

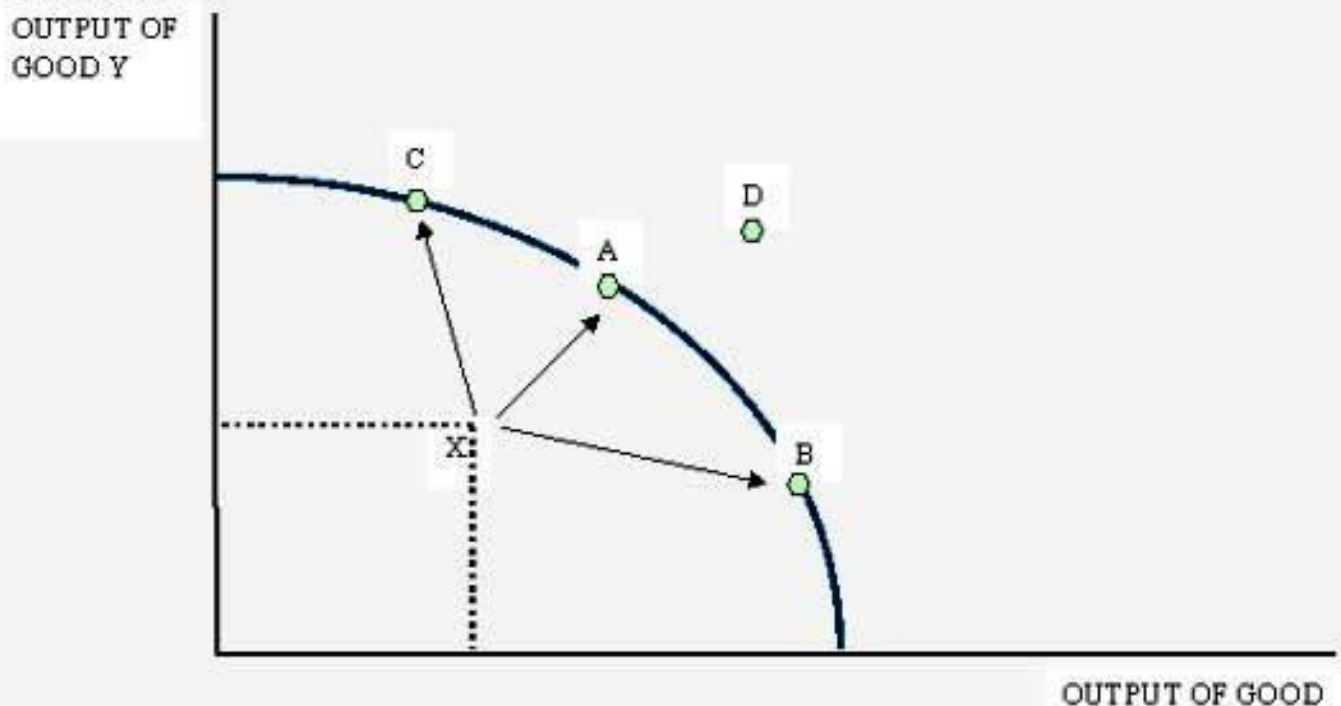
Production Possibility Frontier

In this chapter we will consider the nature of the production possibility frontier and its relationships with the fundamental economic problem.

A production possibility frontier (PPF) is a curve or a boundary which shows the combinations of two or more goods and services that can be produced whilst using all of the available factor resources efficiently.

We normally draw a PPF on a diagram as concave to the origin. This is because the extra output resulting from allocating more resources to one particular good may fall. I.e. as we move down the PPF, as more resources are allocated towards Good Y, the extra output gets smaller - and more of Good X has to be given up in order to produce the extra output of Good Y. This is known as the principle of diminishing returns. Diminishing returns occurs because not all factor inputs are equally suited to producing different goods and services.

A PPF shows the different combinations of goods and services that can be produced with a given amount of resources in their most efficient way
 Any point inside the curve – suggests resources are not being utilised efficiently
 Any point outside the curve – not attainable with the current level of resources

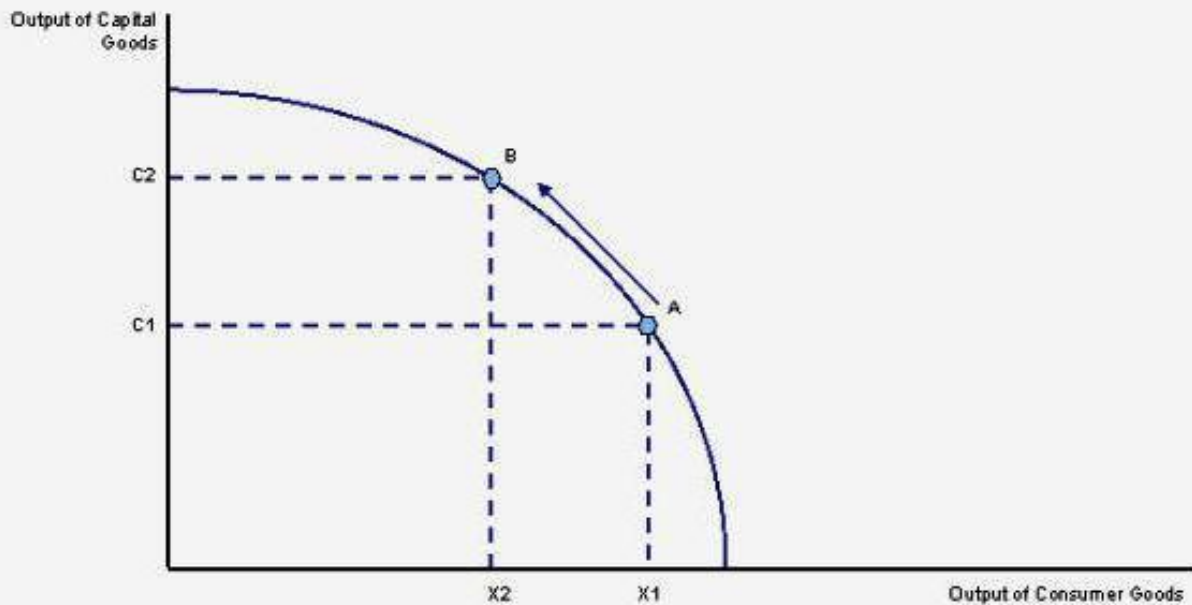


Combinations of output of goods X and Y lying inside the PPF occur when there are unemployed resources or when the economy uses resources inefficiently. In the diagram above, point X is an example of this. We could increase total output by moving towards the production possibility frontier and reaching any of points C, A or B.

Point D is unattainable at the moment because it lies beyond the PPF. A country would require an increase in factor resources, or an increase in the efficiency (or productivity) of factor resources or an improvement in technology to reach this combination of Good X and Good Y. If we achieve this then output combination D may become attainable.

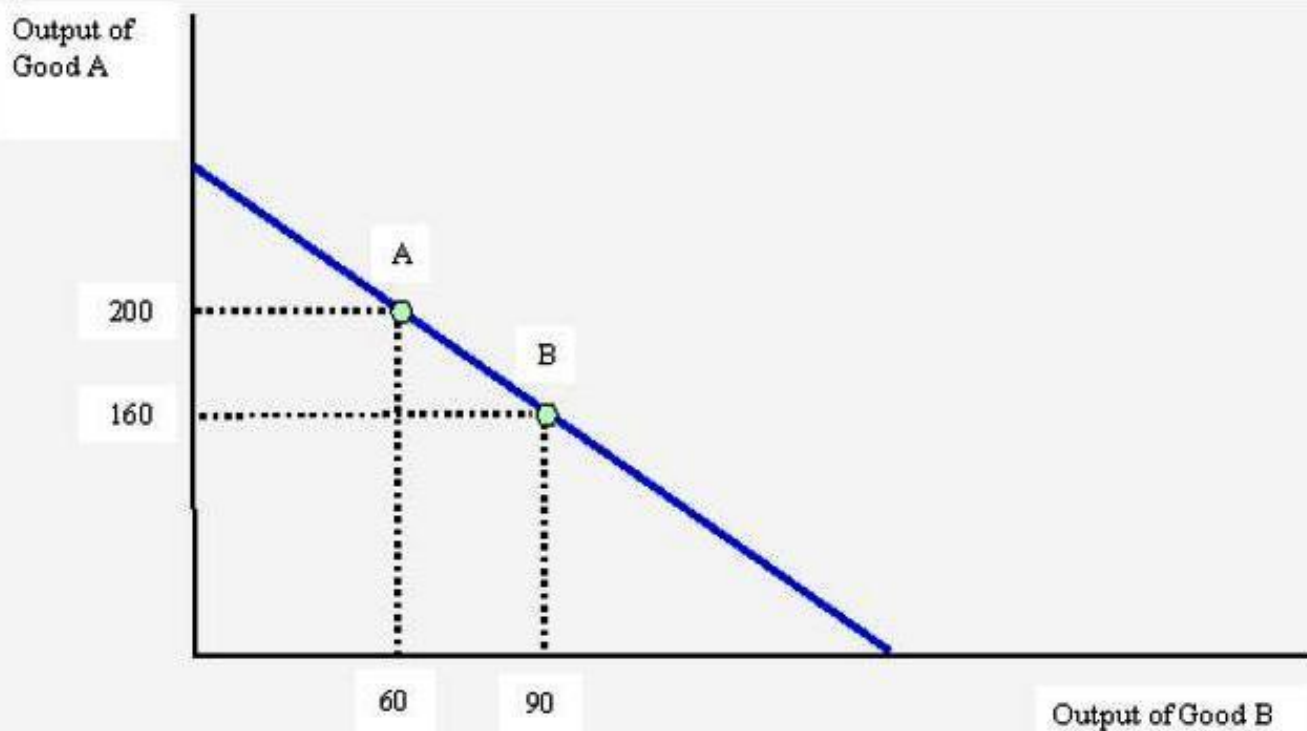
Producing more of both goods would represent an improvement in our economic welfare providing that the products are giving consumers a positive satisfaction and therefore an improvement in what is called allocative efficiency

Reallocating scarce resources from one product to another involves an opportunity cost. If we go back to the previous PPF diagram, if we increase our output of Good X (i.e. a movement along the PPF from point A to point B) then fewer resources are available to produce good Y. Because of the shape of the PPF the opportunity cost of switching resources increases - i.e. we have to give up more of Good Y to achieve gains in the output of good X.



The PPF does not always have to be drawn as a curve. If the opportunity cost for producing two products is constant, then we draw the PPF as a straight line. The gradient of that line is a way of measuring the opportunity cost between two goods.

A straight line PPF shows a constant opportunity cost between two products
Increasing output of good B from 60 to 90 units implies giving up 90 units of good A
The marginal opportunity cost for each extra unit of good B is 30 units of Good A



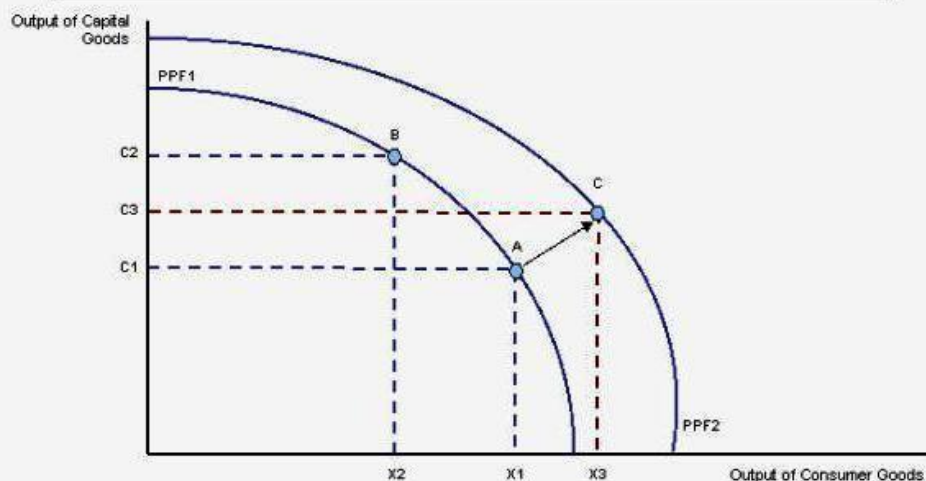
Explaining Shifts in the Production Possibility Frontier

The production possibility frontier will shift when:

- There are **improvements in productivity and efficiency** perhaps because of the introduction of **new technology** or **advances in the techniques of production**)
- **More factor resources are exploited** perhaps due to an increase in the size of the workforce or a rise in the amount of capital equipment available for businesses

In the diagram below, there is an improvement in technology which shifts the PPF outwards. As a result of this, output possibilities have increased and we can conclude (providing the good provides positive satisfaction to consumers) that there is an improvement in economic welfare.

An outward shift in the PPF shows that there has been either an improvement in productivity or an increase in the total stock of resources available to produce different goods and services. The outward shift represents an improvement in economic efficiency



Technology, prices and consumer welfare

Improved technology should bring market prices down and make products more affordable to the consumer. This has been the case in the market for personal computers and digital products. The exploitation of economies of scale and improvements in production technology has brought prices down for consumers and businesses.

External Costs

In the case of air pollution there is an external cost to society arising from the contamination of our air supplies. External costs are those costs faced by a third party for which no compensation is forthcoming. Identifying and then estimating a monetary value for air pollution can be a very difficult exercise - but one that is important for economists concerned with the impact of economic activity on our environment. We will consider this issue in more detail when we study externalities and market failure.

Free Goods

Not all goods have an opportunity cost. Free goods are not scarce and no cost is involved when consuming them.



Air conditioning uses up scarce resources especially during hot weather.

Is fresh air an example of a free good? Usually the answer is yes - yet we know that air can become contaminated by pollutants. And, in thousands of offices, shops and schools, air-conditioning systems cool the air before it is "consumed". With air conditioning, scarce resources are used up in providing the "product" - for example the capital machinery and technology that goes into manufacturing the air conditioning equipment; the labour involved in its design, production, distribution and maintenance and the energy used up in powering the system.

Cool air might appear to be free - but in fact it is often an expensive product to supply!