

SECOND TEST. ECON 237, SPRING 2016. NAME: _____

Fill in the blanks, and answer in the spaces provided. Show your work. Box final answers.

1. Optimal government size. Suppose that there is a private good, with a market that is efficient in the absence of taxation, and a public good that can only be provided by the government using revenue from a per-unit tax of τ on the private good. Let the marginal benefit and cost for the private good (with quantity x) be as follows:

$$MB(x) = 60 - \frac{1}{10}x \qquad MC(x) = 10 + \frac{1}{10}x$$

Let the marginal benefit and cost of the public good (with quantity y) be as follows:

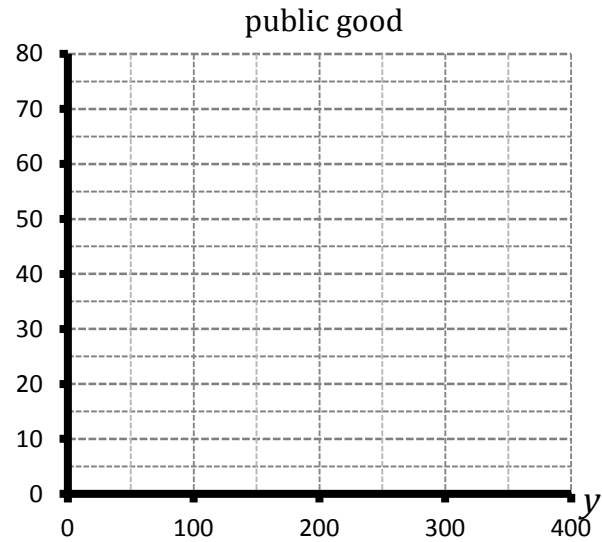
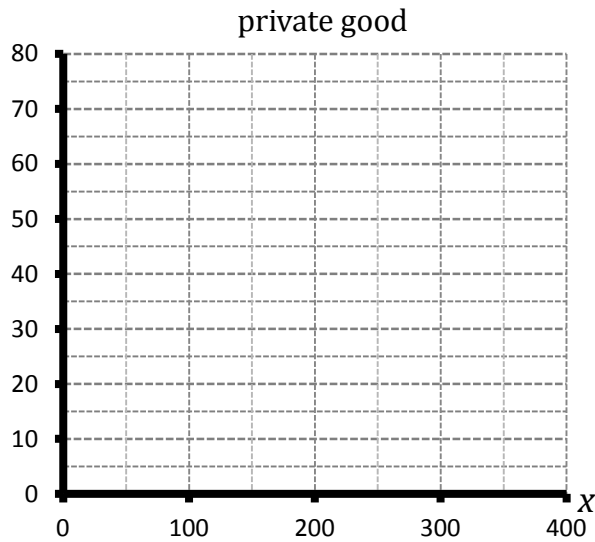
$$MB(y) = 65 - \frac{1}{10}y \qquad MC(y) = 15$$

a) As functions of the tax τ , find the quantity of the private good $x(\tau)$, tax revenue $R(\tau)$, and deadweight loss $D(\tau)$.

b) Find the optimal tax τ^o , supposing that the shadow value of spending a dollar on the public good is $\lambda = 3$. Also, find the resulting tax revenue, $R(\tau^o)$.

c) Using the value of tax revenue that you found, and information about the public goods market above, demonstrate that the shadow value of the last dollar spend on the public good is indeed 3. That is, find the value of y^o that results from spending the revenue $R(\tau^o)$, and use this to calculate the shadow value $\lambda(y^o)$.

d) On the left, graph the market for the private good, with the optimal tax, labeling CS , PS , R , and D . On the right, graph the market for the public good, labeling R (government expenditure, equal to R by assumption) and TES_y (total benefit from the public good, net of expenditure).



2. Optimal government size, derivations. Suppose more general linear marginal benefit and marginal cost functions for both markets:

$$MB(x) = \alpha - \beta x \quad MC(x) = \gamma + \delta x \quad MB(y) = A - By \quad MC(y) = \Gamma$$

a) Derive $x(\tau)$, $R(\tau)$, $R'(\tau)$, $D(\tau)$, and $D'(\tau)$ in terms of α , β , γ , and δ .

b) Use your answer from part (a) to derive μ , the shadow cost of the last dollar of government revenue. What is the value of μ when $\tau = 0$?

c) What is the value of λ when $MB(y) = MC(y)$?

d) What is the relationship between λ and μ when government is too big? Explain.

3. Tiebout.

a) What are the strongest assumptions that the Tiebout model uses? What are the main results of the model when its assumptions hold?

b) Use the above to discuss in general terms which fiscal (taxing and spending) functions tend to be better-handled by larger jurisdictions. (I.e. situations in which major assumptions in the Tiebout model are violated, or the Tiebout equilibrium is otherwise undesirable.)

4. Vertical equity. For each of the simple tax structures below, where $T(y)$ is total tax liability as a function of taxable income Y , determine whether the tax is progressive, regressive, or proportional. Support each of your answers with at least a little algebra.

a) $T(y) = \frac{1}{9}y - 2000$

b) $T(y) = \frac{1}{10}y$

c) $T(y) = \min\left\{\frac{1}{10}y, 1200\right\} = \begin{cases} \frac{1}{10}y & \text{if } y \leq 12000 \\ 1200 & \text{if } y \geq 12000 \end{cases}$

d) $T(y) = \max\left\{0, \frac{1}{3}(y - 9000)\right\} = \begin{cases} \frac{1}{3}(y - 9000) & \text{if } y \geq 9000 \\ 0 & \text{if } y \leq 9000 \end{cases}$

5. Discuss the income effects and substitution effects of a tax on wage earnings. That is, suppose that a worker earns $c = wl$ before the tax, and $c = (1 - \tau)wl$ after the tax, where w is their wage (which is exogenous), l is the time they spend working (which they choose), and $\tau \in (0, 1)$ is the tax rate. Is the overall impact on earnings positive, negative, or ambiguous? Is the overall impact on labor supply positive, negative, or ambiguous? Explain in terms of income and substitution effects. If possible, try to incorporate a graph in your answer.

6. Give a few basic facts about each of the following.

a) US estate tax: What is the basic structure? Who pays it?

b) FICA tax: What is the basic structure? What does it fund?

c) Earned income tax credit: What is the basic structure? Who receives it?

7. **Simple income tax calculation.** Suppose the following graduated income tax:

income bracket	marginal rate
\$0 - \$5,000	10%
\$5,000 - \$10,000	20%
\$10,000 - \$20,000	30%
\$20,000 and above	40%

If your taxable income is \$50,000, how much do you pay? _____