

ASSIGNMENT II

Question I: Baby Boom, Baby Bust and Economic Growth

Read the following paper. Greenwood, Jeremy and Ananth Seshadri (2004) “Technological Progress and Economic Transformation” National Bureau of Economic Research (NBER), Working Paper 10765, September, <http://www.nber.org/papers/w10765> Actually you only need to read the first 14 pages (Section 2: The Baby Bust and Baby Boom) to answer the following questions. However, you are strongly encouraged to read the whole paper. The paper is an excellent exposition of how growth theory can account for U.S. economic development.

1. Why did they use the overlapping generations (OLG) as a setup? Why not the representative agent framework? State your opinion clearly and explain.
2. In Equation (1) on page 6, what does ϕ refer to? Explain.
3. In Equation (1) on page 6, why do we have the term $(1 + \beta)(1 - \phi)$ multiplying $\ln n^y$ in the utility function? Why not just $\ln n^y$ without any term multiplying it? Discuss and interpret in economic terms.
4. In Equation (2) on page 6, what does γ refer to? Explain.
5. Rewrite equation (3) on page 7 in terms of net rates instead of gross rates, i.e., write it in terms of the net rate of interest and the net rate of time preference.
6. If the production function for children is given by $n^y = x(l^y)^\theta$, derive the Euler Equation for the young agent.
7. In Example 1, page 14, $\beta = 0.94^{20}$
 - (a) Why is β raised to the 20th power? Explain.
 - (b) Solve for the implied net real interest rate?

Question II: Cake Eating

[Credit for the setup is due to M. Wälti] Once upon a time there was a little girl who got *one* cake. The girl decided to eat the cake alone. But she was undetermined *when* she wanted to it. First, she thought of eating the whole cake right away. But then, nothing would be left for tomorrow and the day after tomorrow. Well, on one hand, she thought by herself, eating cake today is better than eating it tomorrow. On the other hand, eating too much at the same time might not be the best thing to do. She imagined that the first mouthful of cake is a real treat, the second is great, the third is also nice. But the more you eat, the less you enjoy it. In the end, you're almost indifferent, she thought. So, she decided to eat only a bit of the cake everyday. Then, she could eat everyday another first mouthful of cake. The *rational* girl is not impatient. The girl knew that the cake would be spoiled if she kept it more than nine days. Therefore, she would eat the cake in the first ten days. Yet, how much should she eat everyday? Find the optimal consumption path using Discrete time and Continuous time. Note that the problem is deterministic.

1. Write the maximization problem in Discrete Time.
2. Solve for the optimal consumption path using the Lagrangian.
3. Write the same maximization problem in Continuous Time.
4. Solve for the optimal consumption path using the Hamiltonian.