

Homework 4

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Summarize the Data

Question 1: Remove all SNPs, 800-series plans, and prescription drug only plans (i.e., plans that do not offer Part C benefits). 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?

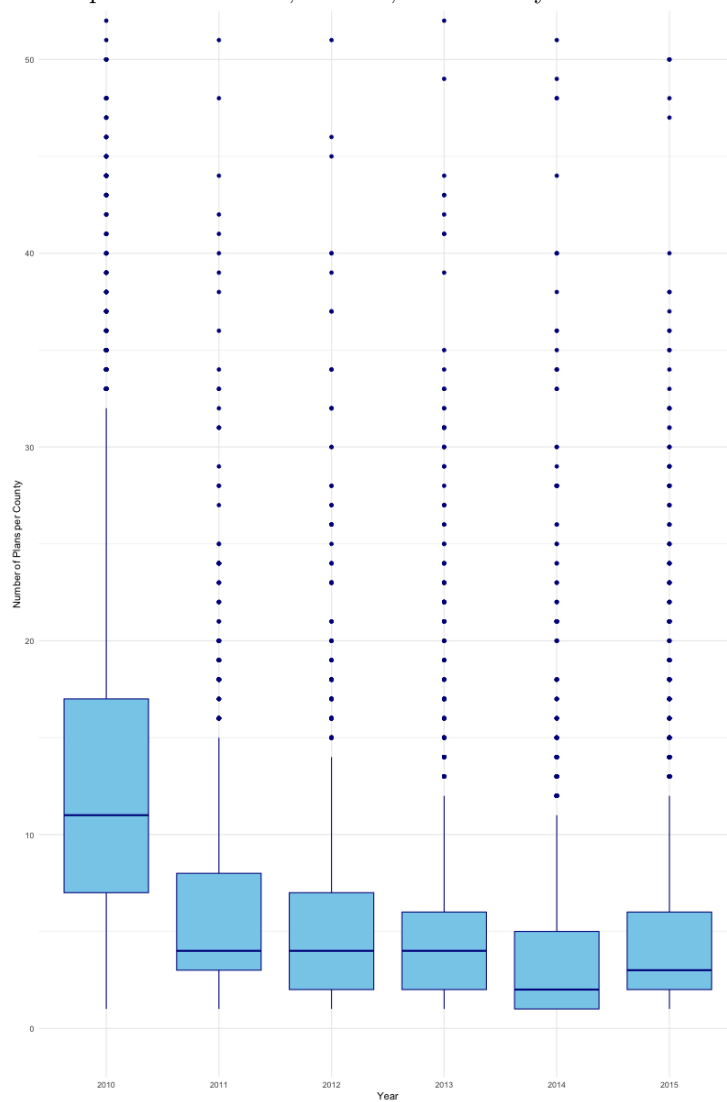


Figure 1: Plan Counts by County over Time. Number of plans seem to be excessive.

Question 2: Provide bar graphs showing the distribution of star ratings in 2010, 2012, and 2015. How has this distribution changed over time?

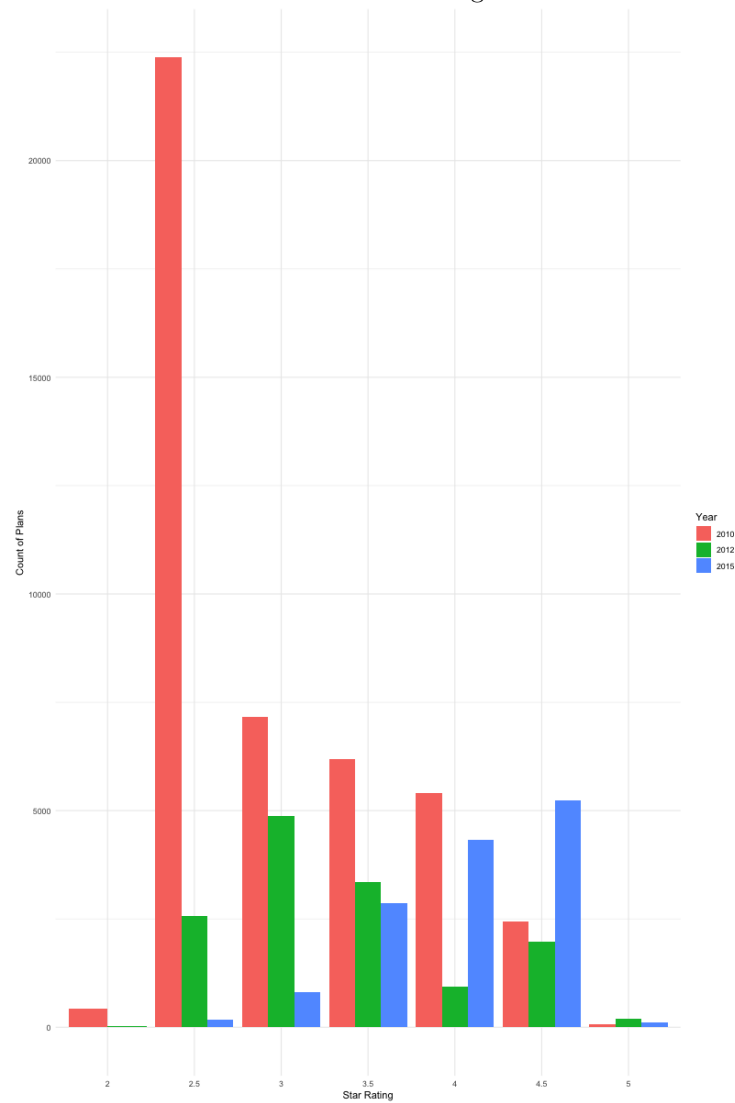


Figure 2: Figure 2 illustrates how the distribution of star ratings has changed from 2009 to 2015. Over the years, more plans have received higher ratings, indicating an overall rightward shift in the distribution.

Question 3: Plot the average benchmark payment over time from 2010 through 2015. How much has the average benchmark payment risen over the years?

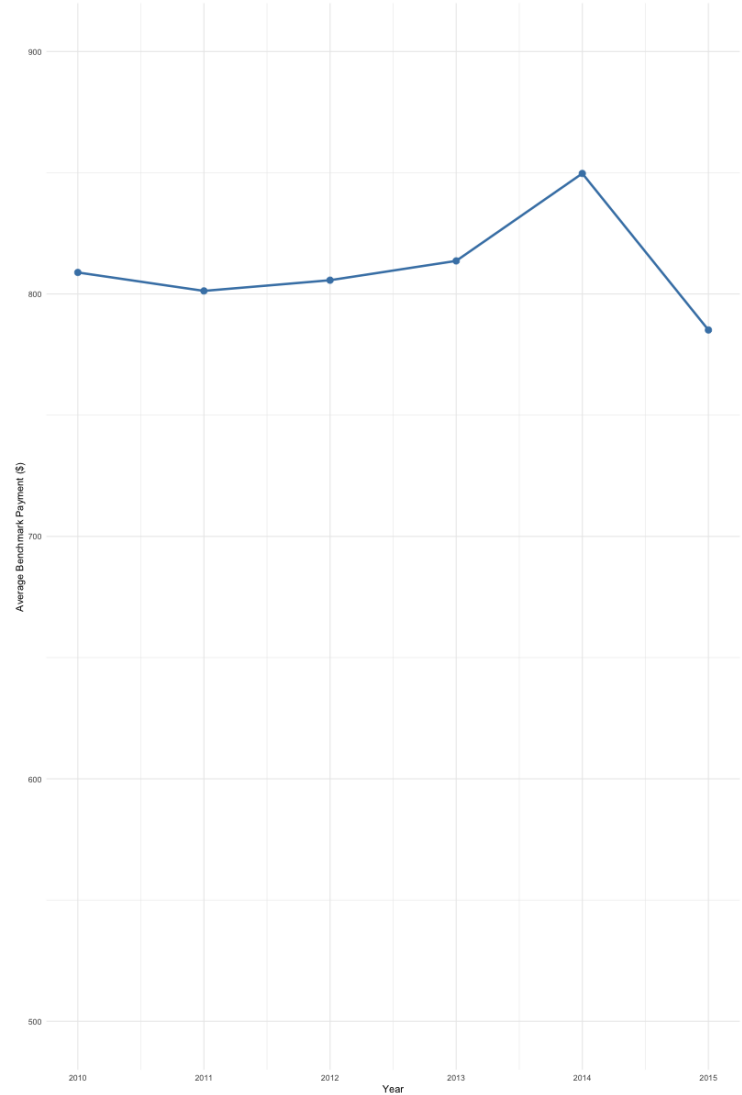


Figure 3: The average MA benchmark payments remained mostly stable over time, with a noticeable increase in 2014 followed by a decline in 2015. This trend aligns with the period from 2012 to 2014, when incentive-based quality improvements were factored into payments. These incentives were revised in 2015, explaining the earlier rise and the later drop in benchmark rates.

Question 4: Plot the average share of Medicare Advantage (relative to all Medicare eligibles) over time from 2010 through 2015. Has Medicare Advantage increased or decreased in popularity? How does this share correlate with benchmark payments?

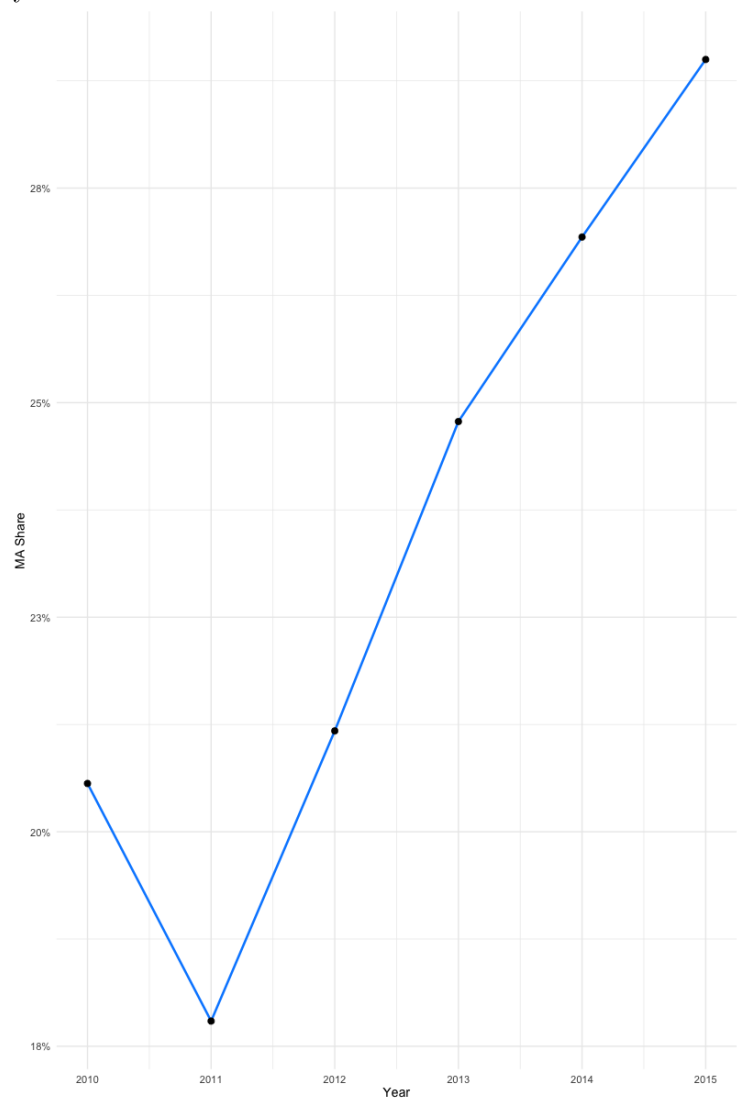


Figure 4: Medicare Advantage Market Share over Time. Medicare Advantage enrollment as a share of total Medicare eligibles increased from 2010 to 2015, indicating rising popularity. The increase correlates positively with benchmark payments, particularly during the period when incentive payments were higher.

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: Count of Rounded Plans by Star Rating

Star Rating	Rounded Up
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, and summarize your results in a table.

Table 2: RD Estimates by Star Ratings

	3 Stars	3.5 Stars
(Intercept)	0.0088 (0.0006)	0.0168 (0.0017)
Rounded	0.0093 (0.0013)	-0.0027 (0.0028)
Running Score	-0.0220 (0.0074)	0.0222 (0.0165)
Num. Obs.	4039	1656
R^2	0.0186	0.0012
RMSE	0.0159	0.0263

Question 7: Repeat your results for bandwidths of 0.1, 0.12, 0.13, 0.14, and 0.15 (again for 3 and 3.5 stars). Show all of the results in a graph. How sensitive are your findings to the choice of bandwidth?

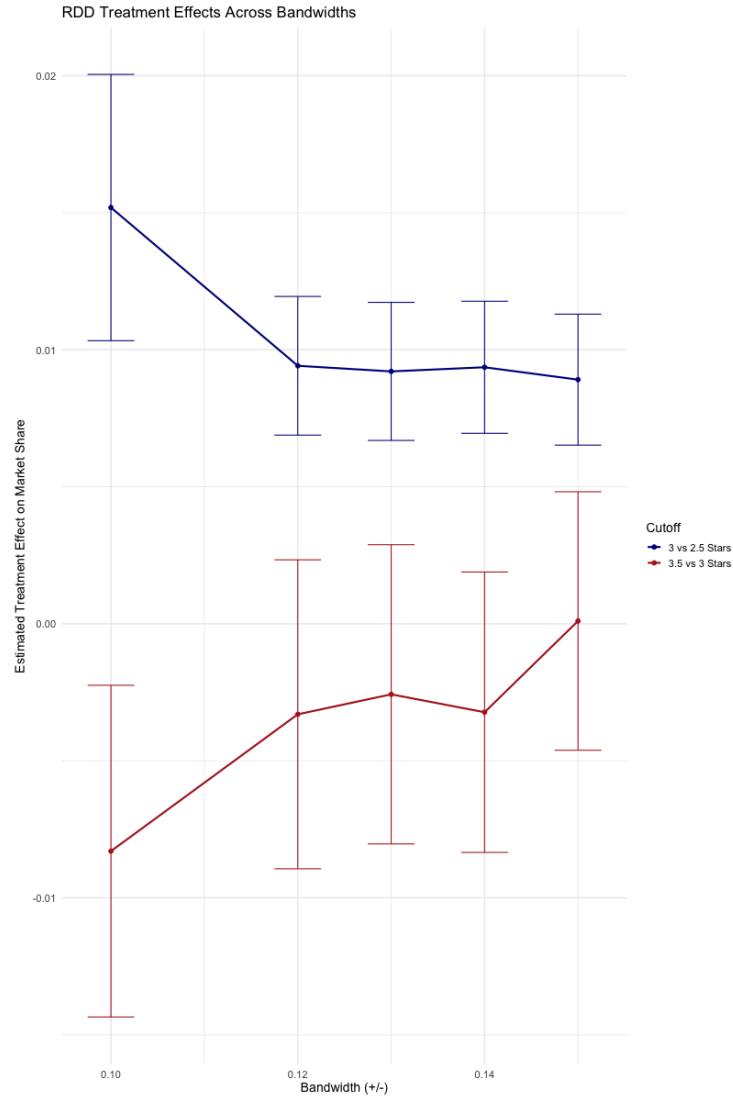


Figure 5: The different RD estimates (from a local linear regression with constant slope terms) across star rating categories and different bandwidth values.

Question 8: Examine (graphically) whether contracts appear to manipulate the running variable. In other words, look at the distribution of the running variable before and after the relevant threshold values. What do you find?

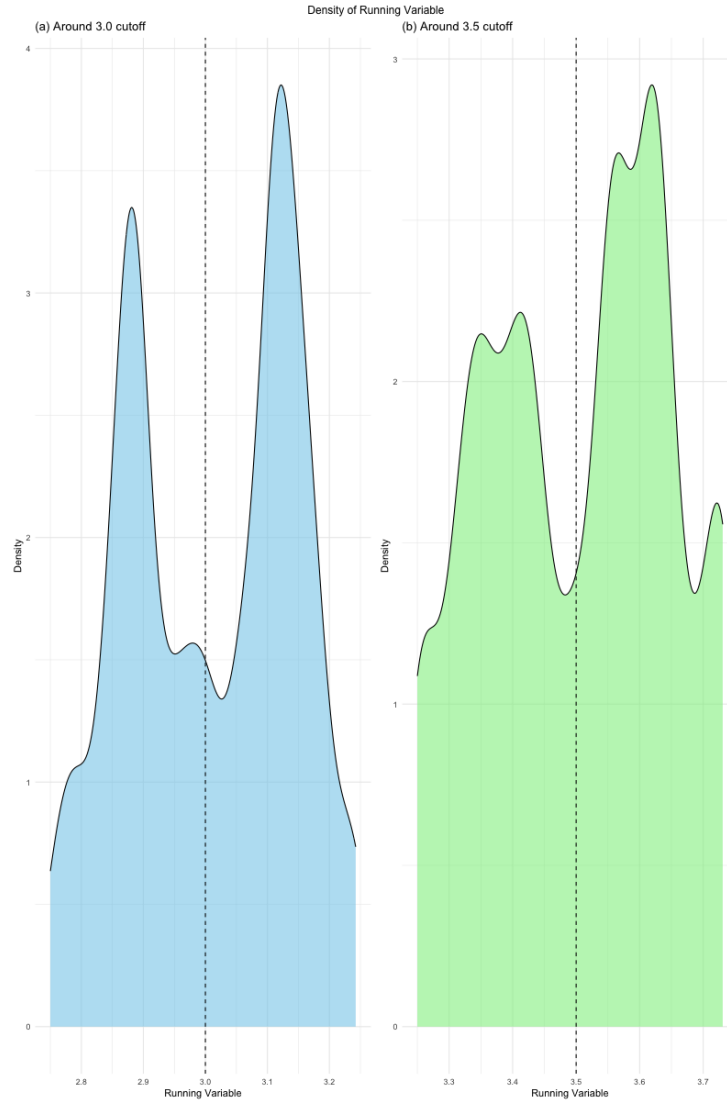


Figure 6: Density of Running Variable. Although there are visible differences in the distribution of raw scores on either side of the threshold, there is little indication that the running variable was deliberately manipulated. Put differently, if insurers were attempting to influence outcomes, we would expect to see a concentration of scores just above the cutoff to secure a higher rating—but this pattern does not appear in the data.

Question 9: Similar to question 4, 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

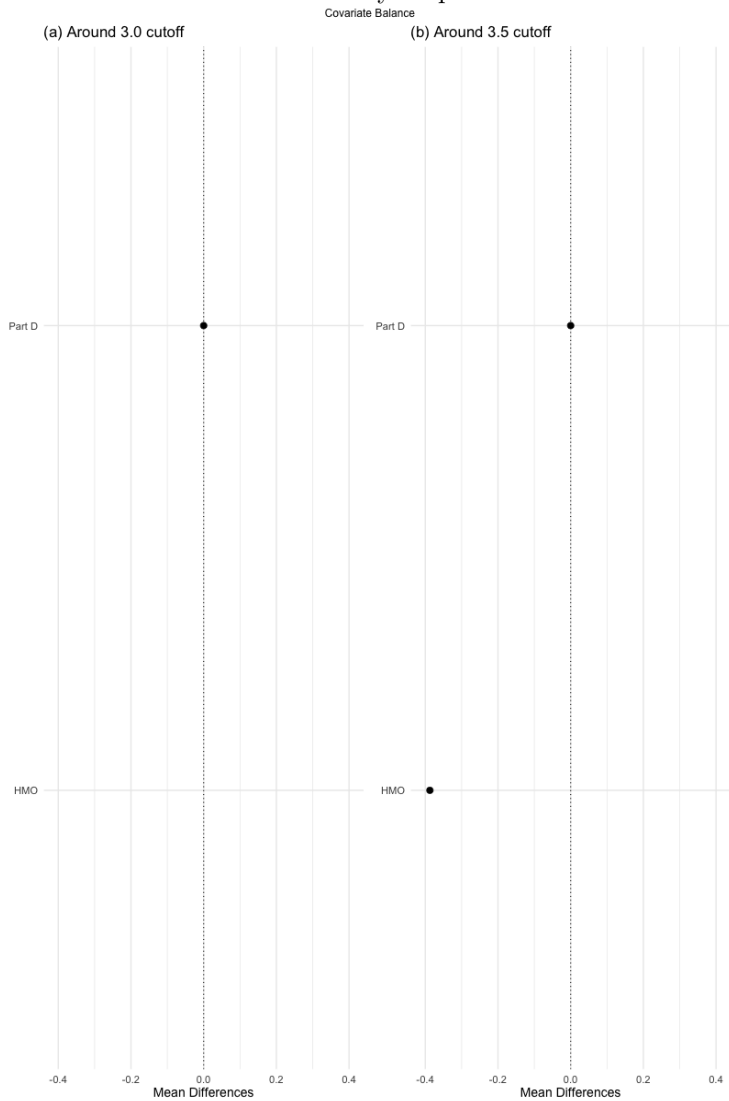


Figure 7: Figure 7 displays balance plots showing substantial differences between plans rounded down to 2.5 stars and those rounded up to 3.0 stars. This is likely due to the limited number of plans that were rounded down to 2.5. In contrast, plans near the 3.5-star threshold appear to have more comparable characteristics, whether rounded up or down.

Question 10: Summarize your findings from 5-9. What is the effect of increasing a star rating on enrollments? Briefly explain your results. Raising a plan’s star rating from 2.5 to 3.0 stars significantly increases

enrollment, while moving from 3.0 to 3.5 stars has no meaningful effect. This suggests that the 3-star threshold is more salient to consumers or more critical for plan marketability.