Homework 4 - Research in Health Economics

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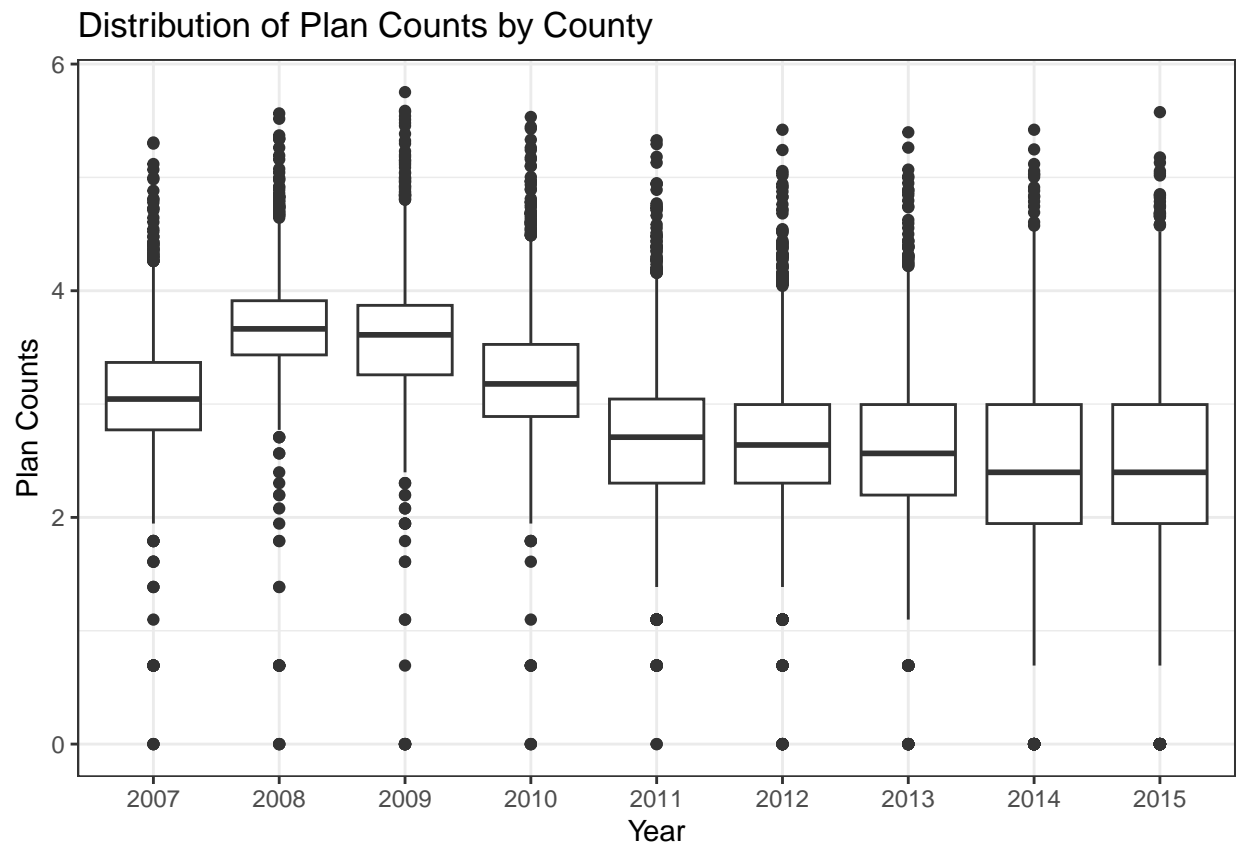## 1 Summarise the Data

1.1 Question 1

Figure 1: Distribution of Plan Counts by County

Figure 1 shows the distribution of plan counts by country per year. On average, each county has 3 plans or less which might be too few as these plans might not cover everyone's needs regarding health insurance.
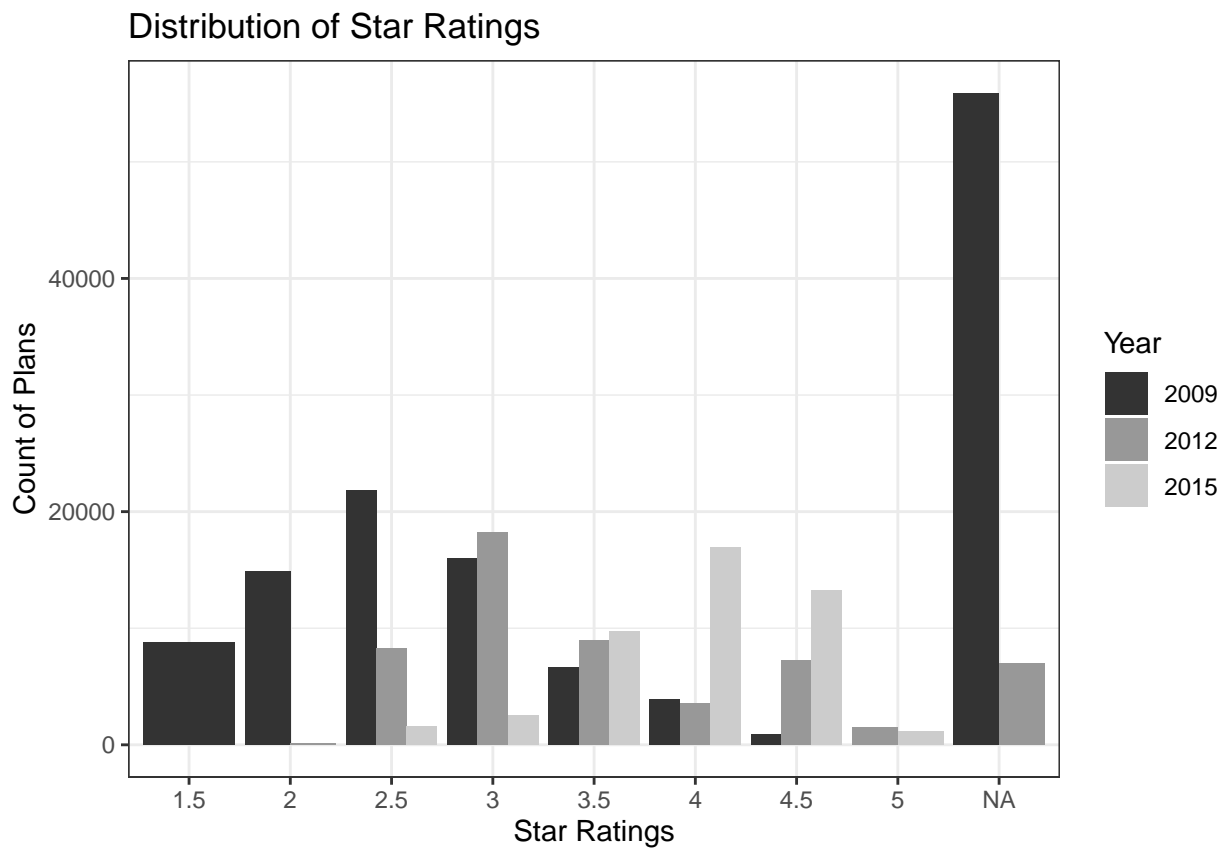
1.2 Question 2

Distribution of Star Ratings

Figure 2: Distribution of Star Ratings (2009, 2012 & 2015)

The Distribution of Star Ratings for the years 2009, 2012 and 2015 are shown in Figure 2. It shows that plans with higher star ratings became more prevalent in 2015 compared to 2009 which could suggest that the helath insurance plans have been improving in quality over time.

1.3   Question 3
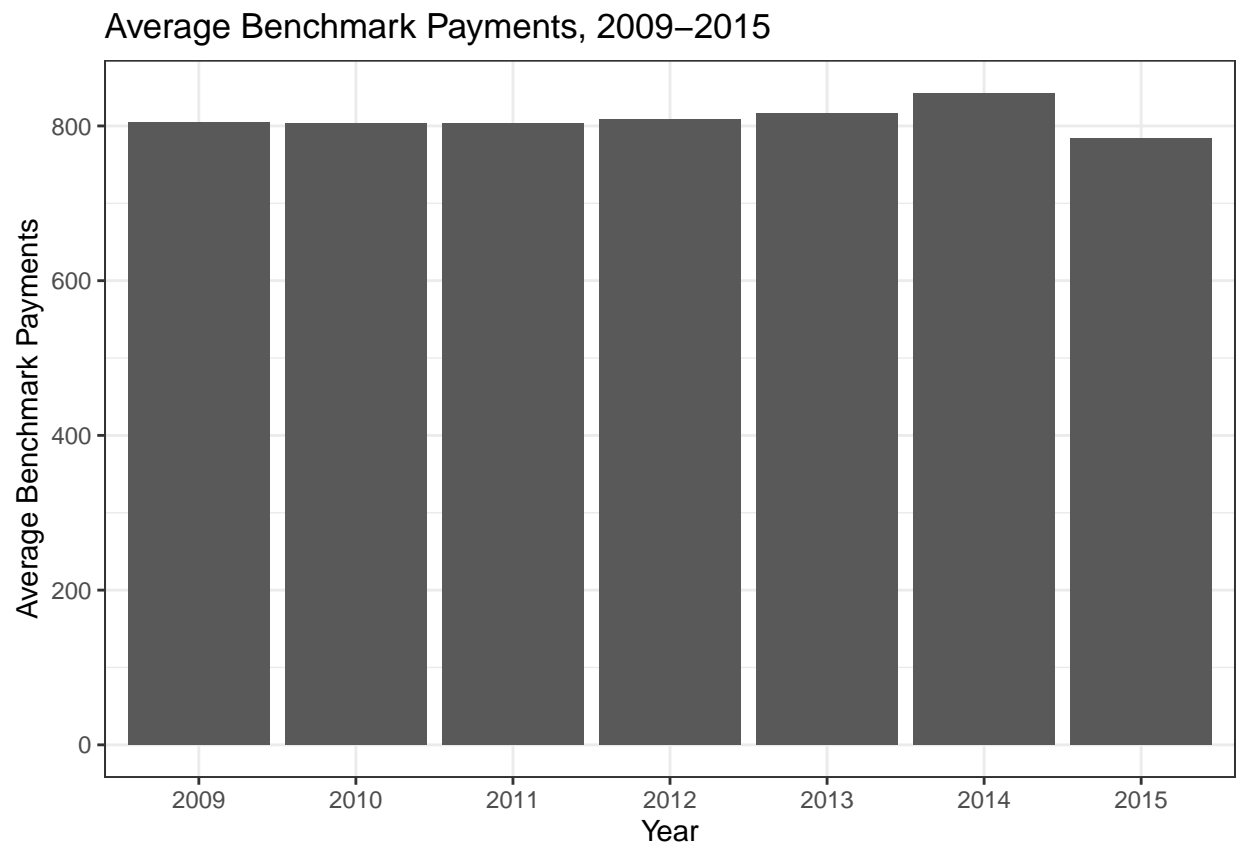
Average Benchmark Payments, 2009–2015

Figure 3: Average Benchmark Payments, 2009-2015

The change in average benchmark payments from 2009 to 2015 is shown in Figure 3 which shows that the average benchmark payment has remained constant at $800 from 2009 till 2012, after which it increased in 2013 and 2014, before falling again in 2015.

1.4 Question 4

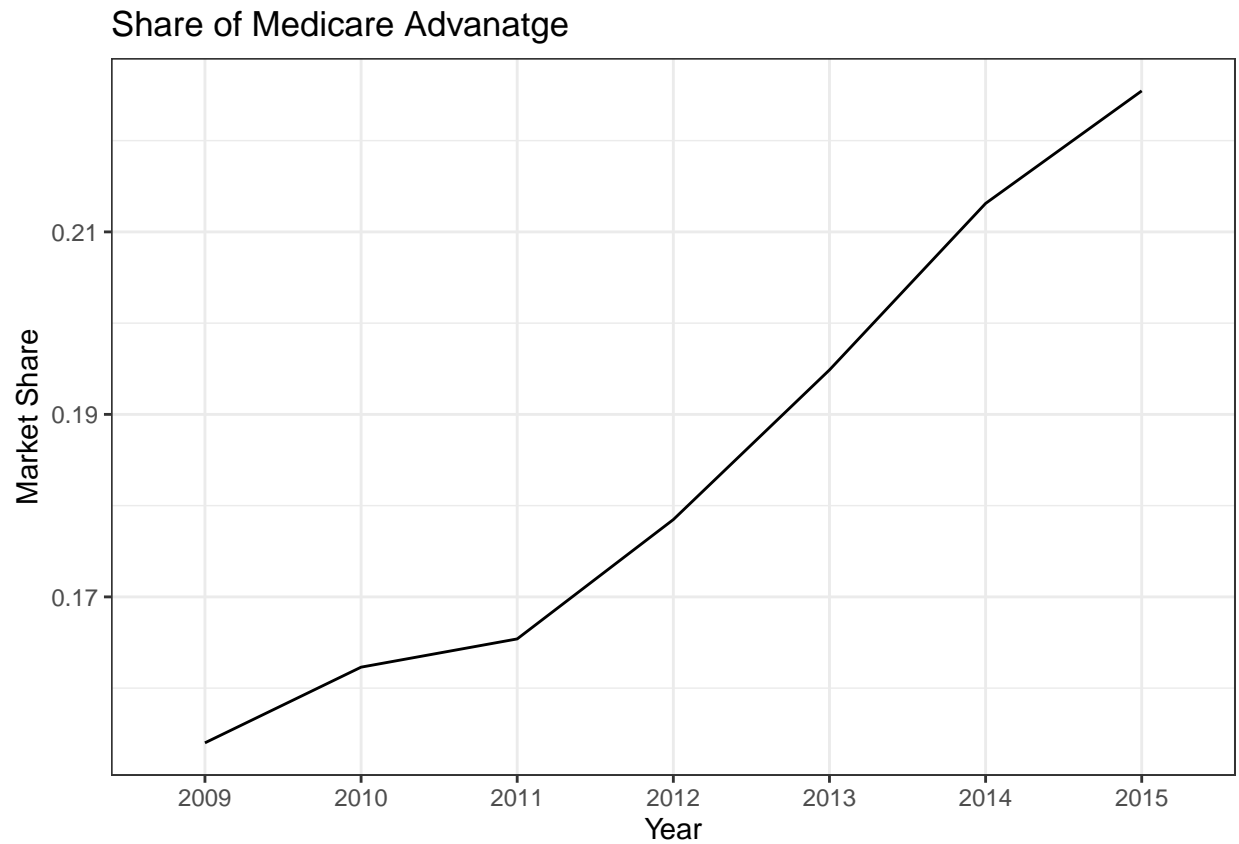### Share of Medicare Advanatge

Figure 4: Share of Medicare Advanatge, 2009-2015

As shown in Figure 4, the average share of Medicare Advantage has increased significantly from 2009 to 2015, indicating an increase in its popularity over time. As the benchmark payments have remained more or less constant during this time period, it suggests that more people preferred Medicare Advantage compared to other options probably due to factors such as better quality or coverage.

2 Estimate ATE

2.1 Question 1

Table 1: Number of Plans with Rounded up Ratings

Star Rating	Rounded to 3	Rounded to 3.5	Rounded to 4	Rounded to 4.5	Rounded to 5
3	2,278	0	0	0	0
3.5	0	1,157	0	0	0
4	0	0	767	0	0
4.5	0	0	0	0	0

2.2 Question 2

Table 2: Star Rating Estimate

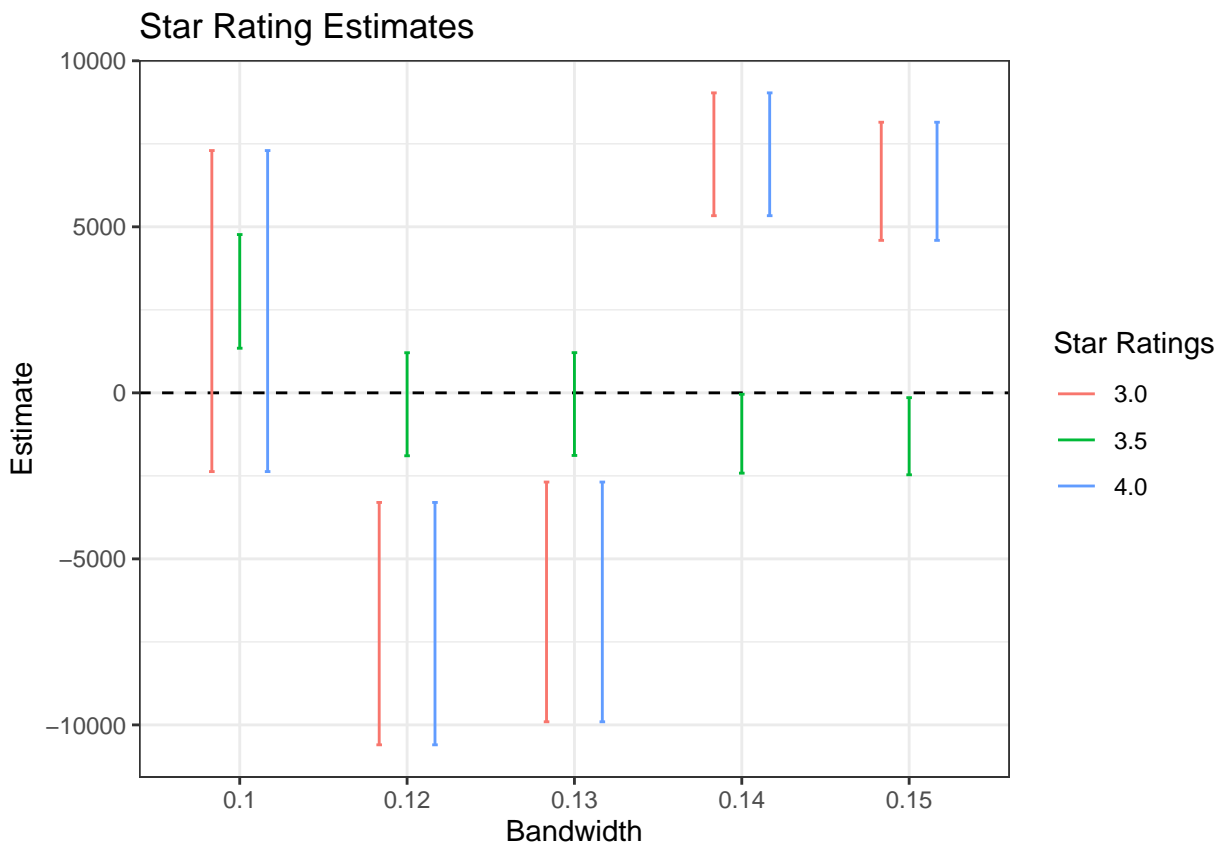|	Estimate	Standard Error	Star Rating
(Intercept)	923.23975	192.35051	3.0
Treatment	-109.51434	349.45332	3.0
Score	-6,296.53192	1,841.79309	3.0
(Intercept)	553.41857	78.89516	3.5
Treatment	-61.28695	101.80680	3.5
Score	-343.82366	791.55587	3.5
(Intercept)	923.23975	192.35051	4.0
Treatment	-109.51434	349.45332	4.0
Score	-6,296.53192	1,841.79309	4.0

2.3   Question 3

Figure 5: Estimate of Star Rating Effects

Figure 5 shows the estimates for the effect of star ratings does vary with different bandwidths. However, the results remain statistically significant.

2.4 Question 4

The results in Figures 6-8 show that the contracts do not appear to manipulate the running variable for ratings of 3.5 and 4.0. There appears to be some manipulation for plans rated 3.0.
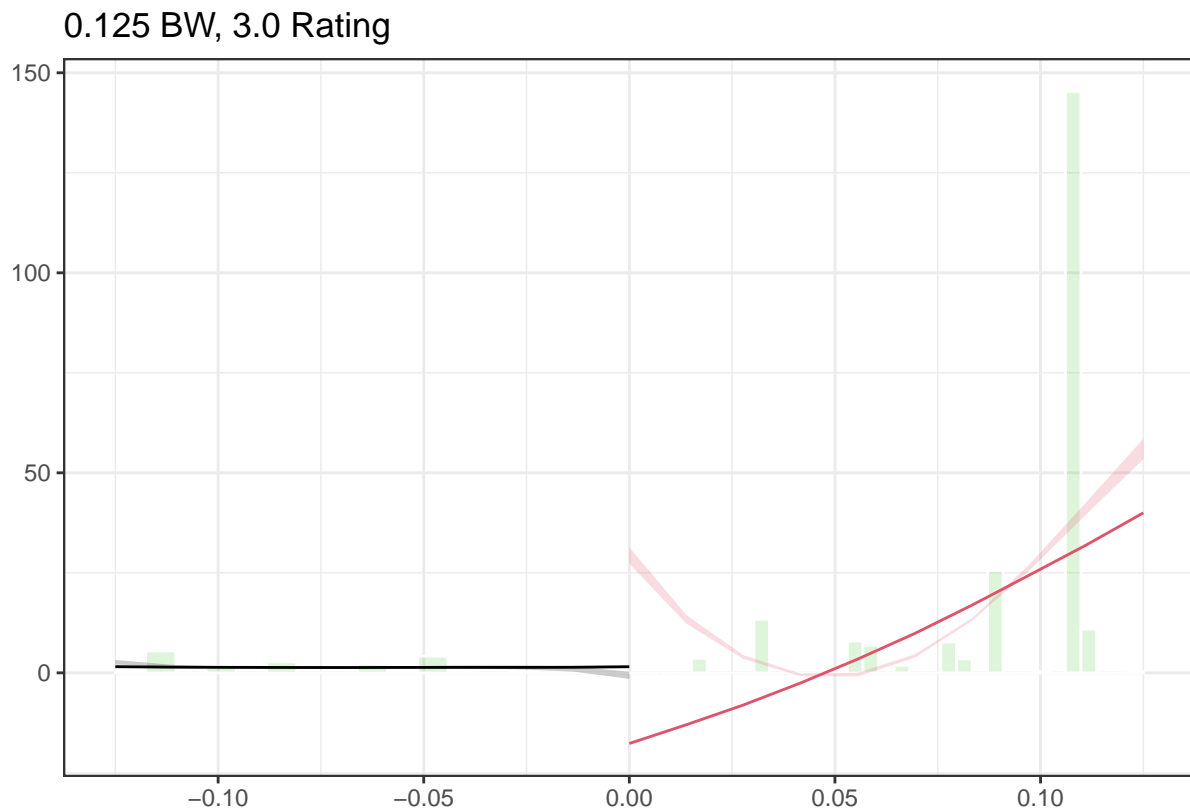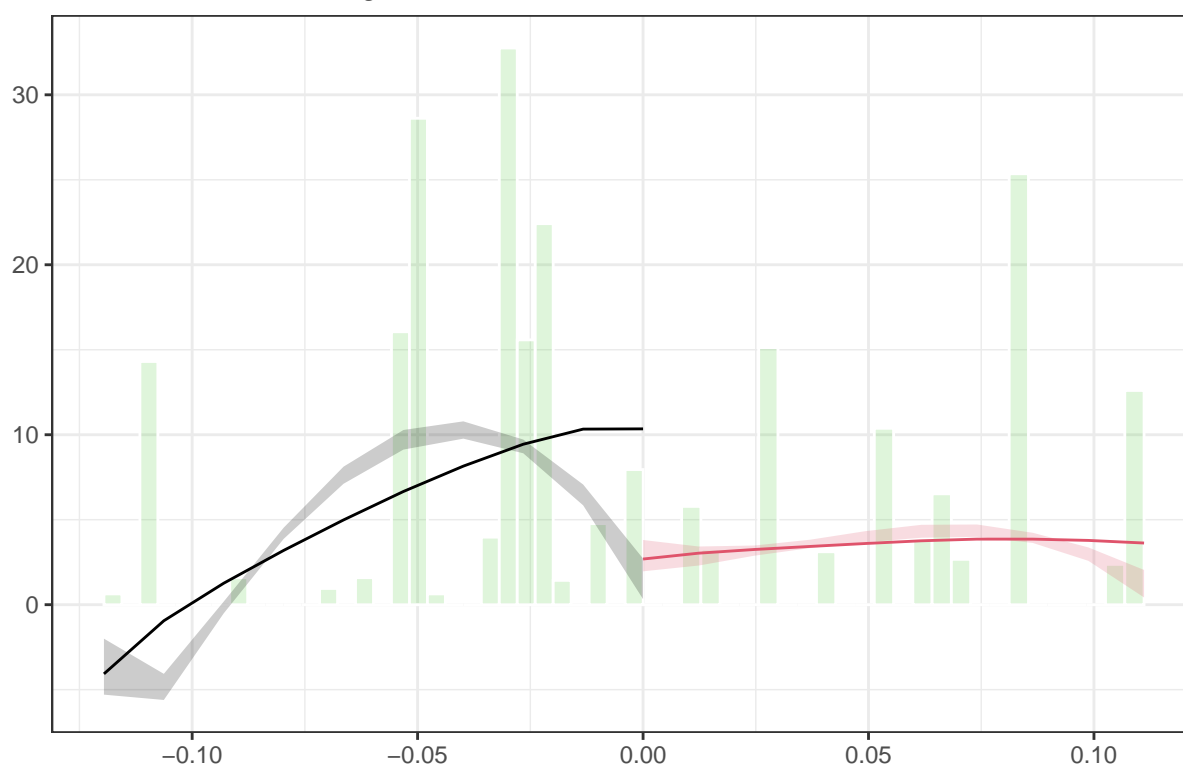
0.125 BW, 3.0 Rating

Figure 6: Manipulation of Running Variable, 2.5 vs 3 Stars

0.125 BW, 3.5 Rating

Figure 7: Manipulation of Running Variable, 3 vs 3.5 Stars
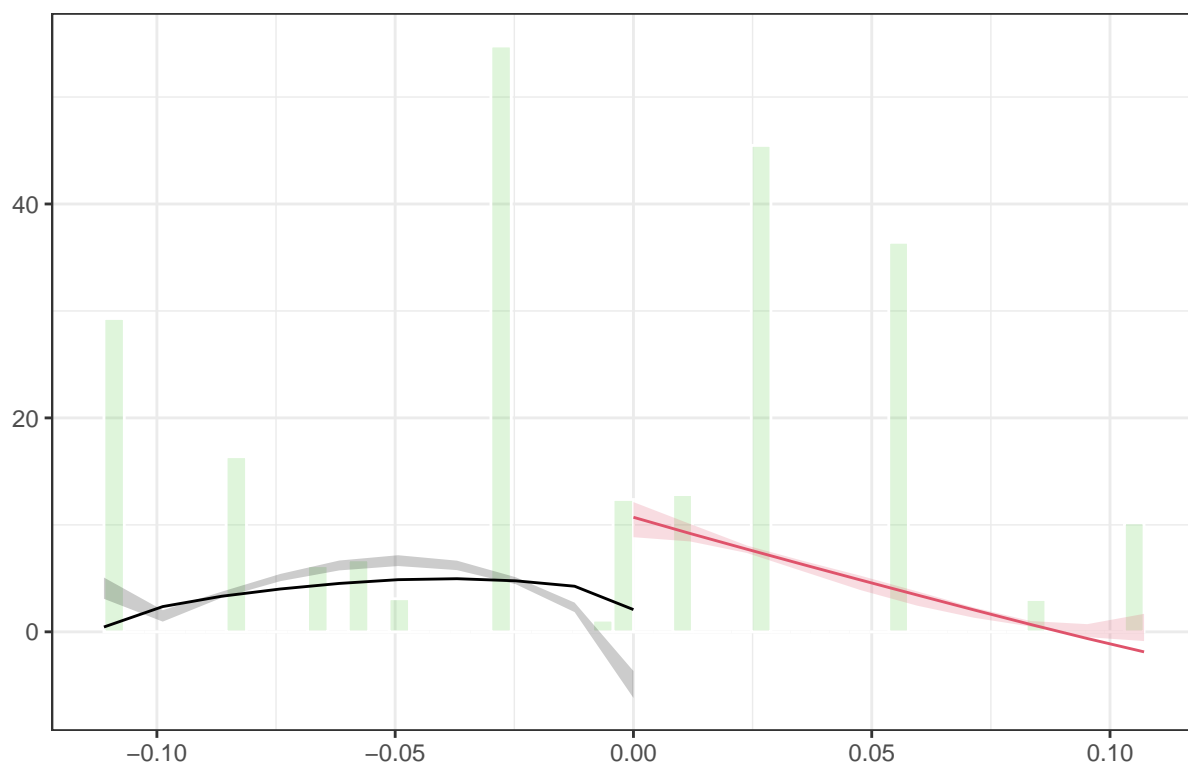
0.125 BW, 4.0 Rating

Figure 8: Manipulation of Running Variable, 3.5 vs 4 Stars

2.5 Question 5

The Figures 9-11 show the mean differences around the threshold. There appears to be small levels of difference in mean which suggests that there isn't much manipulation of the running variable for the different plan characteristics.
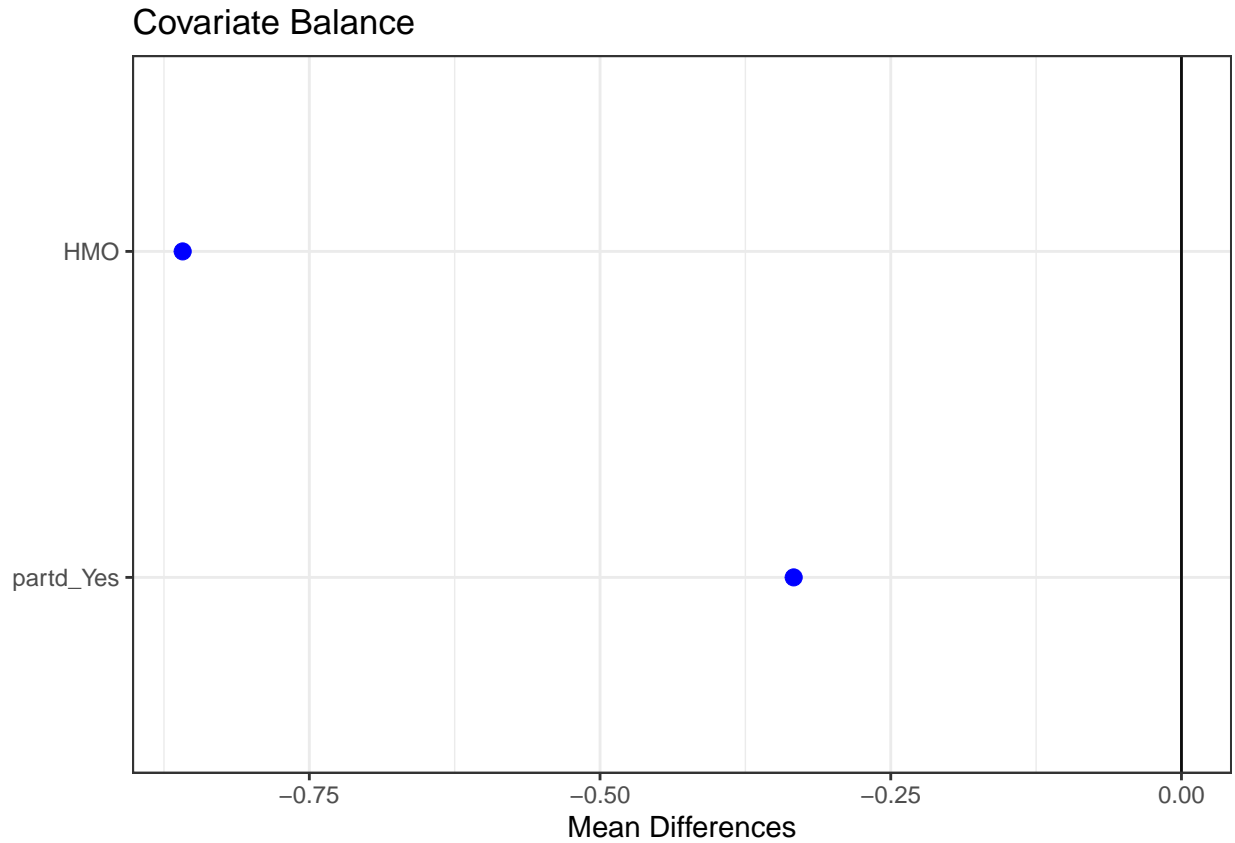
Covariate Balance

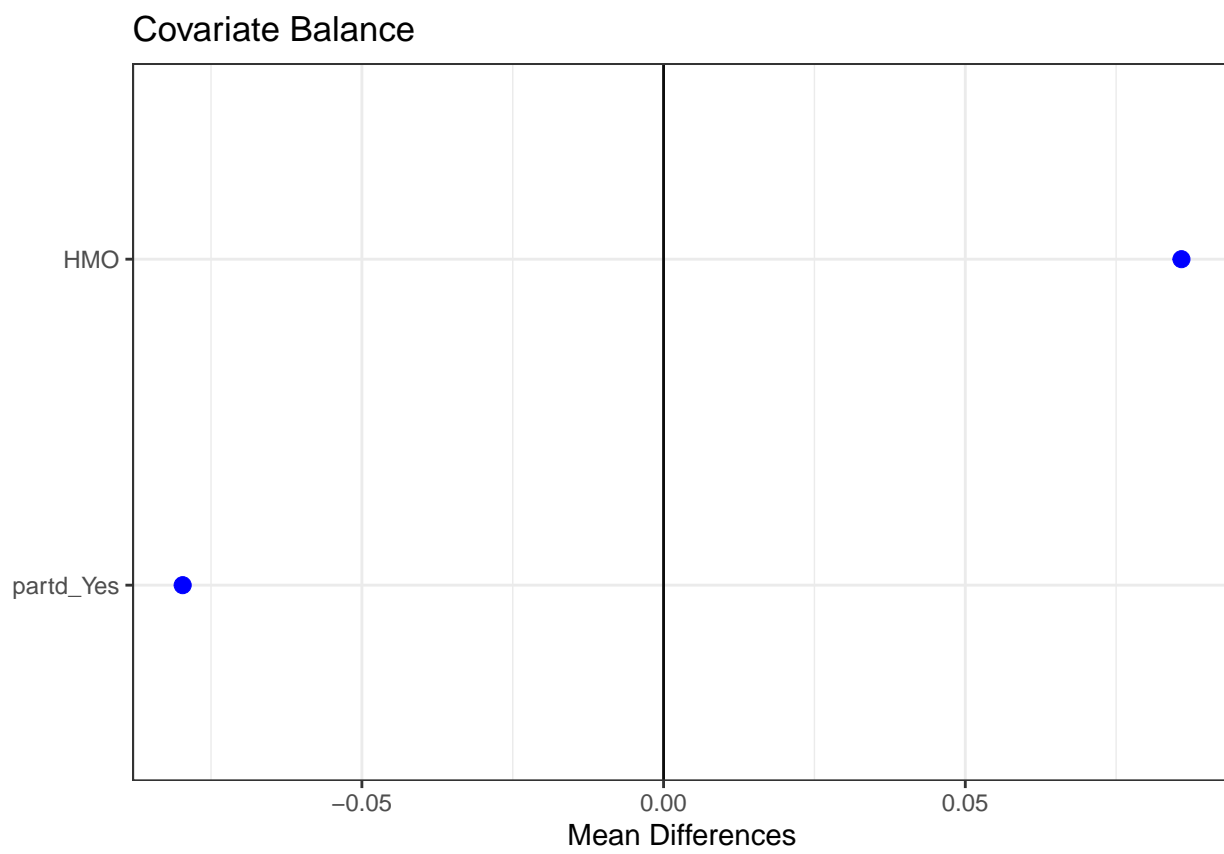Figure 9: Covariate Balance, 3.0 vs 3.5 Stars
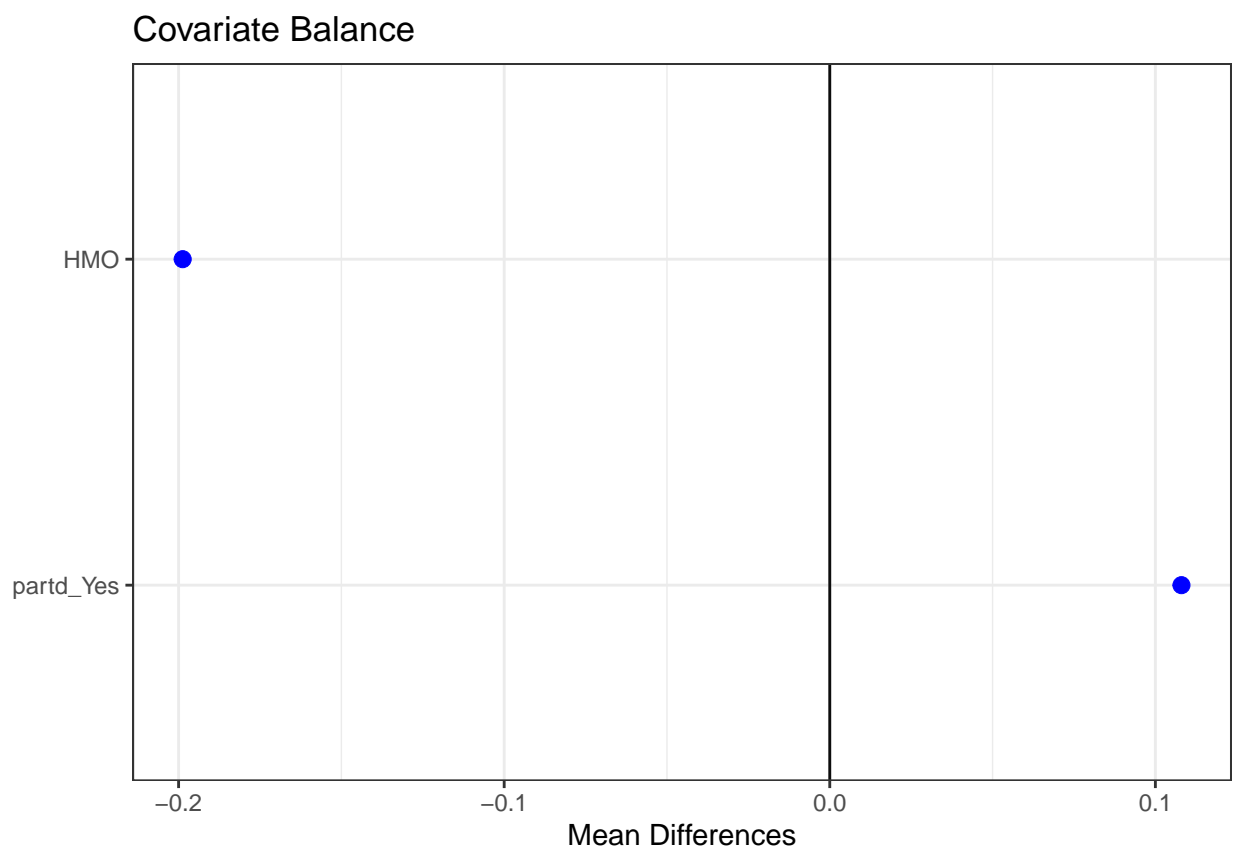
Figure 10: Covariate Balance, 3.5 vs 4.0 Stars

Figure 11: Covariate Balance, 4.0 vs 4.5 Stars

2.6   Question 6

The findings from questions 1-5 show the average treatment effect of star ratings on enrollment. The increase in star rating of a plan is shown to increase enrollment.