Elasticity

Chapter 5

Oisín Moffatt

Leaving Cert 2025/2026

Learing Outcomes

In this chapter we will:

- using data, calculate Price Elasticity of Demand (PED) and Income Elasticity of Demand (YED) using a formula, and evaluate how PED and YED can be used by individuals, firms and the government to help predict the impact of pricing on revenue/ sales

Price Elasticity of Demand (PED)

PED – Definition

Price elasticity of demand measures how much quantity demanded changes in response to a change in price.
In other words, If we are given the demand schedule for a particular product, we can calculate its PED, using the formula:

$$PED = \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

This formula can be found on page 28 of the *Formulae and Tables Book*

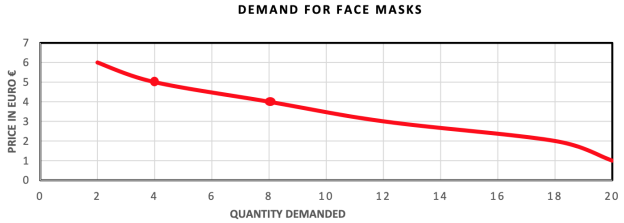
The formula printed above will throw out two pieces of information:

1. Sign: if negative, the good obeys Law of Demand, if positive it doesn't.
2. Value: this will tell us the degree of elasticity, we will explore this further in the next few slides.

Exam Questions

2022, Section A Q1

Using an appropriate formula, calculate the price elasticity of demand depicted in the graph below where the original price of the packet of face masks is €4 and then increases to €5. Show all calculations.



Prices **increase** from €4 to €5 $\Rightarrow \quad \Delta P = +1$

Using the demand schedule, we can see qty demanded will **fall** from 8 to 4 units $\Rightarrow \quad \Delta Q = -4$

$$PED = \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2} = \frac{-4}{+1} \times \frac{4+5}{8+4} = -3$$

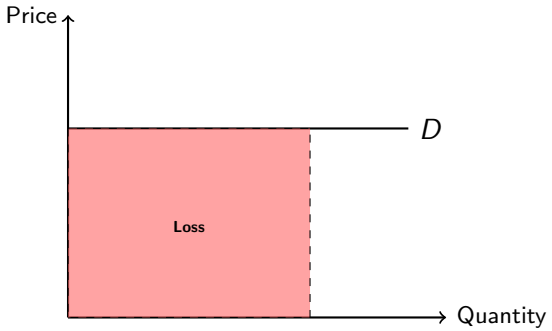
Exam Questions

2023, Section B Q13 (c) (i)
Apple AirPods (earphones) price fell from €160 to €125 online. The quantity demanded increased from 10,000 units to 15,000 units. Calculate the Price Elasticity of Demand of Apple AirPods.

Prices **fall** from €160 to €125 $\Rightarrow \quad \Delta P = -35$
Qty demanded **rose** from 10k to 15k units $\Rightarrow \quad \Delta Q = +5000$

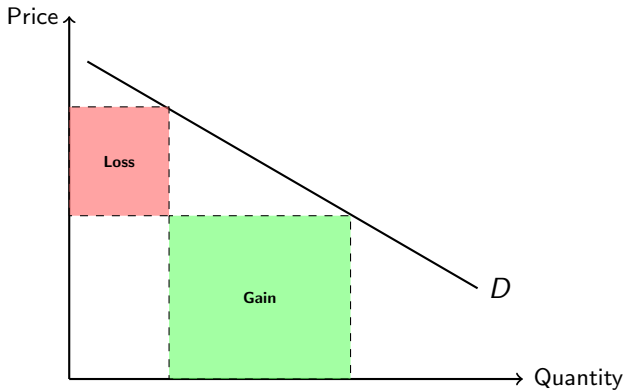
$$PED = \frac{+5000}{-35} \times \frac{160 + 125}{10000 + 15000} = -\frac{1000}{7} \times \frac{285}{25000} \approx 1.63\,(2d.p.)$$

Perfectly Elastic Demand ($PED = \infty$)



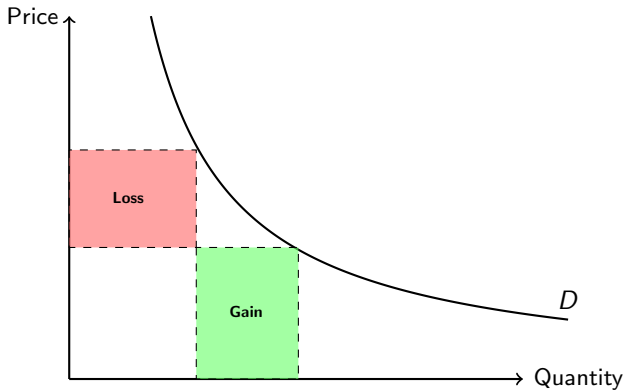
- Firms face a horizontal D/C (perfect competition), so any increase in prices will lead to 100% loss of demand
- To maximise revenue, the producer should keep prices the same. Raising prices will kill demand, while reducing prices will erode profits, as competitors will just follow suit.
- Examples are hard come by, given pure perfect competition doesn't exist in the real world.

Relatively Elastic Demand ($PED > 1$)



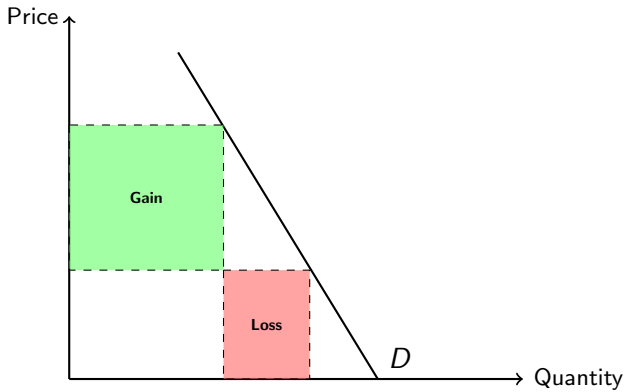
- Firms face a relatively flat D/C. For any 1% change in price, demand will change more than 1%.
- To max revenue, the producer should reduce prices. Lost revenue of charging lower prices is outweighed by the revenue gain from new customers.
- Examples include holidays, AirPods and Spotify Premium.

Unit Elastic Demand (PED = 1)



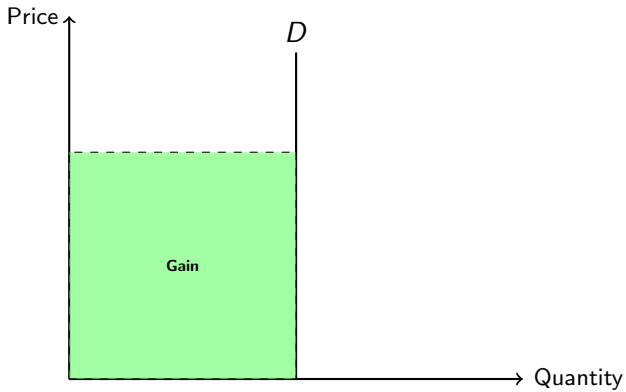
- For any 1% change in price, demand will change by exactly 1%.
- Changing prices won't impact revenue. Lost revenue of charging lower prices will equal the revenue gain from new customers.
- Examples: necessary luxuries like cars and televisions.

Relatively Inelastic Demand ($PED < 1$)



- For any 1% change in price, demand will change by less than 1%.
- To max revenue, the producer should increase prices. Revenue gain of charging higher prices is outweighed by the revenue loss from lost customers.
- Examples: necessary luxuries like cars and televisions.

Perfectly Inelastic Demand ($PED = 0$)



- For any change in price, demand not will change.
- To max revenue, the producer should increase prices. Revenue is gained by charging higher prices without any loss of customers.
- Life-saving medication is a good example.

Factors Impacting Price Elasticity of Demand

Expectations of future price changes: if prices are rising and are expected to rise further in the near future, demand will become more elastic/sensitive to changes in price – in the Irish Housing Market during the Celtic Tiger, escalating house prices caused demand to increase because consumers thought, if I don't buy now, prices will rise further in the future and I'll end up paying more.

Share of wallet/proportion of income spent on the commodity: the greater the proportion of income taken up by a commodity, the more elastic demand for the commodity will be in response to a change in its own price. A 50% hike in rent is likely to have a bigger impact on consumer demand than a 50% rise in the price of a bag of sugar because rent takes up a substantially larger proportion of consumer income.

Durability of the commodity: the more durable a commodity is, the more elastic demand will be in response to a change price. If the price of a lawnmower rises, consumers would simply postpone the purchase of a new model and extend the life of their existing model.

Time allowed to adjust to price changes: demand for a commodity is more price elastic in the long run than in the short run because consumers have more time to respond to price changes. If the price of petrol were to suddenly skyrocket, consumers would likely have to economise on petrol consumption in the short run until they can save up to afford an electric or diesel model.

Using Price Elasticity of Demand

Minister for Finance

When exchequer taxes a commodity they need to know whether demand for that commodity is elastic or inelastic to price. If they increase tax on a price elastic commodity, taxation revenue from that commodity is likely to fall. However, raising taxes on a price inelastic commodity could lead to higher revenue for exchequer.

Boost revenue from indirect taxation: An increase in indirect taxation on a commodity will only lead to increased tax revenue if the demand for the commodity is inelastic. Example: Price inelastic commodities (petrol). If the demand for these commodities is price inelastic then by increasing the VAT rate on these commodities, the Government will earn additional revenue because the percentage decrease in demand is less than the percentage increase in selling price.

Reduce consumption of 'harmful' commodities: Raising indirect tax on some elastic commodities may help the government to reduce the consumption of commodities which may have high social costs, like cigarettes. If the Minister knows they are elastic commodities, then by increasing VAT rates, the demand for these goods will fall, thus helping to achieve this objective. Example: Cigarettes While an increase in the rate of indirect tax/excise duty may not bring in additional revenue (due to the drop in demand) the aim of reducing consumption of these commodities may be achieved.

Using Price Elasticity of Demand Cont'd

Business People

Businesspeople: its vitally important that entrepreneurs build their pricing strategy around PED. If demand for an entrepreneur's product is price elastic, lowering the price will increase revenue. If demand for an entrepreneur's product is price inelastic, lowering the price will increase revenue. This information can help businesspeople to better respond to consumers' price signals.

Using Price Elasticity of Demand Cont'd

Sterling/Euro Exchange Rate 1999 – 2021

The chart above shows a sharp decline of Sterling (£) against the Euro following the Brexit Referendum. In light of this, Irish firms exporting to UK market can use PED to maximise revenue. Let's explore how.

- A fall in the value of sterling means that Irish goods will be more expensive in UK markets. UK consumers will have to pay more for Irish goods
- Irish exporters will have to raise the sterling price of their product in the UK market if they wish earn the same amount of revenue in euros.
- However, a knowledge of PED (elastic/inelastic) will be useful as to whether or not to proceed with the passing on of an increase in price to the consumer as a result of the fall in value of £.
- If the exporter faces price elastic demand, it would be better not to increase prices.

Income Elasticity of Demand (YED)

YED – definition

YED measures how demand for a commodity changes in response to a change in consumer income. This is the formula for YED:

$$\text{YED} = \frac{\Delta Q}{\Delta Y} \times \frac{Y_1 + Y_2}{Q_1 + Q_2}$$

This formula will produce one of three answers:

1. **A positive answer:** this means the good is normal. It has a positive income effect, i.e., more of the good is purchased when income increases. If YED < 1, the good is a necessity (income inelastic demand). If YED > 1, the good is a luxury (income elastic demand).
2. **A negative answer:** this means the good is inferior. However this does NOT mean the good is of inferior quality, simply called inferior in economic terms. Inferior goods have a negative income effect, i.e., more is purchased when income falls.
3. **Zero:** these are goods consumers purchase when income is low – however additional quantities are not purchased when income increases.

Revision

- Make sure you understand the varying degrees of price elasticity and draw the graphs which accompany them.
- Discuss, using relevant examples, the factors affecting PED.
- Outline why elasticity is important to the Minister for Finance and businesspeople.
- Develop understanding of inferior, normal and luxury goods, and how they relate to YED.
- This chapter is short but the theory can be quite tricky. Don't worry if you are struggling to get your head around it. Just stick to the examples to gain a real-world perspective.