Elasticity

The Theory and Application

of Economic Elasticity

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Elasticity

Elasticity: Change in sales due to a change in price.

Elasticity is normally negative because Price and Sales go in opposite directions:

I increase the price, I sell less; I decrease the price, I sell more.

Elasticity of -1 (unit elasticity) means the same (negative) change.

Therefore if the price increases by 10%, sales fall by 10%.

If the price decreases by 10%, sales increase by 10%. E = -1.

A product with many competitors in the market is likely to have a high degree of negative elasticity. Buying oranges at the market: if there are several stalls selling the same type of orange, the elasticity is high since even a small price difference might lead to a high sales difference. Cheaper than the others – sell more; more expensive than the others – sell less.

A product with less competition (Airbus) will be more inelastic.

Elasticity of Demand

My seedpacks I sold in Portugal (Jardins Rees Lda) were inelastic because there was no similar product as competition, (except for other tourist holiday presents) therefore I could maintain a high profit margin (100%).

Elasticity of Demand. Example

You need to fill up your car with petrol. The price of petrol has gone up across the country. **Petrol is inelastic** because the alternative is not using your car, and finding another method of transport.

If petrol prices increase by 50%, and consumption decreases by only 10%, then the elasticity of demand is 10/50 = -0.2.

We should use the negative sign – to indicate that this is negative elasticity, therefore the answer is

E = -0.2

Example – the Elasticity of Petrol Supply

Now, where do you buy your petrol? You probably want the cheapest petrol, rather than saying "Oh, I just love Total petrol!".

Therefore, especially when prices are high, the **supplier** of petrol is very elastic. I live near Leclerc. When the sign goes up that Lecerc is selling at cost price (no profit margin), then the petrol might be a few cents cheaper than at Intermarché or Carrefour, and there are long queues of cars waiting to fill up and save a few euros at Leclerc.

Therefore, although **petrol is inelastic**, the **supply of petrol is elastic**.

Let's imagine that Leclerc's petrol is 5% cheaper than the other suppliers and that sales increase by 20%.

In this case 20/5 = 4, so E = -4.

See https://clinlawell.dyson.cornell.edu/gas_price_volatility_paper.pdf for more details on petrol elasticity.

Elasticity and Brand Confidence

If I prefer Camel cigarettes from other cigarettes, then even if Camel is more expensive than Marlborough, I might continue to smoke Camel, so brand loyalty creates inelasticity.

How elastic is smoking?

Let's imagine that the government increases tobacco tax, and the price of cigarettes (in general) increases by 10%. How many people reduce the number of cigarettes smoked, or simply stop smoking?

We use empirical evidence to find the result. The average result from data in many countries is that E = -0.4. (In France it's – 0.7) Therefore, a 10% increase in price will lead to a 4% reduction in smoking. Smoking is therefore inelastic.

See
https://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-1-price-elasticity-of-demand-for-tobacco
for data from Australia.

Elasticity and MPC

- The poorer you are, the higher your MPC (Marginal Propensity to Consume) and therefore an increase in prices has a greater effect on a poor person than a rich person with a lower MPC.

- The Elasticity rate is, therefore an average of consumer behaviour but consumer bevavior is heterogenous depending on income and hence MPC.

- For the government, remember that the majority of the population has a very high (80-100%) MPC

Tax, MPC and the Multiplier Effect

Marginal propensity to consume and the multiplier

The multiplier effect states that an injection into the circular flow (e.g. government spending or investment) can lead to a bigger final increase in real GDP. This is because the initial injection leads to knock on effects and further rounds of spending.

The marginal propensity to consume will determine the size of the multiplier. The higher the MPC, the greater the multiplier effect will be. If the marginal propensity to consume is 0, there will be no multiplier effect.

$$\text{Multiplier (k)} = \frac{1}{1-mpc} = \frac{1}{mpw}$$

The multiplier (k) = 1/1-mpc

For example, if the government pursues expansionary fiscal policy (higher G) but consumer confidence is very low, then there will be a high propensity to save and a low marginal propensity to consume; this will limit the effectiveness of fiscal policy because the injection will lead to only limited increases in spending and aggregate demand.

Positive Elasticity

Elasticity can be positive.

Therefore, when the price goes up, sales go up, and when the price goes down, sales go down.

This seems strange, but exists for certain goods.

This can relate to luxury goods – the higher the price, the higher the prestige of owning this wonderful handbag etc.

Positive Elasticity

A Gucci handbag at around 2,000€

362bn€ sales in personal luxury goods in 2023
(Statista)
https://www.statista.com/topics/5132/gucci/

Positive Elasticity

Example

You go to the supermarket to buy some meatballs for dinner. The average price (for the same weight / quantity of meatballs) is 3€50.

There is one brand that only costs 1€50. Do you buy it?

Maybe not, since you might suspect that it is highly inferior in quality or even dangerous.

In this case a lower price might lead to lower sales – therefore positive elasticity.

English / French

- For the next exercise, be careful. The punctuation for numbers are different in English and French!

In English, the decimal point is . Thousands are indicated with a comma ,

In French the decimal point is , and usually there is no indication, or perhaps a space, to indicate thousands.

Therefore in English: 12,357,243.908 (12 million, 357 thousand, 243 point nine o eight)

*   in French: 12357243,908 (12 millions, 357 mille, 243 vergule neuf cent huit)*

NB. Sales cannot be less than one unit ! What is the value of half an

I-Phone ?!

Elasticity Exercise

Elasticity	Sales (S)	Price (P)	Revenue (R)	Price change	New Price	New Sales	New Revenue
E = -1	150	35€		+ 10%			
E = -2	3,500	12,000€		+ 5%			
E = 0.5	25	8,350€		-15%			
E = +1	2,200	165.5€		+12%			

Elasticity Exercise Answers

Elasticity	Sales (S)	Price (P)	Revenue (R)	Price change	New Price	New Sales	New Revenue
E = -1	150	35€	**150 * 35 = 5,250€**	+ 10%	35 + 3.5 = 38.5€	**150 – 10% = 135**	**135 * 38.5 = 5,197€**
E = -2	3,500	12,000€	**3,500 * 12,000 = 42m€**	+ 5%	**12,000 + 600 = 12,600€**	**3,500 – 5*2 (10)% = 3,150**	**3,150 * 12,600 = 39.69m€**
E = - 0.5	25	8,350€	**25 * 8,350 = 208,750€**	-15%	**8,350 – 1,252 = 7,098€**	**25 – 15/2 % = 25 + 2 = 27**	**27 * 7,098 = 191,646€**
E = +1	2,200	165.5€	**2,200 * 165.5 = 364,100**	+12%	**165.5 + 19.86 = 185.36€**	**2,200 + 12% = 2,464**	**2,464 * 185.36 = 456,727.04€**

Cross Elasticity

The cross elasticity of demand is the change in sales of one good when the price of another good changes.

This measurement is calculated by taking the percentage change in the quantity demanded of one good and dividing it by the percentage change in the price of the other good.

Exy = % change in Sales of x divided by the % change of Price of y

Cross Elasticity example

Beer demand is unit elastic (E = -1). Cider demand is elastic (-1.3)

(*see https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3991422/*).

I increase alcohol tax on beer but not on cider.

Beer prices increase by 10%, and with E = -1, sales will decrease by 10%.

Cross-elasticity means that those people drinking less beer will find a substitute such as cider, and therefore cider sales will increase.

Therefore, when considering elasticity, remember to think of what is the overall 'market'.

- The price of oranges increases. Sales go down according to the elasticity of oranges, but consumers might switch to other **fruits** which will then increase their sales. Cross-elasticity is low for some products like petrol. If petrol prices go up, it is unlikely that consumers will change to diesel cars, at least not in the short-term.

Elasticity and Taxation

Elasticity and Taxation

When changing taxes, the government needs to consider the elasticity of the product / service being taxed, and the effect on government revenue.

It is no surprise that the government can more easily increase revenue from an inelastic product like fuel (petrol and diesel; E = -0.05 short term and -0.3 long-term)

see https://www.reed.edu/economics/parker/f10/201/cases/oil_demand.html

Fuel is the fourth largest source of income for France.

Example

Tobacco. E = -0.7 in France. Revenue 2018 = 13bn€.

If I increase the price of tobacco by increasing tobacco duty (and hence the VAT) by 10%, there will be a 7% reduction in consumption (excluding tax-drift and illegal importation).

Let us suppose that tax is 80% of the final price.

Consumption (and tax revenue) goes down by 7% (new non-smokers). Revenue 13bn€ - 7% = 12.09bn€

Revenue from the 93% of smokers increases by 10% x 80% = 8%. 12.09bn + 8% = 12.09 + 1.209 = 13.299bn.
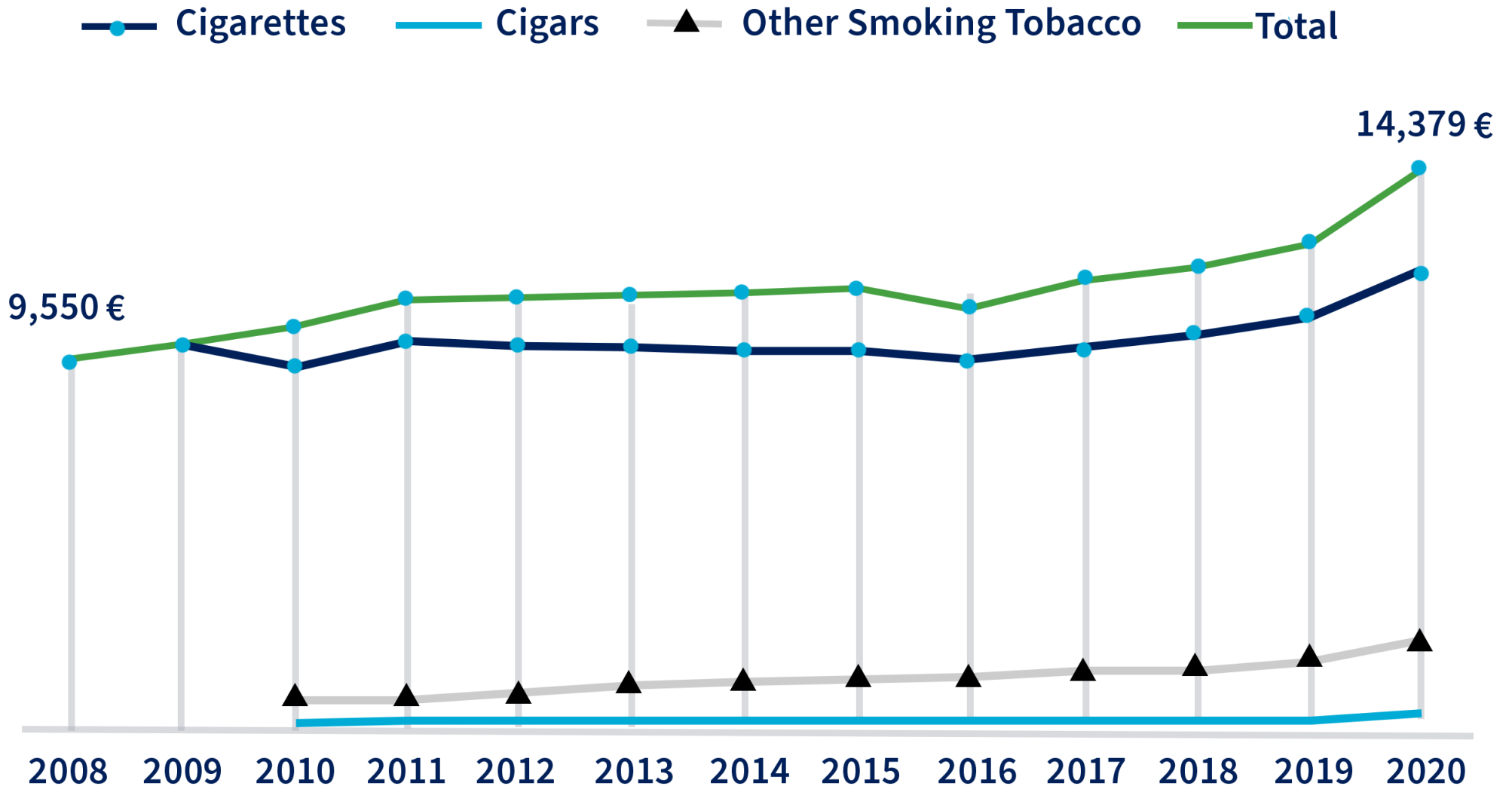
The tax increase leads to a revenue gain of 299m€ for the government.

This tax increase would also lead to Cross-Elasticity. The use of electronic cigarettes (Puffs) would increase (with 20% VAT for the government).

But, the increase of tax-drift (people buying from legal, cheaper sources like Spain) would increase (increasing revenue for Spain and a loss for France) as would the increase of illegal tobacco imports into France (the biggest imp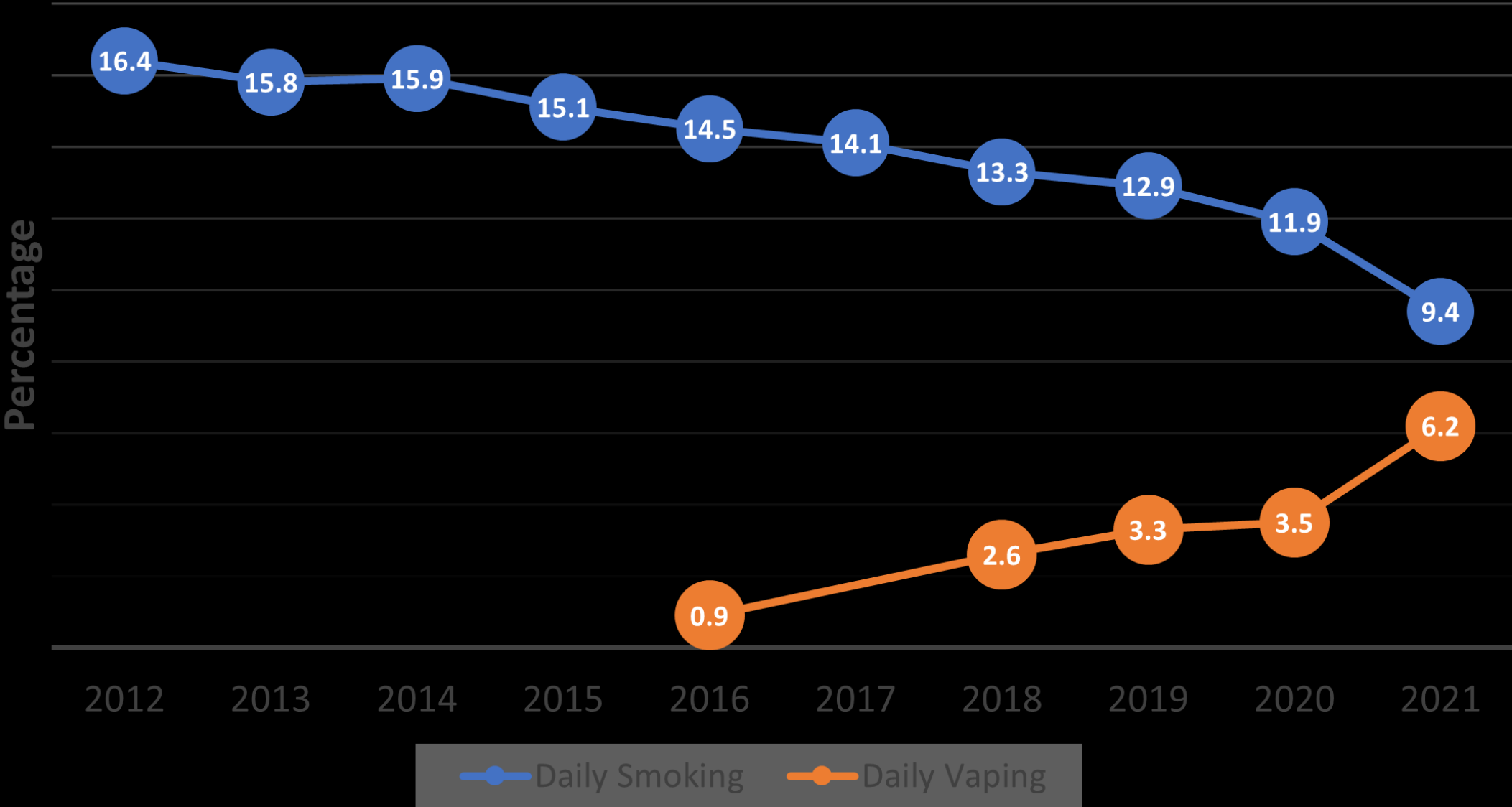orter of illegal tobacco in Europe – *see* *https://www.pmi.com/our-business/illicit-trade-prevention/blog/kpmg-report-uncovers-europe-s-illicit-cigarette-mark*)
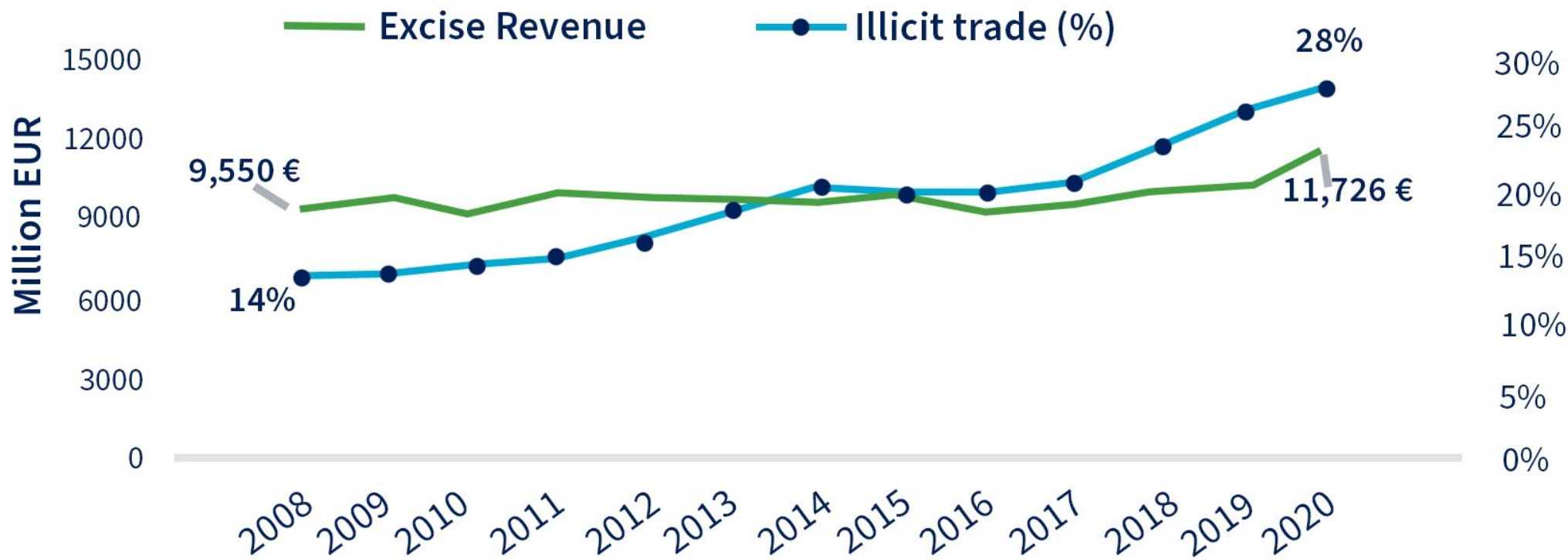
French tobacco duty revenue *(EUCom)*

Legend: Cigarettes, Cigars, Other Smoking Tobacco, Total

9,550 €

14,379 €

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Increase in E-smoking after tobacco

Smoking Goes Down, Vaping Goes Up

Daily Smoking: 16.4 (2012), 15.8 (2013), 15.9 (2014), 15.1 (2015), 14.5 (2016), 14.1 (2017), 13.3 (2018), 12.9 (2019), 11.9 (2020), 9.4 (2021)

Daily Vaping: 0.9 (2016), 2.6 (2018), 3.3 (2019), 3.5 (2020), 6.2 (2021)

Illicit tobacco trade in France
(Euromonitor International, European Commission)

See this video on illegal tobacco sales
And this video on illegal importation

Elasticity and Exporting. Example

I produce lawnmowers in France (material and labour in Euros).

Half of my sales are to the Eurozone. Half of my sales are to the United Kingdom (£)

I keep the price of my product (lawnmowers) the same in Europe.

BUT, due to a 10% increase in the value of the Euro against the Pound *(see https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/e)* my products now cost 10% more in £.

The elasticity of my product is -2. I lose 20% of export sales. Ow!

The Double Whammy! UK lawnmowers (from my competitor) are now 10% cheaper in France and I also lose 20% of my home market.

In real-life, you need to know the elasticity of the product and track the currency changes from your suppliers and export market. This often involves several different currencies.

Income Elasticity

Income elasticity refers to a change in buying behaviour in relation to changes in your income.

What is sensitive to changes in income?

What do you buy less of if your salary goes down (or your taxes have gone up leaving you with less money). Heating, car-use, smoking, water, the barber won't change very much. Things like holidays and going to the restaurant will change much more, and therefore can be said to have high income elasticity.

Maybe you would buy less expensive food and avoid delivery.

The reverse is obviously also true. If your income goes up, do you smoke more (unlikely), drive more (unlikely) take more holidays or more exotic / expensive holidays (likely) and go to the restaurant more often (likely).

Income elasticity also depends on your Marginal Propensity to Consume (MPC). The poorer you are, the more of your income you spend (high MPC)

The richer you are the higher your Marginal Propensity to Save (MPS) which means less of an effect on Income Elasticity.

Elasticity Quiz 1

- 1. Elasticity is normally
- Negative
- Positive
-

2. Price increases 10%, Sales drop 10%. This is:
- Inelastic
- Elastic
- Unit elastic

-

- 3. Sales are 100. E = -2. I increase the price by 20%. New sales are:
- 80
- 100
- 120
- 60

Elasticity Quiz 1 answers

- 1. Elasticity is normally
- **Negative**
- Positive
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  2. Price increases 10%, Sales drop 10%. This is :
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- 3. Sales are 100. E = -2. I increase the price by 20%. New sales are :
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- 120
- **60**

Elasticity Quiz 2

- 1. Which of these are inelastic?

- Tins of sweet corn

- Finding a plumber to mend a leak

- An IRM hospital scanner

-

  2. Car diesel is:

- Inelastic

- Elastic

- Unit elastic

-

- 3. Diesel sales from a petrol station are:

- Inelastic

- Elastic

- Unit elastic

Elasticity Quiz 2 Answers

- 1. Which of these are inelastic?

- Tins of sweet corn

- Finding a plumber to mend a leak

- **An IRM hospital scanner**

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- Unit elastic

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- 3. Diesel sales from a petrol station are:

- Inelastic

- **Elastic**

- Unit elastic

Elasticity Quiz 3

- 1. Tax revenue in France from fuel (diesel and petrol) is:

- The biggest revenue for the government

- 10th revenue for the government

- 4th revenue for the government

-

- 2. An example of positive elasticity could be:

- Buying a house

- Buying a luxury good

- Buying a television

-

- 3. Cross Elasticity is when:

- Elasticity is elastic and inelastic at the same time

- When the price change of one product effects the sales of another product

- When you get cross because you don't understand elasticity

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Elasticity Quiz 4

- 1. Inceasing a tax can lead to:

- Higher tax drift

- Lower government revenue

- Higher government revenue

- All of the above

-

    2. A double whammy is when:

     I miss an economics lesson and get a Malus

- I get three aces in a game of poker

- I lose home market sales as well as export sales when my currency value increases

-

- 3. Someone with a high MPC is probably

- A student

- A bank manager

- A pop star

Elasticity Quiz 4

- 1. Inceasing a tax can lead to:

- Higher tax drift

- Lower government revenue

- Higher government revenue

- **All of the above**

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  2. A double whammy is when:

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- I get three aces in a game of poker

- **I lose home market sales as well as export sales** **when my currency value increases**

-

- 3. Someone with a high MPC is probably

- **A student**

- A bank manager

- A pop star

Congratulations

- You are now an expert elastic student!