ECON742: Exercise 3
Instrumental variables

The goal of this exercise is to determine the price elasticity of cigarette consumption. More information about the dataset can be found at:
http://wps.aw.com/aw_stockwatsn_economtrcs_1/0,7018,291498-,00.html
Or in the papers by Jonathan Gruber about this problem.

1. Why is it important to know this elasticity, in terms of public policy?

2. In this exercise, we will use longitudinal data on cigarette consumption. Download "Data cigarette" under the Lecture 3. This database contains annual data for the 48 continental states of the USA between 1985 and 1995. Look at the lables of the variables to know their exact definition. For the questions 3 to 10, keep only the year 1995.

3. To obtain the price elasticity of cigarette consumption, we would like to regress the quantity of cigarettes consumed (in number of packs of cigarettes per individual per year: packpc) on the average price of a pack of cigarettes, including taxes (avgprs). Estimate this regression in logs. Interpret the coefficient. What is the major problem of this OLS estimation? Write down the regression estimated. Show how an instrumental variables may solve this issue.

4. A candidate for an instrumental variable could be the average state, federal, and average local excise taxes (tax). What are the three conditions for a good instrumental variable? Why would this variable be a good candidate here?

5. Verify that the taxes are related to the price. Interpret the coefficient. Is this a good sign for this instrument? Obtain by two different methods (2SLS amnually, and IV) the IV estimators. Are these coefficients the same?

6. Are you convinced by this identification strategy? Does the instrumental variable seem appropriate? Are there other omitted variables that could bias the analysis?

7. A potential omitted variable could be the average income per capita. Detail the mechanisms through which income could be correlated with the demand for cigarettes, but also with taxes. Include the income per capita (income).

8. Another potential candidate for an instrumental variable could be the specific tax applied to cigarettes (taxs). Explain why taxs would be a good instrument. Show the first-stage regression. Compare it to the first stage regression of question 5). Are these two instruments better than the one instrument used up to now? Explain the two consequences, in terms of consistency and efficiency, of the correlation between the instrumented endogenous explanatory variables and the instruments. Calculate the new IV estimators of the price elasticity. Compare.

9. Do an overidentification test by hand, with overid, and through ivreg2. Conclude.

10. Are you convinced by this strategy? Are there other factors that may influence demand for cigarettes, and tobacco taxes (think about panel data)?

11. Use the panel data. Regress the log of consumption on the log of prices, using a fixed effect methodology. Compare this to the OLS result using only 1995. Instrument the prices by taxes and specific taxes.

12. Perform the two tests (first stage, overid) with this new specification. Conclude.

13. What do you think about the two IVs suggested? Do you think you have established the causal impact of prices on the demand for cigarettes? What recommandation would you do to a decision-maker? Does this estimate for the price elasticity look reasonable to you?