ECON7103 HW6

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1)

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. rdbwselect price rd, bwselect(mserd)

Bandwidth estimators for sharp RD local polynomial regression.
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Cutoff c =	Left of c	Right of c		
Number of obs	720	280	Number of obs =	1000
Min of rd	-181.037	0.087	Kernel =	Triangular
Max of rd	-0.157	96.893	VCE method =	NN
Order est. (p)	1	1		
Order bias (q)	2	2		

Outcome: price. Running variable: rd.

	BW est. (h)		BW bias (b)	
Method	Left of c	Right of c	Left of c	Right of c
mserd	23.836	23.836	36.019	36.019

Sharp RD estimates using local polynomial regression.

Cutoff c = 0	Left of c	Right of c
Number of obs	720	280
Eff. Number of obs	206	159
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	23.836	23.836
BW bias (b)	36.019	36.019
rho (h/b)	0.662	0.662

Number of obs	=	1000	
BW type	=	mserd	
Kernel	=	Triangular	
VCE method	=	NN	

Outcome: price. Running variable: rd.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	-1335.8	894.8	-1.4929	0.135	-3089.62	417.925
Robust	-	-	-1.1997	0.230	-3406.62	819.715

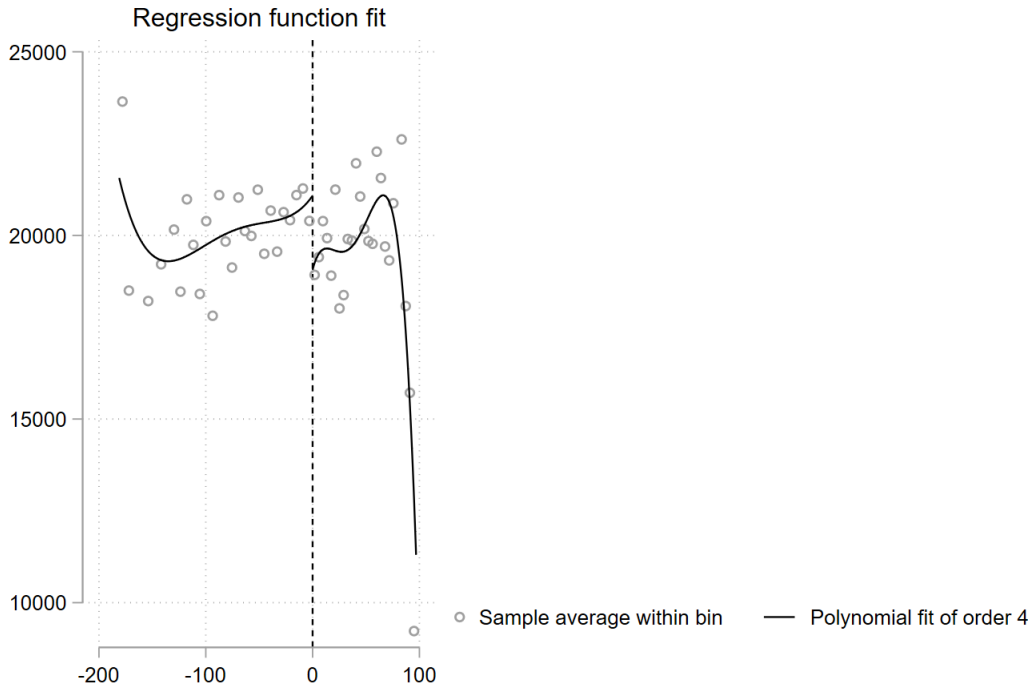
	(1)
VARIABLES	2SLS Results: 2sls Estimator
mpg	162.4***
	(35.14)
car	-4,778***
	(395.0)
Constant	17,290***
	(1,009)
Observations	1,000
R-squared	0.092

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ATE	(2) ATE	(3) ATE	(4) ATE
car			-2,794***	-2,553***
			(292.7)	(509.7)
mpg			-110.5***	-219.7***
			(22.33)	(40.71)
r1vs0.rdl	-3,342***			
	(364.7)			
0.rdl		20,868***		
		(152.3)		
Constant			25,843***	25,920***
			(727.4)	(968.3)
Observations	1,000	1,000	1,000	1,000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

- b)



2)

In the RD design, the treatment variable is determined by a threshold or cutoff point, which creates exogenous variation in the treatment variable for observations that are just above or below the threshold. This exogenous variation can be used as an instrument to estimate the causal effect of the treatment variable on the outcome variable the vehicle's sale price) if the RD design satisfies the necessary assumptions of an IV strategy.

The main assumption for using RD as an IV strategy is that the treatment variable is continuous around the cutoff point, and that there is no other confounding variable that changes discontinuously at the cutoff point. If this assumption is satisfied, the RD design can provide consistent estimates of the causal effect of the treatment variable on the outcome variable.

The IV should be correlated with the endogenous variable of interest. In other words, the IV should be able to explain some of the variations in the treatment variable and The IV should not be correlated with the error term in the outcome equation, after controlling for other covariates. This assumption is necessary to avoid omitted variable bias and to ensure that the IV is not capturing some other confounding effect on the outcome. I think mpg is statistically significant and there is no endogeneity after 2SLS, we can say that this rd design is a good instrument.