

Public Health Economics

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Topic 1: Introduction to Public Health Economics



Definition of Public Health Economics

- Public health economics is “the study of the economic role of government in public health, particularly, but not exclusively, in supplying public goods and addressing externalities.”
 - The role of government is central to the definition of public health economics
 - Also central are the concepts of *public goods* and *externalities*

Vilma Carande-Culis, Thomas Getzen, and Stephen Thacker, “Public Goods and Externalities: A Research Agenda for Public Health Economics,” Journal of Public Health Management Practice, 3:2 (2007), 227-232

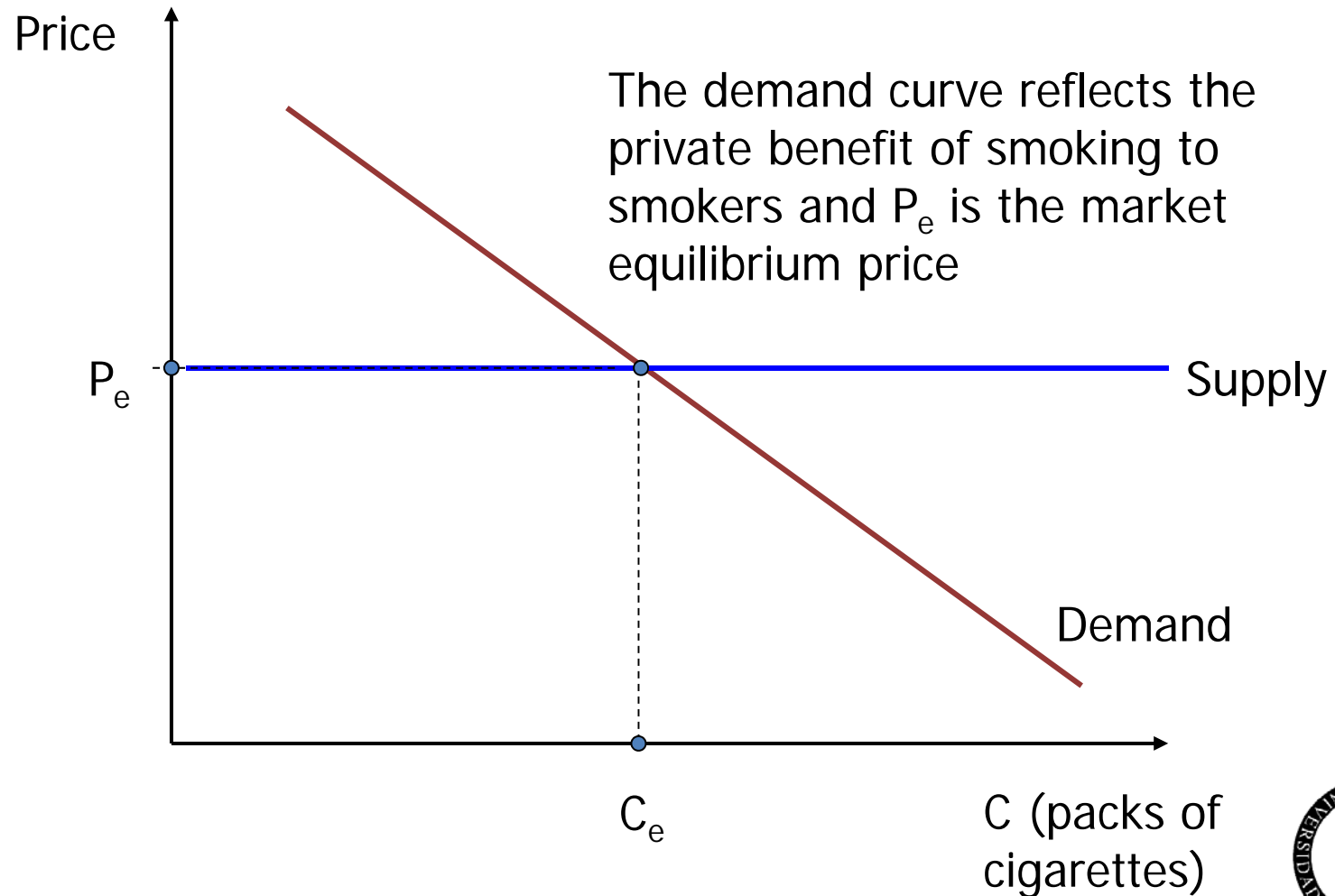


Externalities

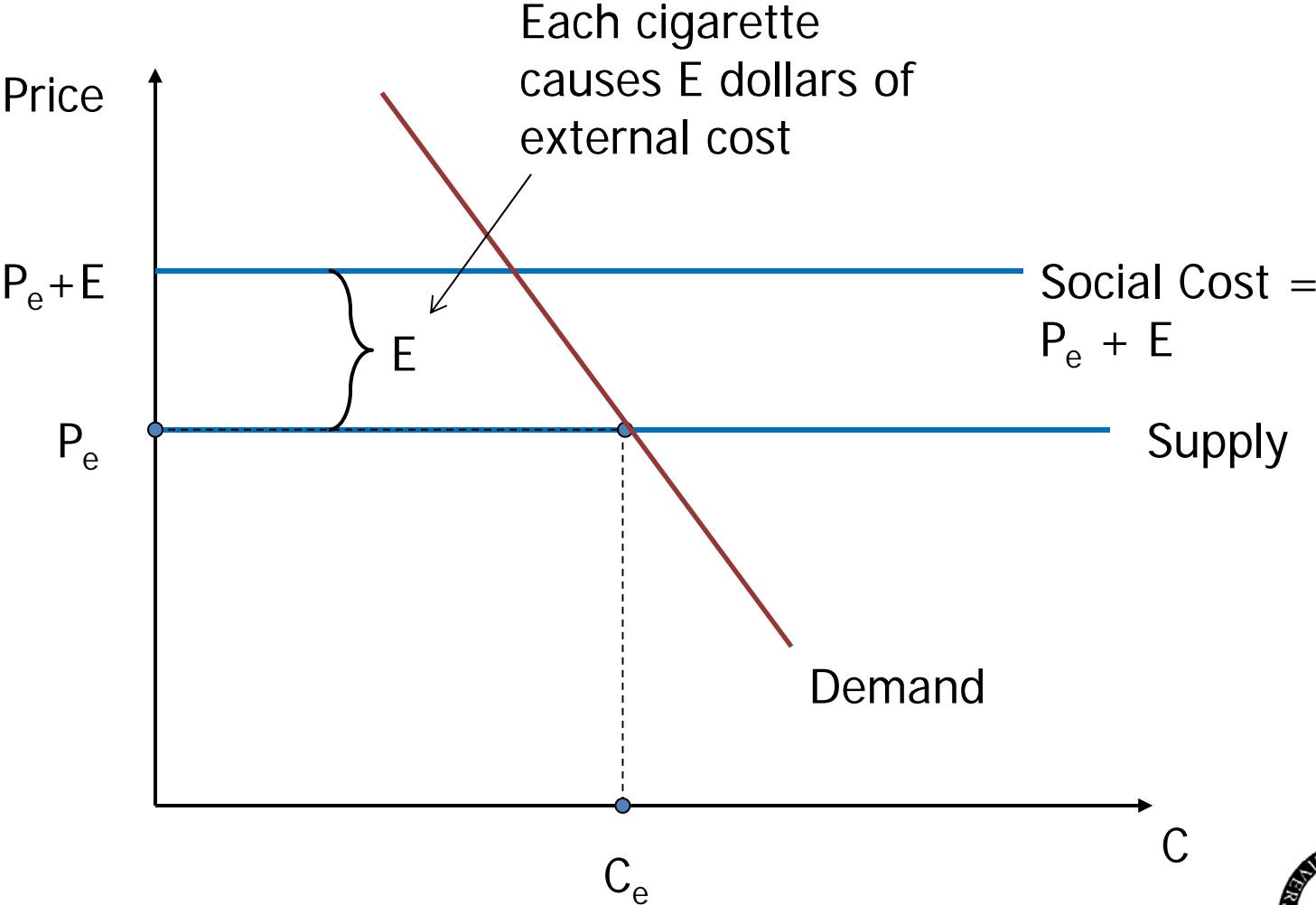
- The most important economic justification for government intervention to improve public health is that some harmful effects of behavior are ‘external’ to the decision-maker
- *Externalities* occur when one person’s decisions affect other people, either adversely or beneficially, and the decision-maker does not consider these effects
- Example: second-hand cigarette smoke harms others and the smoker does not consider the harm when he/she calculates the costs and benefits from smoking
- Economists show this with a market diagram – example of cigarette smoking



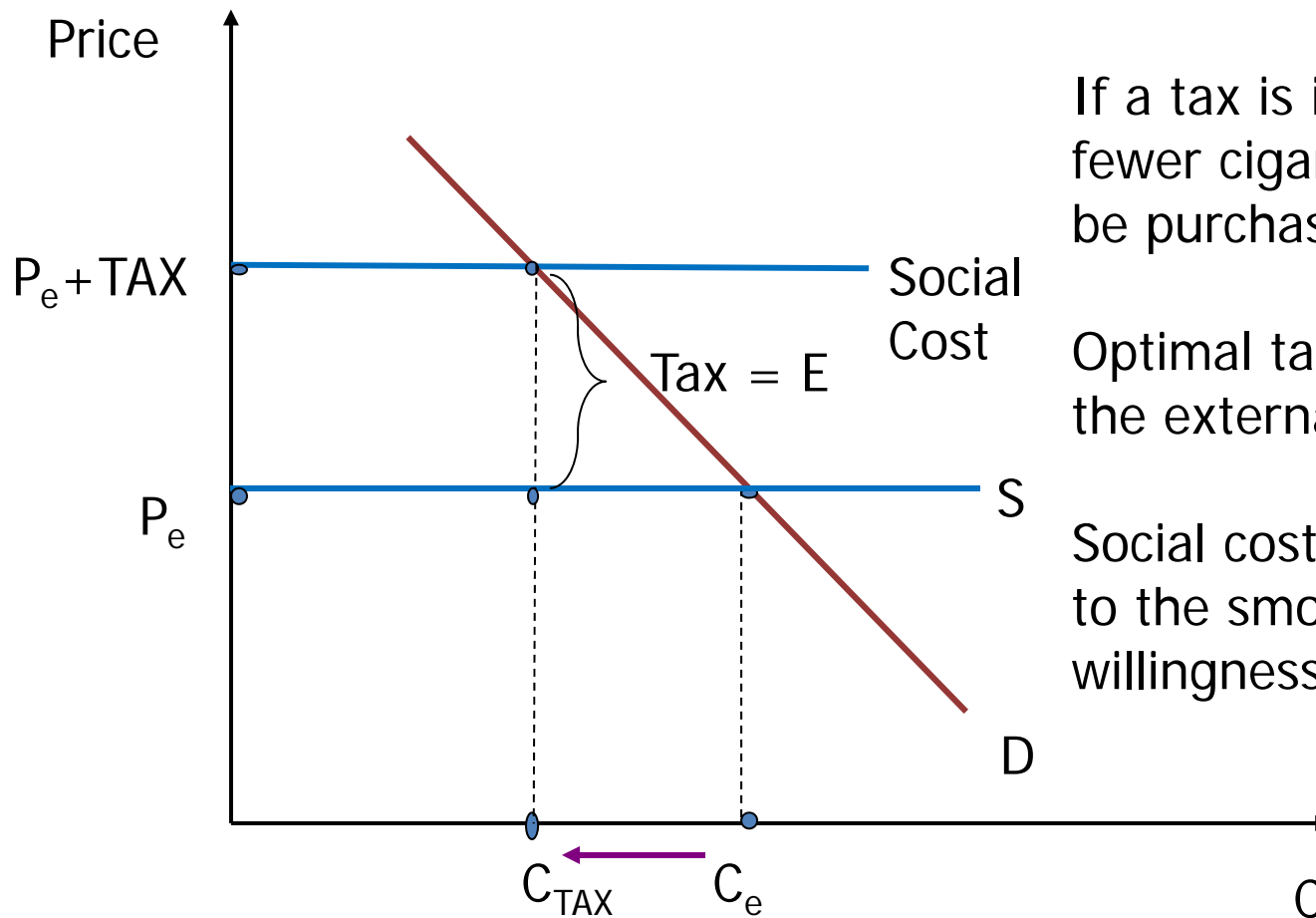
Quantity Purchased Taking only Private Benefit & Cost into Account



External Cost



Optimal Cigarette Tax



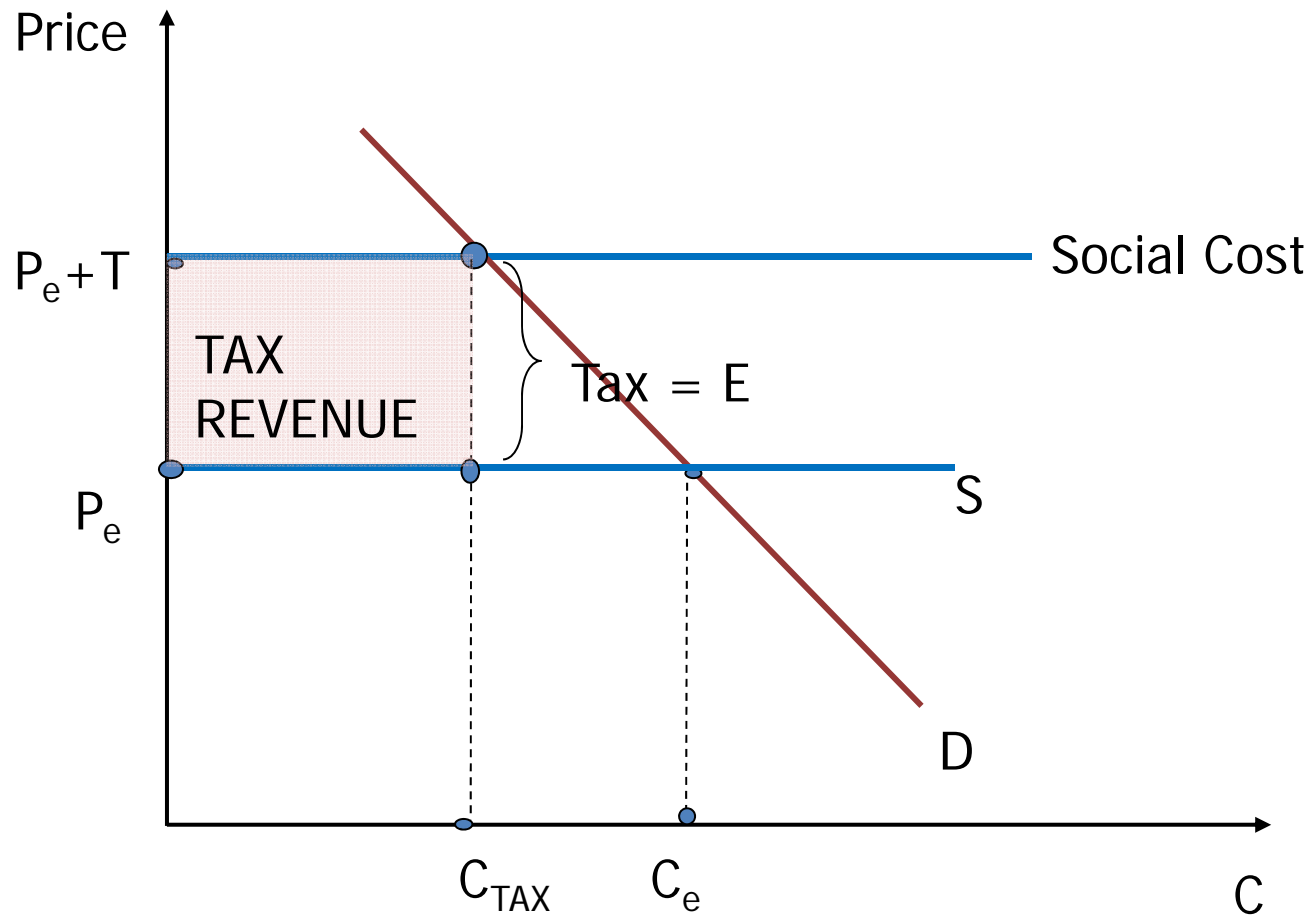
If a tax is imposed, fewer cigarettes would be purchased

Optimal tax is equal to the external cost per C

Social cost is just equal to the smoker's willingness to pay

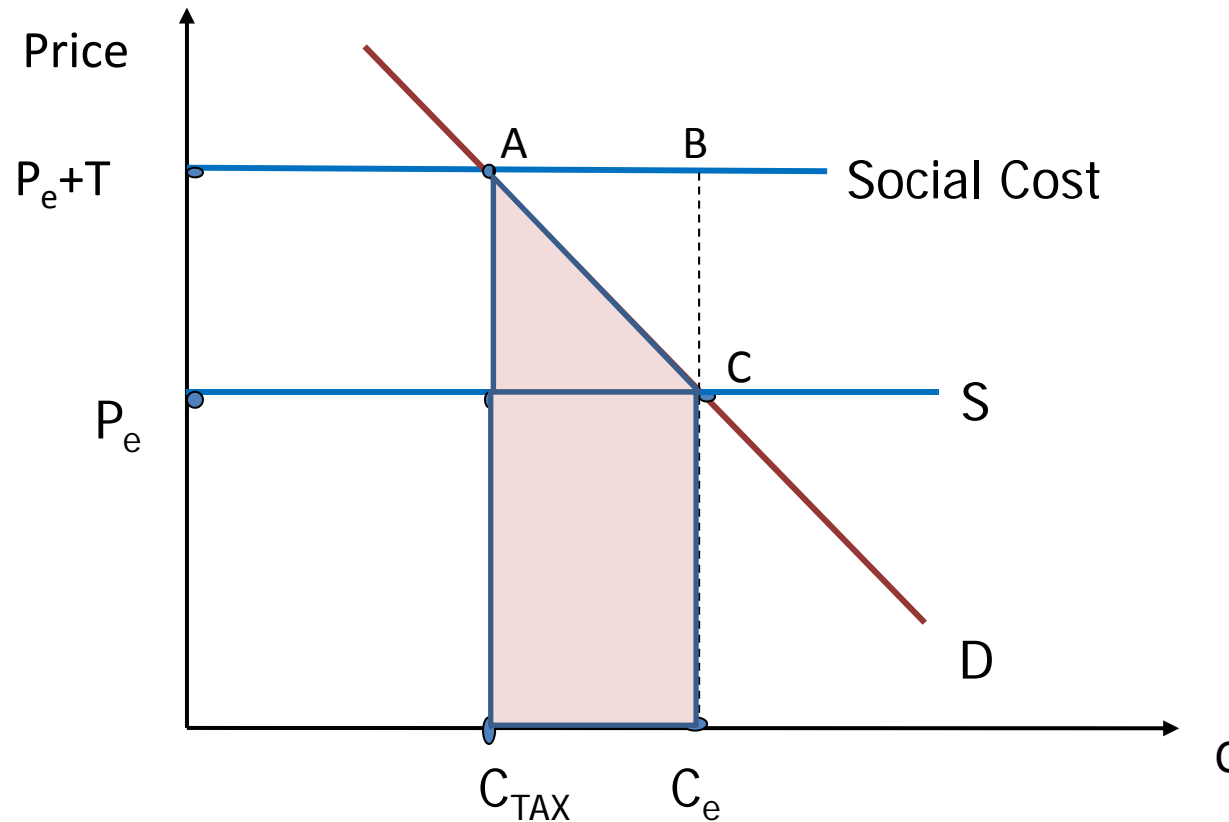


Tax Revenue



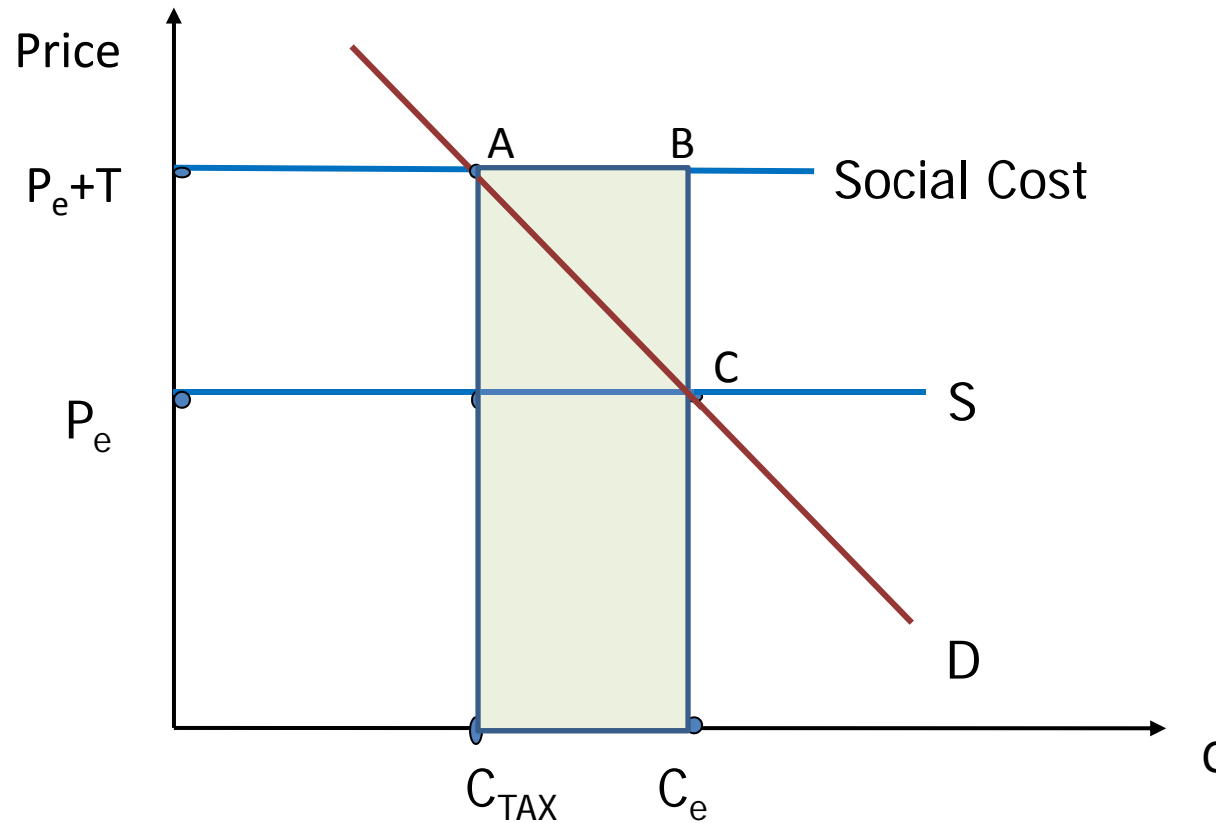
Consumer Surplus - 1

Consumer surplus is a measure of the net gain from the optimal tax. It is calculated in 3 steps: 1. Lost benefits of smoking that is foregone because of tax



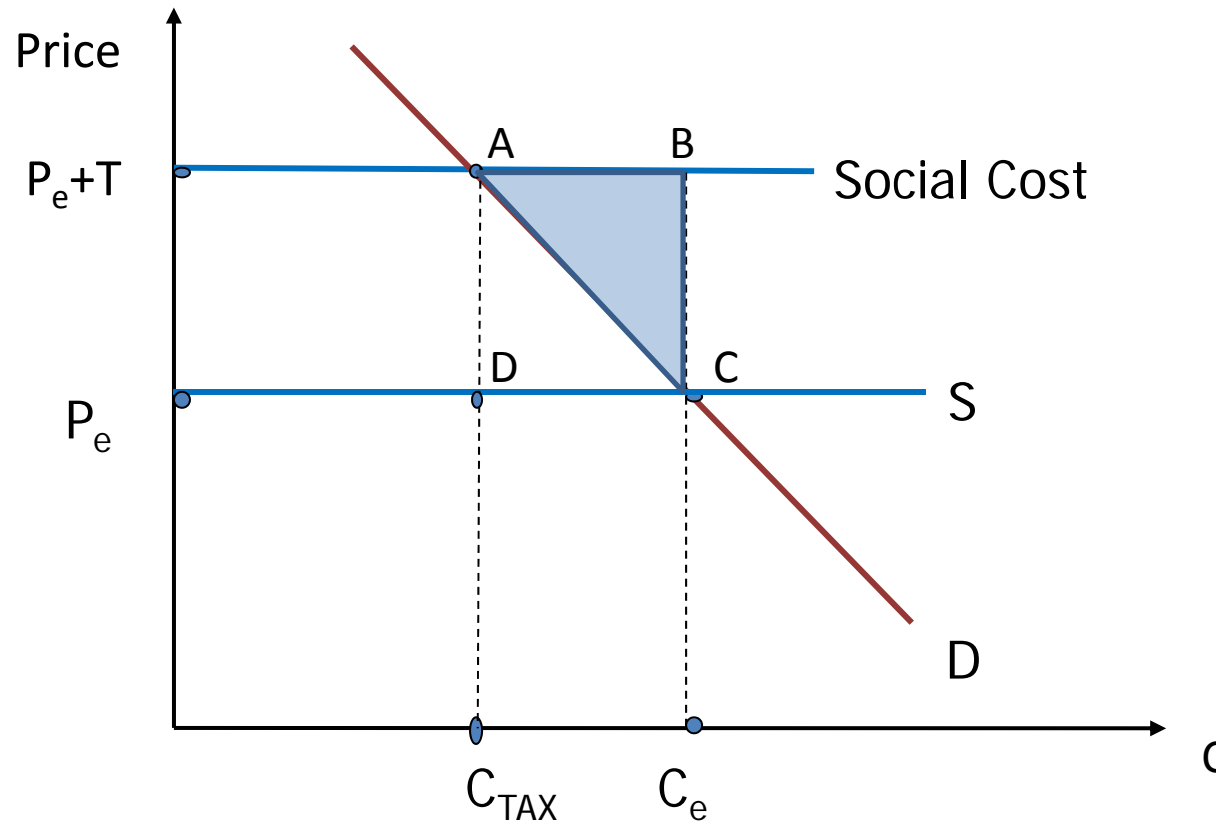
Consumer Surplus - 2

2. Savings of resources not used to make cigarettes



Consumer Surplus - 3

3. Subtract lost benefits from savings: the triangle ABC is the social gain from the tax



Additional Consideration: Equity

- Economists also discuss equity or fairness when thinking about using taxes to reduce external costs
- A number of equity principles are possible:
 - Cost-benefit: tax the smoker who creates the external cost
 - Ability-to-pay: tax the rich more than the poor
- The cigarette tax is *regressive*: the percent of income captured by tax decreases as income increases
 - Many public health experts support taxes on cigarettes, even though they are regressive
 - Taxes are among the least coercive ways to change behavior



Public Goods

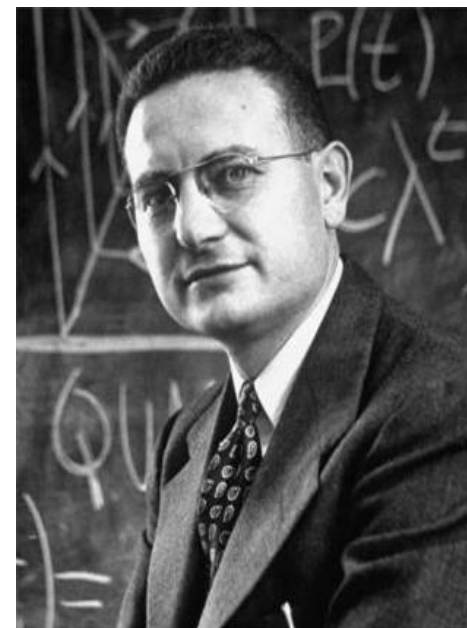
- Public goods have two features:
 - *Non-rival*: Everyone enjoys the benefits of consuming the public good
 - *Non-exclusionary*: no one can be excluded from consuming the public good
- Public goods are an extreme case of externalities
 - The producer of a public good creates a positive externality for everyone else
 - *Information* is the most important public good from a public health perspective



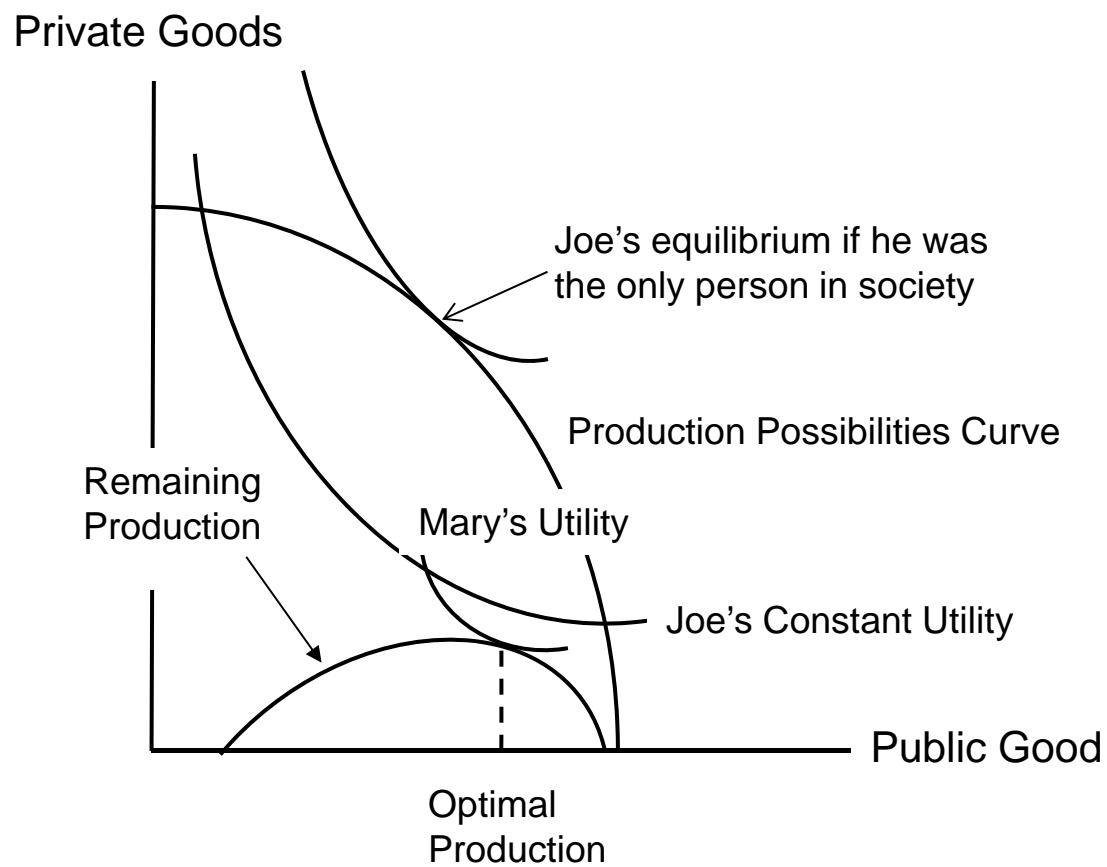
Samuelson's Theory of Public Goods

- Economists knew for a long time that private production of public goods would be inadequate, but no one knew how to find the optimal production of a public good until Paul Samuelson (1954) showed how to do it
 - Samuelson's key insight: the total demand for a public good is the *vertical* sum of individual demand curves
 - If Joe and Mary are each willing to pay \$1 per unit of the public good, the total willingness to pay is \$2/unit
 - Formally, hold Joe's utility constant at any level and maximize Mary's utility, subject to the production possibilities for transforming private goods into the public good

Paul
Samuelson



Samuelson's Graph



Paul Samuelson, "A Pure Theory of Public Expenditure," Review of Economics and Statistics, 36 (1954), 387-389



Problems with Provision of Public Goods

- How do we get Joe and Mary to tell us how much they would be willing to pay?
- They may understate their preferences for the public good, hoping the other person will pay
- This is called the *free-rider hypothesis*
- It is a hypothesis, not a certainty
- Elinor Ostrom – first woman to win the Nobel Prize in Economics, 2009 – challenged conventional wisdom by demonstrating how common property can be managed successfully without regulation by central authorities or privatization
- Other economists have worked on “mechanisms” to get people to reveal their preferences for public goods

Elinor Ostrom



External Costs of a Sedentary Lifestyle

- An early study of external costs, but still a classic, is Emmett Keeler, et al., “The External Costs of a Sedentary Lifestyle,” *American Journal of Public Health*, 79:8 (1989), 975-981
- A sedentary lifestyle creates external costs in several ways:
 - medical care paid by insurance, paid sick leave, group life insurance, nursing home care, and pensions are all external costs of a sedentary lifestyle
 - external cost of medical care = extra medical care costs due to sedentary lifestyle – out-of-pocket medical expenses
- Income taxes are an *external benefit* of my work, so if a sedentary lifestyle increases disability, it reduces the external benefits from work



Results at 5% Discount Rate

<u>External Costs (+)</u>	<u>Sedentary</u>	<u>Exerciser</u>
Medical care	\$11,000	\$9,200
Sick leave	\$2,000	\$1,500
Group life	\$1,000	\$900
Nursing home	\$700	\$800
Retirement pension	\$16,000	\$16,500
Taxes on Earnings (-)	(\$27,000)	(\$27,100)
Net External Cost	\$3,700	\$1,800
Difference (S – E)		\$1,900



Conclusions

- “If sedentary individuals were more active, they would live longer and reduce the costs they impose on others.” (Keeler, et al., page 979)
- What should the public do?
 - subsidize recreational facilities
 - workplace health promotion programs
 - health insurance discounts for exercisers
 - tax goods that are complements to sloth (TV)



The Value of Information on Health Hazards of Smoking



Cigarette advertising from the 1950s

Fujii's Study

- In 1964 the U.S. Surgeon General (SG) declared that cigarettes were harmful to your health
- Edwin Fujii wanted to measure the gain in social welfare from this information
- He estimated the following equation:

$$\ln Q_t = 1.4 + .32 \ln Y_t - .3156 \ln PRICE_t + .71 \ln Q_{t-1} - .06 WARNING_t + u_t$$

Q = packs of cigarettes smoked per person over age 14 per year, 1947-1967

Y = real income per capita

PRICE = price per pack

Q_{t-1} = lagged consumption (because smoking is addictive)

WARNING = dummy variable for SG's warning: 0 before 1964, 1 after 1964

Edwin Fujii, "On the Value of Information on Product Safety: An Application to Health Warnings on the Long Run Medical Implications of Cigarette Smoking,"

21 *Public Finance*, 30 (1975), 323-332

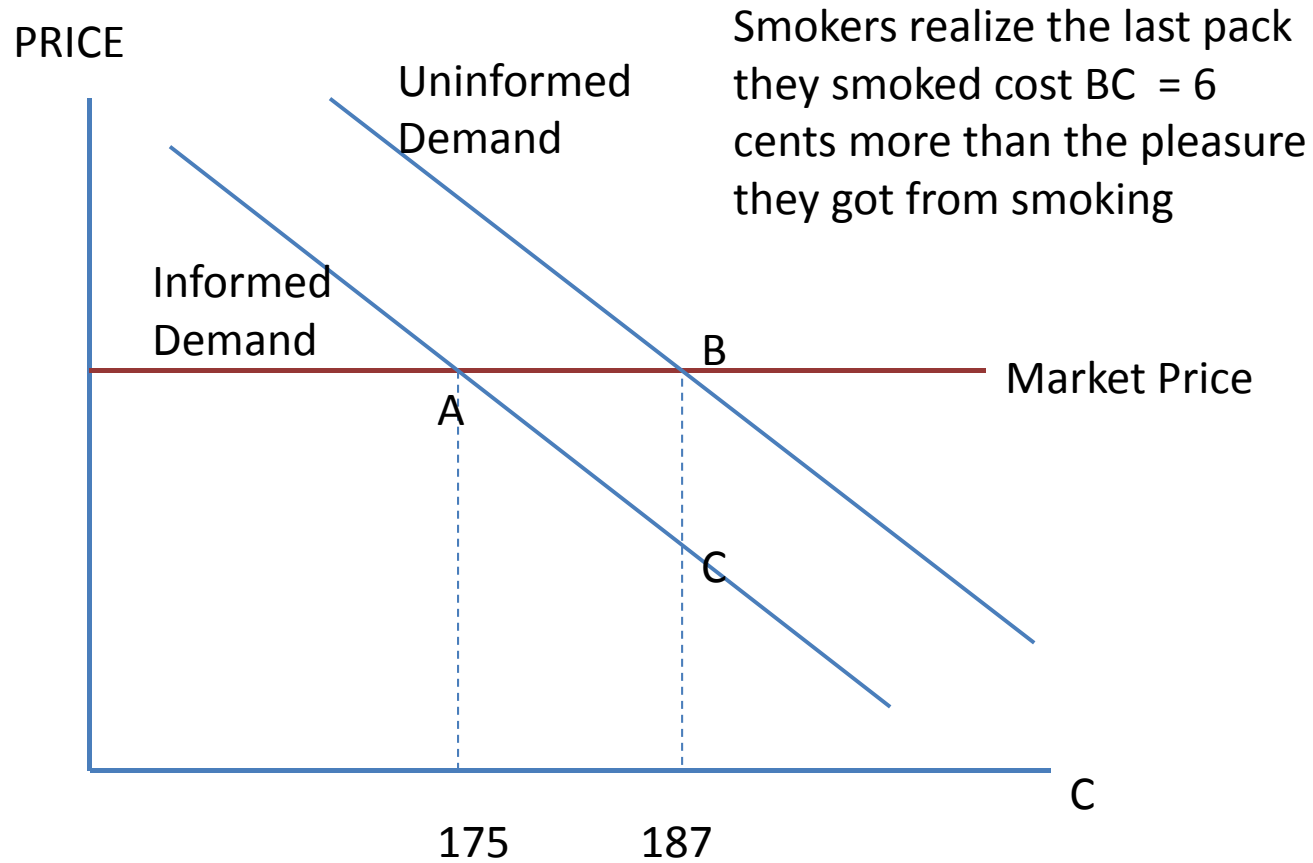


Fujii's Study - 2

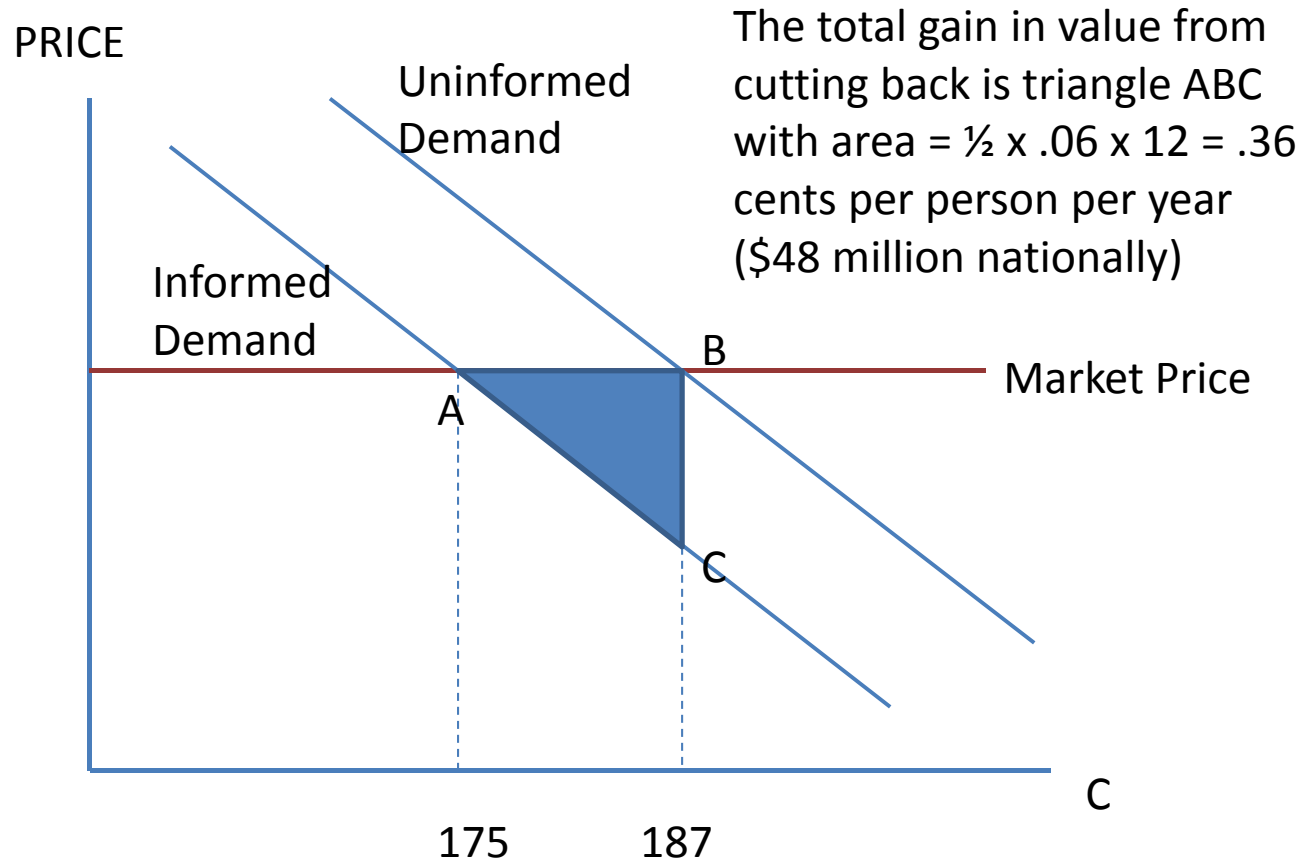
- The SG's warning led to a 6% drop in smoking in the U.S.
 - This represented a decrease from 187 to 175 packs per person per year in the *short run* (holding Q_{t-1} constant)
 - Can you find the long-run effect?
- The same drop in consumption could have been achieved by raising price by 20%:
 $-.06\% (\text{WARNING} = 1) = -.31 \% \Delta \text{PRICE} \rightarrow \% \Delta \text{PRICE} = +20\%$
- Given that a pack of cigarettes cost 29 cents in 1964, the SG's warning was equivalent to a 6 cent price increase
- How can we say that smokers are better off when the price of cigarettes increases?



Fujii's Study - 3



Fujii's Study - 4



The External Costs of Smoking

- Some of the external costs are easy to spot, such as the cost of smokers' medical care paid by insurance
- Second-hand smoke creates external costs (evidence of elevated lung cancer rates among airline flight attendants)
- Many experts consider fetal harm due to maternal smoking as the most important external cost
 - Infants born to smokers are more than twice as likely to have low birth weight (<2,500 gm) than those born to nonsmokers
 - The incremental effect of smoking on LBW risk is estimated to be 0.046
 - The lifetime external cost of a LBW baby is \$144,000 at 5% discount rate
 - The LBW cost per pregnant smoker is $0.046 \times \$114,000 = \$5,245$
 - Suppose over 40 weeks the pregnant smoker consumes 280 packs of cigarettes (one pack per day)
 - *The external cost per pack is \$18.73 (€ 16.72)*



Is Fetal Harm an External Cost?

- Others question whether fetal harm from smoking is an external cost
- Perhaps the mother considers the harm she is causing to her unborn baby and cuts back smoking by an amount that is similar to a price hike of \$18.73 per pack
- Simple test:
 - In 2005, about 21% of women of ages 18-44 in the U.S. were smokers, but only 10.7% of women smoked during pregnancy
 - Assume this is a 'real' reduction in smoking, not selection of non-smokers to become pregnant
 - The cutback in smoking is much less than one would see if pregnant smokers considered the harm they caused
- Implies that at least some of the costs of smoking to the fetus are external costs



A Puzzle for You

- The large external cost of maternal smoking is caused by one group of smokers (pregnant women)
- A tax of \$18.73 per pack of cigarettes sold to *anyone* would be too high
- Can you think of any policies that would set the cost of smoking at the right level for pregnant women versus other smokers?



Spain's Smoking Ban

- Another approach to reduce second-hand smoke is to ban smoking in public places
- Spain implemented a tobacco control law (Law 28/2005) in 2006
 - Smoking was banned in certain public places, but numerous exceptions were made
 - Hospitality venues with service area > 100² meters could designate a ventilated smoking area up to 30% of the total service area
 - Smoking ban was optional in smaller venues
- Law was supported by tobacco industry as an alternative to outright smoking ban

Monique Muggli, et al., "Legislating Tolerance: Spain's National Public Smoking Law," Tobacco Control, 19 (2010), 24-30



Spain's Smoking Ban - 2

- An evaluation after two years found that nicotine concentration decreased by 60% in public administration, university, and private-sector offices, but increased by 40% in hospitality venues that allowed smoking
- January 1, 2011: Smoking is totally banned in hospitality venues
- One-year evaluation found that nicotine and particulate matter decreased by 90%, but there was some “blowback” in venues that allowed outdoor smoking close to the entrance

Maria López, et al., “Two-year Impact of the Spanish Smoking Law on Exposure to Secondhand Smoke: Evidence of the Failure of the ‘Spanish Model’,” Tobacco Control, 21 (2012), 407-411; “Impact of the 2011 Spanish Smoking Ban in Hospitality Venues: Indoor Secondhand Smoke Exposure and Influence of Outdoor Smoking,” Nicotine & Tobacco Research, 15:5 (2013), 992-996

