International Trade
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International Trade (8402)

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Problem set 3

Due Friday, February 1st, 2008, by email

1. Consider the Gourinchas and Jeanne paper we discussed in class. This question ask you to redo their exercise for a set developed countries. In particular focus on a set of 22 OECD countries for the period 1980-2001. The set of countries contains Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. The final output of the question is the equivalent of figure 2 of the paper i.e. a scatter plot of the capital inflows predicted by the standard neoclassical growth model v/s the actual capital inflows. In order to measure actual capital inflows in a country use the dataset of Lane and Milesi Ferretti (2006) available here and compute total capital inflows in the period normalized by initial output. In order to compute the capital flows predicted by the model follow the following simplified (relative to GJ) procedure:

   (a) Obtain a time series for annual TFP in all OECD countries in your sample. To compute TFP use output and employment data from sourceOECD and capital stock from here. Estimate an autoregressive process for the log of TFP in each country. Note that the resulting persistence parameter might, for some countries, be bigger than 1.

   (b) Model each country a small open economy with the following standard features. Preferences are given by

$$\max E \sum_{t=0}^{\infty} \beta^t \left(\frac{1}{1-\sigma} c_t^{1-\sigma} - \frac{l_t^v}{v} \right)$$

Production is done by competitive CRS firms which use a standard Cobb Douglas production function and solve the static problem

$$\max A_t k_{t-1}^{\alpha} l_t^{1-\alpha} - r_t k_t - l_t w_t$$

where A_t is TFP. Consumers budget constraint is

$$\begin{aligned} c_t + x_t + \frac{b_t}{R} &= r_t k_t + l_t w_t + b_{t-1} \\ k_t &= (1-\delta)k_{t-1} + x_t - \eta k_{t-1}(\frac{x_t}{k_{t-1}} - \delta)^2 \end{aligned}$$

where η is a parameter which measures capital adjustment cost, b_t is the amount of the uncontingent international risk free bond which domestic agents purchase (the bond pays a constant interest R). Assume that $\sigma = 2, \beta = 0.96, R = 1/\beta, \alpha = 0.3, \delta = 0.1, \nu = 2, \eta = 0.001$ and that these parameters are, for now, common across countries. Then log-linearize the economy and find decision rules for each country, using your estimated productivity process for that country.

(c) Using the estimated realization of innovation to TFP in point (a) together with model's decision rules, generate model time series for investment. Use these series to set the parameter η different for each country and such that the volatility of investment growth in the model matches the volatility of investment growth in the data for that country.

(d) Generate series for capital inflows in each country and compare them to the one you computed from the data. Clearly specify how you match capital inflows in the data and in the model.

2. Consider the closed economy model with endogenous capital utilization discussed in section 4 of Arias, Hansen and Ohanian. Consider the version of the model with only two shocks, i.e. productivity shocks and taste shocks and try to reproduce their result in table 4. In particular first choose the volatility of productivity and taste shocks so that their model matches the volatility for the entire period of HP filtered log labor productivity (i.e. $\log y - \log(n)$) and HP filtered log wedge (i.e. $\log y - \log c - \log n$). In order to do this you'll need to solve the model using standard log-linearization, using the parameters values reported in the paper. Note that one parameter which is not reported in the paper is ϕ i.e. the elasticity of depreciation to utilization. You should calibrate it so to match volatility of depreciation in the data (how would you measure that?). Then set the volatility of taste shocks different in the two different subperiods so that you match the volatility of the wedge in the two subperiods and see how the model does in explain the volatility changes in output, employment, investment, consumption and labor productivity.