ECON 4160: Seminars autumn semester 2014 - FIFTH SEMINAR

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1. Download the zip file *US_HP_and_RENT*. The file contains the data set *US_pricetorent* in both in7 and xlsx format. Economic theory suggests the following relationship between housing prices, rents and the "user cost"of housing.

$$\frac{PH}{R} = \frac{1}{(1 - \tau_y)(i + \tau_p) - \pi + \delta - E(\text{capital gains})}$$

The expression says that the price (PH) to rent (R) ratio should be proportional to 1 over the user cost of housing (what it costs to live in a house). A semi-logarithmic (not log of the user cost, which may be negative) econometric model of this expression is

$$ph_t = \alpha + \beta_1 r_t + \beta_2 UC_t + \varepsilon_t$$

All the variables are contained in the data file along with a brief variable description.

 (a) Use the Calculator to construct the log of real housing prices, log of real rents and the user cost.

 (b) Start by estimating the model from the beginning of the sample and stop in 1998Q4. Do your estimates support the theoretical model? Are the coefficients stable?

 (c) Now, estimate the model on the full sample, 1980Q1 to 2010Q4. Are the coefficients stable? What may be the reason for your findings? Discuss briefly.

2. We refer to the data and extra lecture material posted under *Lectures – Lect 3 extra (nls and delta)*. Use the data series *INF* (growth rate of *CPI*), and *U* (identical to *UR2*) to estimate a linear Phillips Curve Model (PCM)

$$(1) \qquad INF_t = \phi_0 + \phi_1 INF_{t-1} + \beta_1 U_t + \beta_2 D80_t + \epsilon_t$$

where $D80_t$ is an indicator variable for the lifting of the "wage-and-price" freeze in 1979.

(a) Use a sample that starts in 1974 and ends in 2012. Estimate by OLS. Comment on the congruency and relative parameter stability of this empirical PCM.

(b) Estimate

$$(2) \qquad U_t = \pi_{20} + \pi_{21} INF_{t-1} + \pi_{22} U_{t-1} + \pi_{23} D80_t + \varepsilon_{2t}$$

by OLS on the same sample. Use the OLS residuals and calculate the Durbin-Wu-Hausman test of the exogeneity of U_t in (1). In what sense can we interpret this as a test of weak-exogeneity?

(c) Explain why the results in (b) does not support that this is a congruent empirical model.

(d) To specify a more congruent marginal model of U_t than (2), one possibility is to include a second lag, U_{t-2}, together with an indicator variable for the year 1989 (1 in 1989, otherwise 0). Estimate this model (it should be possible to use the 1974-2012 sample). Use the estimated model to discuss the status of U_t as a possible strongly-exogenous and super-exogenous variable in the PCM estimated in (a).

3. Problem 1 and 3a-3d in *Postponed Exam, spring 2006*. (Find it as a separate posting)

4. For the structural equation (1) in the slides to Lecture 8, Define $\mathbf{W}_1$ as

$$(3) \qquad\qquad \mathbf{W}_1 = (\ \mathbf{Z}_1\ \ :\ \ \mathbf{X}_{01}\ )$$

where $\mathbf{X}_{01}$ is $n \times k_{12}$. Which of the asymptotic properties

(4) $$plim(\frac{1}{n}\mathbf{W}_1'\mathbf{X}_1) = \mathbf{S}_{W_1'X_1} \text{ (invertible)}$$

(5) $$plim(\frac{1}{n}\mathbf{W}_1'\boldsymbol{\epsilon}_1) = \mathbf{0} \text{ (independence)}$$

(6) $$plim(\frac{1}{n}\mathbf{W}_1'\mathbf{W}_1) = \mathbf{S}_{W_1'W_1} \text{ (positive definite)}$$

do you associate with

(a) Instrumental variable relevance

(b) Instrumental variable validity

(c) Absence of perfect multicollinearity?

5. With reference to the symbols and definitions in Lecture 8 slide set, show that
$$\hat{\boldsymbol{\epsilon}}_{\mathbf{IV},\mathbf{1}} = \mathbf{M}_{IV,1}\mathbf{y}_1$$