hwk2-3-analysis

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0.1 ECON 470 Hwk2-3

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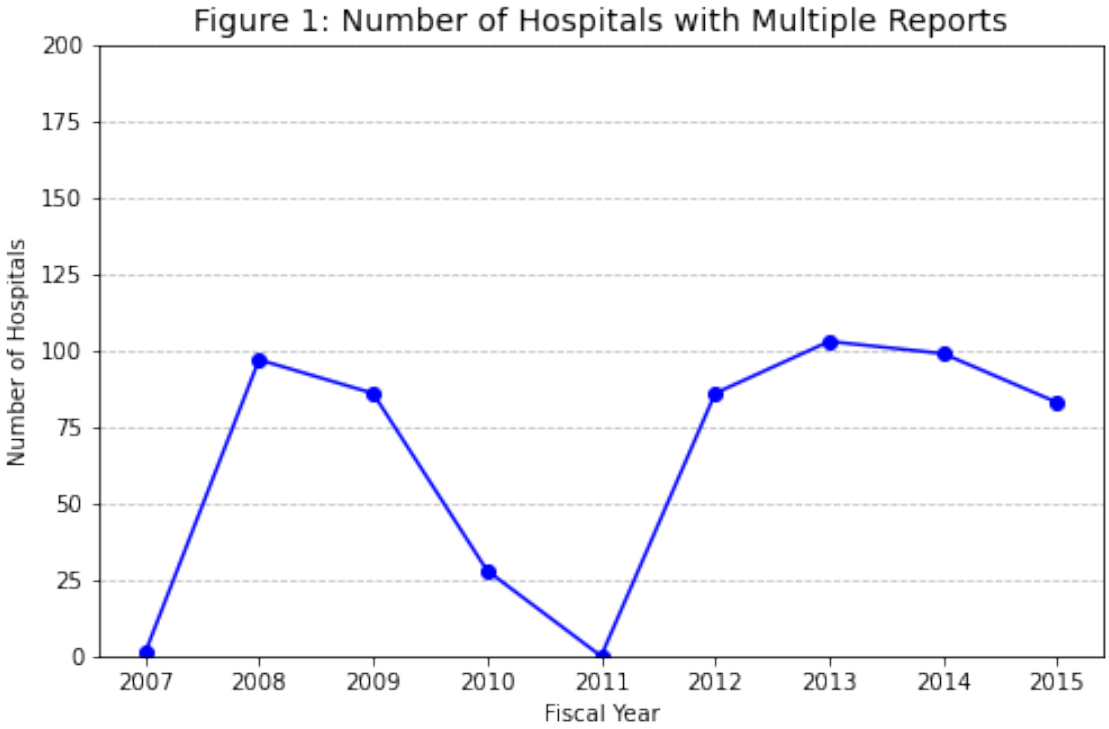
GitHub Repository

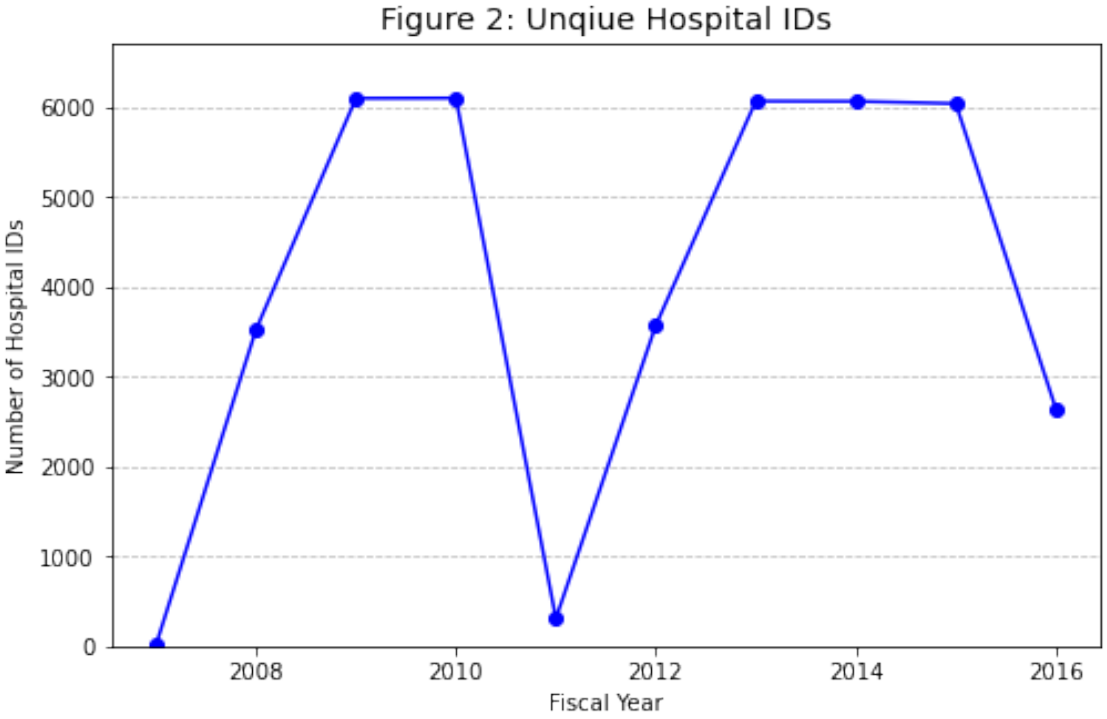
0.2 Summarize Data

Question 1: *How many hospitals filed more than one report in the same year?*

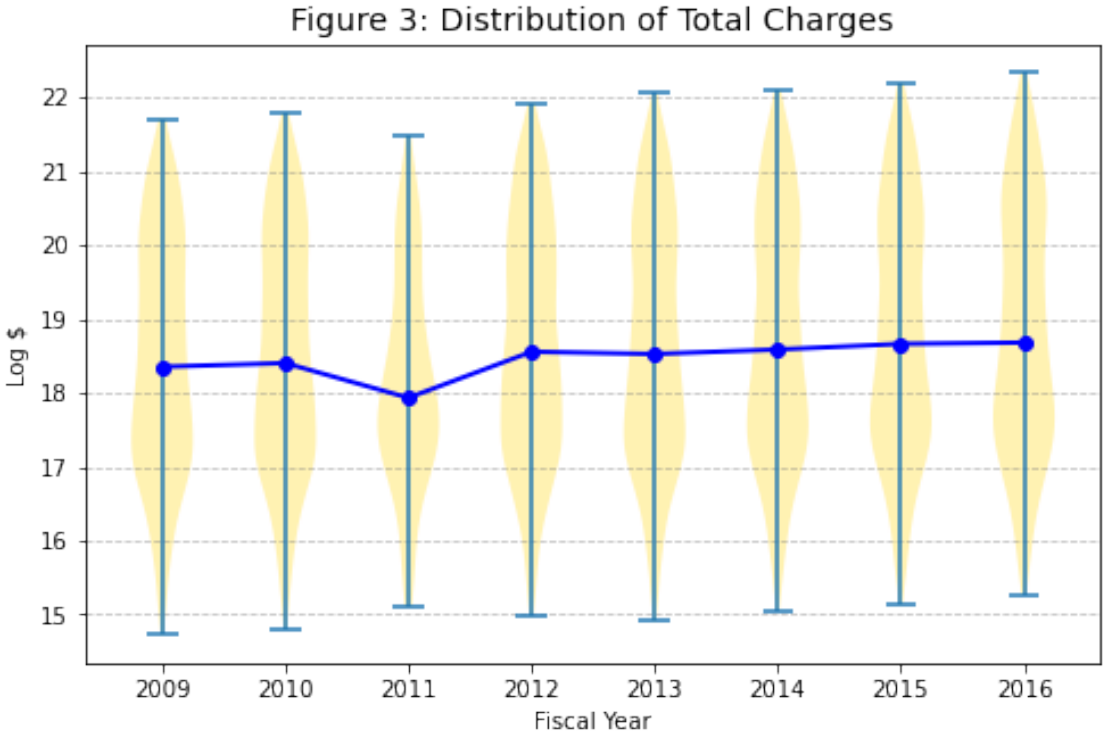
Number of Unique Hospital IDs: 6739



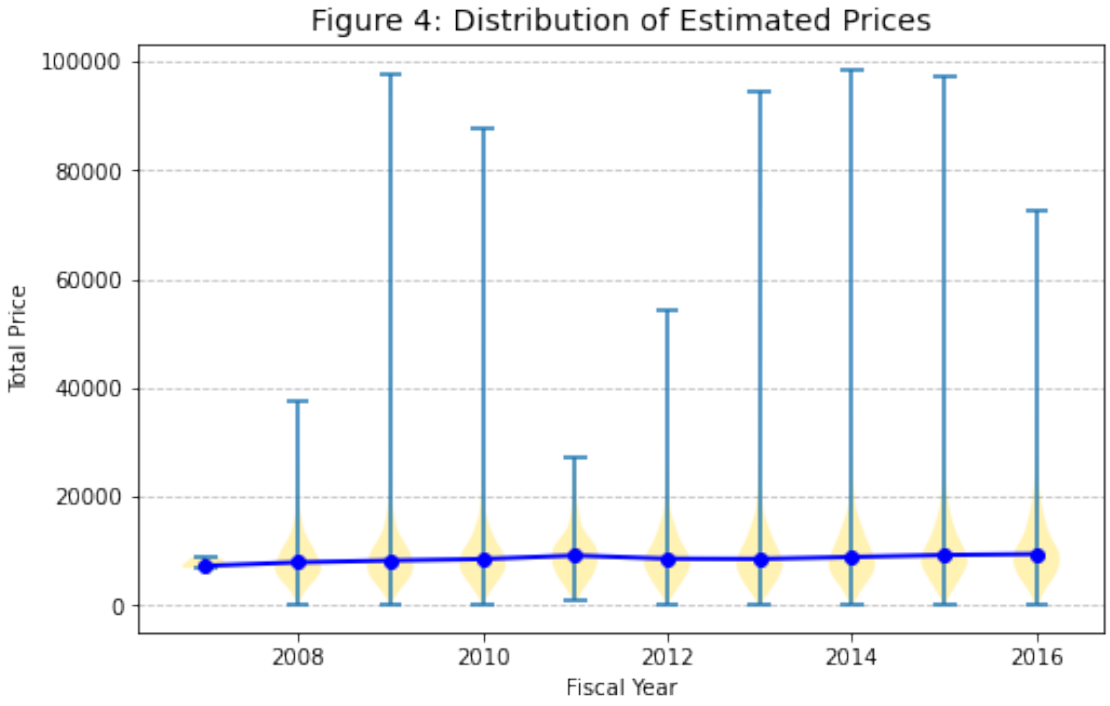
Question 2: *After removing/combining multiple reports, how many unique hospital IDs (Medicare provider numbers) exist in the data?*



Question 3: *What is the distribution of total charges (tot_charges in the data) in each year?*



Question 4: *What is the distribution of estimated prices in each year?*



0.3 Estimate ATEs

Question 5: *Calculate the average price among penalized versus non-penalized hospitals.*

Table 1: Avg. Price for Penalty Status

Penalty Status	Average Price
Penalized	10171.5
Non-Penalized	9651.82

Question 6: *Split hospitals into quartiles based on bed size. To do this, create 4 new indicator variables, where each variable is set to 1 if the hospital's bed size falls into the relevant quartile. Provide a table of the average price among treated/control groups for each quartile.*

Table 2: Avg. Price Among Treated & Control Groups

Quartile	Penalized Avg. Price	Non Penalized Avg. Price
1	$8,888.99	$7,694.39
2	$10,029.57	$8,181.43
3	$11,146.07	$9,577.29
4	$12,954.61	$11,629.75

Question 7: *Find the average treatment effect using each of the following estimators, and present your results in a single table:*

Table 3: ATE Estimates

	INV	MAH	IPW	OLS
ATE	$1,482.630561	$1,482.630561	$1,492.327633	$1,492.601994
SE	$410.488187	$410.488187	$410.375889	$410.384427

Question 8: *With these different treatment effect estimators, are the results similar, identical, very different?*

The estimated ATEs across the four different estimators—**Inverse Variance Matching (INV), Mahalanobis Matching (MAH), Inverse Propensity Weighting (IPW), and Ordinary Least Squares (OLS)**—are highly consistent with each other. - The ATE estimates range from $1,482.63 (INV/MAH) to $1,492.60 (OLS), a difference of only $10, which is relatively small in magnitude. - The INV and MAH Matching estimators produce identical results, suggesting that both methods are capturing similar patterns in the data. - The IPW and OLS estimates are slightly higher but remain within a very narrow range, indicating that the choice of estimation method does not significantly impact the estimated treatment effect.

Additionaly, the Standard Errors (SEs) across all estimators are nearly identical (~$410), implying that the level of precision and uncertainty surrounding these estimates remains consistent regardless of the estimation technique used.

Question 9: *Do you think you've estimated a causal effect of the penalty? Why or why not? (just a couple of sentences)*

While I have estimated an association between the penalty and hospital prices, the results cannot be used to definitively claim causality. The methods used—**matching and weighting**—help control for observable confounders, but unobserved factors (e.g., hospital quality, patient demographics, or other financial incentives) could still influence both the penalty and pricing.

Additionally, penalties are not randomly assigned, meaning there may be selection bias that our estimators cannot fully eliminate. A stronger causal claim would require an instrumental variable or a randomized experiment.

Question 10: *Briefly describe your experience working with these data (just a few sentences). Tell me one thing you learned and one thing that really aggravated or surprised you.* This data was extremely frustrating when trying to merge, and somehow, even after restarting maybe 5 times, my data is still incomplete (2011: multiple reports & unique hospital IDs). However, I was suprised by the variation between charges and estiamted total prices for all hospitals.