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Model Building and Gains from Trade: Positive v/s Normative

Previously . . .

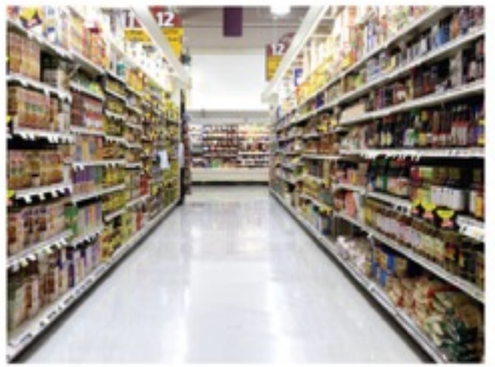
- Economics is the study of how people allocate their limited resources to satisfy their nearly unlimited wants.
- “Scarcity” refers to the limited nature of society’s resources.
- Incentives are factors that motivate a person to act or exert effort.

Big Questions

1. How do economists study the economy?
2. What is a production possibilities frontier?
3. What are the benefits of specialization and trade?
4. What is the trade-off between having more now and having more later?

Scientific Method in Economics

- Similar to “hard sciences”
  - Construct a theory (or hypothesis)
  - Design experiments to test the theory
  - Collect data
  - Revise or refute the theory based on evidence
- Difference from “hard sciences”
  - Economist’s lab is the world around us; firm and consumer behavior studied
  - Not always able to design experiments
  - Historical data often used



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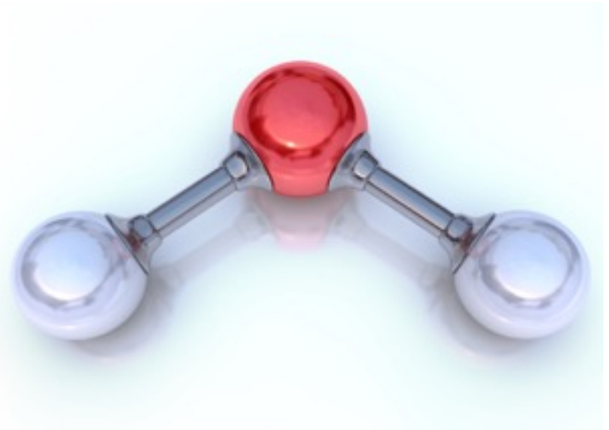
Model Building and Gains from Trade: Models and Ceteris Paribus

Economic Models

- Economists use models to understand the complex real-world economy.
- Models
  - Simplified versions of reality
  - Built with some assumptions
  - ~~Are considered good if they predict accurately~~
  - Are considered good if they are useful for the purpose they were designed for



Economic Models

- *Ceteris paribus*
  - Latin: “other things being equal”
  - Assumption in which we examine a change in one variable, but hold all other variables constant.
  - Allows us to isolate the effect of a single variable

Economic Analysis

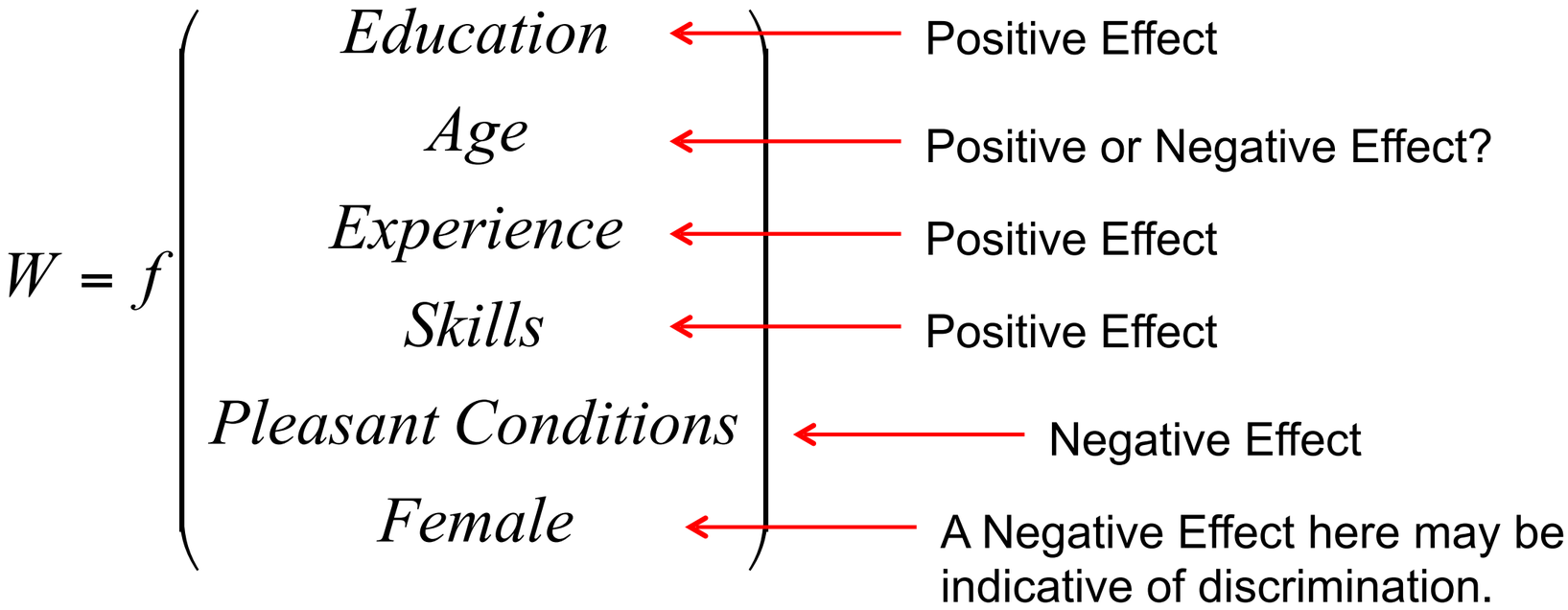
- Endogenous factors
  - Variables controlled for inside a model
  - Independent variables we freely change in the model equations to study their effect on the dependent variable
- Exogenous factors
  - Variables that are not accounted for in a model
  - Outside our control

Models and *Ceteris Paribus*

- What determines a person's wage rate?

$$W = f\left(\begin{array}{c} Education \\ Age \\ Experience \\ Skills \\ Pleasant\ Conditions \\ Female \end{array}\right)$$

Models and *Ceteris Paribus*



- Wage depends on the endogenous variables.
- How will a change in the variables affect wage?
- What might some exogenous variables be?

Models and *Ceteris Paribus*

$$W = f\begin{pmatrix} Education \\ Age \\ Experience \\ Skills \\ Pleasant\ Conditions \\ Female \end{pmatrix}$$

- *Ceteris paribus* analysis
  - Change just ONE of the dependent variables and examine how wage is affected. Assume other variables do not change.

Danger of Faulty Assumptions

- It is necessary to often examine and re-evaluate the assumptions in models.
- Example:
  - Assumption that housing prices always rise
  - Pre-2008 computer models used by banks didn't have a variable for declining housing prices

All Models are False…

A Model who does not understand modeling.

youtu.be/NQ-8IuUkJJc?t=55s

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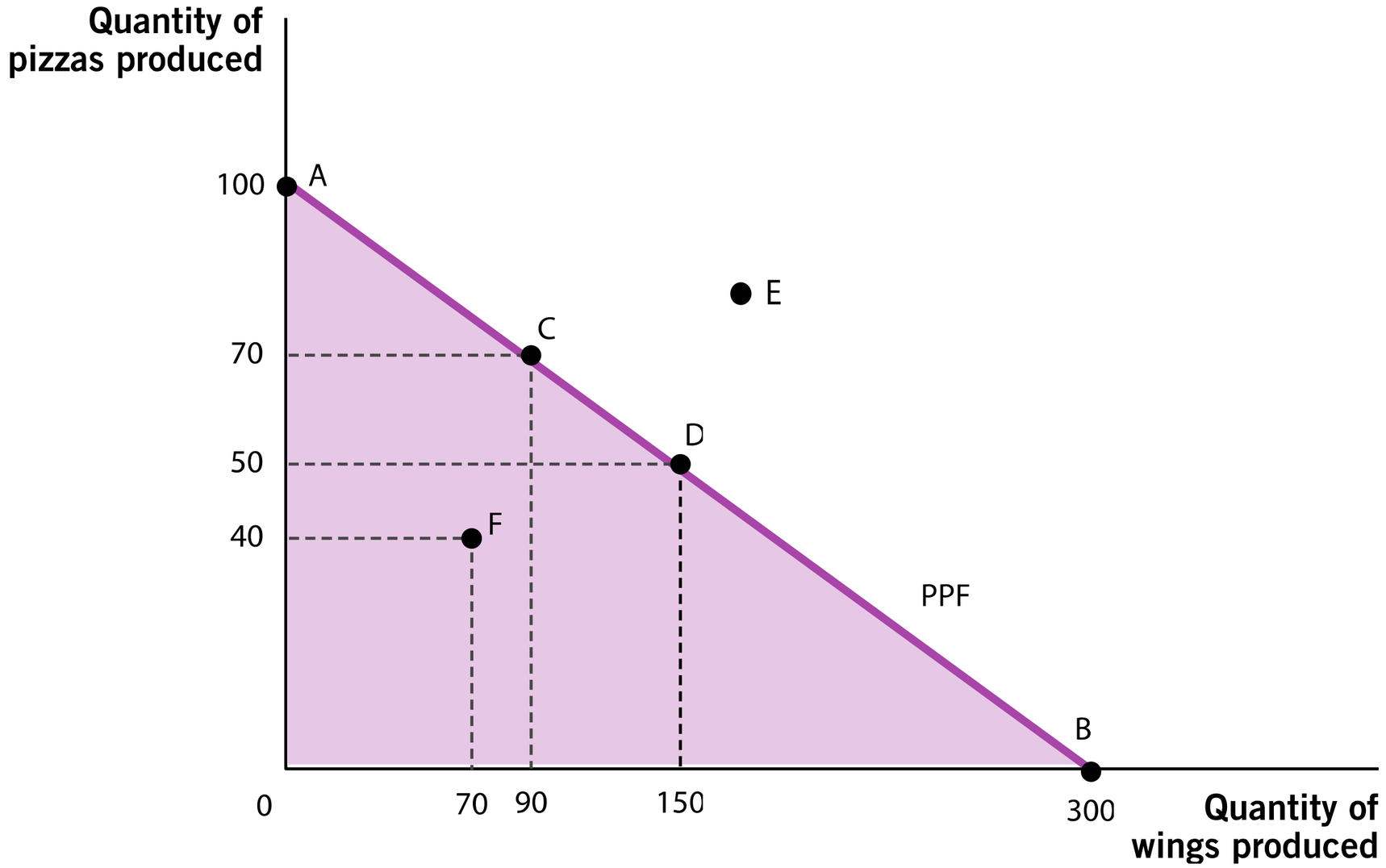
Model Building and Gains from Trade: Production Possibilities Frontier

Production Possibilities Frontier

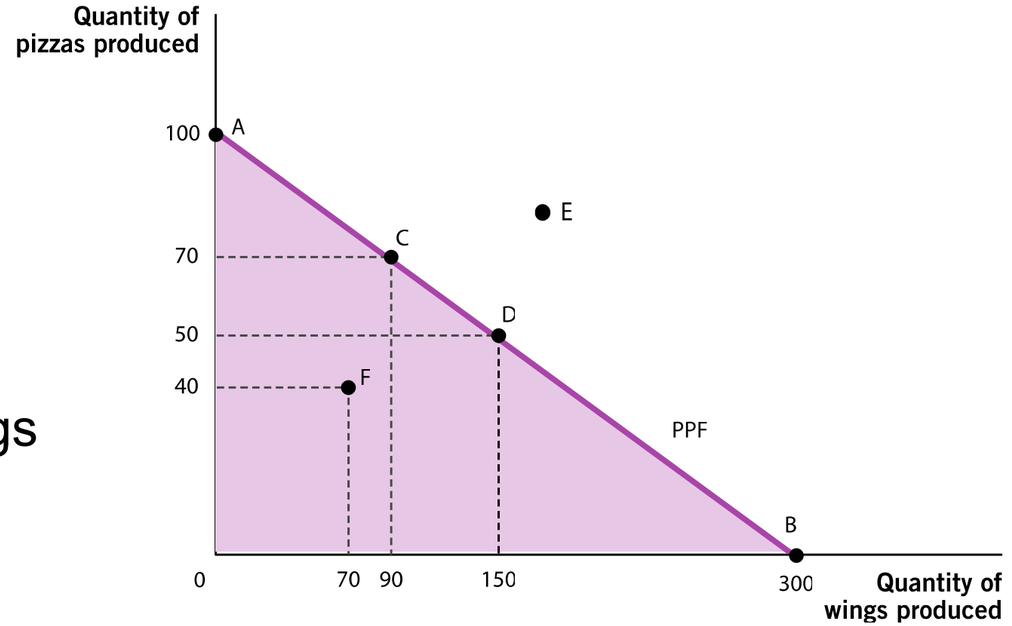
- Production possibilities frontier
  - Combinations of outputs that a society can produce if all of its resources are being used efficiently
- Assumptions of this model
  - Technology fixed
  - Resources fixed
  - Simplified two-good analysis

Production Possibilities Frontier



Production Possibilities Frontier

- Why is the PPF downward-sloping?
  - Must give up one good to increase production of another
- Why are we unable to produce certain combinations?
  - Scarcity and limited resources
- Efficient points
  - Points ON the PPF (A, B, C, and D)
- Inefficient points
  - Points INSIDE the PPF (F)
  - Workers goofing off, unused buildings
- Unattainable (for now) points
  - Points OUTSIDE the PPF (E)



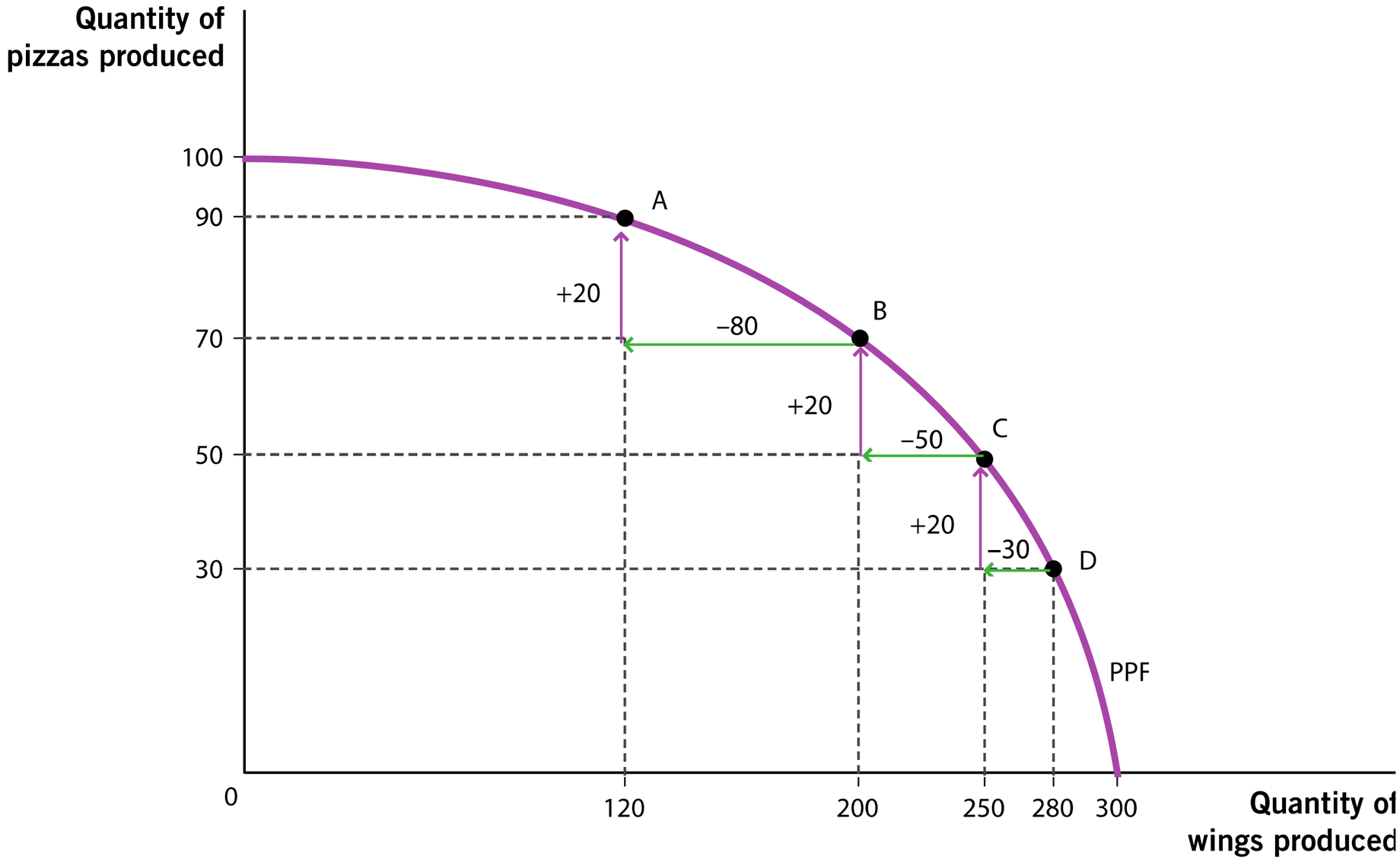
PPF and Opportunity Cost

- Recall opportunity cost
  - Highest-valued alternative
  - What we give up as a result of an action
- Opportunity cost in this case is the slope of the PPF

PPF and Opportunity Cost Nonlinear PPFs

- We can draw a more realistic PPF by making it nonlinear and “bowed outward.”
  - The PPF will not have a constant slope in this case.
  - The slope will get steeper as we move from left to right, and opportunity costs will not be constant.
- Law of increasing relative cost
  - Refers to the increasing opportunity cost of production that occurs as you move along the production
  - As we produce more of good A, we have to give up increasingly larger amounts of good B.

PPF and Opportunity Cost



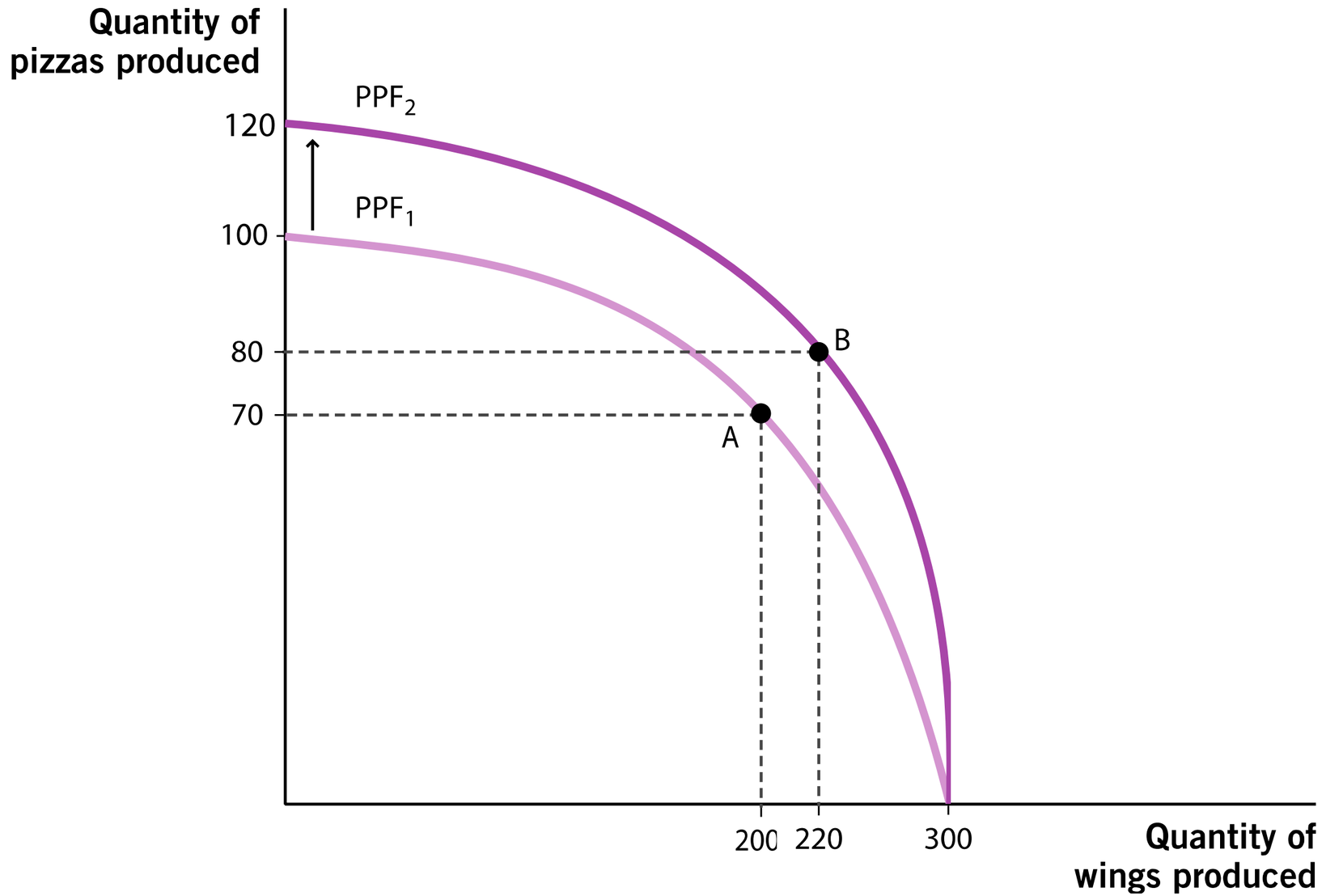
PPF and Opportunity Cost
Nonlinear PPFs

- Intuition of nonlinear PFFs
  - Inputs (resources) are not perfectly homogenous.
  - Some inputs are better at making pizza than other inputs.
  - As we expand pizza production, we'll use the inputs that are the best (Italian chef, dough-tossing master).
  - If we keep expanding production, we'll have to start using inputs that aren't as good at making pizza. They'll still be doing their best, but they won't make as much pizza as other inputs.
  - Pizza production doesn't expand at a linear rate!

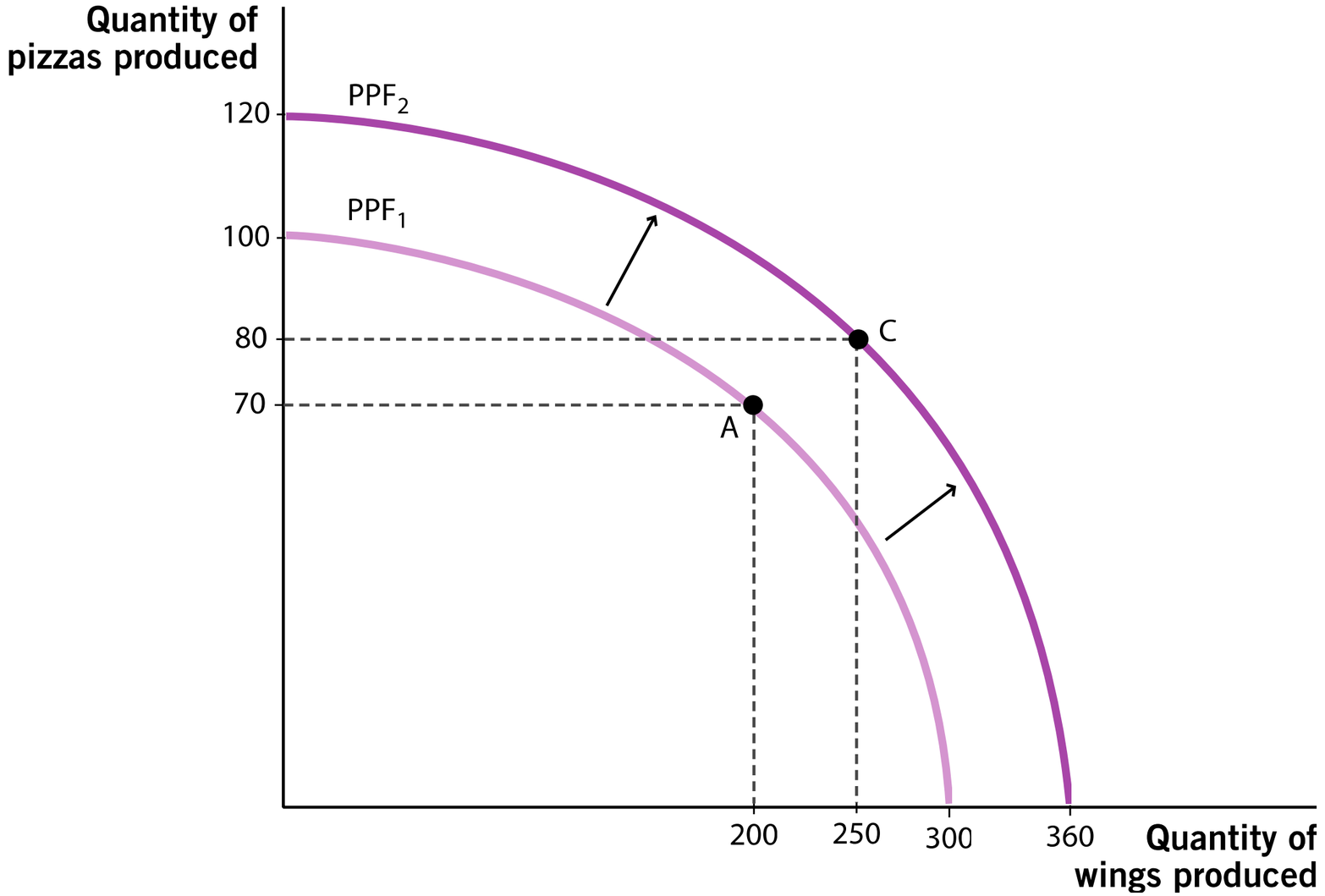
Shift in the PPF

- If the PPF were to expand outward, some previously unattainable good combinations would now be possible to produce.
- The PPF could shift graphically in two ways.
  - New resources or technology could be introduced that either
    - Affect the production of one good, or
    - Affect the production of both goods.

Shift in the PPF



Shift in the PPF



Diminishing Returns

http://www.criticalcommons.org/Members/AdrianFohr/clips/diminishing-returns-of-production

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Model Building and Gains from Trade: Specialization and Trade

Specialization and Trade

- Improvements in technology and more resources can make an economy more productive.
- Specialization and trade can also create gains for society.
- Assume now
  - Two goods (pizza and wings)
  - Two people with different abilities in the production of pizza and wings

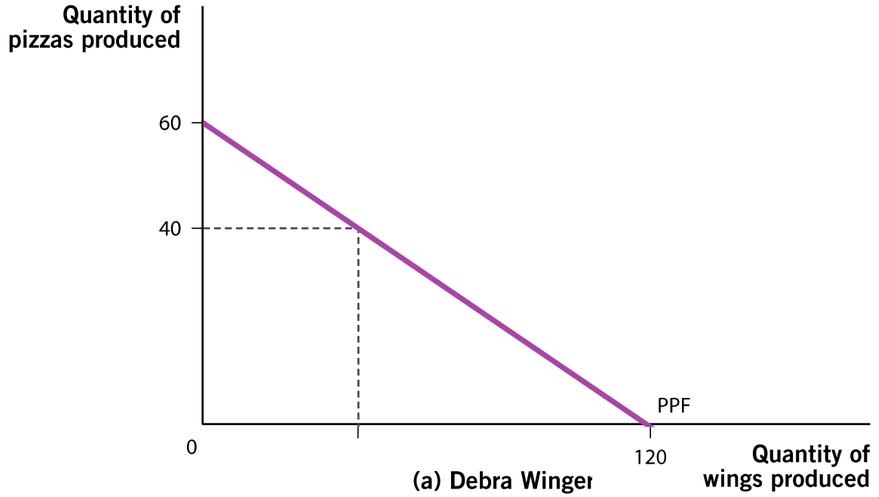
Specialization and Trade

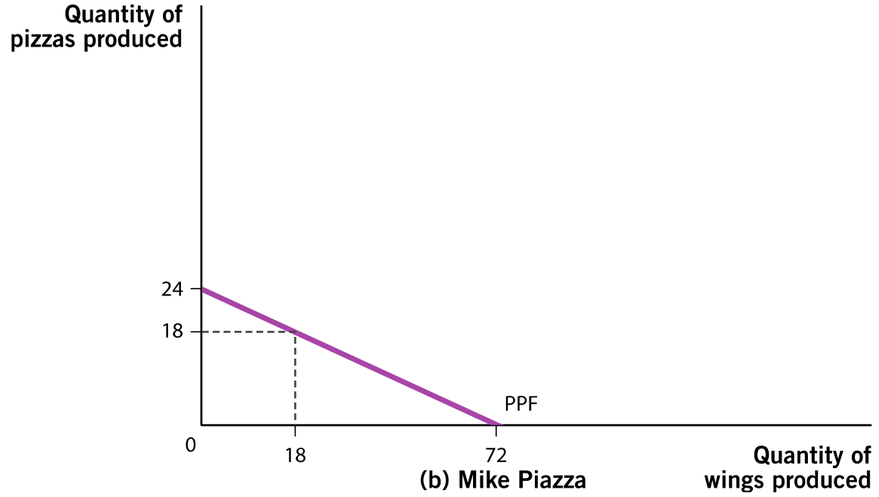
Person	 Daily Production	
	Make Only Pizzas	Make Only Wings
Debra Winger	60	120
Mike Piazza	24	72

- Absolute advantage
  - One person can perform each task more effectively than the other person.
  - Who has the absolute in pizza? In wings?

Specialization and Trade

Person	Daily production	
	Pizzas	Wings
Debra Winger	60	120
Mike Piazza	24	72





Specialization and Trade

		Without Trade	
Person	**Good**	**Production**	**Consumption**
Debra	Pizza	40	40
	Wings	40	40
Mike	Pizza	18	18
	Wings	18	18

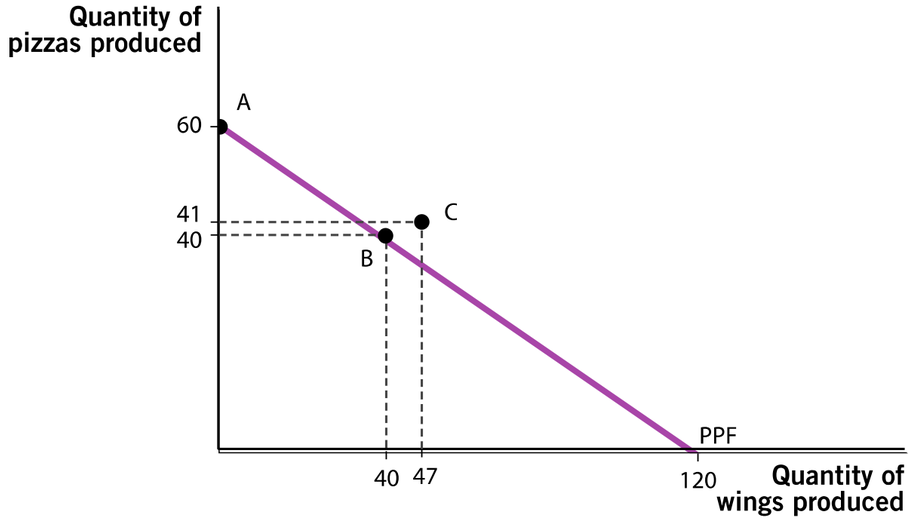
- Without specialization and trade
  - Mike and Debra each have to produce their own wings and pizza;
  - Each person can only consume what they produce.

Specialization and Trade

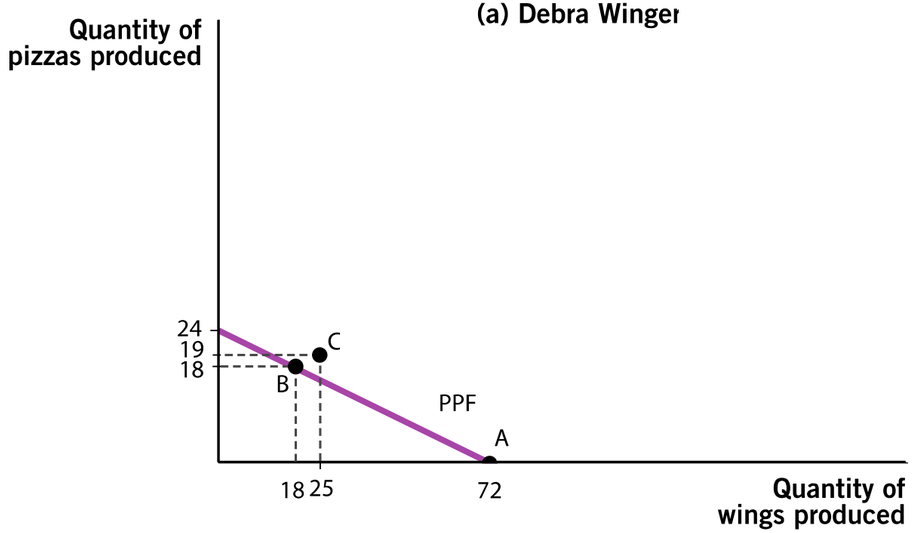
		With Trade		Gains from Trade
Person	Good	Production	Consumption	
Debra	Pizza			
	Wings	0	47 (from Mike)	+ 7
Mike	Pizza	0		
	Wings		25 (keeps)	+ 7

- With specialization and trade
  - Debra produces pizza and gives 19 pizzas to Mike;
  - Mike produces wings and gives 47 wings to Debra;
  - Each person consumes more with trade.

Gains from Trade



(a) Debra Winger



(b) Mike Piazza

Opportunity Cost

	Daily Production	
Person	**Pizzas**	**Wings**
Debra Winger	60	120
Mike Piazza	24	72

	Opportunity Cost	
Person	**1 Pizza**	**1 Wing**
Debra Winger		
Mike Piazza		

Opportunity Cost

Person	Opportunity Cost	
	1 Pizza	1 Wing
Debra Winger	2 wings (120 ÷ 60)	1/2 pizzas (60 ÷ 120)
Mike Piazza	3 wings (72 ÷ 24)	1/3 pizzas (24 ÷ 72)

- Comparative advantage
  - Debra: comparative advantage in pizza production
    - She *gives up* fewer wings than Mike.
  - Mike: comparative advantage in wing production
    - He *gives up* fewer pizzas than Debra.

Gains from Trade

- Previously, we noted the gains from trade and specialization.
- Terms of trade
  - The relative prices, or exchange rate of goods
  - How many wings per pizza?

Terms of Trade

Person	Opportunity Cost
	1 Pizza
Debra	2 wings
Mike Piazza	3 wings

Person	Opportunity Cost	Ratio
Debra Winger	1 pizza equals 2 wings	1:2 = 0.50
Terms of trade		
Mike Piazza	1 pizza equals 3 wings	1:3 = 0.33

- Terms of Trade
  - As long as the terms of trade are between the opportunity costs of the trading partners, the trade benefits both sides.

Economics in *Cast Away*

- *Cast Away* (2000)
  - Imagine a world in which there was no specialization and trade.
  - You would have to do everything by yourself.

https://www.youtube.com/watch?v=qybhVvjsEhE

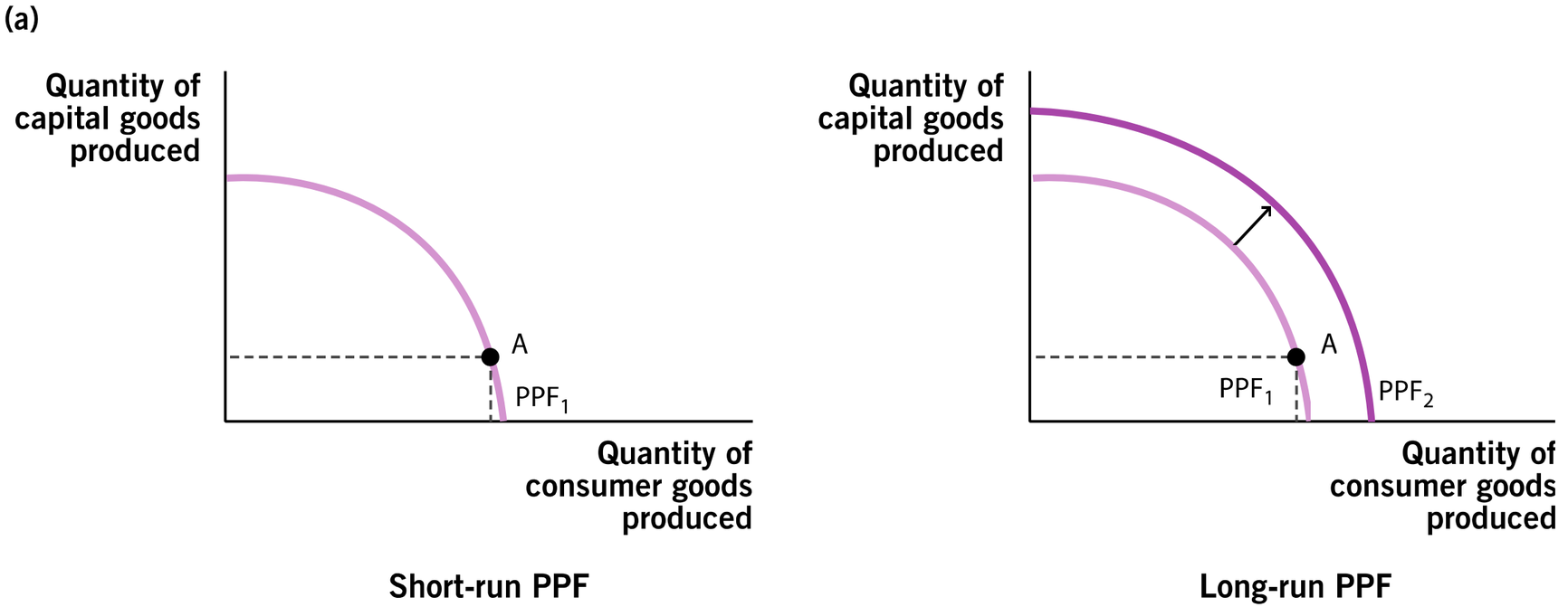
2 Model Building and Gains from Trade: Growth

Trade-off Between Present and Future

- Consumer goods
  - Goods produced for current consumption
  - Food, housing, clothing, entertainment

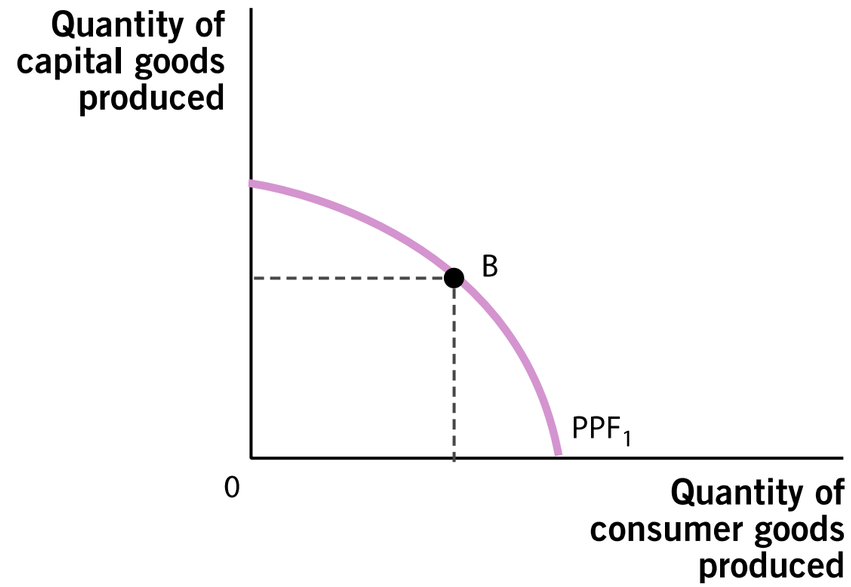
- Capital goods
  - Goods that help produce other valuable goods
  - Buildings, factories, roads, machinery, computers
- Investment
  - Using resources to make new capital

Capital Goods and Future Growth

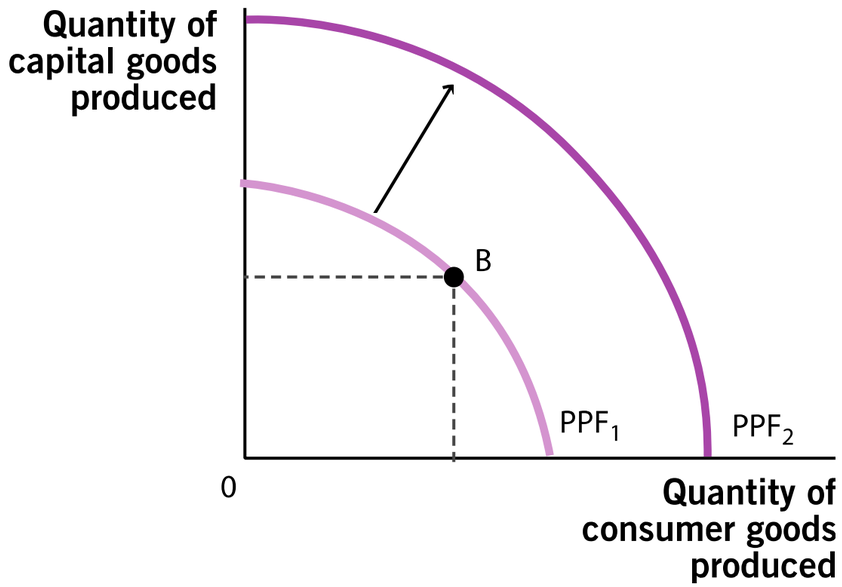


Capital Goods and Future Growth

(b)



Short-run PPF



Long-run PPF

Capital Goods and Future Growth

- Over the last 20 years, China and India have invested in more capital compared to the United States and Europe.
- The result?
  - China is sacrificing today's consumption for a better future.
  - China and India have higher growth rates.
  - Another trade-off: Chinese workers have less leisure time than American workers.

Conclusion

- Economists use simplified models to understand how the economy works.
- The production possibilities frontier (PPF) illustrates the benefits of trade and allows us to describe ways to grow the economy.
- When producers specialize, they focus their efforts on those goods and services for which they have the lowest opportunity cost and trade with others who are good at making something else.