Exercise

EE381

Transport demand elasticity

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 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 impose this 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 effect on 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?

Income, own and cross price elasticities

Presented below are some completely hypothetical passenger figures for public 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:

	Rail	Bus	Underground
Income elasticity of demand:	0.41	-0.50	0.32

Own & cross price elasticities	Rail	Bus	Underground
Rail	-0.45	-0.40	-0.30
Bus	0.08	-0.40	0.10
Underground	0.02	0.05	-0.20

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

Using all of these values you should be 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 percent rise in income, what would be the new daily model split and the new total daily usage?
b) Calculate the effect on modal splits and the new monthly usage of the impact of the following factors and from your answers highlight which modal fare has the largest impact on the overall demand for travel in this city
   i. a 15 per cent increase in the level of rail fares
   ii. a 15 per cent increase in the level of bus fares
   iii. a 15 per cent increase in the level of underground fares

e) What might be expected to happen to the cross price elasticity of the train cross all other modes if the level of rail travel was to significantly increase? Why would this happen?

Transport Costs

Technical, cost and allocative efficiency in bus operations

The following table gives some basic information relating to two small-scale bus operators:

	Company A	Company B
Number of buses:	**3**	**5**
Number of employees:	**13**	**21**
Average wage:	**19000**	**16000**
Vehicle kilometers run:	**210000**	**300000**
Bus cost per km. (including fuel costs):	**0.36**	**0.30**
Annual number of passengers carried:	**370000**	**460000**

Consider the following questions:

i. Which of the two companies is more technically efficient in the production of bus services (note: you will need to separately calculate labor productivity and bus productivity and compare the two figures)?

ii. Which of the two companies is more cost efficient in the production of bus services?

iii. Which of the two companies is more allocatively efficient?

Total, average and marginal products and costs

This exercise concerns the provision of rail services, and the task is comparatively straightforward if slightly involved. Quite simply, you have to fill in all the blanks, for which you will need the following information:

Fixed costs:	100000
Price of a variable factor:	50000

You should round all figures to two decimal places

Labor	Output(000s)			Costs				
units	TP	AP	MP	TFC	TVC	TC	ATC	MC
0	0							
1	50							
2	110							
3	180							
4	260							
5	350							
6	420							
7	480							
8	530							
9	570							
10	590							

Once, you have completed this table, you should use your calculations to answer the following questions:

a) At what level of output should the firm operate at?

b) What is the most efficient level of output in term of :

   a) Technical efficiency?

   b) Cost efficiency?

   c) In terms of measuring the firm's efficiency, which of these two measures should be used and why?

Economies of scale in railway operation

Re-examine case study 5.3 and answer the following questions:

1. Briefly outline your understanding of the traditional and revisionist views of railway economics
2. List what you believe to be the main resources of economies of scale in the rail industry. Once you have produced this list, indicate which arise as a result of returns to scale and which are cost savings
3. What on the other hand do you believe are the main sources of diseconomies of scale in larger integrated railway?
4. If you were a rail industry regulator in your country today, what other factors apart from economies of scale would you take into account when deciding on the number of operators to have in the market?

Perfect competition in bus markets

If we assume that a given bus market is in perfect competition which charges a flat fare of $1, and if the formula for the total demand (in thousands) in the market is given by the equation:

$$Q_d = 250 - 60p$$

Where Q_d is the quantity demanded in thousands at a given price p If we further assume constant return to scale, then:

1. What is the total market demand at the $1 flat fare?
2. If the market is shared equally by 4 firms, what is the number of passengers carried by each company?
3. If the cost per vehicle kilometer is $1.60, average utilization 20 passengers per vehicle kilometer and average trip distance 10 kilometers:
   a. What is the level of bus kilometers required to service this market?
   b. What profits are being made?
   c. What type of profit is this, normal or abnormal?
   d. What is the cost per passenger carried (as opposed to the cost per vehicle kilometer)?
4. As this perfect competition, new firms may enter the market and compete these profits away. What price therefore will ensure that only normal profits are made?