ECON 517: Open Economy Macroeconomics, Spring 2018

Problem Set #1, Due February 5, 2018

This problem set covers small open economies — both the data and the models. Feel free to discuss this with your colleagues, but please write your own code and turn in your own work. Submit a neat summary of your solutions and keep your output to less than 10 pages.

1. Collect quarterly data for GDP (Y), consumption (C), government spending (G), investment (I), exports (X), and imports (M) for the United States, Canada, and Argentina. This data can be found in the OECD *National Quarterly Accounts*. For the same three countries, collect data on the real exchange rate from the Bank for International Settlements web page.

   Take logs of the data (except for the trade balance), HP filter the data ($\lambda = 1600$), and complete the following table for each country.

   Table 1: Business cycle properties

	Std. deviation	Correlation		
	(relative to Y)	Y	RER	TOT
Y				
C				
G				
I				
X				
M				
NX/Y				
TOT				
RER				

   For Y, report the absolute standard deviation. All variables are real except for NX/Y, TOT, and RER.

2. Redo question 1 using first differences rather than the HP filter to make the data stationary (turn in another three tables). Do your finding change?

3. Consider a small open economy that is subject to a stochastic endowment process. The household's problem is

$$\max_{c(s^t),b(s^{t+1})} \quad -\sum_{t=0}^{\infty}\sum_{s^t\in S^t}\pi(s^t)\beta^t\frac{1}{2}\left(c(s^t)-\bar{c}\right)^2$$

$$\text{s.t. } c(s^t)+b(s^{t+1})\leqslant(1+r)b(s^t)+y(s^t) \qquad \forall s^t\in S^t$$

with b_0 given and $\bar{c}\geqslant c(s^t)\geqslant 0$. Following the notation we developed in class, c is consumption, y is the endowment of the tradeable good and b is the household's foreign net asset position (its holdings of bonds).

   (a) Let $r=0.05$, $(1+r)\beta=1$, and $b_0=0$. The endowment process is $y(s^t)=\rho y(s^{t-1})+\epsilon(s^t)$ with $\epsilon\sim N(0,\sigma_\epsilon)$. If $\rho=0.8$, what should σ_ϵ be so that the standard deviation of output is one?

   (b) Plot the impulse response functions for output, consumption, trade balance, current account, and net foreign assets following a one standard deviation "shock" to ϵ.

   (c) Compute some simulated data. Draw 1,000 realizations of ϵ. Compute the equilibrium sequences of output, consumption, trade balance and the current account. Throw away the first 250 data points and compute the standard deviation of each variable.

4. Redo question 3, but let the endowment process be $\Delta y(s^t)=\rho\Delta y(s^{t-1})+\epsilon(s^t)$ with $\epsilon\sim N(0,\sigma_\epsilon)$. Parameterize this process so that the autocorrelation and the standard deviation of Δy_t in this model are the same as the those of y_t in question 3. When you are recomputing 3(c), difference the data before computing the standard deviations.