

A close-up photograph of several interlocking brass gears of various sizes, some with black metal components, set against a blurred background. The gears are the central focus of the cover image.

Unit 1: Production Possibility Frontiers

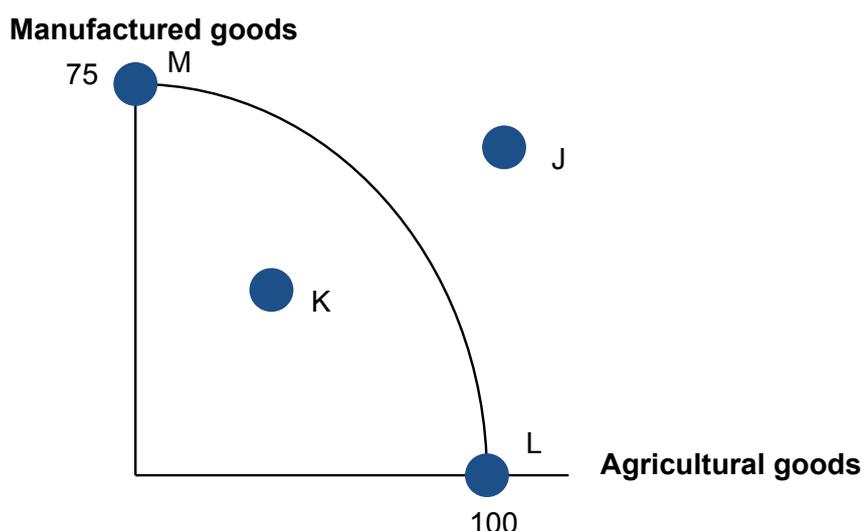
A Level Economics

Production Possibility Frontiers (Curves, Boundaries) – The Basics

A production possibility frontier (PPF) shows the maximum amount of goods and services which an economy can produce with its existing resources at existing factor productivity.

Suppose an economy produces only two types of goods, agricultural goods and manufactured goods. Even if it put all of its resources (land, labour, capital and enterprise) into making agricultural goods, there must be a maximum number of goods that can be produced, for example 100. Because all the resources are used in agriculture, there are none left for manufacturing, hence the output of manufactured goods will be zero. This is illustrated by point L on the diagram below.

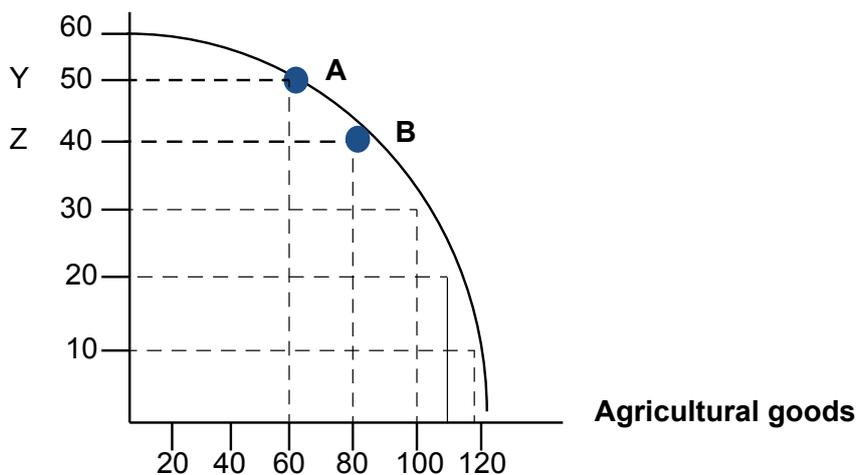
Similarly, if all resources are put into manufactured goods, then (perhaps) 75 will be made, but there will be no agricultural goods (point M). The points in between L and M represent all the possible combinations of agricultural and manufactured goods that are currently possible. Therefore, a point outside of the production possibility frontier (such as J) is currently impossible – there are simply not enough resources. A point such as K, however, indicates wasted resources, perhaps due to unemployment (the output of both goods could be increased, implying that some resources are not currently being used).



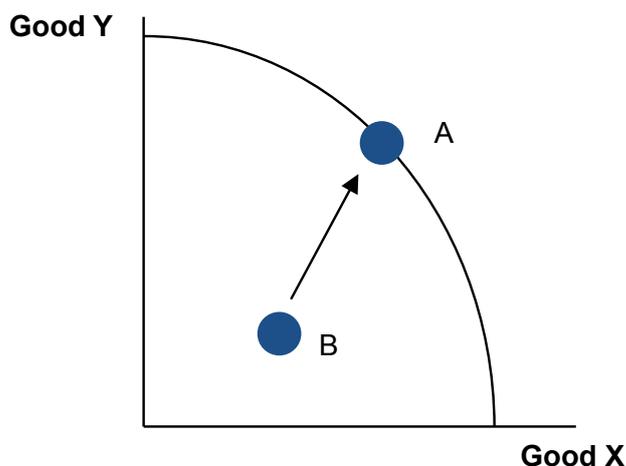
Consequently, a production possibility frontier is ideally suited for explaining the concept of **opportunity cost** – if an economy is using all of its resources to produce a certain combination of goods and services, then if it wants more of one good, it will have to take resources away from some other good. An economy in such a situation is described as “Pareto efficient” because all of its resources are fully employed.

In the diagram below, if the economy wishes to increase its output of agricultural goods from 60 to 80 (moving from point A to point B on the PPF), it will have to take resources away from manufactured goods. Therefore the production of manufactured goods will have to fall from 50 to 40, meaning there is an opportunity cost of 10 manufactured goods, or distance YZ on the diagram.

Manufactured goods



If, however, there was unemployment in an economy, then it would be possible to increase the output of a good without reducing the output of others. This indicates that resources are being wasted and is termed “Pareto inefficient”:



Point A is Pareto efficient. It is not possible to have more of good X without having less of good Y, and vice versa. This is not true at point B. Here it is clearly possible to increase the output of one of the goods without having less of another. Point B is Pareto inefficient and implies that resources are being wasted (e.g. unemployed labour).

A movement from B to A therefore implies a reduction in unemployed resources (since resources are fully employed at any point on the PPF).

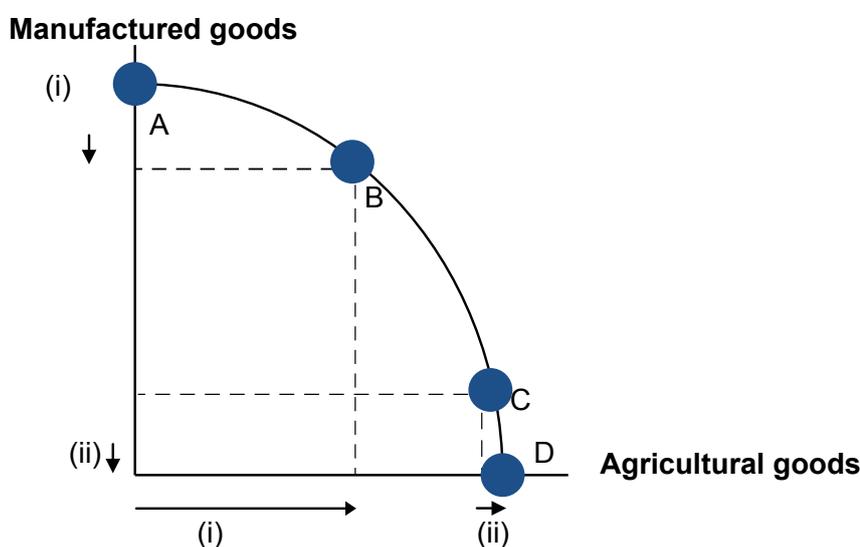
Why are PPFs not usually straight lines?

If a production possibility frontier was a straight line, it would imply that any factor of production was equally good at operating in any industry – i.e. a worker would be equally effective whether (s)he was in computing, mining or bus driving. This would mean that factors of production were **perfectly substitutable**.

In reality, we know that this is not so. For example, some plots of land are better for growing things on than others. Imagine a case where an economy was producing only manufactured goods. All the land would be being used for factories.

Suppose now that the country gave up 20% of its factories, and used the land freed up to grow things. Obviously the economy would choose to use the most fertile land to grow things on. Therefore, giving up a small amount of manufactured goods would lead to a huge increase in agricultural goods (movement from A to B on the diagram below) as the fertile land was used for agriculture.

However, if we continue to switch resources from manufactured goods to agriculture, we will have to use less and less suitable land. Hence each set of manufactured goods we give up will produce fewer and fewer extra agricultural goods, as we have to use poorer and poorer soil. For the last increment (from C to D), we give up manufactured goods, but get almost nothing in return because we are attempting to grow things on the beach, or on solid rock. Therefore, PPFs are non-linear (not straight lines) because resources are not perfectly substitutable.

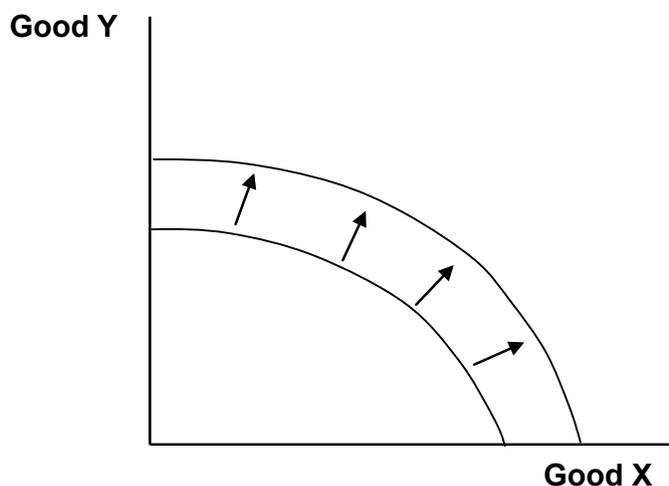


Shifts in PPFs

The PPF represents the maximum amount of goods and services an economy can produce with its existing resources and at existing factor productivity. Therefore the only way a production possibility frontier can shift is if there is a change in either of these two factors. Some examples of this would be:

1. An increase in total factors of production/factor productivity

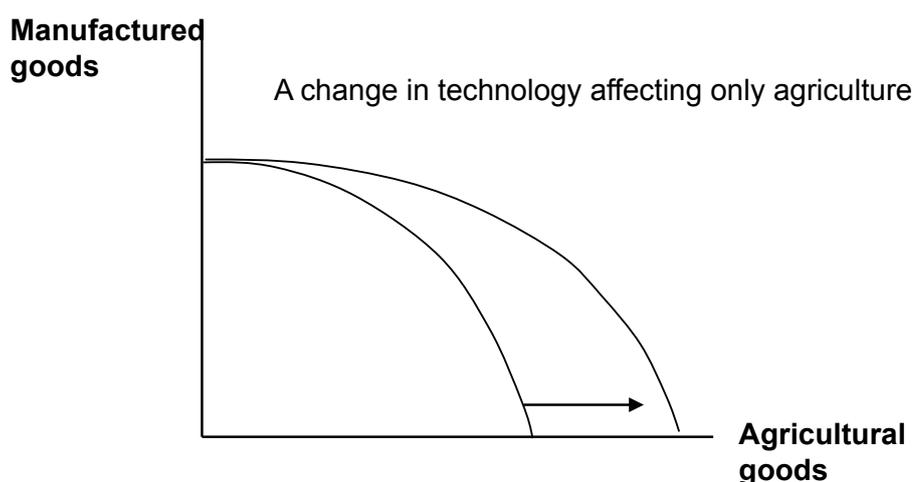
This could occur because of an increase in population, investment by firms in new machines and so on. There are more factors of production, so the potential output is now higher.



As can be seen in the diagram, the maximum possible output of both goods is increased.

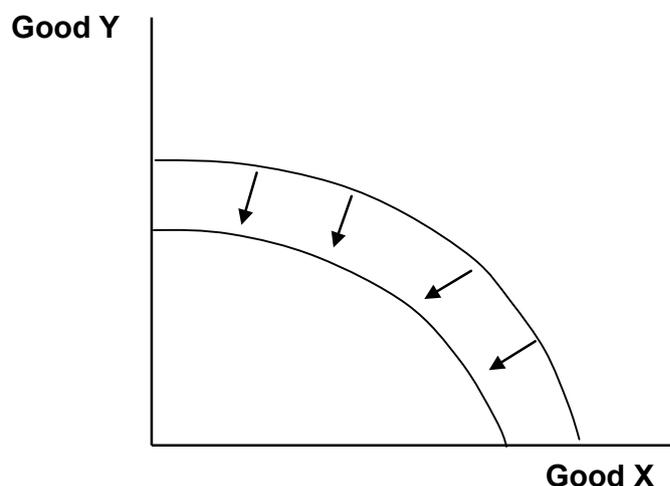
2. A change in one industry

Sometimes a change may come about that affects only one industry. For example the invention of computers affected manufacturing industry but (arguably) had little effect on agriculture. Likewise 'miracle rice' invented in the 1960s, dramatically increased the yield from land for agriculture, but had little effect on manufactured goods. Hence, an increase in technology or productivity affecting one industry will not lead to a parallel shift in the PPF:



3. Depletion of natural resources

Sometimes, the potential output of an economy could be reduced – a war for example, or running out of oil and gas. Under these circumstances, the maximum output of all goods will be reduced, shifting the PPF inwards.

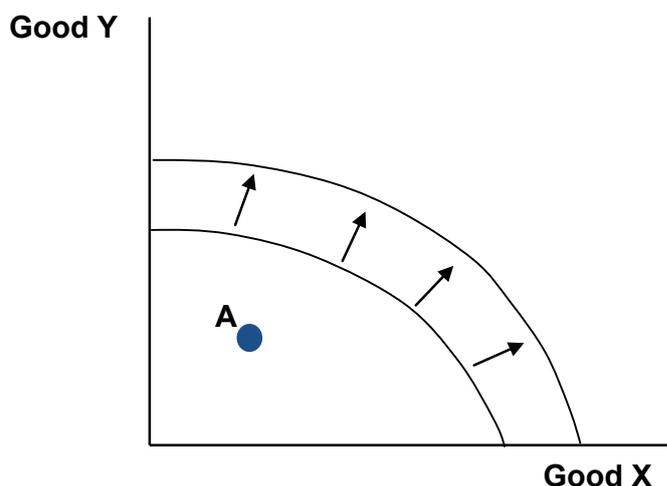


Important note: Unemployment does not cause the PPF to shift inwards. This is because the workers are still available to be used, even though they do not currently have jobs. Thus the PPF shows the potential maximum output; its position is not affected by changes in demand and resource utilisation, at least not in the short run.

PPFs and economic growth

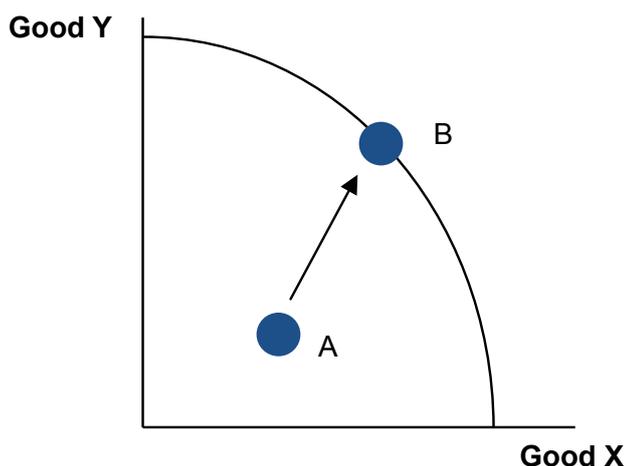
A PPF represents the actual and potential value of an economy's national income (GDP: Gross domestic product) in very simple terms. Therefore PPFs can be used to analyse some of the factors which influence economic growth.

In theory, economic growth can be subdivided into actual growth and potential growth. Potential growth means growth in the actual potential in the economy. It is a shift outwards in the PPF, caused by an increase in the quantity, quality or efficiency of use of the key factors of production. It does not necessarily mean that the GDP has risen – whether the potential is actually used will depend on changes in demand in the economy:

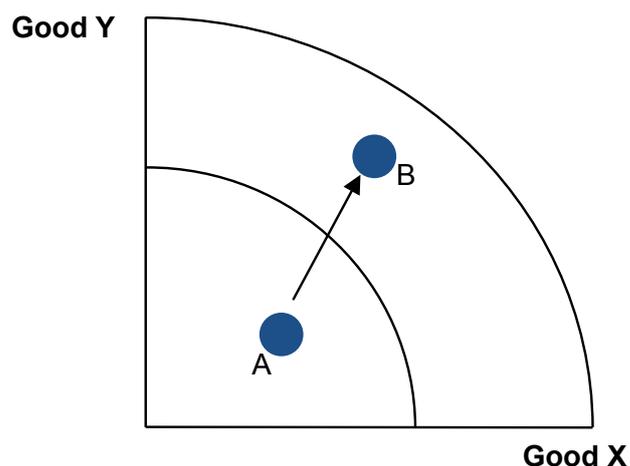


If for some reason demand in the economy did not increase, then there would be no incentive for firms to use the new factors of production. As a result, although the potential output of the economy would be higher, there would be no actual growth – the economy would remain at A – hence unemployment might actually increase in the short run. If workers become more productive, but there is no increase in demand, then the same output can now be made with fewer workers.

Actual growth is an increase in the current GDP, and may or may not be accompanied by potential growth:

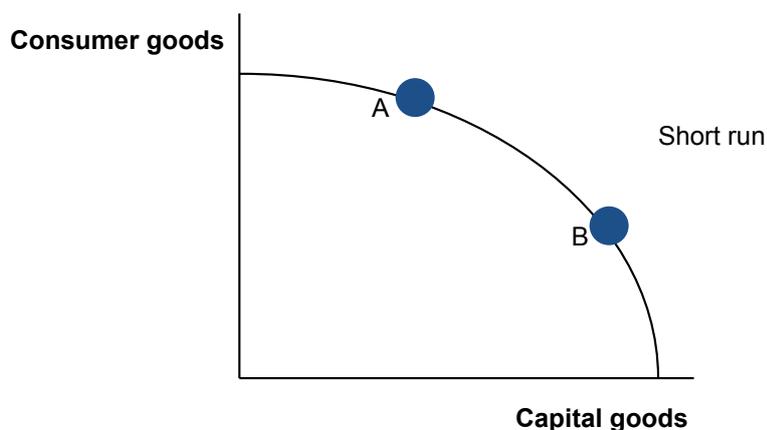


Economy recovering from recession – Actual growth only; the economy is simply making use of previously unemployed resources.

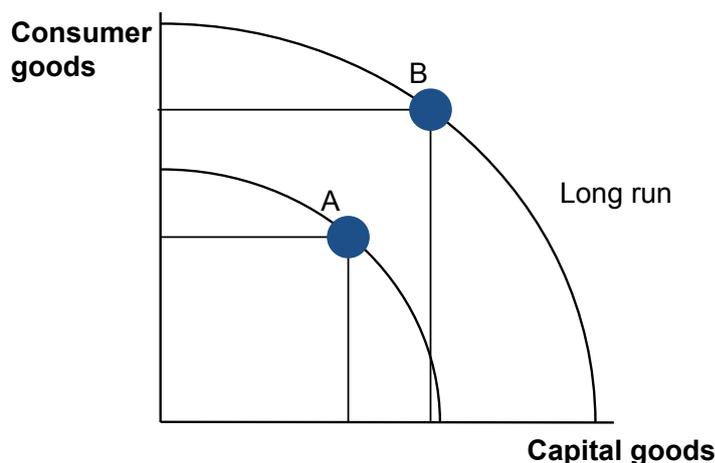


Actual and potential growth. It is this combination of an increase in resources, together with the demand for them that creates sustainable growth.

A possible consequence of this is that an economy is likely to need to produce capital goods (machines) if it is to grow quickly, because these will raise potential growth.

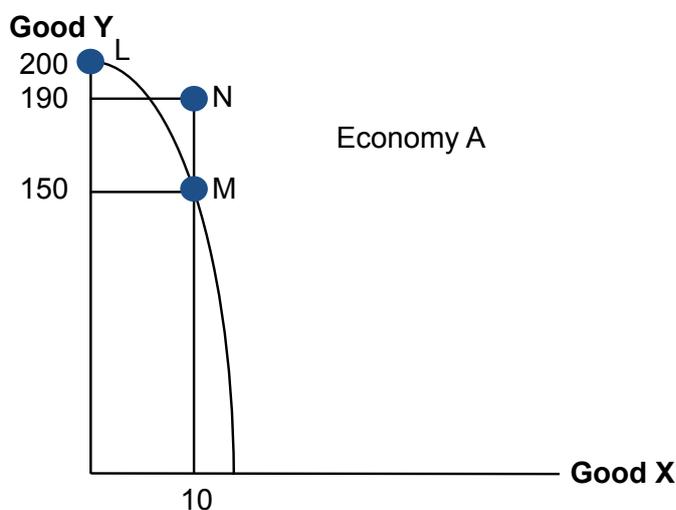


In the diagram, economy A is opting for a high current standard of living, but it is not investing for the future. Economy B is sacrificing current welfare by diverting most of its resources to producing machines. In the long run, however, economy B should grow much more quickly than economy A, resulting in it being able to consume a much higher combination of *both* goods:



PPFs and trade

One way in which an economy can consume a combination of goods that would normally be unobtainable is through trade. Suppose there are two countries, each of which is very good at producing a service or good that the other is very bad at. In the example below, imagine that economy A is very effective at producing good Y but very bad at good X, whereas economy B is the reverse.



Suppose initially that economy A is producing no X at all. To produce 10 units of X, the economy would have to give up 50 Y because it is so bad at X (moves from L to M); a huge opportunity cost. However, country B is very efficient at producing good X, but very poor at producing good Y. Therefore it might well be possible that they could trade 1X for 1Y, both benefiting, and both managing to consume outside of their PPFs because each country specialises in what it is best at, therefore increasing efficiency and world economic output and growth. This would allow country A to consume at point N, outside its original PPF – this point lies on the economy's consumption possibility frontier, which shows what the economy can consume rather than what it can produce.

Therefore, international trade should lead to an increase in economic efficiency and economic growth. This has been shown to be true repeatedly over the last 200 years, but it is still the case that some countries wish to restrict free trade because it is in their short term interest to do so, even though the net consequence is that in the long run all countries will lose out.