

Economics 602
Macroeconomic Theory and Policy
Problem Set 3
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1. **The Wealth Effect on Consumption.** Consider the two-period consumption-savings model we have been developing in class.
 - a. As in class, maintain the simplifying assumption that $A_0 = 0$. Show graphically how a rise in the period-1 nominal price of consumption can lead to a decrease in optimal consumption in period 1.
 - b. Now suppose that $A_0 \neq 0$. Show graphically how a decrease in A_0 can lead to a decrease in optimal consumption in period 1.
 - c. The two effects you analyzed in parts a and b work through seemingly different channels. Actually, they are usefully thought of as operating through the same broadly-defined channel. Explain this broadly-defined channel.

2. **A Three-Period Economy.** Rather than the two-period consumption-savings model economy we have been developing in class, consider a three-period model that is analogous to the two-period model.
 - a. Derive a relation similar to expression 11 on page 46 in the Lecture Text for the three-period economy (that is, derive the lifetime budget constraint (LBC) for the three-period economy). Define any new notation you introduce, and briefly explain the logic you use in deriving your final expression.
 - b. Provide a brief interpretation of the LBC you derive in part a.
 - c. In reality, there are an “infinite” number of periods. Write down the LBC for an infinite-period economy. (No need to be very mathematical – just use what you've learned in class and what you derived above).
 - d. The Permanent Income Hypothesis states that individuals consider their future lifetime earnings when making their current consumption decision. Discuss briefly how the multi-period models we are considering here (regardless of two-period, three-period, n-period, or infinite-period) are consistent with the Permanent Income Hypothesis.

3. **Mechanics of the Consumption-Savings Model.** Recall that in our two-period consumption-savings model, real labor income in any period is given by nominal labor income divided by the price level (that is, recall $y_1 = Y_1 / P_1$ and $y_2 = Y_2 / P_2$). Suppose that nominal labor income in both periods is held constant. Clearly indicating the position of real labor income before and after each change on your diagrams, illustrate how the LBC is affected by the following events. As in class, make the simplifying assumption that the individual has zero initial wealth (i.e., $A_0 = 0$).
- The price level in period 1, P_1 , rises, while P_2 is held constant.
 - The price level in period 2, P_2 , rises, while P_1 is held constant.
 - The nominal interest rate i rises, while both P_1 and P_2 are held constant.
4. **Taxes on Interest Earnings.** In our two-period consumption-savings model (with no leisure), suppose **positive** interest income in period 2 is taxed at the rate t_s , where $0 < t_s < 1$. That is, if interest income in period 2 is positive, then the government takes a fraction t_s of the interest income, while if interest income in period 2 is non-positive, then there is no tax. As in class, make the simplifying assumption that the individual has zero initial wealth (i.e., $A_0 = 0$). Also suppose that the interest tax has no effect on the nominal price level in either period.
- In this modified version of the model, algebraically express the period-1 budget constraint and the period-2 budget constraint of the individual.
 - Using your period-1 and period-2 budget constraints from part a, derive the individual's lifetime budget constraint (LBC). (**Hint:** Is the slope of this LBC continuous?)
 - Recall our assumption (based on empirical evidence) that the aggregate private savings function is an increasing function of the real interest rate. Suppose that at the representative agent's current optimal choice, he is choosing to consume exactly his real labor income in period 1.
 - At his current optimal choice, is his marginal rate of substitution between present consumption and future consumption equal to (one plus) the real interest rate? Explain why or why not.
 - President Bush, as part of his first-term economic agenda, lowered the tax rate on interest income from savings (one part of this packages was eliminating the tax on dividends – but there are other elements of this idea in his tax package as well). Part of the rationale is that it will encourage individuals to save more. In this example, would a decrease in the tax rate t_s encourage the representative agent to save more in period 1? Explain why or why not?