Homework 3

Submission 1, Spring 2026

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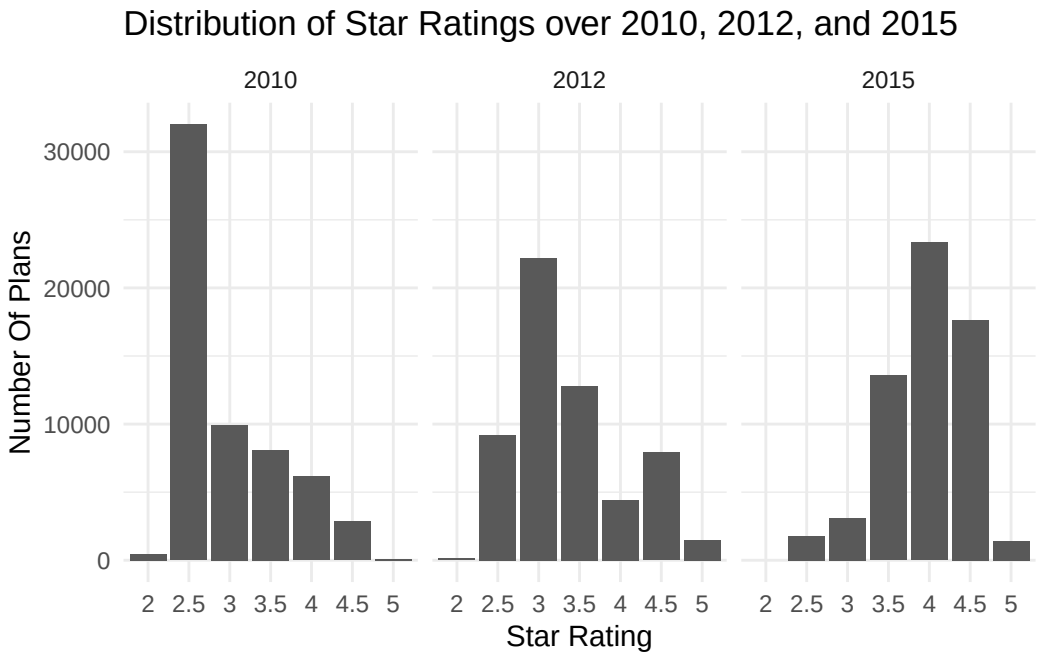
Problem 1

```
# A tibble: 6 x 5
   year `Average Star Rating` `Average Enrollments` `Average Market Share`
  <int>                 <dbl>                 <dbl>                  <dbl>
1  2010                  2.97                  256.                 0.0658
2  2011                  3.26                  343.                 0.0855
3  2012                  3.36                  377.                 0.0856
4  2013                  3.55                  396.                 0.0815
5  2014                  3.81                  437.                 0.08
6  2015                  3.96                  470.                 0.0787
# i 1 more variable: `Total Number Of Plans` <int>
```

Problem 2

```
# A tibble: 6 x 4
   year `Average Enrollments` `Average Market Share` `Total Number Of Plans`
  <int>                 <dbl>                  <dbl>                    <int>
1  2010                  107.                 0.0673                    48643
2  2011                  168.                 0.09                      12754
3  2012                  173.                 0.0567                     9077
4  2013                  214.                 0.06                       3661
5  2014                  258.                 0.0557                     3708
6  2015                  314.                 0.0405                     4680
```

Problem 3



We note that there is a steep decrease in the number of high-rated plans in 2010, whereas in 2012, the difference is less stark, and in 2015, we notice an improvement, with the existence of a larger number of high-rated plans.

Problem 4

	2010	2011	2012	2013	2014	2015
Excluded (<= 2.5 stars)	0.0634	0.0702	0.0789	0.0491	0.0640	0.0606
3 Stars	0.0126	0.0350	0.0307	0.0621	0.0267	0.0271
3.5 Stars	0.0005	0.0191	0.0129	0.0385	0.0273	0.0388
4 Stars	-0.0036	0.0028	-0.0246	0.0172	0.0074	0.0115
>= 4.5 Stars	-0.0076	-0.0095	-0.0134	0.0222	0.0071	0.0233

Problem 5

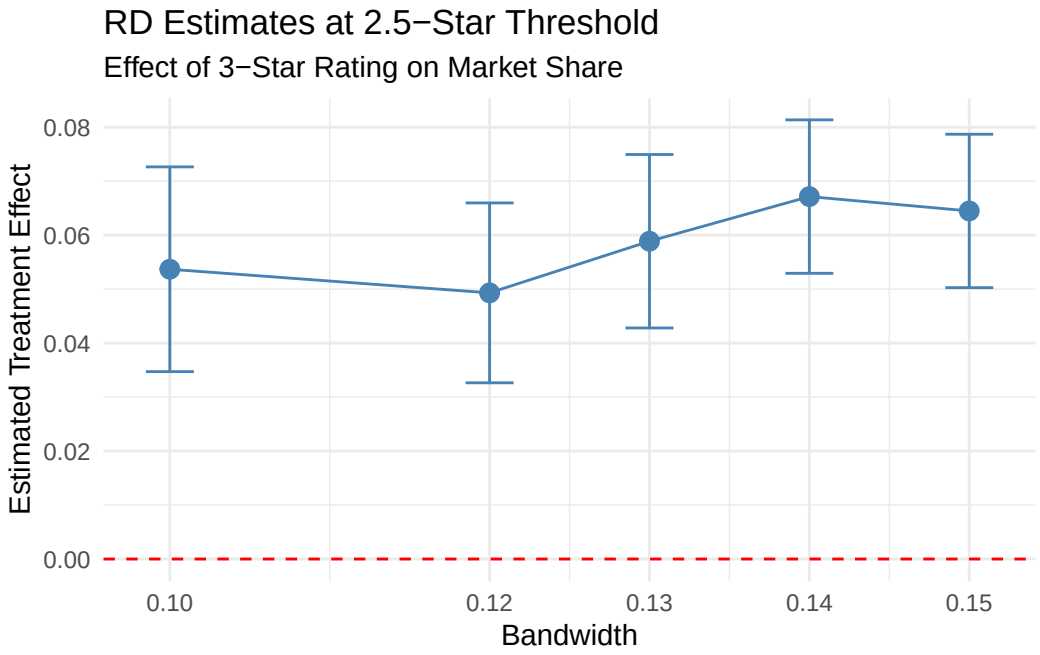
	`Star Rating`	`Corresponding Number Of Plans`
	<chr>	<int>
1	Rounded up to 3	9918
2	Rounded up to 3.5	8091
3	Rounded up to 4	4284

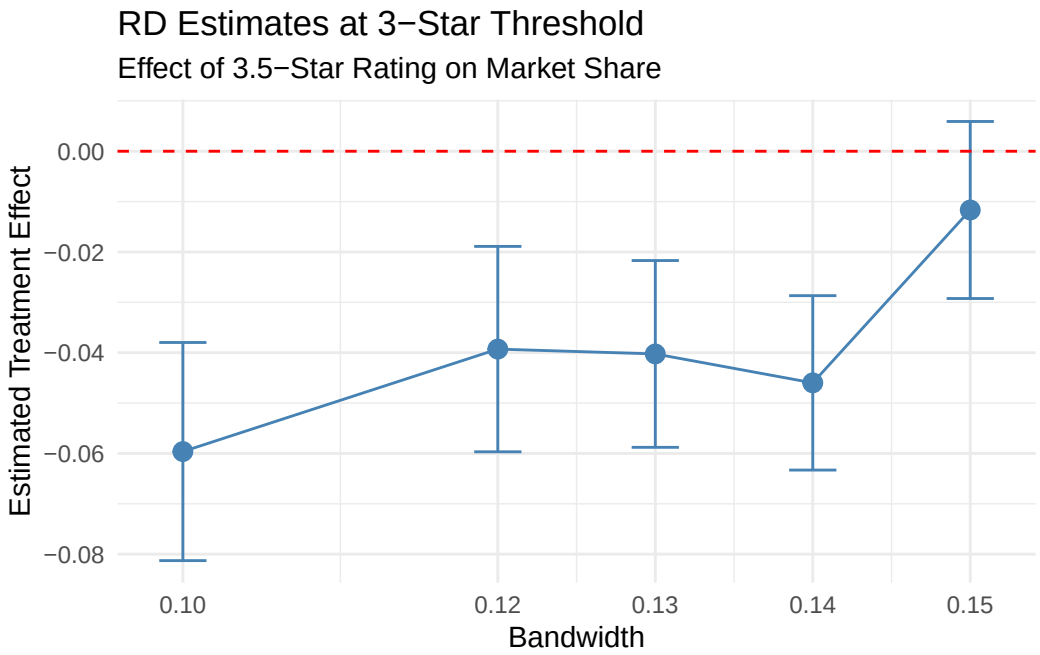
```
4 Rounded up to 4.5                                  771
5 Rounded up to 5                                     30
```

Problem 6

```
            X3.vs.3.5   X2.5.vs.3
RD Estimate 0.0546005 -0.03953024
```

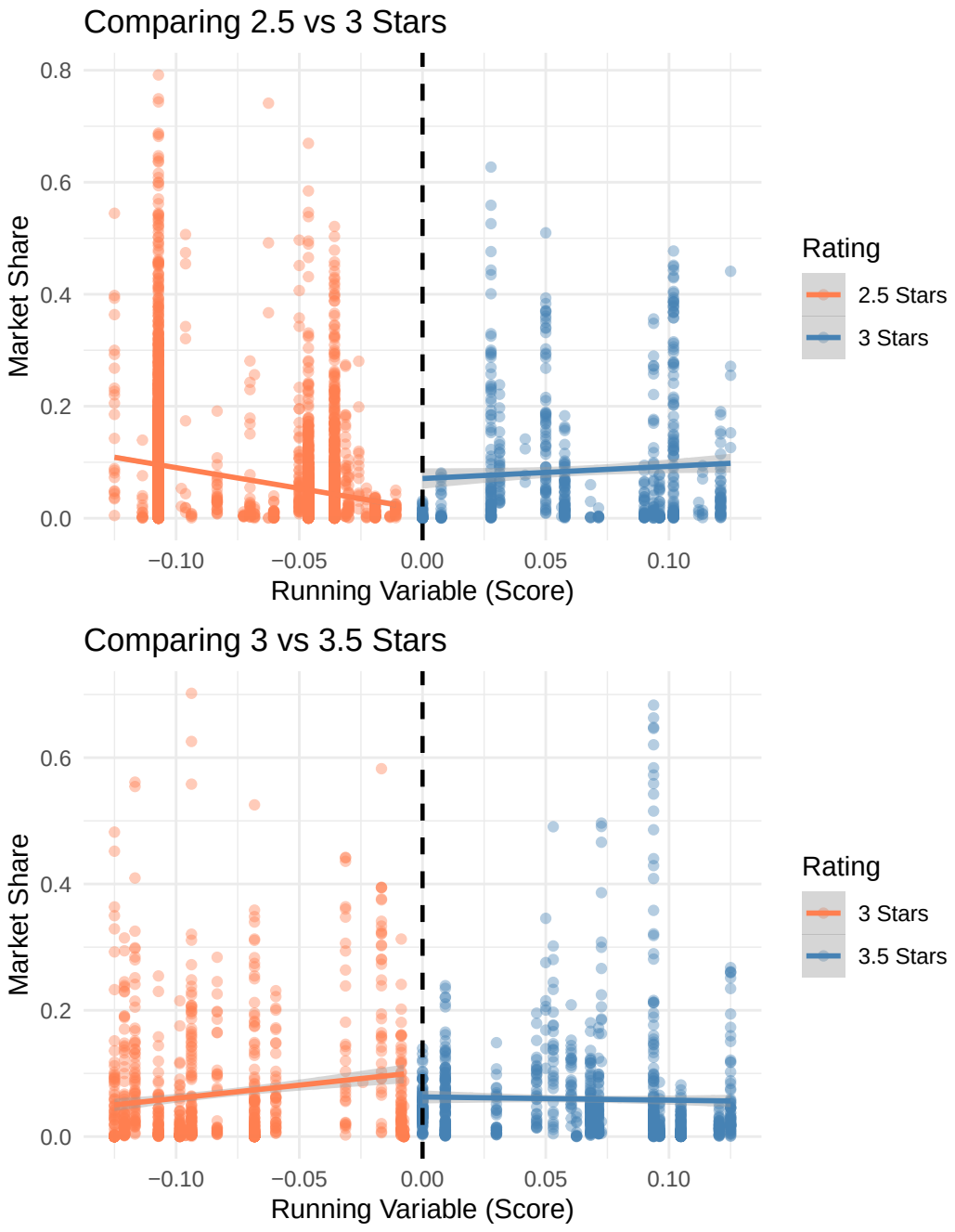
Problem 7





We note that findings are indeed sensitive to bandwidth choice. For instance, the treatment effect in comparing 3 versus 3.5 star plans appears to be more vivid when compared at the threshold of 0.1 as opposed to 0.15. Similarly, we see a difference in calculated effect when a bandwidth of 0.12 is chosen as opposed to 0.14 while comparsing 2.5 star plans versus 3-star plans.

Problem 8



We do see an abrupt increment in market share concording to values below and above the threshold, particularly prominent near the threshold of comparison for 2.5 stars against 3 stars (i.e., the first plot). Particularly, the drop from -0.10 to -0.05 in the upper plot and a slight increase from 0.05 to 0.10 in the lower plot.

Problem 9

	Threshold	PartD_Yes	PartD_No	Below_Threshold	Above_Threshold
1	2.5 vs 3 Stars	11868	9396	19313	1951
2	3 vs 3.5 Stars	4851	672	3127	2396

With a bandwidth of 0.125, we note that there are substantially more Plan D contracts below the threshold than above, for both categories. Furthermore, we see the number of plans that are HMO-approved (calculated via adjusted raw rating as HMO is constituted through Part C and defined here as score) to be significantly varying below and above the threshold. Thus, there are indeed varying characteristics between plans.

Problem 10

The effect of increased star rating is directly proportional to a larger number of enrollments, particularly prominent from the upward and downward slopes, above and below the threshold, respectively, in the Problem 8 plot comparing 2.5-star plans against 3-star ones. However, these results are highly sensitive to the chosen bandwidth (Problems 6 & 7), as that brings an asymmetric distribution of the number of plan D contracts below and above it (Problem 9). Further, an effect is added from the fact that the 3-star ratings experience the largest number of round-ups as compared to plans above it, thereby making that region particularly volatile to analysis.