Public Affairs 856
Spring 2022
University of Wisconsin-Madison

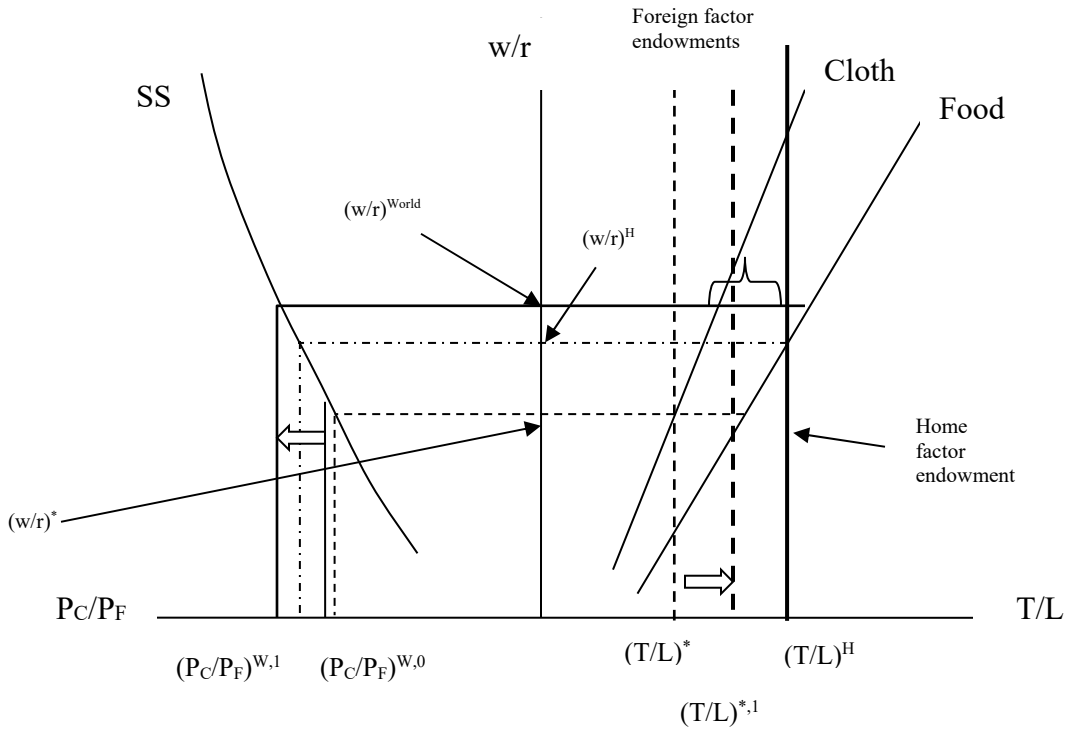
Menzie D. Chinn
Social Sciences 7418

Midterm Exam 1 Answers

The total time for the exam is 60 minutes, although you are given 70 minutes to complete it. Points are allocated proportionally to the time allocations**.**

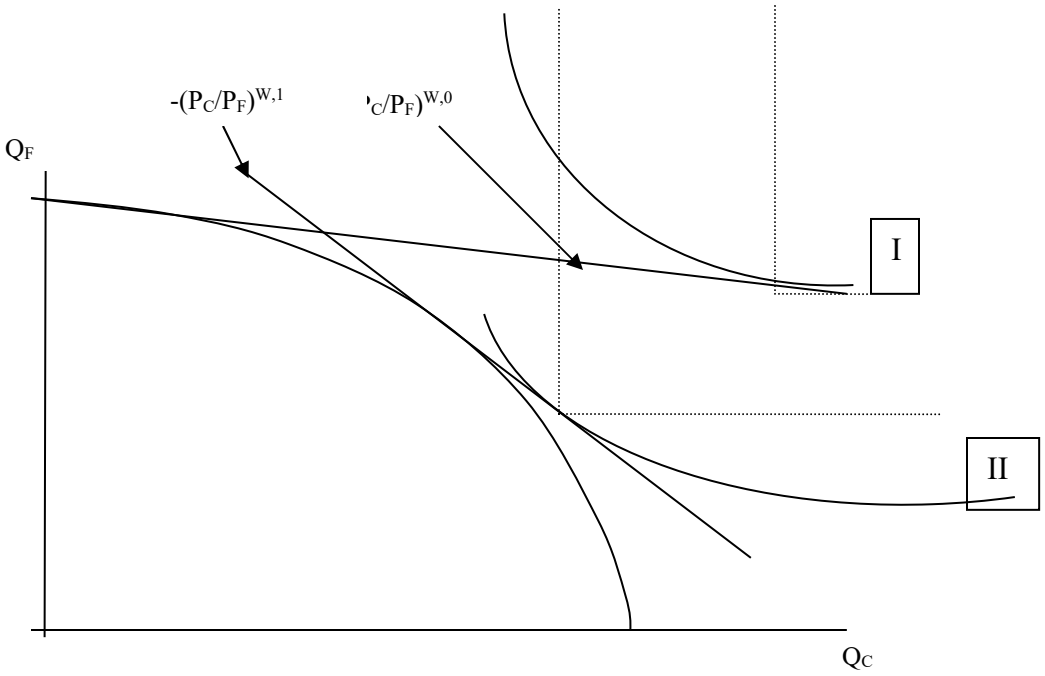
1. [25 minutes total] Hecksher-Ohlin.

   a. (10 minutes) Draw the "Johnson Diagram", where cloth is labor intensive and food is land intensive, and home is land abundant, a*ssuming that both countries are initially specialized under free trade*. Analyze the effect of an increase in the amount of land in Foreign that causes both countries to be non-specialized.



Initially, at world price $(P_C/P_F)^{W,0}$, Home is specialized in Food, Foreign in Cloth. The original wage rental rate is $(w/r)^{*}$ in Foreign, while it is $(w/r)^{H}$ in Home. Once the Foreign land/labor ratio rises from $(T/L)^{*}$ to $(T/L)^{*,1}$, the world price rises from $(P_C/P_F)^{W,0}$ to $(P_C/P_F)^{W,1}$ and the wage rental rate in this example rises in both countries to $(w/r)^{world}$. Home now produces both goods, but still tends to produce more food than cloth, relative to Foreign. Foreign produces both goods, but still tends to produce more cloth than food, relative to Home. The bracketed space above is the share of Land in Food in Home.

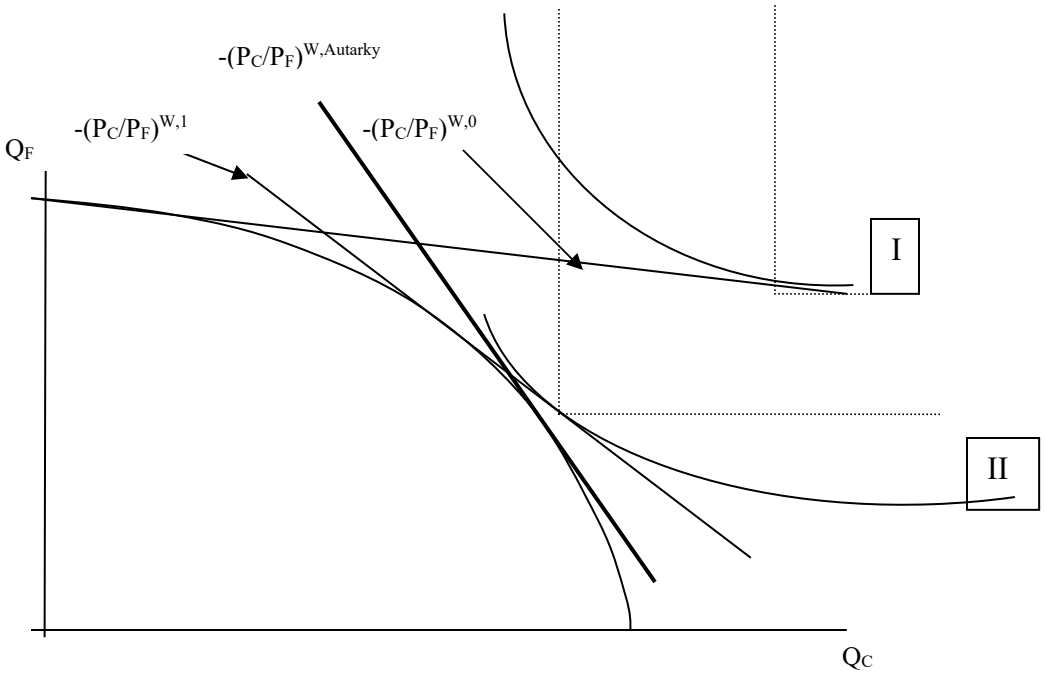
   b. (10 minutes) Using a PPF/relative price/social indifference curve diagram for Home, show what happens when this event occurs. Is Home better off relative to conditions before Foreign increased its endowment of Land?



Originally, home is specialized in Food, facing a relative price of $(P_C/P_F)^{W,0}$, and level of social welfare associated with social indifference curve I. When foreign's land-to-labor endowment increases, the relative price of cloth rises to $(P_C/P_F)^{W,1}$, and the slope of the relative price line rises, and a level of social welfare associated with social indifference curve II, which is lower than that achieved originally. An alternative way of showing the reduction in welfare is by noting that higher levels of consumption of both goods could be achieved originally, versus after the endowment change.

c. (5 minutes) Is Home better off relative to the situation under autarky? Explain, using a diagram.

Even with the relatively higher price of cloth, utility at II is still higher than under autarky. Under autarky, one sees that consumption must match production, where the indifference curve is tangent to the PPF which is tangent to the relative price line (shown in bold).

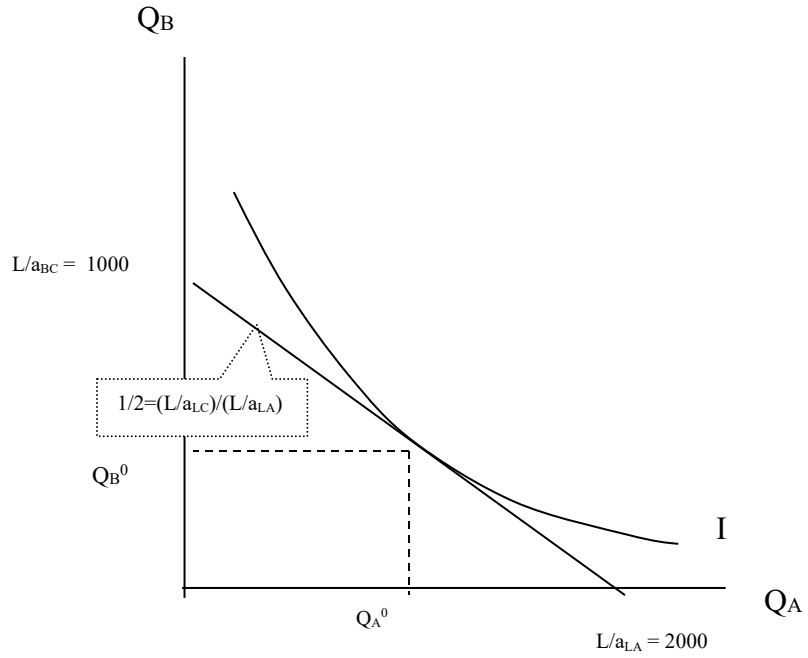


2. [20 minutes total] The following shows the labor time necessary to produce one unit of the good in a Ricardian model of trade:

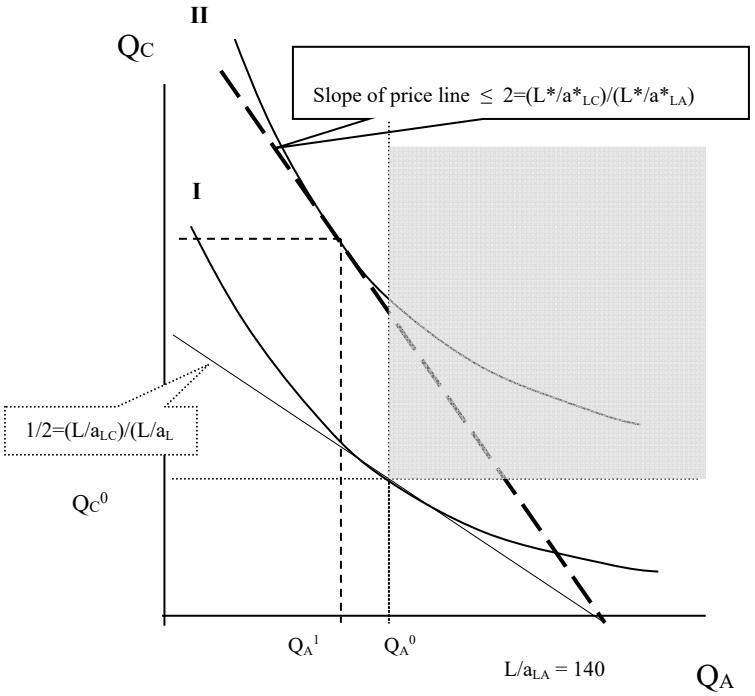
	Biotech	Airliners
US	400 worker-days	200 worker-days
Europe	250 worker-days	500 worker-days

a. (7 minutes) Which country has a comparative advantage in what good? If the US has 400,000 workers, draw and label the country's PPF. Show graphically the production and consumption point for the US under autarky (assume that you know the preferences of the country).

The US has a comparative advantage in Airliners, while Europe has a comparative advantage in Biotech. The PPF is given by a straight line between L/a_{LB} and L/a_{LA}. The slope is given by $(L/a_{LB})/(L/a_{LA}) = a_{LB}/a_{LC} = 1000/2000 = 1/2$ {biotech/airliner} . How does one know that the US has a comparative advantage in Airliners? Calculate the analogous slope for Europe; it is $(L^*/a^*_{LB})/(L^*/a^*_{LA}) = a^*_{LA}/a^*_{LC} = 500/200 = 2$ {biotech/airliners}. In other words it takes fewer biotech (1/2) to obtain a single airliner in the US than in Europe 2).



b. (7 minutes) Suppose that trade opens up. Show graphically the US production and consumption points under trade (assume that you know the world prices of the goods).



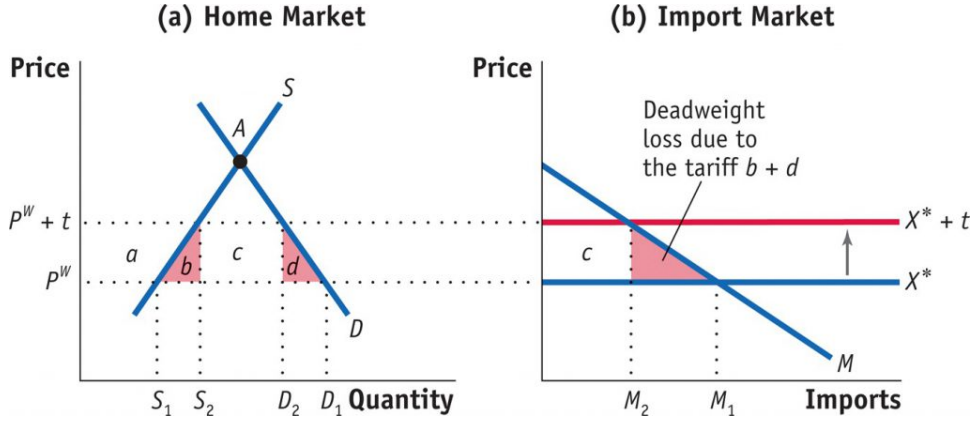
When trade opens up, then the US can transform Airliners into Biotech along the price line that has a slope that is at most as steep as the PPF of Europe (2, see part (a)), and at least as steep as the PPF of the US (1/2). Consumption of either Airliners or Biotech *could* be less than that occurring originally. In the case drawn above, the tangency of the indifference curve (II) with the price line indicates that consumption of Airliners (Q_A^1) is lower than initially (Q_A^0). The fact that consumption is at a higher indifference curve indicates that welfare is indeed higher. An alternative way of deducing the fact that the country is better off to note that with trade, higher levels of consumption of *both* goods is possible (the shaded area).

c. (6 minutes) Can the consumption of Biotech be smaller with trade? Can the consumption of Airliners be smaller with trade? In what sense is the country better off?

Depending on the shape of the indifference curves, consumption of either Biotech *or* of Airliners could be lower (but not both). The way the figure in the answer to part b is drawn, Airliner consumption is lower. The country is better off in the sense that the representative agent can reach a higher indifference curve. Notice that in the figure drawn for 3(b), the gray area denotes higher consumption of both goods – so in principle higher welfare can be inferred without appeal to indifference curves.

3. [15 minutes total] Consider a small country that imports widgets initially under free trade.

a. (10 minutes) Show the impact of a tariff *t* on widgets, clearly labeling the change in consumer surplus, producer surplus, consumption side dead weight loss, and production side dead weight loss.



Originally, the price of widgets faced at Home is PW (assuming a small country, P^W is given exogenously, i.e., the import supply/foreign export supply curve is perfectly elastic – blue line). The original quantity of demand is D_1, of supply S_1, so *import* demand is M_1 ($=D_1-S_1$) The increase in tariff rates from 0 to t results in the price faced at Home being P^W+t, and quantity demanded falls to D_2, quantity supplied rises to S_2, so import demand falls to M_2 ($=D_2-S_2$). Production side DWL is area b, consumption side DWL is d; total change in consumer surplus is reduction equal to sum of areas a+b+c+d, while change in producer surplus is increase in area a. (Tariff revenue is area c)

b. (5 minutes) On net is the country better or worse off?

Consumer surplus reduction is a+b+c+d, producer surplus gain is area a, tariff revenue gain is area c. The uncompensated changes are the sum of areas b+d, production side and consumption side DWL. These arise because producers are producing at a higher marginal cost than the widgets can be obtained for for units S_1 to S_2, and consumers are foregoing marginal benefits in excess of the price widgets can be obtained from the foreign country over units D_2 to D_1. (Note this answer uses the convention that consumer and producer surplus are equally weighted.)

pa856mt1a_s22
7.3.2022