

# Economic Models

EC 201: Principles of Macroeconomics

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# Two questions

What experiments can we run to answer these questions?

## **Question # 1**

Is copper a better conductor of electric current than iron?

## **Question # 2**

Does poor insurance coverage increase infant mortality?

# Economic Models

- Economic models are “labs” where economists as social scientists run “experiments”
- An economic model is a simpler version of real life
- While simple, it is realistic and often quite powerful
- We will learn three such models in this class
  - 1 The Production Possibilities Frontier (PPF) model
  - 2 The Comparative Advantage Model of trade
  - 3 The Circular Flow Model of the economy

# Context

- We make numerous choices in our daily lives
- When making choices we face trade-offs
- PPFs help us analyze these trade-offs and the consequent **opportunity costs**
- In today's class we will see how we can use PPF to learn about
  - 1 Efficiency
  - 2 Opportunity costs
  - 3 Economic growth

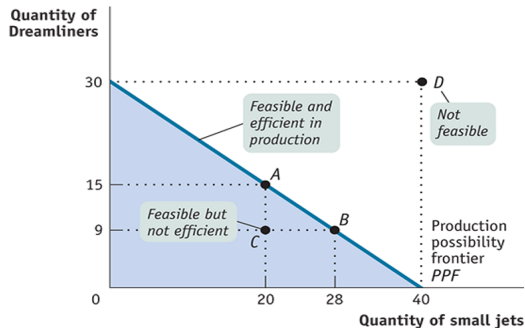
# PPF is a Diagram

- The PPF is a diagram that shows the combinations of two goods that are possible for a society to produce with available resources and current technology.
- The PPF model can help us answer questions like
  - ▶ How much can we produce?
  - ▶ What will it cost us to change our mix of production?
  - ▶ Does it make sense to import the good from somewhere else?

# PPF Tells Us About Opportunity Costs and Efficiency in Production

- Boeing can produce Dreamliners, or small jets (choices)
- Producing more small jets requires reducing the number of Dreamliners produced (opportunity cost)
- Points on the PPF are **attainable and efficient**
- Points below the PPF are **not efficient**
- Points above the PPF are **not feasible** with the current resources and technology

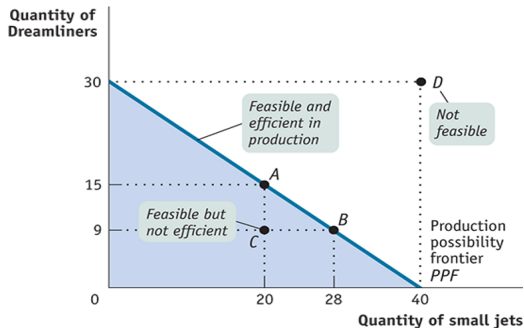
Boeing's Production Possibilities		
Combination	Quantity of Dreamliners	Quantity of Small Jets
1	0	40
2	9	28
3	15	20
4	30	0



# Straight Line PPF Represents Constant Marginal Opportunity Costs

- If Boeing decides to change its production from point A to point B, it will produce 8 more small jets but 6 fewer Dreamliners: each small jet has an marginal opportunity cost of  $\frac{6}{8} = \frac{3}{4}$  of a Dreamliner.
- What would be the marginal opportunity cost if Boeing goes from producing no small jets to producing 20 of them? From 28 to 40?
- What can we say about the marginal opportunity cost along the PPF?

Boeing's Production Possibilities		
Combination	Quantity of Dreamliners	Quantity of Small Jets
1	0	40
2	9	28
3	15	20
4	30	0



# Make Your Own PPF!

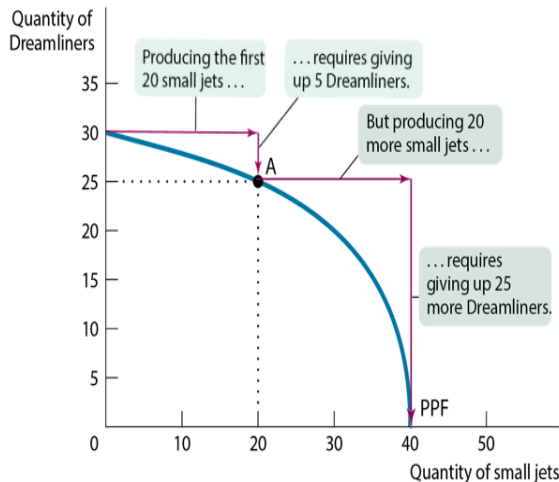
- In 30 seconds each, record how many
  - ▶ Happy faces you can draw
  - ▶ Elephants you can draw
- Now construct your PPF with elephants on the vertical axis and faces on the horizontal axis.
- Can you calculate the opportunity cost of drawing each?





# Real Life PPF Has Bowed-out Shape

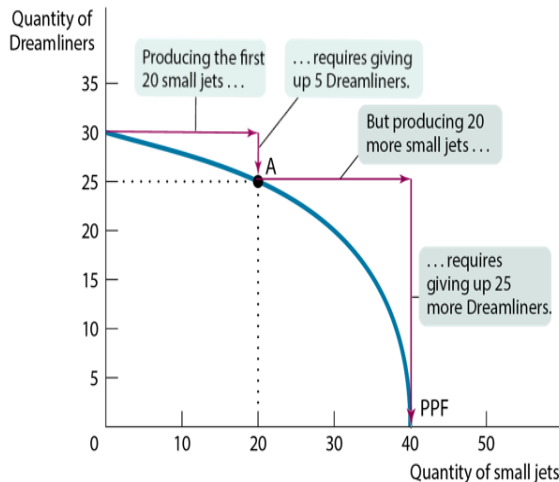
- So far we have assumed that marginal opportunity costs are constant across the PPF. **In reality, marginal opportunity costs are often increasing.**
- This means that in **real life, PPFs often have a bowed-out shape** as shown on the right.



# Bowed-out PPF Means Increasing Marginal Opportunity Cost

Why are marginal opportunity costs increasing?

- **Some resources are better suited to one task than another.** The first resources to “switch” are the one best suited to switching.
- The more resources already devoted to an activity, the smaller the payoff to devoting additional resources to that activity and thus higher the marginal opportunity cost.



# Let's Apply the Concepts!

In a group of 2-3, discuss the following question and come up with an answer as a group

Suppose you have a limited amount of time to study for two exams tomorrow, EC 201 and BA 201.

What would the PPF for the exam grades look like? **Why?**

- 1 A straight line PPF
- 2 A bowed-out PPF

# Increasing Marginal Opportunity Cost of Studying

## Studying economics and test grades

*The more hours you have already spent studying economics, the smaller the increase in your test grade for each additional hours you spend studying—the greater the marginal opportunity cost of using your time this way.*

Is this true for studying Business/ Chemistry/ Music as well?

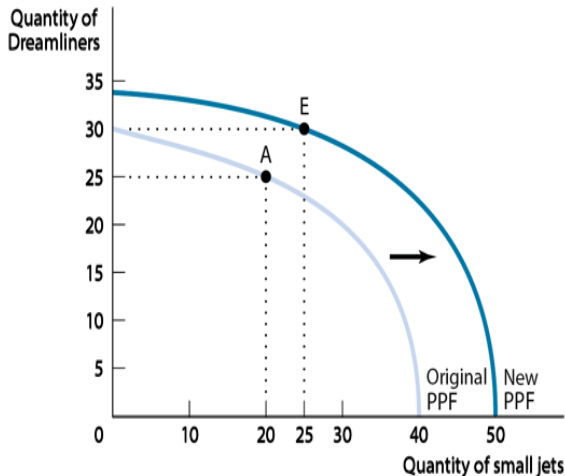
# Increasing Marginal Opportunity Cost in Real Life

Here are some more real-life situations of increasing marginal opportunity cost:

- **Research and development funds and new knowledge:** *The greater the amount of funds a firm has spent on research and development, the smaller the new knowledge added for each additional dollar—the greater the marginal opportunity cost of using funds this way.*
- **Using Land to produce corn vs. wheat:** *Producing more corn requires using less and less suitable land for corn production and thus leads to increasing marginal opportunity cost of producing corn.*

# An Outward Shift in the PPF Shows Economic Growth

- **Economic Growth** is the ability of the economy to produce more goods and services.
- It can occur for two reasons
  - 1 An increase in factors of production: land, labor, physical capital, and human capital
  - 2 Better technology: internet, smartphones, new software
- The outward shift in the production possibilities frontier represents economic growth.
- What if the PPF shifts inward? Is that possible? When?



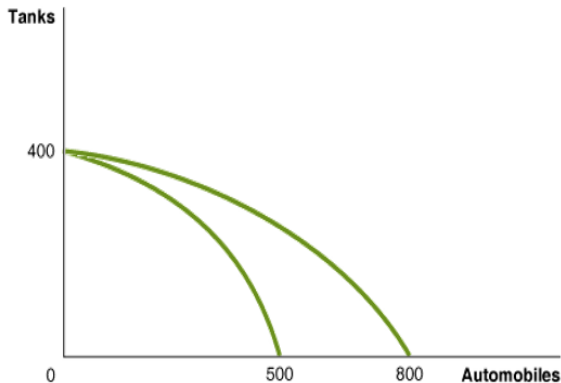
# With More Factors of Production Economy Can Produce More



Image Source: Krugman/Wells

# Technological Change Can Also Shift PPF Outward

- We can also show the effect of technological change using PPF
- This diagram shows technological improvement in the automobile industry.
- The quantity of tanks that can be produced remains unchanged, but we can produce 300 more automobiles due to better technology!

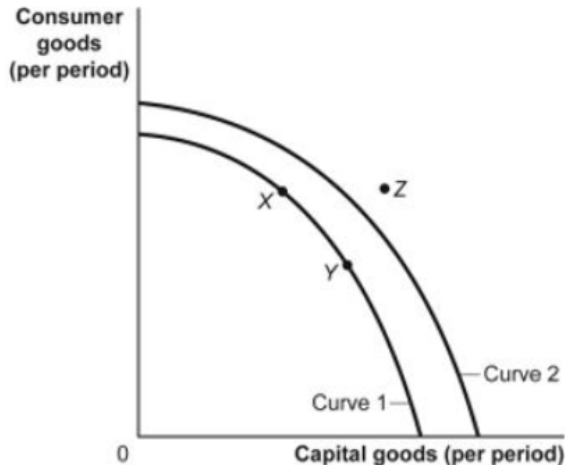


(b) Technological change in the automobile industry



# Practice Question 1

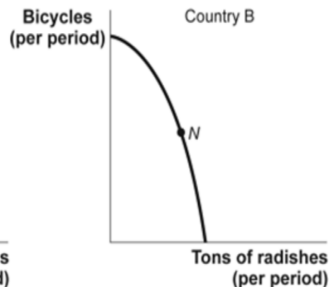
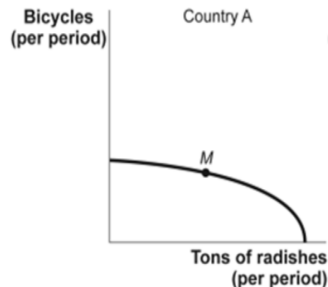
- What does movement from X to Y tell us?
- How about the movement from X to Z?



## Practice Question 2

Country A is producing at point M, and country B is producing at point N. The marginal opportunity cost of producing radishes would be greater in

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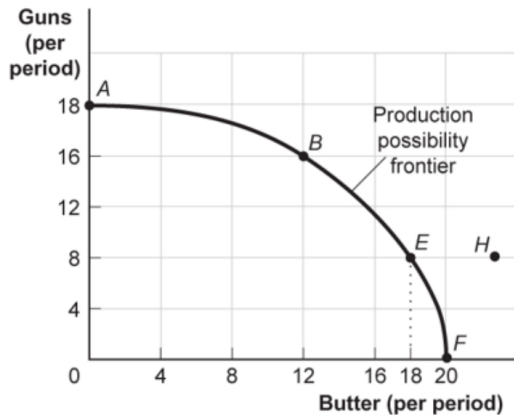


## Practice Question 3

Let's figure out the marginal opportunity cost of:

- Moving from A to B
- Moving from B to E

What do you find?



## A Quick Recap

- PPF is a nice, simple, and a powerful model/tool that helps us analyze trade-offs and opportunity costs faced by Dru, Alexandria, the city of Birmingham, the state of Alabama, or by the U.S.!
- In real life, PPF has a bowed-out shape. This means that the marginal opportunity cost increases as we go down the PPF.
- An outward shift in the PPF represents economic growth.
- Technological change could also shift PPF outward, but it need to affect all the sectors.