ECON 355: Homework 4
Spring 2021
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This homework is due April 9 at noon. Please upload a single pdf file with your answers to our shared folder on Google Drive. You should also upload your MATLAB and Dynare code files separately. Be sure to show your work.

1. Read "Why Do Americans Work So Much More Than Europeans?" by Edward C. Prescott (2004). The file can be found on Moodle.

a. Briefly summarize the article in one to two paragraphs

b. Set up the representative ("stand-in") household's problem either as a Lagrangian or Bellman equation. What are the first-order conditions (only need those associated with the household)? If you used a Lagrangian, be sure to solve out for the Lagrange multipliers so they are not in your FOCs.

c. Show how to solve for equation 6 from the paper (there is actually a typo with this relationship, it will be obvious when you solve for it), which is a steady state relationship.

d. Suppose you are interested in calibrating α for the model. You are going to look at the model with the time frame of 1975-2000 in mind and want to use annual data. Rewrite equation 6 from the paper so α is a function of steady state values of: the ratio of ouptut to consumption, τ, θ, and hours worked. Suppose you are given that $\tau = 0.4$. Use FRED to find what the calibration should equal to by looking at the time series: hours worked (TOTLA), population (CNP16OV; select end of year values to convert to annual), labor's share of income (LABSHPUSA156NRUG), output (GDPA), nondurable consumption (PCNDA), consumption of services (PCESVA). Define consumption as being equal to consumption of nondurable goods and services, which removed consumption of durable goods since it is more like an investment than consumption. Define h as average hours worked per week per person, $1-\theta$ as the average labor's share of income, and y/c as the average ratio of output to consumption (all of these for the time period from 1975-2000). Use these along with τ to calculate the value to set α in the model.

2. Assume a simple RBC model is modified to include a labor preference shock. The representative household would like to maximize their expected lifetime utility defined as

$$\sum_{t=0}^{\infty} \beta^t u(c_t, 1-h_t)$$

where

$$u(c_t, 1-h_t) = \ln c_t + A a_t \ln(1-h_t)$$

where a_t follows the process $\ln a_t = \rho \ln a_{t-1} + \sigma \epsilon_t$ where ϵ is an i.i.d. standard normal shock. The production function is defined as $f(k_t, h_t) = k_t^{\theta} h_t^{1-\theta}$, capital evolves as $k_{t+1} = (1-\delta)k_t + i_t$ and the feasibility condition is defined as $f(k_t, h_t) \geq c_t + i_t$.

a. Set up the problem in a Bellman equation. Use the Bellman equation to find the first order conditions.

b. What are the log linear equations that summarize the model? Include consumption in the equations. Do not include output, the real interest rate/rental rate of capital, or wages in these equations (this is intended to make the log linear equations quite different from those in the book in order to give you more practice). (Note: the process for the shock defined as $\ln a_t$ is already log linearized, so you do not need to log linearize this but you should define $\tilde{a}_t = \ln a_t$.)

c. Assume the following calibration $\beta = 0.99$, $\delta = 0.025$, $\rho = 0.8$, $\theta = 0.35$ and $A = 1.75$. Put the log linearized model into Dynare. Include a log lineariezed equation that defines output and one that defines wages. Do not include investment or the real interest rate in the file. If the standard deviation of log output is 0.02 and you want to match that standard deviation in the model, what should you set σ to?

d. Include a figure showing the impulse responses in response to a positive, one standard deviation shock to the labor preference shock. What happens to output? Why is this happening?