

# ECON 4160: Seminars autumn semester 2015 - FIFTH SEMINAR

André K. Anundsen, Claudia Foroni and Ragnar Nymoen

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1. Download the data set in *NorPCMdataSeminar5.zip*. Use the data series *INF* (growth rate of *CPI*), and *U* (in fact identical to *UR2* in the file) to estimate a linear Phillips Curve Model (PCM)

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

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

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

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 do not support that (2) 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).

2. Problem 1 and 3a-3d in *Postponed Exam, spring 2006*. (Find it as a separate posting)
3. For the structural equation (1) in the slides to Lecture 8, Define  $\mathbf{W}_1$  as

$$(3) \quad \mathbf{W}_1 = \begin{pmatrix} \mathbf{Z}_1 & \mathbf{X}_{01} \end{pmatrix}$$

where  $\mathbf{X}_{01}$  is  $n \times k_{12}$ .

- (a) Where do the variables in  $\mathbf{X}_{01}$  “come from”?
- (b) Which of the asymptotic properties

$$(4) \quad plim\left(\frac{1}{n}\mathbf{W}'_1\mathbf{X}_1\right) = \mathbf{S}_{W'_1X_1} \text{ (invertible)}$$

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

$$(6) \quad plim\left(\frac{1}{n}\mathbf{W}'_1\mathbf{W}_1\right) = \mathbf{S}_{W'_1W_1} \text{ (positive definite)}$$

do you associate with

- i. Instrumental variable relevance
  - ii. Instrumental variable validity
  - iii. Absence of perfect multicollinearity?
- (c) With reference to the symbols and definitions in Lecture 8 slide set, show that

$$\hat{\boldsymbol{\epsilon}}_{IV,1} = \mathbf{M}_{IV,1}\mathbf{y}_1$$