Homework 5

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1 Python

1.1

- The coefficient on the endogenous *mpg* is -22.21. A unit increase in *mpg* corresponds to a decrease in price of $22.21.

1.2

- We should be concerned primarily with omitted variable bias, or equivalently, the possibility that *mpg* is a confounder correlated with both *price* and the error term. It's unlikely that we have measurement error or simultaneity in this particular application.

1.3

	Dependent variable: price		
	(1)	(2)	(3)
car	-4676.09***	-4732.67***	-90156.39
	(574.37)	(573.29)	(226687.35)
const	17627.64***	17441.23***	-264024.20
	(1754.87)	(1751.12)	(746919.27)
$\hat{mpg}(a)$	150.43**		
	(62.16)		
$\hat{mpg}(b)$		157.06**	
		(62.02)	
$\hat{mpg}(c)$			10165.74
			(26559.83)
First-stage F	[[75.4640828]]	[[75.76900674]]	[[0.0003864]]
Observations	1,000	1,000	1,000
R^2	0.20	0.20	0.19
Adjusted R^2	0.19	0.19	0.19
Residual Std. Error	3481.08	3480.12	3491.04
F Statistic	121.62***	121.97***	118.09***
Note:			*p<0.1; **p<0.05; ***p<0.01

1.4

- Using GMM, the second-stage coefficient of interest (*mpg*) is 150.43, with S.E. 63.05. The point estimate is identical to treatment (1) in the table above, but with slightly larger errors, likely due to a suboptimal weighting matrix in the GMM estimation. GMM is more efficient than 2SLS when there are multiple instruments. In this case, there is only one.

2 Stata

2.1

	(1)
VARIABLES	price
mpg	150.4**
	(63.05)
car	-4,676***
	(589.7)
Constant	17,628***
	(1,773)
Observations	1,000
R-squared	0.104

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

2.2

- The MOP effective F-statistic is 78.362. The 5% critical value is 37.418, so we reject the null hypothesis (that *weight* is a weak instrument).