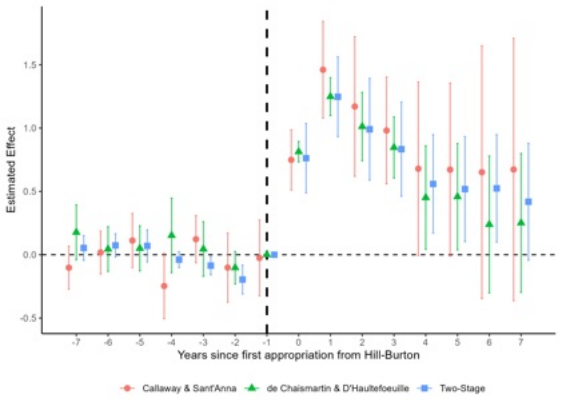


(a) Total Beds (b) Acceptable Beds

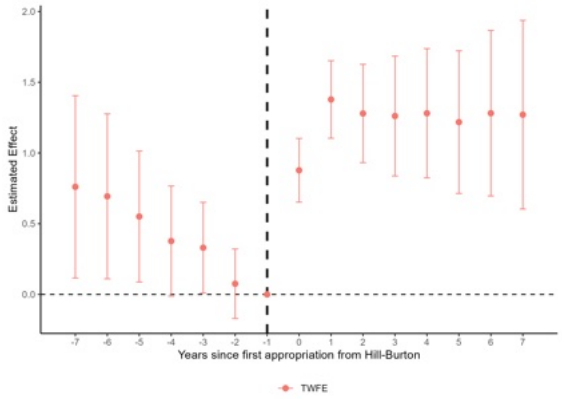
FIGURE 4: ESTIMATED ATT



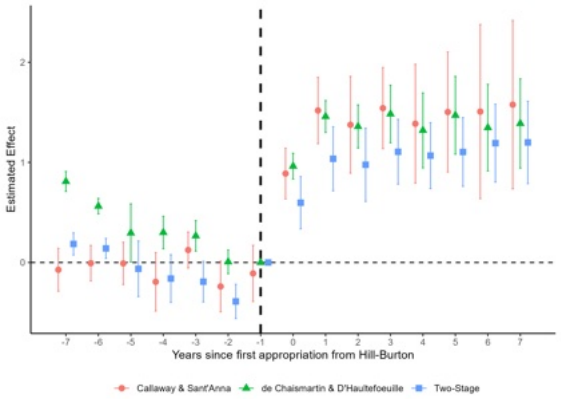
(a) Total TWFE



(b) Total Robustness



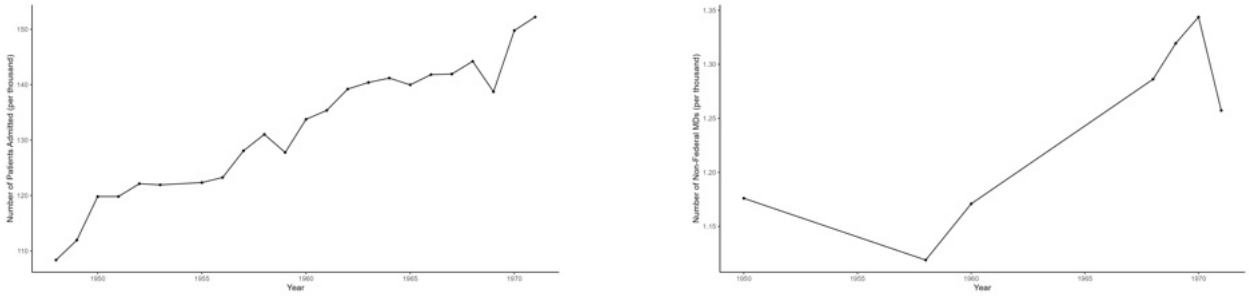
(c) Acceptable TWFE



(d) Acceptable Robustness

FIGURE 5: EVENT-STUDY ESTIMATES FOR TOTAL AND ACCEPTABLE HOSPITAL BEDS.

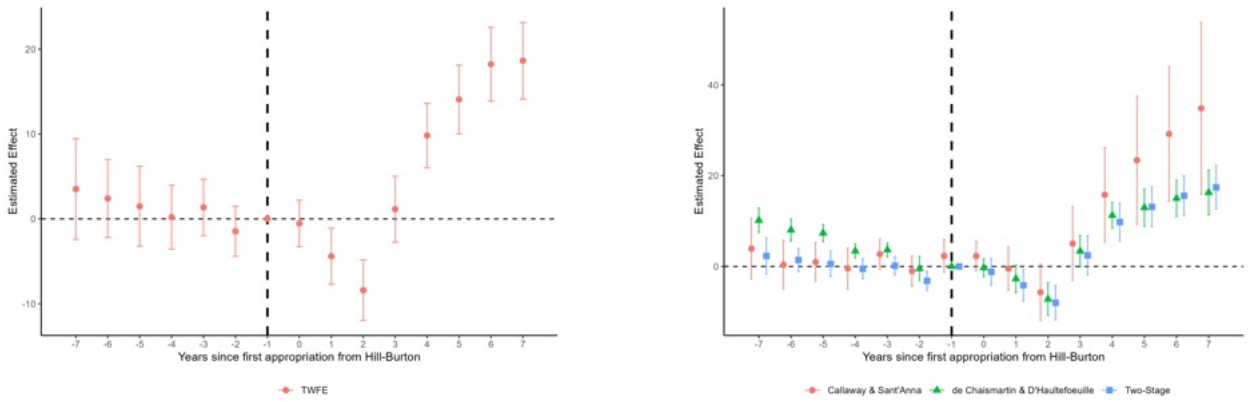
Notes. Panels (a) and (b) show the effect on total beds per thousand; panels (c) and (d) on acceptable beds per thousand. Panel (a) and (c) use the standard TWFE estimator. Panel (b) and (d) uses estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect on beds per thousand; the horizontal axis is years relative to the first funded year.



(a) Patients Admitted to General Hospitals (b) Non-Federal M.D.s

FIGURE 6: TRENDS IN HOSPITAL USAGE AND STAFFING.

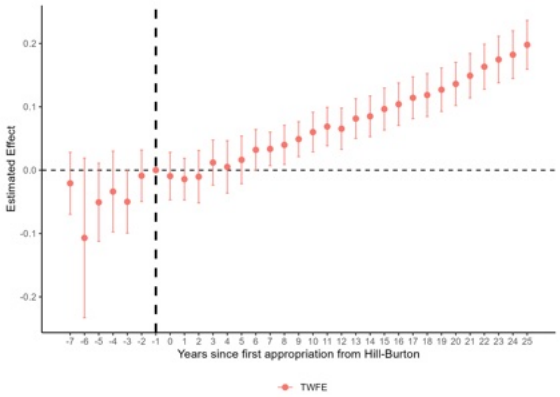
Notes. Panel (a) shows the change in the average number of patients admitted to general hospitals as measured in the American Hospital Association's annual surveys. Panel (b) shows the change in the number of non-federal, active M.D.s as reported in the Area Resource File. Each panel reports population-weighted averages. The y-axis is the value of the outcome of interest reported as in per thousand in population units.



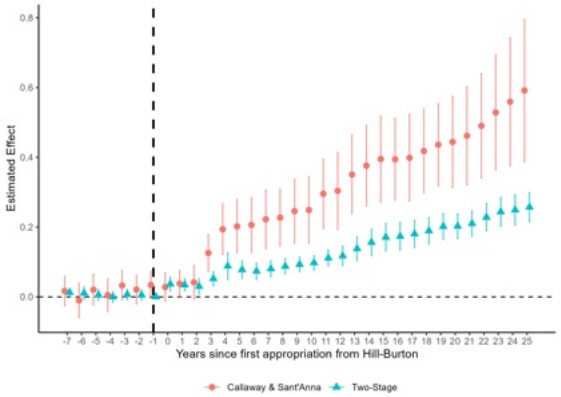
(a) Admissions TWFE (b) Admissions Robustness

FIGURE 7: EVENT-STUDY ESTIMATES FOR HOSPITAL ADMISSIONS.

Notes. Panels (a) shows the effect on total general hospital admissions per thousand using the standard TWFE estimator. Panel (b) reports estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect on total general hospital admissions in; the horizontal axis is years relative to the first funded year.



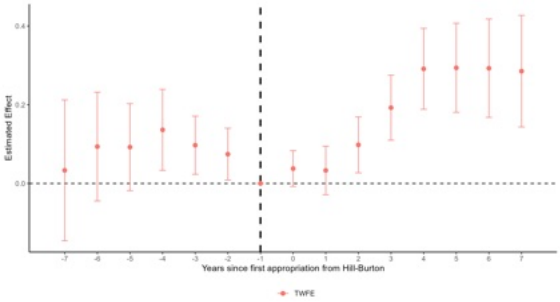
(a) Non-Federal MD's TWFE - ARF Data



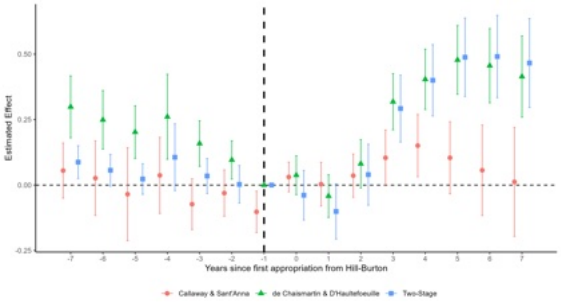
(b) Non-Federal MD's Robustness - ARF Data

FIGURE 8: EVENT-STUDY ESTIMATES FOR TOTAL ACTIVE, NON-FEDERAL M.D.'S.

Notes. Panels (a) shows the effect on total active, non-federal M.D.s per thousand using the standard TWFE estimator. Panel (b) use estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect on total active, non-federal M.D.s per thousand; the horizontal axis is years relative to the first funded year.



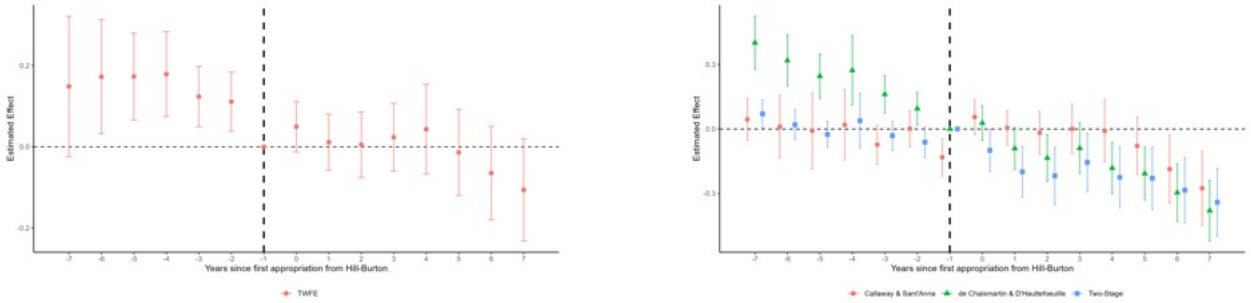
(a) Mortality by Occurrence TWFE



(b) Mortality by Place of Occurrence Robust

FIGURE 9: EVENT-STUDY ESTIMATES FOR MORTALITY BY PLACE OF OCCURRENCE

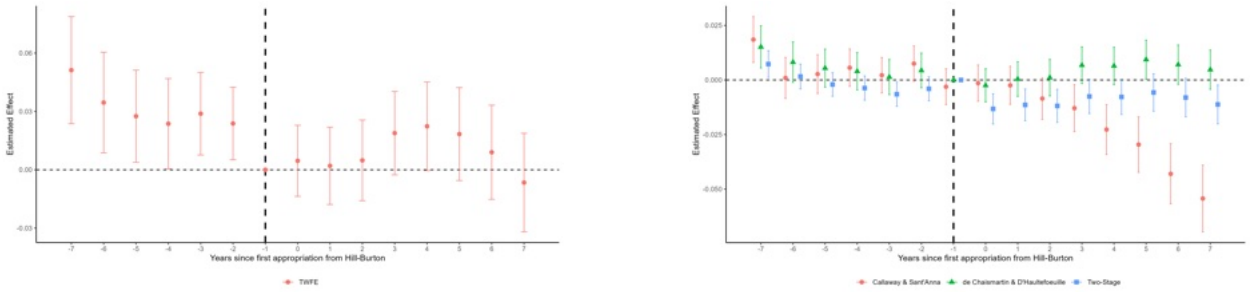
Notes. Panels (a) shows the effect on total mortality by place of occurrence using the standard TWFE estimator. Panel (b) uses estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect. The horizontal axis is years relative to the first funded year.



(a) Mortality by Residence TWFE (b) Mortality by Place of Residence Robust

FIGURE 10: EVENT-STUDY ESTIMATES FOR MORTALITY BY PLACE OF RESIDENCE

Notes. Panels (a) shows the effect on total mortality by place of residence using the standard TWFE estimator. Panel (b) uses estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect. The horizontal axis is years relative to the first funded year.



(a) Infant Mortality TWFE (b) Infant Mortality Robust

FIGURE 11: EVENT-STUDY ESTIMATES FOR INFANT MORTALITY RATES

Notes. Panels (a) shows the effect on the infant mortality rate per thousand using the standard TWFE estimator. Panel (b) use estimators from Callaway and Sant'Anna (2021), Gardner (2022), and de Chaisemartin and D'Haultfœuille (2024). The vertical axis is the estimated effect on the infant mortality rate per thousand; the horizontal axis is years relative to the first funded year.

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APPENDIX

A Coordinated Hospital Service Plan

Dr. Thomas Parran, Surgeon General of the United States Public Health Service from 1936 to 1948, outlined his vision for a coordinated hospital service plan to a subcommittee of the Committee on Interstate and Foreign Commerce of the U.S. House of Representatives on March 7, 1946.

> Existing facilities may be broadly classified under four types: The first is what we might term a "Medical Center." By this is meant a large teaching hospital desirably associated with a medical school. In these institutions there is concentrated the best clinical and medical research brains of the country.
>
> The second type of institution we might term a "district hospital." This again is a large well-equipped and well-staffed institution comparable in quality of service to the medical center but not giving undergraduate medical training and usually less extensively engaged in research.
>
> The third type is the smaller institution and those frequently referred to as "rural hospitals." We think of these as smaller institutions of less than 100 beds and having few, if any, regular training activities, except through affiliation with a medical center.
>
> The fourth type of institution is the "health center." These modern health workshops are needed in health districts of larger cities, in smaller cities and counties, and in the remote rural center, too small to maintain even a rural hospital. Since they are relatively inexpensive to construct and operate, they have great potentialities for benefit in the over-all health plan. In addition to providing for conventional public health work, in many places they will be ideally suited for all local community health activities, including facilities for the private practice of medicine and dentistry. In the rural center also they could include a few beds for emergency care.
>
> In the past, it has very largely been the practice for each of these institutions to maintain independent types of service with little relationship with each other. Many leaders in the health field now feel that a high grade of health and medical care requires an organic relationship between these several types of institution. In rural locations, in particular, the community cannot afford comprehensive facilities and medical personnel sufficient to handle the more complicated diagnostic and treatment cases. An integrated service implies a ready means whereby patients may be referred from health centers or rural hospitals to district hospitals or medical centers, as may be necessary, and then be sent back to their home communities. An integrated service implies further that interns and student nurses in the medical center will secure some of their training under supervision in the ancillary rural and other small hospitals, and in general that all of the highly specialized facilities of the medical center may be available even to the most rural communities.
>
> (Hrg. S. 191 (79th Cong., 2nd Sess.), pp. 15–16)

Figure A1 recreates an image shared as part of the Senate hearings for the Hospital Survey and Construction Act and related bills.

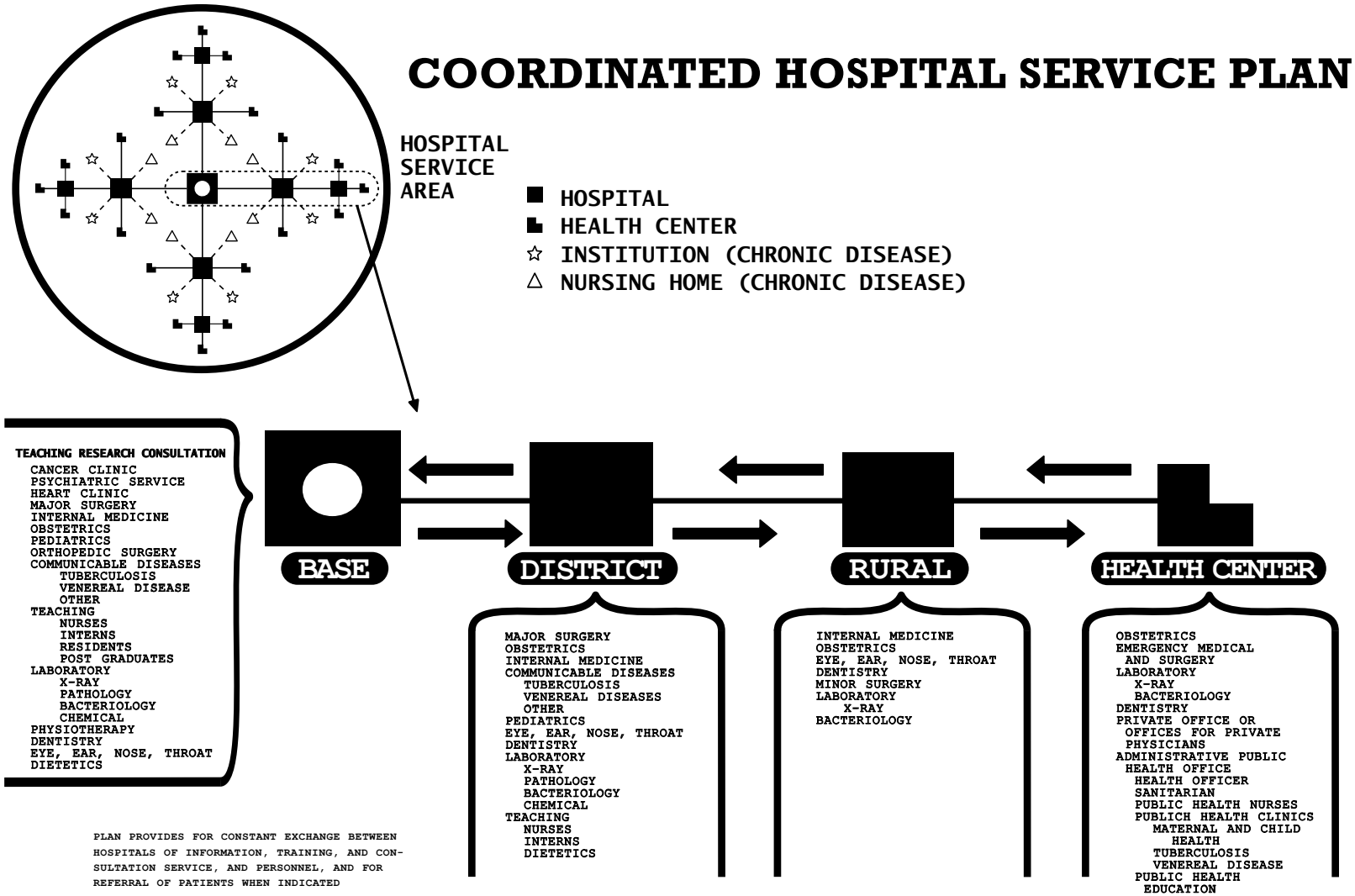


FIGURE 1 – A diagram showing relationsips among base, distridt, and rural hospitals and health centers in a coordinated service plan.

Reprinted from Public Health Bulletin No. 292, Federal Security Agency, U. S. Public Health Service.

85131–46 (Face p. 16)

FIGURE A1: COORDINATED HOSPITAL SERVICE PLAN

Source. Hrg. S. 191 (79th Cong., 2nd Sess.) (p. 16)

B State Funding Allocation

B.1 Formula

Because policymakers believed poor, rural areas experienced the greatest medical facility shortages, the policy prioritized funding for less populated areas with below average median family income levels. To this end, Sen. Robert A. Taft (R-OH) designed an allotment formula that explicitly included the state's per capita income to direct a majority of funds to poor areas. Chung et al. (2017) translate a description of the formula from congressional testimony into the following expression:

$$\text{Share}_s = \left[\frac{\left\{1 - \frac{1}{2}\left(\frac{\text{Per Capita Inc}_s}{\text{Nat'l Avg Inc}}\right)\right\}^2 \times \text{Pop}_s}{\sum_{k \in \text{U.S.}} \left\{1 - \frac{1}{2}\left(\frac{\text{Per Capita Inc}_k}{\text{Nat'l Avg Inc}}\right)\right\}^2 \times \text{Pop}_k} \right]$$

where state s received $Share_s$ of the total allotment of federal HB funds. The state's share shrank nonlinearly as per capita income rose, explicitly directing more funds to poorer states.

B.2 Example

TABLE A1: AN EXAMPLE OF THE DETERMINATION OF ALLOTMENT PERCENTAGE

State	Per Capita Income (1)	Index of Per Capita Income (2)	Half of Index of Per Capita Income (3)	Allotment Percentage (4)	Allotment Percentage Squared (5)
Richest	$2,000	133	66.7	33.3	11.09
Average	$1,500	100	50.0	50.0	25.00
Poorest	$750	50	25.0	75.0	56.25

Notes: Replicated from Brinker and Walker, 1962.

Source: U.S. Congress, House Committee on Interstate and Foreign Commerce, *Hearings on H.R. 7341*, 83d Cong., 2d Sess., February 4 and 5, 1954, 88.

TABLE A2: AN EXAMPLE OF THE DETERMINATION OF THE STATES SHARE OF THE ANNUAL FEDERAL APPROPRIATION TO AID IN HOSPITAL CONSTRUCTION

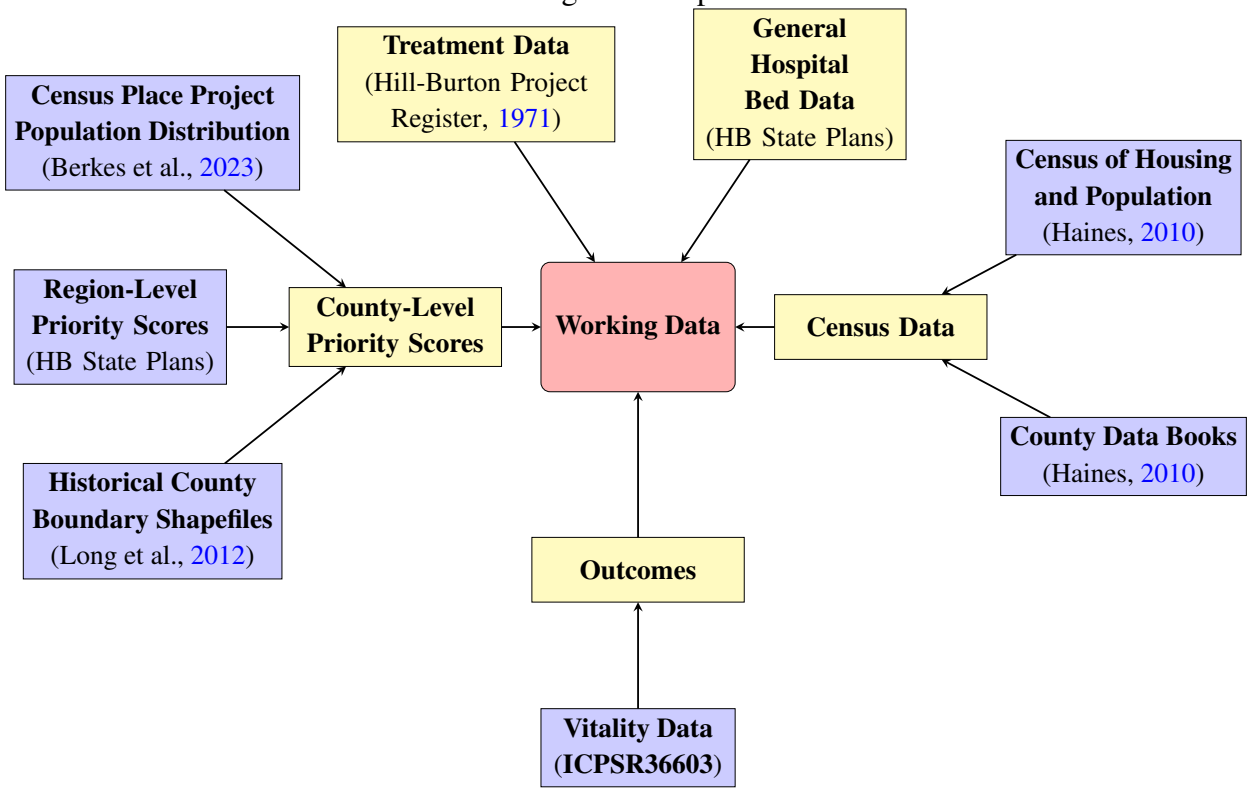
State	Allotment Percentage Squared (1)	Population (2)	Weighted Population (3)	Percentage Share (4)	Appropriations Share (*thousands*) (5)
Richest	11.9	3,000,000	332,700	0.79	$1,185
Average	25.00	3,000,000	750,000	1.70	$2,685
Poorest	56.25	3,000,000	1,687,500	4.02	$6,030
U.S. Total	—	150,000,000	42,000,000	100.00	150,000

Notes: Replicated from Brinker and Walker, 1962.

Source: Adapted from U.S. Congress, House Committee on Interstate and Foreign Commerce, *Hearings on H.R. 7341*, 83d Cong., 2d Sess., 88.

C Data Construction Chart

This figure depicts the various data sources used and how they fit together to create the main working data. Data sources labeled as (HB State Plans) are those I digitized specifically for this project. The source for these Hill-Burton data is about 320 unique State Plans published under Hill-Burton. The sources and titles are cataloged in a separate code book.



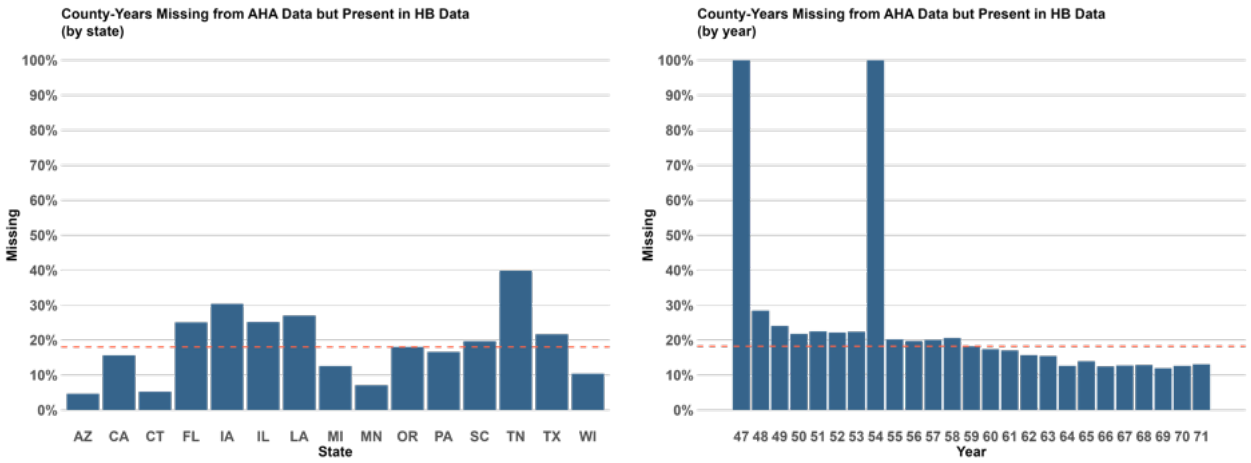
D Comparing the Hill-Burton and American Hospital Association Hospital-Level Data

At the core of this project are data from the health facilities surveyed under Hill-Burton Act. I have collected and digitized novel data on U.S. health facilities at the facility level from 1947 to 1971. These data compliment and improve upon the commonly used source: The American Hospital Association Annual Survey (AHA data). The AHA data from 1948-1975 were collected, digitized, and shared by Amy Finkelstein.[40] The Hill-Burton survey data improves on the AHA data in several ways. The improvements enumerated below are based on a comparison of short-term, general hospitals.

D.1 The Hill-Burton data offer more complete coverage of the era

The AHA data have gaps in coverage for county-years in my sample. Figure A2 shows the distribution of county-years missing in the AHA data that are present in the Hill-Burton data. In both panels, the red dashed line indicates the mean percentage missing. In Panel (b), the years are abbreviated in the following form: from 1947 to 47. A county-year is considered missing if the AHA data do not report at least one general hospital.[41]

FIGURE A2: THE PERCENT OF COUNTY-YEARS MISSING IN THE AHA DATA BUT PRESENT IN THE HILL-BURTON DATA



(a) By State

(b) By Year

[40] Finkelstein digitized these data under the support of award P30AG012810 from the National Institute on Aging of the National Institute of Health.

[41] This comparison is strictly at the county-year level, not the facility level. I am working on a facility level comparison that will be added upon completion.

D.2 The Hill-Burton data are more detailed

The Hill-Burton data will provide enriched insights compared to the AHA data. For example, the AHA data give a total count of hospital beds for a given facility without noting the quality the beds. The Hill-Burton surveys measured the number of beds that met contemporary medical standards, which describes a hospital's preparedness to meet its community's medical needs and is crucial when identifying the causal effect of medical capital on local communities. The Hill-Burton data also contain useful variables missing in the AHA data like the number of bassinets in a hospital, the occupancy rate, and the total patient days over the relevant year. Table A3 provides a list of variables in each data source.

TABLE A3: COMPARISON OF VARIABLES IN HILL-BURTON AND AMERICAN HOSPITAL ASSOCIATION DATA

	Present In	
Variable	Hill-Burton	American Hospital Association
Facility Name	✓	✓
County	✓	✓
City	✓	✓
Medical Type	✓	✓
Control	✓	✓
Acceptable Beds	✓	–
Replaceable Beds	✓	–
Unacceptable Beds	✓	–
Total Beds	✓	✓
Number of Bassinets	✓	–
Number of Patients Admitted	✓	✓
Number of Patient Days	✓	–
Total Expenses	–	✓
Annual Payroll	–	✓
Paid Persons	–	✓

D.3 The Hill-Burton data contain more facility types

The Hill-Burton data add a more complete set of hospitals by type, including short-term, long-term, chronic disease, and tuberculosis hospitals as well as mental-health facilities, nursing homes, public health centers, and diagnostic and treatment centers. Finally, the compulsory nature of the Hill-Burton survey means that the Hill-Burton data surveyed hospitals that are missing in the AHA data.

D.4 Other Hill-Burton data contributions

In addition to the hospital-level data, the Hill-Burton State Plans also record the health facility networks in the form of Hospital Service Areas (HSA). These plans map the locations of hospitals by region and connect the hospitals into their respective ”networks.” These HSA details allow studies to extend beyond looking at hospitals in isolation and instead look at how a new hospital in a given network affects the entire network. The State Plans would support this by providing HSA maps and data on these HSA's (e.g., demographics, medical professionals, birth rates). Additionally, the Hill-Burton data include rich administrative details. For example, they include details on the administration of the agency that coordinated Hill-Burton projects in the state. This section enumerates the roles, powers, and hierarchy of the agency as well as the members of the agency's board and their respective affiliations.

E Geographic Distribution of Hill-Burton Treatment

Figure A3 shows the geographic distribution of total Hill-Burton funding between 1947 and 1971 for states in the sample. Because the purpose is to illustrate where states distributed federal funds, the total funds are reported by state-specific quintiles. The value of funds in each quintile is not homogeneous across states.

FIGURE A3: TOTAL HILL-BURTON FUNDING BETWEEN 1947 AND 1971 BY STATE-SPECIFIC QUINTILE

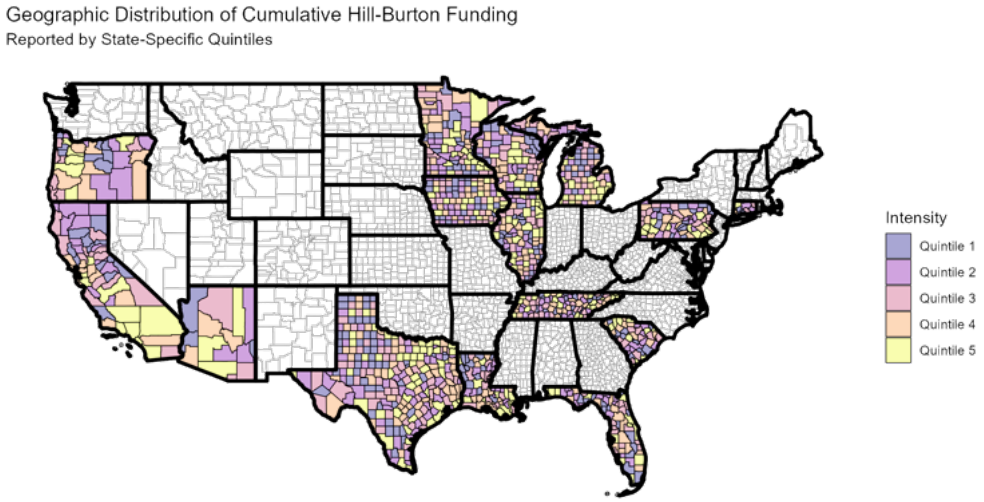
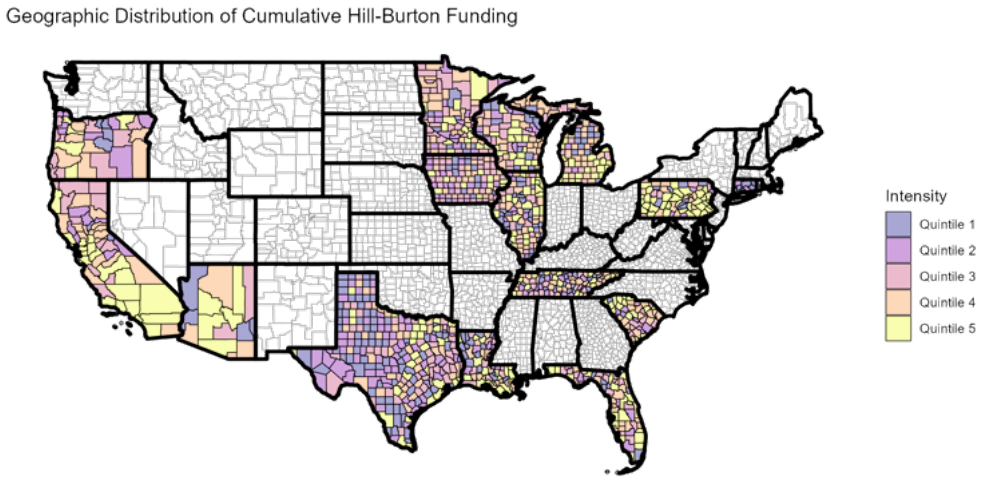


Figure A4 shows the same distribution using country-level quintiles. The value of funds in each quintile is homogeneous across states.

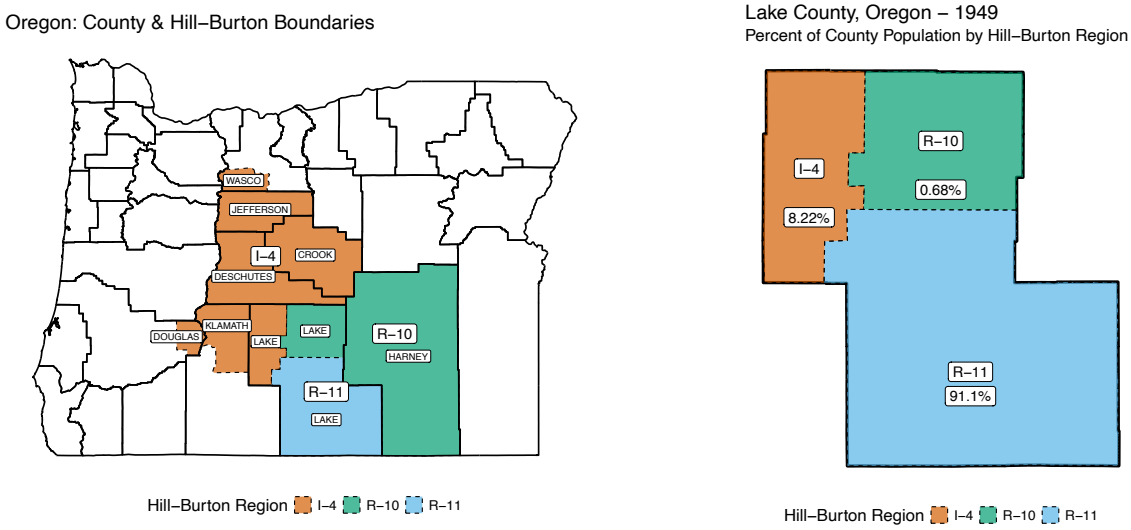
FIGURE A4: TOTAL HILL-BURTON FUNDING BETWEEN 1947 AND 1971 BY QUINTILE



F Description of the Priority Score Reweighting

The Hill-Burton priority scores are reported at the region level. Regions may be thought of as hospital service areas (HSA). Because my analysis is at the county level, I reweighted the region-level priority scores to the county level using the approach described below.

A simple aggregation of counties to the Hill-Burton region level or regions to the county level is impossible. Regions generally did not conform to county boundaries, meaning multiple counties were in a region and multiple regions were in a county. The process for reaggregation relied on Hill-Burton region maps published with the State Plans. These maps were digitized into ArcGIS as `.shp` files. These `.shp` files were then intersected with historical county boundary shapefiles from Long et al. (2012). Panel (a) shows a simplified map of Oregon from 1949 with the county and region boundaries intersected. Only three regions (i.e., I-4, R-10, and R-11) were included in this illustration for clarity. The thick boundary lines denote county boundaries. Counties and parts of counties that fall inside one of the three included regions are labeled by name. Region I-4 is a good example for how multiple counties are in the same region. There are seven distinct counties in region I-4: Crook, Douglas, Deschutes, Jefferson, Klamath, Lake, and Wasco. In the case of All but Crook, Deschutes, and Jefferson, only parts of the county are in region I-4. Panel (b) shows only Lake County, Oregon. This is an example of how multiple regions are in the same county. Note, these three regions in Lake County are the same from Panel (a). Only a portion of I-4 and R-10 reside in Lake County while the entirety of R-11 is in Lake County.



(a) County and HB Region Boundaries

(b) Lake County

FIGURE A5: PRIORITY REWEIGHTING EXAMPLE

To create county-level priority scores, I created a data set that matched each county to all the regions within that county. In the case of Lake County, OR, it was matched to regions I-4,

R-10, and R-11. Then, the distribution of the population within each county was mapped into the respective regions using data from the Berkes et al. (2023). I used the 1940 decennial census population distribution because it is the most recent full-count census that has been geo-referenced. To calculate a county-level priority score, the region-level priority scores within the county are weighted by their respective populations:

$$\text{County Priority}_I = \frac{\sum_{i \in I} (\text{pop}_i \cdot \text{priority}_i)}{\sum_{i \in I} (\text{pop}_i)}$$

where i represents a region within county I. For example, the 1949 priority score for Lake County, OR is a weighted average drawn from regions I-4, R-10, and R-11 with the respective weights shown on Panel (b). This process was repeated for each county-year in the sample. The maps vary over time, meaning that a unique county-region map was generated for each year. These annual maps include changes to county and/or region boundaries.

G Percent Need Met Example

TABLE A4: EXAMPLE OF THE PERCENT NEED MET DETERMINATION: FLORIDA 1958, SELECTED COUNTIES

Year	State	County	Hill-Burton Region	Civilian Population	Bed Need Ratio	Area Ratio	Existing Acceptable Beds	Bed Pool Allocation	Total Beds Allowed Under P.L. 725	Additional Beds to be Constructed	Without Bed Pool Allocation		With Bed Pool Allocation	
											Percent Need Met	Priority Score	Percent Need Met	Priority Score
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Comparison A														
1958	Florida	Taylor	R-11	13,820	2.5	35	30	0	35	5	85.71	D	85.71	D
1958	Florida	Hardee	R-24	13,365	2.5	33	26	17	50	24	78.79	D	52	C
Comparison B														
1958	Florida	Putnam	I-7	34,039	4	136	67	0	136	69	49.26	B	49.26	B
1958	Florida	Brevard	I-11	34,150	4	137	70	109	246	176	51.09	C	28.46	B
Comparison C														
1958	Florida	Calhoun	R-6	11,438	2.5	29	25	0	29	4	86.21	D	86.21	D
1958	Florida	Gulf	R-7	10,771	2.5	27	22	21	48	26	81.48	D	45.83	B
1958	Florida	Franklin-Liberty	R-8	12,989	2.5	32	25	0	32	7	78.13	D	78.13	D

This is a stylized version of the "Bed Distribution Program: General Hospitals" table from the Florida State Plan of 1958 from which percent need met values are calculated. I have abbreviated the rows and columns to improve readability. Columns (4)-(5), (7)-(11) and (13) are present in the actual table. I added Columns (1)-(3) and (6) to improve clarity. I added Columns (12)-(13) and (15) to illustrate how Column (9), Bed Pool Allotment, materially affected the Percent Need Met and Priority Score outcomes for otherwise similar areas. There are three examples in the table, one in each panel. Each panel demonstrates an example of two or more similar regions. These regions should have similar Percent Need Met and Priority Scores, as is demonstrated by column (12) and (13). Due to choices of the Hospital Advisory Council, one region in each county has received additional beds through the Bed Pool Allocation. As a result, their priority score changed, increasing the probability of funding in each case. Receiving beds from the Bed Pool Allocation could only increase the likelihood of funding.

H Hospital Advisory Council

Table A5: Effect of Local Representation on the Hospital Advisory Council on Hill-Burton Variables

Dependent Variable =	Percent Need Met	Treated	HB Beds (per 1,000)	HB Funds (per 1,000)
	(1)	(2)	(3)	(4)
Panel A				
HAC Membership (count)	1.148	-0.009	0.001	2.758
	(0.747)	(0.014)	(0.007)	(329.494)
Observations	893	1,094	1,094	1,094
Mean of DV	70.14	0.62	0.88	66,922.34
Panel B				
HAC Membership (binary)	1.236	-0.006	0.026	1,121.790
	(2.736)	(0.059)	(0.038)	(2,149.036)
Observations	893	1,094	1,094	1,094
Mean of DV	70.14	0.62	0.88	66,922.34
Hill-Burton Controls	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y
Weighted by Population	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Panel A reports the results of regressing observed percent need met values and Hill-Burton treatment measures on Hospital Advisory Council (HAC) membership defined as a count variable. Panel B reports the results of regressing observed percent need met values and Hill-Burton treatment measures on Hospital Advisory Council (HAC) membership defined as a binary variable. HB Controls include median family income and the county's population that lives in an urban area. Demographic Controls include the percent of the population that is non-white and the percent of the population in an urban area. Age Controls include the percent of the population under five and the percent of the population above 65. Standard errors are clustered at the county level and reported in parentheses.

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