Homework 4

Research in Health Economics, Spring 2024
https://github.com/riadharnidharka/Econ470HW4

Ria Dharnidharka

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?
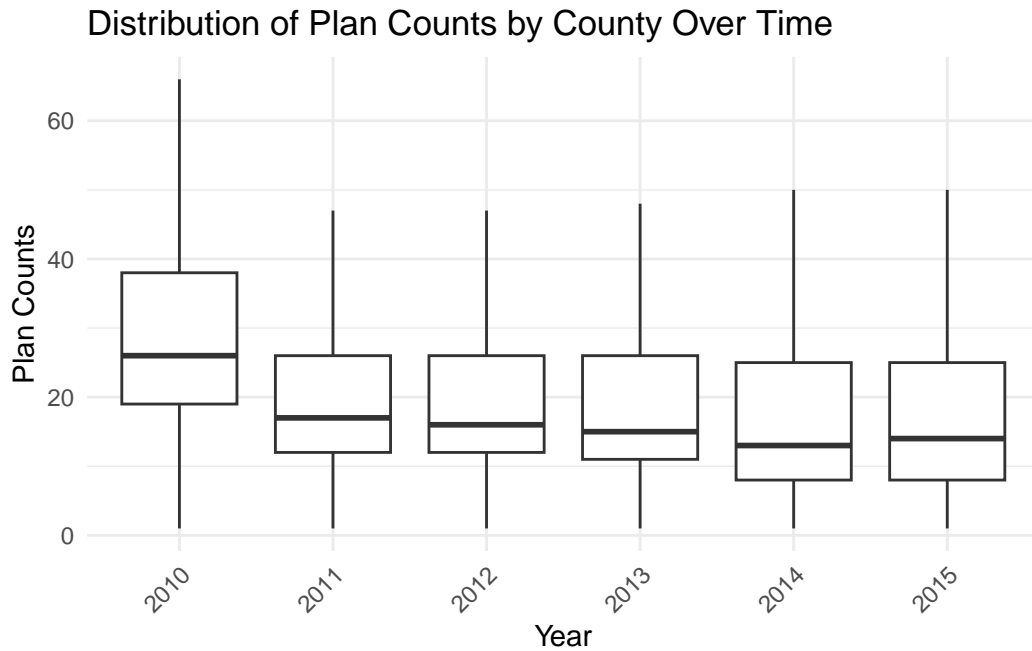

Figure 1: Plan Counts by County Over Time

I think that the number of plans is sufficient because too many plans may be overwhelming for members to choose from, and each plan isn't always super different from the next, so this amount of plans provides enough choice.

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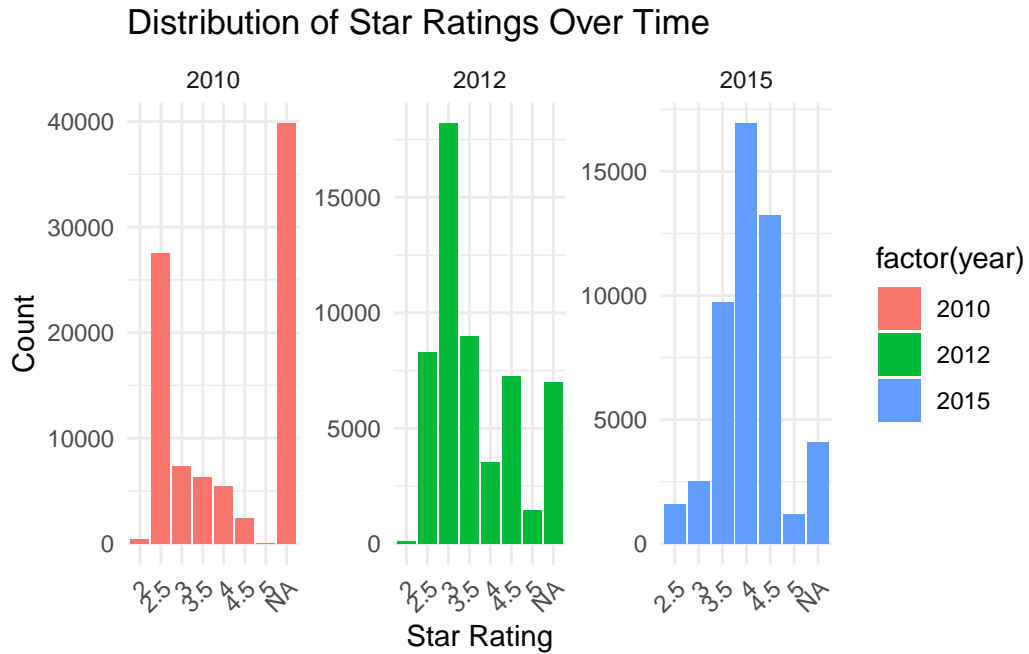

Figure 2: Distribution of Star Ratings

Over time, there are more rating concentrated towards the upper half of ratings and ratings have generally gotten better over time.

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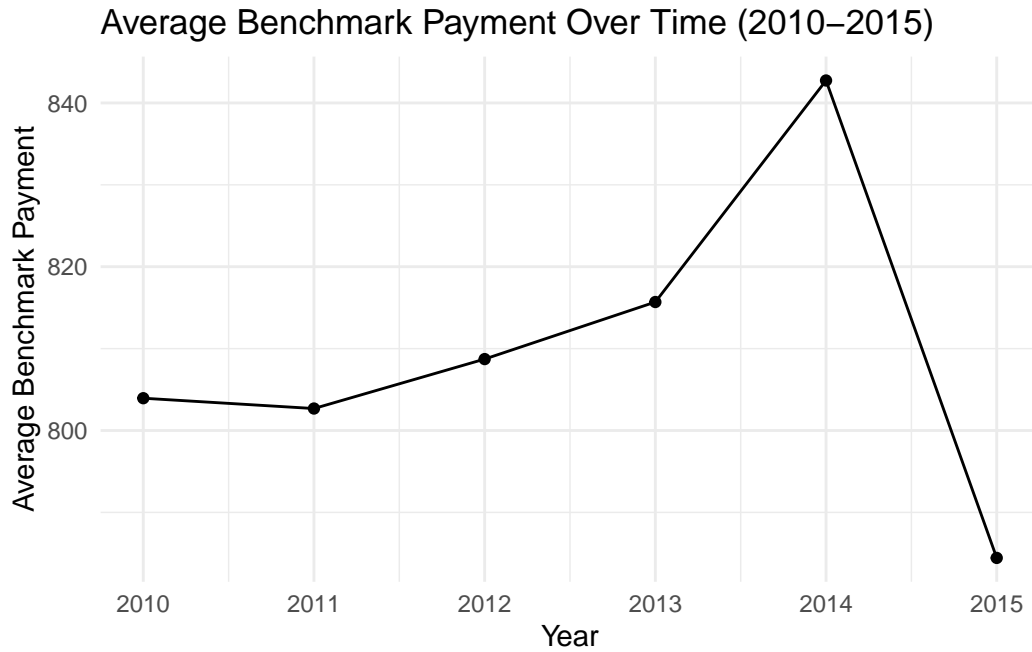

Figure 3: Avg Benchmark Payment Over Time

Average benchmark payment has risen from about 800 to over 840 from 2010-2014, but subsequently fell in 2015 to under 800. Therefore, the payment has actually decreased from 2010 to now.

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?
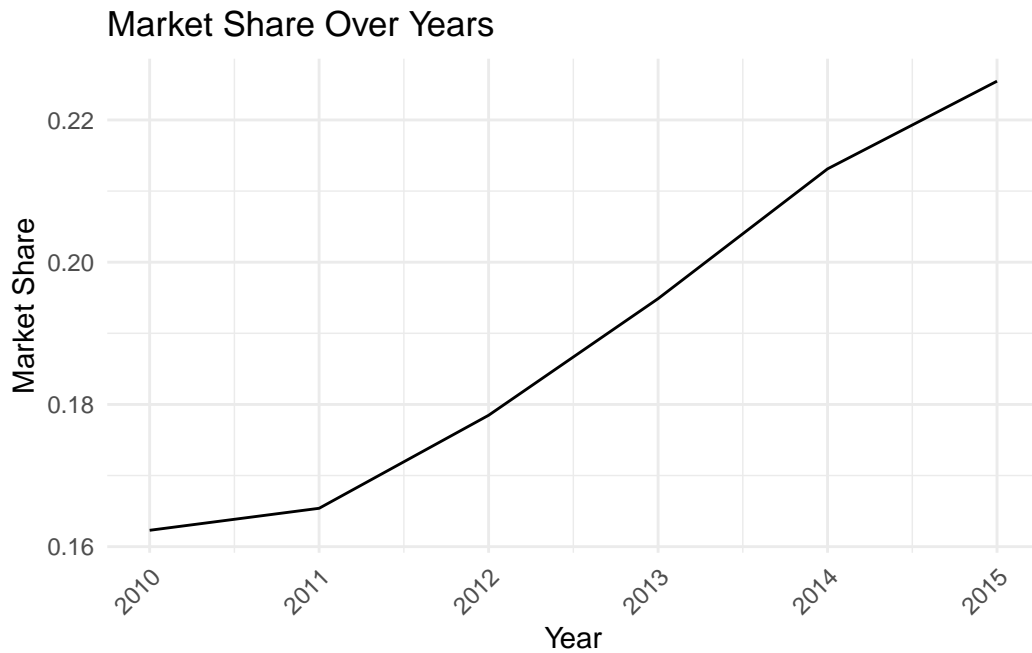

Figure 4: Avg Benchmark Payment Over Time

Medicare Advantage has increased in popularity over the years, which somewhat correlates to the average benchmark payment as the benchmark payment increased until 2014.

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: Plan Counts

3-star	3.5-star	4-star	4.5-star	5-star
1,734	1,815	606	0	0

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: Estimate of the Effect of Receiving a 3-star Versus a 2.5 Star Rating on Enrollments

	Rating	Coeff	Std..Err.	z	P.Value
Conventional	3 vs 2.5	-0.0049040	0.0033526	-1.462718	1
Bias-Corrected	3 vs 2.5	-0.0337209	0.0033526	-10.058014	1
Robust	3 vs 2.5	-0.0337209	0.0055193	-6.109645	1

Table 3: Estimate of the Effect of Receiving a 3.5-star Versus a 3 Star Rating on Enrollments

	Rating	Coeff	Std..Err.	z	P.Value
Conventional	3 vs 3.5	0.0013883	0.0029540	0.4699752	1
Bias-Corrected	3 vs 3.5	-0.0106484	0.0029540	-3.6047154	1
Robust	3 vs 3.5	-0.0106484	0.0049341	-2.1581298	1

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?
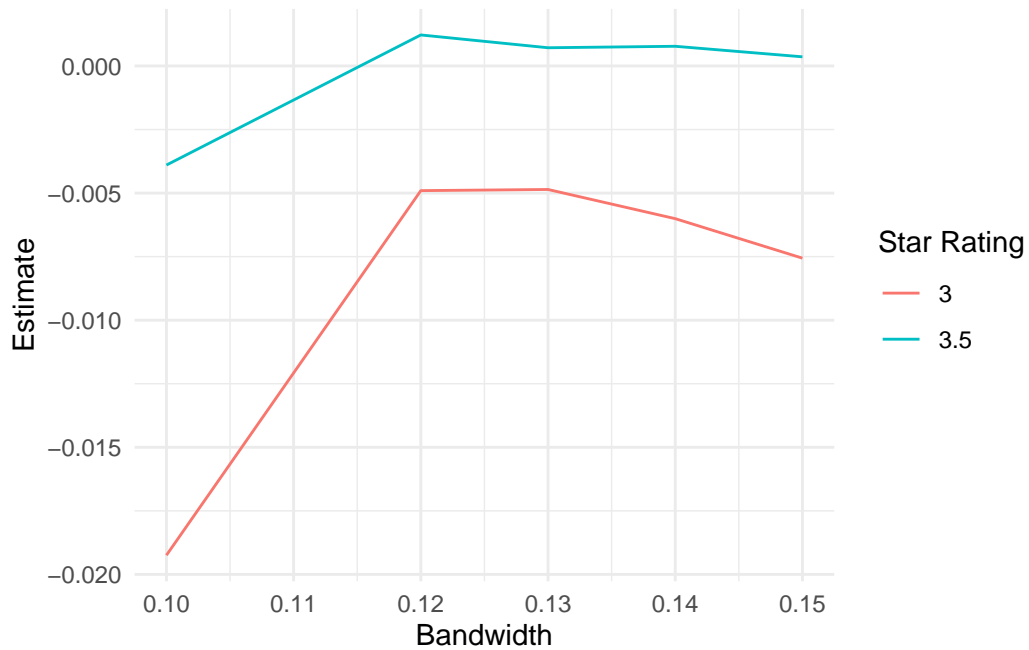

Figure 5: Bandwidths for 3 and 3.5 Stars

My findings are relatively sensitive to the choice of bandwidth, seen by the fact that there are not stable slopes and are somewhat close together. However, if they were to cross eachother or vary even more widely, they would be more sensitive.

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?

Looking at Figure 6 and 7, there is sudden discontinuity in the density plots at the threshold values, which indicuates that contracts may be selectively altering their characteristics around threshold values.

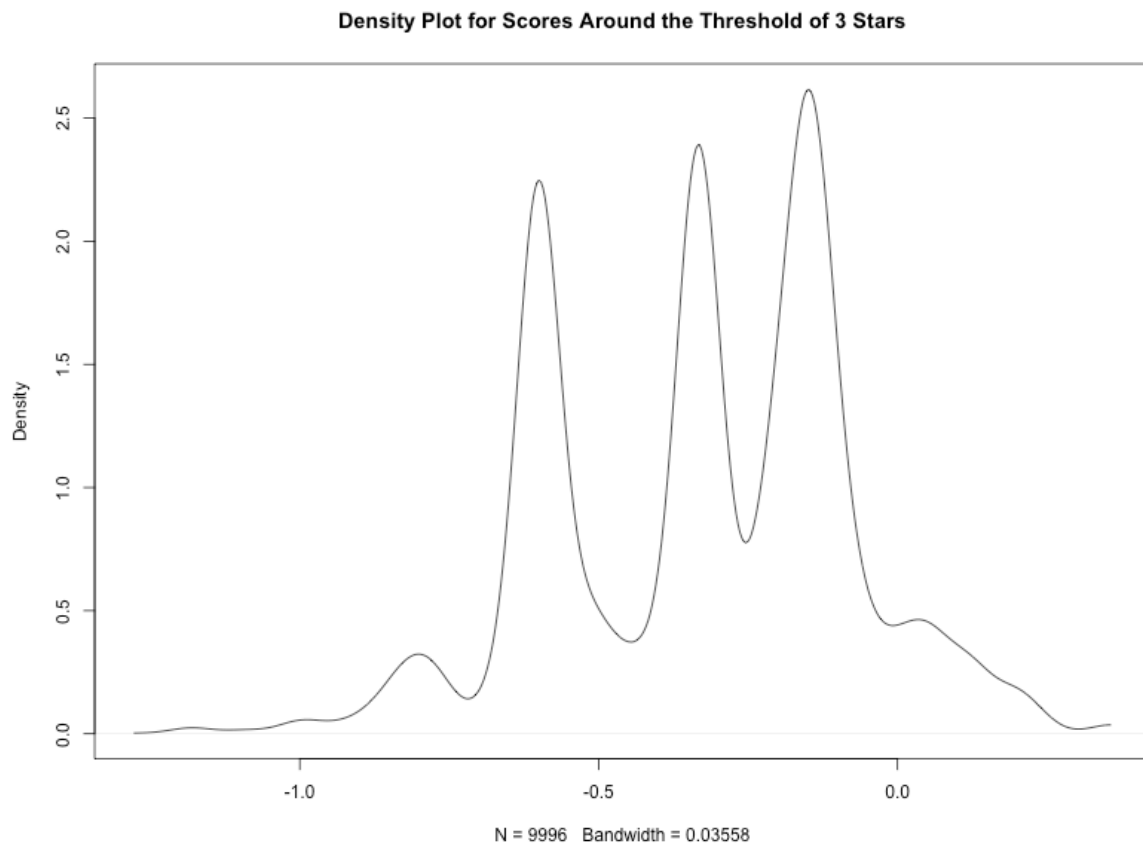**Density Plot for Scores Around the Threshold of 3 Stars**

Figure 6: Density Plot for Scores Around the Threshold of 3 Stars
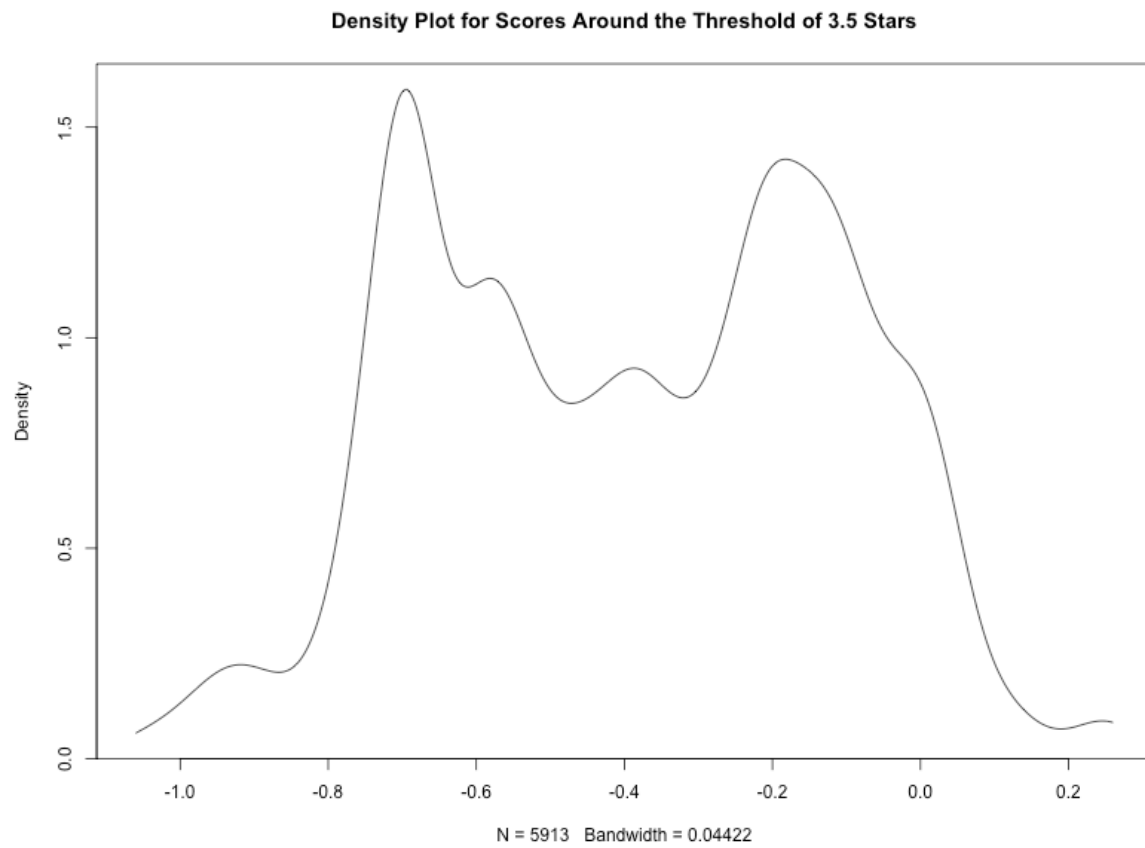
Figure 7: Density Plot for Scores Around the Threshold of 3.5 Stars

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.

As seen in Table 4 and Table 5, the plans right above and below the threshold are very similar, meaning that there is not much difference in the actual quality or characteristics of plans right above and below.

Table 4: Summary of lp_vars

plan_type	partd	rounded	count
HMO/HMOPOS	No	TRUE	272
HMO/HMOPOS	Yes	FALSE	34
HMO/HMOPOS	Yes	TRUE	1599
Local PPO	Yes	FALSE	120
PFFS	No	FALSE	8283
PFFS	Yes	FALSE	8105
Regional PPO	No	FALSE	62
Regional PPO	Yes	FALSE	62

Thresholds for 3 stars

Table 5: Summary of lp_vars

plan_type	partd	rounded	count
HMO/HMOPOS	No	FALSE	4
HMO/HMOPOS	No	TRUE	255
HMO/HMOPOS	Yes	FALSE	120
HMO/HMOPOS	Yes	TRUE	1587
Local PPO	No	FALSE	38
Local PPO	Yes	FALSE	514

Thresholds for 3.5 stars

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

Based on my findings, it seems that there are conflicting results of whether increasing a star rating actually increases enrollments. For example, in question 6, there is a negative coefficient for most estimates, meaning that is a negative impact on enrollments when moving from a 2.5-star rating to a 3-star rating, and the same for 3 to 3.5 stars. However, question 8 shows that because there is sudden spikes in density at the threshold values, contracts may strategically adjust their characteristics to qualify for certain thresholds, implying that there is an effort to bump contracts up to the next rating.