1.1.4 Production possibility frontiers - notes for Edexcel A Economics

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What is a production possibility frontier?

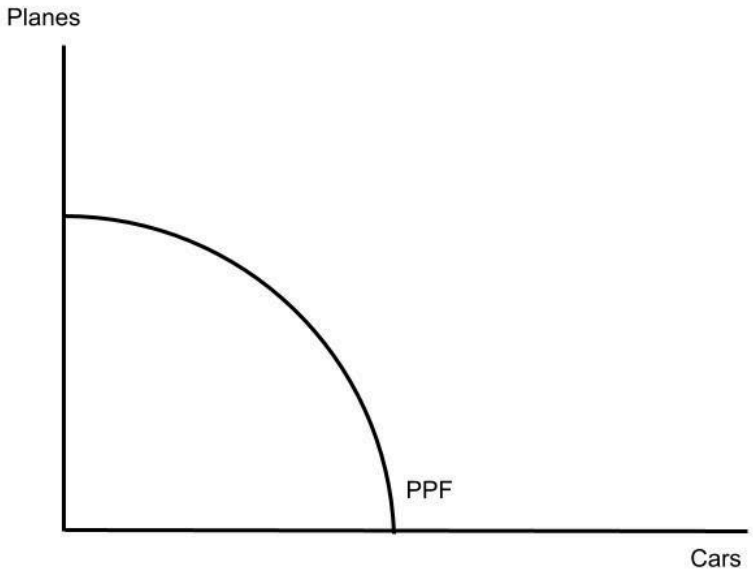
A production possibility frontier (or PPF) shows the maximum possible output combinations of two goods, using all available resources.

A PPF shows the "productive potential" of the economy.

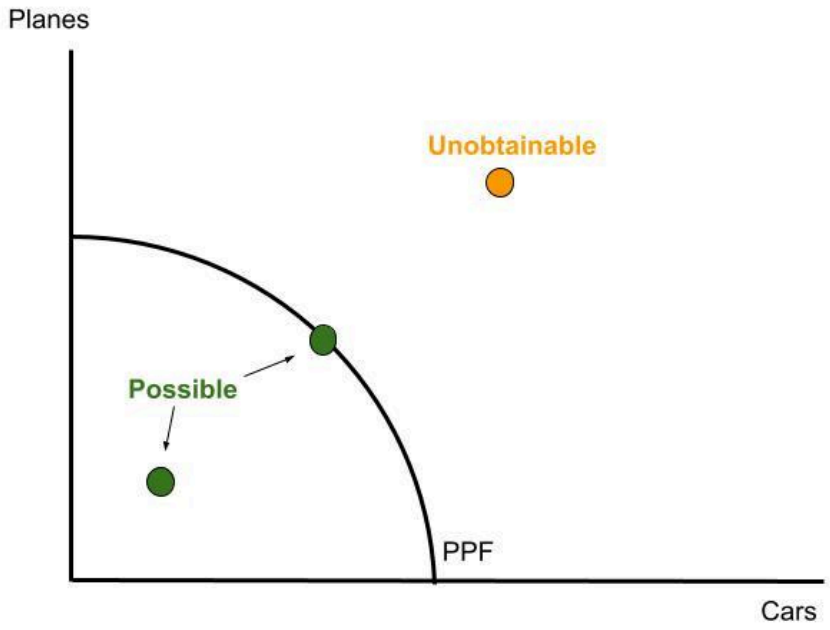
Consider a fictional example of a small island economy that can only produce planes and cars.

- The economy could be used to produce only planes (say 1000 planes a year) or only cars (say 1000 cars a year).
- Alternatively, the resources on the island could be used to produce a mix of planes and cars, such as 700 planes and 700 cars.

We can plot all the possible combinations of cars and planes that can be produced, using all available resources. This gives the PPF diagram shown below.



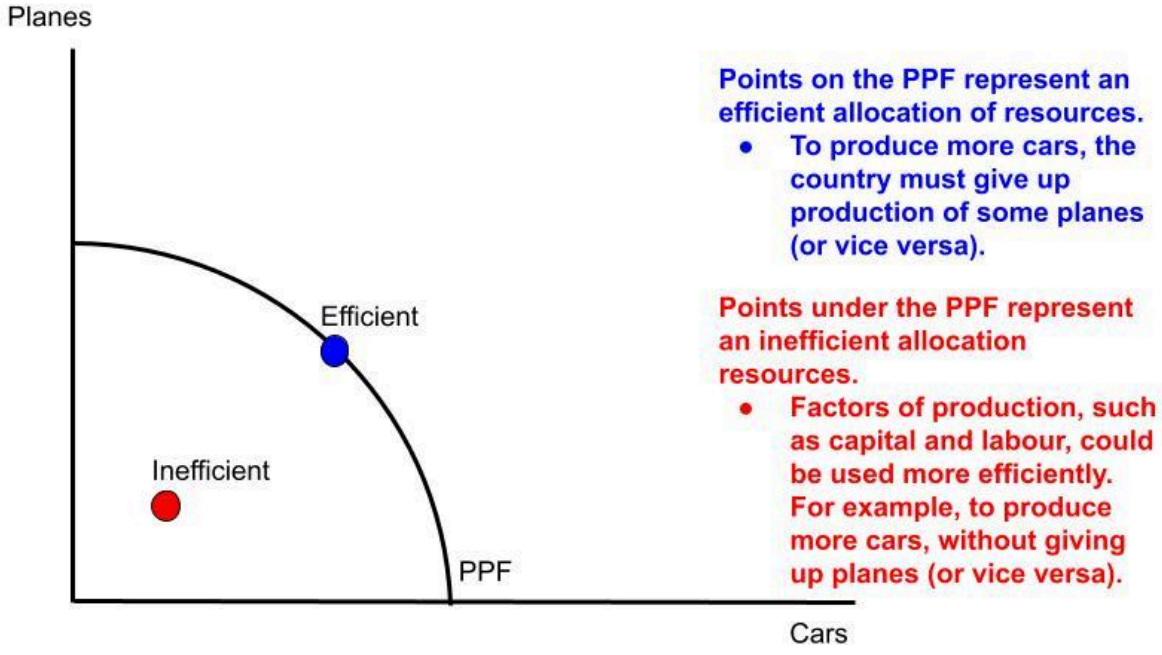
Possible and obtainable production



Points within or on the PPF show are “possible” for the economy to produce at.

Points beyond (up and to the right of) the PPF are “unobtainable”. In other words, it is not possible for the economy to produce these amounts on planes and cars at the same time.

PPFs and efficiency

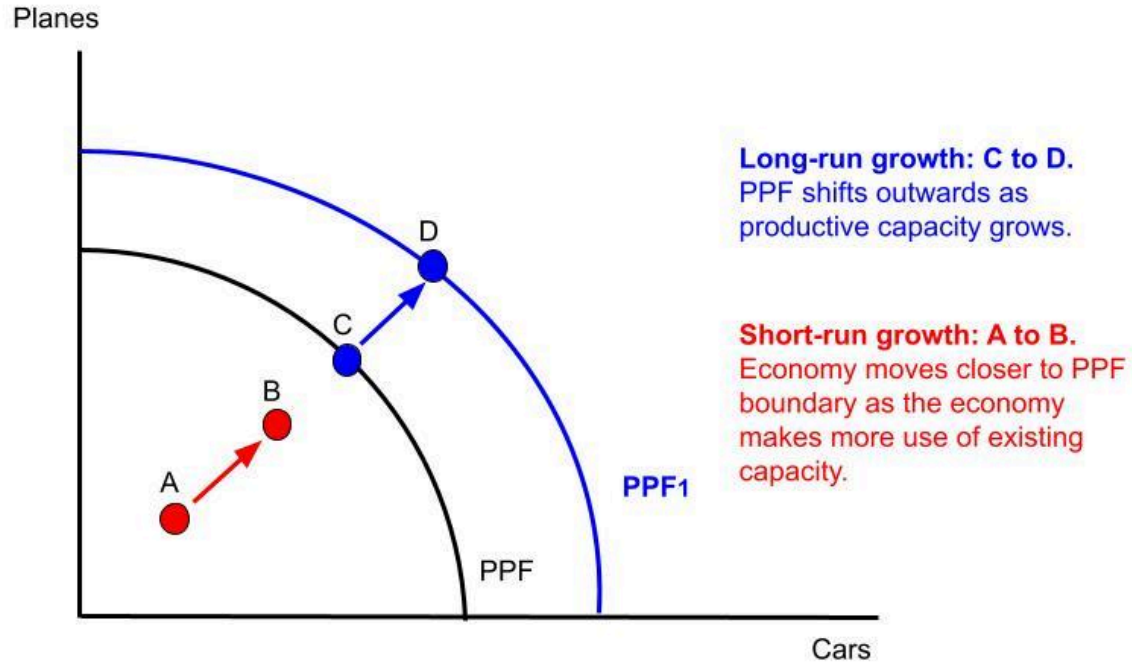


Points on the PPF represent an **efficient** allocation of resources, where all factors of production are being used efficiently. Therefore, in order to produce more cars, the economy must produce fewer planes.

Specifically, the points on the PPF are called "productively efficient" outcomes.

However, points under the PPF represent an **inefficient** allocation of resources. The factors of production are not being used efficiently. So, by making more efficient use of factors of production, it is possible to produce more cars without giving up the production of planes.

Economic growth and decline

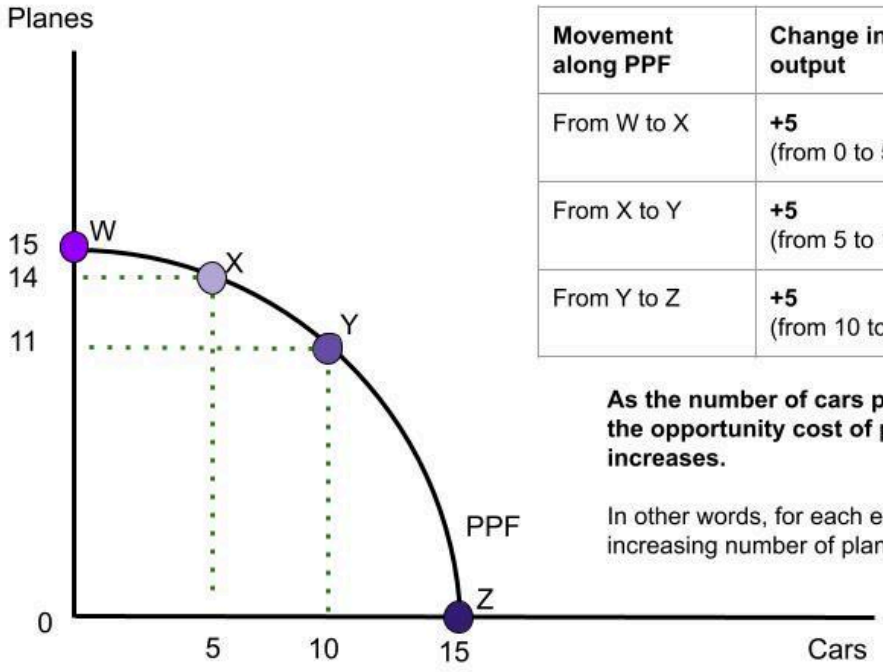


The PPF can be used to show economic growth.

- A movement from point A to B, within the PPF, shows **short-run economic growth.** The economy is making greater use of its existing capacity.
- A movement from point C to D, shifting the PPF itself, shows **long-run economic growth.** The productive potential of the economy is growing.

The opposite movements would show economic decline, a shrinking of the economy.

PPFs and opportunity cost - why is the PPF curved?



Movement along PPF	Change in car output	Change in plane output
From W to X	**+5** (from 0 to 5)	**-1** (from 15 to 14)
From X to Y	**+5** (from 5 to 10)	**-3** (from 14 to 11)
From Y to Z	**+5** (from 10 to 15)	**-11** (from 11 to 0)

As the number of cars produced increases, the opportunity cost of producing cars increases.

In other words, for each extra car produced, an increasing number of planes must be given up.

The PPF is usually drawn as a curve, which becomes steeper when moving from left to right. This shape is "**concave** to the origin".

Why is the PPF drawn concave?

The slope of the PPF reflects the opportunity cost of producing one more car

- In other words, the number of planes that must be given up to produce one more car.
- As more cars are produced, the PPF becomes steeper.
    - So the opportunity cost of car production is increasing.
    - More planes must be given up to produce an extra car.

What's the economic logic behind increasing opportunity cost for cars (the good on the horizontal axis)?

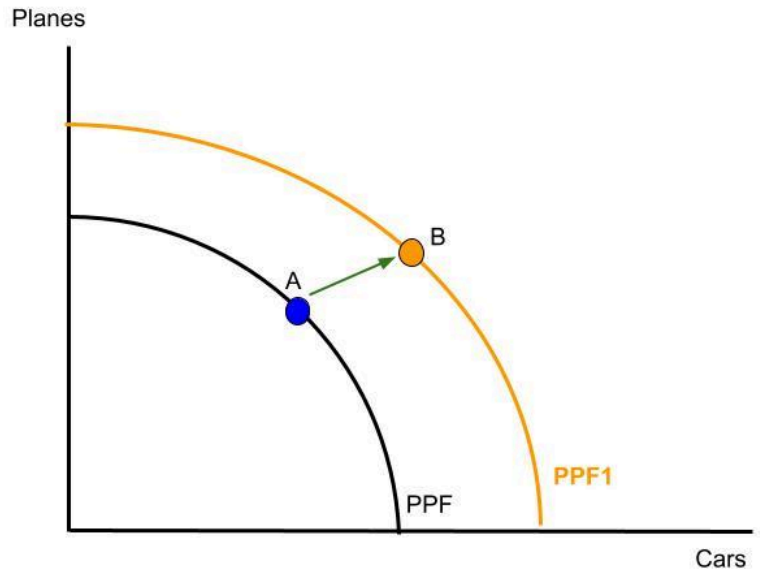
- To produce the very first car, few planes must be given up.
- However, it may become more difficult to produce each extra car, as even more workers are moved to car production.

- For instance, workers in the car factory may get in the way of one another, or workers are being hired from plane production who lack the skills for making cars.
- This is known as the "**law of diminishing returns".** As more workers are moved to car production, each extra worker generates less and less extra output.

Shifts in the PPF

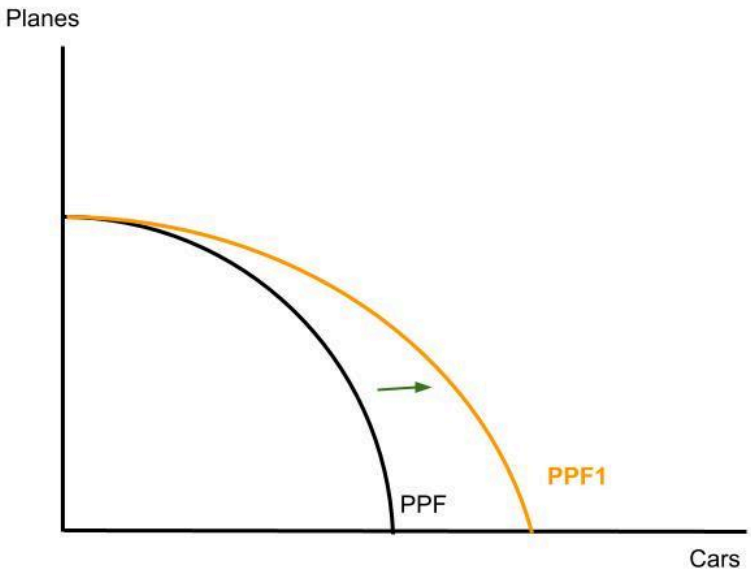
A shift in the PPF is caused by changes to the **quality** (i.e. productivity) or **quantity** of factors of production.

- **Productivity**
    - Productivity means output produced per unit of input.
    - An improvement in productivity could occur because of improvements in technology or worker training.
    - This would shift the PPF outwards, e.g. from PPF to PPF_1 in the diagram below.
- **Quantity of factors of production**
    - The factors of production refer to land, labour, capital and entrepreneurship.
    - For instance, if there is an increase in the rate of immigration into the country, this increases the quantity of labour available.
    - This would also shift the PPF outwards.



Suppose the economy only becomes more productive at producing one good (cars) but not the other (planes).

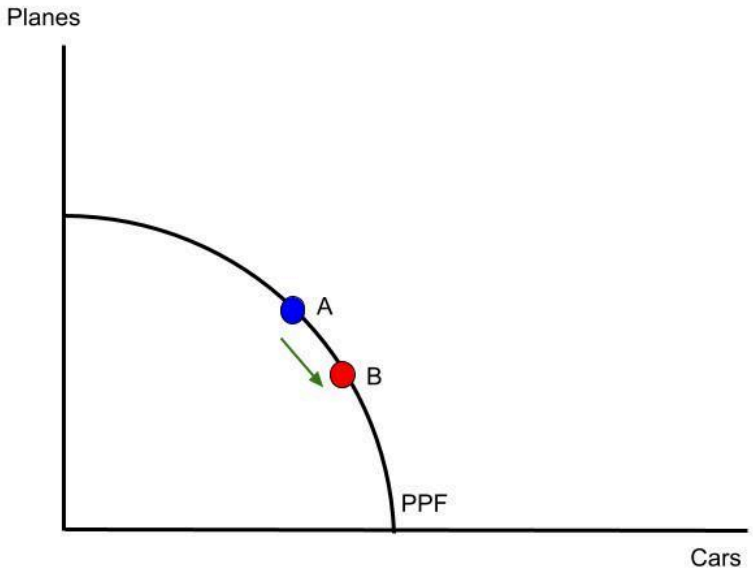
- This could occur because of some specific worker training for car production or some improvement in the assembly line for cars.
- Then the PPF will stretch outwards from PPF to PPF1 as in the diagram below.
    - If the economy devotes all its resources to planes and none to cars, it will still produce the same number of planes. So even after productivity in cars increases, the PPF will start at the same point on the plane axis.
    - However, suppose instead the economy devotes all resources to cars and none to planes. Following an increase in car industry productivity, total car output will increase.



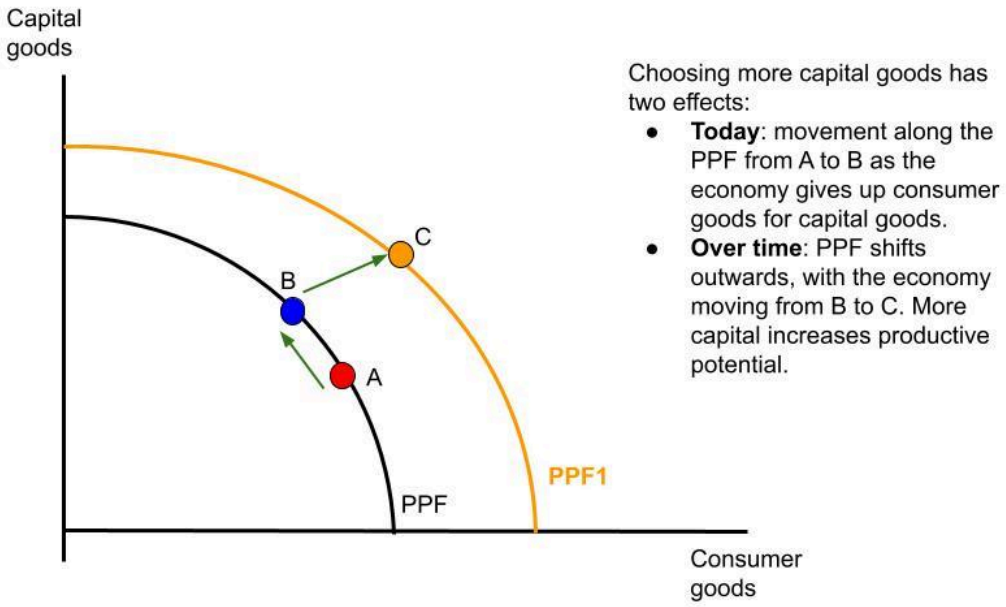
Movements along the PPF

Movements along the PPF can be caused by **changes in consumer preferences** or by **government intervention**:

- Suppose consumers decide to buy fewer cars due to a change in tastes towards flying.
    - For example, consumer preferences may change from package holidays abroad to domestic holidays by car.
    - This could reduce demand for planes and increase demand for cars.
    - This encourages firms to produce more cars and fewer planes.
    - So there is a movement along the PPF from A to B in the diagram below.
- The government may also intervene to move firms away from producing planes and towards producing cars.
    - For example, the government could use subsidies for cars and taxes for plane production. This could encourage car production and reduce the incentive to produce planes.
    - Other government policies could include limits on the price or quantity of some goods. The government could also influence consumer demand through education campaigns, e.g. encouraging electric car use by highlighting the pollution of going by plane.



PPF with consumer goods versus capital goods



Consumer goods satisfy the wants and needs of consumers. Examples include chocolate bars or clothes.

Capital goods are used to produce future consumer goods. This includes machines or other equipment needed to produce a good, such as a tractor for farming.

Choosing more capital goods today has two effects:

1. **Today:** Leads to a **movement along the PPF towards capital goods**. This means giving up consumer goods. This is a movement from point A to point B in the diagram above.
2. **Over time: Shifts the PPF outwards in the future.** This is because capital is a factor of production. So more capital goods increases the quantity of a factor of production, increasing productive potential and shifting the PPF outwards from PPF to PPF1 in the diagram. As a result, the economy could move from point B to point C.

Practice question on PPFs in the style of Edexcel Economics A

Below is a practice question on PPFs, written in the style of Edexcel Economics A. It features a short extract, followed by a practice question.

Extract A - Migration and productivity growth

In the year to June 2023, net migration, which counts the number of people coming into the UK minus the number of people leaving the UK, reached 906,000 people. This compares with 321,000 for the year to June 2016.

Productivity growth has been slow in the UK since the 2008 financial crisis. One potential cause of slow productivity growth is low investment. Investment was 18% of GDP for the UK from 2017-21, the lowest among the G7 group of advanced economies. Different sectors in the UK economy have experienced differing rates of productivity growth. From 1997 to 2019, sectors such as information and communication and manufacturing have seen the largest productivity growth. Meanwhile, mining, water and real estate have seen productivity falls over the same period.

Sources: World Bank, UK Government, The Productivity Institute.

Question: With reference to Extract A, discuss **two** influences on the production possibility frontier (PPF) for the UK economy. (12 marks)

Related resources for Edexcel Economics A

Edexcel Economics A notes, model answers and practice questions:
https://tfurber.com/edexcel-economics

Edexcel Economics A Theme 1 notes, model answers and practice questions:
https://tfurber.com/theme-1-edexcel-economics/