

Econ 340

Lecture 3

Comparative Advantage and the Gains from Trade

News: Sep 9-15

- China and US delay and reduce tariffs ahead of renewed trade talks -- WSJ: [9/13](#) | [Canvas](#) | NYT: [9/12](#) | [Canvas](#) | FT: [9/13](#) | [Canvas](#)
 - Trump announced he would delay the next round of tariffs on China, from Oct 1 to Oct 15.
 - China responded with first large purchase of soybeans in months, and state-owned firms are looking into buying more pork and soybeans, as China's government announced some exemptions on its tariffs against the US.
 - A new round of trade talks is planned to begin in early October.
- Brexit news -- WSJ: [9/13](#) | [Canvas](#) | NYT: [9/12](#) | [Canvas](#) | FT: [9/12](#) | [Canvas](#)
 - Boris Johnson will meet with Jean-Claude Juncker, President of the European Commission, to seek a revised deal. The UK currency, the pound, rose on this news.
 - Boris Johnson is considering an "all-Ireland zone" to avoid both the hard border and the Irish backstop. Northern Ireland would remain in the EU common market while the rest of the UK exits.
 - France is preparing for no-deal Brexit by inspecting goods from the UK, as they would goods from China or the US. It has spent €40m on new facilities to inspect goods arriving through the Channel tunnel.
- "Global Drop in Currencies" -- WSJ: [9/11](#) | [Canvas](#)
 - WSJ article reports that many currencies have dropped in value against the US dollar since the start of the trade war.
 - This is not surprising, as US tariffs lower US demand for foreign goods, and therefore for foreign currency.
 - But the fall in other currencies makes their goods cheaper, increasing US imports, and "fanning the flames" of the trade war.

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China's pork imports from Europe and Brazil have surged, but American farms missed out when Beijing raised duties on US pork to 72 per cent © Getty

Taking Stock of Soybeans

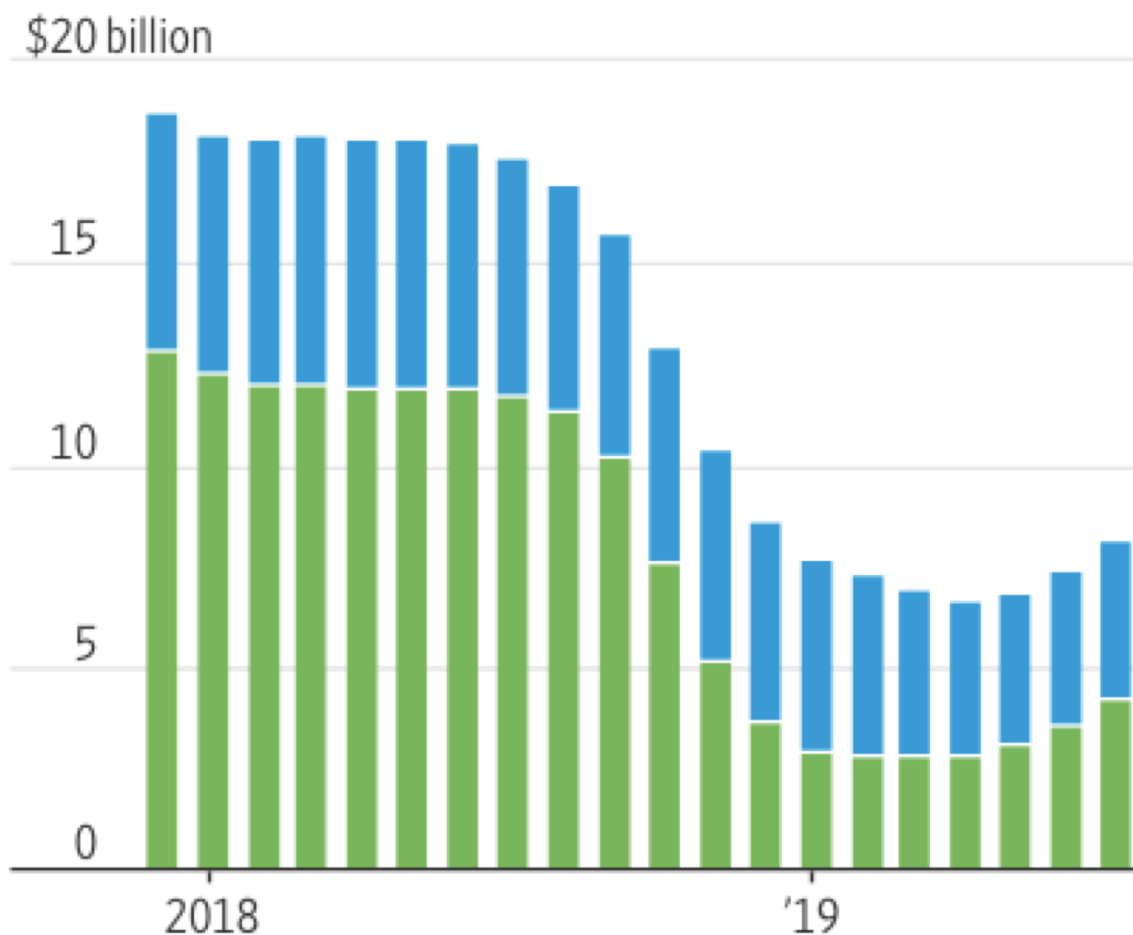
Price of one bushel, soybean futures, continuous contract



Source: FactSet

Exports to China

- Soybeans and other oil seeds
- Other ag and foodstuffs



Note: Sum over the past 12 months

Source: Commerce Department

News: Sep 9-15

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European Commission President [Jean-Claude Juncker](#), left, and British Prime Minister Boris Johnson are set to meet in Luxembourg next week. **PHOTO: OLIVIER**



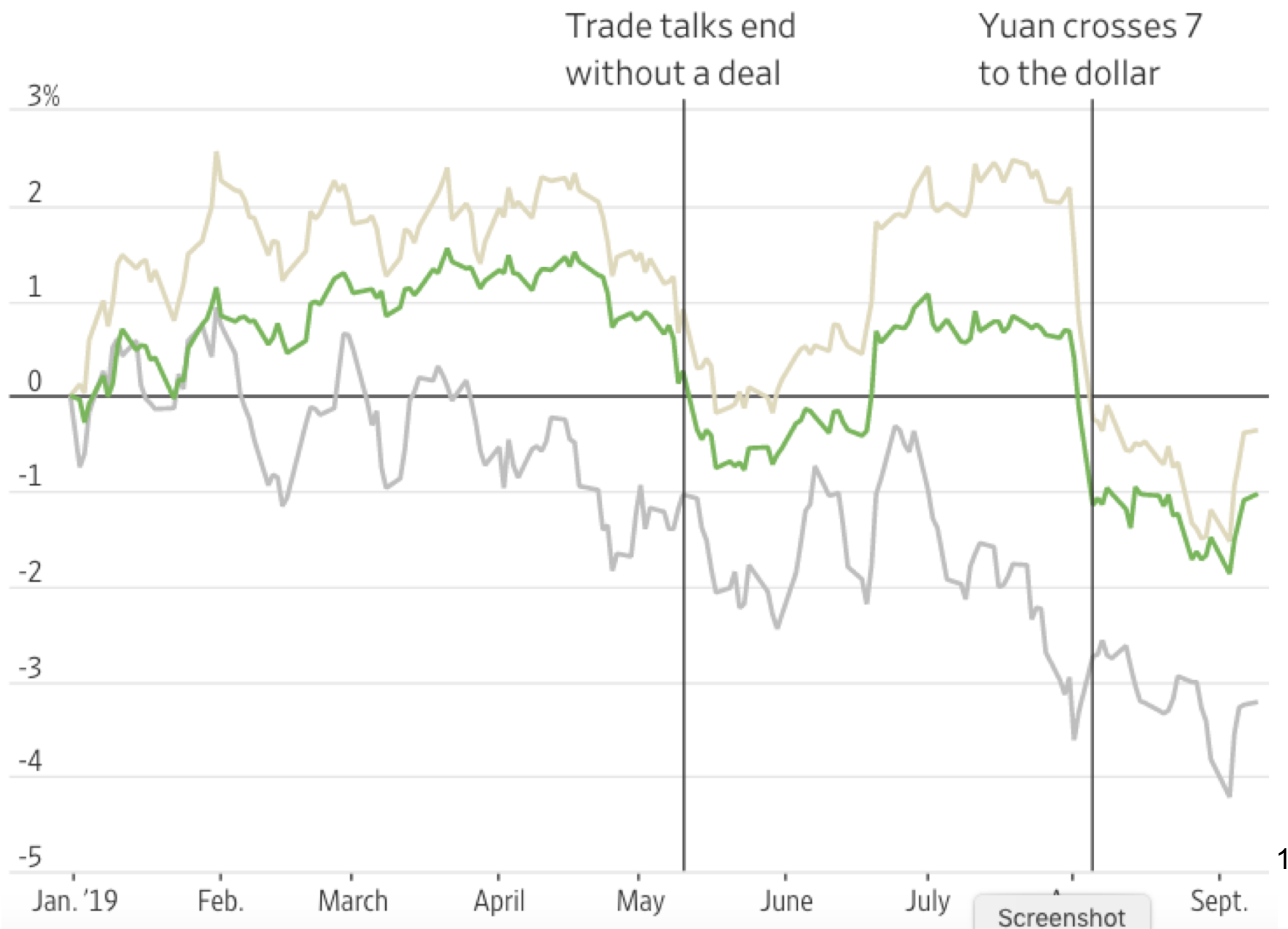
France has spent €40m on a new IT system and facilities for handling and inspecting trucks in ports such as Calais at the French end of the Channel tunnel © Reuters

News: Sep 9-15

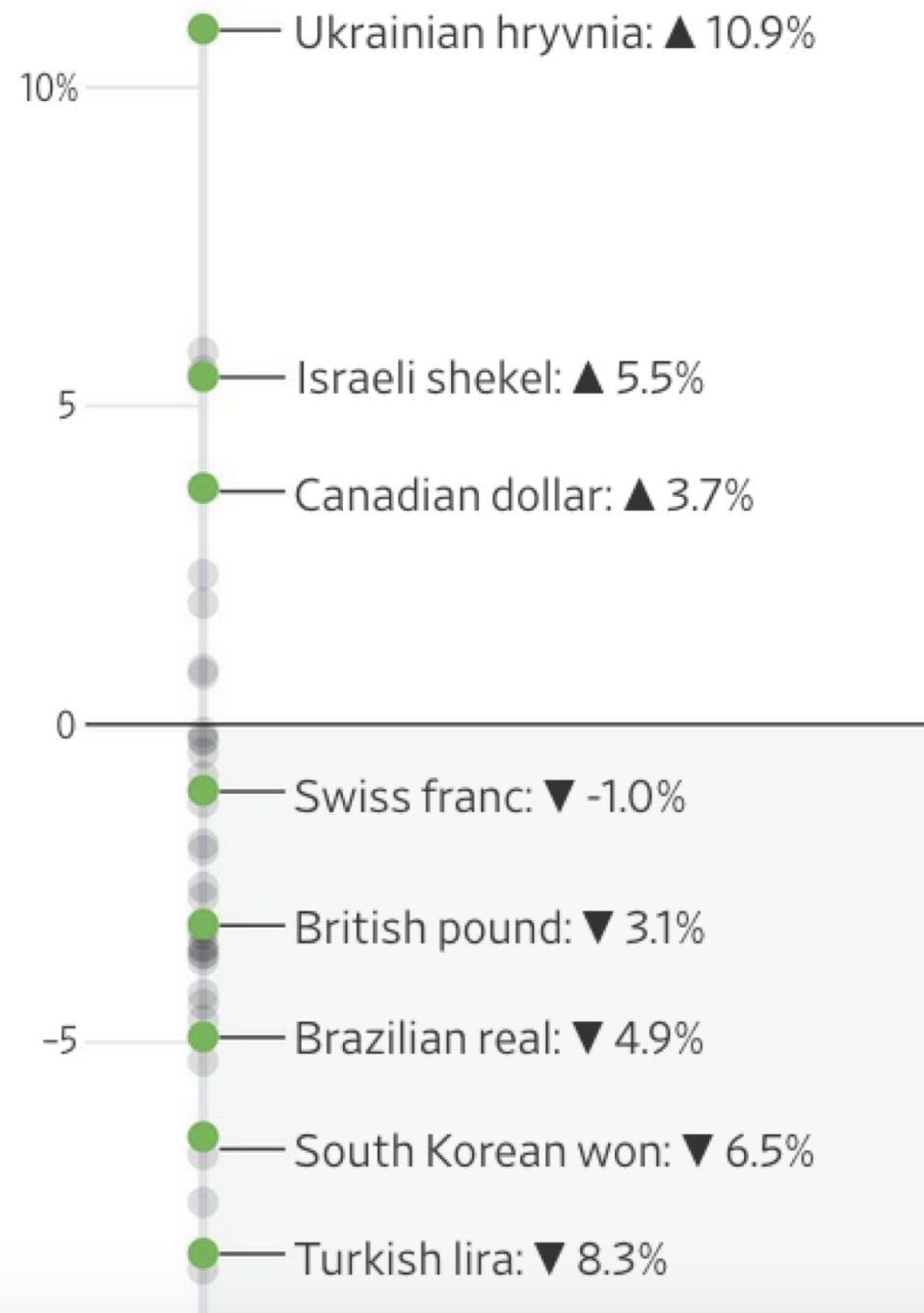
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Currency performance against the dollar by region

■ Asia excluding Japan ■ Europe ■ Emerging markets



Year-to-date performance against the dollar of a selection of 41 currencies



Argentine peso
Down 32.7 %

Trade-weighted dollar index, weekly



Outline: Comparative Advantage and the Gains from Trade

- Why Countries Trade
 - Price Differences
 - Supply and Demand
 - Determinants of Prices
- Ricardian Model of Trade
 - Examples
 - Wages and Prices in the Ricardian Model
 - Lessons from the Ricardian Model
- Generality of the Gains from Trade
- Identifying Comparative Advantage
- Critiques of Comparative Advantage

Why Countries Trade

- Price differences
 - If prices differ by more than transport costs
 - Buyers in high-price country will import
 - Sellers in low-price country will export
 - Anybody in any country can profit by doing both:
 - Buying in low-price country
and
 - Selling in high-price country

Why Countries Trade

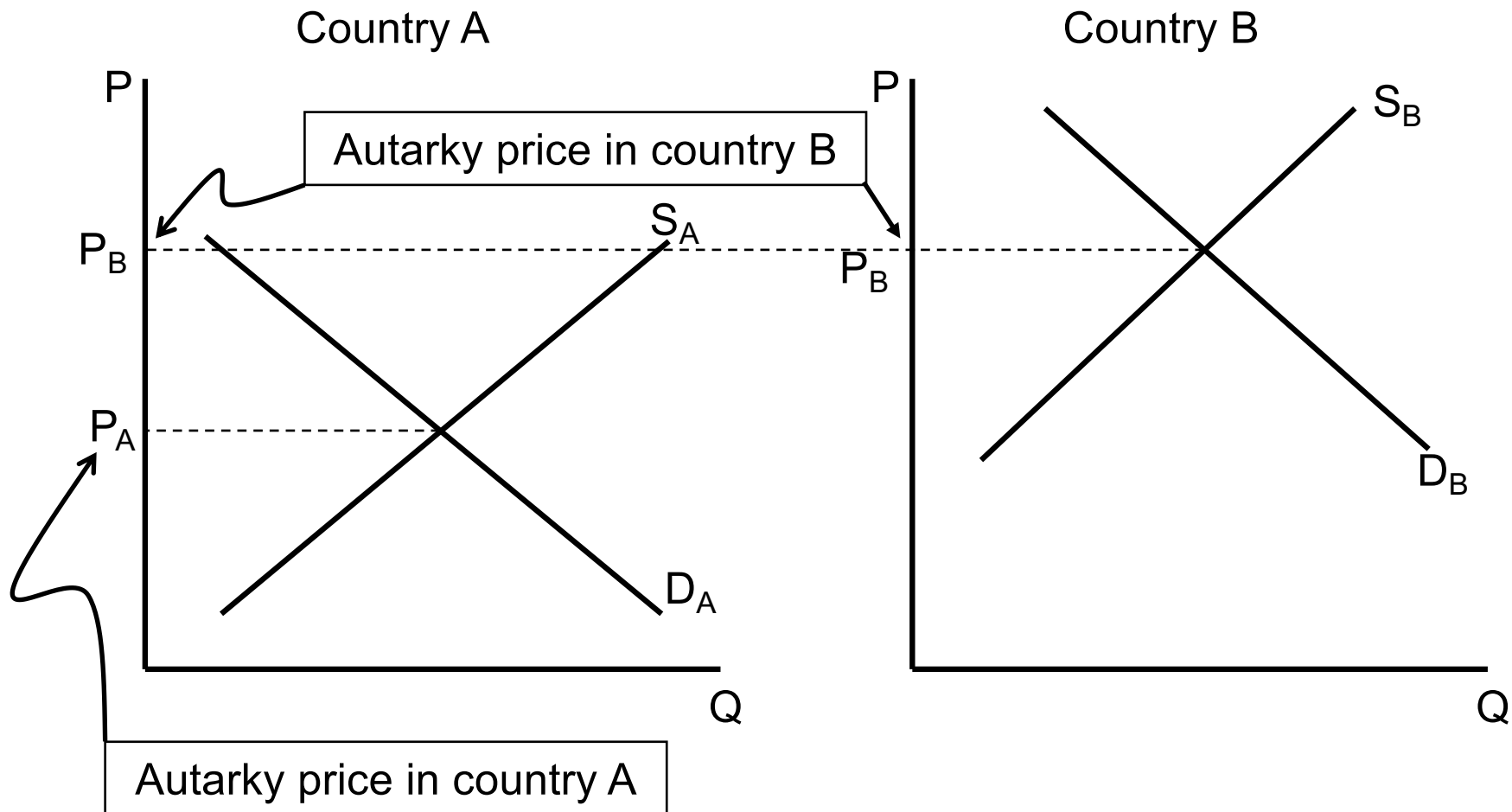
– Thus, in all cases:

$P_A < P_B$ may lead to: trade $A \rightarrow B$
that is, A exports
 B imports

$P_A < P_B$ will lead to: trade $A \rightarrow B$
if $P_B - P_A > t$
 $t =$ trade cost

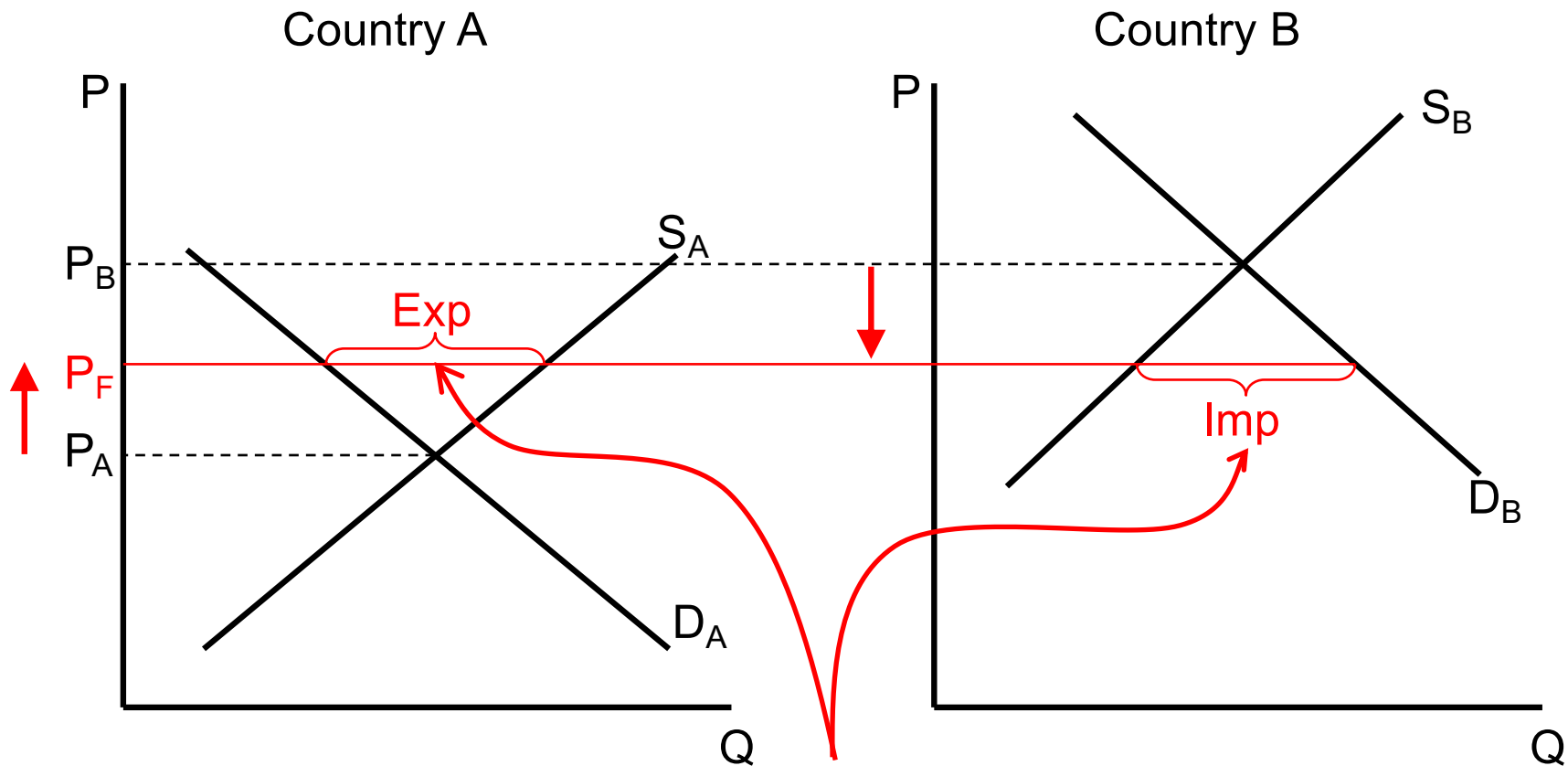
Why Countries Trade: Supply and Demand

“Autarky” = No trade



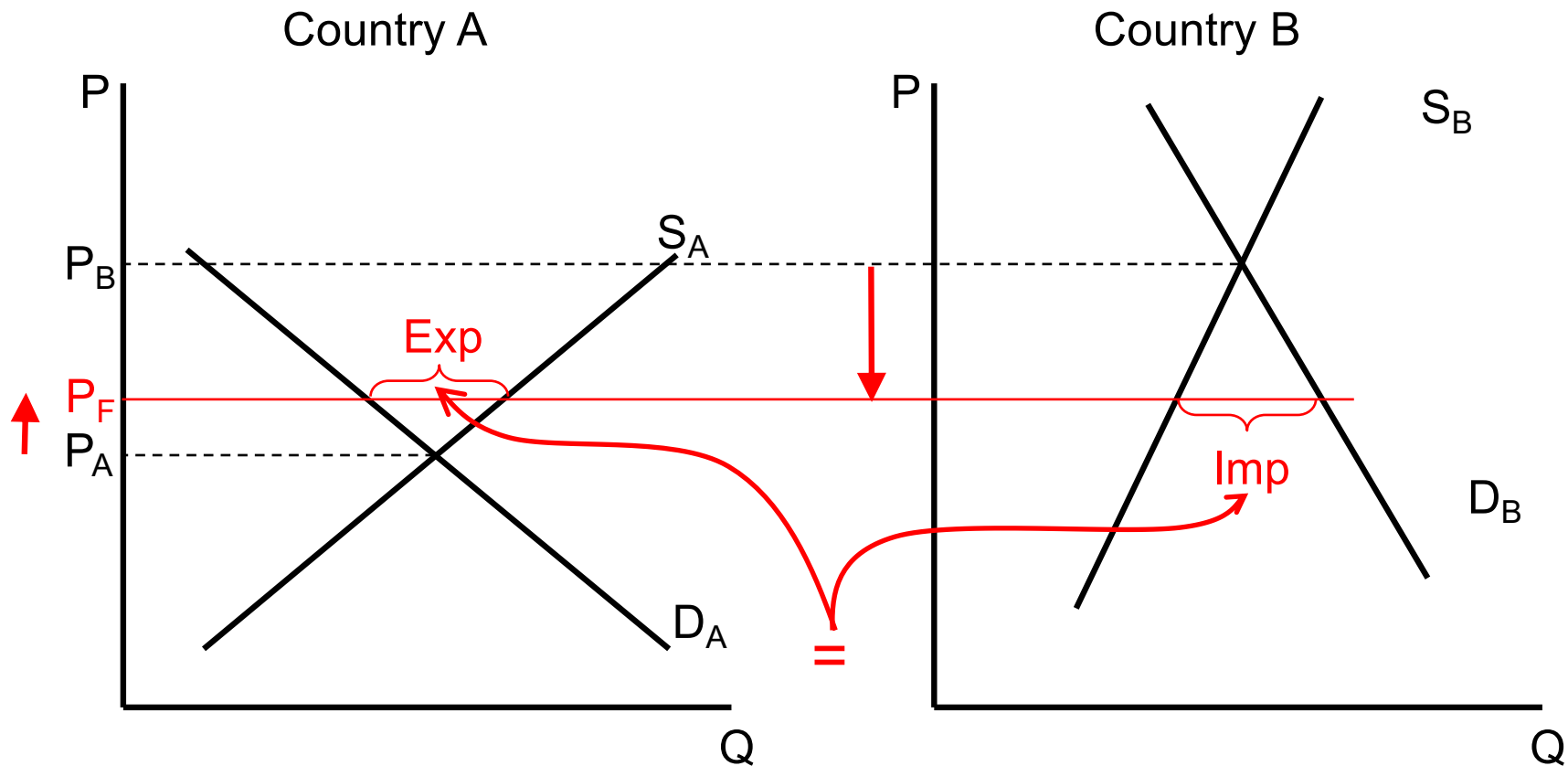
Why Countries Trade: Supply and Demand

Free Trade = No barriers to trade



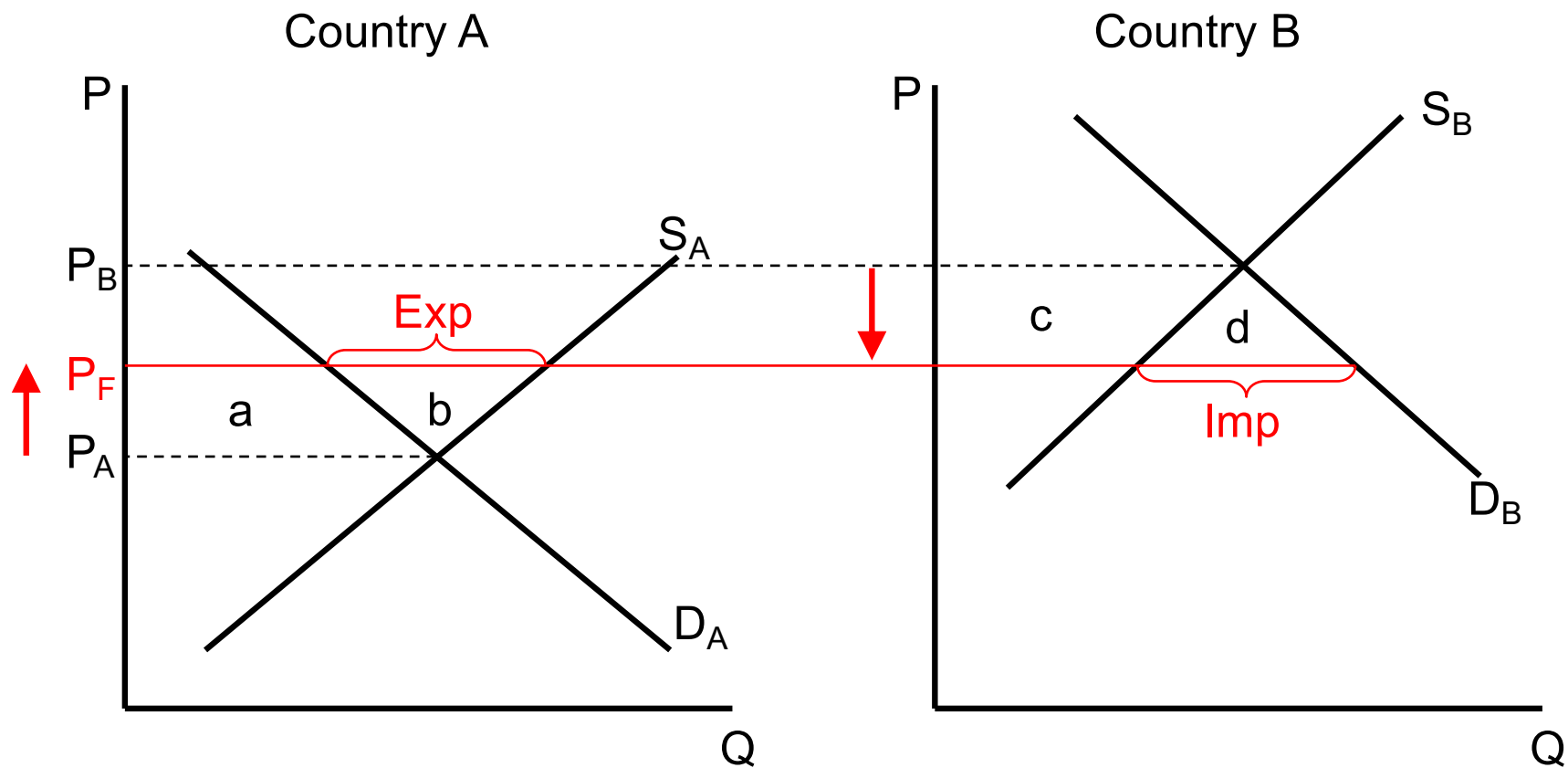
P_F is defined by these two distances being equal.

Why Countries Trade: Supply and Demand



Note that price need not be half way between.

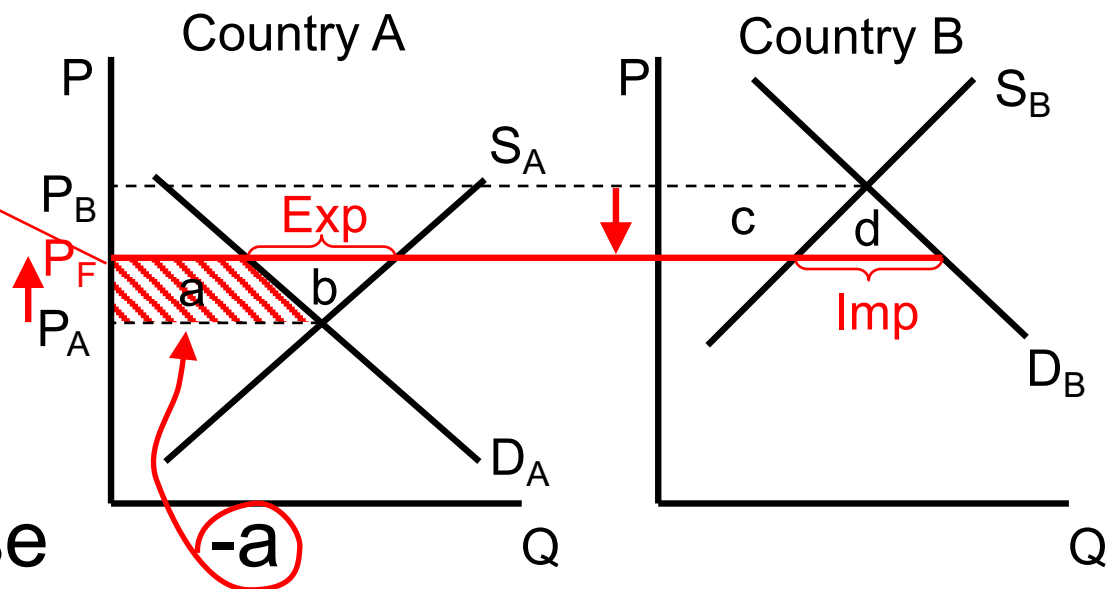
Use areas to measure gains and losses.

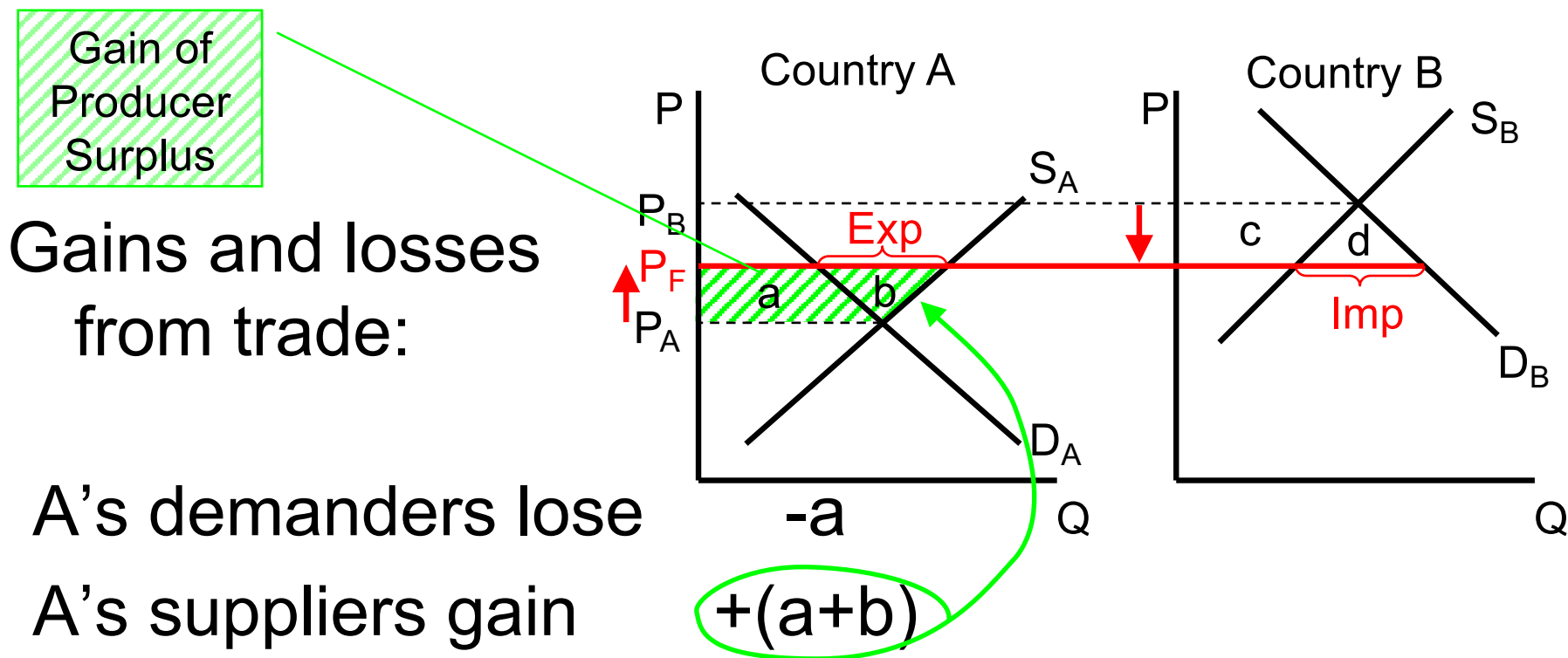


Loss of
Consumer
Surplus

Gains and losses
from trade:

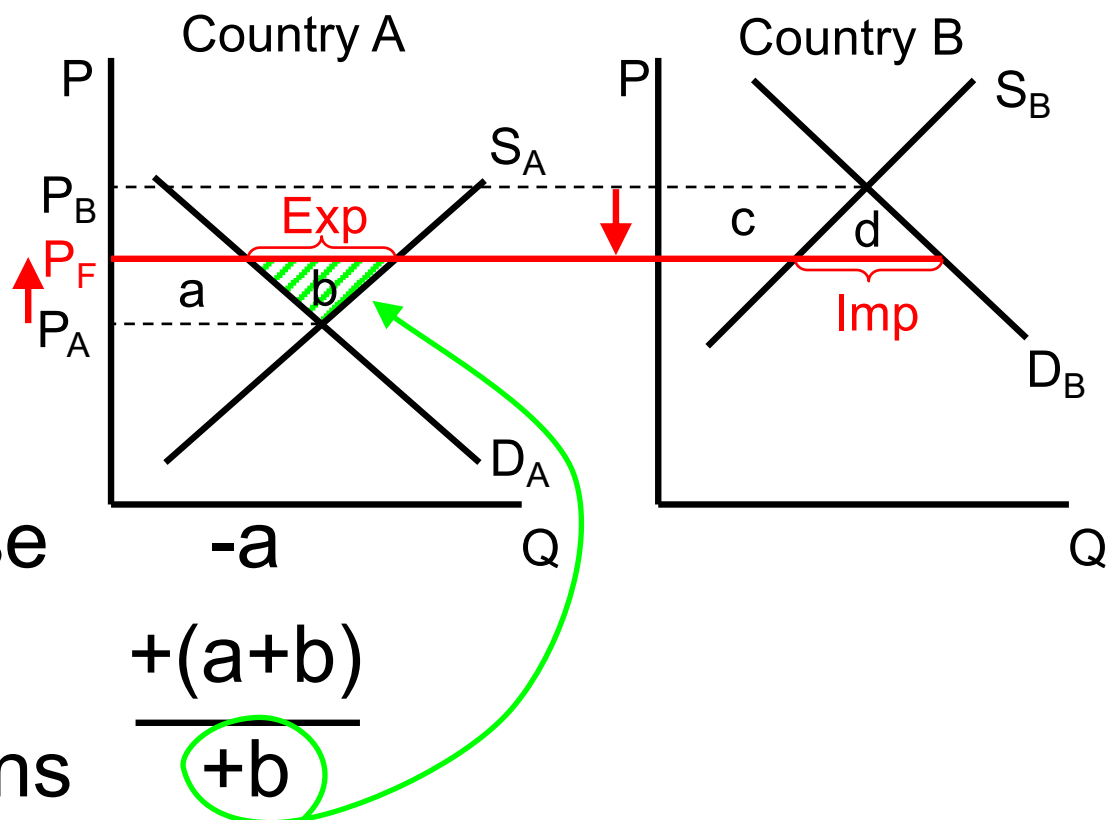
A's demanders lose





Gains and losses
from trade:

A's demanders lose
A's suppliers gain
→ Country A gains



Gain of
Consumer
Surplus

Gains and losses
from trade:

A's demanders lose

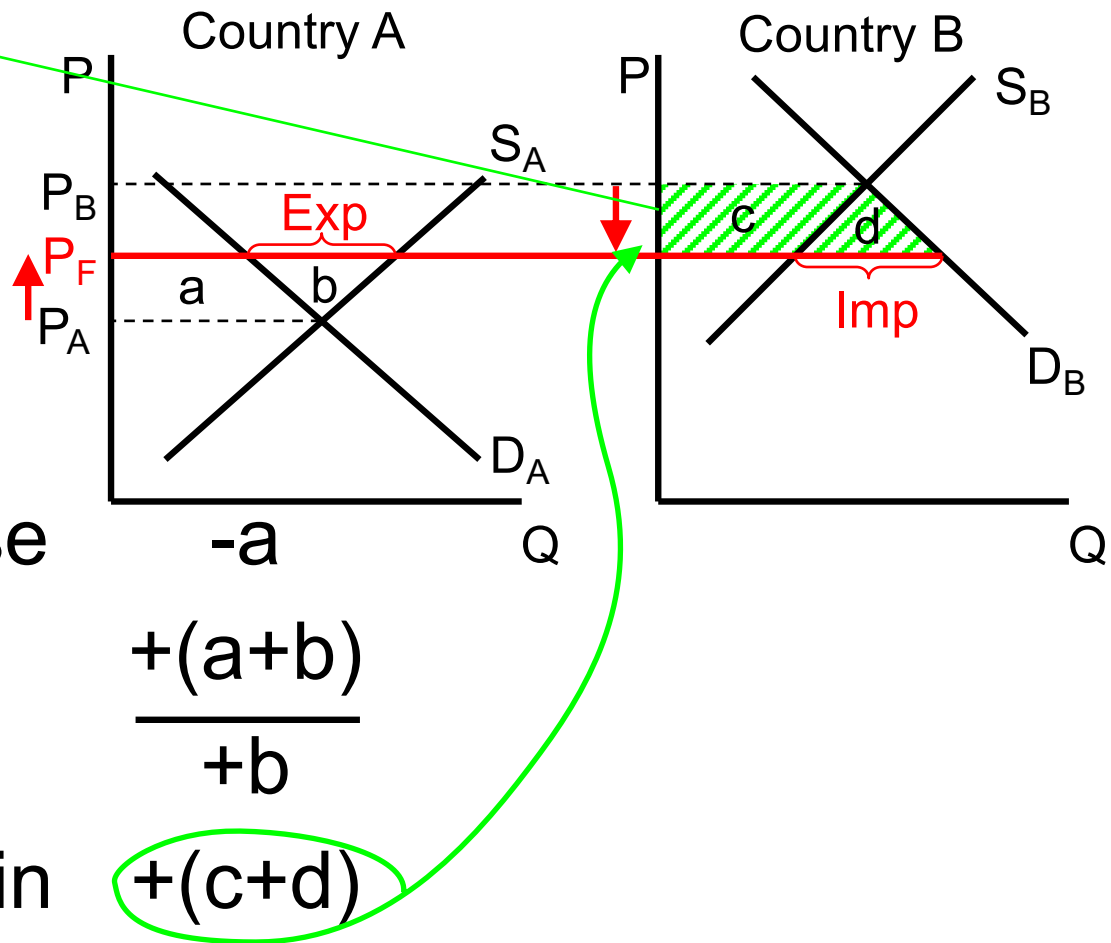
A's suppliers gain

Country A gains

B's demanders gain

$$\frac{+(a+b)}{+b}$$

$$+(c+d)$$



Loss of
Producer
Surplus

Gains and losses
from trade:

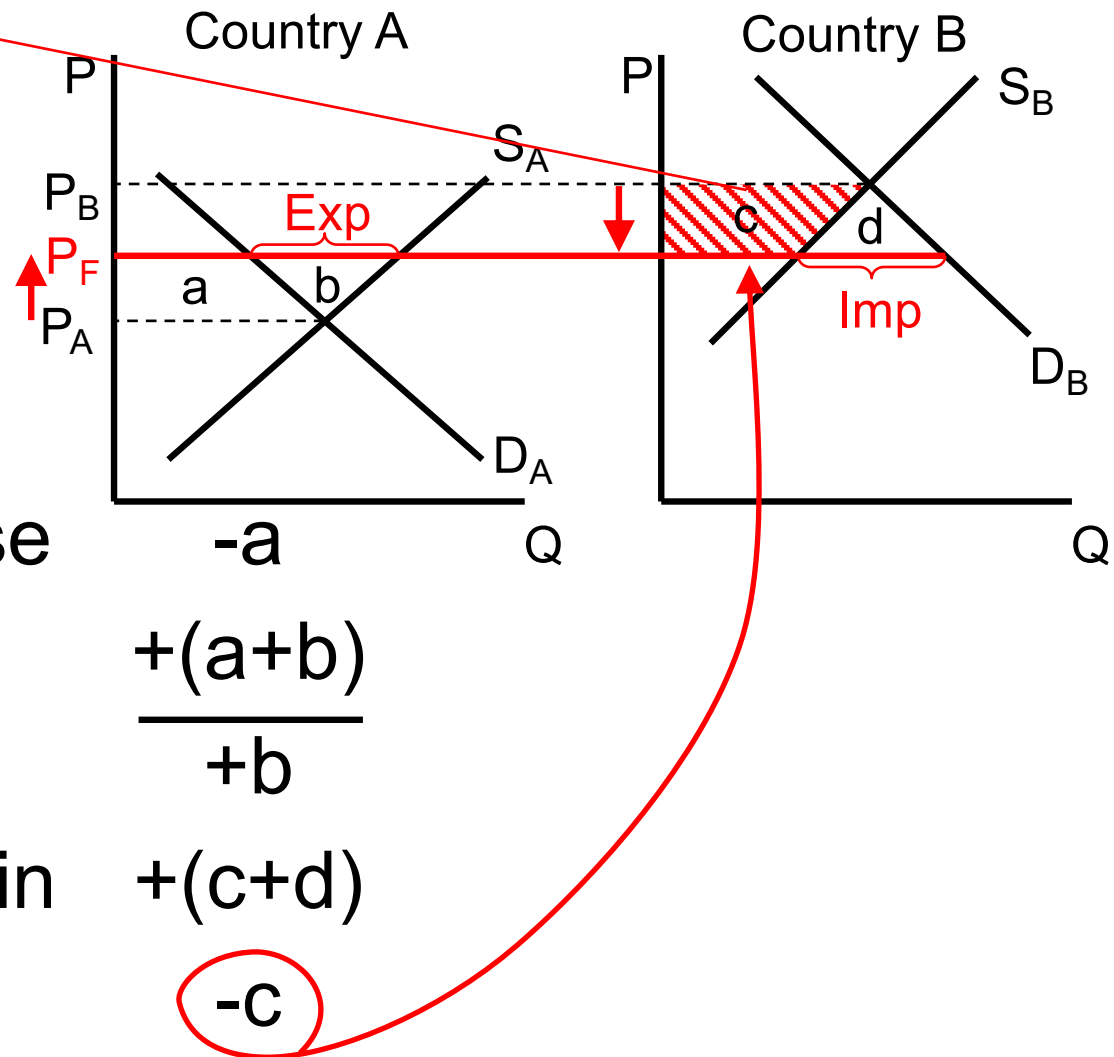
A's demanders lose

A's suppliers gain

Country A gains

B's demanders gain

B's suppliers lose



Gains and losses from trade:

A's demanders lose

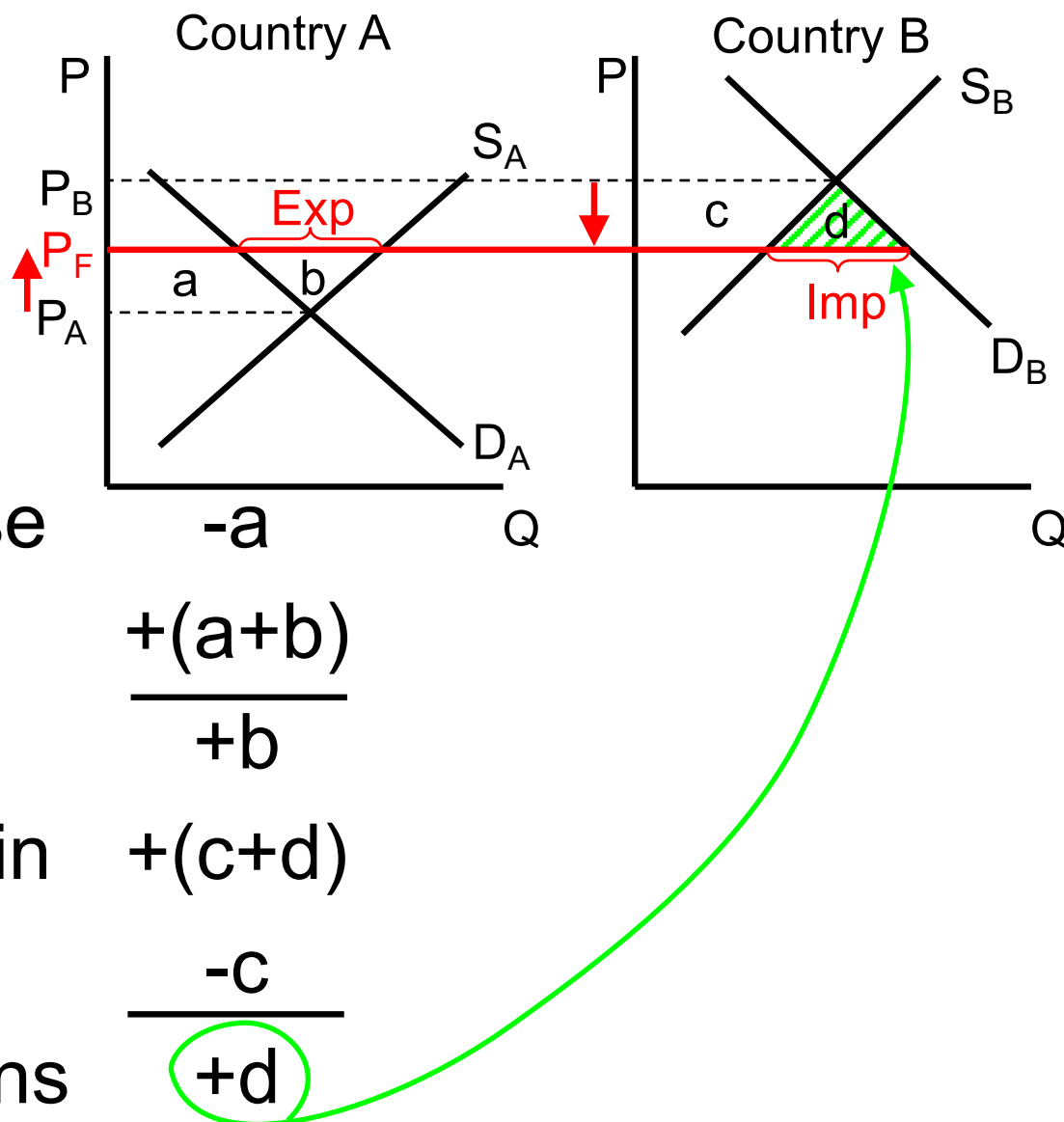
A's suppliers gain

Country A gains

B's demanders gain

B's suppliers lose

→ Country B gains



Gains and losses from trade:

A's demanders lose

A's suppliers gain

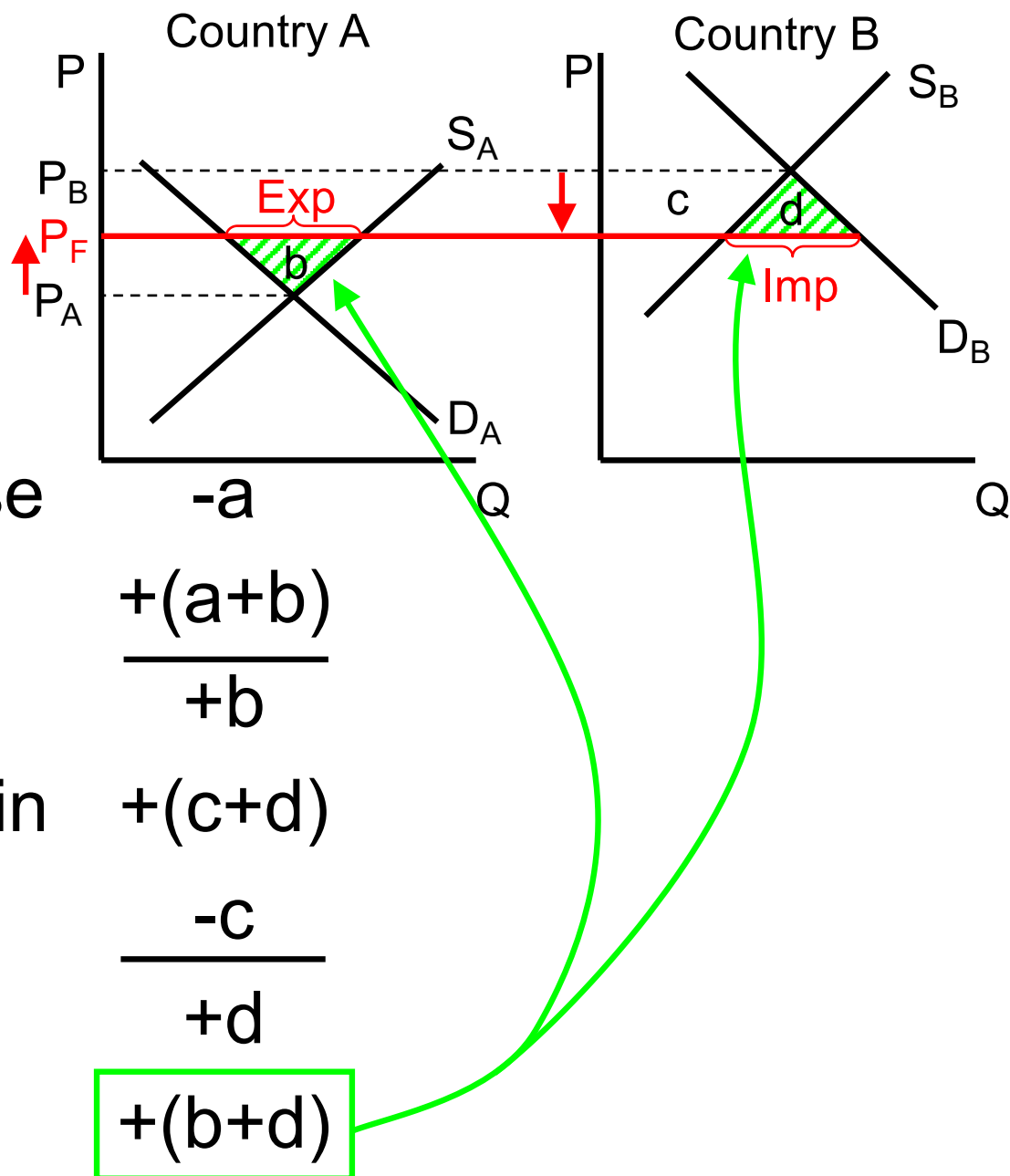
Country A gains

B's demanders gain

B's suppliers lose

Country B gains

→ World gains



What Determines Prices, and Thus Trade?

- Prices determined by
 - Productivity of labor (and other factors)
 - Price of labor (w =wage)
 - Exchange rate (E) (i.e., prices of currencies)
- Since w and E are largely common to all sectors
 - The main determinant of how individual sectors trade (i.e., whether they export or import) is Productivity in sectors
 - High (relative) productivity, i.e., output per worker
 - Implies low (relative) price
 - And hence export

Adjustment Mechanism

- What if all of a country's prices are too high for it to export at all?

Then either:

- Exchange rate (value of currency) will fall
 - Because otherwise nobody would buy its currency,

Or:

- Wages will fall
 - Because nobody would hire its labor

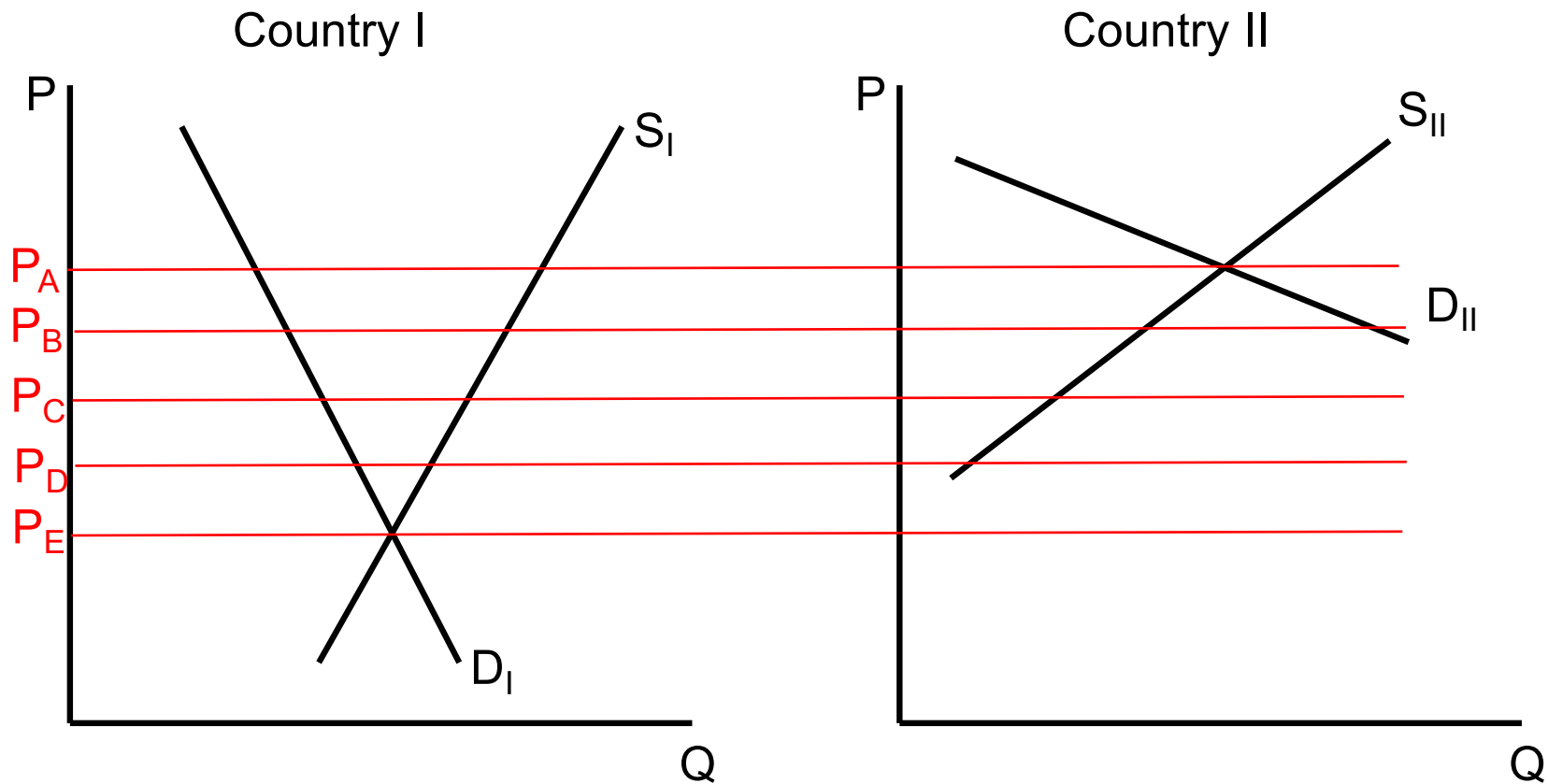
➔ Either of these will lower the country's prices

Clicker Question

The diagram on the next slide shows supply and demand for a good in two countries. If these are the only countries in the world, what is the free-trade equilibrium price?

- a) P_A
- b) P_B
- c) P_C
- d) P_D
- e) P_E

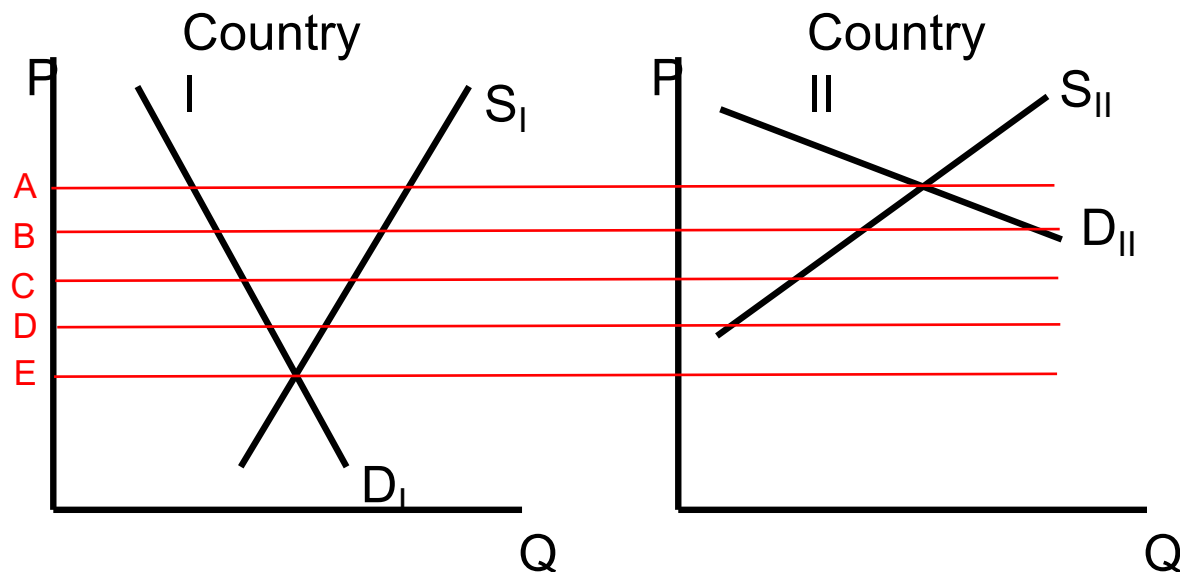
Clicker Diagram



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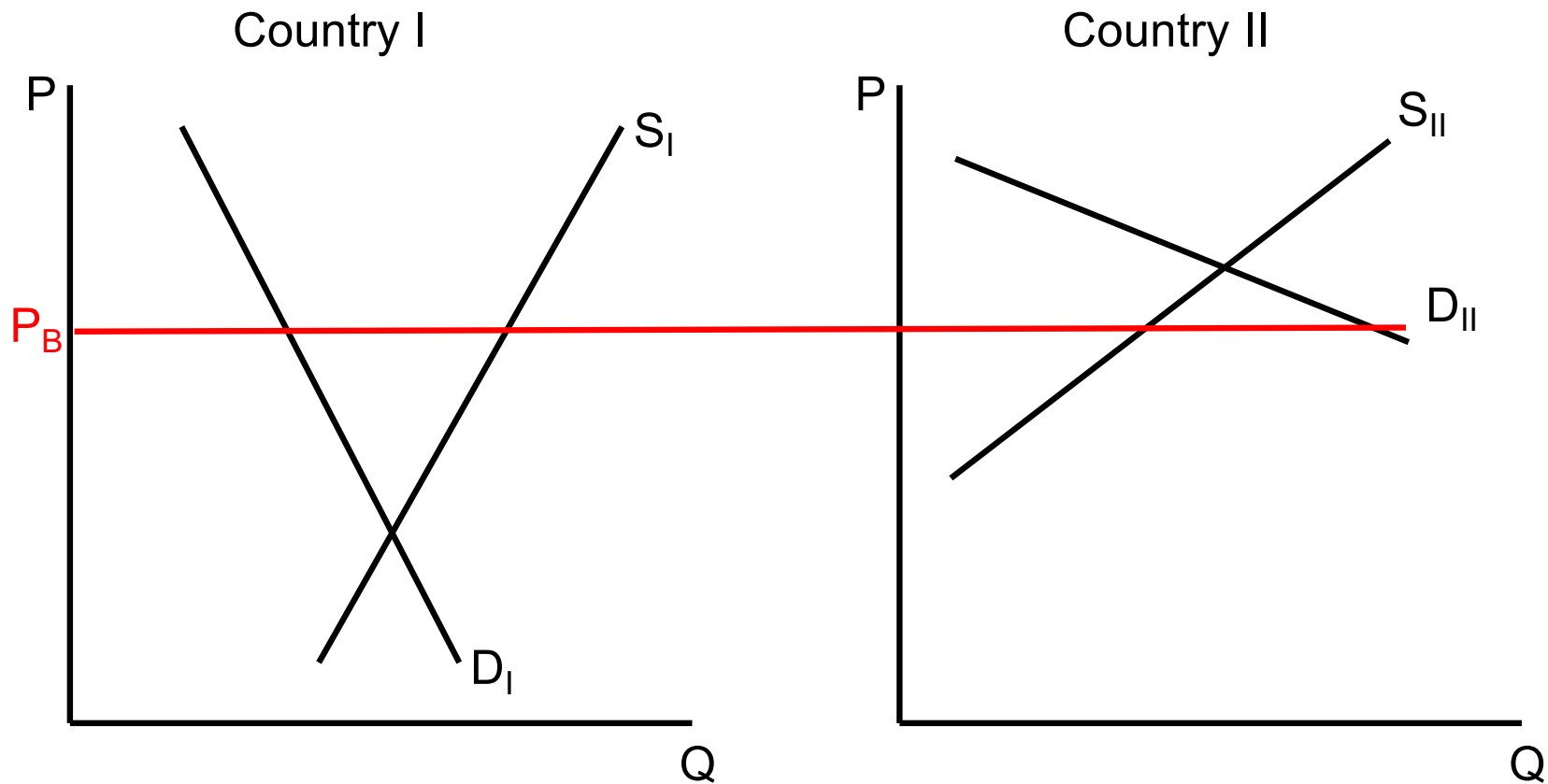


Clicker Question

Looking back at the same diagram, which country gains more from trade?

- a) Country I
- b) Country II
- c) They each gain the same amount

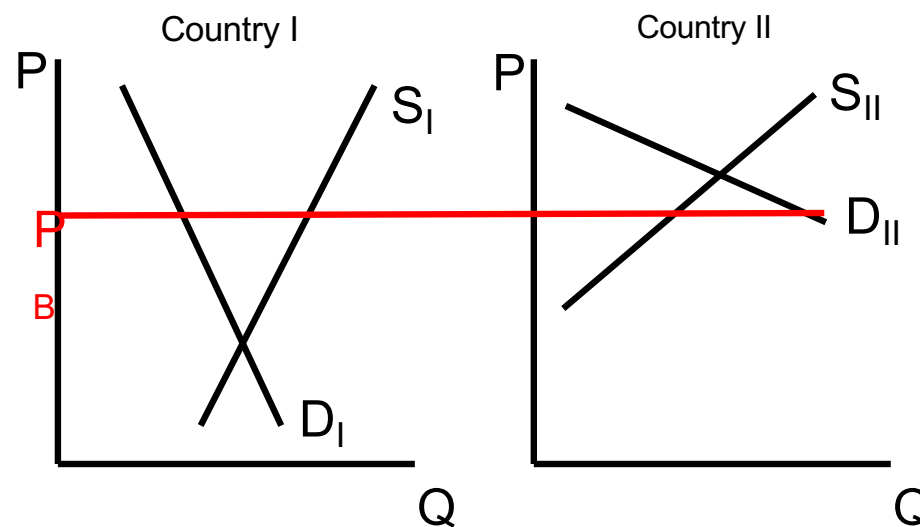
Clicker Diagram



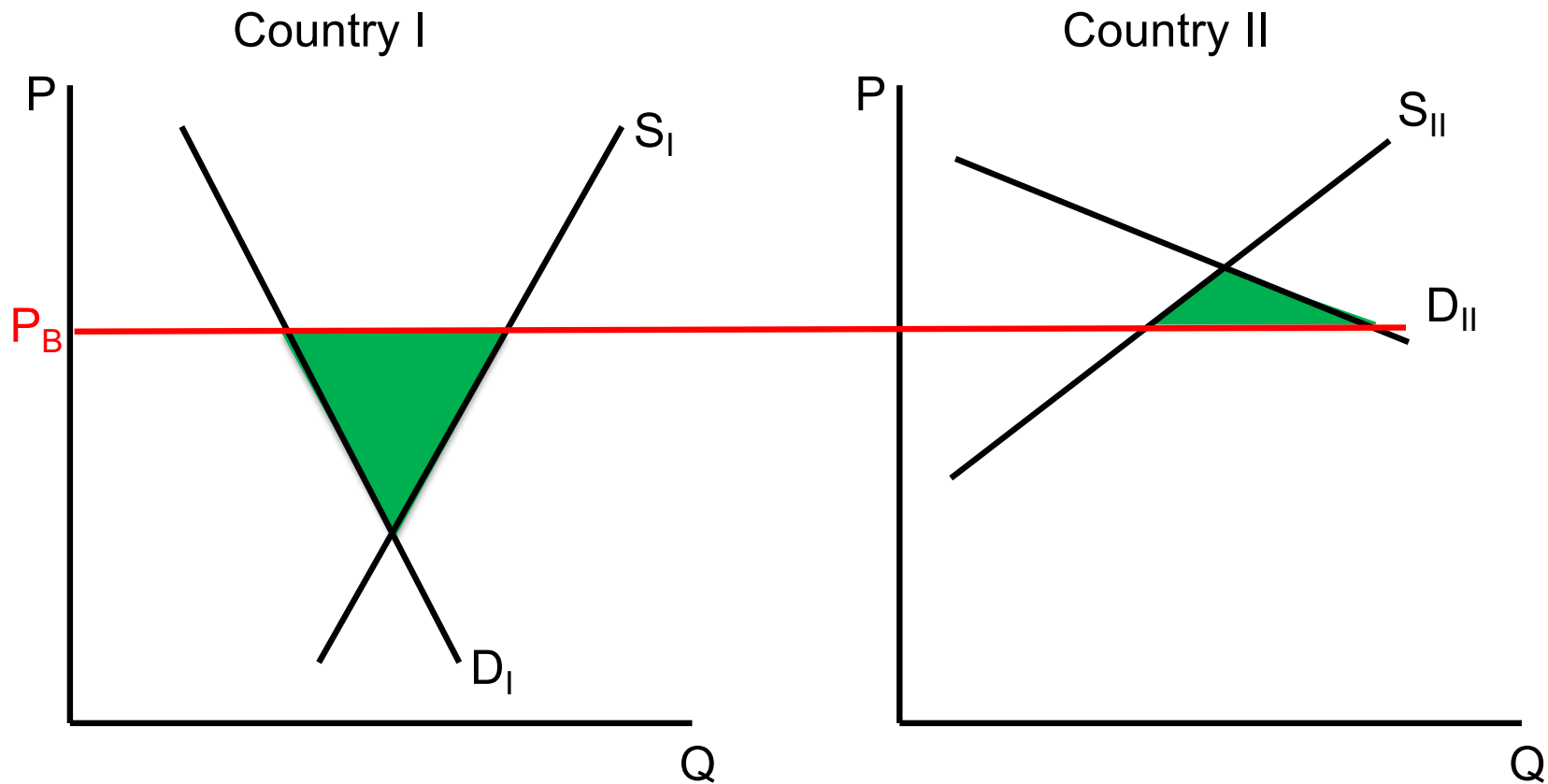
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Clicker Diagram



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Ricardian Model of Trade

- Due to David Ricardo (1772-1823)

Assumptions:

- Production uses only labor
 - Technology:
 - Constant unit labor requirements
(labor per unit of output)
 - Or equivalently, constant labor productivities
(output per unit of labor)
- (“constant” here means “does not vary with output”)



Ricardian Model of Trade

- Example 1 (Absolute Advantage):

2 goods	Food	Cloth
2 countries	A=US	B=UK

- Data:

Labor requirements per unit	US	UK
Food (hr/lb)	.01	.02
Cloth (hr/yd)	.02	.01
Labor endowment (workers)	10	10

Ricardian Model of Trade

- Autarky Equilibrium
(Example only)

	US	UK
Food @	.01	.02
Cloth @	.02	.01
Labor	10	10

Labor allocations	Food	4	6
	Cloth	6	4
Production = Consumption	Food		
	Cloth		

$$= 4 / .01$$

$$= 6 / .02$$

Ricardian Model of Trade

	US	UK
Food	.01	.02
Cloth	.02	.01

- Trade
 - If countries had the same currency and same wage = \$10/hr, then

$$P_{Food}^{US} = \$0.10$$

- Thus
 - US produces Food
 - UK produces Cloth
- Suppose that they both completely specialize
 - (i.e., US produces only food and UK only cloth)

Ricardian Model of Trade

- Trade Equilibrium

	US	UK
Food @	.01	.02
Cloth @	.02	.01
Labor	10	10

Production	Food		
	Cloth		
Possible Consumption	Food		
	Cloth		

Ricardian Model of Trade

- Compare consumption in autarky and trade:

Consumption in Autarky	Food	400	300
	Cloth	300	400

Ricardian Model of Trade

- Compare consumption in autarky and trade:

Consumption in Autarky	Food	400	300
	Cloth	300	400

Consumption with Free Trade	Food	500	500
	Cloth	500	500

- Trade permits consumption to be higher, of both goods, in both countries!
- Both countries gain from trade

Ricardian Model of Trade

	US	UK
Food	.01	.02
Cloth	.02	.01

- This example had “absolute” advantage; that is
 - US used less labor to produce food than UK
 - UK used less labor to produce cloth than US
- But results don’t depend on that
- Change the example
 - UK $\rightarrow$ UK’ (United Klutzes)
 - Assume UK’ needs ten times as much labor to do anything
 - And also has ten times as much labor

Ricardian Model of Trade

- Example 2 (Comparative Advantage):
- Data:

Labor requirements	US	UK'
Food (hr/lb)	.01	.20
Cloth (hr/yd)	.02	.10
Labor endowment (workers)	10	100

Now US has absolute advantage in both goods, i.e., it needs (a lot) less labor

Ricardian Model of Trade

- Does this matter for production, consumption, or trade? NO!
 - In autarky, UK could produce 300 food and 400 cloth, by allocating 6 workers to food and 4 to cloth.
 - So can UK': by allocating 60 workers to food and 40 to cloth.

Ricardian Model of Trade

- With trade, UK could produce 1000 cloth by allocating all 10 workers to cloth.
- So can UK', by allocating all 100 workers to cloth.
- With trade, UK could consume 500 food and 500 cloth, by exporting 500 cloth.
- So can UK', by trading as before!

Ricardian Model of Trade

- How does this happen? Through prices and wages
- Suppose initial wage is \$10 in both US and UK'.
- Then prices are:

Prices	US	UK'
Food	\$.10	\$2.00
Cloth	\$.20	\$1.00

- DISEQUILIBRIUM!
 - Nobody would buy from UK'
 - No labor demand in UK'
 - Wage in UK' must fall
- How far?
 - At least to \$2.00
 - (so $P_C = $.20$)
 - At most to \$0.50
 - (so $P_F = $.10$)

Ricardian Model of Trade

One possible trade equilibrium for US and UK'		US	UK'
	Wage of Labor	\$10.00	\$1.50

This works! Free trade prices

Gains from trade	Wage in units of	US		UK'	
		Aut.	Trade	Aut.	Trade
	Food	100	100	5	15
	Cloth	50	67	10	10

Lecture 3: Comp. Advantage

What the wage can buy

Ricardian Model of Trade

- Implications for Fears of Trade
 - Low productivity country (UK') can still compete, because of its low wage
 - High wage country (US) can still compete because of its high productivity

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Gain from Trade in General

- This is a very simple model
- But it does generalize to less restrictive assumptions (trust me!)
 - Many goods (not just 2)
 - Many countries (not just 2)
 - Many other assumptions can also be relaxed

Gain from Trade in General

- Sources of gain from trade
 - Most sources of gain are analogous to how individuals gain from trade
 - Comparative advantage focuses on
 - Differences in ability to produce goods
 - Other sources of gain, not in this model
 - Differences in tastes
 - Economies of scale

Gain from Trade in General

- What trade does not do:
 - Trade does not help everybody
 - There are losers from trade
 - See Giles
 - We'll see later in the course who they are
 - Trade does not reduce inequality
 - At least not necessarily; it could, in some cases
 - But there are also good reasons why it may increase inequality

Gain from Trade in General

- What trade does not do:
 - Trade may not cause countries to grow faster
(There is debate on that. See Giles.)
 - Trade certainly does not fix all problems
 - Weak or corrupt government
 - Failure to save
 - Poor technology
(Look at UK'. It gains from trade, but it is still very poor.)

Gain from Trade in General

- Implications for Trade Policies
- Autarky is not realistic, but “protection” (i.e., use of tariffs, quotas, etc.) is very realistic
- Result that there is gain from trade does extend to reducing protection
 - There are exceptions – we’ll see later
 - But in most cases, countries (as a whole) do gain from reducing their tariffs
 - Even if other countries do not reduce tariffs
 - Countries also gain when other countries liberalize
 - And today, countries lose from raising tariffs
 - Even if others do not retaliate

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Identifying Comparative Advantage

- Definition: A country has a **comparative advantage** in a good, relative to another good and another country, if its relative cost of producing the good is lower than the other country's

(This comparison should be done in autarky, i.e., when they do not trade, because costs may change as a result of trade)

Identifying Comparative Advantage

- If C_{gc} is the cost of producing 1 unit of good g in country c , then country 1 has a C-A in good 1 (compared to good 2 and country 2) if

Country 1's
C-A

$$\frac{C_{11}}{C_{21}} < \frac{C_{12}}{C_{22}}$$

Country 2's
C-A

Identifying Comparative Advantage

- Examples

- Given data on unit labor requirements, since cost is proportional to these, look for where these are relatively low:

Labor per unit output		Country	
		Iran	Peru
Good	Ham	6	7
	Eggs	9	14

Here, Peru has C-A in ham because

$$\frac{7}{14} < \frac{6}{9} \quad \text{i.e.,} \quad \frac{1}{2} < \frac{2}{3}$$

And Iran has C-A in eggs because

$$\frac{9}{6} < \frac{14}{7}$$

Identifying Comparative Advantage

Labor per unit output		Country	
		Iran	Peru
Good	Ham	6	7
	Eggs	9	14

- In this example, you could also compare across countries:
 - Although Peru's labor requirement is higher than Iran's in both goods,
 - it is only $1/6$ higher in Ham and it is $5/9$ ($>1/6$) higher in Eggs

$$\frac{7}{6} < \frac{14}{9}$$

Identifying Comparative Advantage

- Examples in a different form:
 - Given data on labor productivities (outputs per worker), since cost is inversely proportional to these, look for where these are relatively high:

Output per unit labor		Country	
		Blog	Slog
Good	Rugs	400	200
	Drugs	8	5

Here, Blog has Abs Adv in both goods.

But Blog has C-A in rugs because

$$\frac{400}{8} > \frac{200}{5}$$

Identifying Comparative Advantage

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 - Given data on labor productivities (outputs per worker), since cost is inversely proportional to these, look for where these are relatively high:

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8 Identifying Comparative Advantage

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	Drugs	8	5

Here, Blog has Abs Adv in both goods.

But Blog has C-A in rugs because

$$\frac{400}{200} > \frac{8}{5} \quad \text{or} \quad \frac{400}{8} > \frac{200}{5}$$

Is the Theory of Comparative Advantage Correct?

- It's not easy to test, for reasons explained in Dizikes article
 - Model says countries don't produce at all where they have no comparative advantage; so how can you measure productivity there?
 - Economists Costinot and Donaldson get around this with data on land characteristics
 - They find support for the theory

Is the Theory of Comparative Advantage Correct?

- Problem: Comparative Advantage is defined in terms of autarky prices
 - These normally cannot be observed
 - Bernhofen & Brown do observe them from historical Japan, which was closed to trade prior to 1859
 - They found:
 - “Japan exported products with relatively low prices during autarky and imported products that had relatively high autarky prices.”
 - Gains were 7% of GDP

How Large Are the Gains from Trade?

- Costinot and Rodriguez-Clare use a model to estimate the gains from trade
 - Their estimate for the US today ranges from 2% to 8% of GDP
 - Why the large range?
 - It depends crucially on the “elasticity of demand for imports”
 - This determines how easily consumers are able to substitute domestic goods for imports
 - If low, then we need imports more than if high

Clicker Question

For the countries and technologies in the table below, which country has a comparative advantage in good X?

- ✓ a) A
- b) B
- c) Both
- d) Neither

Labor per unit output		Country	
		A	B
Good	X	200	150
	Y	10	5

$$\frac{200}{10} = 20 < 30 = \frac{150}{5}$$

Clicker Question

For the countries and technologies in the table below, which country has a comparative advantage in good X?

- a) A
- ✓ b) B
- c) Both
- d) Neither

Output per unit labor		Country	
		A	B
Good	X	2.5	1.5
	Y	2000	1000

$$\frac{1.5}{2.5} = 0.6 > 0.5 = \frac{1000}{2000}$$

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Critiques of Comparative Advantage

- Some argue that Ricardian assumptions no longer hold
 - Some say the Ricardian Model assumes
 - Factors are freely mobile within countries
 - Factors are immobile between countries
 - Without these assumptions, they say, countries lose from trade
 - NOT TRUE! Relaxing either assumption does not interfere with the gains from trade

Critiques of Comparative Advantage - Prestowitz

- Prestowitz cites a study by 3 very respected (by me) economists
 - They measures losses from increased trade with China
 - Find them to be significant
- Prestowitz concludes that US may have lost from this trade
 - Yes, there are both losses and gains
 - Large losses, yes, but even larger gains

Critiques of Comparative Advantage - Prestowitz

- Prestowitz also claims that the case for the gains from trade assumes:
 - Perfect competition, No economies of scale
 - No cross-border flows of investment, technology, or people
 - Full utilization of all resources, No costs of adjustment
 - Fixed exchange rates
 - That losers from trade (who exist, but whose losses are temporary) will be compensated by the winners
- And that these assumptions do not hold.
- He's
 - Right that these assumptions do not hold
 - Wrong that the gains from trade require them

Conclusion

- Bottom line from all this
 - Yes, there are losers from trade
 - Gains from trade, especially from comparative advantage, outweigh the losses
 - Note also (see Brooks) that countries have done much better with trade than without, and not just in income – also reduced child mortality and increased education

Next Time

- Modern Theories and Additional Effects of Trade
 - Other theories of trade that are more realistic than the Ricardian Model
 - Effects of trade on other things, such as wages
 - How some will lose from trade