

# Master PPD - Public Economics: Tax & Transfer Policies

Final Exam, November 20, 2012 - 14h-16h

## 1 Exercise 1: Second Welfare Theorem (5 points)

- 1) State the second welfare theorem and its assumptions (1 point)
- 2) What does the optimal tax system look like under the assumptions of the second welfare theorems? (1 point)
- 3) In practice, why don't governments implement the optimal tax system of the second welfare theorem? (1 point)
- 4) Taller individuals tend to have higher income. Is that a rationale for taxing height? Why? (2 points)

## 2 Exercise 2: Optimal Linear Labor Income Taxation (10 points)

### 2.1 Intensive labor supply responses

Consider an economy with a continuum of agents  $i$  in  $[0, 1]$ . Each agent has an exogenous wage rate  $w_i$  and supplies a number of hours of work  $l_i$  in order to obtain pre-tax income  $y_i = w_i l_i$  and to maximize utility  $U_i(y_i, l_i)$ .

We assume that the government chooses a unique tax rate  $t$  on incomes in order to maximize tax revenues  $R = t\bar{y}$ , where  $\bar{y}$  is the average pre-tax income (equal to total income in this economy). Denote  $e$  the labor supply elasticity of agents. Consider an increase in the tax rate from  $t$  to  $t + dt$ . Agent's  $i$  net-of-tax wage rate goes from  $(1 - t)w_i$  to  $(1 - t - dt)w_i$ , i.e. decreases by  $dt/(1 - t)\%$ .

1) How does labor supply  $l_i$  evolve when the tax rate increases from  $t$  to  $t + dt$ ? (1 point)

2) Express the change in tax revenues  $dR$  as a function of  $\bar{y}$ ,  $t$ , and  $e$  (1 point)

3) What is the optimal tax rate  $t^*$ ? Interpret the formula (2 points)

4) The average labor supply elasticity found in the literature is  $e = 0.25$ . What is the corresponding revenue maximizing tax rate? (1 point).

5) Could a decrease in the average tax rate increase tax revenues in rich countries? Why? (1 point).

## 2.2 Extensive labor supply responses

We now turn to a model in which agents do not respond to taxes by varying the number of hours worked, but by varying the effort they make to find better paid jobs. We assume that there are three groups of agents:

- Group 0:  $m_0$  unemployed agents, who have pre-tax income equal to 0 and receive a transfer  $y_0$  from the government;
- Group 1:  $m_1$  low-wage agents, who have pre-tax income  $w_1$  and after tax income  $y_1$ ;
- Group 2:  $m_2$  high-wage agents, who have pre-tax income  $w_2$  and after tax income  $y_2$ .

We denote  $e_0$  the elasticity of an upward transition from group 0 to group 1 with respect to the income gap  $(y_1 - y_0)$ : If  $(y_1 - y_0)$  increases by 1%, then a proportion  $e_0$  of unemployed individuals finds a low-paid job. Similarly,  $e_1$  is the elasticity of an upward transition from group 1 to group 2 with respect to the income gap  $(y_2 - y_1)$ . Denote  $T_0 = 1 - (y_1 - y_0)/w_1$  the marginal tax rate associated with a transition from unemployment to low-wage employment. Similarly,  $T_1 = 1 - (y_2 - y_1)/(w_2 - w_1)$  is the marginal tax rate associated with a transition from low-wage to high-wage employment.

6) How does the number of low-wage workers change when the government increases  $T_0$  from  $T_0$  to  $T_0 + dT_0$ ? (1 point)

7) How do tax revenues  $R$  change when the government increases  $T_0$  from  $T_0$  to  $T_0 + dT_0$ ?

8) Compute the optimal marginal tax rate  $T_0^*$  (1 point)

9) Compute similarly the optimal marginal tax rate  $T_1^*$  (1 point)

### 3 Exercise 3: Capital Income Taxes (5 points)

1) What is the average amount of capital taxes as a fraction of GDP in the EU27 and the U.S.? (1 point)

2) What are the various capital taxes that typically exist in rich countries? (1 point)

3) What is the difference between a bequest and an inheritance tax? (1 point)

4) How have top inheritance tax rates evolved in the U.S. and France over the twentieth century? (1 point)

5) What factors can account for this evolution? (1 point)