

**SOLUTIONS MANUAL**

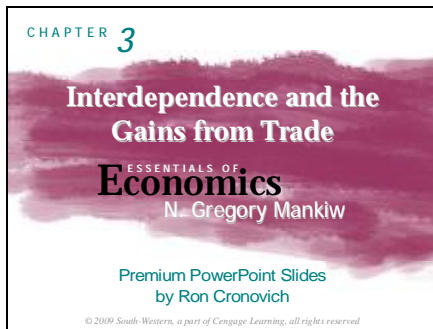


ESSENTIALS OF  
**Economics**  
N. Gregory Mankiw



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**PowerPoint Lecture Notes for Chapter 3:  
Interdependence and the Gains from Trade**  
*Essentials of Economics* 5<sup>th</sup> edition, by N. Gregory Mankiw  
**Premium PowerPoint Slides by Ron Cronovich**



**Please ask your students in advance to bring calculators to class.** This PowerPoint chapter includes simple in-class exercises which lead students to see for themselves the gains from trade arising from comparative advantage.

This PowerPoint chapter covers the same topics as Chapter 3 in the textbook (comparative & absolute advantage, the gains from trade), but using a different example and a different approach that is likely to benefit your students. The textbook presents these topics using an example involving two individual producers (the farmer & rancher). After the example, the textbook states that its lessons apply to countries as well as individual producers. This PowerPoint presentation takes the opposite approach, illustrating the concepts with an example involving two countries, and then states that the lessons apply to individuals as well as countries. Seeing the analysis both ways, and seeing a different example in class than in the textbook, will help students better learn these concepts.

The example in this PowerPoint chapter builds on the PPF example introduced in the Chapter 2 PowerPoint. (It is not essential to cover the Chapter 2 PowerPoint before this one, though.)

This PowerPoint omits “Should Tiger Woods Mow His Own Lawn?” It’s a great example of comparative advantage, but it does not introduce any new concepts, and students can easily understand it on their own.

**In this chapter,  
look for the answers to these questions:**

- § Why do people – and nations – choose to be economically interdependent?
- § **How** can trade make everyone better off?
- § What is absolute advantage?  
What is comparative advantage?  
How are these concepts similar?  
How are they different?

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### Interdependence

*Every day  
you rely on  
many people  
from around  
the world,  
most of whom  
you've never met,  
to provide you  
with the goods  
and services  
you enjoy.*



### Interdependence

- § One of the Ten Principles from Chapter 1:  
*Trade can make everyone better off.*
- § We now learn why people – and nations – choose to be interdependent, and how they can gain from trade.

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### Our Example

- § Two countries: the U.S. and Japan
- § Two goods: computers and wheat
- § One resource: labor, measured in hours
- § We will look at how much of both goods each country produces and consumes
  - § if the country chooses to be self-sufficient
  - § if it trades with the other country

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The lessons illustrated by this international trade example also apply to trade between two individual producers. Note that this chapter in the textbook does the reverse: It develops the lessons in the context of an example involving two individual producers, and then states that the lessons also apply to international trade. So, between this PowerPoint and the textbook chapter, students will see the same concepts and lessons developed in two different but entirely consistent approaches and examples.

The example here is highly contrived and unrealistic in order to illustrate complex concepts as simply as possible. The example has some qualities that make it especially valuable:

- \* The two goods are fundamentally different (one is agricultural, the other manufactured), which makes gains from trade based on comparative advantage very likely. An example using more similar goods, say laptop computers and MP3 players, would not be appropriate for this chapter because it would more likely give rise to inter-industry trade, and the gains would likely arise from a source other than comparative advantage (probably increasing returns to scale).

- \* In the example here, it turns out that the U.S. has an absolute advantage in both goods, yet both countries gain from trade. Students see, therefore, that comparative advantage, not absolute advantage, is what's necessary for trade to be mutually beneficial.

- \* In the real world, one often sees gains from trade based on comparative advantage occurring between countries that are very different – such as between rich industrialized countries and poor developing countries. This example shows that trade based on comparative advantage can also occur between countries that are at similar levels of industrialization and income. (Of course, the U.S. and Japan are very different; but they are far more similar than are, say, the U.S. and Botswana.)

### Production Possibilities in the U.S.

- § The U.S. has 50,000 hours of labor available for production, per month.
- § Producing one computer requires 100 hours of labor.
- § Producing one ton of wheat requires 10 hours of labor.

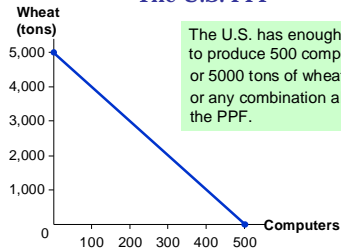
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If you just covered Chapter 2, point out to your students that the U.S. PPF here is the same as in the Chapter 2 PowerPoint.

Warn students that, in a few moments, they will be asked to derive Japan's PPF. They will need to follow the same steps that you are about to show for deriving the U.S. PPF.

### The U.S. PPF



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Deriving the intercepts, or endpoints of the PPF:

The U.S. has 50,000 labor hours.

It takes 100 hours to produce a computer. If the U.S. uses all its labor to produce computers, then it will produce  $50,000/100 = 500$  computers. Hence, the horizontal intercept is (500 computers, 0 wheat).

It takes 10 hours to produce a ton of wheat. If the U.S. uses all its labor to produce wheat, then it will produce  $50,000/10 = 5000$  tons of wheat. Hence, the vertical intercept is (0 computers, 5000 tons of wheat).

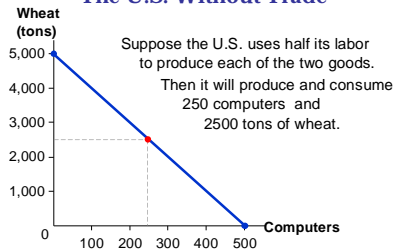
The PPF is the straight line that connects the two endpoints.

Of course, the U.S. could choose a different point. The actual choice will depend on the preferences of society. (In the following chapter – on supply and demand – we will learn what determines how much of each good society produces.)

**Important note for students:**

***Without trade, a country consumes what it produces.***

### The U.S. Without Trade



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**ACTIVE LEARNING 1**  
**Derive Japan's PPF**

Use the following information to draw Japan's PPF.

- § Japan has 30,000 hours of labor available for production, per month.
- § Producing one computer requires 125 hours of labor.
- § Producing one ton of wheat requires 25 hours of labor.

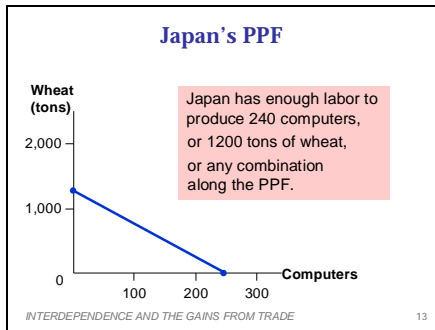
Your graph should measure computers on the horizontal axis.

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Using this information to draw Japan's PPF requires a calculator (or the ability to do long division).

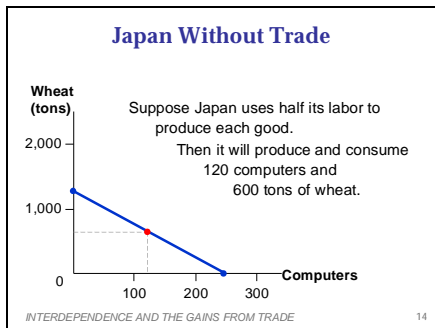
If your students have the "guttled handout" of these slides, they can draw their PPF on the axes provided on the following slide.

This activity should take only 3 minutes of class time. It's good practice & review for students, and helps break up the lecture.



Horizontal intercept:  $(30,000 \text{ labor-hours}) / (125 \text{ hours per computer}) = 240 \text{ computers}$ .

Vertical intercept:  $(30,000 \text{ labor-hours}) / (25 \text{ hours per ton of wheat}) = 1200 \text{ tons of wheat}$ .



**Consumption With and Without Trade**

- § Without trade,
  - § U.S. consumers get 250 computers and 2500 tons wheat.
  - § Japanese consumers get 120 computers and 600 tons wheat.
- § We will compare consumption without trade to consumption with trade.
- § First, we need to see how much of each good is produced and traded by the two countries.

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**ACTIVE LEARNING 2**  
**Production under trade**

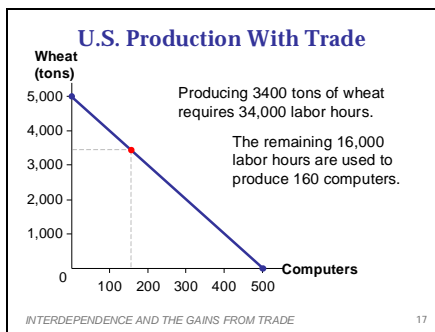
1. Suppose the U.S. produces 3400 tons of wheat. How many computers would the U.S. be able to produce with its remaining labor? Draw the point representing this combination of computers and wheat on the U.S. PPF.
2. Suppose Japan produces 240 computers. How many tons of wheat would Japan be able to produce with its remaining labor? Draw this point on Japan's PPF.

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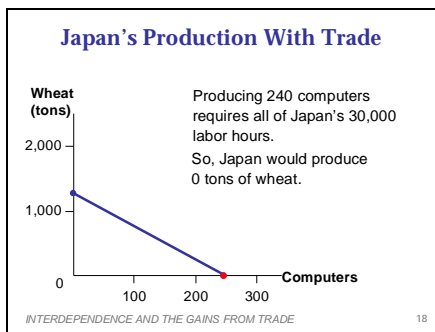
Give your students a few minutes to solve these problems before showing the answers on the next slides. This will break up the lecture, get the students involved, and give them practice with “word problems.”

It is not necessary that all students finish both problems before moving on. It's fine if most finish the first, and a few finish the second. However, the second problem is easy for most students.

Note that most students will need a calculator to solve the first problem.



Point out to students that the red dot represents the combination (160 computers, 3400 tons of wheat). We will assume that this is the combination the U.S. produces in the scenario in which the U.S. trades.



The red dot represents the combination (240 computers, 0 tons wheat). We will assume this is the combination that Japan produces.

Point out that, just because Japan is not producing any wheat does not mean that Japan's consumers must all go on the Atkins diet (which shuns bread and other foods made from wheat). When trade is allowed, Japan can trade some of its computers for wheat produced in another country.

### Basic International Trade Terms

#### § Exports:

goods produced domestically and sold abroad

**To export** means to sell domestically produced goods abroad.

#### § Imports:

goods produced abroad and sold domestically

**To import** means to purchase goods produced in other countries.

These terms are so basic that many instructors skip this slide.

There's a subtle point that you might want to mention (if you're anal like me), or that your students might ask about (especially if tourism is an important part of your local economy).

Someone from Germany or South Korea visits Las Vegas and spends \$200 on a pair of tickets to a show. How should we classify this and other expenditures by foreign tourists on lodging and entertainment while they are vacationing here?

Answer: we count it in U.S. exports. It doesn't matter that the service was consumed here. What matters is that it was produced here but sold to a foreign buyer.

Hence, a more precise definition of exports would be goods and services produced here and purchased by foreign buyers. This stricter definition of exports doesn't care whether the good or service was consumed in the buyer's home country or in the exporting country.

Similarly, a stricter and more precise definition of imports would include purchases by domestic residents of goods and services produced abroad – including entertainment and lodging services that tourists from the U.S. consume in the foreign countries they visit.

Some students need help figuring out that consumption of a good is the difference between the amount produced and the amount exported.

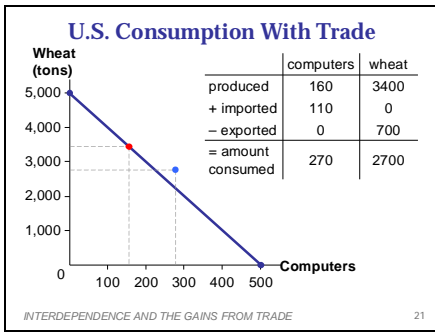
### ACTIVE LEARNING 3 Consumption under trade

Suppose the U.S. exports 700 tons of wheat to Japan, and imports 110 computers from Japan. (So, Japan imports 700 tons wheat and exports 110 computers.)

§ How much of each good is consumed in the U.S.? Plot this combination on the U.S. PPF.

§ How much of each good is consumed in Japan? Plot this combination on Japan's PPF.

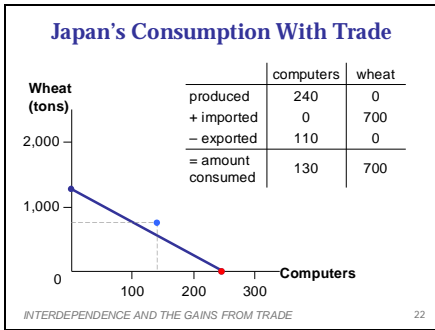




The red point again represents production.

Trade un-tethers consumption from production. The light blue point represents consumption. Notice that the consumption point is above the PPF. Without trade, it would not be possible to consume this combination of the two goods!

In a sense, international trade is like technological progress: it allows society to produce quantities of goods that would otherwise not be possible.



Again, the light blue point representing consumption is above the PPF. Without trade, it would not be possible to consume this combination of the goods.

### Trade Makes Both Countries Better Off

U.S.			
	consumption without trade	consumption with trade	gains from trade
computers	250	270	20
wheat	2,500	2,700	200
Japan			
	consumption without trade	consumption with trade	gains from trade
computers	120	130	10
wheat	600	700	100

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These tables summarize the gains from trade for both countries.

### Where Do These Gains Come From?

- § **Absolute advantage:** the ability to produce a good using fewer inputs than another producer
- § The U.S. has an absolute advantage in wheat: producing a ton of wheat uses 10 labor hours in the U.S. vs. 25 in Japan.
- § If each country has an absolute advantage in one good and specializes in that good, then both countries can gain from trade.

The last bullet point states that gains from trade will arise if each country has an absolute advantage in something. We will see next, though, that absolute advantage is not required for both countries to gain from trade.

### Where Do These Gains Come From?

- § Which country has an absolute advantage in computers?
- § Producing one computer requires 125 labor hours in Japan, but only 100 in the U.S.
- § The U.S. has an absolute advantage in both goods!

**So why does Japan specialize in computers?  
Why do both countries gain from trade?**

### Two Measures of the Cost of a Good

- § Two countries can gain from trade when each specializes in the good it produces at lowest cost.
- § Absolute advantage measures the cost of a good in terms of the inputs required to produce it.
- § Recall:  
Another measure of cost is *opportunity cost*.
- § In our example, the opportunity cost of a computer is the amount of wheat that could be produced using the labor needed to produce one computer.

### Opportunity Cost and Comparative Advantage

- § **Comparative advantage:** the ability to produce a good at a lower opportunity cost than another producer
- § Which country has the comparative advantage in computers?
- § To answer this, must determine the opp. cost of a computer in each country.

## Opportunity Cost and Comparative Advantage

- § The opp. cost of a computer is
  - § 10 tons of wheat in the U.S., because producing one computer requires 100 labor hours, which instead could produce 10 tons of wheat.
  - § 5 tons of wheat in Japan, because producing one computer requires 125 labor hours, which instead could produce 5 tons of wheat.
- § So, Japan has a comparative advantage in computers. *Lesson: Absolute advantage is not necessary for comparative advantage!*

## Comparative Advantage and Trade

- § Gains from trade arise from comparative advantage (differences in opportunity costs).
- § When each country specializes in the good(s) in which it has a comparative advantage, total production in all countries is higher, the world's "economic pie" is bigger, and all countries can gain from trade.
- § The same applies to individual producers (like the farmer and the rancher) specializing in different goods and trading with each other.

### ACTIVE LEARNING 4

#### Absolute & comparative advantage

Argentina and Brazil each have 10,000 hours of labor per month.

In Argentina,

- § producing one pound coffee requires 2 hours
- § producing one bottle wine requires 4 hours

In Brazil,

- § producing one pound coffee requires 1 hour
- § producing one bottle wine requires 5 hours

Which country has an absolute advantage in the production of coffee? Which country has a comparative advantage in the production of wine?

### ACTIVE LEARNING 4

#### Answers

Brazil has an absolute advantage in coffee:

- § Producing a pound of coffee requires only one labor-hour in Brazil, but two in Argentina.

Argentina has a comparative advantage in wine:

- § Argentina's opp. cost of wine is two pounds of coffee, because the four labor-hours required to produce a bottle of wine could instead produce two pounds of coffee.
- § Brazil's opp. cost of wine is five pounds of coffee.

Allow a few minutes for students to work on this problem. Ask for volunteers to share their answers.

Variation: Before asking for volunteers, instruct students to compare their answers with their neighbors. Not everyone will volunteer to explain their answer to the class, but everyone will at least get to explain his or her answer to a classmate.

### Unanswered Questions...

- § We made a lot of assumptions about the quantities of each good that each country produces, trades, and consumes, and the price at which the countries trade wheat for computers.
- § In the real world, these quantities and prices would be determined by the preferences of consumers and the technology and resources in both countries.
- § We will begin to study this in the next chapter.
- § For now, though, our goal was merely to see how *trade can make everyone better off*.

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The 5<sup>th</sup> edition adds a brief explanation of the range of prices that will permit gains from trade, in the context of the farmer-rancher example.

The second bullet point mentions technology and resources. In our example, the technology is how many labor-hours are required to produce each good. The resources are simply the quantity of labor-hours available in each country.

In the following chapter (on supply & demand), students will begin their study of how prices and quantities are determined.

### CHAPTER SUMMARY

- 
- § Interdependence and trade allow everyone to enjoy a greater quantity and variety of goods & services.
  - § Comparative advantage means being able to produce a good at a lower opportunity cost. Absolute advantage means being able to produce a good with fewer inputs.
  - § When people – or countries – specialize in the goods in which they have a comparative advantage, the economic “pie” grows and trade can make everyone better off.

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