

Problem Set 4

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1 Labor Supply Elasticity

Olivier mentioned that the two main failures of the RBC framework are the lack of evidence for technology shocks and the fact that RBC models make no distinction between unemployment and leisure. Let's focus on the labor/leisure issue.

1.1 The log-linear RBC model

The equations of the log-linear model are in the handout on RBC that I wrote, on page 12 (section 6.3).

Discuss each equation. (Is it supply/demand of labor/capital? Is it forward looking? etc..).

Show that $\alpha = \alpha'$ in the Cobb-Douglas case.

1.2 The solution concept

Question 2 in PS2 was about Rational Expectations Equilibria. The handout (section 7) presents the method of undetermined coefficients. Let's compare these two methods. You DO NOT NEED to go through the details of the computations of section 7.2. You should read sections 7.1, 7.3 and 8.

What is the policy rule that we obtained in PS2, question 2.5)? How did we obtain it?

Show that it can be written:

$$c_t = \alpha_1 k_t + \alpha_2 z_t$$

α_1 and α_2 are constant terms that you do not need to compute. This is a relation between time t variables only. Does this mean that consumers are not forward looking?

What are the two other equations of the model? How would you use these three equations to compute and plot an impulse response? How would you use them to simulate the model?

What is equation (7) of the handout? Explain why the two methods (*REE – Blanchard – Kahn* and undetermined coefficients) are equivalent (no math, no matrix algebra, just economics). Given this equivalence, explain the meaning of what I wrote in section 7.2.3 (again, no math).

1.3 Impulse Responses

Reproduce the graphs that Olivier presented in class. (for $\rho = .974, .999$ and $.9$). Why does consumption jump a lot when shocks are permanent? Why does it jump less when they are transitory? Why is it the opposite for employment?

1.4 Population Moments

RBC.m produces also a table. What do you learn from it? Compare the numbers to the empirical ones reported in King and Rebelo, “*Resuscitating Real Business Cycles*,” Chapter 14, Volume 1B, *Handbook of Macroeconomics*, J. Taylor and M. Woodford eds, North Holland, 927-1007.

Discuss the role of persistence (for $\rho = .974$ and $.5$ for instance) for the volatility of output, capital, consumption, employment and the interest rate.

1.5 Labor Supply

The elasticity of labor supply is 4 in the simulations. Where do you see it in the original system? In the linearized system? Why is it different from ϕ ?

The micro estimates of the elasticity of labor supply are between 0 and 1. What happens if you adjust ϕ so that the elasticity is 0.5? (discuss the population moments and the impulse responses). What do you conclude?

Empirically, most of the changes in aggregate employment (hours worked) at business cycle frequencies are due to people moving in and out of unemployment (as opposed to the average guy adjusting how many hours he works). How would you introduce unemployment in an RBC model? Do you think this would help the model fit the facts without using a labor supply elasticity inconsistent with micro estimates? Would the welfare implications be different from the ones of the standard RBC model?