CH10 The Government in the Economy: Taxation and Regulation

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CH10 Review

Tax Structure

Progressive Tax			
	Income	Percentage of Income Paid in Tax	Amount of Tax
Family A	$ 10,000	10 percent	$ 1,000
Family B	$ 50,000	20 percent	$10,000
Family C	$100,000	30 percent	$30,000
Proportional Tax			
	Income	Percentage of Income Paid in Tax	Amount of Tax
Family A	$ 10,000	20 percent	$ 2,000
Family B	$ 50,000	20 percent	$10,000
Family C	$100,000	20 percent	$20,000
Regressive Tax			
	Income	Percentage of Income Paid in Tax	Amount of Tax
Family A	$ 10,000	20 percent	$2,000
Family B	$ 50,000	4 percent	$2,000
Family C	$100,000	2 percent	$2,000

- In a progressive income tax system, high-income individuals pay higher average taxes and marginal taxes.
- In a proportional tax system, households pay the same percentage of their income in taxes regardless of their income level.
- In a regressive tax system, the marginal and average tax rates decline with income.

Tax Structure (continued)

- Average tax rate is the total tax paid divided by total income earned.
- Marginal tax rate is how much of the last dollar earned the household pays in taxes.

Tax Incidence and Deadweight Losses

- Tax incidence refers to how the burden of the tax is distributed across various agents in the economy. (e.g. buyers and sellers)
- In competitive markets, tax incidence and equilibrium prices and quantities are independent of wether the tax is imposed on consumers or producers.

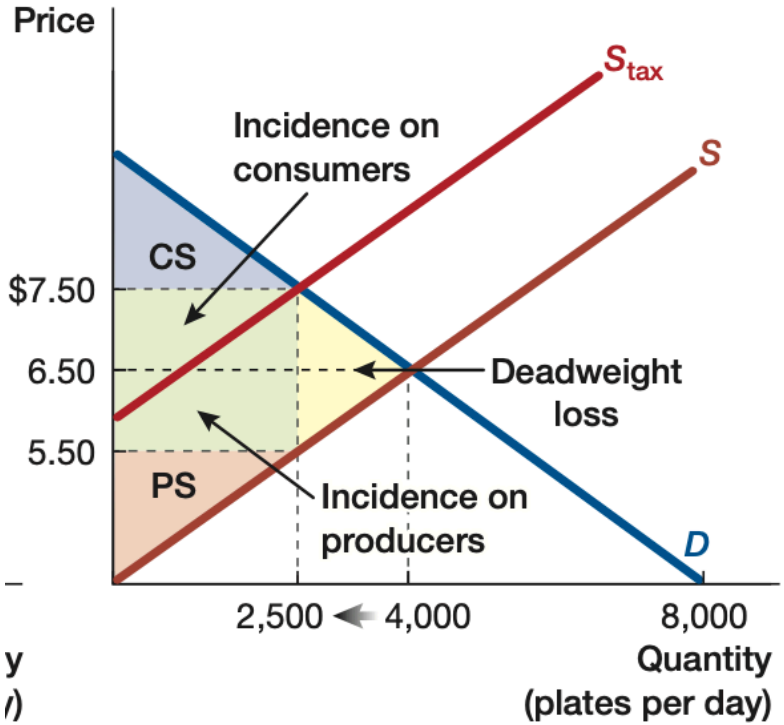


Figure: A $2 tax on producers

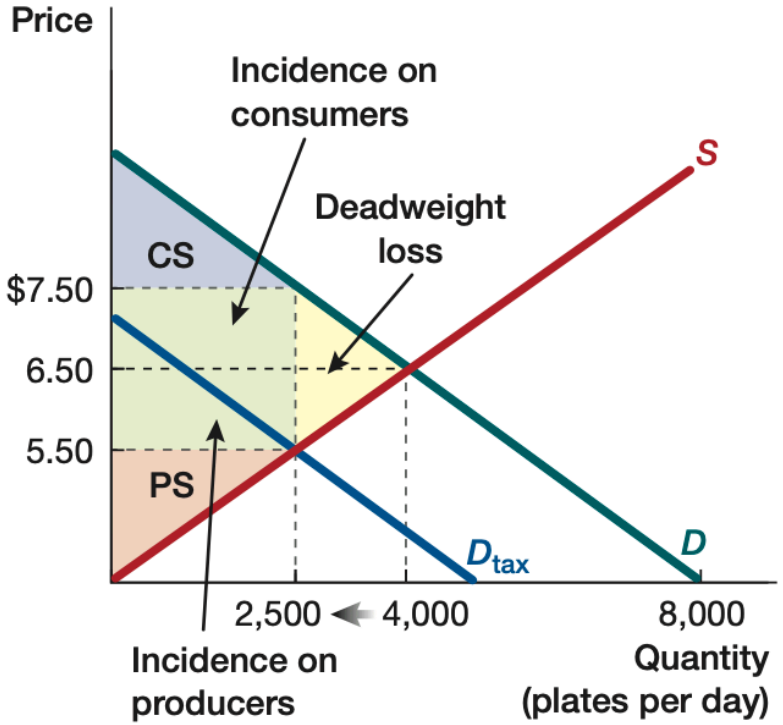


Figure: A $2 tax on consumers

Effects of Demand and Supply Elasticities on Tax Incidence

- The general rule: The tax burden falls less on the side that is more elastic.
- Intuition: If buyers are more price-elastic, they have more alternatives to turn to. Same logic applies to the producer.

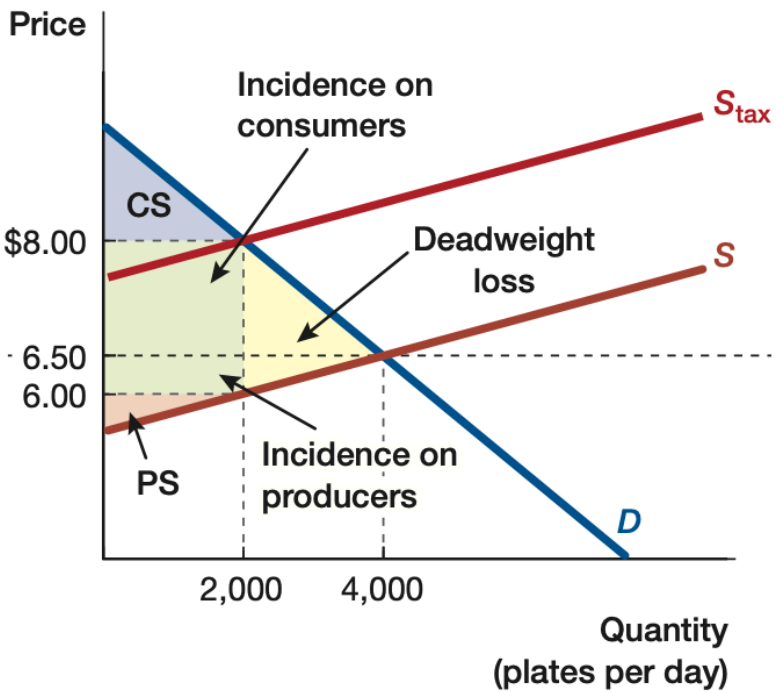


Figure: Supply is more elastic

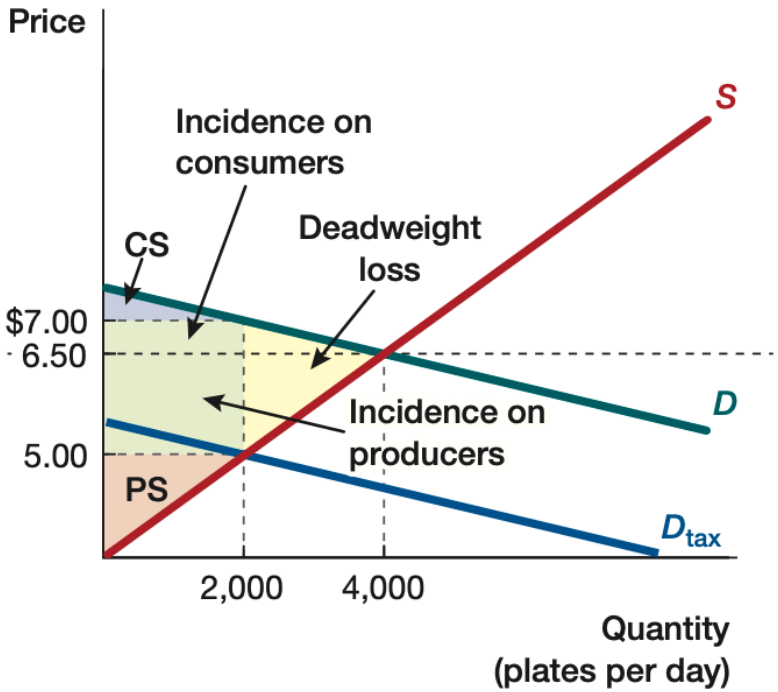


Figure: Demand is more elastic

CH10 Exercises

Exercise1: Problem10-1 (二版課本題號同)

The following table gives the 2017 federal income tax rates for the head of a household.

Taxable Income Bracket	Rate
$0 to $13,350	10%
$13,350 to $50,800	15%
$50,800 to $131,200	25%
$131,200 to $212,500	28%
$212,500 to $416,700	33%
$416,700 to $444,550	35%
$444,550 and above	39.60%

a. Calculate the total tax owed for the head of a household who earns $25,000 a month.
b. What is the marginal tax rate?
c. Calculate the average tax rate.

Answer:

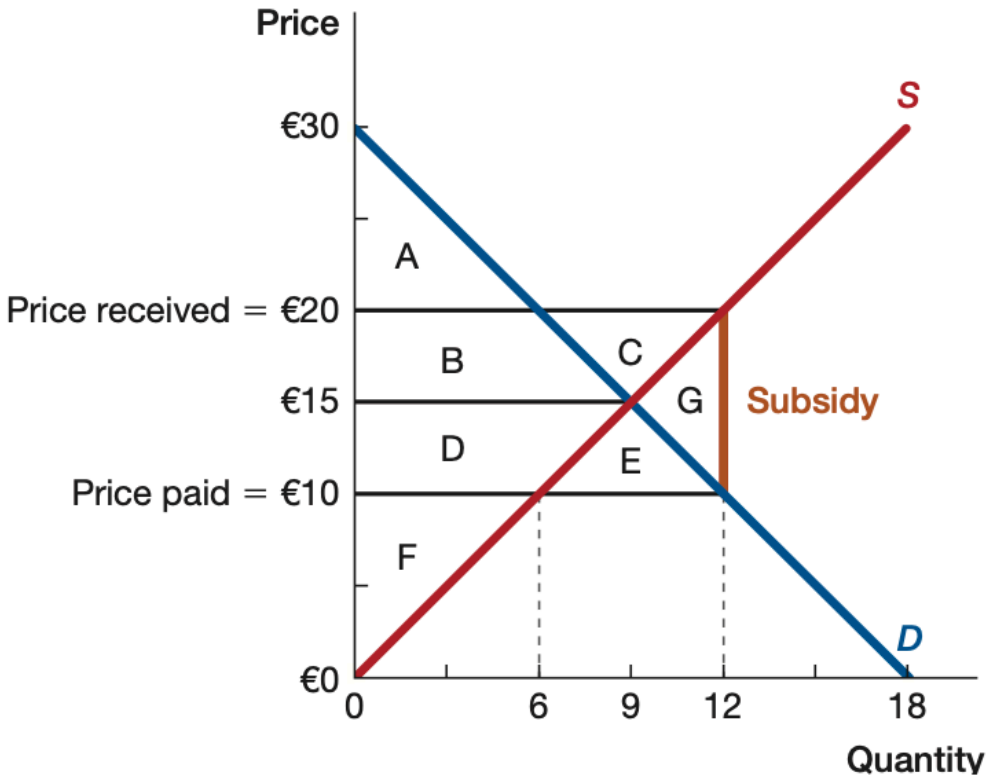
a. The head of the household earns $12 \times \$25,000 = \$300,000$ a year, so the total tax owed is
$$(13,350 - 0) \times 10\% + (50,800 - 13,350) \times 15\%$$
$$+(131,200 - 50,800) \times 25\% + (212,500 - 131,200) \times 28\%$$
$$+(300,000 - 212,500) \times 33\% = 78,691.50$$

b. The marginal tax rate is 33%.

c. Their average tax rate is $\frac{78,691.5}{300,000} \times 100\% \approx 26.23\%$.

Exercise2: Problem10-7 (二版課本題號同)

This chapter has focused on the effect of taxes. Let's consider the effect of subsidies, which also generate deadweight loss. A subsidy creates a gap between the price received by sellers and the price paid by buyers.



Exercise2: Problem10-7 (continued)

a. Complete the table. (see table in answer)

b. Based on this table, what is the deadweight loss of the subsidy?

c. How is deadweight loss resulting from a tax different from deadweight loss resulting from a subsidy?

Answer:

a.

	No Subsidy	With Subsidy
Consumer Surplus	67.5 A+B	120 A+B+D+E
Producer Surplus	67.5 D+F	120 B+C+D+F
Government Revenue	0	-120 -(B+C+D+E+G)
Social Total Surplus	135 A+B+D+F	120 A+B+D+F-G

Answer: (continued)

b. With the subsidy, the social total surplus is lower by the value of G; this is the deadweight loss, which is €15.

c. The deadweight loss from a tax is due to the decrease in exchange; however, the deadweight loss from a subsidy is due to too much trade. The optimal quantity is Q = 9; it exhausts all gains from trade. The additional trade shown at Q = 12 induced by the subsidy allows for consumption by buyers who value the good at below marginal cost.

Exercise3

Suppose that the market for boxed lunches is described by the following demand and supply equations

$Q_S = -50000 + 1500P, Q_D = 75000 - 1000P.$

a. Solve for the equilibrium price and quantity of boxed lunches.

b. Suppose that a tax of \$5 is placed on the buyers of boxed lunches, so that the new demand function is $Q_D = 75000 - 1000(P + 5)$. Calculate the price received by sellers, the price paid by buyers, and the quantity sold.

c. Tax revenue is $\$5 \times Q$. Use your answer in part b. to solve for tax.

d. The deadweight loss of a tax is the area of the triangle between the supply and demand curves. Solve for the deadweight loss caused by this \$5 tax.

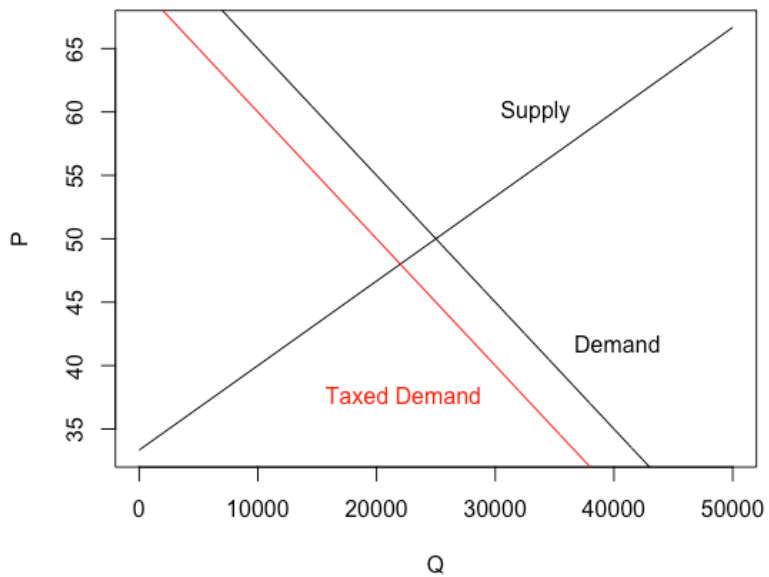
Answer:

a. $Q_S = -50000 + 1500P = 75000 - 1000P = Q_D,$

$\Rightarrow P^* = 50,\ Q^* = 25000.$

b. $Q_S = -50000 + 1500P = 75000 - 1000(P + 5) = Q_D,$

$\Rightarrow P_S = 48,\ P_D = 48 + 5 = 53, Q^* = 22000.$



c. $\text{Tax} = 5 \times 22000 = 110000.$

d. $\text{DWL} = \frac{1}{2} \times 5 \times (25000 - 22000) = 7500.$