

# Tutorial Questions 1

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*Unless otherwise stated, assume all economies are large and closed. Assume output is always at potential and that the “interest rate” refers to the natural interest rate.*

1. Suppose that there are two closed economies— $A$  and  $B$ —in the world. Except for the fact that consumers in country  $A$  have a higher discount factor ( $\beta$ ) than in country  $B$ , both countries are identical. Which country has the higher natural interest rate?
2. Suppose there are two large countries,  $A$  and  $B$ . In contrast to  $A$ ,  $B$  is a closed economy, but the intertemporal elasticity of substitution is higher in  $B$ . If both countries start with the same interest rate, and both experience an equal increase in investment demand, where does the interest rate rise most?
3. Explain graphically how the *global savings glut* could explain a fall in domestic savings rates in developed countries. What happens to the level of domestic investment?
4. During times of economic uncertainty, there is often sudden capital inflow to the U.S. What effect would this have on the natural interest rate and the nominal exchange rate?
5. Suppose a closed country has a high mortality rate. (You could represent this as a relatively high probability  $p$  that the consumer will not exist the following period.) Determine how this would affect the natural rate of interest and the level of equilibrium investment each period. Could this model explain the negative empirical relationship between mortality rates and economic growth?
6. How does the shape of the production function affect the slope of the investment curve?
7. Assume that the production function is  $Y = AK^\alpha L^{1-\alpha}$  (rather than  $Y = AK^\alpha$ ). In a recent paper, Brad DeLong argues that, as a result of falling population levels, interest rates across the developed world will fall markedly in the future. Using the model, explain how this could occur.
8. Suppose there are  $N$  identical consumers in an economy with lifetime utility function:

$$u(C_1, C_2) = \log C_1 + \log C_2$$

Each consumer receives an income of  $y_1$  in period 1 and  $y_2$  in period 2, where  $y_2 > y_1$ . Consumers cannot store goods in the economy, and there is no production; i.e., it is an *endowment economy*. Consumers take the interest rate as *given*.

- i.) Find the natural rate of interest in period 1. (Hint: find the aggregate *supply* of savings and the aggregate *demand* for savings and equate them.)
- ii.) What happens to the interest rate as  $y_2$  rises? Explain the intuition for this.
- iii.) What happens to the interest rate if all goods have a price of  $P$  (as opposed to 1)?
- iv.) Suppose there is another identical economy of population  $N$  except the income stream is  $y'_1 > y'_2$ , and there is *perfect capital mobility*. What is the world interest rate?

9. In an environment of uncertainty and when consumers have the utility function

$$u(C) = \frac{C^{1-\theta}}{1-\theta}$$

the parameter  $\theta$  is often used as a measure of *risk aversion*. Explain why this may be so. (Hint: consider its role in a world of certainty, and how it mediates the incentive to “move” consumption across time. In a world of uncertainty, we are not moving consumption across time, but across what?)