

Worksheet on Consumption Smoothing

For each problem, assume the household or country prefers consumption to be as smooth as possible (perfectly smooth would be equal in all periods). Be sure your answers do not violate the appropriate budget constraint. If you need a numerical value for  $r$ , use  $r = 0.10$ .

1. Temporary shock in the two-period household model
  - a. Initially, the household expects  $Y = 1000$  in both periods. What is the present value of the household's lifetime income? What values of  $C$  will the household choose for each period?
  - b. Suppose there's a positive income shock in period 0:  $Y = 1100$  in period 0 and returns to 1000 in period 1. What happens to the household's consumption and saving in period 0, and consumption in period 1?
    - i. The household responds to this happy news by raising consumption in period 0 by  $X$ . Write down an expression for the change in period 0 saving.
    - ii. Thanks to this extra saving, the household will enjoy extra consumption in period 1. Write down an expression (which involves  $X$ ) for the change in period 1 consumption.
    - iii. To achieve perfect consumption smoothing, what must be true about your answers to i. and ii.? Use this relationship to solve for  $X$ . Then, tell me the final numeric answers for the change in consumption in each period and the change in saving in period 0.
2. Temporary shock in the three period household model (no calculations required)
  - a. Initially, the household expects  $Y = 1000$  in each period. What is  $C$  in each period?
  - b. Suppose there's a positive income shock in period 0:  $Y = 1100$  in period 0 and returns to 1000 in periods 1 and 2. Tell me approximately what happens to: period 0 consumption and saving, period 1 consumption and saving, and period 2 consumption. (No calculations required.)
3. Temporary shock in the ten period household model (no calculations required)
  - a. Initially, the household expects  $Y = 1000$  in each period. What is  $C$  in each period?
  - b. Suppose there's a positive income shock in period 0:  $Y = 1100$  in period 0 and returns to 1000 in all subsequent periods (periods 1 through 9). Tell me approximately what happens to: saving and consumption in period 0, and consumption in periods 1 through 9.
4. Permanent shock in the ten-period household model (no calculations required)
  - a. Continue the scenario from problem 3, but now suppose the income shock described in 3b is permanent: that is,  $Y = 1100$  in period 0 and all subsequent periods. Tell me what happens to consumption and saving in period 0, and consumption in periods 1 through 9.
5. Gathering a few lessons.
  - a. Generalizing: how do the effects of a temporary income shock (current period only) differ from the effects of a permanent income shock (current + all future periods)?
  - b. What if the income shocks in problems 1-4 were negative rather than positive. Briefly (and without re-doing the problems or any calculations), how would your answers be different?
6. Write down the 10-period intertemporal budget constraint for a country with no capital controls that can borrow and lend in world financial markets at the interest rate  $r^*$ . In the face of each of the following kinds of shocks, how would the country adjust its gross national expenditure and trade balance in response?
  - a. the shock is country-specific and temporary (e.g., GDP falls by 100 in the current period only)
  - b. the shock is country-specific and permanent (e.g., GDP falls by 100 in all periods)
  - c. the shock is temporary but affects all countries. (In this case, a variable we have until now treated as exogenous will change. What variable is that? Why?)