E 5101/9101: Questions to seminar 3.

9 March, 2011.

Exercises to Seminar 3

1. *IV and GMM estimation of dynamic equations*

   Read the paper by Gali and Gertler (1999) with an emphasis on the sections with the estimation results.

   Use the data set from Gali and Gertler (1999) to estimate the forward looking New Keynesian Phillips-curve model

   $$\pi_t = \beta_0 + \phi_f \pi^e_{t+1} + \beta x_t + \varepsilon_t \tag{1}$$

   for US inflation over the period 1960(1) - 1997(4).

   π_t denotes inflation, π^e_{t+1} is expected inflation (conditional on period $t-1$ information) and x_t is the so-called forcing variable of the model.

   Notes: The data set is called gg99jmedata.in7/bn7. You also may need the file called Urate.in7/bn7. There is a batch file called US_npc.fl which adds the Urate.in7/bn7 data file, and which explains the variable names and makes some data transformations. Run the batch file in OxMetrics. Afterwards that you may export the consolidated data set to other programs, if you wish.

   Use *Dpy* as the inflation variable, and *wsh* as the forcing variable.

   (a) Estimate the model by OLS, IV/2SLS and, if you can, also GMM. Use the same set of instruments as in Gali and Gertler (1999) and regard both right hand variables as endogenous in the outset.

   (b) Comment on the results, across estimation methods, and compare your results to the results given by Gali and Gertler (1999).

   (c) Consider the hybrid NPC

   $$\pi_t = \beta_0 + \phi_f \pi^e_{t+1} + \phi_f \pi_{t-1} + \beta x_t + \varepsilon_t \tag{2}$$

   and estimate this equation with OLS, IV/2SLS and compare results with those given by Gali and Gertler (1999).

   (d) Does it matter a lot for the results if x_t is instrumented or not?

   (e) One potential problem with the results is that Sargan's Specification test tend to have a low p-value in the IV estimations. Try to design a model that avoids this problem, and give an interpretation.

   Hint: Explore the role of the output-gap as an instrumental or explanatory variable. The textbook by Davidson and MacKinnon contains a good discussion of Sargan's test and the J-statistic (see e.g., page 338, 367-68)

(f) Optional: Try a similar analysis on a different data set (for consumer price inflation).

2. *Spectral analysis and filters.*

   (a) Graph the power spectral density function (SPD) for an ARMA(1,1) process with $\phi_1 = 0.95$ and $\theta_1 = 0.5$. Set $\sigma^2 = 1$.

   (b) Optional: Check the SPD for ARMA(2,1) given in the lecture note.

   (c) Graph the (SPD) for an ARMA(2,1) for the case of complex roots in the autoregressive part of the model. Consider the case of $\theta_1 = 0.5$ and $\theta_1 = 0$ (keeping the autoregressive parameters fixed).

   (d) Find data for a variable of you choice with a clear seasonal pattern. Estimate/find the empirical SPD for the variable (you may first subtract a deterministic trend if needed), and for one or more seasonally filtered series. Show by graphs.

   (e) The HP-filter. Discuss informally how low/high values of the smoothing parameter in the HP filet may affect the power shift function.

Reference

Gali, J. and M. Gertler (1999): Inflation Dynamics: A Structural Econometric Analysis. Journal of Monetary Economics 44(2), 233-258.