Master PPD - Public Economics: Tax & Transfer Policies

Final Exam, November 19, 2013 - 14h-16h

1 Problem : Optimal redistributive taxation of labor income (10 points)

1.1 Linear optimal labor income tax (4.5 points)

We consider an economy made up of individuals who have identical preferences defined over consumption c and labor l, but different wage rates w_i. Assume that each agent i has utility function :

$$u(c,l) = c - \frac{l^{1+\mu}}{\mu+1}$$

where $\mu > 0$ is a given fixed parameter.

An individual with wage rate w supplying labor l, earns $z = w \cdot l$ (pre-tax earnings) and consumes $c = z - T(z)$ where $T(.)$ is the (possibly nonlinear) income tax.

1) Interpret the form of the utility function ? (1 point)

Answer : This utility function reflects the basic trade-off between leisure and consumption. Individual works to consume goods but the disadvantage of working more is decreased leisure. $\frac{l^{1+\mu}}{\mu+1}$ represents the cost of earnings (opportunity cost of the consumption).

2) Consider a linear income tax system $T(z) = -R + \tau \cdot z$ where $R > 0$ is the lump-sum income transfer and τ is a flat tax rate. Compute the optimal level of labor supply that agent i makes (1.5 point).

Answer : Program of the individual i :

$$Max_l U(c,l) = R + w \cdot l(1-\tau) - \frac{l^{1+\mu}}{\mu+1}$$

$$\text{FOC : } l^\star = [w(1-\tau)]^{1/\mu}$$

3) Show that the tax rate maximizing total tax revenue is equal to $\tau^\star = \dfrac{1}{1+1/\mu}$ (taking R as given). (1 point)

Answer : Program of the government :

$$Max_\tau T = -R + \sum_i \tau \cdot w_i^{\frac{1}{\mu}+1} \cdot (1-\tau)^{1/\mu}$$

$$\text{FOC : } w_i^{\frac{1}{\mu}+1}[(1-\tau)^{1/\mu} - \frac{1}{\mu} \cdot \tau \cdot (1-\tau)^{1/\mu - 1}] = 0$$

$$\tau^\star = \frac{1}{1+\frac{1}{\mu}}$$

4) What is the parameter $\dfrac{1}{\mu}$? Interpret the formula. (1 point)

Answer : $e = frac1\mu$ is the elasticity of income with respect to the net-of-tax rate $1-\tau$. It measures real economic responses to the net-of-tax rate, i.e. labor supply effects, broadly defined (more hours of work, more intense effort per hour worked, occupational choices, etc.). if the elasticity e is higher, then the optimal tax $\tau^\star$ is lower.(basic principle of optimal taxation theory : other things equal, don't tax what's elastic)

1.2 Non linear optimal taxation of Top Labor Incomes (5.5 points)

We next assume that the government imposes the following two-bracket income tax :

$$T(z) = -R + \tau_1 \cdot z \text{ if } z \leq \bar{z}$$

$$\text{and } T(z) = -R + \tau_1 \cdot \bar{z} + \tau_2 \cdot (z - \bar{z}) \text{ if } z > \bar{z}$$

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R > 0 is the lump-sum income transfer. Aggregating over all top bracket taxpayers, we now denote by z_2 the average income reported by top bracket taxpayers whose income is above the threshold $\bar{z}$. We assume that the government wants to maximize the tax resources it gets from top bracket taxpayers.

5) Plot the budget constraint of a top bracket taxpayer on a diagram (l, c) with labor supply l on horizontal axis and after-tax income c on vertical axis. (1 point)

Answer : Standard plot. The budget constrained is a two piecewise linear function.

$c = R + w \cdot (1 - \tau_1) \cdot l$ when $l \leq \bar{l}$

$c = R + w \cdot (1 - \tau_1) \cdot \bar{l} + w \cdot (1 - \tau_2) \cdot (l - \bar{l})$ when $l > \bar{l}$

6) Assume that $\tau_1 < \tau_2$. Solve for the optimal labor l and earnings $z = w \cdot l$ choice for an individual which is in the top bracket.(1 point)

Answer : Program of the top bracket taxpayer i :

$$Max_l U(c, l) = R + w \cdot (1 - \tau_1) \cdot \bar{l} + w \cdot (1 - \tau_2) \cdot (l - \bar{l}) - \frac{l^{1+\mu}}{\mu + 1}$$

$$\text{FOC} : l^\star = [w(1 - \tau_2)]^{1/\mu}$$

7) Taking R and $\bar{z}$ as fixed, show that the tax rate $\tau_2^\star$ that maximizes taxes collected from the top bracket taxpayers is equal to (1.5 points) :

$$\tau_2^\star = \frac{1}{1 + \frac{1}{\mu} \cdot \frac{z_2}{z_2 - \bar{z}}}$$

.

Answer : Program of the government :

$$Max_{\tau_2} T = -R + \sum_i \tau_1 \cdot \bar{z} + \tau_2 (w_i^{\frac{1}{\mu}+1} \cdot (1 - \tau_2)^{1/\mu} - \bar{z})$$

$$\text{FOC} : (w^{\frac{1}{\mu}+1} \cdot (1 - \tau_2)^{1/\mu} - \bar{z}) - \frac{1}{\mu} \cdot \tau_2 \cdot w^{\frac{1}{\mu}+1} \cdot (1 - \tau_2)^{1/\mu - 1}] = 0$$

$$\text{with } z_2 = w^{\frac{1}{\mu}+1} \cdot (1-\tau_2)^{1/\mu}$$

$$\Rightarrow \frac{\tau_2}{1-\tau_2} = \frac{(z_2 - \bar{z}) \cdot \mu}{z_2}$$

$$\tau_2^\star = \frac{1}{1 + \frac{1}{\mu} \cdot \frac{z_2}{z_2 - \bar{z}}}$$

8) What is the economic interpretation of the coefficient $a = z_2/(z_2 - \bar{z})$ when the top incomes distribution follows a Pareto distribution ? (1 point)
Answer : a is the Pareto coefficient. Higher a (i.e. lower coefficient $b = a/(a-1)$, i.e. less fat upper tail = less income concentration) imply lower tax rates, and conversely.

9) In Piketty-Saez-Stantcheva, « Optimal Taxation of Top Labor Incomes : A Tale of Three Elasticities »(AEJ 2013), the authors compute an « augmented »optimal tax formula such as :

$$\tau = \frac{1 + t \cdot a \cdot e_2 + a \cdot e_3}{1 + a \cdot e}$$

What is the meaning of e_2 and e_3 ? (1 point)
Answer : e_2 is the tax avoidance elasticity : when tax rates are high, top incomes earners find ways to exploit loopholes and report less of their taxable income. e_3 is the compensation bargaining elasticity : lower top tax rates induces top earners to bargain more aggressively for higher pay.

2 True/False Questions : (10 points)

Explain your answer fully (5-7 lines), since all the credit is based on the explanation.

1) According to the first welfare theorem, the intervention of the government can not generate Pareto improvements. (2 point)
Answer : False. Definition of the First welfare theorem : under standard convexity assumptions (absence of externalities, scales economies...), a market equilibrium

is Pareto-optimal. If these assumptions are not satisfied, adequate government interventions can generate Pareto improvements (i.e. can raise everybody's welfare at the same time). Examples of adequate interventions : Public good provisions, correction of the externalities or policy reducing the macroeconomic volatility.

2) The modified golden rule says that with higher expected growth, we should accumulate less capital for the future generations. (1 point)
Answer : Yes. Modified Golden rule :

$$r^{\star} = \delta + \gamma \cdot g$$

$r^{\star}$ is the social discount rate, i.e, the rate at which an ideal social planner should discount the future. When g increases, $r^{\star}$ increases because future generations are going to be richer and will be more able to clean up our pollution. Therefore, we need to accumulate less capital for the future generations, i.e, we need to sacrifice less welfare today in order to avoid global warming.

3) The economic burden of a tax always falls upon the group who has the legal obligation to make the tax payment. (Illustrate your answer with an example of an incidence study using micro data). (2 points)
Answer : False. The tax incidence depends on the various elasticities of demand and supply on the relevant labor market, capital market and goods market. Usually the more elastic tax benefit wins, i.e. the more elastic tax base shifts the tax burden towards the less elastic. Illustration with Fack(2006) : a large part of housing benefit is shifted to higher rents. The magnitude of the effect is given by the paremeter $\theta = e_d/(e_d + e_s)$ which depends on the values of the supply and demand elasticities on the housing market. Other possible illustration with Carbonnier(2007) : VAT is always partly shifted on prices and partly shifted on factor income depending on the value of the supply and demand elasticities for this good.

4) According to the Atkinson-Stiglitz model or to the infinite-horizon dynastic model, there is no reason to tax capital. (Explicit the hypothesis made by the authors) (2 points)

Answer : Yes. According to Atkinson-Stiglitz(1976), linear optimal capital tax should be equal to 0% if there are perfect capital markets, separable preferences, no inheritance and nonlinear labor income tax. Under separable preferences, there is no point taxing capital income ; it is more efficient to redistribute income by using solely a labor income tax. if inequality entirely comes from labor income inequality, then it is useless to tax capital ; one should rely entirely on the redistributive taxation of labor income

According to the infinite-horizon dynastic model, capital tax is inefficient in the long run in an infinite horizon model with homogenous discount rate (infinite elasticity). In effect, even agents with zero capital loose from capital taxation (no matter how small) because the corporate tax is shifted on labor in the very long run). This result requires three strong assumptions : infinite elasticity of capital supply ; perfect capital markets ; and linear capital taxation.

5) According to you, what are the rationales for capital taxation.(2 points)
Answer : See « Rethinking capital and wealth taxation », Piketty and Saez (2013) for more details on the topic. At least three possible reasons for taxing capital :

- « Fuzzy frontier » : if the frontier btw labor and capital income flows not so clear (e.g. for self-employed), then it is better to tax both income flows at rates that are not too different
- « Fiscal capacity » : for top wealth holders, wealth is a better indicator of the capacity to contribute than income
- « Meritocracy » : individuals are not responsible for their inherited wealth, so maybe this should be taxed more than their labor income ; but incentives and imperfect k markets imply that part of the ideal inheritance tax tax should be shifted to lifetime k tax

6) According to you, why do we observe a decline in tax progressivity and a reduction of the capital tax base since 1980 in a number of developed countries. (2 points)

Answer : See « Rethinking capital and wealth taxation », Piketty and Saez (2013) pp12-13 for more details on the topic. Some possible reasons : change in the balance of political power, international capital mobility, tax competition and the residence principle of taxation