

Master PPD - Public Economics: Tax & Transfer Policies

Final Exam, November 20, 2012 - Solutions

1 Exercise 1: Second Welfare Theorem (5 points)

1) State the second welfare theorem and its assumptions (1 point)

Answer Any Pareto efficient outcome can be reached through a suitable set of lump sum taxes and the subsequent free functioning of markets with no additional government interference. Standard perfect market assumptions, in particular perfect information (for instance the government must be able to observe the true abilities of agents).

2) What does the optimal tax system look like under the assumptions of the second welfare theorems? (1 point)

Answer Lump sum taxes that depend on exogenous characteristics of each individual (e.g., intrinsic abilities or other endowments or random shocks). Intuition: If some individuals have better earnings ability than others and the government wants to equalize disposable income, it is most efficient to impose a tax (or a transfer) based on earnings ability and then let people keep 100% of their actual earnings at the margin.

3) In practice, why don't governments implement the optimal tax system of the second welfare theorem? (1 point)

Answer Because the government cannot observe earnings abilities but only realized earnings.

4) Taller individuals tend to have higher income. Is that a rationale for taxing height? Why? (2 points)

Answer. In the standard utilitarian framework, yes: it is optimal to tax any exogenous characteristic correlated with unobservable abilities. However: Horizontal equity concerns.

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)

Answer: Labor supply decreases by $e \cdot dt / (1 - t)\%$.

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

Answer: $dR = \bar{y}dt + t d\bar{y} = \bar{y}dt - t\bar{y}ed t/(1-t)$. First term = revenue increase due to higher rate for a given base; second term = revenue losses due to behavioral reaction of workers.

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

Answer t^* is such that $dR = 0$ which yields $t^* = 1/(1+e)$. The higher the elasticity, the lower t^* . Don't tax what is elastic.

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

Answer $t^* = 1/(1+0.25) = 80\%$.

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

Answer Probably not. $t^* = 80\%$ is more than the current average tax rates in rich countries, which is around 50% of national income.

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)

Answer $dm_1 = -m_0 e_0 dT_0 / (1 - T_0)$

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

Answer $dR = (m_1 + m_2)w_1 dT_0 + T_0 w_1 dm_1 = (m_1 + m_2)w_1 dT_0 - T_0 w_1 m_0 e_0 dT_0 / (1 - T_0)$

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

Answer It is such that $dR = 0$ i.e. $T_0^* = \frac{1}{1 + m_0 e_0 / (m_1 + m_2)}$

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

Answer Same computations except that the increase in tax rate only applies to pre-tax wages higher than w_1 , so $T_1^* = \frac{1}{1 + m_1 e_1 / m_2}$.

This exercise was based on Piketty T. (1997), “La redistribution fiscale face au chômage”, *Revue française d’économie*, vol. XII, 1, p. 157-201.

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)

Answer 9% and 8%.

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

Answer Inheritance taxes, annual wealth and property taxes, corporate tax, capital income tax.

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

Answer Bequest = paid on total wealth left by decedents; inheritance = paid on wealth received by each successor.

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

Answer U.S.: from 0 in 1900 to 80% from 1940s-mid1970s to 55% in 2000 (35% today). France: From almost 0% in 1900 to 30% in the 1920, then roughly stable (40% in 2000).

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

Need for government revenues after World War 1, evolution of the magnitude of the inheritance flow, evolution of meritocratic preferences, tax competition.