ECON 4160: Seminars autumn semester 2015 - THIRD SEMINAR

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1. Download the zip file *KonsData2Nor_old* from the course web page. In this exercise we work with the three variables LCP, $LRCa$ and LF. They are the natural logs of private consumption and income in Norway and LF is the natural logarithm of total household wealth.

   In this exercise we will attempt to model the three equation system made up of LC, $LRCa, LF$ by means of one conditional model and two marginal models.

   (a) Start with the marginal model for $LRCa$. Specify it as:

   $$LRCa_t = \sum_{i=1}^{4} a_{RRi} LRCa_{t-i} + const + seasonals + \epsilon_{Rt} \quad (1)$$

   and estimate the equation for the sample 1968q2-2004q4. Use recursive OLS.

   i. Investigate the stability of this marginal model for income over the sample. What do you find?

   ii. There are signs of residual autocorrelation for this equation. How might this affect the estimates, for example $\hat{a}_{RR1}$?

   iii. Test if the autocorrelation can be explained by omitted variables: Test for omission of four lags of LC and LF. Remember: do not include the current value of LC, and LF, just the lags.

(b) Next, consider a marginal model for LF. Specify it as

$$LF_t = a_{FD}LF_{t-1} + \sum_{i=1}^{4} a_{FRi}LRCa_{t-i} + \sum_{i=1}^{4} a_{FCi}LCP_{t-i}$$
$$+ Const + Seasonals + \epsilon_{Ft} \quad (2)$$

and estimate by recursive OLS for the sample 1968q2-2004q4. Investigate stability of this equation. What do you find?

(c) Finally, estimate a conditional model for LCP:

$$LCP_t = \sum_{i=1}^{4} a_{CC_i}LCP_{t-1} + \sum_{i=0}^{4} a_{CRi}LRCa_{t-i} + \sum_{i=0}^{4} a_{CFi}LF_{t-i}$$
$$+ Const + Seasonals + a_{CD}D_t + \varepsilon_{Ct} \quad (3)$$

with the same sample size as for the two marginal equations above. D_t is a dummy variable which is 1 in 1969q4, -1 in 1970q1 and 0 otherwise. (Create it in Calculator or Algebra)

i. Comment on the mis-specification tests for this model

ii. Investigate the empirical stability of (3) and use the joint evidence from the estimation of the three equations to characterize income and wealth as strongly exogenous or super exogenous, with respect to the parameters of the conditional consumption function

iii. The conditional ADL model in (3) may have several irrelevant variables. Try to simplify the conditional model of LCP_t by omitting the irrelevant variables and report your parsimonious equation.

(d) Formulate a VAR (using *Multi-equation-Dynamic Modelling*) that encompasses the three equations (3),(2) and (1). Estimate the unrestricted system on the 1968q2-2004q4 sample. Under which assumption are the reported parameter estimates interpretable as the results of Maximum Likelihood estimation of the VAR?

(e) Use (1), (2) and (3) to formulate a model of the system (VAR), (HINT: Even though there is no simultaneity you do that by pushing the *Simultaneous equations model* radio button in the *Choose a model type* menu).

i. Estimate the three equation model by choosing *Equation by equation OLS (1SLS)*. Make sure that the coefficient estimates are identical to those from the answers to the previous questions.

ii. Compare the log-likelihood from the model estimation with the log-likelihood from the system (VAR) estimation. Why are the two likelihoods different? How can you "get back" the VAR likelihood from the model estimation? (reference: §14.1 in HN)

(f) Based on your modelling results: If you should estimate the dynamic responses of consumption to a temporary shock to income, which model would you use? The conditional model (based on) equation (3) or your multi-equation dynamic model? Explain, and show examples of dynamic multipliers/impulse responses.

2. 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. Does 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.