

Problem Set IV

Section I: Chapter 9

Question 1

Consider the following effects of an increase in taxes for a consumer.

- The consumer's taxes increase by Δt in the current period. How does this affect current consumption, future consumption, and current saving?
- The consumer's taxes increase permanently, increasing by Δt in the current and future periods. Using a diagram, determine how this affects current consumption, future consumption, and current saving.

Explain the differences between your results here and in part (a).

Question 2

Suppose that the government introduces a tax on interest earnings. That is, borrowers face a real interest rate of r before and after the tax is introduced, but lenders receive an interest rate of $(1 - x)r$ on their savings, where x is the tax rate. Therefore, we are looking at the effects of having x increase from zero to some value greater than zero, with r assumed to remain constant.

- Show the effects of the increase in the tax rate on a consumer's lifetime budget constraint.
- How does the increase in the tax rate affect the optimal choice of consumption (in the current and future periods) and savings for the consumer? Show how income and substitution effects matter for your answer and show how it matters whether the consumer is initially a borrower or a lender.

Question 3

An employer offers his or her employee the option of shifting x units of income from next year to this year. That is, the option is to reduce income next year by x units and increase income this year by x units.

- Would the employee take this option (use a diagram)?
- Determine, using a diagram, how this shift in income will affect consumption this year and next year and saving this year. Explain your results.

Question 4

A consumer receives income y in the current period, income y' in the future period, and pays taxes of t and t' in the current and future periods, respectively. The consumer can borrow and lend at the real interest rate r . This consumer faces a constraint on how much he or she can borrow, much like the credit limit typically placed on a credit card account. That is, the consumer cannot borrow more than x , where $x < we - y + t$, with we denoting lifetime wealth. Use diagrams to determine the effects on the consumer's current consumption, future consumption, and savings of a change in x , and explain your results.

Question 5

In the example laid out in the subsection titled "Ricardian Equivalence: An Example," suppose

That

$$b < \frac{Ny' - G'}{Ny - G}$$

- Solve for the equilibrium real interest rate, and the consumption of lenders and borrowers in the current and future periods.
- Does Ricardian equivalence hold in this case? Explain why or why not.

Question 6

Suppose that all consumers are identical and also assume that the real interest rate r is fixed. Suppose that the government wants to collect a given amount of tax revenue R , in present value terms. Assume that the government has two options: (i) a proportional tax of s per unit of savings, in that the tax collected per consumer is $s(y - c)$; (ii) a proportional tax u on consumption in the current and future periods, so that the present value of the total tax collected per consumer is

$$uc + \frac{uc'}{1+r}.$$

Note that the tax rate s could be positive or negative. For example, if consumers borrow, then s would need to be less than zero for the government to collect tax revenue. Show that option (ii) is preferable to option (i) if the government wishes to make consumers as well off as possible and explain why this is so. [Hint: Show that the consumption bundle that consumers choose under option (i) could have been chosen under option (ii), but was not.]

Section II: Chapter 10

Question 7

Suppose that there is a credit market imperfection due to asymmetric information. In the economy, a fraction b of consumers consists of lenders, who each receive an endowment of y units of the consumption good in the current period, and 0 units in the future period. A fraction $(1-b)a$ consumers are good borrowers who each receive an endowment of 0 units in the current period and y units in the future period. Finally, a fraction $((1-b)(1-a))$ of consumers are bad borrowers who receive 0 units of endowment in the current and future periods. Banks cannot distinguish between good and bad borrowers. The government sets $G = G' = 0$, and each consumer is asked to pay a lump-sum tax of t in the current period and t' in the future period. The government also cannot distinguish between good and bad borrowers, but as with banks can observe endowments.

- Write down the government's budget constraint, making sure to take account of who is able to pay their taxes and who does not.
- Suppose that the government decreases t and increases t' in such a way that the government budget constraint holds. Does this have any effect on each consumer's decisions about how much to consume in each period and how much to save? Show with the aid of diagrams.
- Does Ricardian equivalence hold in this economy? Explain why or why not.

Question 8

Suppose that there is limited commitment in the credit market, but lenders are uncertain about the value of collateral. Each consumer has a quantity of collateral H , but from the point of view of lender, there is a probability a that the collateral will be worth p in the future period, and probability $1-a$ that the collateral will be worthless in the future period. Suppose that all consumers are identical.

- a) Determine the collateral constraint for the consumer and show the consumer's lifetime budget constraint in a diagram.
- b) How will a decrease in a affect the consumer's consumption and savings in the current period and consumption in the future period? Explain your results.

Question 9

Suppose a credit market with a good borrowers and $1 - a$ bad borrowers. The good borrowers are all identical and always repay their loans. Bad borrowers never repay their loans. Banks issue deposits that pay a real interest rate r_1 , and make loans to borrowers. Banks cannot tell the difference between a good borrower and a bad one. Each borrower has collateral, which is an asset that is worth A units of future consumption goods in the future period.

- a) Determine the interest rate on loans made by banks.
- b) How will the interest rate change if each borrower has more collateral?
- c) Explain your results, and discuss.