

supply and so price has to fall until a new equilibrium is reached, which is at a price of  $P_1$ , where  $Q_1$  is both demanded and supplied.

In this case, the producers can pass on a lot of the burden of the tax, because demand is fairly inelastic and few of the consumers would stop buying the product. Thus the consumers have most of the burden of the tax passed on to them. The price of the product for the consumers rises substantially from  $P_e$  to  $P_1$ . Thus they contribute the majority of the tax,  $P_1P_e$  per unit. Producers now receive  $C$  per unit, after paying the tax of  $XY$  to the government. The income of producers falls a small amount, from  $OP_eWQ_e$  to  $OCYQ_1$ . The government will receive high tax revenue equal to  $CP_1XY$  and the market falls in size from one producing  $Q_e$  units to one producing  $Q_1$  units. This will once again have implications for the level of employment in the market.

In this case, the burden of the indirect tax is much heavier on the consumers than on the producers. We can use the examples above to derive a set of rules relating to the incidence of indirect taxes on producers and consumers:

- 1 Where the value of PED is equal to the value of PES for a product, then the burden of any tax imposed will be shared equally between the consumers and producers of the product.
- 2 Where the value of PED is greater than the value of PES for a product, then the burden of any tax imposed will be greater on the producers of the product than on the consumers.
- 3 Where the value of PED is less than the value of PES for a product, then the burden of any tax imposed will be greater on the consumers of the product than on the producers.



This is why governments tend to place indirect taxes on products that have relatively inelastic demand, such as alcohol and cigarettes. By doing this, demand changes by a proportionately smaller amount than the change in price and so the government will gain high revenue and yet not cause a large fall in employment. You should be able to think of some other good reasons why governments put taxes on such goods. These will be addressed further when we study macroeconomics.

### Student workpoint 5.2

#### Be a thinker—illustrate and explain

- 1 A product has relatively inelastic demand and also relatively inelastic supply. Draw a diagram to show this and then show the effect of the imposition of a **percentage tax** on the product. Label the diagram carefully and state the areas corresponding to:
  - a the original revenue of the producer
  - b the revenue of the producer after the tax is imposed
  - c the tax revenue received by the government
  - d the amount of the tax paid by the consumers
  - e the amount of the tax paid by the producers.

Would it be sensible for a government to tax a product with such elasticities? Explain your answer.
- 2 A product has relatively elastic demand and also relatively elastic supply. Draw a diagram to show this and then show the effect of the imposition of a **specific tax** on the product. Label the diagram carefully and state the areas corresponding to:
  - a the original revenue of the producer.
  - b the revenue of the producer after the tax is imposed
  - c the tax revenue received by the government
  - d the amount of the tax paid by the consumers
  - e the amount of the tax paid by the producers.

Would it be sensible for a government to tax a product with such elasticities? Explain your answer.

### HL: Assessment Advice

In HL paper 3 you may be asked to plot demand and supply curves from linear functions and then illustrate and calculate the effects of the imposition of an indirect tax on the market in terms of price, quantity, consumer expenditure, producer revenue, government revenue, consumer surplus, or producer surplus. You may also be asked to explain any of the above changes or calculations.

Here is an example of the kinds of questions that you may face and suggested responses.

Let us assume that a product has the demand function and supply function shown below:

$$Q_D = 2,000 - 200P$$

$$Q_S = -400 + 400P$$

- 1 Graph and label the demand and supply curves when prices are \$0, \$1, \$2, \$3, \$4, \$5, and \$6.
- 2 Identify:
  - a the equilibrium price
  - b the equilibrium quantity bought and sold.

A specific tax of \$1.50 is placed upon the product.

- 3 Draw and label a new curve to show the effect of the imposition of the specific tax.
- 4 Identify:
  - a the new equilibrium price
  - b the new equilibrium quantity bought and sold
- 5 Calculate the government revenue from the tax.
- 6 Calculate the amount of tax paid by:
  - a consumers
  - b producers
- 7 Illustrate the area showing the loss of consumer and producer surplus.
- 8 Explain why the consumers bear more of the burden of tax than the producers.

The required diagram is shown below: