

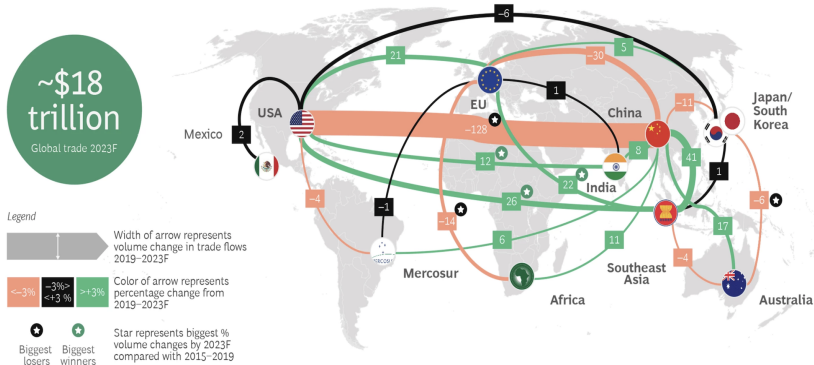
Chapter 3. Independence and the Gains from Trade

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Interdependence Between Countries

Change in volume of goods traded in major corridors from 2019 through 2023 under baseline scenario (\$billions)



Source: BCG Trade Finance Model 2020; UN Contrade; OECD; World Economic Forum; IHS; TradeAlert; BCG analysis.

Note: Baseline scenario assumes a U-shaped global economic recovery by 2023. Corridors in the map above represent ~32% of global trade. Intra EU = ~20%; intra NAFTA = ~8%; China (including Hong Kong) = 4%; intra Southeast Asia = 3%, rest of world = ~32%.

Interdependence Between Countries

- Our goal this chapter is to build a simple model to justify the principle that trade can make everyone better off.
- We need a model about international trade.
- How to construct this model? Participants? Goods? Money?

Interdependence Between Countries

- We need at least two countries or two people
- We need at least two goods.
- Money is not necessary. Countries or people trade one good for another.

Interdependence Between Countries

- Two people: Frank and Ruby
- Two goods: meat and potatoes
- Both Frank and Ruby like to eat a diet of both meat and potatoes.

Interdependence Between Countries

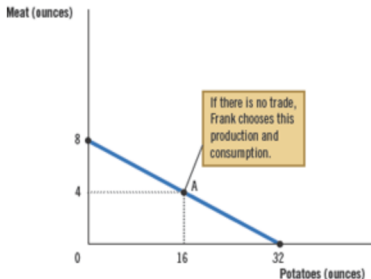
- Scenario 1: Frank and Ruby each only produce one good.
- Scenario 2: Both Frank and Ruby can produce meat and potatoes. And Frank is good at producing meat and Ruby is good at producing potatoes.
- Scenario 3: Both Frank and Ruby can produce meat and potatoes. However, Ruby is good at producing both meat and potatoes.

Interdependence Between Countries

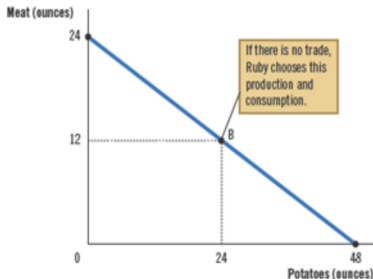
(a) Production Opportunities

	Minutes Needed to Make 1 Ounce of:		Amount Produced in 8 Hours	
	Meat	Potatoes	Meat	Potatoes
Frank the farmer	60 min/oz	15 min/oz	8 oz	32 oz
Ruby the rancher	20 min/oz	10 min/oz	24 oz	48 oz

(b) Frank's Production Possibilities Frontier



(c) Ruby's Production Possibilities Frontier



Absolute advantage

- Absolute advantage: the ability to produce a good using fewer inputs than another producers
- Ruby has an absolute advantage in producing meat
 - Frank needs 60 minutes to produce 1 oz of meat. Ruby needs only 20 minutes to produce 1 oz of meat.
 - Ruby has a higher productivity of meat
 - Productivity: the quantity of goods and services produced from each unit of labor force.

Absolute advantage

- Absolute advantage: the ability to produce a good using fewer inputs than another producers
- Ruby also has an absolute advantage in producing potatoes
 - Frank needs 15 minutes to produce 1 oz of potatoes. Ruby needs only 10 minutes to produce 1 oz of potatoes.
 - Ruby has a higher productivity of potatoes.
 - Productivity: the quantity of goods and services produced from each unit of labor force.

Production Possibilities

- Production possibilities frontier: a graph that shows the combinations of output that the economy can possibly produce with the available factors of production and production technologies.
- How to draw Frank's production possibilities frontier?
 - Frank's production possibilities frontier is a graph that shows the combinations of potatoes and meat that Franks can possibly produce with the available factors of production and production technologies.
 - Available factors of production: 8 hours
 - Production technology: 60 min/oz for meat, 15 min/oz for potatoes.

Production Possibilities

■ Frank's production possibilities frontier

- Available factors of production: 8 hours
- Production technology: 60 min/oz for meat, 15 min/oz for potatoes.
- Suppose Frank produces x ounces potatoes and y ounces of meat using 8 hours.
- $x \frac{15 \text{ min}}{60 \text{ min/hour}} + y \frac{60 \text{ min}}{60 \text{ min/hour}} = 8 \text{ hours}$
- $\frac{x}{4} + y = 8$
- $y = -\frac{x}{4} + 8$

Production Possibilities

- $y = -\frac{x}{4} + 8$
- The equation is a straight line on graph.
- If we let x equal to zero, we can solve the equation and get $y = 8$, which is the y -intercept of the line.
- If we let y equal to zero, we can solve the equation and get $x = 32$, which is the x -intercept of the line.
- Now we have find two points on the line, $(0, 8)$ and $(32, 0)$. We connect this two points on the graph and get a straight , which is Frank's production possibilities frontier

Production Possibilities

- If we know Frank's production possibilities frontier is a straight line, then we only need two points to draw Frank's production possibilities frontier.
- Which two points do we choose?
- What is the economic story behind the two points $(0, 8)$ and $(32, 0)$?

Production Possibilities

■ Ruby's production possibilities frontier

- Available factors of production: 8 hours
- Production technology: 20 min/oz for meat, 10 min/oz for potatoes.
- Suppose Ruby produces x ounces potatoes and y ounces of meat using 8 hours.
- $x \frac{10 \text{ min}}{60 \text{ min/hour}} + y \frac{20 \text{ min}}{60 \text{ min/hour}} = 8 \text{ hours}$
- $\frac{x}{6} + \frac{y}{3} = 8$
- $y = -\frac{x}{2} + 24$

Production Possibilities

- $y = -\frac{x}{2} + 24$
- The equation is a straight line on graph.
- If we let x equal to zero, we can solve the equation and get $y = 24$, which is the y -intercept of the line.
- If we let y equal to zero, we can solve the equation and get $x = 48$, which is the x -intercept of the line.
- Now we have find two points on the line, $(0, 24)$ and $(48, 0)$. We connect this two points on the graph and get a straight , which is Ruby's production possibilities frontier

Production Possibilities

- If we know Ruby's production possibilities frontier is a straight line, then we only need two points to draw Ruby's production possibilities frontier.
- Which two points do we choose?
- What is the economic story behind the two points $(0, 24)$ and $(48, 0)$?

Practice 1

- Maria can read 20 pages of economics in an hour. She can read 50 pages of sociology in an hour.
- Maria spends 5 hours per day studying.
- x : pages of economics Maria reads per day; y : pages of sociology Maria reads per day.
- Write down the equation for Maria's production possibilities frontier and get the slope intercept form equation.
- Draw Maria's production possibilities frontier.

Consumption without trade

- Suppose Frank consumes 16 ounces of potatoes and 4 ounces of meat per day without trade.
- Verify that Frank needs to work 8 hours to produce his consumption.
- Suppose Ruby consumes 24 ounces of potatoes and 12 ounces of meat per day without trade.
- Verify that Ruby needs to work 8 hours to produce his consumption.
- Why can Ruby consume more meat and potatoes than Frank?

Consumption with trade

- Can Frank and Ruby's situation get better through trade?
- "get better" means they can consume more meat or potatoes or both if they trade with each other.
- If Frank and Ruby get married, how should they arrange their production?

Opportunity cost

- Opportunity cost: what must be given up to obtain some item
- What is Frank's opportunity cost of producing one oz of potatoes in terms of meat?
- What is Ruby's opportunity cost of producing one oz of potatoes in term of meat?
- Whose opportunity cost of producing one ounce of potatoes is lower?

Opportunity cost

- Opportunity cost: what must be given up to obtain some item
- What is Frank's opportunity cost of producing one oz of meat in terms of potatoes?
- What is Ruby's opportunity cost of producing one oz of meat in term of potatoes?
- Whose opportunity cost of producing one ounce of meat is lower?

Opportunity cost

- Comparative advantage: the ability to produce a good at a lower opportunity cost than another produce

	Opportunity cost of:	
	1 oz of meat	1 oz of potatoes
Frank	4 oz potatoes	$1/4$ oz meat
Ruby	2 oz potatoes	$1/2$ oz meat

Practice 2

- Diego takes 4 hours to brew a gallon of root beer and 2 hours to make a pizza. Darnell takes 6 hours to brew a gallon of root beer and 4 hours to make a pizza.

	Opportunity cost of: 1 gallon of root bear	Opportunity cost of: 1 pizza
Diego	? pizza	? gallon of root beer
Darnell	? pizza	? gallon of root beer

Opportunity cost

	Opportunity cost of:	
	1 oz of meat	1 oz of potatoes
Frank	4 oz potatoes	$1/4$ oz meat
Ruby	2 oz potatoes	$1/2$ oz meat

- If Frank produces meat by himself, the opportunity cost of 1 oz of meat is 4 ounces of potatoes.
- However, Ruby's opportunity cost of producing 1 oz of meat is 2 only ounces of potatoes.
- Ruby is willing to sell 1 oz of meat to Frank if Frank offers more than 2 ounces of potatoes for 1 oz of meat.
- Frank is willing to buy 1 oz of meat from Ruby if Ruby asks for less than 4 ounces of potatoes for 1 oz of meat.

Opportunity cost

	Opportunity cost of:	
	1 oz of meat	1 oz of potatoes
Frank	4 oz potatoes	$1/4$ oz meat
Ruby	2 oz potatoes	$1/2$ oz meat

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Opportunity cost

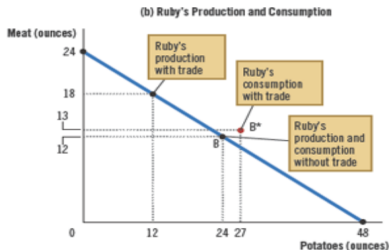
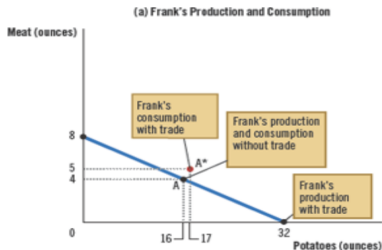
	Opportunity cost of:	
	1 oz of meat	1 oz of potatoes
Frank	4 oz potatoes	$1/4$ oz meat
Ruby	2 oz potatoes	$1/2$ oz meat

- If Ruby produces potatoes by herself, the opportunity cost of 1 oz of potatoes is $1/2$ ounce of meat.
- However, Frank's opportunity cost of producing 1 oz of potatoes is only $1/4$ ounce of meat.
- Frank is willing to sell 1 oz of potatoes to Ruby if Ruby offers more than $1/4$ ounce of meat for 1 oz of potatoes.
- Ruby is willing to buy 1 oz of potatoes from Frank if Franks asks for less than $1/2$ ounce of meat for 1 oz of potatoes.

Comparative Advantage and Trade

- If Ruby produces potatoes by herself, the opportunity cost of 1 oz of potatoes is $1/2$ ounce of meat.
- However, Frank's opportunity cost of producing 1 oz of potatoes is only $1/4$ ounce of meat.
- Frank is willing to sell 1 oz of potatoes to Ruby if Ruby offers more than $1/4$ ounce of meat for 1 oz of potatoes.
- Ruby is willing to buy 1 oz of potatoes from Frank if Franks asks for less than $1/2$ ounce of meat for 1 oz of potatoes.

Interdependence Between Countries



(c) The Gains from Trade: A Summary

	Frank		Ruby	
	Meat	Potatoes	Meat	Potatoes
Without Trade:				
Production and Consumption	4 oz	16 oz	12 oz	24 oz
With Trade:				
Production	0 oz	32 oz	18 oz	12 oz
Trade	Gets 5 oz	Gives 15 oz	Gives 5 oz	Gets 15 oz
Consumption	5 oz	17 oz	13 oz	27 oz
GAINS FROM TRADE:				
Increase in Consumption	+1 oz	+1 oz	+1 oz	+3 oz

Comparative Advantage and Trade

- The gains from specialization and trade are based on comparative advantage. When people produce goods in which they have comparative advantage, total production rises.
- Trade can benefit everyone because it allows people to specialize in the activities in which they have a comparative advantage.

The Price of the Trade

- What determines the price at which trade takes place?
- How are the gains shared between the trading parties?
- For both parties to gain from trade, the price at which they trade must lie between their opportunity costs.
- In our example, the price of meat must be between 2 ounces of potatoes per ounce of meat (which is Ruby's opportunity cost of meat) and 4 ounces of potatoes per ounces of meat (which is Frank's opportunity cost of meat).