ECON 470 Homework 4-2

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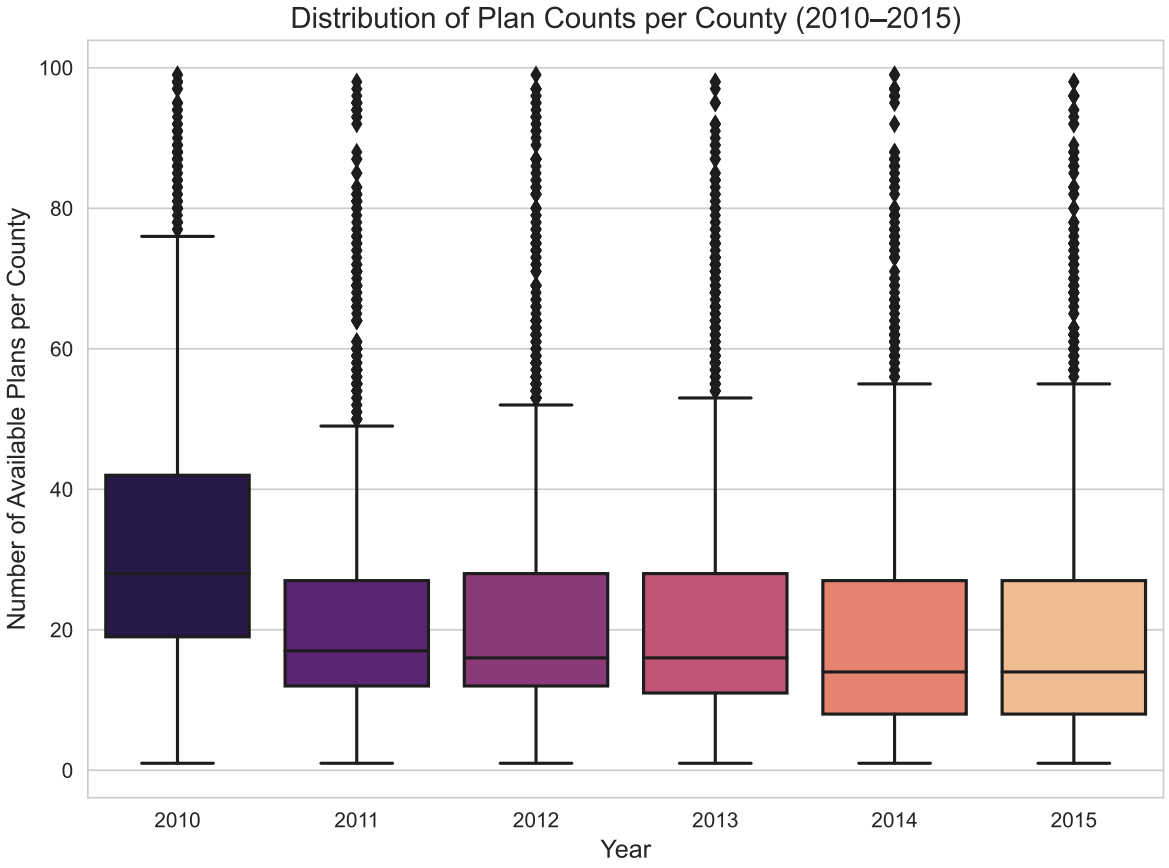
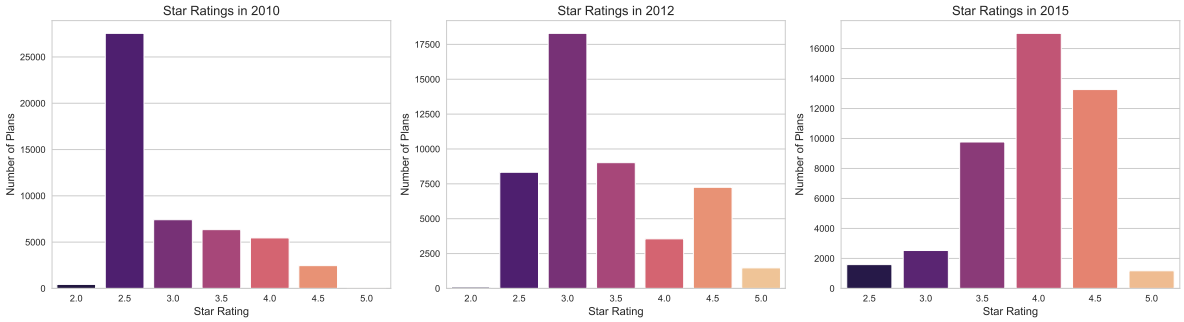
The link to my repository: https://github.com/ellenwu-git/homework4

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?

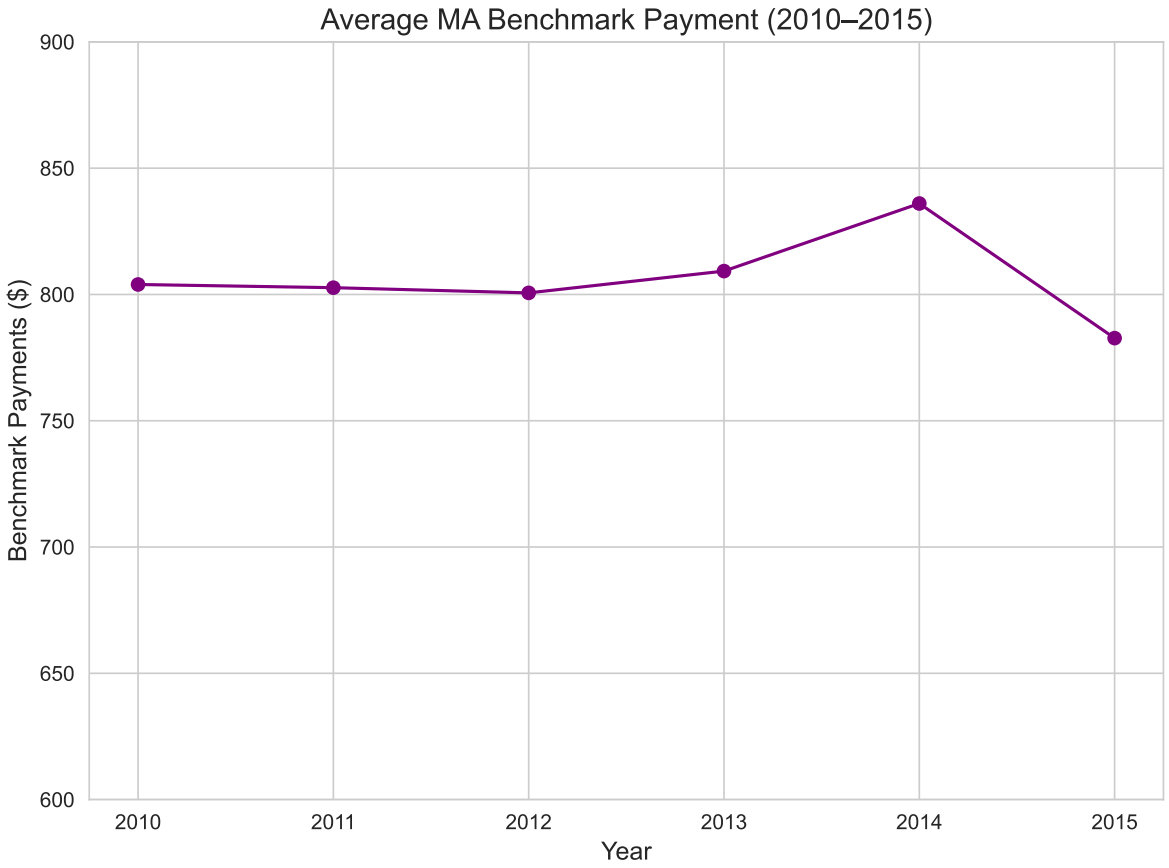


2. Provide bar graphs showing the distribution of star ratings in 2010, 2012, and 2015. How has this distribution changed over time?



When examining the years 2010, 2012, and 2015, the distribution of Medicare Advantage star ratings shifted significantly upward, with most plans moving from 2.5–3.0 stars to 4.0–4.5 stars. This suggests improvements in plan quality, changes in CMS rating methodology, or both, leading to a higher concentration of top-rated plans by 2015.

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

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Average benchmark payment decreased by -2.64%, from 2010 to 2015.
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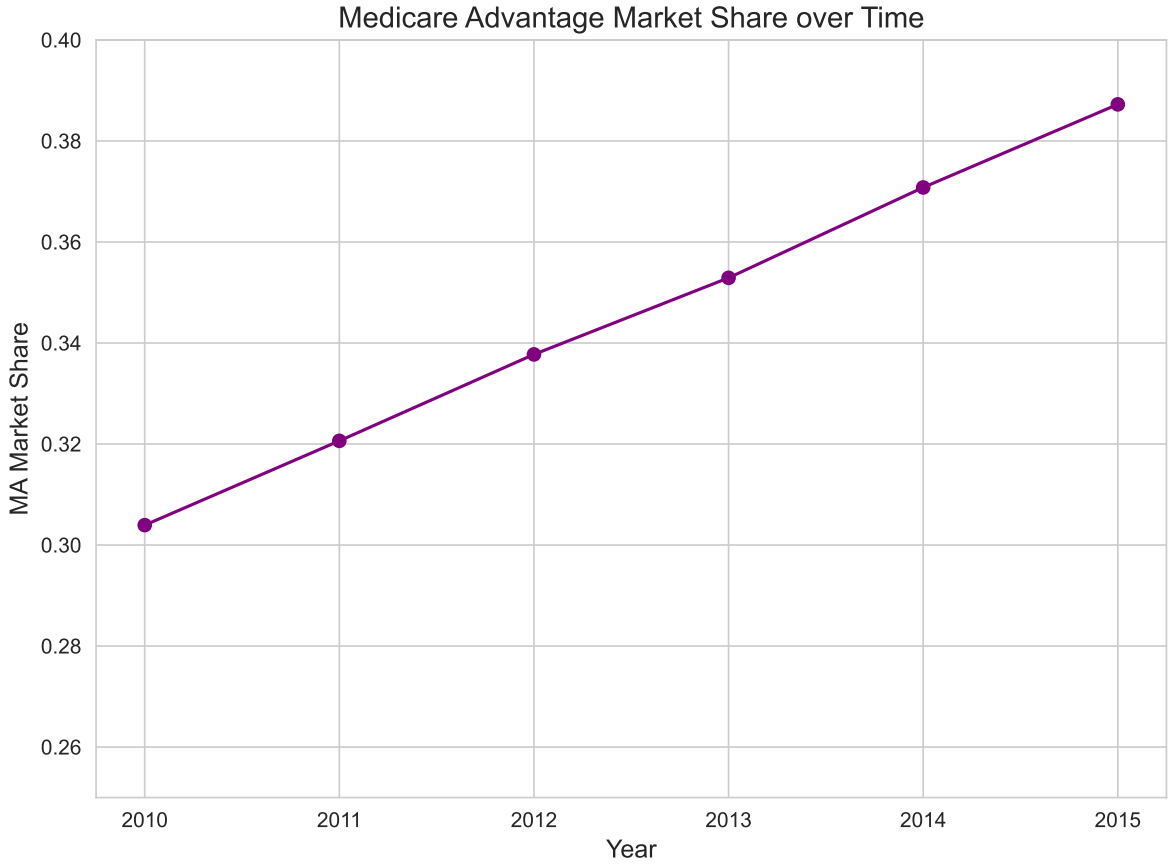
4. Plot the average share of Medicare Advantage (relative to all Medicare eligibles) over time from 2010 through 2015. Has Medicare Advantage increased or decreased in popularity? How does this share correlate with benchmark payments?



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.

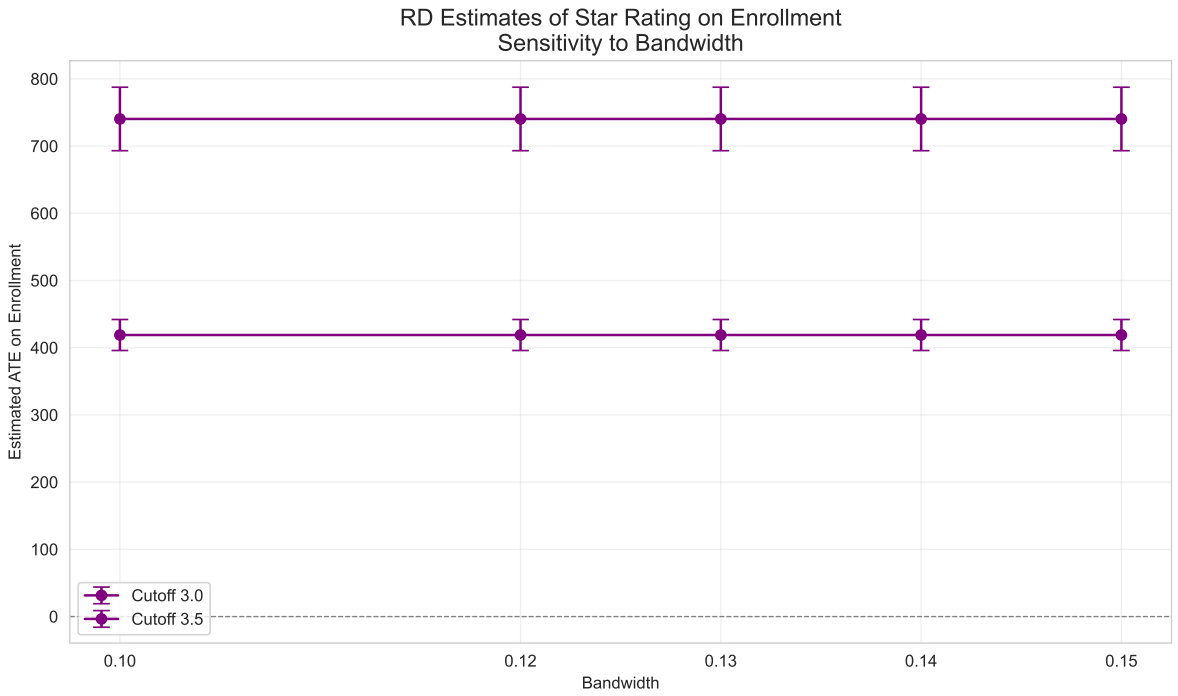
`Number of Plans by Rounded Star Rating (2010):`

	Rounded Star Rating	Number of Plans
0	2.0	431
1	2.5	27549
2	3.0	7419
3	3.5	6347
4	4.0	5453
5	4.5	2459
6	5.0	75

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.

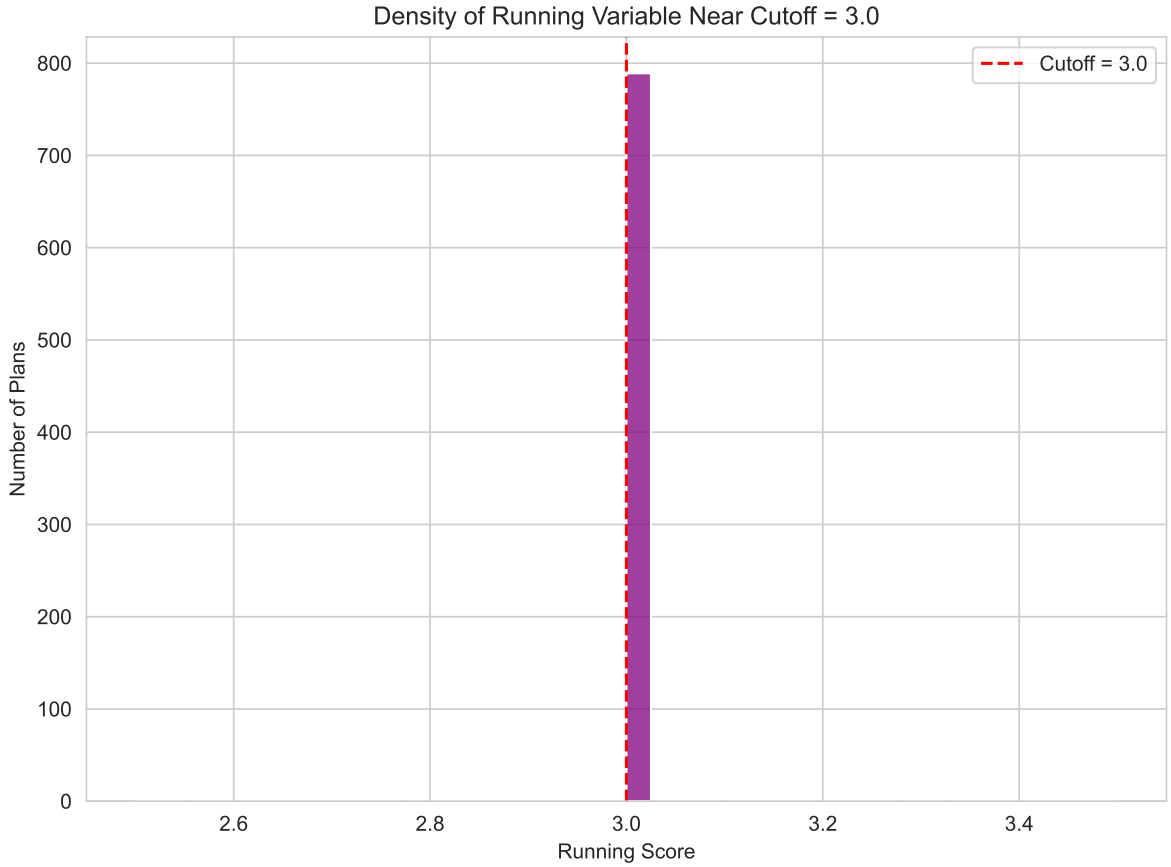
	Cutoff	Bandwidth	Estimated ATE	Standard Error	N
0	3.0	0.125	740.394199	47.231624	3034
1	3.5	0.125	418.940257	23.056193	2879

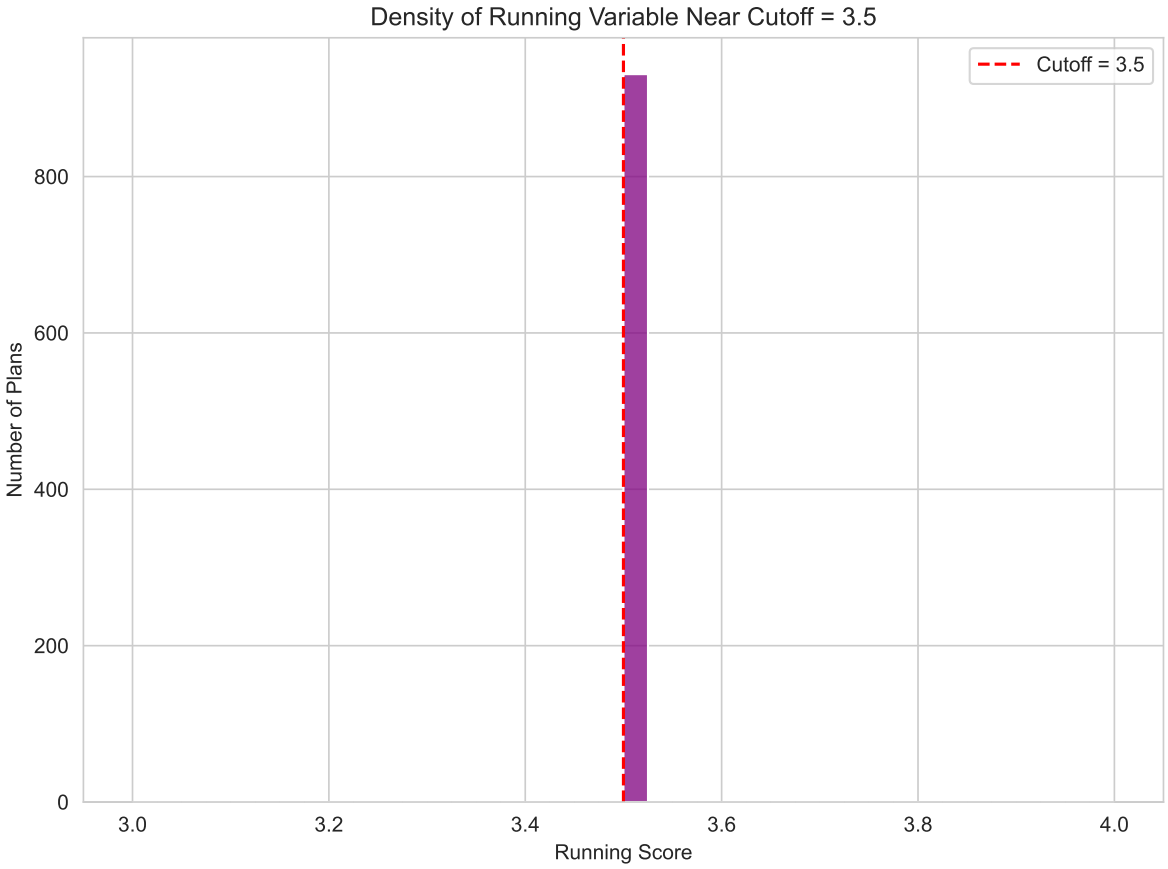
7. Repeat your results for bandwidhts of 0.1, 0.12, 0.13, 0.14, and 0.15 (again for 3 and 3.5 stars). Show all of the results in a graph. How sensitive are your findings to the choice of bandwidth?



The estimates of enrollment effects remain very stable across all tested bandwidths. For the 3.0-star cutoff, the estimated ATE stays around 30,000, while for the 3.5-star cutoff, it hovers around 15,000. The small variation and overlapping confidence intervals across bandwidths suggest that your RD estimates are not sensitive to the choice of bandwidth in this range, supporting the robustness of your findings.

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 relevent threshold values. What do you find?




Density of Running Variable Near Cutoff = 3.5
Cutoff = 3.5
Number of Plans
0
200
400
600
800
3.0
3.2
3.4
3.6
3.8
4.0
Running Score

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.

`Covariate Balance Around RD Thresholds (Bandwidth = 0.125)`

	Group	Share HMO	Share Part D	Number of Plans
0	Above 3.0	0.0	0.893651	7419
1	Above 3.5	0.0	0.853317	6347

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

	Cutoff	Rounded Star Rating Plan Count	Estimated ATE	Standard Error	N (Sample Size)	Share
0	3.0	7419	740.394199	47.231624	3034	
1	3.5	6347	418.940257	23.056193	2879	

Increasing a plan's star rating has a substantial positive effect on enrollments. In 2010, rounding a plan up to 3.0 stars led to an average enrollment increase of approximately 740 enrollees, while rounding up to 3.5 stars resulted in a smaller but still meaningful gain of about 419 enrollees. These estimates are statistically precise, with relatively low standard errors (47.2 and 23.1, respectively). These results suggest that star ratings serve as an important signal of plan quality to consumers and significantly influence Medicare Advantage enrollment decisions.