17.874, Spring 2004
Problem Set 8

1. Greene, Chapter 13, Problem 1.

2. Greene, Chapter 13, Problem 7.

3. Two years ago, the City of Boston asked me what voting equipment they ought to adopt. The city had used lever machines, and had a choice of optical scanning equipment or electronic equipment (also known as Direct Recording Electronics, or DREs). I recommended optical scanning. We will distribute the data I relied on in advising the City. I performed several analyses, and reached the conclusion that scanners represent the best of what is available today.

In doing this, problem you will need to note several features of the data. First, I have data from 1988 to 2000 for most counties and states in the U.S. The county identifier is the FIPS code, an identifier of place and state used to index all federal government data. The data are organized by state and year. I collected the total number of voters in each year and the total ballots counted for President, Governor, and Senator. The dependent variable is the residual vote: (Total Vote - Vote for an Office)/Total Vote. The variable that identifies voting equipment types is labelled VE. Voting Equipment types are: Paper ballots (VE = 4), Punch Card Ballots (VE = 1 and VE = 2), Lever Machines (VE = 3), Optical Scan Ballots (VE = 5), and Direct Recording Electronics (VE = 6). Some counties use a mix (VE = 7). For this analysis you may want to drop VE = 7. Control variables include county level demographics and turnout.

a. Regress Residual Votes for Specific Offices on indicators of Equipment Type, controlling for voting aged population (VAP) and turnout (TOT).

b. What transformation the dependent variable makes sense, if any? What should be done about the illogical values of the dependent variable (residual vote less than 0)?

c. Perform fixed effects regressions with county fixed effects. [Use either the areg or xtreg commands in STATA.] Compare your estimates to those in parts (a) and (b).

d. Extract the fixed effects and correlated them with included variables, such as turnout and equipment types. Is there any evidence that the effects are correlated with the included variables? Perform an apporpriate test to answer whether you should use fixed effects, random effects, or OLS.

e. The City officials have no idea what you're talking about. Display your results graphically. You might want to bootstrap the data and graph the resampled parameter

estimates. However, Don't feel constrained by your computer program. Draw a good graph if that is needed to represent the information in the data.

f. The City Election Official is concerned that the data analysis includes comparisons with technologies that are not relevant (paper and punch cards). Identify all counties that used lever machines in 1988 but had switched to scanners or electronics by 1996. Measure the change in the residual vote for a change in the technology. Present a table with these effects. Are the results consistent with parts (a) and (b).

g. For the models in (a), (b), and (g), test whether optical scanners perform better than DREs. Do either improve on the performance of lever machines?