

Some Practice Problems

1. It is sometimes argued that the wartime destruction of capital goods stimulated the post-World War II economic growth in Japan and Germany. Is this a plausible result? Does it follow that losing a war is an economic benefit?
2. In the data, is average labor productivity pro-cyclical or counter-cyclical. From this observation can you conclude that supply shocks are the primary-driving force behind business cycle fluctuations?
3. A consumer has preferences $E \sum_{t=0}^{\infty} \beta^t \frac{1}{\gamma} (c_t^\gamma)$, where $\gamma < 1$ and $\gamma \neq 0$. She begins with consumption $c > 0$ in period 0. Every period thereafter her consumption either doubles or halves, each with probability 1/2. (i.e. in period 1 she consumes either $2c$ or $(1/2)c$, and so on.) Express the consumer's expected utility $v(c)$ as a function of c .
4. In his paper "Indivisible Labor and the Business Cycle," Gary Hansen assumed that consumers have the current period utility function: $u(c_t, 1 - h_t) = \ln c_t + A \ln(1 - h_t)$. Suppose that instead he had assumed preferences of the form:

$$u(c_t, 1 - h_t) = \frac{1}{1 - \sigma} [c_t(1 - h_t)^A]^{1 - \sigma}$$

where $\sigma > 1$.

- (a) How would this change have affected the amplitude of output (as Hansen measures it in his Table 1) predicted by the divisible labor model? Explain.
 - (b) How would it have affected the amplitude of output in the indivisible labor version? Explain.
5. Consider the following deterministic growth model

$$\max_{c_t, k_{t+1}} \sum_{t=0}^{\infty} \beta^t \ln(c_t)$$

subject to:

$$c_t + k_{t+1} = Ak_t^\alpha.$$

- (a) Write the functional equation for the optimal growth problem stated above. Show that the value function has the form $v(k) = A + D \ln(k)$. Find the value of D .
- (b) What is the economic interpretation of the value function?
- (c) Compute the optimal decision rules for saving and consumption. Find the optimal growth rate of the capital stock.
- (d) What is the price of capital (in terms of the consumption good) in this model?
- (e) Consistently over the last 140 years, the United States has grown on average 3% per year. Can this model explain this fact? Why or why not?