

# Econ 741 Homework 5

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December 9, 2018

## 1 Question 1. Discrete Choice (44 points):

1. Run a clogit of transportation choice on travel time (10 points)
2. What percentage of people in the data choose each of the four options? (10 points)
3. What are the predicted probabilities with the clogit? (10 points)
4. Suppose that planes get quicker, and that the average plane trip becomes one hour shorter. (12 points)
  - (a) How much less likely (as a percent) are people to fly? (3 points)
  - (b) How much more likely (as a percent) are people to take the train? (3 points)
  - (c) How much more likely (as a percent) are people to take the bus? (3 points)
  - (d) How much more likely (as a percent) are people to take a car? (3 points)
5. Report the marginal effect of travel time on the likelihood that someone flies for someone making 20,000 a year and for someone making 80,000 a year. (12 points)

## 2 Question 2. Time Series:

For this question you will need to clean some data. Take the `ur.dta` dataset and merge it with the `GDP cleaned.dta` file so that you have data on the average unemployment rate in a quarter and quarterly GDP growth. Keep data from 1950 to present that you can match (i.e. you can't use October 2017). You will want to use the commands `collapse` and `merge` here. With this cleaned data, answer the following questions (34 points)

1. Using only data from 1950 through 2016, test for stationarity in both variables. Ignore drifts and trends. (24 points)
  - (a) Suppose you are asked to regress UR on GDP growth. In order for this regression to be meaningful, what needs to be true? (4 points)

Both UR and GDP growth need to be stationary for the regression to be meaningful. If either of these variables are non-stationary the mean and the variance of that variable will be growing/shrinking over time.
  - (b) Is UR stationary? (3 points)

No. When we ran the Dickey Fuller test we got a t-statistic of -1.89 and a critical value of -2.879 for the 5 percent critical value. Our p-value is 0.35.
  - (c) If not, how many lags do you need to include for it to become stationary? (3 points)

We only need one lag to make UR stationary. At one lag we get a test statistic of -4.109 and a p-value of 0.0009.
  - (d) Is GDP growth stationary? (3 points)

Growth is stationary. When we run a Dickey Fuller test on growth we get a test statistic of -4.446 and a p-value of 0.0002.

- (e) If not, how many lags do you need to include for it to become stationary? (3 points) N/A
- (f) Can you run a meaningful regression of UR and GDP given what you have found above and any other evidence you may want to explore? If not, run a model with transformations of the variables that would be meaningful. (8 points)

We cannot run a meaningful regression of UR and GDP given that UR is not stationary. However, if we make UR stationary through differencing than we can run a regression.

D.UR	Coef.	Std.Err.	t	95 perc Confidence level
growth	-.1003998	.0063872	-15.72	-.1129759 -.0878237
cons	.3193156	.0266202	12.00	.2669016 .3717296

Table 1: Regression Results: Differenced UR on Growth.

2. Run a VAR of UR on GDP growth.

- (a) Try this with 1-5 lags. Pick the best model according to the BIC and report only those results. (10 points)
- (b) Does GDP growth Granger cause UR? (5 points)
- (c) Does UR Granger cause GDP growth? (5 points)