Production Possibility Frontiers

AQA A-Level Economics | Microeconomics 1.4

Topics: Scarcity · Opportunity Cost · Efficiency · Economic Growth

The Fundamentals of Economics

- **The fundamental economic problem is scarcity.**
- Scarcity arises because human wants are unlimited but the resources (factors of production) available to satisfy them are finite.
- The main purpose of economic activity is to allocate scarce resources as efficiently as possible.
- **Because of scarcity, choices must be made:**
  - WHAT goods and services should we produce to best satisfy society's desires?
  - HOW should we produce them efficiently, avoiding waste of resources and time?
  - FOR WHOM should these goods and services be produced?

Motivation for PPFs: Trade-offs

- **Decisions about what to produce, and how to produce it, require trade-offs.**
- A trade-off is a balance or compromise between two objectives that cannot both be fully satisfied simultaneously.
- Example: society faces near-unlimited desires for both housing and hospitals. With finite resources, producing more houses means fewer hospitals — a trade-off.
- **PPF Curves illustrate these core economic concepts:**
  - A) Resource allocation
  - B) Trade-offs and opportunity costs
  - C) Unemployment of economic resources
  - D) Economic growth

What is a PPF?

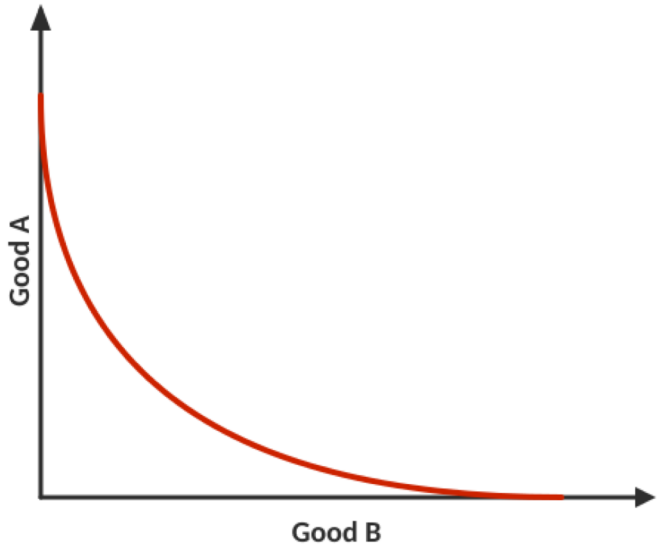
Definition

A PPF shows the maximum possible combinations of two goods/services that can be produced when all factors of production are used as efficiently as possible.

Key features:

- Points ON the curve → productively efficient
- Points INSIDE the curve → inefficient (unemployment of resources)
- Points OUTSIDE the curve → currently unattainable (unfeasible)

The curve is concave (bowed outward) due to the Law of Increasing Opportunity Cost.



Opportunity Cost

Definition

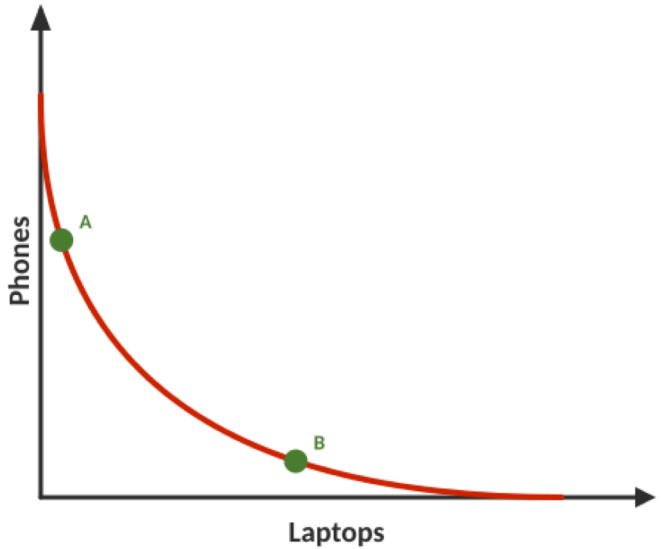
The opportunity cost of a choice is the benefit of the next best alternative foregone (given up).

On the PPF:

- Moving from one point to another along the curve requires reallocating resources.
- To produce more laptops, we must divert resources away from phones — those phones are the opportunity cost.

Law of Increasing Opportunity Cost:

As production of one good increases, its opportunity cost rises. Resources are not perfectly adaptable — this gives the PPF its concave (bowed-out) shape.



Worked Example: Phones & Laptops

A firm has fixed resources: 10 machines, 10 workers, 10 kg natural resources. The table shows possible combinations using all resources:

Combination	Phones Produced	Laptops Produced	Opp. Cost of extra Laptop
A	31	0	—
B	30	1	1 phone
C	28	2	2 phones
D	24	3	4 phones
E	16	4	8 phones
F	0	5	16 phones

Notice: opportunity cost increases with each extra laptop → this is why the PPF is concave

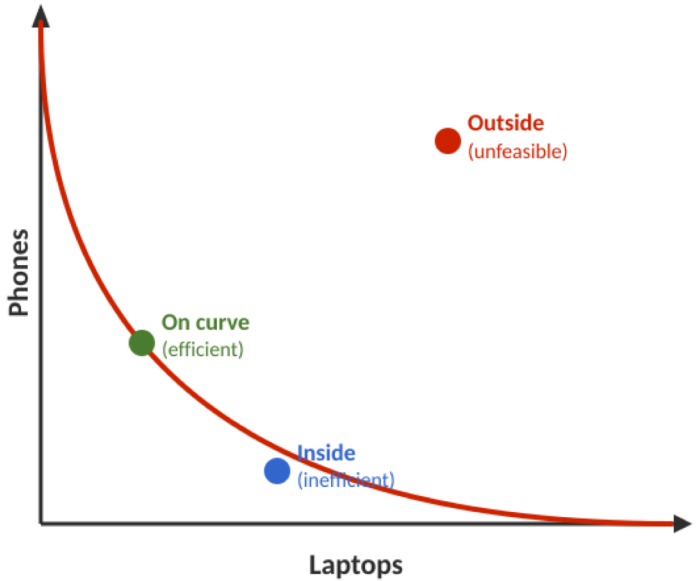
Points on the PPF: Feasibility & Efficiency

Feasible combinations
Any combination on or inside the PPF can be produced with existing resources.

Unfeasible combinations
Any combination outside the PPF cannot currently be produced — more resources would be needed.

Unemployment of Resources
A point inside the PPF means some factors of production are idle. Output could be increased without sacrificing any other good.

Resource allocation:
Upper-left → more Good A; Lower-right → more Good B



Productive & Allocative Efficiency

Productive Efficiency

Achieved when all factors of production are used as efficiently as possible.

→ The firm/economy produces ON the PPF
→ Impossible to produce more of one good without reducing the other

Allocative Efficiency

Occurs when resources are allocated to produce the combination of goods that best meets the demands and preferences of society.

→ A specific point on the PPF
→ Cannot be determined from the diagram alone

Pareto Efficiency

A situation is Pareto efficient if it is impossible to make one person better off without making someone else worse off.

- Any point ON the PPF is Pareto efficient — moving along the curve makes one group worse off
- Points INSIDE the PPF are not Pareto efficient — reallocation could improve output at no cost

Shape of the PPF: Curved vs Straight Line

Curved PPF (typical)



Law of Increasing Opportunity Cost:
As output of one good rises, more and more of the other must be sacrificed. Resources are not perfectly adaptable between uses.

Straight Line PPF (special case)



Constant Opportunity Cost:
Each unit sacrificed releases exactly the same resources — resources are perfectly substitutable between uses.

Economic Growth: Shifts of the PPF

Outward shift = Economic Growth

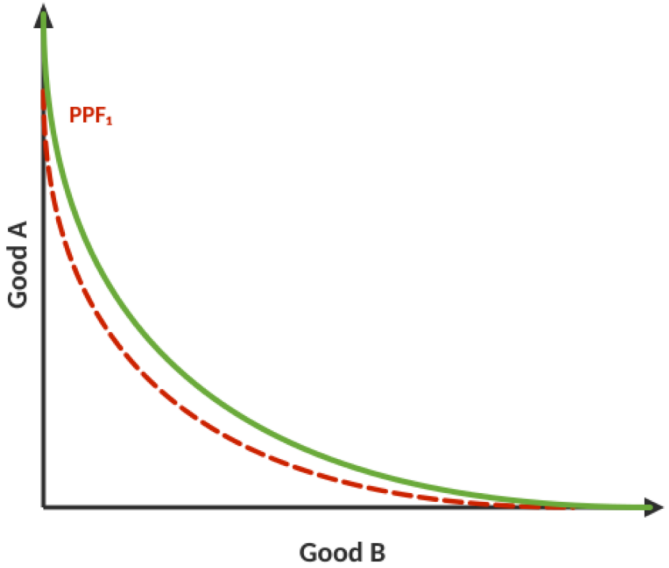
The PPF shifts outward when the quantity or quality of factors of production increases — the economy can now produce more of both goods.

Causes of an outward shift (Q^2 CELL):

- Capital — more/better machinery or technology
- Enterprise — improved management or innovation
- Labour — more workers or a more skilled workforce
- Land — discovery/improvement of natural resources

Inward shift

Productive capacity falls — e.g. war, natural disaster, emigration of skilled workers, capital depreciation.



Macro PPF: Consumer Goods vs Capital Goods

At the macro level the PPF is often drawn for:

Consumer Goods — goods that directly satisfy wants (food, cars, clothes)

Capital Goods — machinery that helps produce more goods in the future

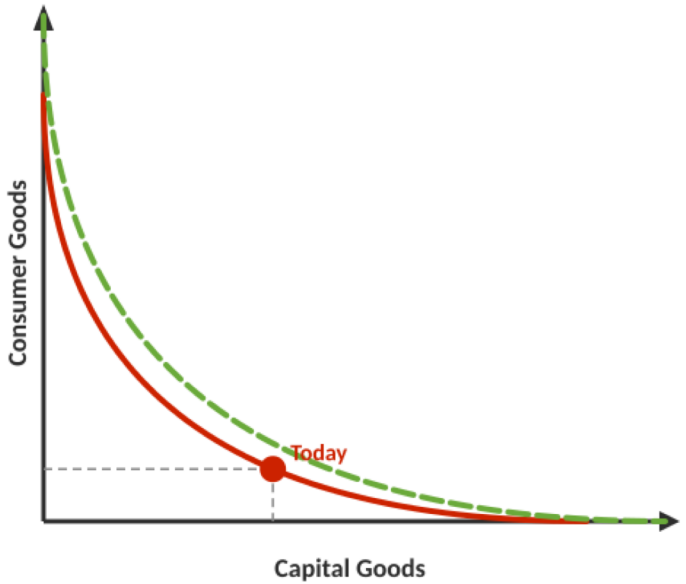
Present sacrifice for future gain:

Moving along the PPF towards more capital goods (sacrificing consumer goods today) builds productive capacity, shifting the future PPF outward.

Robert Solow (Solow Growth Model):

The key to economic growth is capital accumulation. Developing economies must sacrifice short-term consumption to invest in capital — only then can they converge on the GDP levels of advanced economies.

Ceteris paribus — the PPF shifts only when the quantity/quality of CELL factors changes.



What Determines the PPF? — Q^2 CELL

The PPF shifts only when there is a change in the QUANTITY or QUALITY of factors of production (CELL):

Capital

More machinery or better technology raises productive potential. E.g. a new automated assembly line.

Labour

More workers (immigration, higher birth rate) or more skilled workers (education, training).

Enterprise

Better management, entrepreneurship, and innovation. E.g. new business models that reduce waste.

Land / Natural Resources

Discovery of new resources or improved agricultural methods that raise land productivity.

Remember: a movement along the PPF is NOT a shift — it is a reallocation of existing resources between goods.

Summary: Key Terms & Relationships

Key Term	Meaning
Scarcity	The fundamental economic problem: unlimited wants, finite resources.
PPF	A curve showing maximum combinations of two goods producible with given resources.
Opportunity Cost	Benefit of the next best alternative foregone when a choice is made.
Law of Increasing Opp. Cost	Each additional unit of a good requires an ever-larger sacrifice — causing concavity.
Productive Efficiency	On the PPF — no waste; impossible to produce more of one good without less of another.
Allocative Efficiency	The combination on the PPF that best satisfies society's preferences.
Pareto Efficiency	No reallocation can make anyone better off without making someone worse off.
Outward PPF Shift	Economic growth — increase in quantity or quality of CELL factors.
Inward PPF Shift	Reduction in productive capacity — war, natural disaster, emigration, capital depreciation.