Investigating the Allocation of Hill-Burton Funding Across States

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1 Assembling the Data

In assembling the panel dataset for the Hill-Burton fund allocation analysis, I followed a systematic approach to clean and merge multiple data sources. The process began with cleaning and reshaping the per capita income (`pcinc`) and population (`pop`) datasets from the Bureau of Economic Analysis. I began by calculating smoothed state per capita income values using three-year averages, in line with the allocation formula. Additionally, I converted character columns to numeric formats, ensuring consistency across the dataset.

Following the Hill-Burton allocation formula, I calculated the national average per capita income, state index numbers, allotment percentages, and weighted populations. I then computed state allocation shares and predicted Hill-Burton allocations for each state-year. Throughout this process, I applied the specified minimum and maximum thresholds for allotment percentages as well as the minimum allocation amounts for 1948 and subsequent years. To verify the accuracy of my calculations, I compared the 1947 allotment percentages with those documented in the Federal Register (31 August 1946, p. 9641). While there were minor discrepancies, likely due to rounding or slight variations in the source data, the overall numbers were consistent.

The final step involved merging the predicted allocations with the actual Hill-Burton fund allocations from the Hill-Burton Project Register (`hbpr`) dataset. During this process, I discovered a critical issue: 83 state-year observations had missing values for the `hbfunds` variable. Given the ambiguity around whether the missing values represented zero allocations or were truly absent, I opted to retain them as `NA` in the primary dataset. Otherwise, removing all observations with `NA` values for `hbfunds` would have reduced the sample from 768 state-year observations to only 240, spanning just five years (1957-1961). Instead, I opted to retain the `NA` values in the dataset and continue the analysis as normal, preserving the original data and leaving room for different treatment options for my analysis. The final panel dataset includes three key variables for each state-year: `stateyear` (unique identifier), `predicted` (predicted allocation), and `hbfunds` (actual allocation, if available).

2 Analysis of Hill-Burton Allocation Percentages and Predictions

2.1 Assessing Minimum and Maximum Allotment Percentages

To evaluate the empirical relevance of the minimum (0.33) and maximum (0.75) allotment percentage values in practice, I analyzed the distribution of allotment percentages in the final allocations dataset. Table 1 shows that a small but noteworthy proportion of states consistently reached the minimum threshold of 0.33, with the percentage of states at this boundary varying between 2.1% and 12.5% each year. The highest occurrence was observed in the early years of the program

(1947-1948). Conversely, no states reached the maximum threshold of 0.75 during the entire period examined.

Year	% at Minimum	% at Maximum
1947	12.5	0.0
1948	10.4	0.0
1949	8.3	0.0
1950	6.2	0.0
1951	2.1	0.0
1952	4.2	0.0
1953	4.2	0.0
1954	6.2	0.0
1955	6.2	0.0
1956	6.2	0.0
1957	6.2	0.0
1958	6.2	0.0
1959	6.2	0.0
1960	4.2	0.0
1961	4.2	0.0
1962	4.2	0.0

Table 1: Percentage of States at Minimum/Maximum Allotment Percentage by Year

These findings highlight the empirical significance of the minimum allotment percentage of 0.33, which consistently constrains a subset of states throughout the program's duration. Although this threshold did not affect the majority of states, its influence on a recurring portion of the population underscores its relevance. In contrast, the maximum threshold of 0.75 does not appear to be binding in practice, hence making it less relevant for empirical analysis.

2.2 Analysis of Predicted vs. Actual Hill-Burton Allocations

To assess whether the predicted state allocations are a good predictor of actual federal Hill-Burton funding allocations, I included both visual and statistical analyses. Figure 1 presents a scatter plot of predicted allocations against actual allocations for all state-years. The plot reveals a positive relationship between predicted and actual allocations, as evidenced by the upward trend in the data points. The dashed red line indicates a perfect 1:1 relationship between predicted and actual allocations. Notably, many data points cluster near this line, suggesting that the predictions align closely with the actual allocations for a large portion of the dataset. However, there is considerable scatter around the line, indicating that the relationship is not perfect. Some states received significantly more or less funding than predicted, as shown by points far above or below the line.

To quantify this relationship, I conducted a simple linear regression analysis, with results presented in Table 2. The regression coefficient on the predicted allocation is 0.845, which is statistically significant at the 1% level. This suggests that, on average, a $1 increase in predicted allocation is associated with a $0.845 increase in actual allocation. The R-squared value of 0.579 indicates that the predicted allocations explain about 57.9% of the variation in actual allocations, which is substantially higher than initially reported. This suggests that the prediction formula captures a significant portion of the variation in actual allocations, although other factors still play a role.

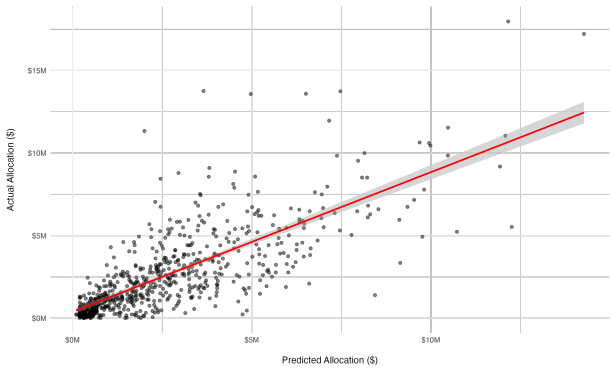

Figure 1: Scatter plot of Predicted vs Actual Hill-Burton Fund Allocations

	Dependent variable:
	Actual Allocation
Predicted Allocation	0.845***
	(0.028)
Constant	395,014.300***
	(96,682.030)
Observations	685
R-squared	0.579
Adjusted R-squared	0.578
Residual Std. Error	1,658,934.000 (df = 683)
F Statistic	939.491*** (df = 1; 683)
Note: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$	

Table 2: Regression of Actual on Predicted Allocations

Based on these analyses, we can conclude that the predicted state allocations are a good predictor of actual federal Hill-Burton funding allocations. The positive and statistically significant relationship between predicted and actual allocations indicates that the allocation formula played a substantial role in determining funding levels.

3 Documenting the Allocation Formula

To identify reliable sources on the state-level allocation formula under the Hill-Burton Act, I employed a targeted search strategy using Boolean operators in Google Scholar. My initial search terms included combinations such as `"Hill-Burton Act"`, `"allocation formula"`, and `"hospital construction funds"`. I also experimented with variations like `"federal grant formula"`, `"hospital funding"`, and `"index number"` to capture different phrasings of the same concept. To further refine the results, I used Google Scholar's advanced search features, such as date range filters to focus on publications from the 1940s to the 1960s since these years corresponded to the initial implementation and early years of the Hill-Burton program. I also utilized the "cited by" feature to identify more recent scholarly works that referenced original sources on the allocation formula.

This search yielded a number of results, but the most relevant reference I found is the document titled `Allotment Formula, Hospital Survey and Construction Act` from the Social Security Bulletin (May 1954). The reason this document is particularly an excellent resources is due to its credibility and detailed explanation of the allocation formula. In particular, it includes a step-by-step breakdown of the calculation for the "allotment percentage," which weights each state's population by its fiscal ability. Furthermore, it includes information about minimum and maximum allotment percentages and provides illustrative examples of using allotment percentage and population to determine State share of annual appropriation.

Additional papers and resources I found include `The Hospital Construction Act: An Evaluation of the Hill-Burton Program` by Judith and Lester Lave and `The Hill-Burton Act: 1948-1954` by Paul A. Brinker and Burley Walker. These sources not only provide critical evaluations of the Hill-Burton program but also offer valuable historical context and insights into the funding formula's long-term impacts on states, especially in low-income regions.