

CHAPTER EXERCISES

Exercise 4.1 Own price elasticity

Presented below are the price and quantity figures facing a UK rail operator. The current price is £1 and estimated demand figures are given for sequential price reduction from £6 down to free fare, and demand rises from zero up to 240. What you have to do is calculate the missing figures, and then graph out the relationship between price and quantity and quantity and revenue on something akin to the two blank charts below before answering the following questions.

■ *Table 4.1a*

<i>Price</i>	<i>per cent Change</i>	<i>Quantity</i>	<i>per cent Change</i>	<i>PED</i>
6	-	0	-	-
5		40	-	-
4		80		
3		120		
2		160		
1		200		
0		240		

- How does this exercise relate to the theory concerning price elasticity of demand outlined earlier in this chapter?
- What does this tell us about the profit maximising position of the company?
- What do you consider to be the main determinant that is affecting the elasticity values as the price falls?

Exercise 4.2 Price elasticity of demand, a practical exercise

A local bus company is facing strong competition in its 'home' market, as a consequence its demand curve is relatively elastic due to the existence and closeness of a high number of readily available substitute transport services.

Nevertheless, the workforce of the company, after years of accepting low pay deals, have put in a wage demand significantly above the rate of inflation which could potentially put £1m onto the costs of the firm. In order to counter this potentially serious situation, the management board have brought you in as a consultant to advise on its possible courses of action. After studying the situation, you outline three alternative 'strategies' that are open to the board. These are:

- Bargain strongly with the workforce from negotiating position that large pay increases will cost jobs.
- Agree to the workforce's pay claim, but tie any such payment agreement with significant increases in productivity and possible redundancies.

3 As with two above, agree to the workforce's pay claim, tying in any such pay agreement with significant increases in productivity, but in this case undertake an expansionist competitive position by slightly increasing services levels and cutting prices.

When you put these options to the board, they 'like' option 1 although they don't quite understand it, option 2 they simply don't understand and are completely baffled by option three. They point out that as the firm is facing potentially a large increase in its costs, that will surely mean increased fares and a possible reduction of services, which is the exact opposite of option 3. Your counter that it is all to do with the price elasticity of demand fails to shed any further light on the matter.

Part A

- I. In order to convince the board of the viability of each of your options, briefly outline the concepts of elastic and inelastic demand.
- II. Outline each of the alternative options explaining how they 'work'.
- III. Point out to the board what their options (and the related 'strength' of their bargaining position) would have been if demand for their services had been relatively inelastic.

Now that you have explained that, the board seem quite keen to pursue option 3. As a consequence, you advise them to commission a market survey to investigate the possible effect of changes in the fare on the company's total revenue. The results of this survey are presented below.

■ **Table 4.2a**

<i>Fare</i>	<i>Demand (million journeys per year)</i>	<i>Total revenue (£ms)</i>	<i>Old costs (£ms)</i>	<i>New costs (£ms)</i>
£0.80	18.0	14.4	11.0	12.0
£1.00	12.0	12.0	11.0	12.0
£1.20	8.0	9.6	11.0	12.0

As it stands, the company currently charge a £1 flat fare on all its routes at all times, hence the £1 fare above represents the current position in terms of fare and demand levels. With the current wage agreement, profits are therefore £1m per annum. As can be seen, however, this profit may be entirely wiped out if the workforce's pay claim is agreed without any concessions. If the company was to increase the fare to £1.20 then the survey confirms that this would actually significantly increase losses. Even at the 'breakdown' position of the £1 fare, the firm would have no funds for the investment and could potentially in the longer term be driven out of business as it would have no profits from which to fund new buses when the existing stock wears out.

Part B

In order to further illustrate the principles involved to the board, you should answer the following three questions:

- I. Calculate the price elasticity of the demand for the price decrease of £1 to 80p and for the the price increase from £1 to £1.20.
- II. Should the firm have brought you in earlier as an consultant, i.e. was the fare set at the right level at the beginning in order to maximise profits?
- III. With regard to the fare reduction option, the above information is accurate as long as the increase in demand is met by current underutilised services. As highlighted above, however, some increase in service will be required to meet this increased demand - how should the board decide whether this is a viable option or not?

Part C

- I. What is the major assumption that the above analysis presupposes?
- II. What, if anything, have you learned from undertaking this exercise?

Exercise 4.3 income, own and cross price elasticities

This is a totally artificial exercise; however, it is designed to try to get you to think about your own price, cross price elasticities. Presented below are some completely hypothetical passenger figures for transport services in a hypothetical city somewhere near you!

Transport Mode:	Rail	Bus	Underground	Total
Annual usage (millions):	38	90	23	151

For this hypothetical public transport market, the following elasticities apply:

■ *Table 4.3a*

		Rail	Bus	Underground
Income elasticity of demand:		0.41	-0.50	0.32
			<i>Price</i>	
<i>Own & cross price elasticities</i>		Rail	Bus	Underground
	Rail	-0.45	-0.40	-0.30
<i>Quantity</i>	Bus	0.08	-0.40	0.10
	Underground	0.02	0.05	-0.20

Note: modes listed on rows relate to the quantity change in demand, those listed on the columns relate to change in price

Using all of these values you should be able to answer the following questions - as a side note, if you have the necessary skills you may find a spreadsheet useful to assist with this exercise.

- a) If there is a 5 per cent rise in income, what would be the new daily modal splits and the new total daily usage?
- b) Using your answer for the new total daily usage from part (a), what is the overall income elasticity to travel?
- c) How does your answer from part (b), compare with the results presented in Case study 3.1 in Chapter 3 and what might be the reason for any differences? (Hint: you will need to calculate a rough elasticity from the values presented in the case study.)
- d) Calculate the effect on modal splits and the new monthly usage of the impact of the following factors (each should be considered on its own) and from your answers highlight which modal are has the largest impact on the overall demand for travel in this city.
 - i) a 15 percent increase in level of rail fares
 - ii) a 15 percent increase in level of bus fares
 - iii) a 15 percent increase in level of underground fares
- e) What might be expected to happen to the cross price elasticity of the train across all other modes of the level of rail travel was to significantly increase? Why would this happen?
- f) Roughly speaking, why have we got the answers that we have got for part c and what does this underline with regard to own and cross price elasticities of public transport services?

Exercise 4.4 Elasticity and the tax take - why all the good things in life are taxed!

In order to finance a considerable improvement in public transport provision, the government needs to raise significant levels of public finance, increasing more income tax is not seen as a realistic option due to the unpopularity of such taxes with the electorate. The government therefore decides to raise this finance through an expenditure (as opposed to an income) tax. What type of good (price elastic or inelastic) should the government tax upon? In order to help answer this question, you should draw two illustrations in the form of the basic market graph, which illustrate the shift in the supply curve as a result of the increase in tax and then note the effect this would have on an elastic and an inelastic good. Note also that the resultant change in revenue would be the total tax take, as all additional revenue raised is tax. What does this exercise tell us about general taxation policies; are, for example, cigarettes taxed purely for health reasons or petrol taxed purely because of environmental/conservation concerns?