

Module 3 Empirical Exercise

Jingxuan Zhao

In this assignment, I replicated the main analysis from the paper by Ericson et al. 2014 with the regression discontinuity designs.

The replicated Figure 3 (Figure 1 in the assignment) showed that pricing below the benchmark resulted in an increase in enrollment. Using different numbers of bins changed the figure slightly, but the conclusion from Figure 3 in Ericson et al. 2014 was largely unchanged. The replicated Table 3 confirmed the visual effect of Figure 3. The estimates from Table 3 showed that pricing just below the benchmark leads to higher market shares. Using the calculated optimal bandwidth changed the estimates from Table 3 slightly, but the conclusion was largely unchanged.

Please refer to the 'readme' file and R codes for more information on the codes and analysis

Question 1

Table 1. Description of Medicare part D plan

	Cohort (Year of plan introduction)				
	2006	2007	2008	2009	2010
Mean monthly premium (\$)	37 (13)	40 (17)	36 (20)	30 (5)	33 (9)
Mean deductible (\$)	92 (116)	114 (128)	146 (125)	253 (102)	118 (139)
Fraction enhanced benefit	0.43	0.43	0.58	0.03	0.69
Fraction of plans offered by firms already offering a plan . . .					
...in the United States	0.00	0.76	0.98	1.00	0.97
...in the same state	0.00	0.53	0.91	0.68	0.86
Number of unique firms	51	38	16	5	6
Number of plan	1429	658	202	68	107

Question 2

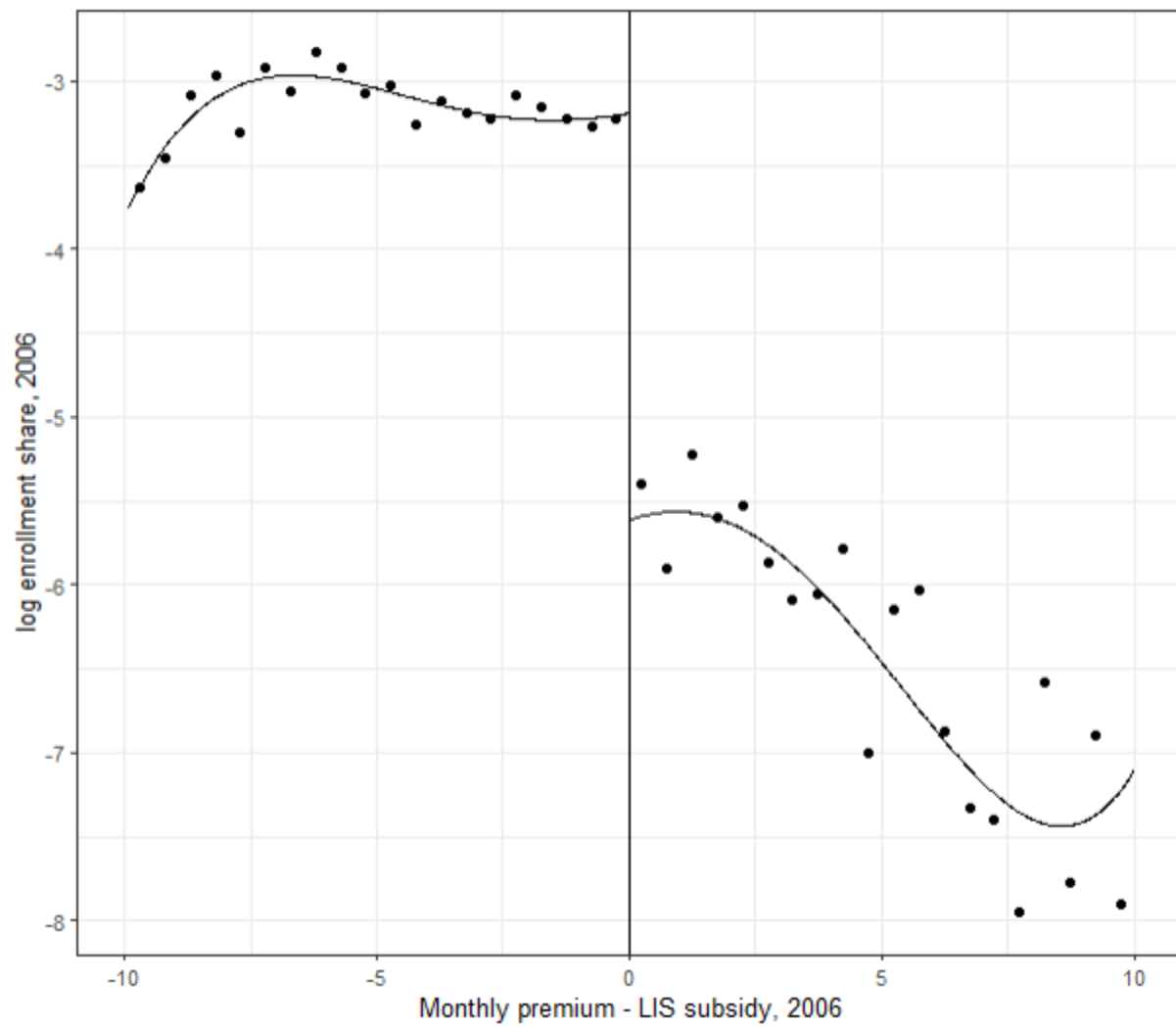


Figure 1. The effect of 2006 benchmark status on 2006 enrollment.

Question 3

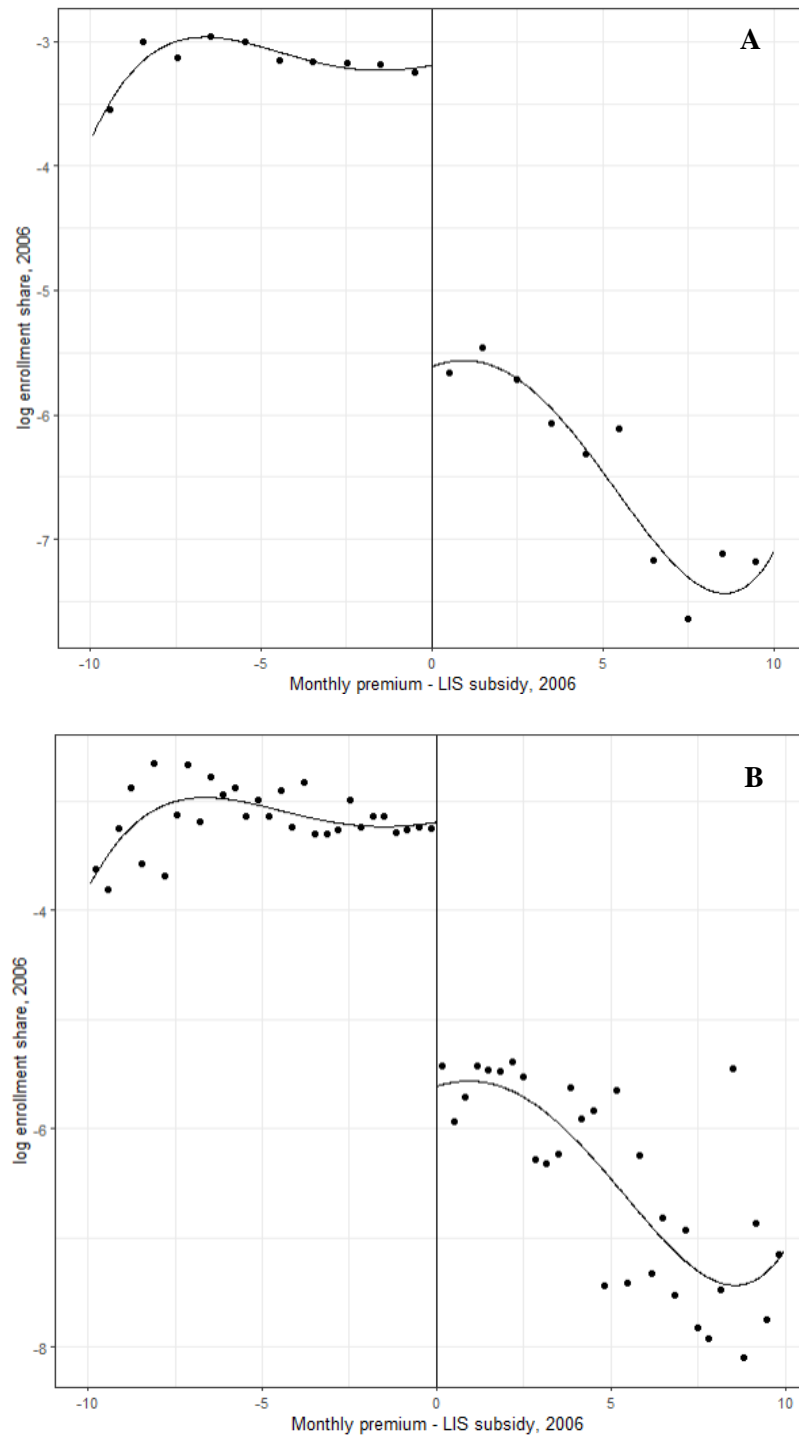


Figure 2. The effect of 2006 benchmark status on 2006 enrollment. (A) $J_{-,n}=J_{+,n}=10$, (B) $J_{-,n}=J_{+,n}=30$

Question 4

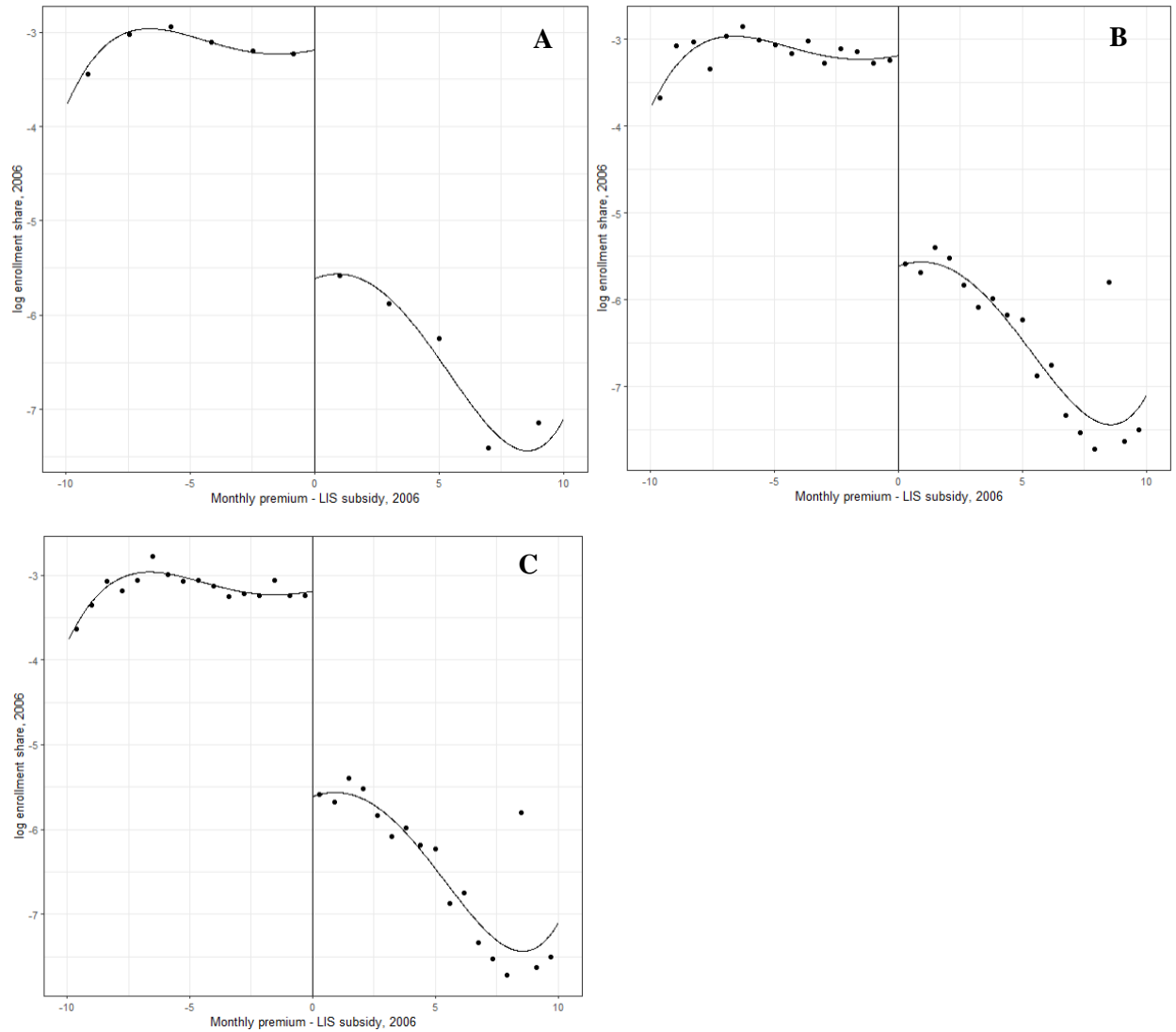


Figure 3. Bin count selection for the effect of 2006 benchmark status on 2006 enrollment. (A) binselect = "es" or binselect = "espr": $J_{-,n}=6$, $J_{+,n}=5$, (B) binselect = "esmv": $J_{-,n}=15$, $J_{+,n}=17$, (C) binselect = "esmvpr": $J_{-,n}=16$, $J_{+,n}=17$

Question 5

When setting `fitselect="unrestricted"`, the p-value for the test is 0.343. When setting `fitselect="restricted"`, the p-value for the test is 0.093, suggesting no evidence of manipulation.

Question 6

Table 2. Effect of LIS benchmark status in 2006 on plan enrollment

ln s _t	2006	2007	2008	2009	2010
Panel A. Local linear, bandwidth \$4					
Below benchmark, 2006	2.224 (0.283)	1.332 (0.267)	0.902 (0.248)	0.803 (0.362)	0.677 (0.481)
Premium—subsidy, 2006					
Below benchmark	-0.0141 (0.0322)	-0.0774 (0.0882)	-0.0731 (0.1156)	-0.17 (0.105)	-0.215 (0.088)
Above benchmark	-0.142 (0.078)	-0.0331 (0.1104)	0.0494 (0.1634)	0.0737 (0.1701)	0.0488 (0.2017)
Observations	306	299	298	246	212
R ²	0.576	0.325	0.131	0.141	0.124
Panel B. Polynomial with controls, bandwidth \$4					
Below benchmark, 2006	2.464 (0.222)	1.364 (0.321)	0.872 (0.246)	0.351 (0.324)	-0.277 (0.301)
Premium—subsidy, 2006	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic
Observations	306	299	298	246	212
R ²	0.794	0.576	0.472	0.535	0.685
Panel C. Past interactions, local linear, bandwidth \$4					
Below benchmark or de minimis in:					
2006 and current year	2.224 (0.283)	2.089 (0.364)	2.377 (0.275)	2.633 (0.257)	2.443 (0.309)
2006 but not current year		0.628 (0.293)	0.892 (0.329)	1.068 (0.446)	0.967 (0.625)
Current year but not 2006		0.148 (0.29)	1.356 (0.293)	2.107 (0.242)	2.281 (0.259)
Premium—subsidy, 2006	Linear	Linear	Linear	Linear	Linear
Observations	306	299	298	246	212
R ²	0.576	0.48	0.426	0.498	0.467

Question 7

Table 3. Effect of LIS benchmark status in 2006 on plan enrollment, with alternative bandwidths

ln s _t	2006	2007	2008	2009	2010
Panel A. Local linear, bandwidth \$4					
Below benchmark, 2006	2.349 (0.422)	1.24 (0.455)	0.498 (0.444)	0.123 (0.63)	0.073 (0.738)
Premium—subsidy, 2006					
Below benchmark	-0.13 (0.164)	-0.359 (0.305)	-0.409 (0.371)	-0.472 (0.443)	-0.507 (0.536)
Above benchmark	0.11 (0.445)	0.179 (0.265)	-0.161 (0.316)	-0.445 (0.418)	-0.352 (0.437)
Observations	142	138	138	116	101
R ²	0.550	0.310	0.148	0.140	0.100
Panel B. Polynomial with controls, bandwidth \$4					
Below benchmark, 2006	1.874 (0.277)	1.45 (0.579)	0.863 (0.311)	0.736 (0.555)	-0.152 (0.254)
Premium—subsidy, 2006	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic
Observations	142	138	138	116	101
R ²	0.838	0.725	0.725	0.733	0.776
Panel C. Past interactions, local linear, bandwidth \$4					
Below benchmark or de minimis in:					
2006 and current year	2.349 (0.422)	1.945 (0.381)	2.298 (0.352)	2.568 (0.354)	2.183 (0.423)
2006 but not current year		0.626 (0.408)	0.666 (0.437)	0.937 (0.508)	0.55 (0.698)
Current year but not 2006		0.057 (0.424)	1.185 (0.381)	2.13 (0.347)	2.161 (0.267)
Premium—subsidy, 2006	Linear	Linear	Linear	Linear	Linear
Observations	142	138	138	116	101
R ²	0.550	0.459	0.446	0.504	0.457

Question 8

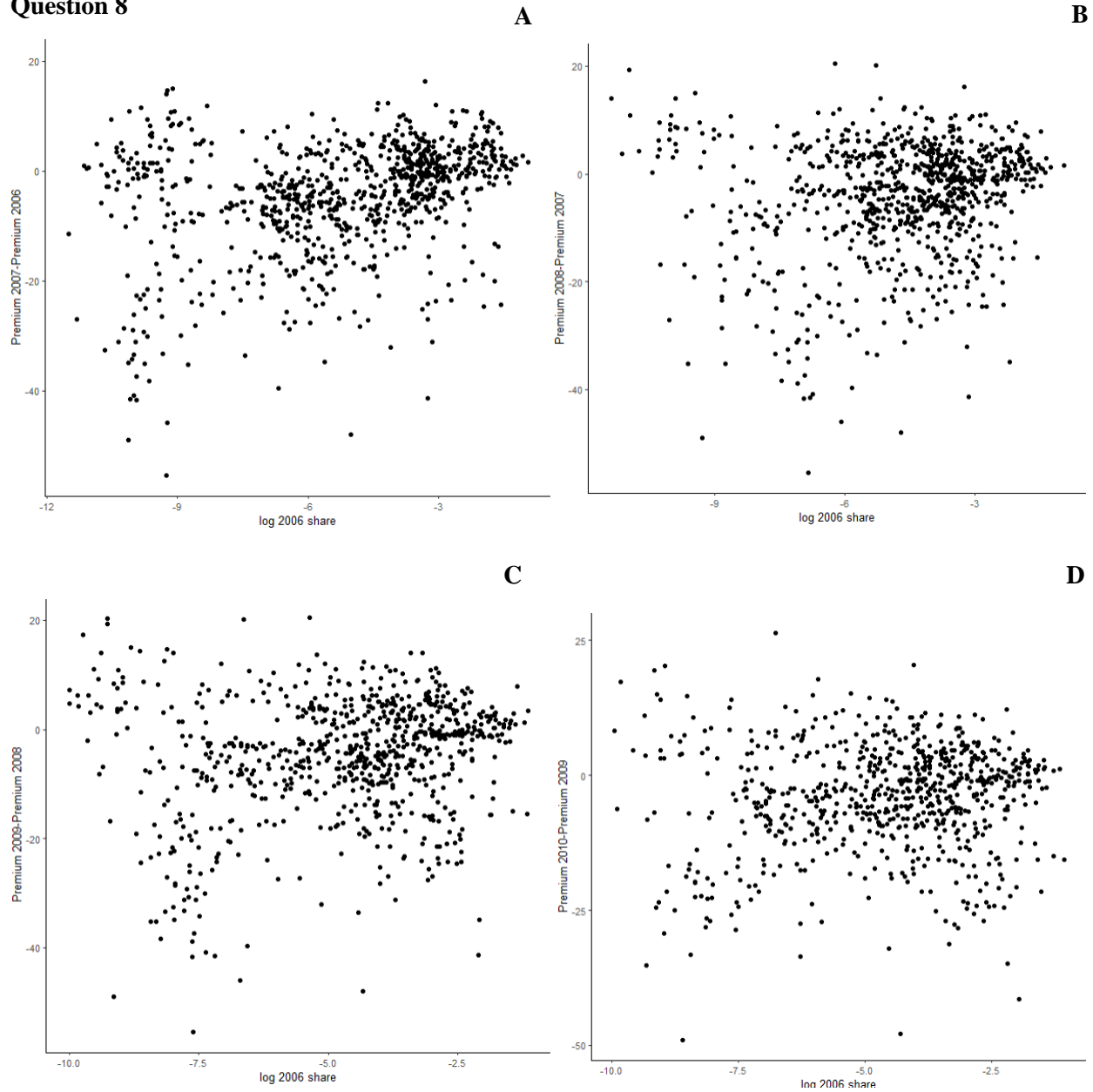


Figure 4. The effect of 2006 enrollment on future premiums. (A) Premium change from 2006 to 2007. (B) Premium change from 2007 to 2008, (C) Premium change from 2008 to 2009, and (D) Premium change from 2009 to 2010.

From this figure, it looks like that higher share in 2006 could result in greater increase in premiums in the next few years.

Table 4. Effect of market share in 2006 on future premium changes

	2007	2008	2009	2010
Log of 2006 share	-1.170 (0.882)	-1.940 (0.462)***	0.0105 (0.267)	0.949 (0.277)***
Observations	896	879	781	753
R ²	0.220	0.251	0.504	0.461

Question 9

Comparing Figure 1, Figure 2, and Figure 3, I found that the findings were largely unchanged with different choices of number of bins. Comparing Table 3 with Table 2, I also found similar results with different bin width selections. I expected to see greater increase in plan premiums for plans with larger market share in 2006. However, the results in Table 4 was different from what I expected.

Question 10

The Stata code is really helpful! It helps me better understand the study design and model specification and saved me a lot of time replicating tables and the figure.

The results from Questions 1-7 were not surprising to me. But for Question 8, I expected to see greater increase in plan premiums for plans with larger market share in 2006. However, the results in Table 4 was different from what I expected.