

## 14.382 FINAL

1. 20 MIN

Explain the idea of partialing out for the linear IV model

$$Y = D\alpha + W'\beta + u,$$

$$D = Z'\delta + W'\gamma + v,$$

and how it can be used to simplify analysis.

2. 20 MIN

Explain why bootstrapping the sample average works.

3. 20 MIN

Explain what logistic regression is and how it fits in the GMM framework. What are the large sample properties of the logistic regression estimator?

4. 30 MIN

Explain how "FD" and "FE" columns were obtained in the table below and what each entry in these columns are. Explain what clustering in Note 2 refers to.

TABLE 1. Effect of Expenditure per Student on Math Scores

	Pooled	FD	GMM-FD1	GMM-FD2	FE	GMM-FE1	GMM-FE2
log(rexpp)	0.53 (2.51) [2.49]	-1.41 (4.93) [4.65]	-1.73 (2.99) [3.43]	0.65 (1.30) [3.39]	-0.41 (2.79) [2.74]	-0.28 (2.09) [2.51]	1.07 (1.31) [2.61]
L1.log(rexpp)	9.05 (2.79) [2.81]	11.04 (5.12) [5.10]	7.94 (2.77) [3.69]	9.87 (1.12) [4.26]	7.00 (4.24) [4.20]	9.44 (2.47) [3.42]	7.63 (1.03) [3.87]
log(enrol)	0.59 (0.41) [0.40]	2.14 (1.64) [1.59]	1.84 (1.02) [1.34]	1.42 (0.42) [1.32]	0.25 (0.95) [0.95]	0.31 (0.75) [0.96]	0.05 (0.41) [0.93]
lunch	-0.41 (0.03) [0.03]	0.07 (0.17) [0.15]	0.02 (0.12) [0.16]	0.02 (0.04) [0.12]	0.06 (0.13) [0.12]	0.01 (0.10) [0.11]	0.01 (0.04) [0.11]
J-test			25.37	157.94		19.13	157.43
p-val			0.06	0.00		0.51	0.02
d.o.f.			16	101		24	122

Note 1: All the specifications include time effects.

Note 2: Clustered standard errors at the school level in parentheses.

Note 3: Bootstrap standard errors in brackets based on 500 replication.

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