Economics 203 Matthias Doepke
Macroeconomics II Spring 2000

Problem Set 2

Allowances, Deductions, and Income Tax

In the United States as in many other countries, only parts of the total income of an individual are taxed. Personal allowances and other deductions often cause taxable income to be significantly lower than total income. Deductions and allowances are equivalent to lump-sum rebates on the total tax bill. In the following problem, you will compare a tax code with generous allowances to a tax code in which all income is taxed.

Question 1:
Consider an economy with 10 households who have the utility function:

$$u(c, l) = 4\sqrt{c} - l.$$

The only income of the household is wage income. There are 40 firms in the economy, who all have the production function:

$$f(l) = l - .5l^2.$$

To start, compute an equilibrium for this economy without government expenditures or taxes. What is the equilibrium wage, and how much labor does each household supply?

Next, assume the government levies a flat income tax of 25%. What is the new equilibrium wage, and how much labor does each household supply? How much revenue does the government achieve?

Finally, assume that the government raises the marginal tax to 50%, but at the same time refunds an amount t to the household in lump-sum fashion. What is the new budget constraint and maximization problem of the household? What is the new equilibrium, as a function of t? How do wage, labor supply, and consumption compare to the case with lower marginal taxation?

Soaking the Rich

As a background, read the article "Soaking the Rich" from the Economist magazine. The article challenges the view that high-income individuals are more sensitive towards changing tax rates than low-income individuals. Rather then settling this complicated empirical issue, in the following question you will examine a theoretical reason why rich people might be more tax-sensitive.

Question 2:
In this question we will investigate how tax-sheltering affects the sensitivity to tax rate changes, depending on income. Consider an individual with a fixed income of w who is subject to a proportional income tax τ. However, it is possible to hire a tax lawyer who may succeed in finding tax-hiding schemes that lower taxable income. The fraction of income that the lawyer succeeds to design as tax-exempt will be denoted ϕ, so that the total tax bill is $\tau(1-\phi)w$. The tax lawyer commands a wage w_L for his services. The higher ϕ, the more time the tax lawyer has to spend on the case. For simplicity, assume that the time required to hide fraction ϕ of income from taxes is given by ϕ^2. This means that the time is a convex function of the fraction of sheltered income, because it gets harder and harder to get around taxation. Summing up, the after-tax and after-tax-lawyer income I of our individual is given by:

$$I = w - \tau(1-\phi)w - \phi^2 w_L.$$

Given the wage w, compute the optimal amount ϕ of tax-sheltering. How does ϕ depend on the wage w? Why?

Question 3:
Given the optimal ϕ, write the total tax bill $B = \tau(1-\phi)w$ as a function of w, w_L, and τ only. Then compute the elasticity of of B with respect to τ, i.e., compute $\frac{\partial B}{\partial \tau}\frac{\tau}{B}$. This elasticity gives you the percentage change in tax revenue, given a one-percent increase in the tax rate. How does this elasticity depend on the wage? Can the elasticity ever turn negative? Explain.

Supply Side Economics

Read the article "Supply-Side Economics: An Analytical Review" by Robert Lucas. The article appeared in Oxford Economic Papers 42 (1990), 293-316, and it is on reserve at Harper library, call number YL 5620. Some of the math used in the article is beyond the level used in class, but you should still be able to follow the general line of thought.

Question 4:
In no more than two paragraphs, summarize Lucas' main argument. Which question does Lucas try to to answer? What is the approach to answering the question? What is the answer?

Question 5:
If Lucas' argument is correct, which specific changes should be made to the U.S. taxation laws?