Professor Robert Staiger

Economics 39F
Problem Set 1

(First 6 problems from Caves, Frankel and Jones, 1990)

1.   With reference to the home country's trade triangle illustrated in Figure 2.3, suppose that the world relative price of clothing stays at the slope shown by line CFD.   How would the home country's volume of imports and exports be altered if (a) a fire destroyed ten percent of its clothing endowments or (b) a bumper harvest expanded its food production by ten percent?

2.   Referring to the previous exercise, if a fire destroyed quantity GE of clothing in Figure 2.3, would the home country cease to trade if the world relative price of clothing is shown (again) by the slope of line CFD?

3.   In figure 2.6, a positively sloped curve is drawn to show the foreign supply of exports of food rising as the price of food rises.   How can this response be reconciled with the assumption that each nation's endowment supply of commodities is fixed with respect to price?

4.   The individual whose tastes are shown by the indifference curves in Figure 2.9 is a net seller of food at autarky home prices shown by line 1.   This individual loses if trade with the rest of the world is allowed and food prices are lower there, shown by line 2.   Show how this same individual might gain if the world price of food is even much lower than that shown by line 2.

5.   The relative price that clears the world's food market is shown by OT in Figures 2.5 and 2.6.   Using the assumed balance in each country between total expenditures and total income, prove that the world's clothing market must be cleared as well.   Would this mutual clearing of markets take place if one country tried to "live beyond its means"?

6.   For the individual portrayed in Figure 2.9, describe the trade pattern after the compensation scheme is in effect.   How does this compare with the trade pattern of others in the country?

7.   Country A is endowed with 18 units of good x and 1 unit of good y, while country B is endowed with 2 units of good x and 7 units of good y.   Both countries consume x and y in fixed and equal proportions (e.g., x is a left shoe, y is a right shoe).

   a). Construct an Edgeworth box for the two countries.

   b). Identify the contract curve.

   c). Solve for the free-trade equilibrium relative price.

   d). How are the gains from trade allocated across the two countries?

   e). What explains the peculiar allocation of the gains from trade across these countries?

   f). What is the direction of trade between the two countries.   Show that it is balanced.

8.   Suppose that country A is endowed with two goods, tuna and milk, and composed of two citizens, one a tuna fisherman and the other a dairy farmer.   The tuna fisherman is endowed with 3 units of tuna and 1 unit of milk.   The dairy farmer is endowed with 3 units of milk and 1unit of tuna.   Both citizens share the same set of (homothetic) preferences: they only consume tuna and milk in fixed and equal proportions (e.g., 1 unit of tuna with 1 unit of milk, 2 units of tuna with 2 units of milk, etc.).

   a). Show that the autarky relative price for country A is not uniquely determined, and in fact can lie anywhere in the interval between zero and infinity.

   b). What happens if country A opens its borders to trade with the rest of the world?

FIGURE 2.3   The Trade Triangle for the Home Country

The home country originally consumes its endowment bundle, E, at relative prices shown by line AB. If it could trade at prices shown by line CD, it could export GE units of clothing to obtain FG units of food, thus consuming the bundle shown by F and improving its real income to the level indicated by the y_1 indifference curve.
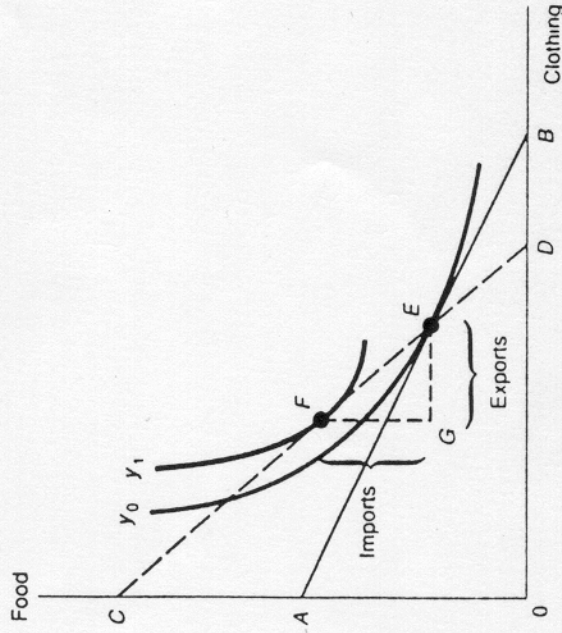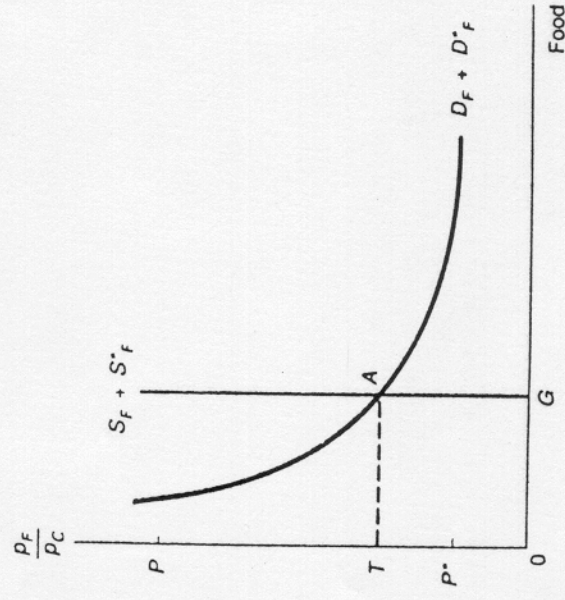

FIGURE 2.6   Excess Demand and Supply

Equilibrium quantity OA shows free-trade imports of food by the home country at the equilibrium price ratio, OT.
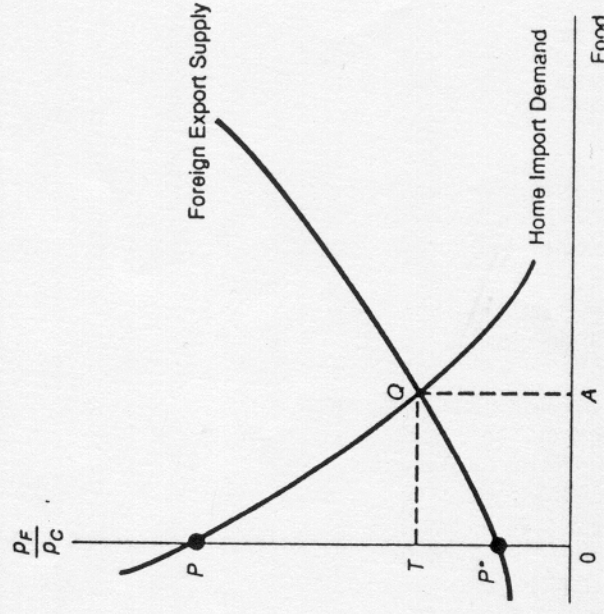

FIGURE 2.5   World Demand and Supply

The terms of trade, OT, are determined by the equilibrium between the world's demand for food $(D_f + D_f^*)$ and the supply of food $(S_f + S_f^*)$.

FIGURE 2.9   International Trade Can Hurt

This individual is a net seller of food (amount EA) at home, with home prices shown by line 1. With food relatively cheaper on world markets (line 2), the individual's consumption is reduced from G to H. The individual is hurt by international trade.

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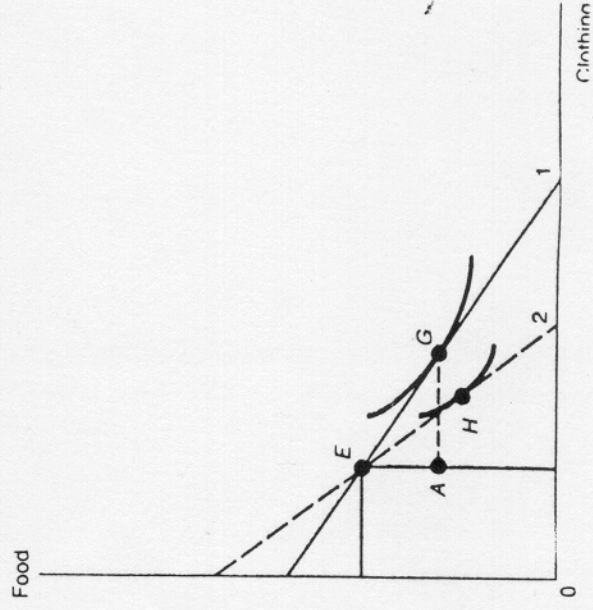
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Problem Set 1: Sketch of Answers

1.   a) As long as both food and clothing are normal goods in consumption, the negative income effect associated with a 10% reduction in the country's clothing endowment will reduce consumption of both goods. Since relative prices are unchanged at their world levels by assumption, there is no substitution effect.   Therefore, we know that the country's endowment of food is unchanged but its demand for food falls, so it imports less food. As for clothing, both endowments of clothing and demand for clothing fall, but since world prices are unchanged and trade must still balance, the smaller import of food implies that exports of clothing must fall as well.

        b) Now the income effect is positive, so more of both goods will be consumed. Since clothing endowments are unchanged, exports of clothing must fall. As for food, both endowments of food and demand for food rise, but since world prices are unchanged and trade must balance, imports of food must fall.

2.   If a fire destroyed the quantity GE of clothing in Figure 2.3, trade could cease, trade could continue in the same direction, or the pattern of trade could be reversed, depending on the slope of the social indifference curve through G. If this slope is equal to the slope of the world price line CFD, then trade will cease, but if this slope is flatter (steeper) than the slope of CFD, the pattern of trade will be preserved (reversed).

3.   This is because the demand for food will fall as the price of food rises relative to the price of clothing, at least starting from autarky prices. As the relative price of food rises well beyond its autarky level, the demand for food could begin to rise (if the positive income effect dominates the substitution effect), and the export supply curve could "bend backwards."

4.   If the individual whose tastes are shown in Figure 2.9 faces a relative price of clothing to food that is higher than his "autarky prices," i.e., the slope of his indifference curve at point E, then the pattern of his trade would reverse from that shown in the figure and he could reach, for sufficiently "steep" relative prices, an indifference curve higher than the indifference curve pictured through point G in the figure.

5.   This is just proving Walras' Law, which we did in class.

6.   A compensation scheme might first let the individual trade with fellow residents at the autarky price line labeled 1 in Figure 2.9. Then the country would be allowed to trade with the world at the worlds price line labeled 2. Under this compensation scheme, the individual represented in Figure 2.9 would then export clothing and import food on the world market, and would gain from trade.

7.   Country A is endowed with 18 units of good x and 1 unit of good y, while country B is endowed with 2 units of good x and 7 units of good y. Both countries consume x and y in fixed and equal proportions (e.g., x is a left shoe, y is a right shoe).

a). Construct an Edgeworth box for the two countries.
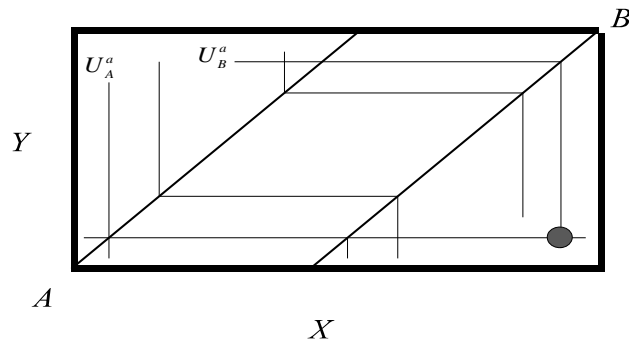
b). Identify the contract curve.

The contract curve is the entire area between the two 45^0 lines and the indifference curves labeled U_A^a and U_B^a.

c). Solve for the free-trade equilibrium relative price.

The free-trade equilibrium relative price is $p_x/p_y=0$. At this price, there will be excess supply of x, which is consistent with market clearing provided that the relative price of x is zero.

d). How are the gains from trade allocated across the two countries?

Country B gets all the gains from trade, and Country A gains nothing from trade (it maintains its autarky utility level.

e). What explains the peculiar allocation of the gains from trade across these countries?

Country A is so big (along what turns out to be the relevant dimension, x), that the two countries can trade at A's relative autarky prices and markets will clear. So Country B is the only country to face changes in the relative price as a result of trade, and it is therefore the only country to gain from trade.

f). What is the direction of trade between the two countries. Show that it is balanced.

> There is no trade in y. A exports x to B. But even so, trade is balanced because the equilibrium relative price of x is zero, so each country's trade balance is zero as required.

8.   Suppose that country A is endowed with two goods, tuna and milk, and composed of two citizens, one a tuna fisherman and the other a dairy farmer. The tuna fisherman is endowed with 3 units of tuna and 1 unit of milk. The dairy farmer is endowed with 3 units of milk and 1 unit of tuna. Both citizens share the same set of (homothetic) preferences: they only consume tuna and milk in fixed and equal proportions (e.g., 1 unit of tuna with 1 unit of milk, 2 units of tuna with 2 units of milk, etc.).

> a). Show that the autarky relative price for country A is not uniquely determined, and in fact can lie anywhere in the interval between zero and infinity.

> > The autarky prices for country A can be identified using an Edgeworth Box for the fisherman and the farmer.
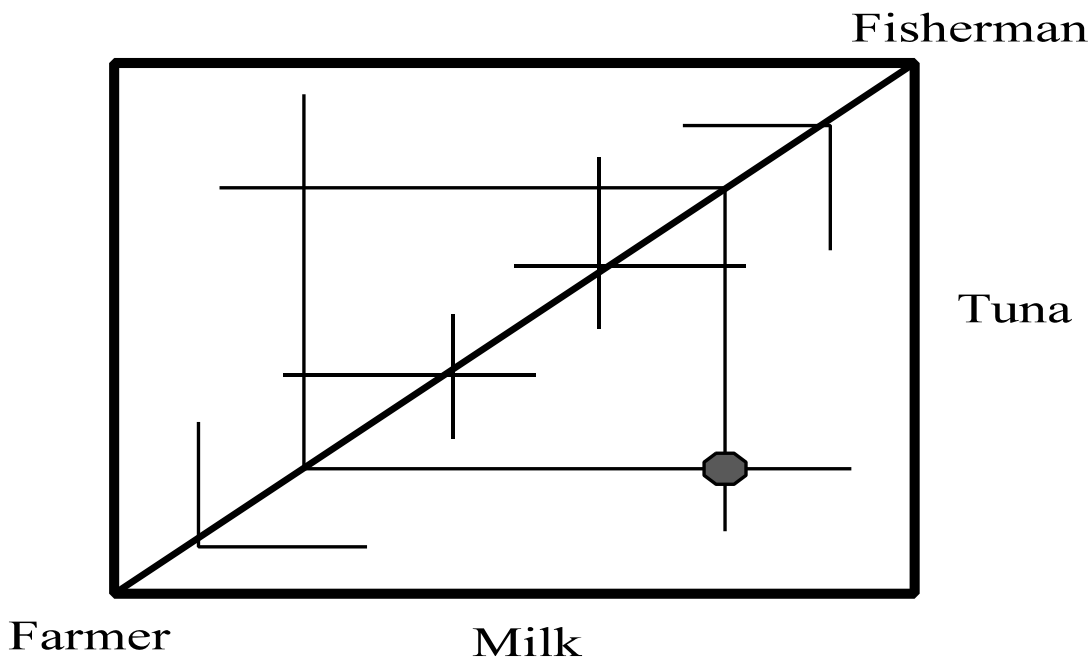
b). What happens if country A opens its borders to trade with the rest of the world?

If relative prices in the rest of the world are determined to be p_x^w/p_y^w when country A is not trading with the rest of the world, then when country A is permitted to trade with the rest of the world, (i) prices everywhere in the world will become equalized, and (ii) the equilibrium free-trade prices will be equal to p_x^w/p_y^w, the original prices in the rest of the world. Point (ii) follows because, at these prices, country A will have no excess demands or supplies (recall from part (a). that *any* relative price between zero and infinity is consistent with autarky equilibrium in country A), and so country A will not engage in any actual trades with the rest of the world at these prices. This means that, unless by chance country A's relative autarky prices happen to be equal to p_x^w/p_y^w, someone in country A will gain from the opportunity to trade with the rest of the world and someone will lose, even though no trade with the rest of the world takes place. In this peculiar case, a compensation scheme that prevented anyone in country A from losing due to the opportunity to trade would necessarily hold both the farmer and the fisherman at their autarky utility levels.