Economics 181 : Spring 2004
Solutions to Problem Set #1

(1a.) The ratio of pre-trade prices in Iceland is equal to the ratio of the unit labor requirements. This makes sense as the harder something is to produce (i.e. the higher the unit labor requirement), the higher its price:

\[
\frac{P_{\text{Lumber Iceland}}}{P_{\text{Fish Iceland}}} = \frac{w_{\text{Iceland}} \ast ULR_{\text{Lumber Iceland}}}{w_{\text{Iceland}} \ast ULR_{\text{Fish Iceland}}} = \frac{1.2}{6} = .2
\]

(1b.) The ratio of pre-trade prices in Canada is:

\[
\frac{P_{\text{Lumber Canada}}}{P_{\text{Fish Canada}}} = \frac{w_{\text{Canada}} \ast ULR_{\text{Lumber Canada}}}{w_{\text{Canada}} \ast ULR_{\text{Fish Canada}}} = \frac{.8}{4} = .2
\]

Since the two countries have the same pre-trade price ratios, there is no reason for either of them to export or import. In other words, there is no reason for them to trade.

(1c.) Canada has an absolute advantage in producing lumber because it only takes .8 units of labor to produce a unit of lumber in Canada whereas it takes 1.2 units of labor to produce a unit of lumber in Iceland. The two countries have the same unit labor requirement (same productivity) in fish. Therefore, neither country has an absolute advantage in fish.

(1d.) The two countries have the same productivity in fish but Canada has higher productivity (a lower ULR) in lumber. Therefore, Canada is relatively better at producing lumber. In other words, Canada has a comparative advantage in producing lumber and Iceland has a comparative advantage in producing fish.

(1e.) First we have to compute pre-trade prices for both Iceland and Canada:

\[
\frac{P_{\text{Lumber Iceland}}}{P_{\text{Fish Iceland}}} = \frac{w_{\text{Iceland}} \ast ULR_{\text{Lumber Iceland}}}{w_{\text{Iceland}} \ast ULR_{\text{Fish Iceland}}} = \frac{1.2}{6} = .3
\]

\[
\frac{P_{\text{Lumber Canada}}}{P_{\text{Fish Canada}}} = \frac{w_{\text{Canada}} \ast ULR_{\text{Lumber Canada}}}{w_{\text{Canada}} \ast ULR_{\text{Fish Canada}}} = \frac{.8}{4} = .2
\]

Also, we have to calculate the relative quantities produced of lumber to fish when Iceland is specialized in fish production and Canada is specialized in lumber production. The quantities can be calculated by multiplying the size of the labor force by the marginal product of labor (the inverse of the ULR) for each sector:

\[
\frac{Q_{\text{Lumber Canada}}}{Q_{\text{Fish Iceland}}} = \frac{L_{\text{Canada}} \ast MPL_{\text{Lumber Canada}} \ast ULR_{\text{Fish Iceland}}}{L_{\text{Iceland}} \ast MPL_{\text{Fish Iceland}} \ast ULR_{\text{Lumber Iceland}}} = \frac{400 \ast 4}{300 \ast .8} = \frac{20}{3} = 6 \frac{2}{3}
\]

Now we can draw the world relative supply diagram:
(1f.) Incomplete specialization by Iceland occurs when the world price is equal to Iceland’s pre-trade price. This occurs when supply intersects demand at Iceland’s pre-trade price. We show this in the graph below:

![Graph showing the relationship between relative price (Lumber/Fish) and relative quantity (Lumber/Fish)]

(1g.) If Iceland is incompletely specialized, then it will produce both lumber and fish. Since Canada will be specialized in lumber if Iceland is incompletely specialized, then both countries will produce lumber. In which case the ratio of the wages across countries should equal to the inverse of the ratios of their unit labor requirements:

\[
\frac{w_{\text{Iceland}}}{w_{\text{Canada}}} = \frac{P_{\text{Lumber}}}{P_{\text{Fish}}} \times \frac{\text{MPL}_{\text{Iceland}}}{\text{MPL}_{\text{Canada}}} = \frac{\text{ULR}_{\text{Iceland}}}{\text{ULR}_{\text{Canada}}} = \frac{.8}{1.2} = .667
\]

(1h.) The quantity of labor increasing in Iceland from will not impact pre-trade prices. Nor will it impact anything on the Ricardian supply curve diagram except for the ratio of lumber to fish produced when each country is completely specialized. It will increase the amount of fish produced under these circumstances because Iceland’s labor force has increased and Iceland specializes in fish when both countries are completely specialized. First we calculate the new complete specialization quantity ratio. Then, we redraw the Ricardian supply curve:

\[
\frac{Q_{\text{Lumber Canada}}}{Q_{\text{Fish Iceland}}} = \frac{L_{\text{Canada}}}{{\text{MPL}_{\text{Canada Lumber}}} \times \frac{L_{\text{Iceland}}}{{\text{MPL}_{\text{Iceland Fish}}} \times \frac{w_{\text{Iceland}}}{w_{\text{Canada}}} = \frac{400 \times 4}{480 \times .8} = \frac{25}{6} = \frac{4}{6}
\]

(1i.) Here, again, we can calculate relative wages by using the definition of the wage as the marginal revenue product and then we can make substitutions:

\[
\frac{w_{\text{Iceland}}}{w_{\text{Canada}}} = \frac{P_{\text{Fish}}}{P_{\text{Lumber}}} \times \frac{\text{MPL}_{\text{Iceland Fish}}}{{\text{MPL}_{\text{Lumber I}}}} = \frac{1}{{\text{ULR}_{\text{Iceland Lumber}}} \times \frac{w_{\text{Iceland}}}{w_{\text{Fish}}} = \frac{.25 \times .8}{4} = .8
\]

Alternatively, we can draw the box diagram:
Note the real wage of Iceland to Canada, then is equal to: \( \frac{1}{10} \div \frac{1}{8} = .8 \)

(2.) (a.) is correct: remember that the lower the URL, the more of that good trades for one unit of the other good. In this case, \( \frac{P_{\text{Kenya Shirts}}}{P_{\text{Kenya Oil}}} = \frac{ULR_{\text{Kenya Shirts}}}{ULR_{\text{Kenya Oil}}} = \frac{6}{12} \) which means that 1 unit of oil costs 12 which is the equivalent of 2 shirts… or 1 unit of oil trades for 2 shirts. (The key here is to realize that the ratio of trade of quantities is the inverse of the ratio of the trade of goods… if the price of oil is twice that of shirts, then 2 shirts trade for one unit of oil).

(3.) (b.) is correct: this trade ratio is the same as Kenya’s pre-trade ratio of trade between shirts and oil. Therefore, nothing changes for Kenya after Kenya opens up to trade. Therefore, Kenya is neither better nor worse off after trade relative to before trade. So, Kenya does not share in any gains from trade.

(4.) (c.) is correct: if the price of good X over price of good Y is relatively higher in the country in comparison with the world price, then good Y is relatively cheap for the country to produce. Therefore, the country has comparative advantage in producing good Y. From the Ricardian theory of comparative advantage, we know that a country exports the good in which it has comparative advantage and imports the other good. Therefore, the country will export good Y and import good X.