Price Elasticity of Demand

# Starter - Recap Questions

**Instructions:** Test yourself with the below quick question

What factors affect demand?

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What factors affect supply?

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# Presentation 1 – Elasticity Theory

Complete the activities below so as to have a complete set of notes:

**Definition:** *Elasticity*

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Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Tip:** For elasticity equations,it is always the ‘effect’ over the ‘cause’

*E.g.*PED= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Recap:** *Percentage Change Formula*

Equation: $\%∆$=

$Equation: \%∆$=

**Definition:** *Elasticity Coefficient*

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*E.g.*If price increases by 5% demand might decrease by 15%, the coefficient of PED = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Presentation 2 – Price Elasticity of Demand

Complete the activities below so as to have a complete set of notes:

**Definition:** *Price Elasticity of Demand*

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Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Key Question:** Why is PED always negative?

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However, economists often find it convenient to drop the negative sign as it is easier to deal with positive numbers, whilst accepting that it is really a negative

**Fill in in the gaps:** PED values and meanings

*Price Elastic*

*PED > 1*– e.g. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

% change in demand is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the % change in price

Change in Qd is proportionately \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than change in Price

*Extreme:* if PED = ∞, then it is perfectly elastic

*Price Inelastic*

*PED <1*– e.g. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

% change in demand is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the % change in price

Change in Qd is proportionately \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than change in Price

*Extreme:*if PED = 0, then it is perfectly inelastic

*Unit elasticity*

*PED = (-)1*

% change in demand is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_as the % change in price

Change in Qd is proportionately \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change in Price

**Diagrams:** Demand curves with different PED

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| --- | --- |
| *Elastic* | *Perfectly Elastic* |
| *Inelastic* | *Perfectly Inelastic* |
|  | *Unit Elastic* |  |

**Technical point:** Elasticities over the same price range can differ depending on initial price

*Example:* at price £2 the quantity demanded is 20 units, and at price £3 the quantity demanded is 18 units

PED for a rise in price from £2 to £3 is:

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PED for a fall in price from £3 to £2 is:

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**Tip:** Always make sure you work out percentage change from the initial values for Qd and P

# Task: Price Elasticity of Demand Practice

**Instructions:**

* *Answer the below questions to test your understanding of PED*

**Questions**

What does price elasticity of demand (PED) measure?

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PED = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calculate the PED for each of the following examples:

a) When the price of Mars bars fell from 40p to 35p, demand rose from 20 to 30.

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b) When the price of petrol at the BP service station rose from 98p to £1 per litre, demand fell from 46,000 litres per day to 30,000 litres per day.

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c) When cigarette prices rose from £4.50 to £5.00, demand fell from 230 to 222 packets per day.

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d) When the price of uniforms at the local school shop doubled, demand fell from 1000 to 900 complete sets.

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e) When airline ticket prices tripled, passenger numbers fell to a third of their previous figure

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# Discussion Question: Factors affecting PED

**Instructions:**

* Individually consider the below questions
* Discuss your thoughts with a partner
* Share your ideas with the class

*What might affect the PED of a given good?*

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# Presentation 3 – Factors Determining PED

Complete the activities below so as to have a complete set of notes:

**LCAs task:** Complete bullet points to explain how the below policies affect PED

*The availability of close substitutes*

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 … therefore influencing the PED

*Branding*

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 … therefore influencing the PED

*Luxury or Necessity*

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 … therefore influencing the PED

*The proportion of income spent on the product*

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 … therefore influencing the PED

*Whether the purchase can be postponed*

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 … therefore influencing the PED

*The time period under consideration*

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 … therefore influencing the PED

# Premier League - WikipediaArticle task: Rising Football Ticket Prices

**Instructions:**

* Read, highlight, and annotate the article and answer the discussion questions

**Article:**

The issue of rising football ticket prices has been getting increasing coverage in the media lately. Tickets for top flight football matches in England have risen at an exponential rate since the old Football League First Division was revamped in 1992. We are constantly told by pundits and clever advertisements that the Barclays Premier League is the best and the most exciting league in the world; but even if these two claims were proved correct the reason why fans continue to pay increasing prices can be explained to some extent by simple economic theory. In 1990 you could buy a ticket to see the then league champions Liverpool for £4. If you wanted a season ticket these could be bought via the ticket office over the counter. Fast forward twenty years and the price of the same ticket had increased by an eye watering 975%! If you want a season ticket at Liverpool today you will have to join the waiting list – behind 28,000 other fans. This isn’t an isolated example – demand has been increasing in line with prices pretty much across the country. It’s safe to say that demand for top flight tickets is price inelastic. There are a number of potential reasons for this:

1. Lack of close substitutes – match going fans will argue that there is no feeling quite like going to the match. Despite the dominance of Sky and BT and various other not-so-legal ways of watching football on the internet it still can’t replicate being at the match. As well as this the majority of match going fans would be highly unlikely to swap football for a different sport (although this does happen in a small number of cases).

2. Habitual consumption – going to the football is a weekly ritual for most fans. It’s an event that is attended by families and groups of friends alike. In some cases the match is a secondary event to the other social aspects of the match going experience!

3. Emotional attachment – Eric Cantona once said that “You can change your wife, your politics, your religion, but never, never can you change your favourite football team.” Football fans often build up an unbreakable emotional attachment to their team which inevitably has an influence of their responsiveness to ticket price changes.

Fans have admitted to re-mortgaging their house to afford a season ticket. Sacrificing money they could be spending on education - for football. I’m sure behavioural economists would have a field day analysing the irrational decisions football fans make and their perceptions of value!

**Questions:**

What is the likely price elasticity of premier league tickets? Why?

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What effect has this price elasticity had on the prices football clubs are setting for their tickets? Why?

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# Presentation 4 – Importance of PED to Firms

Complete the activities below so as to have a complete set of notes:

**Key Point:** Firms need to know what the PED of their product is for their market in order to reduce risk and uncertainty.

**Questions:** Looking at the prompts, answer the questions for each of the reasons as to why PED is important to firms

***Sales forecasting:*** The firm can forecast the impact of a change in price on its sales volume, and sales revenue (total revenue, TR).

A firms sells 1000 units of a product at a price of £10. If PED for a product is (-) 2, when there is a reduction in price from £10 to £9, what will happen to:

Quantity?

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Revenue?

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***Life cycle of product:*** PED will vary according to where the product is in its life cycle.

New products often have more inelastic PED. Why???

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Why does PED become more elastic at the end of the product’s lifecycle?

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Can you think of any examples?

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***The effects of Marketing:*** Firms may use persuasive marketing to win new customers and retain the loyalty of existing ones.

How do firms market?

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What does marketing do to a product’s demand?

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***Pricing policy:*** Knowing PED helps the firm decide whether to raise or lower price.

What considerations should a firm make when changing its price?

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# Video Task: The Wolf of Wall street

**Instructions:**

* Watch the stimulus video: [The Wolf of Wall Street 2013 selling thru phone scene - YouTube](https://www.youtube.com/watch?v=MJXLV_DMKa0)
* Consider the question and discuss your ideas with the rest of the class

*How does Jordan Belfort’s (Leonardo DiCaprio’s) phone call affect the demand and elasticity for penny stocks?*

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| Note Space: |

# Presentation 5 – PED and Revenue

Complete the activities below so as to have a complete set of notes:

**Definition:** *Revenue*

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**Definition:** *Marginal Revenue*

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**Key Point:** Should a firm wish to increase its revenue, it is important that it considers its PED.

What will be greater the proportional change in price or the opposite proportional change in quantity?

**Calculations:** *Worked Example*

A firm has a product with a selling price of £20. It currently sells 200 units. PED is -0.5. It is considering lowering price by £2. Do you agree with this pricing strategy?

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**Rules:** Changes in total revenue are influenced by PED

If PED is **elastic** i.e. >1

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If PED is **inelastic** i.e. <1

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Therefore, the total revenue depends on the PED of the good or service

**Diagrams:** Draw and annotate Diagrams to illustrate the below ideas

*Technical Point 1:*PED varies along all straight line demand curves



When price is very high, quantity demanded is very low. Hence a small fall price that sees Qd increase from 0 to 1 will have an infinite PED (perfectly elastic) as 0 to 1 is an infinite percentage increase in Qd.

When price is very low (i.e. zero), quantity demanded is very high. An increase in price as small as £0 to £1 represents an infinite percentage rise in price, so PED is zero (perfectly inelastic) even if the fall in Qd is miniscule

PED then varies as you move along the demand curve and is unitary at the midpoint.

*Technical Point 2:*Total revenue is maximised when PED is unitary

*Equation:* Total revenue = P x Q

We can visualise it diagrammatically as the area of the rectangle on between a point on the demand curve and the price and quantity axes.

When PED is elastic, cutting the price will increase revenue, when it is inelastic, increasing the price will increase revenue

It follows then that when PED is unitary, an increase in price will take us to the elastic part of the demand curve and cut revenue, and a fall in price will take us into the inelastic part of the demand curve and cut revenue also. So revenue is maximised at the level of output where PED is unitary

It also means that marginal revenue must be equal to zero at this output level too.

# Task: PED, Slope and Total Revenue

The *slope* of the demand curve may give us a clue about how price elastic the product is. PED, however, is more specifically to do with the percentagechange in demand versus the percentage change in price.

Accordingly, PED can also be used to determine a firm’s revenue maximising price.

We can prove this through the following exercise:

Firstly, remember ***total revenue*** (TR) is simply:

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And ***marginal revenue*** (MR) is:

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Complete the table below to calculate total revenue, marginal revenue and PED:

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| --- | --- |
| **Demand Schedule** |  |
| **Price (£) = AR** | **Demand ('000 units per week)** | **Total Revenue (£'000)** | **Marginal Revenue (£'000)** | **PED** |
| 80 | 0 | 0 |  |  |
| 70 | -infinity |
| 70 | 1 | 70 |  |
| 50 | -7 |
| 60 | 2 | 120 |  |
| 30 | -3 |
| 50 | 3 | 150 |  |
| 10 | -5/3 |
| 40 | 4 | 160 |  |
| -10 | -1 |
| 30 | 5 | 150 |  |
| -30 | -3/5 |
| 20 | 6 | 120 |  |
| -50 | -1/3 |
| 10 | 7 | 70 |  |
| -70 | -1/7 |
| 0 | 8 | 0 |  |
|  |  |

Plot graphs for MR, TR and AR

200

180

160

140

120

100

 80

 60

 40

 20

 0

 -20

 -40

 -60

**£**

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**Output (‘000s of Units)**

 0 1 2 3 4 5 6 7 8 9 10

**Questions:**

1. At what level of output does TR reach its maximum point?

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1. At what level of output is MR equal to zero?

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1. Hence what is the relationship between TR and MR, and how can this be reasoned? (**Clue**: look again at the definitions of these two terms)

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1. At what level of output is there unit price elasticity?

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5) Hence what is the relationship between PED, TR and MR?

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1. Focusing on PED and TR, why is the relationship between these two variables important for a firm?

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1. In each of the following cases, say whether price/quantity demanded will rise or fall, and by how much ***and*** whether TR will therefore rise or fall:
2. PED is -1.3 and the firm raises its price by 2%

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1. PED is -0.7 and the firm raises its price by 25%

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1. PED is -0.45 and the firm lowers its price by 6%

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1. PED is -3.5 and the firm has just seen a 49% contraction of demand

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1. PED is -1 and the firm lowers its price by 22%

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1. PED is -0.1 and the firm has just seen a 0.5% contraction of demand

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1. PED is -7.5 and the firm has just seen a quadrupling of demand

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# Extension Reading: Price discrimination and football tickets

Football clubs have inevitably exploited this situation to increase their revenues by engaging in price discrimination which is defined as when a firm charges a different price to different groups of consumers for an identical good or service, for reasons not associated with costs.

This has particularly been the case for away fans that travel up and down the country following their football teams. In April of this year Liverpool fans were charged £50 each for an away ticket at Hull. In August of the same season Stoke fans were only charged £16 each by Hull. Same stadium, same seats……same dull affair!

This is a classic example of third degree price discrimination where fans of bigger clubs are being exploited because they are part of a larger fan base and have more inelastic demand. An added factor that contributes to this inelastic demand for fans of the bigger clubs is that if they want to go to the more prestigious away matches e.g. Chelsea or Man Utd then fans need to build credits up on their season tickets by purchasing tickets for “lower tier” games. Clubs like Hull know this and ramp the prices up.

Away fans from northern clubs are also discriminated on price by location. Manchester City fans were charged £62 for an away ticket at North London club Arsenal in 2013 – nearly twice as much as the £35 they were being charged by Southampton the following month. This particular incident sparked the Football Supporters Federation to launch theTwenty’s Plenty for Away Tickets campaign which had its national weekend of action just a couple of weeks ago. This excellent article in the Guardian touches on a number of issues that I’ve discussed and also puts forward some innovative pricing strategies that could be employed by clubs.

In evaluation to this analysis clubs will argue that the extra revenue they have been generating from ticket prices has been ploughed back into the clubs which has seen safer all seater stadiums, better facilities, more inclusive fanbases, higher wages, better players and better football. In reality though match day revenue now makes up a much smaller percentage of total revenue when you compare it to huge sponsorship deals and particularly the new TV deal which would allow clubs to lower prices and still leave them with more money than they have had before.

# Assignment: Price elasticity of demand

**Short-answer questions (Section A)**

1. Estimates of UK price elasticity of demand for selected food items, 2011

|  |  |
| --- | --- |
| **Food item** | **Price elasticity of demand** |
| Meat | -0.3 |
| Fruit and vegetables | -0.2 |
| Cereal | 0.0 |

Other things being equal, the data in the table suggest that:

A A fall in the price of meat will lead to a decrease in total revenue for meat producers

B An increase in the price of fruit and vegetables will lead to a more than proportionate decrease in demand for them

C Demand is less price elastic for meat than fruit and vegetables

D Demand for cereal is perfectly price elastic

[1]

1. Between 2007 and 2008, the price of fresh fruit in the UK increased by 7.0%. As a result, demand for fresh fruit fell by 7.7%.
	1. With reference to the data provided, calculate the price elasticity of demand for fresh fruit in the UK. You are advised to show your working.

[2]

* 1. The price elasticity of demand for fresh vegetables in the UK is -1.2. Demand for fresh vegetables is:

A Perfectly price elastic

B Perfectly price inelastic

C Relatively price elastic

D Relatively price inelastic

[1]

* 1. Given the price elasticity of demand for fresh vegetables, explain the likely impact on the revenue of greengrocers of an increase in vegetable prices.

[2]

1. A mobile phone company has 2 million customers for a package of services. Each customer pays a monthly fee of £25. The company conducts market research and estimates that price elasticity of demand for this package is -2.

Calculate the change in total revenue if the mobile phone company reduces monthly fees by £5. You are advised to show your working.

 [4]

1. A London health club has 5,000 members. They each pay monthly fees of £80. The health club owner conducts market research and estimates that price elasticity of demand for its membership is -0.5.

Calculate the change in total revenue if the owner decides to increase monthly fees by 10%. You are advised to show your working.

 [4]

**Data response (Section B)**

**The proposed expansion of Heathrow Airport**

**Extract 1: Should a third runway be built at Heathrow Airport?**

London Heathrow is the world’s third busiest airport and a major hub for the global economy. In 2011 it handled more than 476,000 flights and some 65 million passengers. However, the airport is operating at 99.2% of its capacity, making it vulnerable to any disruption. There is a shortage of runway capacity to meet the forecast increase in passenger demand of 15 million using Heathrow Airport by 2020.

Research by a business consultancy claims that Britain could lose out on an extra 140,000 jobs if capacity at Heathrow is not increased in the medium term. It estimates that £4.5 billion will be lost from Gross Domestic Product because of falling foreign investment, as businesses consider locating elsewhere in Europe, and £1.6 billion lost in trade with emerging markets by 2020.

However, a third runway at Heathrow would lead to a significant increase in external costs from the extra 900 flights per day over London. Expansion at Heathrow might be unnecessary as almost a quarter of flights are to destinations less than 300 miles away and already well served by train. Domestic flights and short flights to Europe could easily be carried out by train, especially with the continued expansion of Eurostar rail services to many more European cities. Substituting these flights for train services would reduce the need for extra capacity at Heathrow and have significant environmental benefits, as train travel creates one tenth of the pollution per passenger compared to air travel.

An alternative might be to develop other airports around London such as Gatwick, Stansted and Luton where significant spare capacity exists. In the long-run a new super-sized airport in the Thames estuary might provide the best solution although the financial cost is expected to exceed £50 billion and take at least 15 years to build after planning permission has been received.

**Figure 1: Estimates of price elasticity and income elasticity of demand for UK air travel**

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**Figure 2: Air Passenger Duty (APD) rate from April 2012**

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The APD is an indirect tax introduced in 2006 and is charged to airlines carrying passengers from UK airports. Between 2010 and 2011 APD remained the same. In April 2012 the government increased APD by 8%.

1. With reference to Figure 1, examine why business and leisure air travel passengers have different price elasticities of demand.

[8]