

Ph.D. Econometrics II
Heinz School, Carnegie Mellon University
90-907, Fall 2000

Midterm

Instructions You may use any books, notes, calculators, and other aids you like. You may not converse, nor may you cooperate.

Please complete all questions.

Each question is worth 25 points.

Please show all relevant work.

Please interpret your results in plain English.

15 points Please react to the following, deploying knowledge you gained in this course. A researcher runs an OLS regression with an endogenous RHS variables. He is interested in β_3 . X_3 is exogenous. But X_4 is endogenous. He claims that there is no problem with his interpretation of β_3 because X_3 isn't endogenous.

25 points Consider the bivariate model $Y = \beta_1 + \beta_2 X + \epsilon$. Suppose that X, ϵ are positively correlated as are X, W and W, ϵ . A researcher estimates β_2 by IV using W as his instrument for X . He says “Yes, W is also endogenous, but it’s less endogenous than X , so my estimate is better than OLS” Evaluate.

25 points Consider the bivariate model $Y = \beta_1 + \beta_2 X + \epsilon$. Suppose that X, ϵ are correlated, but that W, ϵ are not. If a researcher runs OLS on $Y = \alpha_1 + \alpha_2 W + \epsilon$, what will $\hat{\alpha}_{2,OLS}$ estimate? Can we get from it to a good estimator of β_2 ?

35 points Consider a model of whether a person takes a bus or car to work. The utility of doing so depends on the average utility of each transport mode and also the price and time each demands:

$$\begin{aligned} U_{i,bus} &= \beta_1 + \beta_2 P_B + \beta_3 T_B + \epsilon_{i,B} \\ U_{i,car} &= \beta_4 + \beta_5 P_C + \beta_6 T_C + \epsilon_{i,C} \end{aligned}$$

Assume the ϵ are indep of all RHS and iid Weibull.

You have data on the price and times and a variable Y , which is 1 if the person takes the bus.

A researcher runs a logit model on:

$$Y^* = \delta_1 + \delta_2(P_B - P_C) + \delta_3(T_B - T_C) + \nu$$

The results of the estimation are:

$$\begin{aligned} \hat{\delta}_{MLE} &= \begin{pmatrix} -1 \\ 0.2 \\ 4 \end{pmatrix} \\ \widehat{V(\hat{\delta})} &= \begin{bmatrix} 0.04250 & 0.00059 & -0.0041 \\ 0.00057 & 0.00007 & 0.0096 \\ -0.00410 & 0.00960 & 0.2500 \end{bmatrix} \end{aligned} \quad (1)$$

If the prices and travel time for cars and buses were to be equal, how much would ridership of buses ride with a \$1 subsidy?

How much is time worth to the average person?

For both, give me estimate and confidence interval