Homework 4

Research in Health Economics, Spring 2025

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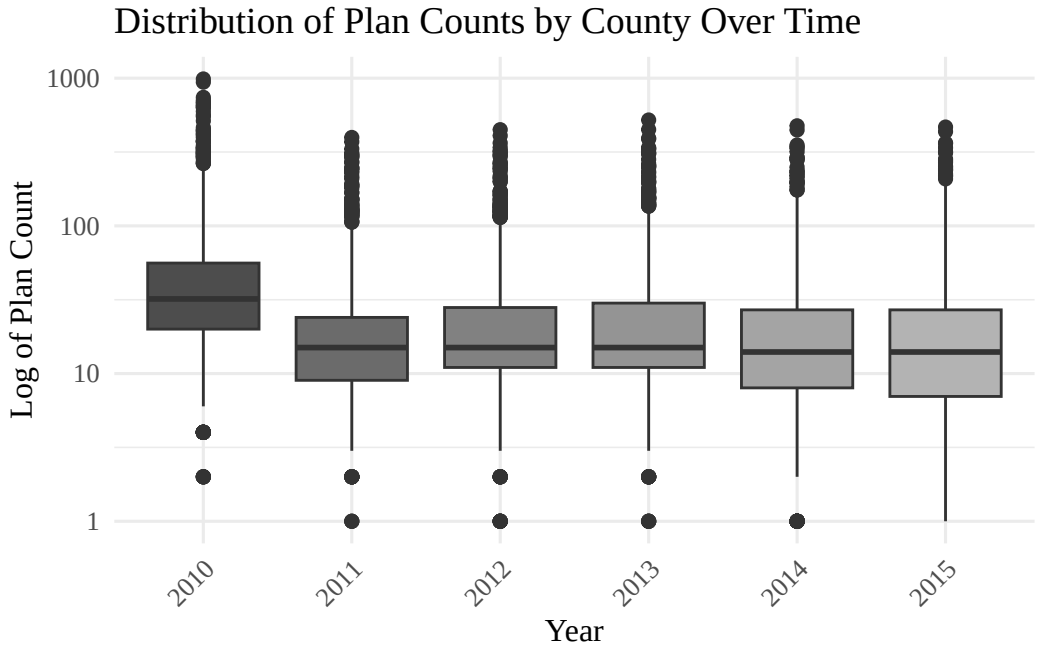
The following is my submission for Homework 4. Note that the setup and analysis for these responses are in a seperate `R` script. The GitHub repository for this work is available here.

Summarize the Data

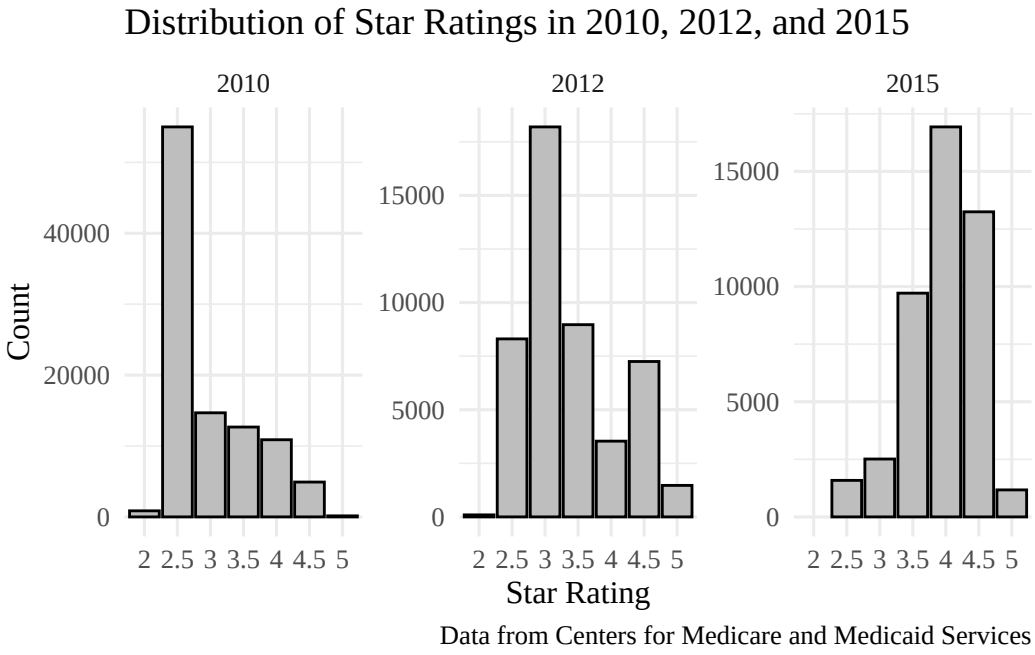
Question 1. Remove all SNPs, 800-series plans, and prescription drug only plans. Provide a box and whisker plot showing the distribution of plan counts by county over time.



Do you think that the number of plans is sufficient, too few, or too many?

The middle 50% of data indicates that the number of plans may be insufficient for coverage in certain counties. Whiskers suggest that there is significant variation in the number of plans between counties; some counties have too many plans while others have too few. It appears that the variation between counties is increasing, leading to greater disparity over time.

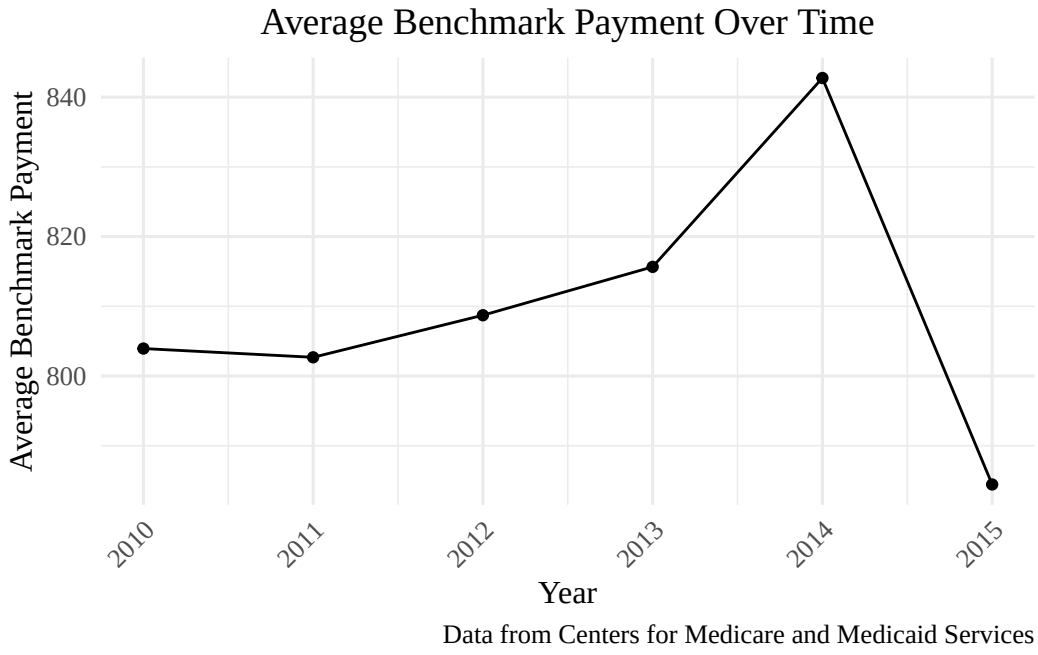
Question 2. Provide bar graphs showing the distribution of star ratings in 2010, 2012, and 2015.



How has this distribution changed over time?

There is a noticeable shift toward the right, meaning more plans now receive ratings of 3 or higher. This means that Medicare Advantage plans have improved in quality over time, likely in response to quality incentive programs.

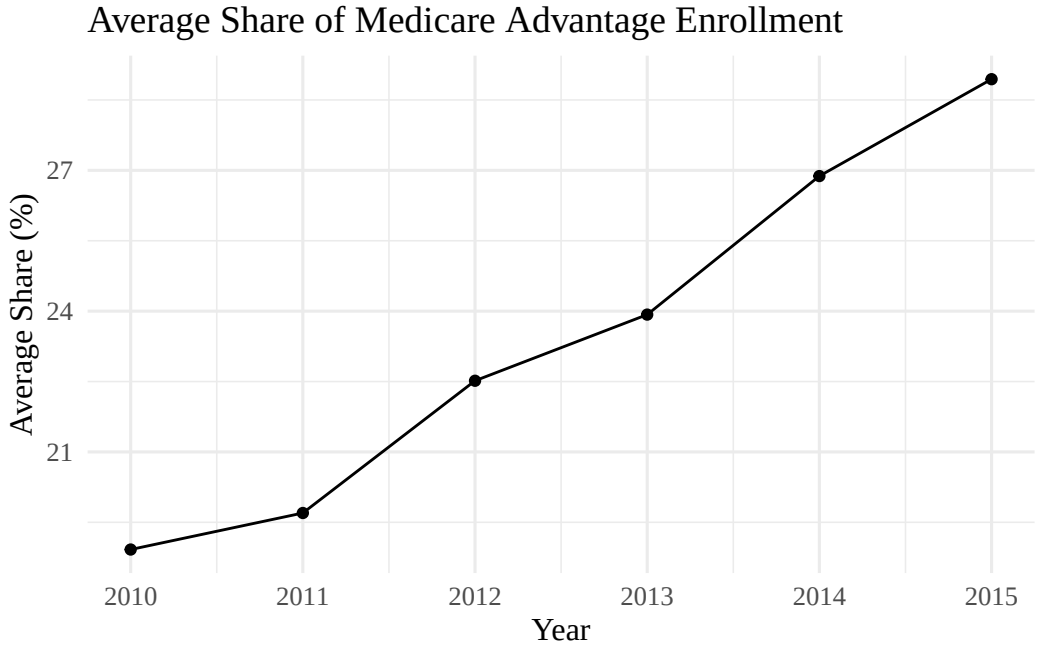
Question 3. Plot the average benchmark payment over time from 2010 through 2015.



How much has the average benchmark payment risen over the years?

Average benchmark payments increased steadily until 2015, where they faced a signficant drop. This reflects several of the provisions of the Affordable Care Act including, but not limited to, reduced pyaments, the star ratings system, and adjustments in how bids were structured.

Question 4. Plot the average share of Medicare Advantage over time from 2010 through 2015.



Has Medicare Advantage increased or decreased in popularity? How does this share correlate with benchmark payments?

The popularity of Medicare Advantage has increased stedily over time – more eligible beneficiaries are choosing Medicare Advantage plans. There appears to be a positive relationship between MA enrollment and benchmark payments, as benchmark payments must increase to cover all beneficiaries in a plan. This suggests that higher benchmark payments attract more enrollees, with increased enrollment leading to better payments.

Estimate ATEs

Question 5. Calculate the running variable underlying the star rating. Provide a table showing the number of plans that are rounded up into a 3-star, 3.5-star, 4-star, 4.5-star, and 5-star rating.

Table 1: Rounded Star Ratings in 2010

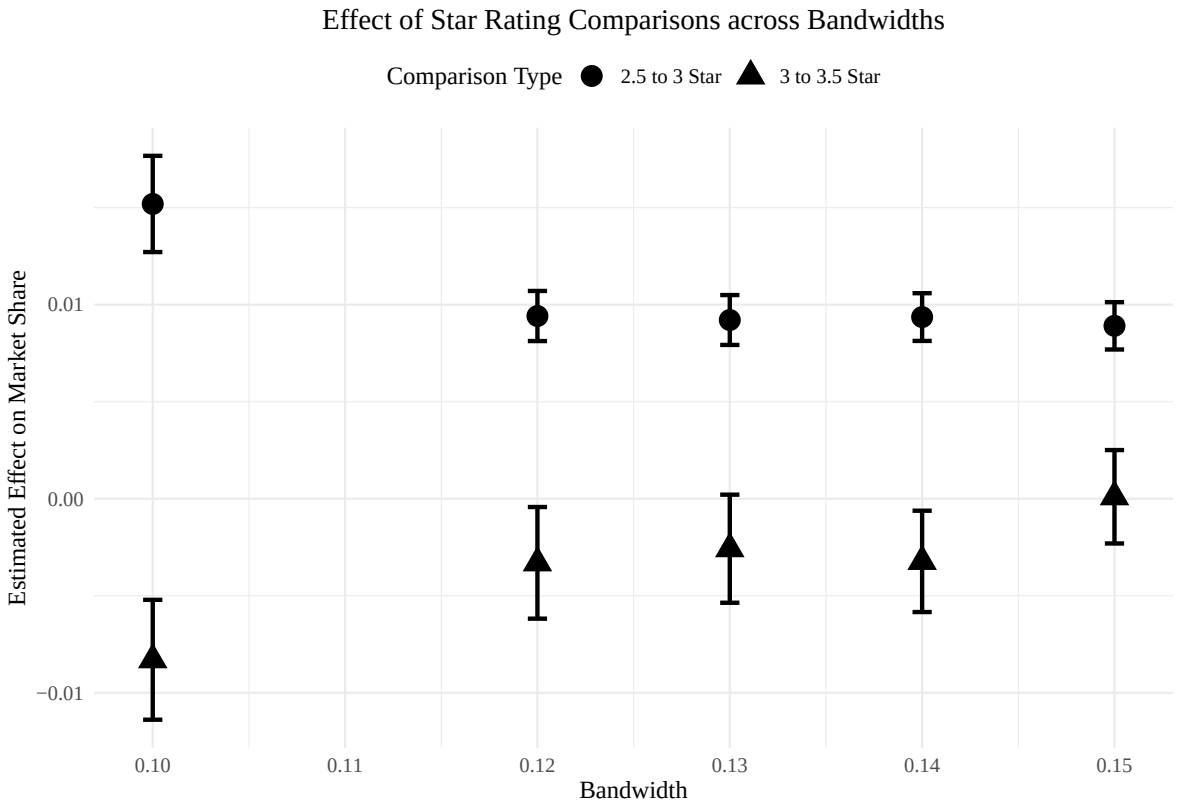
Star Rating	Count
3.0	1304
3.5	1547
4.0	1399
4.5	176
5.0	26

Question 6. Using the RD estimator with a bandwidth of 0.125, provide an estimate of the effect of receiving a 3-star versus a 2.5 star rating on enrollments. Repeat the exercise to estimate the effects at 3.5 stars.

Table 2: Effect of Star Rating on Enrollment Near Thresholds

	2.5–3	3–3.5	3.5–4
Rounded	0.009	−0.003	−0.006
	(0.001)	(0.003)	(0.002)
Running Score	−0.022	0.022	0.075
	(0.007)	(0.017)	(0.011)
Num.Obs.	4039	1656	1609
R2	0.019	0.001	0.028

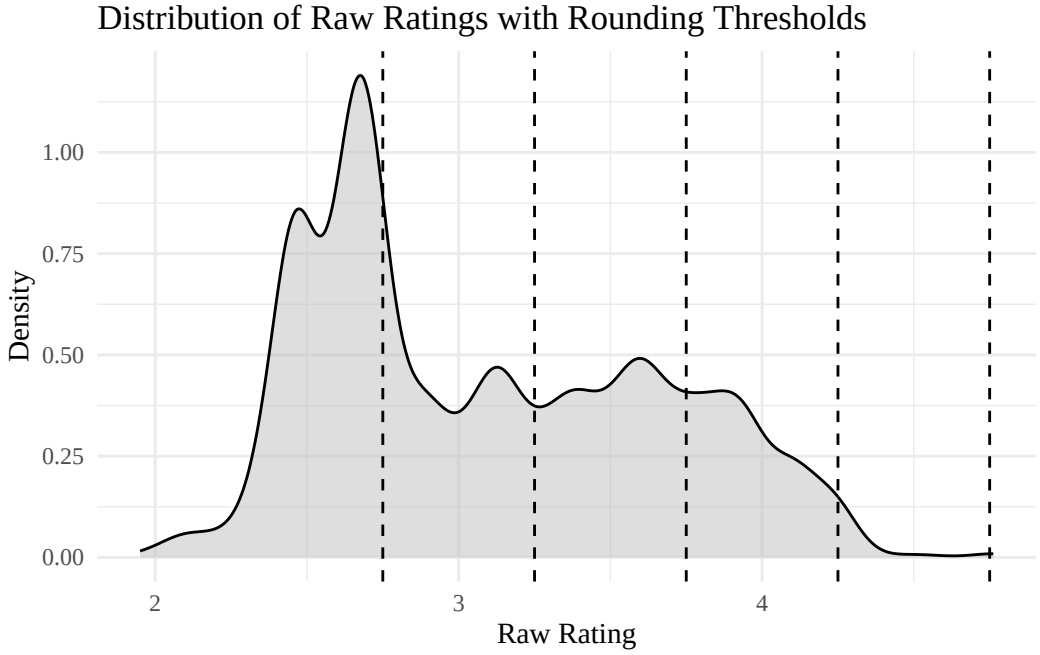
Question 7. Repeat your results for bandwidths of 0.1, 0.12, 0.13, 0.14, and 0.15



How sensitive are your findings to the choice of bandwidth?

Across most bandwidths, the estimated effects are robust to changes in bandwidth. The results are more sensitive to the choice of bandwidth at the extremes. This suggests that smaller bandwidths might exclude relevant data, while larger bandwidths may include irrelevant data.

Question 8. Examine whether contracts appear to manipulate the running variable. In other words, look at the distribution of the running variable before and after the relevent threshold values.



As seen above, the distribution of the running variable is higher before each of the threshold values, and dips right after. This pattern does not suggest evidence of manipulation. In that situation, we would expect bunching just above the cutoff as insurers try to get higher ratings. However, the drop may reflect changes in plan behavior after crossing a threshold.

Question 9. Examine whether plans just above the threshold values have different characteristics than contracts just below the threshold values. Use HMO and Part D status as your plan characteristics.

Table 3: Plan Characteristics Around Star Rating Thresholds

Star Rating	Percent HMO Plans	Percent with Part D	Number of Plans
3.5	48%	87%	2849
4.5	85%	69%	1162

Question 10. Summarize your findings from 5-9. What is the effect of increasing a star rating on enrollments? Briefly explain your results.

Increasing star rating appears to have a positive effect on plan enrollment. Plans with higher rounded star ratings generally experience an increase in market share—especially for plans between 3.5 and 4 stars, where the estimated effect is strongest at approximately 0.075. This impact diminishes when using wider bandwidths, suggesting that the effect is more localized around thresholds.

The distribution of raw ratings across rounding thresholds may indicate that insurers are not manipulating their raw scores to cross rating thresholds. Additionally, plan characteristics differ across thresholds but patterns are too inconsistent to fully explain enrollment effects.

Altogether, the results suggest that higher star ratings do in fact drive more enrollments—presumably because of their purpose as a quality signal.