

Problem set 4, due Tuesday 10/27/2015

1. Negative externality. Suppose the market for a certain good (e.g. 'gasoline') is perfectly competitive, but that the good causes a *negative* externality. Marginal benefit, marginal private cost, and marginal external cost are given by the functions below:

$$MB = 20 - \frac{1}{50}q \qquad MC = 5 + \frac{1}{100}q \qquad MEC = 6$$

a) No policy. Given that there is no policy to address the externality, find the equilibrium quantity, price, consumer surplus, producer surplus, external cost, and total economic surplus.

$$q = \underline{\hspace{2cm}} \qquad p = \underline{\hspace{2cm}} \qquad CS = \underline{\hspace{2cm}}$$

$$PS = \underline{\hspace{2cm}} \qquad EC = \underline{\hspace{2cm}} \qquad TES = \underline{\hspace{2cm}}$$

Graph the market with no policy intervention, labeling *CS*, *PS*, and deadweight loss (*DWL*). Why is this area the deadweight loss?

b) Pigovian tax. To maximize total economic surplus, the government should charge a tax of $\tau^o = \underline{\hspace{2cm}}$ per unit to the consumers. Given this, find the equilibrium quantity, price, consumer surplus, producer surplus, external cost, government revenue, and total economic surplus.

$$q = \underline{\hspace{2cm}} \qquad p = \underline{\hspace{2cm}} \qquad CS = \underline{\hspace{2cm}}$$

$$PS = \underline{\hspace{2cm}} \qquad EC = \underline{\hspace{2cm}} \qquad GR = \underline{\hspace{2cm}} \qquad TES = \underline{\hspace{2cm}}$$

Graph the market with the subsidy, labeling *CS* and *PS*. Why is there no deadweight loss in this case?

2. Positive externality. Suppose the market for a certain good (e.g. 'education') is perfectly competitive, but that the good causes a *positive* externality. Marginal private benefit, marginal external benefit, and marginal cost are given by the functions below:

$$MB = 200 - \frac{1}{25}Q \qquad MEB = 110 \qquad MC = 60 + \frac{1}{100}Q$$

a) No policy. Given that there is no policy to address the externality, find the equilibrium quantity, price, consumer surplus, producer surplus, external benefit, and total economic surplus.

$$q = \underline{\hspace{2cm}} \qquad p = \underline{\hspace{2cm}} \qquad CS = \underline{\hspace{2cm}}$$

$$PS = \underline{\hspace{2cm}} \qquad EB = \underline{\hspace{2cm}} \qquad TES = \underline{\hspace{2cm}}$$

Graph the market with no policy intervention, labeling CS^* , PS^* , and deadweight loss (DWL). Why is this area the deadweight loss?

b) Pigovian subsidy. To maximize total economic surplus, the government should offer a subsidy of $\sigma^o = \underline{\hspace{2cm}}$ per unit to the consumers. Given this, find the equilibrium quantity, price, consumer surplus, producer surplus, external benefit, government expenditure, and total economic surplus.

$$q = \underline{\hspace{2cm}} \qquad p = \underline{\hspace{2cm}} \qquad CS = \underline{\hspace{2cm}}$$

$$PS = \underline{\hspace{2cm}} \qquad EB = \underline{\hspace{2cm}} \qquad GE = \underline{\hspace{2cm}} \qquad TES = \underline{\hspace{2cm}}$$

Graph the market with the subsidy, labeling CS and PS . Why is there no deadweight loss in this case?