

Transport Economics Lecture 5

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1

Elasticity of Demand for Transport Services

2

Price Elasticity of Demand

- Only effective demand is of interest to the economist

The ability of the consumer to pay

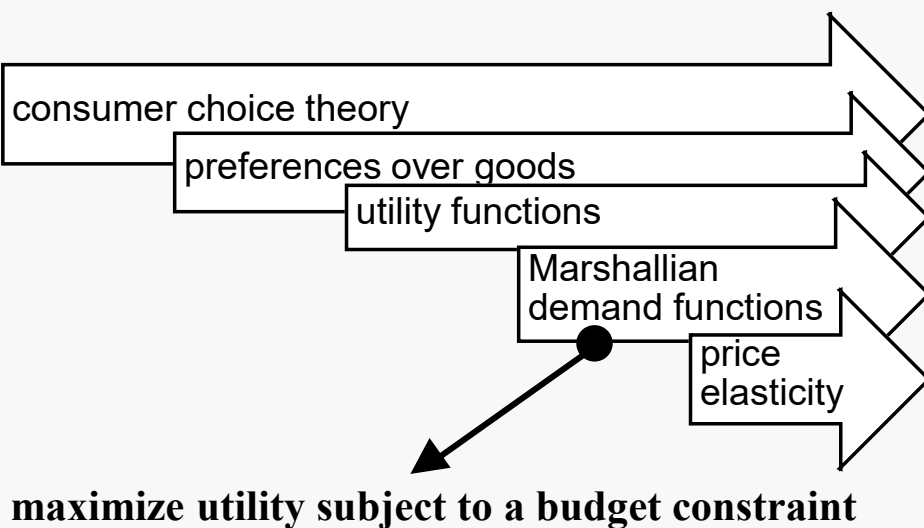
the purchasing power element

The price of the services

The income of the consumer

- it is important to examine the price and income elasticities.

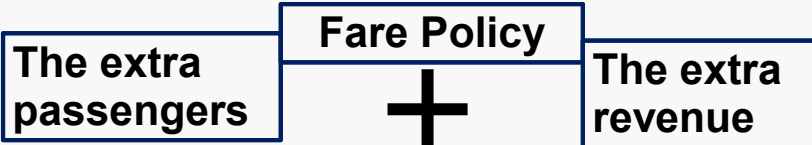
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4

Own-price elasticity of demand for transport services

- A general definition of elasticity of transport demand is the **responsiveness of demand for a transport mode** to a change in one of its determinants.
- The responsiveness, or sensitivity, of passengers or potential passengers to the transport operator's own price.



how much the quantity demanded will fall?

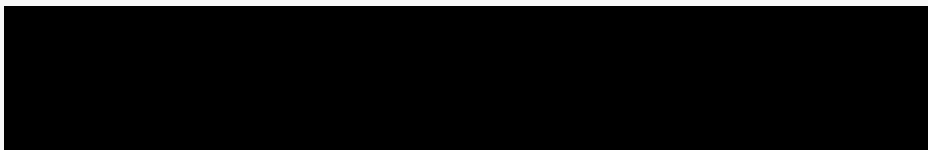
how price sensitive are consumers in the market?

▪ For example,

how sensitive are people to purchasing train tickets if the fare was to rise by 2 per cent, 5 per cent or even 20 per cent?

5

Law of Elasticity



- $Q(P,S)$ is the demand function
 - P = a vector of all relevant prices
 - p = the good's own-price.
 - q = equals the quantity demanded of the good
 - S = a vector of all relevant shift variables other than prices (real income, demographic characteristics etc.)

6

The basic determinants of the elasticity of demand of a service with respect to its own price are:

■ The availability of substitutes

The number and closeness of alternative modes of travel

■ The nature of the commodity: luxury goods or necessary goods

The purpose of using transport services: Business Travel or Leisure Travel; and Distance (short or long)

■ The proportion of income spent on the particular commodity

The proportion of disposable income purchased on the mode of travel

■ The time period: long run or short run

7

■ The availability of substitutes

- The higher the number of **alternative modes** available
and
- the **closer** they are in meeting the same basic travel need

➤ the higher will be the price elasticity for a particular transport service.

- Conventional **public transport** services
- **Bus service routes** using small vehicles that pick up and discharge passengers close to origin and destination. This service is particularly appropriate for areas where demand is low (e.g. in rural areas).
- **Conventional taxis**

8

- **Dial-a-Ride service** for door-to-door travel for passengers who require assistance and/or who use a wheelchair that cannot be accommodated by a taxi or accessible bus
- **Accessible pedestrian infrastructure** to allow access to all transport services and to make journeys wholly on foot

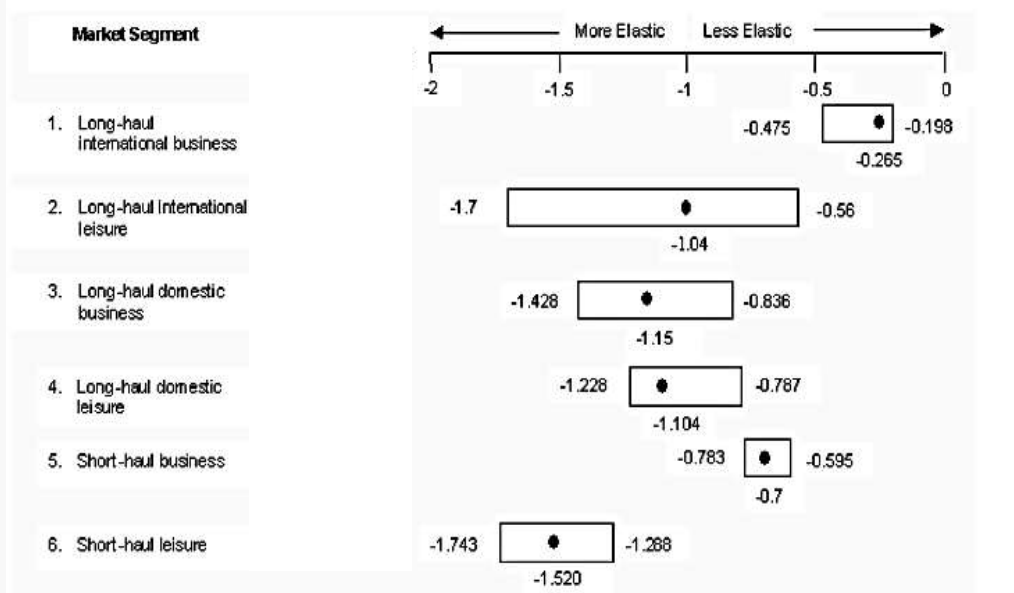
■ **The nature of the commodity: luxury goods or necessary goods**

The purpose of using transport services:

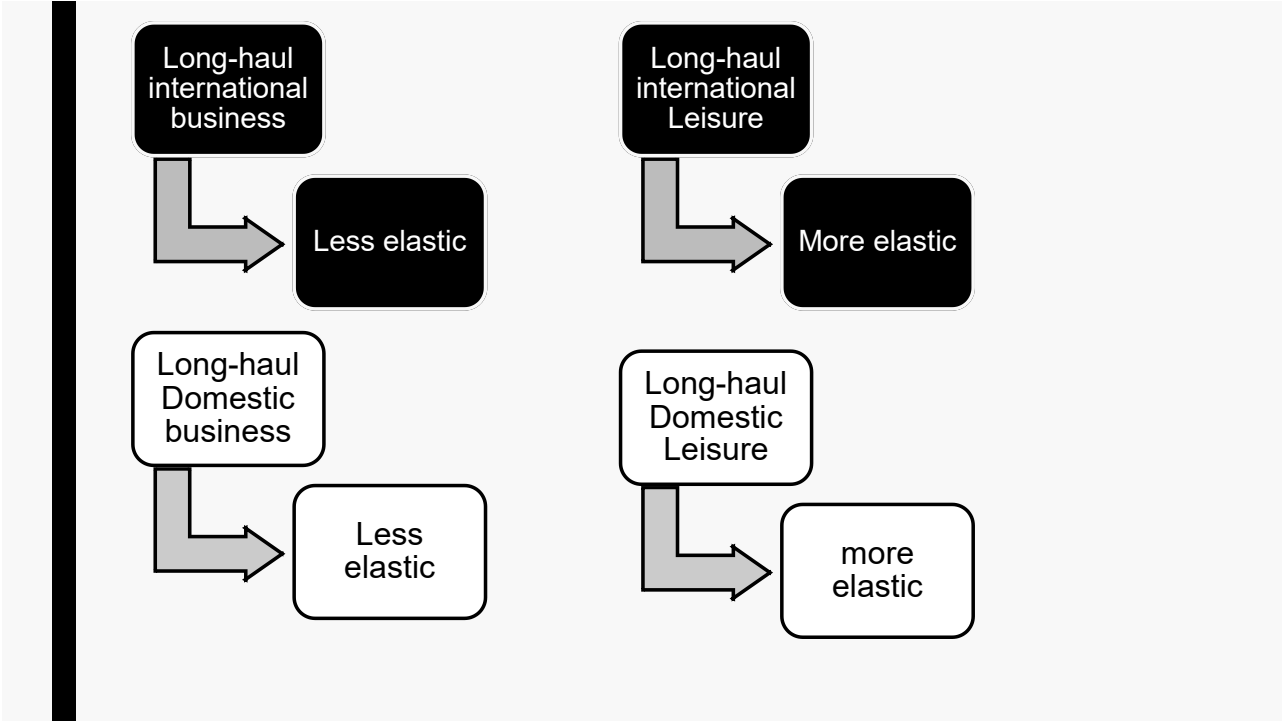
- ✓ Business Travel (less elastic)
- ✓ Leisure Travel (more elastic)

9

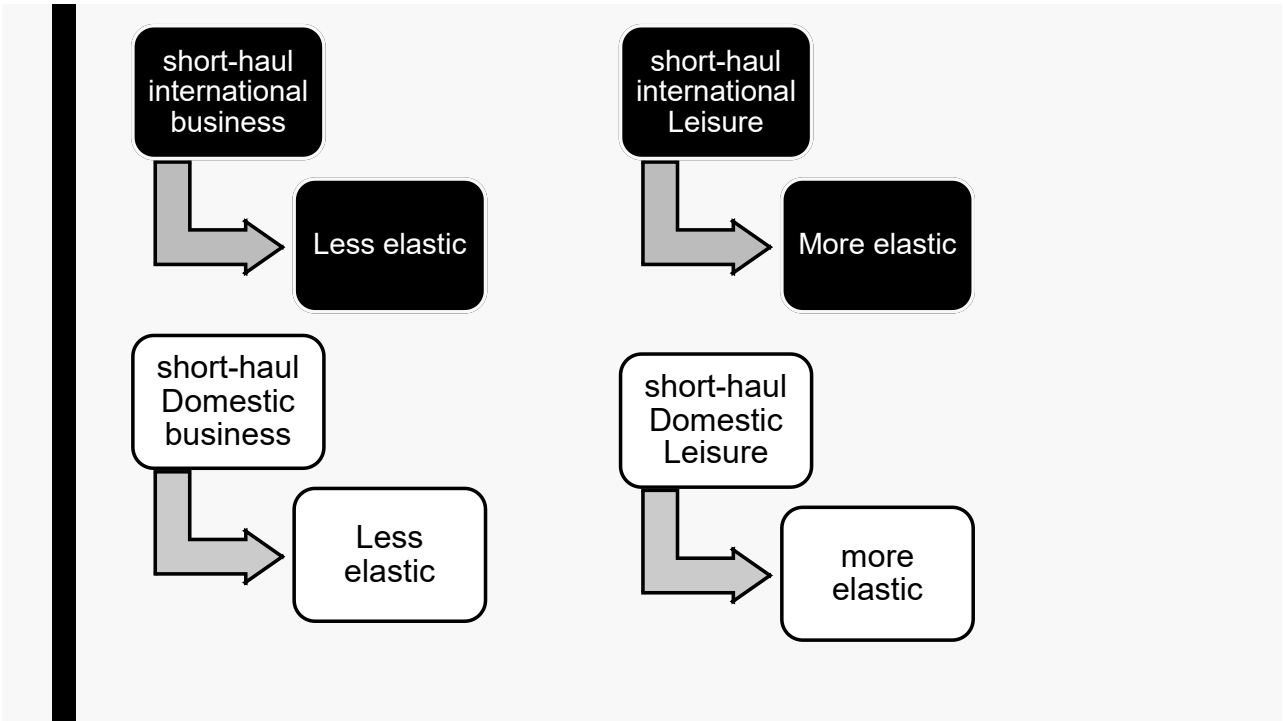
Chart 1 - Own-Price Elasticities of Demand



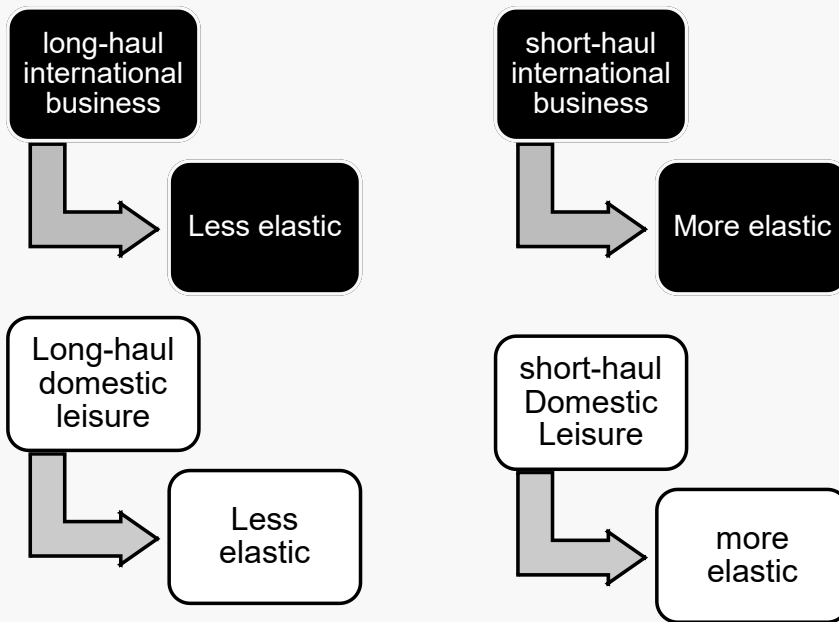
10



11



12



13

■ The proportion of income spent on a particular transport service

the higher the proportion of disposable income spent on the mode of travel

➔ the higher the price elasticity of demand

■ The time period: long run or short run

- **In the short term**, individuals used to purchase a certain company's services (In this case demand would be **less** elastic)
- **In the longer term**, one may decide to purchase a car or alternatively use another bus company. (In this case demand would be **more** elastic)

14

Own-price demand elasticity

✓ Negative

✓ Absolute values less than unity



relative price insensitivity

✓ Absolute values exceeding unity



relative price sensitivity

15

Cross price elasticity of demand for transport services

It is a measure of the effect of a change in the fares or rates of one operator on the demand for the services of another.

Between transport modes

Within modes

Within an operator

✓ The sign of the cross-elasticity is **negative** if x and y are complementary transport services, and **positive** if x and y are substitutes.

✓ The **higher** the value of the cross-elasticity the **stronger** will be the degree of substitutability or complementarity of x and y.

The main determinant of the cross-elasticity

➤ The nature of the services relative to their uses

▪ If two services can **satisfy equally well** the same need, the cross-elasticity is high, and vice versa.

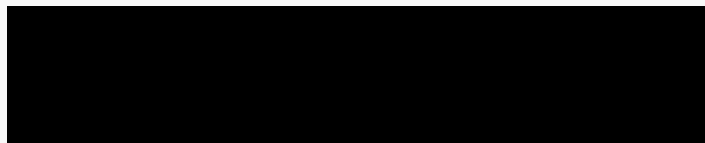
16

Notes

- For substitute transport services, cross price elasticity will always be positive. As the price of one service rises, demand for the alternative service also rises and vice-versa.
- The cross price elasticity of demand will be negative for goods and services that are complements i.e. cars and petrol

17

Law of Cross - Elasticity



- $Q_y(P,S)$ is the demand function
- P = a vector of all relevant prices
- p = the price of the good x .
- q = equals the quantity demanded of the good y
- S = a vector of all relevant shift variables other than prices (real income, demographic characteristics etc.)

18

Income elasticity of demand for transport services

The income elasticity is defined as the proportionate change in the **quantity demanded** resulting from a proportionate change in **income**.

The main determinants of income elasticity are:

- ✓ The **initial level of income** of a country
- ✓ The **time period**, because consumption patterns adjust with a time-lag to changes in income.

19

Notes:

- ✓ When income elasticity is measured, it is not the total income of consumers that is used in the assessment but rather **disposable income**, i.e. net of income tax
- ✓ In the short term, income elasticity for bus travel is **negative**, and hence as real incomes increase consumers will use other forms of transport, most notably the private car

20

Law of income - Elasticity

- $Q(P,S)$ is the demand function
- P = a vector of all relevant prices
- y = the disposable income of a consumer.
- q = equals the quantity demanded of the good
- S = a vector of all relevant shift variables other than prices (real income, demographic characteristics etc.)

21

Elasticity of Demand for Transport Services and price discrimination

22

Introduction

- A monopolist charges:
 - A. **Same price for all units.**
 - B. **Same price to all customers.**
- Changing one or both of these is called price discrimination.
- A firm with monopoly power has some **control** over output **price**
 - It is able to **increase profits** by discriminating among consumers

A firm desires to sell **additional output**

without **lowering price** on units it is currently selling

By **separating market** into two or more segments

23

Price Discrimination

is a pricing strategy that charges customers different prices for the same product or service.

if a firm is able to sell identical units of output at different prices.

It is feasible depends on the inability of buyers to practice arbitrage.

24

Price Discrimination

It becomes possible if resale is costly

All the monopolist needs to know in this case is the price elasticity of demand for each market.

the monopoly can separate its buyers into a few identifiable markets.

Market Separation

It requires the monopolist to know the demand function for each potential buyer

25

Conditions for Price Discrimination

- If elasticities associated with market segments are the same
 - No incentive on part of a firm to price discriminate

Two necessary conditions for price discrimination are

1. Ability to segment market (No **arbitrage**)
2. Existence of different **demand elasticities**

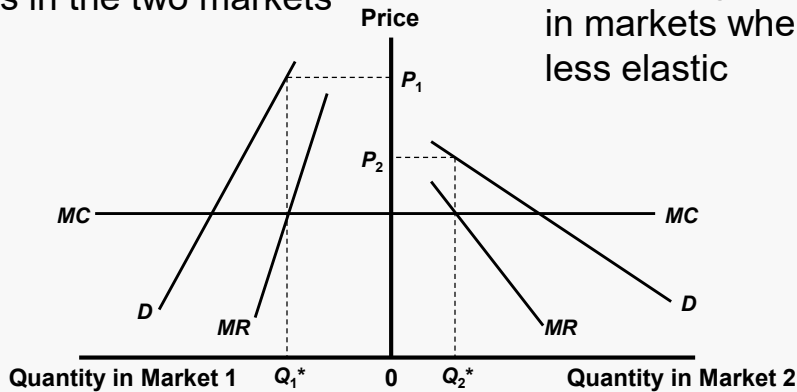
26

26

Market Separation

If two markets are separate, a monopolist can maximize profits by selling its product at different prices in the two markets

If the marginal cost is the same in all markets, the profit-maximizing price will be higher in markets where demand is less elastic



27

Question:

- Suppose that the demand curves in two separated markets are given by

$$Q_1 = 24 - P_1$$

$$Q_2 = 24 - 2P_2$$

- Suppose that marginal cost is constant and equal to 6.

➤ What are the prices that prevail in the two markets?

28

The Answer

- Profit maximization requires that

$$MR_1 = 24 - 2Q_1 = 6 = MR_2 = 12 - Q_2$$

- The optimal choices are:

$$Q_1 = 9$$

$$Q_2 = 6$$

- The prices that prevail in the two markets are

$$P_1 = 15$$

$$P_2 = 9$$

29

- A firm may price discriminate across any category of consumers based on various criteria:
 - Income level,
 - Type of business,
 - Quantity purchased,
 - Geographic location,
 - Time of day,
 - Brand name,
 - Age

30

30

Types of Price Discrimination

First-degree price discrimination:

- ✓ Different prices for both consumers and units (both A and B are changed)
- ✓ it includes pricing strategies such as two-part tariffs

Second-degree price discrimination:

- ✓ Different prices for different units (A changed).
- ✓ potential social benefits

Third-degree price discrimination:

- ✓ Different prices to different consumers (B changed).
- ✓ it segments the market for instance, into a foreign and a domestic market

31

31

Two-part tariffs

- Pricing decision is setting the entry fee (T) and the usage fee (P)

Characteristics of First-, Second-, and Third-Degree Price Discrimination

Characteristic	Degree		
	First	Second	Third
Output is sold for the maximum price each consumer is willing to pay (e.g., high-pressure sales, new-product pricing).	X		
Price differs across the commodity unit not across consumers (e.g., cell phone minutes and cereal packaging).		X	
Price differs across consumers not across commodity unit (e.g., happy hours, senior discounts, and campus parking).			X

32

Note

- Transport analysts need to recognize that in markets where price discrimination is possible aggregate data will not allow for accurate predictions of demand responses in the relevant market segments.

33

Thank you

34