

**Economics 381, Fall 2016**

**Problem Set 6 – Instrumental Variables**

**Due Date: November 17**

**Instructions:** These questions in this problem set will take more effort than previously. Type out your answers in a separate document, and **staple** your answers to this sheet.

**Name (printed):**

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This problem set requires you to compare results from estimating a relationship using OLS and 2SLS, based on data from the National Longitudinal Survey of Women, 1968. You can access this dataset from Stata using the `webuse nlswork` command.

- Q1. I want you to run a regression of (the log of) wages on age, industry, marital status, education, and tenure (i.e. length of years in the same job.) Ensure you break industry into multiple dummy variables, i.e. give each industry its own dummy variable, and apply White's 'robust' standard errors. Copy the regression table into Excel, and format it to a professional standard, including restricting how many numbers appear after the decimal place.
- Q2. Highlight the coefficient on the tenure variable. Discuss what you consider to be the key take-aways from this regression, including the interpretation of the effect of tenure on wages.
- Q3. It is reasonable to be concerned that tenure is endogenous with wage. For example, it is likely that people who are naturally good at their jobs get higher pay and have longer tenure. This situation is ripe for an instrumental variable. I want you to instrument tenure with whether the firm has a union or not. This is arguably exogenous to the individual's natural ability, but likely predicts tenure.

Manually investigate the first-stage of this IV, by regressing tenure on union status. Be sure to include all the control variables (age, etc.) from the previous regression as control variables in the first stage, and to use robust SEs. Copy the regression table into Excel, and format it to a professional standard. What is the  $t$ -stat on the union variable?

- Q4. There are two very specific requirements for a valid IV. Comment on whether you believe they are satisfied here. Be completely clear and concise.
- Q5. Use Stata's `ivregress` command to perform a 2SLS analysis of the effect of tenure on wages, instrumenting tenure with union status as mentioned above. Again, don't forget to use robust SEs. Take the second-stage results to Excel and format them neatly.
- Q6. Compare the results from 2SLS to OLS.