

# Foundations of Economic Analysis & Explanation

## Lecture 4: The Opportunity Cost and Applications

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# Economics vs The Economy

"The economy" and "economics" are not the same thing. It's easy to say what economics is: it's the academic discipline that studies the economy. But what is the economy? That, it turns out, is a harder question.

- For the field of economics, the standard definition of the economy focuses on the choices people make about using scarce resource.
- Specifically, by the standard definition, the economy is how we make decisions about using resources that are limited in amount or availability.
- Economists call these "scarce" resources, but they're using the term scarce in a special, technical sense. This means the economy is largely about trade-offs.
- Because most resources are limited in some way, our decisions about how to use them involve trading off one possible use for another.

Greg Forster (2019) Economics: A Student's Guide. Crossway. pp.18-19.

# OVERVIEW

- The Opportunity Cost
- Applications and Examples
- Highlights on Opportunity Cost
- Production Possibilities Frontier



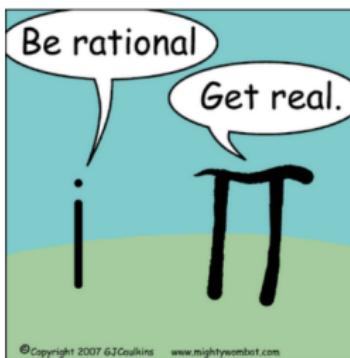
This lecture introduces the pivotal concept of opportunity cost in Economics and applies it to individual decisions. As an introductory example of economic models, the Production Possibilities Frontier illustrates the opportunity cost in production and consumption.

## OUTLINE

- 1 The Opportunity Cost
  - 2 Applications and Examples
  - 3 Production Possibilities Frontier
  - 4 Appendix

# The Starting Point of Economics

- Rationality
  - Self-interest
  - Economic man



Economics is the study of choice under scarcity.

The postulate of Economics is rationality.

What is its implication? Answer: Decision-makers know how to choose the best option. Individual knows how to achieve maximum benefits at a minimum cost.

# Economic Reasoning Propositions

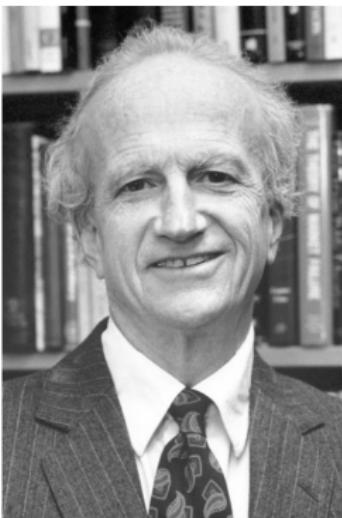
- ① People choose, and individual choices are the source of social outcomes. Scarcity necessitates choices: not all of our desires can be satisfied.
  - ② Choices impose costs; people receive benefits and incur costs when they make decisions. The cost of a choice is the value of the next-best alternative foregone, measurable in time or money or some alternative activity given up.
  - ③ People respond to incentives in predictable ways.
  - ④ Institutions are the "rules of the game" that influence choices.
  - ⑤ Understanding based on knowledge and evidence imparts value to opinions.

<https://www.fte.org/teachers/teacher-resources/economic-reasoning-propositions/>

# Economics: Decision and Behavior

The 1992 Nobel Prize in Economics was awarded to Gary S. Becker "for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including nonmarket behaviour." Applications of his basic model:

- Investments in human capital
  - Behavior of the household (work distribution and time allocation)
  - Crime and punishment
  - Discrimination on the markets



<https://www.nobelprize.org/prizes/economic-sciences/1992/summary/>

## Special Meaning of Opportunity Cost

- In Economics, cost is specifically referred to opportunity cost. For brevity, just call it cost.
- The cost of an event is the highest-valued opportunity necessarily forsaken. The cost of any chosen act is the most valuable forsaken alternative opportunity.
- Therefore, all costs are tied to actions, not things.
- All costs relevant decision making lie in the future.
- Costs are always the opportunities that particular people sacrifice. All costs are costs to someone who places value on forgone opportunities.

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## Opportunity Cost: Example 1

Suppose you face two job choices: A or B.

	Income	Cost
A	\$20/hr	?
B	\$30/hr	?



What is the opportunity cost of working as A?  
What is the opportunity cost of working as B?

## Opportunity Cost: Example 2

Three choices A, B or C

	Income	Cost
A	\$20/hr	?
B	\$25/hr	?
C	\$30/hr	?



What is the opportunity cost of working as A?

What is the opportunity cost of working as B?

What is the opportunity cost of working as C?

## Opportunity Cost: Highlights

The cost of an event is the highest-valued opportunity necessarily forsaken.  
Three implications:

- No Choice, No Cost.
  - Historical Cost is Not a Cost.
  - Cost is Forward-Looking (Ex Ante).

Cost is tied to an action or decision. No choice, no cost, no economics!  
Almost never can we encounter a situation in which there is no alternative.  
Always think about the alternative! Moreover, opportunity cost shall NOT be measured in historical terms. We should try to avoid making decision based on historical costs. The best thing we can do is to look forward and estimate the cost ahead of the decision!

## Opportunity Cost: Application I

Q1. If all students in college are required to take Economics, is it an opportunity cost to the students?

Q2. Biwei is a philatelist. Ten years ago, he bought a 1980 issue Chinese monkey zodiac stamp at \$100.

- What is the opportunity cost of holding it?
  - Shall Biwei sell it now? Why?



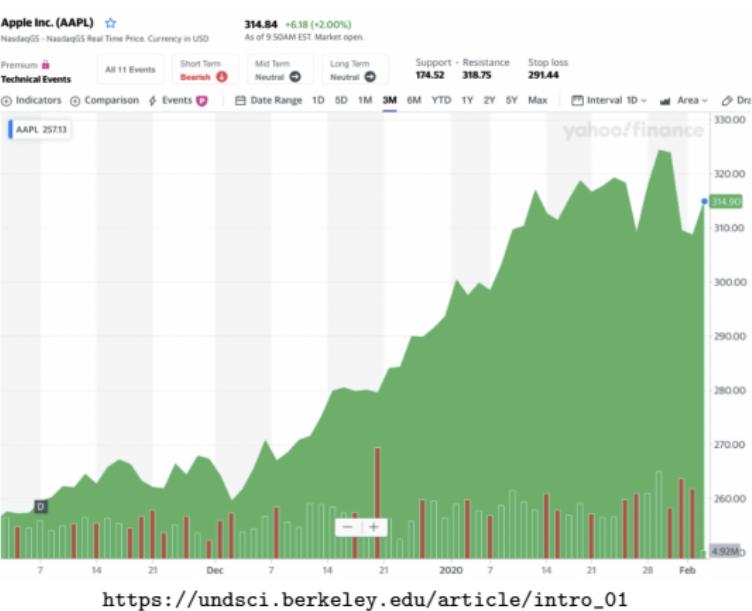
[https://www.ebay.com/b/Monkeys-Chinese-Stamps/68114/bn\\_27132867](https://www.ebay.com/b/Monkeys-Chinese-Stamps/68114/bn_27132867)

## Opportunity Cost: Application II

Biwei bought a share of apple stock at \$320 last week. The current price is \$315. Should Biwei sell it now or tomorrow given the following two scenarios?

- Expect it would continue to drop to \$310 tomorrow
  - Expect it would rise to \$325 tomorrow

Note: Assume Biwei will need the money by tomorrow.



## Opportunity Cost: Application III

- Accounting: market value vs historical book value
- Corporate finance: the cost of capital (debt and equity) in financing and investment decisions
- The evolution of accounting rules and corporate business principles dealing with capital and asset values
- Financial regulation: solvency and liquidity problems arising from mark-to-market practices can cause fire sale, bank runs and financial panic

In the 1980s, there was not as much mark-to-market accounting (because the crisis involved loans that weren't traded every day in public markets), so the banks were not as "insolvent" as they were in 2008 when asset price crash triggered fire sales. With more mark-to-market accounting in 2008, the banks required capital injections and/or guarantees to improve their balance sheets.

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# An Opportunity Cost Model: Production Possibilities Frontier

**Production Possibilities Frontier or PPF model is a graph showing all the possible combinations of output that the economy can produce given the available factors of production and technology.**

A PPF model has three components:

- ① Input: Production factor(s)
- ② Output: Goods and services
- ③ Technology: Means to an end

It is a model of the production capacity of an economy.

## The PPF Model: Assumptions

- An economy consists of one input and two outputs
- Assumptions on output and productivity
  - Two goods: computers and wheat
  - One resource: labor (measured in hours)
  - Economy has 50,000 labor hours per month available
  - Producing one computer requires 100 hours labor.
  - Producing one ton of wheat requires 10 hours labor.

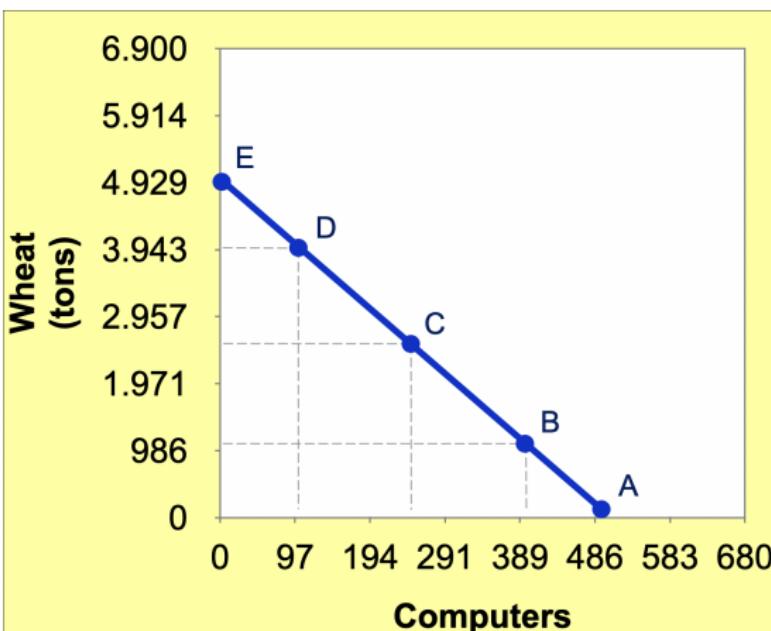
# The PPF Model

- Producing one computer requires 100 hours labor.
- Producing one ton of wheat requires 10 hours labor.

	Employment of labor hours		Production	
	Computers	Wheat	Computers	Wheat
A	50,000	0		
B	40,000	10,000		
C	25,000	25,000		
D	10,000	40,000		
E	0	50,000		

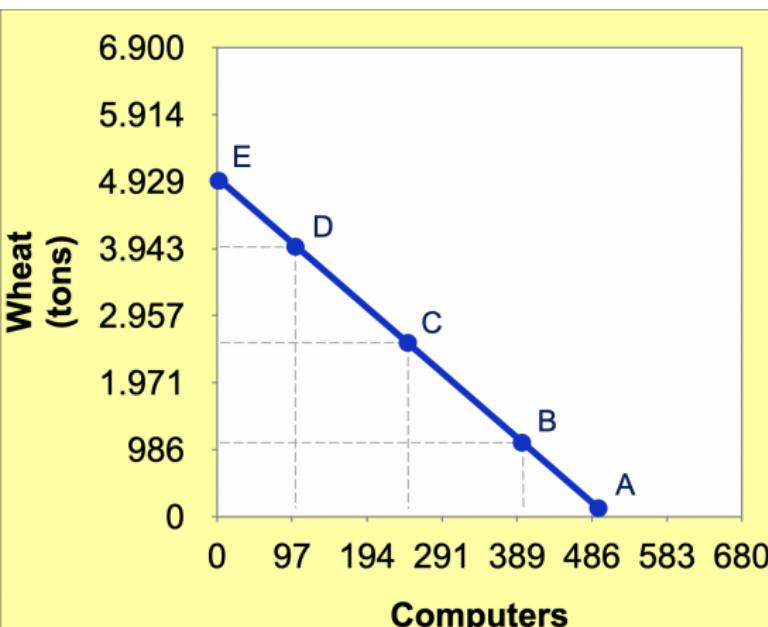
## The PPF Model

<i>Point on graph</i>	<i>Production</i>	
	<i>Com- puters</i>	<i>Wheat</i>
A	500	0
B	400	1,000
C	250	2,500
D	100	4,000
E	0	5,000



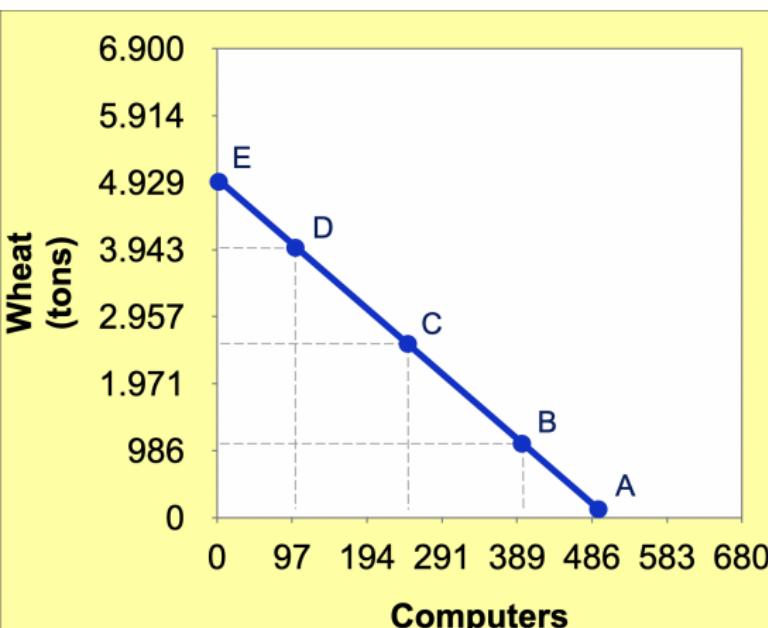
# The PPF Model: ACTIVE LEARNING

- On the graph, find the point that represents (100 computers, 3000 tons of wheat), label it F.
- Would it be possible for the economy to produce this combination of the two goods? Why or why not?



# The PPF Model: ACTIVE LEARNING

- Next, find the point that represents (300 computers, 3500 tons of wheat), label it G.
- Would it be possible for the economy to produce this combination of the two goods?



# The PPF: Production Efficiency

Points on the PPF (like A–E)

- Possible
- Efficient: max output without a waste of resources

Points under the PPF (like F)

- Possible
- Inefficient: some resources underutilized (e.g., workers unemployed, factories idle)

Points above the PPF (like G)

- Impossible: resources are limited and scarce

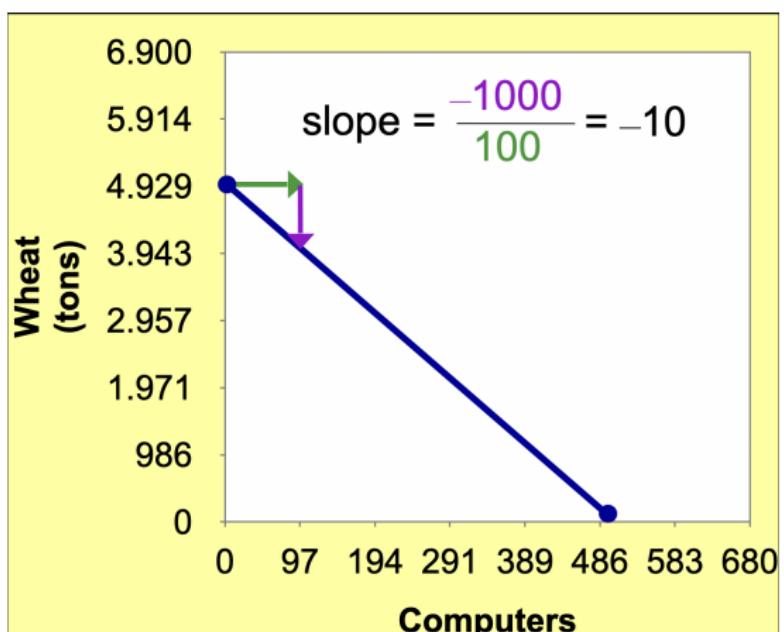
Efficiency can be viewed in the relation between ends and means.

Efficiency implies maximum benefit is achieved at a minimum cost.

# The PPF and Opportunity Cost

- Recall that the opportunity cost of an item is what must be forgone to obtain that item.
- Moving along a PPF involves shifting resources (e.g., labor) from the production of one good to the other.
- Society faces a tradeoff: Getting more of one good requires sacrificing some of the other.
- The slope of the PPF tells you the opportunity cost of one good in terms of the other.
- More fundamental, the opportunity cost of production is the time sacrificed in labor hours.

# The PPF Model: ACTIVE LEARNING



The slope of a line is "rise over the run," the amount the line rises when you move to the right by one unit.

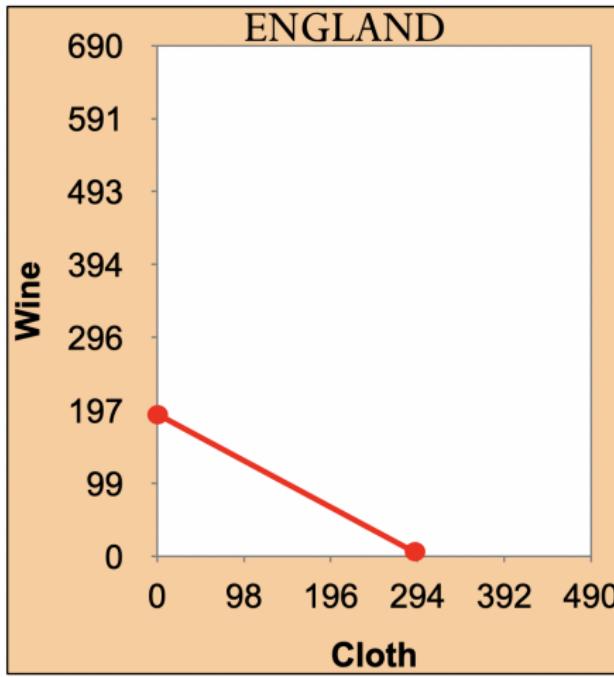
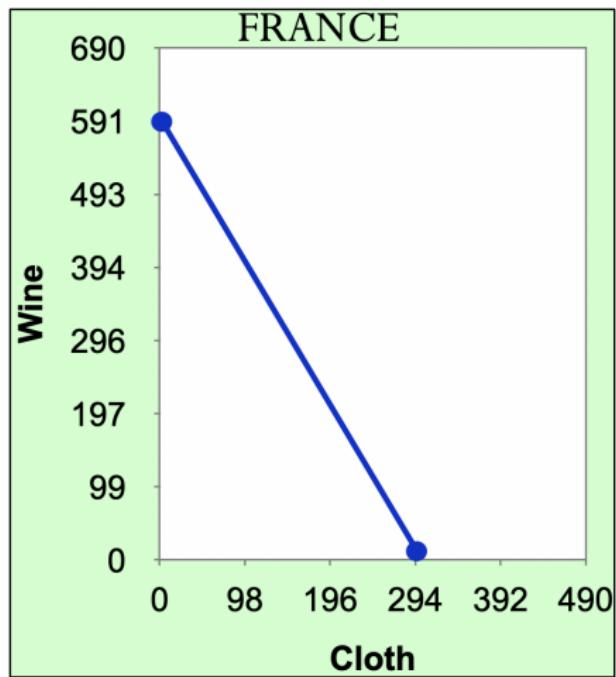
What is the production cost of a computer?

What is the production cost of a ton of wheat?

What is the production cost of a computer and a ton of wheat?

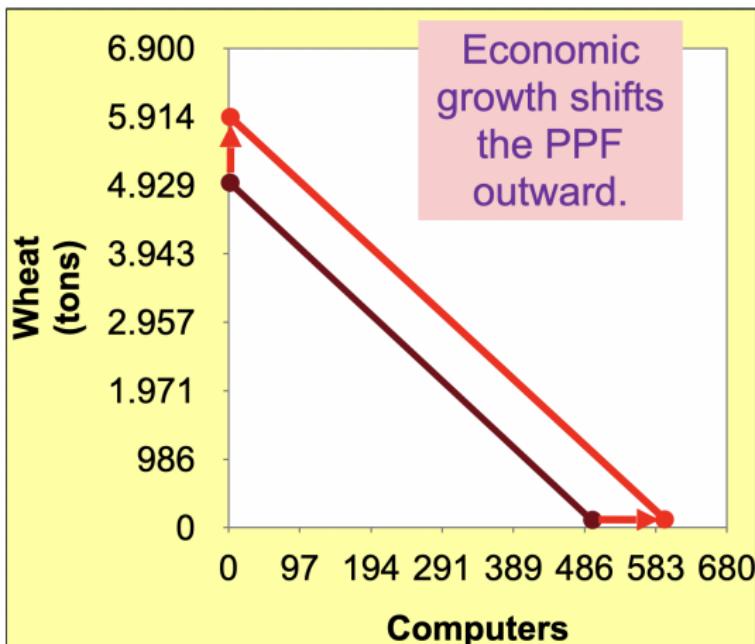
# PPF and Opportunity Cost: ACTIVE LEARNING

In which country is the opportunity cost of cloth lower?



# The PPF and Economic Growth

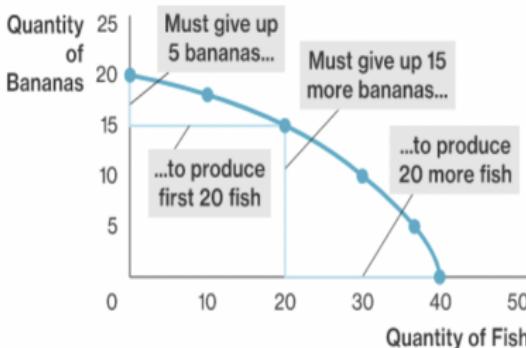
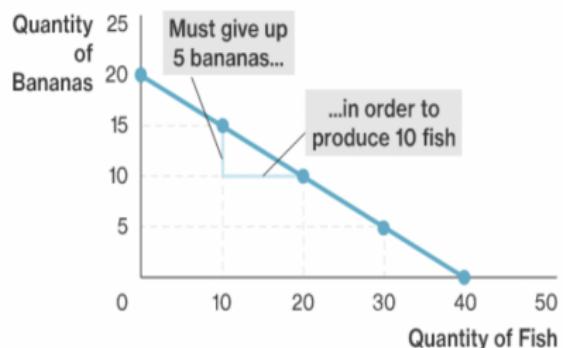
With additional resources such as immigration or an improvement in productivity, the economy can produce more computers, more wheat, or any combination of more of both compared with the initial condition.



# The Shape of the PPF

- The PPF could be a straight line, hump-shaped, or bow-shaped.
- Why can PPF have various shapes, intuitively and economically? Which shape of the PPF is most realistic?
- Depends on what happens to the opportunity cost of production as economy shifts resources from one industry to the other.
  - If opportunity cost remains constant, PPF is a straight line.
  - If opportunity cost of a good rises as the economy produces more of the good, the PPF is hump-shaped, which implies increasing cost of production.
  - If opportunity cost of a good falls as the economy produces more the good, the PPF is bow-shaped.

# Linear PPF and Concave PPF



- Linear PPF: constant opportunity cost of production.  
Reason: Homogeneous input and seamless transformation.
- Concave PPF: rising opportunity cost of production.  
Reason: The law of diminishing marginal product.  
Production inputs are heterogeneous and not fully compatible.

## PPF: Reality, Intuitions and Lessons

- Which shape of PPF is a better description of reality? Why?
- Suppose you have eight hours to prepare for the midterm, would you be able to draw the PPF for the total hours-exam scores tradeoff? (Tips:  $Y$  – 8 hours,  $X$  – 100 scores.)
- Intuition I: it takes more time (opportunity cost) to improve from 90 to 100 than from 60 to 70. Not every hour is equally productive.
- Intuition II: the first two hours of study is usually more productive than the second two hours (diminishing marginal product) because you will get tired if you study too hard for too long.
- Lesson I: to make the most out of your effort, it is more efficient to focus on the basic concepts and easiest part first.
- Lesson II: for every hour or two, take a break and refresh yourself. All work and no play makes Jack a dull (unproductive) boy.

# The PPF Model: Summary

- The PPF shows all combinations of two goods that an economy can possibly produce, given its resources and technology.
- The PPF illustrates the concepts of tradeoff and opportunity cost, efficiency and inefficiency,
- The PPF explains the effects of migration and unemployment, technology progress and economic growth, disasters and crises.
- Various shapes of the PPF are driven by production technology and opportunity costs, e.g., a hump-shaped PPF illustrates the concept of increasing opportunity cost.

# Moving up the Pyramid of Knowledge

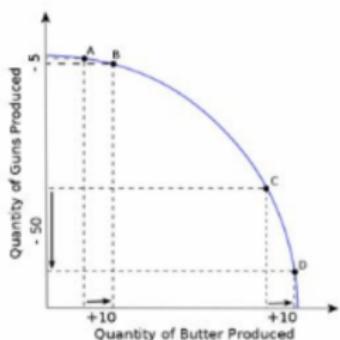
Students often mistakenly believe that learning is equivalent to memorizing. In contrast, college courses in economics expect students to progress to application and analysis. As an illustration,

- Can you remember/recite the definition of opportunity cost?
- Can you understand/restate/explain the definition of opportunity cost?
- Can you apply the concept of opportunity cost in a given context?
- Can you use the concept of opportunity cost to analyze, compare, and contrast situations?
- Can you suggest and justify using the concept of opportunity cost to analyze a novel economic situation?
- Can you evaluate/critique an analysis based on opportunity cost?
- Can you create a new use of the concept or create a related concept?

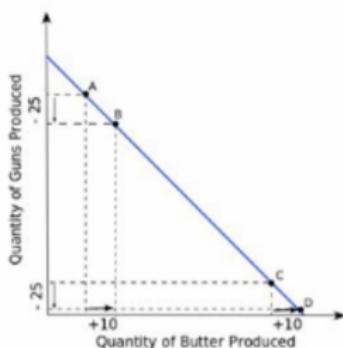
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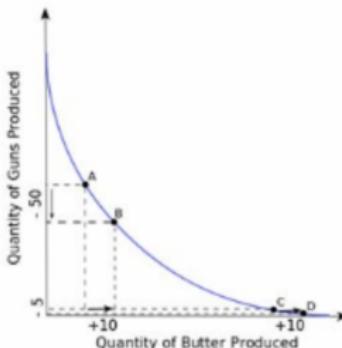
# PPF Shapes and Opportunity Costs



Increasing  
opportunity cost



Constant  
opportunity cost



Decreasing  
opportunity cost

Resources are not usually perfectly adaptable, and production doesn't usually change at a constant rate.

<https://slideplayer.com/slide/10917792/>

## References

Armen A. Alchian & William R. Allen (1969), Exchange and Production: Theory in Use, Belmont, California, Wadsworth Publishing Company, Inc.

N. Mankiw, Principles of Microeconomics, 8th edition. South-Western

Scott A. Wolla, "Choices Are Everywhere: Why Can't We Just Have It All?"  
Page One Economics, January 2013 [Link]

## Opportunity Cost

<https://www.econlib.org/library/Enc/OpportunityCost.html>

## Efficiency

<https://en.wikipedia.org/wiki/Efficiency>

## Videos

202010 Is An Online Master's Degree Worth The Money? | CNBC 8:37

<https://www.youtube.com/watch?v=gkyoSPk1uuA>

201902 Why College Is So Expensive In America | CNBC 18:04

<https://www.youtube.com/watch?v=aWJ0OaojfiA>

201812 Why Medical Bills In The US Are So Expensive | CNBC 14:56

<https://www.youtube.com/watch?v=3NvnOUcG-ZI>

201810 What's the Cost of Corruption? | CNBC 6:49

<https://www.youtube.com/watch?v=JUjGUpg2I0k>