



INDIRECT TAXES

Notes

WHY DO GOVERNMENTS IMPOSE INDIRECT TAXES?

1. Government revenue
2. Discourage harmful consumption
3. Redistribute income
 - Taxes on luxury goods
 - Payment of a tax on these goods reduces after tax income
 - ↳ narrows difference
4. Improve allocation of resources

WHAT IS AN INDIRECT TAX?

- Indirect tax: taxes imposed on spending to buy goods and services
- They are partly paid by consumers & are paid to govt by producers (firms)

TWO TYPES OF INDIRECT TAXES

1. Excise taxes: taxes imposed on particular goods and services such as gasoline, cigarettes and alcohol
2. General taxes: Taxes on spending on all (or most) goods and services

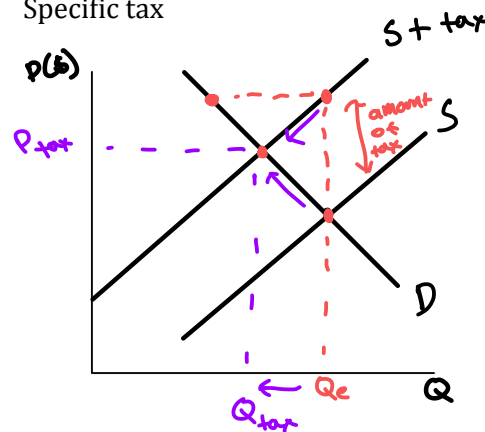
Example: general sales in USA and value-added in Canada

TWO TYPES OF EXCISE TAXES

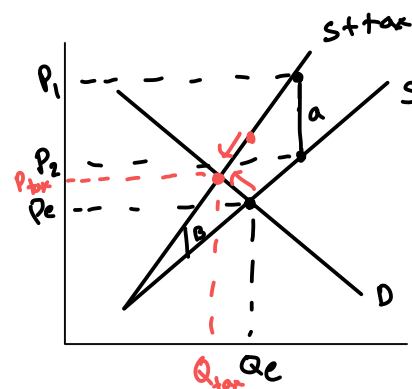
1. Specific taxes: A fixed amount of tax per unit of the good and service sold - ex. \$2 / pack of cigarettes
2. Percentage (ad valorem) taxes: a tax that is fixed percentage of the price of the good or service
 - The amount of tax increases as the price of goods increase

MODELLING INDIRECT TAXES

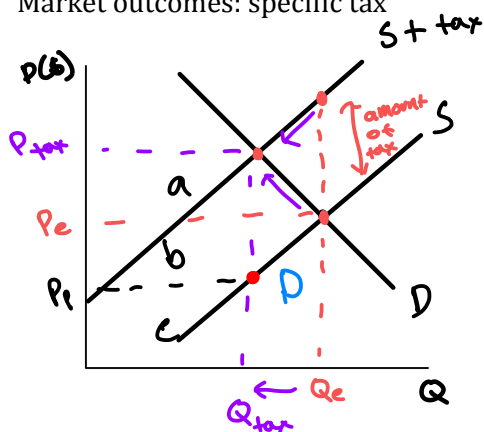
a) Specific tax



b) Ad valorem tax



c) Market outcomes: specific tax



Consumers:

- Pay more ($P_e \rightarrow P_{tax}$)
- Consume less ($Q_e \rightarrow Q_{tax}$)
- expenditure: $P_c \cdot Q$, overall \downarrow

Producers:

- Receive less ($P_e \rightarrow P_p$)
- Producers sell less ($Q_e \rightarrow Q_{tax}$)
- Producers lose TR ($b+c+d \rightarrow c$)

Government:

- Gains revenue ($a+b$)
- a = consumer share of revenue, b = producer share

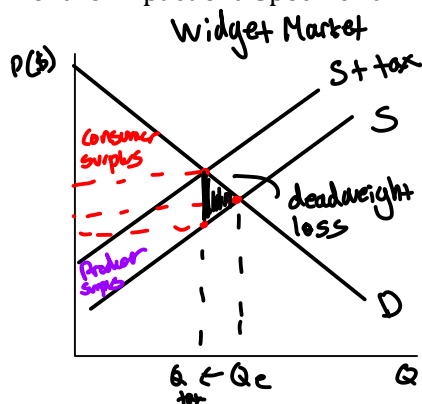
Workers:

- Less TR, firms may fire workers or decrease wages

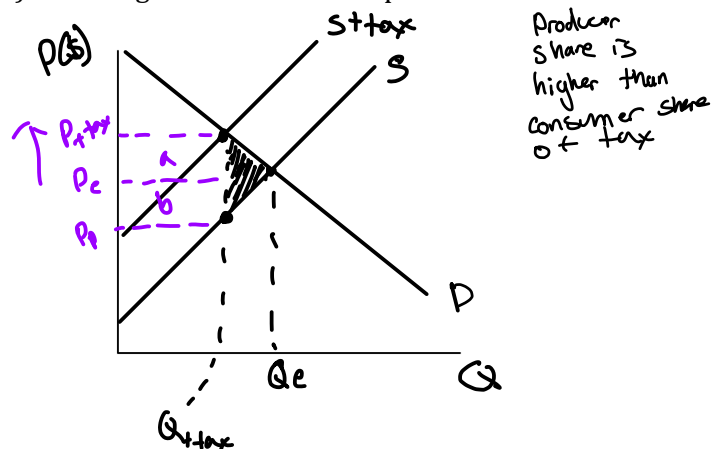
Society:

- Loses allocative efficiency
- but it can gain from spending later

d) Welfare Impact of a Specific Tax

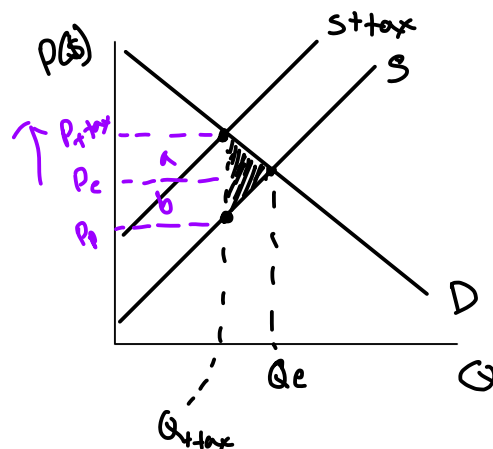


e) PED is greater than PES – specific tax



Producer share is higher than consumer share of tax

f) PED is less than PES – specific tax



consumer share is higher than producer share of tax

Calculating Market Outcomes for Indirect Taxes

Notes

GRAPHING INDIRECT TAX WHEN GIVEN EQUATIONS

- Given the functions:
 - $Q_d = 60 - 2P$
 - $Q_s = -4 + 2P$

We can graph the demand and supply curves.

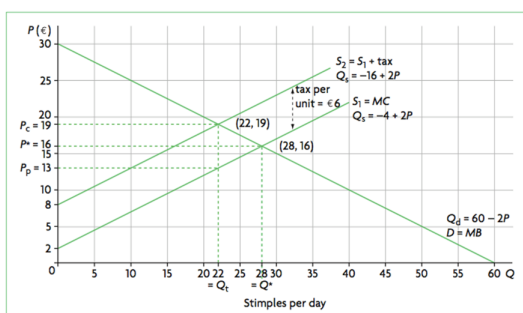


Figure 4.3 Demand and supply functions and indirect (excise) taxes

- By looking at the diagram, we can see that equilibrium is... $(22, 16)$
- We can also find this point algebraically:
 - $Q_d = Q_s$
 - $60 - 2P = -4 + 2P$
 - $P = 16$
- Now assume: government imposes a tax of 6 euros per unit on this product.
- To graph the new supply curve, "S2:"
 - Start at the P intercept $-4 \rightarrow S_1 (0, 2)$
 - Count 6 upward $(0, 8)$
 - Draw a line parallel to S_1

FINDING THE NEW POST-TAX SUPPLY FUNCTION

- When there is an upward shift of S, the supply function becomes:
 - $Q_s = c + d(P - t)$
 - "t" is the tax per unit
- In the previous example the new function would be:

$$\begin{aligned} Q_s &= -4 + 2(P - 6) \\ Q_s &= -4 + 2P - 12 \\ Q_s &= -16 + 2P \end{aligned}$$

FINDING THE NEW POST-TAX EQUILIBRIUM

- Using previous information:
 - $Q_d = Q_s \text{ (after tax)}$
 - $60 - 2P = -16 + 2P$
 - $76 = 4P$
 - $P = 19$
- Substituting into the demand or supply function:
 - $Q_d = 60 - 2(19)$
 - $Q_d = 22$
- Therefore, equilibrium is at: $(22, 19)$

PRICE PAID BY CONSUMERS AND RECEIVED BY PRODUCERS

- The price paid by consumers is the equilibrium price of 19 euros and the quantity exchanged is 22 units.
- Price received by producers:
 - = price paid by consumers - tax per unit
 - $= 19 - 6 = 13 \text{ € per unit}$

HOW MUCH MORE DO CONSUMERS SPEND?

- **Consumer expenditure** is the price paid per unit of a good or service multiplied by the amount purchased.
- Before the tax, consumers spend:

$$P_e \cdot Q_e$$

$$= 16 \text{ eur} \cdot 28 \text{ units}$$

$$= 448 \text{ eur per day}$$
- After the tax, consumers spend:

$$P_e \cdot Q_t$$

$$= 19 \text{ eur} \cdot 22 \text{ units}$$

$$= 418 \text{ eur per day}$$
- Difference:

$$= 448 - 418$$

$$= 30$$
- Therefore, consumer expenditure...
fell by 30 eur per day

HOW MUCH REVENUE DO PRODUCERS LOSE?

- **Producer revenue** is given by the price received per unit of a good or service multiplied by the number of goods/services sold.
- Before the tax, producer revenue was:

$$= P_e \cdot Q_e$$

$$= 16 \text{ eur} \cdot 28 \text{ units}$$

$$= 448 \text{ eur per day}$$
- After the tax, producer revenue was:

$$= P_p \cdot Q_t$$

$$= 13 \text{ eur} \cdot 22 \text{ units}$$

$$= 286 \text{ eur per day}$$
- Difference:

$$= 448 - 286$$

$$= 162 \text{ euros}$$

- Therefore, producer revenue...
fell by 162 eur per day

HOW MUCH DID THE GOVERNMENT MAKE?

- **Government tax revenue** is equal to the tax per unit ($P_c - P_p$) times the number of units sold, Q_t .

$$6 \text{ eur} \cdot 22 \text{ units} = 132 \text{ eur}$$
- It is also equal to the difference between consumer expenditure and producer revenue after the tax.

$$418 \text{ eur} - 286 \text{ eur} = 132 \text{ eur}$$

WELFARE IMPACT

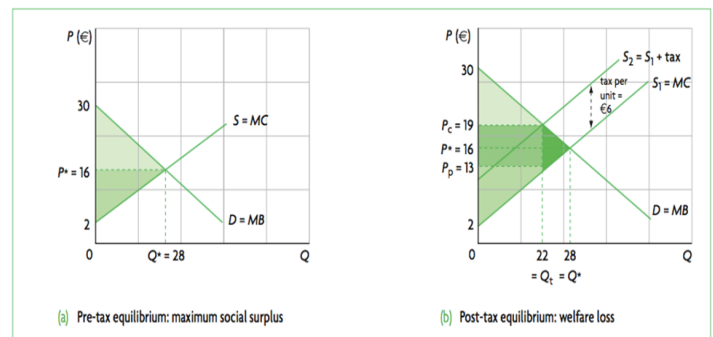


Figure 4.5 Calculating consumer and producer surplus before and after an indirect tax

- To calculate consumer surplus:
 - think of it as half rectangle area
 - One side equals the P-intercept minus price paid.
 - Other side equals the number of units purchased
- Area of a triangle:

$$= \frac{b \cdot h}{2}$$

P -int of D curve - P of consumers $\cdot Q$ purchased

2

- Consumer surplus before tax:

$$= \frac{(30 - 16) \cdot 28}{2}$$

$$= 196$$

- Consumer surplus after tax:

$$= \frac{(30 - 19) \cdot 22}{2}$$

$$= 121$$

- To calculate producer surplus:

- o think of it as half rectangle

- o One side equals the price received by producers minus the P -intercept of the initial supply curve.

- o other side equals num units sold

- Area of a triangle:

$$= \frac{b \cdot h}{2}$$

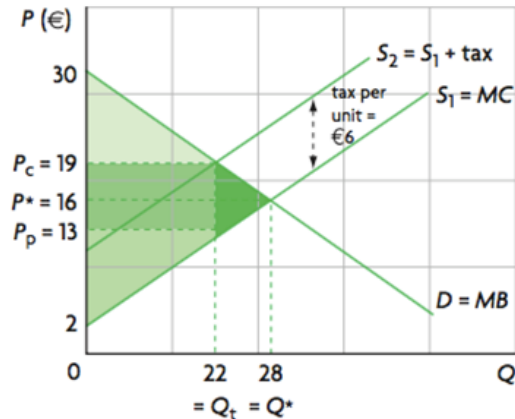
$$= \frac{P \text{ of producers} - P \text{ intercept} \cdot Q \text{ sold}}{2}$$

- Producer surplus before tax:

WELFARE LOSS (DEADWEIGHT LOSS)

- The welfare loss can be found by:

- o taking the pre-tax sum of consumer and producer surplus (total social surplus) and
- o subtracting from that the post-tax sum of benefits (post-tax consumer surplus, producer surplus and tax revenue).



(b) Post-tax equilibrium: welfare loss

- Based on this, the area of deadweight loss would be:

$$= 196 + 196 - (121 + 121 + 132)$$

- Alternatively, you can find the area of the deadweight loss triangle:

$$= \frac{(P_c - P_p)(Q_e - Q_t)}{2}$$

$$= \frac{(19 - 13)(28 - 22)}{2}$$

$$= \frac{6 \cdot 6}{2}$$

$$= 18$$