

**Warm up questions (hint...both answers are true)**

1. I have written my name and student number on each page of the exam and the bubble sheet.
2. You see a sink with two handles marked hot and cold, and you turn the handle marked hot. It is very likely that hot water will come out.

**Questions 3-8 refer to empirical evidence taken from our class discussions and the textbook.**

3. Since 1970, international investment of all kinds has grown less quickly than international merchandise trade.

False. See first day notes.

4. Countries with rising labor productivity experience falling wages because fewer workers are needed to produce the same amount of output.

False. Rising labor productivity correlates to higher wages. see text figure 2-8.

5. Countries used to trade primarily with close neighbors, but globalization means that proximity no longer matters to trade patterns.

False. Countries still trade primarily with neighbors. See first day notes, figure 1-2.

6. Before David Ricardo articulated the theory of comparative advantage, mercantilists believed countries gained from exporting and lost from importing.

True. See sidebar on text page 32

7. In the US, Trade Adjustment Assistance (TAA) is designed to help factory owners who suffer losses due to import competition.

False. TAA is designed to help workers displaced by import competition. See p. 75-79

8. An early study of the Heckscher-Ohlin theory by Wassily Leontief found that US imports have a higher capital-labor ratio than US exports.

**True. This is called the Leontief Paradox. see p. 108-109.**

For questions 9-17 assume we have a Ricardian model of trade with two countries (US, Mexico) producing two goods (apples, wheat) .

	US	Mexico
Total Labor	200	100
Total Possible Output of Each Good -- if all labor were used to produce only that good.		
Apples	100	50
Wheat	40	40

Note that the table above describes the total labor force of each country and total production of each good that could be attained if all labor were used to produce that good. Finally, assume that consumers in both countries have identical preferences (the same indifference curves).

First translate these total outputs into unit labor requirements, using  $\text{output} = L/a$ , or  $a = L/\text{output}$ .

	US	Mexico
Total Labor	200	100
Unit labor requirements		
Apples	2	2
Wheat	5	2.5

Or you can do it in terms of marginal products of labor using  $\text{output} = L * \text{MPL}$ , or  $\text{MPL} = \text{output}/L$

	US	Mexico
Total Labor	200	100
MPL		
Apples	0.5	0.5
Wheat	0.2	0.4

**In autarky...(questions 9-12)**

9. The marginal product of labor in wheat production is the same in both countries.

False. It is higher in Mexico.

10. The price of apples / price of wheat is lower in the US.

True.

$$\frac{P_{apples}}{P_{wheat}} = \frac{a_{apples}}{a_{wheat}}$$

For the US =  $2/5=0.4$  For Mexico =  $2/2.5 = 0.8$

11. The US consumption frontier, measured on a per person basis, is lower than Mexican consumption possibilities.

True.

To get the consumption frontier on a per person basis, divide the total output in each sector by total labor force. The result is the same as the marginal product of labor in each sector. Note that the MPL is the same in both countries for apples, but is lower for the US in wheat. That means that the US CPF measured on a per person basis is lower than Mexico.

12. People in the US should consume the same ratio of apples/wheat as people in Mexico.

False.

If preferences are the same, and  $\frac{P_{apples}}{P_{wheat}}$  is lower in the US, people in the US should consume more apples.

**In moving from autarky to free trade...(questions 13-17)**

13. The US should export wheat.

False.

The US has lower autarky  $\frac{P_{apples}}{P_{wheat}}$  than Mexico and should export apples.

14. Mexican apple output should rise.

False.

Mexico should export wheat, which requires that they produce more wheat and fewer apples.

15. The prices of apples/price of wheat in the US should rise.

True. Free trade causes the price of your export good to rise and the price of your import good to fall.

16. Workers in both countries should be better off as measured by the rise in consumption possibilities.

True.

17. The ratio of apples/wheat consumed in the US should fall.

True. As  $\frac{P_{apples}}{P_{wheat}}$  rises, people will consume fewer apples and more wheat.

**For questions 18-27...Brazil and Chile produce coffee and wine using land and labor. Labor is mobile between the sectors, however, coffee beans and wine require different soil and climate. This means that some land is good only for growing coffee beans and some land is only good for growing wine grapes. Brazil is relatively abundant in coffee-growing land, while Chile is relatively abundant in wine grape growing land. Preferences are identical in both countries.**

**Draw the RS curves with  $P_{wine} / P_{coffee}$  on the vertical axis and  $Q_{wine} / Q_{coffee}$  on the horizontal axis.**

Chile's RS curve lies to the right of Brazil's. That means that Chile has a low relative  $P_{wine} / P_{coffee}$

**Questions 18- 19...Assume both countries are in autarky.**

18. At the same relative output levels,  $Q_{wine} / Q_{coffee}$ , Brazilian prices of wine relative to coffee

$P_{wine} / P_{coffee}$  are higher than in Chile.

True.

19. Chilean consumers will prefer to purchase a higher ratio of wine/coffee than consumers in Brazil.

**True.** Since  $P_{wine} / P_{coffee}$  is lower in Chile than in Brazil, consumers will consume a higher ratio of  $Q_{wine} / Q_{coffee}$

**Questions 20-23... Still in autarky, the demand for coffee rises and the demand for wine falls in both countries. In the new equilibrium in Chile...**

**To see this effect... shift the RD curve down and to the left. Or, using the bucket diagram, shift the labor demand curve for coffee up and the labor demand curve for wine down.**

20. The price of coffee should rise relative to the price of wine.

True.

21. The marginal product of labor in wine should rise.

True.

The rise in coffee prices pulls labor into the coffee sector and out of the wine sector. Since MPL is declining in L, this causes MPL in wine to rise.

22. Coffee producing firms should hire more labor.

True.

You can see this from the bucket diagram. Since labor demand = P \* MPL, a rise in coffee prices causes the marginal benefit of hiring coffee workers to rise.

23. The value of land used to grow coffee should fall while the value of land used to grow wine grapes should rise.

**False.**

**The land returns depend on prices and the marginal product of land. Both are going up for coffee, both are going down for grapes.**

**Questions 24 – 27. Now let Chile and Brazil trade with each other. In the move from autarky to free trade**

24. Brazil exports coffee.

True.

$P_{wine} / P_{coffee}$  is higher for Brazil than in Chile, which means that  $P_{coffee} / P_{wine}$  is lower in Brazil.

25. The price of wine relative to coffee will rise in Chile.

True. Trade causes product prices to converge, and  $P_{wine} / P_{coffee}$  started lower in Chile.

26. Owners of wine grape land in both countries are worse off as a result of free trade.

False.

Since  $P_{wine} / P_{coffee}$  rises in Chile, owners of wine grape land will be better off.

27. The relative quantity of wine/coffee consumed in Chile will rise.

False.

Since  $P_{wine} / P_{coffee}$  rises, consumers there will buy less wine and more coffee.

**Questions 28-35 use a Heckscher-Ohlin model of trade. Japan and China produce cars and shirts using two factors, capital and labor, that are mobile across sectors. Cars are capital-intensive. Shirts are labor-intensive. The country-wide capital-output ratio is higher in Japan than in China. The cost of labor is  $w$ . The cost of capital is  $r$ .**

**Questions 28-31...In autarky.**

28. At the same factor price ratio ( $w/r$ ), shirts use a higher labor/capital ratio than cars in Japan.

True. This is the definition of labor-intensive.

29. A fall in the cost of labor relative to capital ( $w/r$  falls) will cause both shirts and cars in Japan to use more labor.

True. Demands for each input are decreasing in their price. See figure 4-1.

30. We would expect to see the marginal product of capital in Japan to rise after  $w/r$  falls.

True.

As  $w/r$  falls Japan will start to use more labor and less capital. This will drive down the MPL and drive up the MPK.

31. At the same output ratio  $Q_{cars} / Q_{shirts}$ , China has a lower opportunity cost for producing cars than does Japan.

False.

China has less capital, and cars are capital-intensive. This means that at the same output ratio car output will have a higher opportunity cost for China.

**Questions 32-35. In the move to free trade.**

32. Japan should export cars.

True.

33. The relative demand curve for labor/capital in China as a whole should shift right.

True.

Recall that the RD curve for labor/capital depends on the labor and capital intensity of production for cars and shirts and on the importance of cars and shirts in production. China will specialize in shirts, meaning that the demand for factors coming from shirts will be more important. The RD curve for the economy as a whole shifts right to look more like demand for labor/capital from the shirt section.

34. The factor price ratio ( $w/r$ ) in Japan and China should converge.

True.

Trade causes the price of the scarce factor to fall and the abundant factor to rise. For Japan  $w/r$  falls, for China,  $w/r$  rises. They converge.

35. The quantity of labor/capital demanded by the car industry in Japan should rise.

True

Trade causes the price of the scarce factor to fall and the abundant factor to rise. For Japan  $w/r$  falls.

As  $w/r$  falls in Japan labor becomes less expensive and the car industry should use more labor.

Short Answer 1 (30 pts) The US and Canadian fishing fleets both fish in the same waters in the North Atlantic, but the US fleet is 10% more productive than the Canadian fleet. Swordfish populations in the North Atlantic are falling rapidly and are in danger of going extinct. In response, the US government puts a strict quota that cuts in half the number of fish that can be caught by each US-owned swordfish boat. Answer a,b,c, d.

a. How would the quota impact US production possibilities and fish prices in autarky?

The quota effectively lowers the marginal product of capital in the fishing sector. If we were to graph fishing output against output from another sector, the PPF would shift in relatively more for the fish sector.

The increased scarcity of fish in the US market, plus an inability to import them from abroad, causes their price to rise.

b. How would the quota impact the pattern of trade and the returns to owning fishing boats in the US and Canada in free trade?

The US starts off with a 10% efficiency advantage and then has its productivity cut in half. The restrictions should give Canada a comparative advantage in fishing. That is, autarky prices in Canada are now below US autarky prices. Canada should start exporting fish to the US.

Returns: In the US, the fishing quotas would directly lower the marginal product of capital, but this would be partially compensated by a rising price in autarky. Free trade with Canada would then push fish prices down.

For the US, this would represent a significant decrease in the returns to owning fishing boats.

For Canada, the restriction would probably increase the MPK of their boats (more fish to catch with US boats out of the way). And the supply reduction on the US side would push up prices. The returns to their fishing fleet would rise.

c. Compare the US quota to two alternative policies: fixed quotas for both fishing fleets, or permits to catch swordfish, initially assigned to each nation and then made trade-able. Which policy has the best chance to help fish populations recover with the least economic inefficiency?

US quota: Production would be diverted from the US fleet to the Canadian fleet, meaning that fish populations would still be heavily over-fished.

US + Canada quota: This would reduce the incentive for Canada to ramp up production to offset a US only quota. However, the quota hits efficient and inefficient fleets the same way.

Trade-able fishing permits. This would also reduce the incentive for Canada to boost production, but it allows a reallocation of fishing rights so that the more efficient producer could produce more.

d. If trade-able permits were put in place which country should buy and which country should sell fishing permits?

The US is more efficient, so it should buy fishing permits from Canada and catch more fish. Canada should fish less and sell the rights to fish to US firms.

Short Answer 2 (20 pts): Compare the Ricardian and Specific Factors Models when labor is mobile across two sectors of production (X and Y). Answer a,b,c,d.

a. Describe in words and an equation what determines the demand curve for labor in the Specific Factors model. Does this equation also work for the Ricardian model?

Firms hire workers until marginal costs equal marginal benefits.

$$\text{wage} = \text{price} * \text{MPL}.$$

Yes. Note that in the Ricardian model,  $\text{MPL} = 1 / a$ , where  $a$  = unit labor requirement.

We showed that in the Ricardian model  $p = w * a$ ; you can also write this as  $w = p/a$ , and since  $a = 1/\text{MPL}$  you get back

$$w = p * \text{MPL}$$

The only difference is that in the Ricardian model, MPL is a constant.

b. For each model, describe what determines opportunity costs of production, and describe what happens to the opportunity cost of producing X as production of Y falls?

In both models opportunity costs are given by the ratio of marginal products of labor.

So moving one unit of labor from Y production to X production yields  $\text{MPL}(x)$  more x output and  $\text{MPL}(y)$  less Y output.

In the Ricardian model, the MPL in each sector is a constant, so the opportunity cost does not change as production of Y falls.

In the SF model, rising L  $\Rightarrow$  falling MPL. Production of Y down  $\Rightarrow$  L used in Y down  $\Rightarrow$   $\text{MPL}(y)$  up. And at the same time, production of X up  $\Rightarrow$  L used in X up  $\Rightarrow$   $\text{MPL}(x)$  down.

So, the opportunity costs of X production are rising as Y output falls.

c. What does your answer to 2b imply should happen to product prices in each model as Y output falls?

Prices reflect opportunity costs of production.  $\frac{P_x}{P_y} = \frac{MPL_y}{MPL_x}$

In the Ricardian model, the marginal products are constant, so prices do not change as we move along the PPF. (Once we hit the axis and we are completely specialized in producing one good prices can change.)

In the SF model, the marginal products are changing, so  $\frac{P_x}{P_y} \uparrow$

d. What does it imply about the likelihood that a country will completely specialize (produce only one good)?

In the Ricardian model, opportunity costs and prices don't change until the country completely specializes.

In the SF model, every incremental increase in output of the export good raises opportunity costs and prices. This makes it much more likely that prices will converge on the foreign price before the country has specialized completely.