Homework 2

Research Methods, Spring 2026

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1. Box-and-whisker plot of county plan counts by year

Distribution of MA plan counts by county, 2014–2019 (SNP/800/PDP dropped in build)

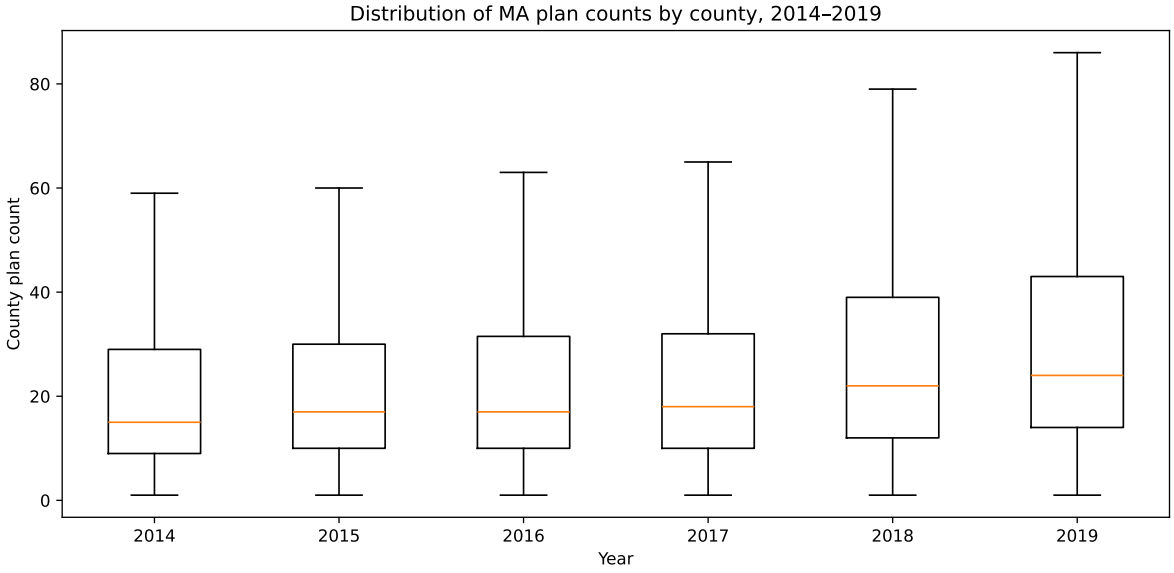

Table 1: County plan counts summary by year

year	count	mean	median	std	min	max
2014	3162	23.900000	15.000000	29.300000	1	389
2015	3169	24.800000	17.000000	29.200000	1	359
2016	3175	26.200000	17.000000	31.400000	1	398
2017	3172	26.900000	18.000000	32.100000	1	408
2018	3185	32.400000	22.000000	39.500000	1	469
2019	3196	36.100000	24.000000	43.500000	1	525

Q1 answer: After removing SNPs, 800-series plans, and PDP-only plans, the county-level distribution of plan counts increased from a median of 15 (2014) to 24 (2019). The mean also moves from 23.9 to 36.1. Overall, this looks sufficient in the typical county, but the right tail suggests some large counties may have too many plan options.

2. Histogram of plan bids in 2014 vs 2018

Plan bid distribution, 2014

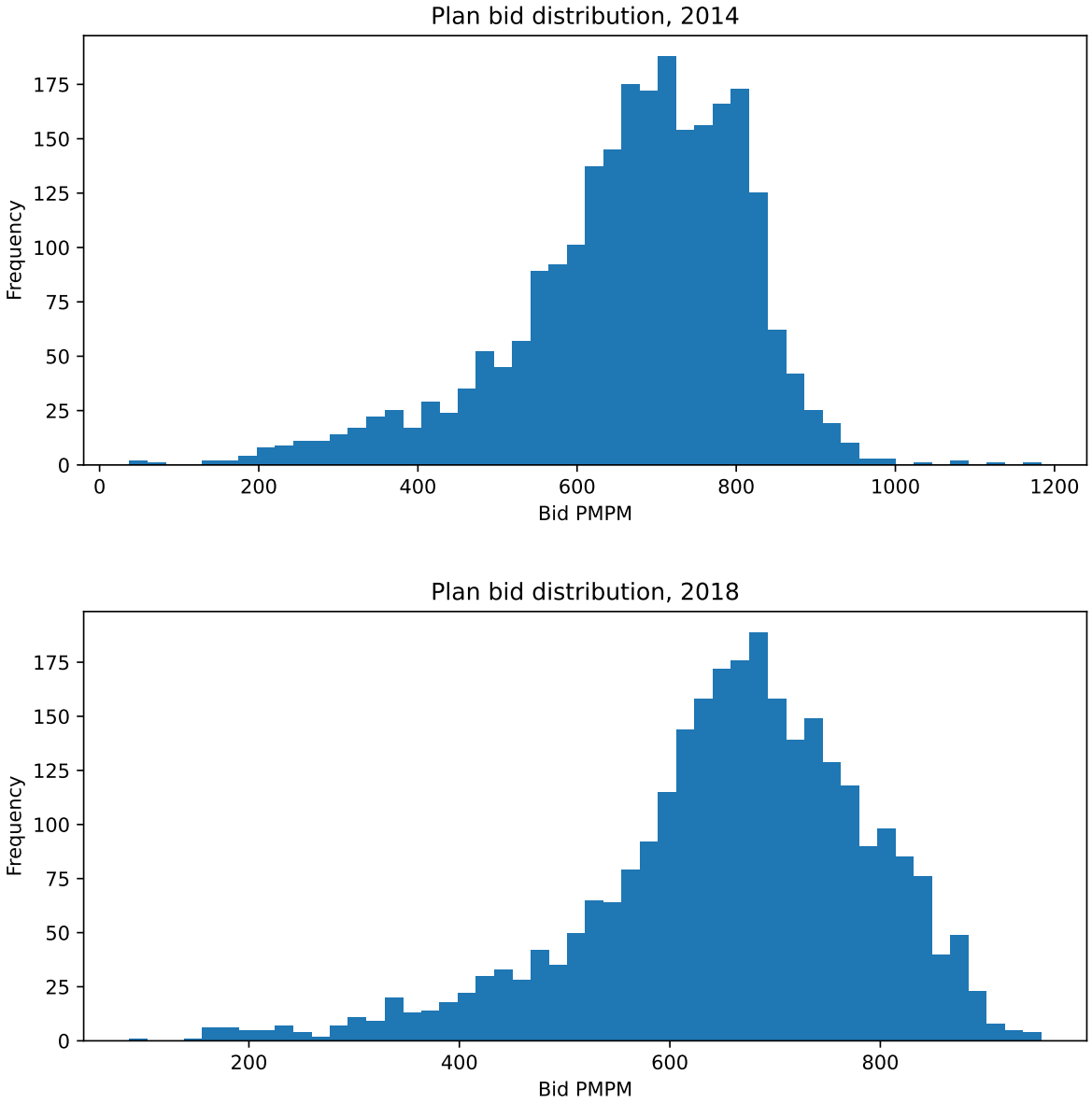

Figure 1: Plan bid distribution, 2018

Table 2: Bid summary statistics (2014 vs 2018)

year	n	mean	median	p10	p90
2014	2429	669.730000	692.180000	478.660000	824.370000
2018	2794	658.540000	672.220000	482.890000	816.140000

Q2 answer: Comparing 2014 to 2018, the overall bid distribution is similar but the center decreased. The mean changes 669.73 $\rightarrow$ 658.54 and the median changes 692.18 $\rightarrow$ 672.22. The upper tail (p90) moves 824.37 $\rightarrow$ 816.14.

3. Plot average HHI over time

Average county HHI over time, 2014–2019

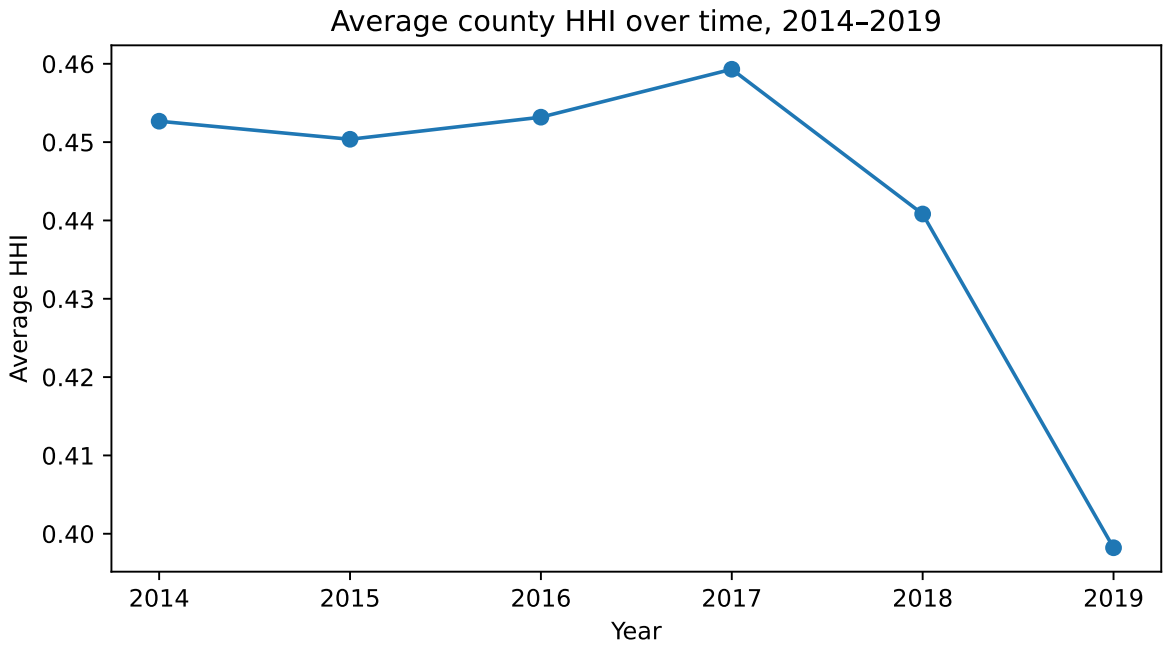

Table 3: Average HHI by year

year	avg_hhi	n
2014	0.452670	2980
2015	0.450360	2977
2016	0.453180	2988
2017	0.459300	2987
2018	0.440820	2994
2019	0.398210	2987

Q3 answer: Average county HHI falls over 2014–2019, moving from about 0.453 in 2014 to about 0.398 in 2019. Interpreting HHI as concentration, this suggests markets became more competitive on average over time.

4. Plot average MA share over time

Average Medicare Advantage share over time, 2014–2019

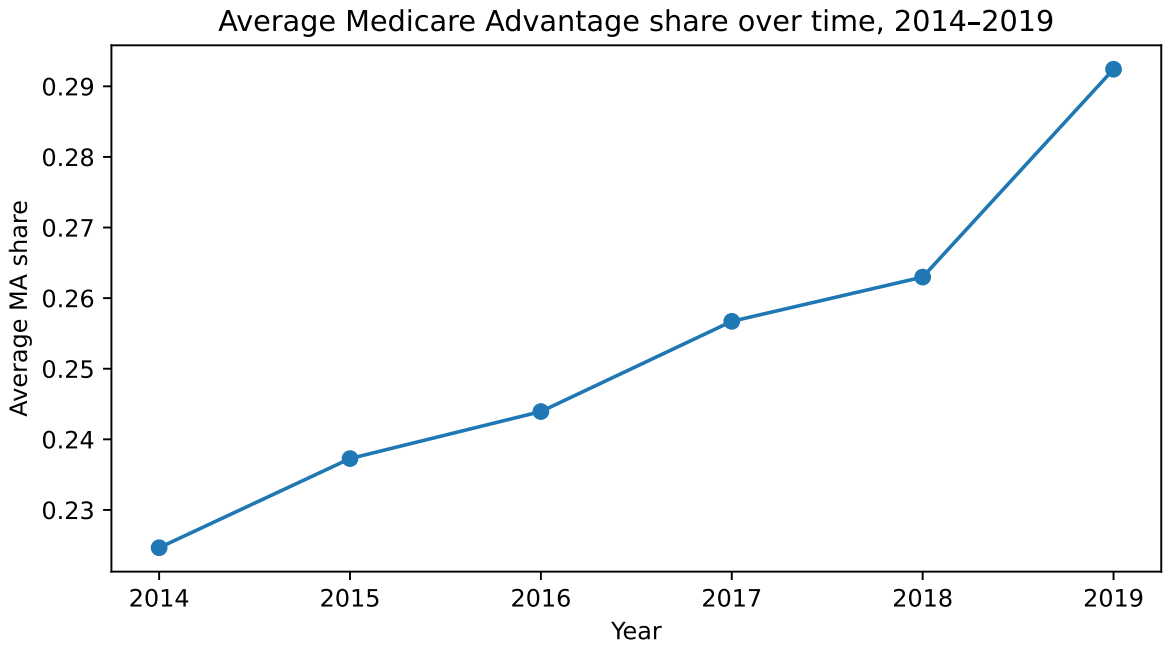

Table 4: Average MA share by year

year	avg_ma_share	n
2014	0.224649	3108
2015	0.237273	3108
2016	0.243935	3114
2017	0.256713	3119
2018	0.262980	3124
2019	0.292419	3138

Q4 answer: Average MA share increased from about 0.225 in 2014 to about 0.292 in 2019. That implies Medicare Advantage became more popular over this period.

Table 5: 2018 county bid means by market type

5. Average bids in competitive vs uncompetitive markets (2018)

market_type	n	mean	median
competitive	1006	690.080000	718.540000
uncompetitive	1036	766.750000	782.390000

Q5 answer: In 2018, the average bid is 690.08 in competitive markets and 766.75 in uncompetitive markets. The difference (competitive − uncompetitive) is -76.67, meaning bids are lower in competitive markets on average.

Table 6: 2018 average bids by FFS cost quartile and market type

6. Average bids by treated/control within FFS quartiles (2018)

ffs_quartile	group	n	mean_bid	median_bid
1	control (uncompetitive)	245	754.170000	766.780000
1	treated (competitive)	296	616.660000	688.520000
2	control (uncompetitive)	236	758.030000	771.320000
2	treated (competitive)	264	720.500000	723.040000
3	control (uncompetitive)	274	766.220000	781.020000
3	treated (competitive)	246	720.660000	721.080000
4	control (uncompetitive)	280	785.300000	802.990000
4	treated (competitive)	197	724.750000	742.670000

Q6 answer: After merging quartiles, the quartile missing rate is 0.0020. Splitting counties by FFS cost quartiles, the competitive–uncompetitive bid gap varies by quartile. The largest absolute gap appears in quartile 1 (competitive − uncompetitive = -137.51).

Table 7: Treatment effect estimates (FFS quartile controls)

7. Estimate ATE using matching, IPW, and regression (FFS quartile controls)

estimator	effect
1-to-1 matching ATE (inv var distance)	-74.800241
1-to-1 matching ATE (Mahalanobis)	-74.800241
IPW ATE (logit on FFS quartile dummies, stabilized)	-71.506329
OLS ATE (quartiles + interactions, prediction)	-71.506329

Q7 answer: Across methods, the estimated ATEs are shown in the table above. Because D=1 is defined as competitive, a negative effect means competitive markets have lower bids than uncompetitive markets. The estimates range from -74.80 to -71.51 (spread 3.29).

8. Compare the estimates across estimators

Q8 answer: The results are similar across estimators. All estimators point in the same direction (competitive markets have lower bids), and the overall range is about -74.80 to -71.51.

Table 8: Quartile vs continuous-control treatment effects

9. Re-estimate using continuous FFS costs and total Medicare beneficiaries (eligibles)

spec	effect
IPW ATE (FFS quartile dummies)	-71.506329
IPW ATE (continuous FFS + eligibles, trimmed)	-58.128257
OLS ATE (quartiles + interactions, prediction)	-71.506329
OLS ATE (continuous + interactions, prediction)	-47.113105

Q9 answer: Using weighting as my preferred estimator, the quartile-based IPW estimate is -71.51, while the continuous-controls IPW estimate is -58.13. The continuous specification is closer to zero than the quartile specification, and after trimming the share kept is 0.9322.

10. Brief reflection

Q10: Some thing that I learned with this data is that depending on whether you use continuous controls or quartiles and if you weight by enrollment, the same question can yield somewhat different estimates. In addition to the merging losses, what bothered me was how disorganized and inconsistent the raw files are between years. Things like header detection, ID cleaning, and determining why large portions of bids or matches were missing was something that took a lot of time.