

Economics 101: International Trade

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Problem Set 1b

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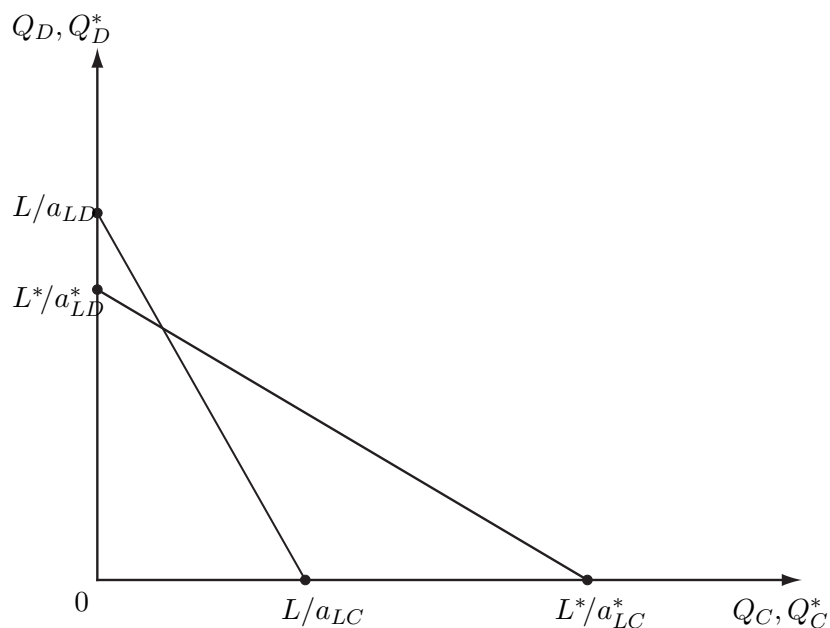
3 Productivity and Autarky Prices

Consider two countries, Home and Foreign, producing two commodities, A and B . Home needs 2 hours of labor to produce a unit of B . Foreign needs 12 hours of labor to produce a unit of A . The autarky ratio of the price of A to the price of B for Home $P_A/P_B = 5$ and the autarky price for Foreign is $P_A^*/P_B^* = 3$. Home is endowed with 800 hours of labor and Foreign is endowed with 1,000 hours of labor.

- Find the number of labor hours Home needs to produce a unit of A and the number of labor hours Foreign needs to produce a unit of B . Does either country have higher productivity in both goods? Do Home and Foreign want to trade? What will the pattern of trade be?
- Suppose that population growth in Foreign raises its labor endowment from 1,000 to 1,200 hours. How much of each good do Home and Foreign produce under trade? (Hint: the unit input requirements do not change.) Does the welfare of the representative Home consumer increase, decrease, or remain unchanged? Briefly explain your answer.

4 Comparative Advantage

Two countries can produce coffee (C) and donuts (D). The production possibility frontiers for Home and Foreign ($*$) are shown below. The labor forces of Home and Foreign are equal, $L = L^* = 100$.



The quantities produced under complete specialization are $Q_C = 100$, $Q_D = 50$, $Q_C^* = 200$, and $Q_D^* = 40$.

- What are the unit input requirements for donuts and coffee in Home and Foreign?
- Calculate the opportunity cost of coffee in terms of donuts for Home and Foreign. Which country has an absolute advantage in coffee? Which country has a comparative advantage in coffee?
- Home and Foreign trade coffee and donuts. What is the range of possible relative price of coffee (P_C/P_D)?
- Pick a feasible equilibrium relative price. Is trade beneficial to both countries? Show this on your graph.
- Will trade equalize wages in Home and Foreign? Explain your answer.

5 Productivity and Trade

Home and Foreign (*) produce cheese (C) and wine (W). The unit labor requirements for Home and Foreign are shown in the table below.

<i>Sector</i>	<i>Home</i>	<i>Foreign</i>
Cheese	$a_{LC} = 2$	$a_{LC}^* = 4$
Wine	$a_{LW} = 2$	$a_{LW}^* = 1$

Home's labor force $L = 100$ and Foreign's labor force $L^* = 100$.

- What is the opportunity cost of cheese in terms of wine for Home and Foreign? Which country has a comparative advantage in cheese?
- Graph the world relative supply of cheese $(Q_C + Q_C^*)/(Q_W + Q_W^*)$ as a function of world relative prices P_C/P_W . Provide specific values on the axes.
- Suppose world consumers' relative demand for cheese $(Q_C + Q_C^*)/(Q_W + Q_W^*)$ depends on the world relative price of cheese as follows:

$$\frac{Q_C + Q_C^*}{Q_W + Q_W^*} = 1 - \frac{1}{5} \frac{P_C}{P_W}$$

Graph the relative demand and indicate the world-trade equilibrium. What is the relative price of cheese under free trade?

- What is the production of cheese and wine in Home and Foreign (Q_C , Q_C^* , Q_W , and Q_W^*) under free trade? What does this pattern of production imply for the pattern of trade?
- What is Home's the relative wage w/w^* ?

6 Productivity Growth and Trade

Home and Foreign produce cheese and wine as in question 5.

Foreign experiences productivity growth in its *export* sector. Its unit labor requirement falls from $a_{LW}^* = 1$ to $a_{LW}' = 0.8$. World relative demand is the same as in question 5.

- Graph the original and new world relative supply of cheese $(Q_C + Q_C^*) / (Q_W + Q_W^*)$ as functions of world relative prices P_C / P_W .
- Indicate the new equilibrium on your graph. What is the relative price of cheese under free trade after the productivity change?
- Has the pattern of trade changed after productivity growth?
- What happens to Home's relative wage w/w^* following Foreign's productivity growth? Are Home's residents made better or worse off?

Now suppose Foreign is able to adopt Home's cheese-producing technology and experiences productivity growth in its *import* sector. Foreign's unit labor requirement for cheese falls from $a_{LC}^* = 4$ to $a_{LC}' = 2$.

- Graph the original and new world relative supply of cheese $(Q_C + Q_C^*) / (Q_W + Q_W^*)$ as functions of world relative prices P_C / P_W .
- Indicate the new equilibrium on your graph. What is the world-trade relative price ratio after the productivity change?
- How have the patterns of production and trade changed after productivity growth? Compare this with your answer above.
- What happens to Home's relative wage? Are Home's residents made better or worse off? Compare this with your answer above.

7 Comparative Advantage with Many Goods

Two countries, Japan and Brazil (*), can produce coffee (C), airplanes (A), and motor vehicles (M). The unit labor requirements for Japan and Brazil in the production of each good are in the table below. The wage paid in Japan is 3 times the wage paid in Brazil.

<i>Sector</i>	<i>Japan</i>	<i>Brazil</i>
Coffee	$a_{LC} = 4$	$a_{LC}^* = 1$
Airplanes	$a_{LA} = 2$	$a_{LA}^* = 4$
Motor vehicles	$a_{LB} = 1$	$a_{LB}^* = 6$

- Calculate Japan's relative productivity advantage for each good.
- In which good does Japan have the strongest comparative advantage? In which good does Brazil have the strongest comparative advantage?
- Graph world relative supply and world relative demand for labor.
- Given relative wages, which goods will Japan produce and which goods will Brazil produce? What is the pattern of trade when trade between Japan and Brazil is costless?
- Suppose wages in Japan and Brazil are now equal ($w/w^* = 1$). Does the pattern of trade change? If so, how and why?

Suppose that international trade between Japan and Brazil is no longer costless. For each unit of a good shipped between countries, only $\tau = 0.5$ unit arrives at its destination. This effectively doubles the cost of importing a good. The wage paid in Japan is 3 times the wage paid in Brazil.

- Calculate Japan's relative productivity advantage for each good *including* transportation costs.
- Given relative wages, which goods will Japan produce now? Which goods will Brazil produce?
- Does the pattern of trade change? If so, how and why?
- What would happen to the pattern of trade if transportation costs fell to $\tau = 0.75$?