Economics 181: International Trade
Midterm Solutions

1 Short Answer (20 points)

Please give a full answer. If you need to indicate whether the answer is true or false, please explain your answer. You must give an explanation to get full credit for the answer (1 point for correct answer; 1 point for the explanation).

1. (Ricardian framework). Assume that country X produces two goods, cloth and steel. Country X has an absolute advantage in the production of both goods, but only has a comparative advantage in producing steel. Assume that the free trade price is in between the two country autarky prices. With trade, consumers will have to pay a higher price for steel, but wages in country X will rise when it opens up to trade. True or False?

   TRUE. We know that $\left(\frac{a_s}{a_c}\right)_X < \left(\frac{a_s}{a_c}\right)_W$, *which implies that both the autarky opportunity cost and relative price of steel in terms of cloth is lower in country* X. *Therefore, with trade, the relative world price for steel is higher for consumers in* X *than it was in autarky. Even still, since world prices differ from autarky prices, there are gains from trade, which implies that consumption in* X *increases. Since consumption = income = wages, wages unambiguously increase.*

2. The Theorem of Factor Price Equalization (FPE) states that with trade, returns to factors should equalize throughout the world. This implies that wages should become equal across all countries. One important assumption underlying this theorem is differences in technology across countries. True or False?

   FALSE. The FPE theorem is derived under the assumptions of the H-O model, which assumes technology is identical across countries.

3. Home and Foreign can produce cheese, wine, and tools with the following unit labor requirements:

   Table 1: Unit Labor Requirements

	Home	Foreign
Cheese	4	2
Wine	2	4
Tools	2	3

   In world trade equilibrium, wages are the same in home and foreign, $w = w^*$. What good(s) will Home produce? What good(s) will Foreign produce?

   Each country's production is determined by comparing the unit production costs, or $a_i \times w$ *vs.* $a_i^* \times w^*$, *for each good* i. *Whichever country has the lower unit production costs will produce the good. Since* $w = w^*$, *comparative advantage is determined by directly comparing the ULR's of each country. Therefore, Home will produce wine and tools and Foreign will produce cheese.*

4. Answer and Explain. If P_c/P_f were to increase in the international marketplace, then:

   (a) All countries would be better off

   (b) The terms of trade of cloth exporters improve

   (c) The terms of trade of food exporters improve

   (d) The terms of trade of all countries improve

   (e) None of the above

   Answer: B. In the standard trade model, terms of trade are defined by: $TOT = \frac{P_X}{P_M}$. *Therefore, for countries with* $\frac{P_X}{P_M} = \frac{P_c}{P_f}$, *an increase in the international price will increase the* TOT. *This is true for cloth exporters.*

5. If the USA is abundant in skilled labor relative to unskilled labor, then the Stolper-Samuelson theorem suggests that when the USA increases its trade with China, wage inequality in the USA should rise. True or False? What has actually happened to wage inequality in the USA? Is this consistent with the theory? What should happen to wage inequality in China?

   TRUE. The Stolper-Samuelson theorem tells us that wages for skilled workers in the USA should increase and wages for the unskilled in the USA should decrease. Therefore, the ratio $\left(\frac{w_{\text{skilled}}}{w_{\text{unskilled}}}\right)_{\text{USA}} \uparrow$. *Assuming* $w_{\text{skilled}} > w_{\text{unskilled}}$, *initially, then inequality would increase. In the US, the data show that wage inequality has increased, therefore, it is consistent with the theory. In China, however, wage inequality should be decreasing because the Stolper-Samuelson theorem also tells us that* $\left(\frac{w_{\text{skilled}}}{w_{\text{unskilled}}}\right)_{\text{China}} \downarrow$. *Given that China is abundant in unskilled labor, and wage inequality has increased, this is not consistent with the H-O Model.*

6. The incidence of poverty in the world is falling. Trade shares are rising. Therefore globalization has led to a reduction in the incidence of poverty. True or False?

   FALSE. These are two facts that are correlated but there is no proven causal relationship. There could be any number of reasons as to why this is happening.

7. True or False? The gravity model states that trade between two countries will increase if the size of either country's economy increases and the distance between the two countries is bigger.

   FALSE. The gravity equation is: $T_{i,j} = \frac{A \times Y_i \times Y_j}{D_{i,j}}$, *where* $Y_i \times Y_j$ *is the product of country* i *and country* j*'s Gross Domestic Products; and* $D_{i,j}$ *is the distance between them. Therefore, trade will increase when any country's GDP increases and will decrease when the distance between countries is larger.*

8. True or False? In the Ricardian framework, everyone always gains from trade (assuming that the free trade price differs from the autarky price) but in the Specific Sector Model, the factor used to produce the good which is imported always loses.

   TRUE or FALSE. This question is a bit tricky, and the answer completely depends on if the factor you are referring to is the specific factor or the mobile factor. In the Ricardian model, everyone gains from trade when autarky prices are different from world prices. In the Specific Factors model, however, there are two factors of production for each good, one mobile and one fixed. Although we know for sure that the returns to the fixed factor will fall, the outcome on the return for the mobile factor is ambiguous. Therefore, for the mobile factor, even though they produce the imported good, they may experience an increase in real returns.

9. Suppose that the United States and Canada have the factor endowments in the table below. Suppose further that the production requirements for a unit of steel is two machines and eight workers, and the requirements for a unit of bread is one machine and eight workers.

Table 2: Unit Labor Requirements

	United States	Canada
Capital (machines)	40	10
Labor (workers)	200	60

(a) Which good, bread or steel, is relatively capital intensive? Labor intensive? Explain how you know.

We take the unit factor requirements to produce steel and bread and we compare them to find out whether production of bread or steel is capital intensive. Therefore, compare the following ratios:

$$\left(\frac{2\,\text{machines}}{8\,\text{workers}}\right)_{steel} > \left(\frac{1\,\text{machines}}{8\,\text{workers}}\right)_{bread} \Rightarrow \left(\frac{1}{4}\right)_{steel} > \left(\frac{1}{8}\right)_{bread}$$

Conclude from the above comparison that the production of steel is capital intensive and the production of bread is labor intensive.

(b) Which country would export bread? Why?

Remember the H-O Theorem states that a country exports those goods that use intensively the factors in which the country is relatively abundantly supplied. To find out which country is abundant in capital, we take the total stock of capital and labor in both countries and compare these ratios. We compare the following:

$$\left(\frac{40\,\text{machines}}{200\,\text{workers}}\right)_{USA} > \left(\frac{10\,\text{machines}}{60\,\text{workers}}\right)_{Canada} \Rightarrow \left(\frac{1}{5}\right)_{USA} > \left(\frac{1}{6}\right)_{Canada}$$

Therefore, conclude that the United States is capital abundant and Canada is labor abundant. Then according to the H-O Theorem the United States would export steel and Canada would export bread.

10. Studies suggest that the poor in exporting sectors tend to benefit from globalization (i.e. poverty falls when exports rise) and that the poor in import-competing sectors are hurt from globalization. Is this consistent with a Heckscher-Ohlin view of the world or a specific sector view? Why or why not?

    It could be consistent with the Specific Sectors model if we assume that the poor are the fixed factors in both the export and the import sectors and these poor are different in some respect. Then the predictions from this model would be that the fixed factor in the exporting sector will be better off with trade and the fixed factor in the import-competing sector will be worse off with trade. We would know this unambiguously.

2 The Ricardian Model (25 points)

All parts worth 5 points except (d), which is worth 1 point, and (f), which is worth 4 points.

Malaysia has 300 units of labor while there are 500 units of labor in Indonesia. When they produce, the countries have the following unit labor requirements.

Table 3: Unit Labor Requirements

	Malaysia	Indonesia
Cameras	15	20
Rugs	10	20

(a) What is the relative price of rugs to cameras in Malaysia if there is no trade?

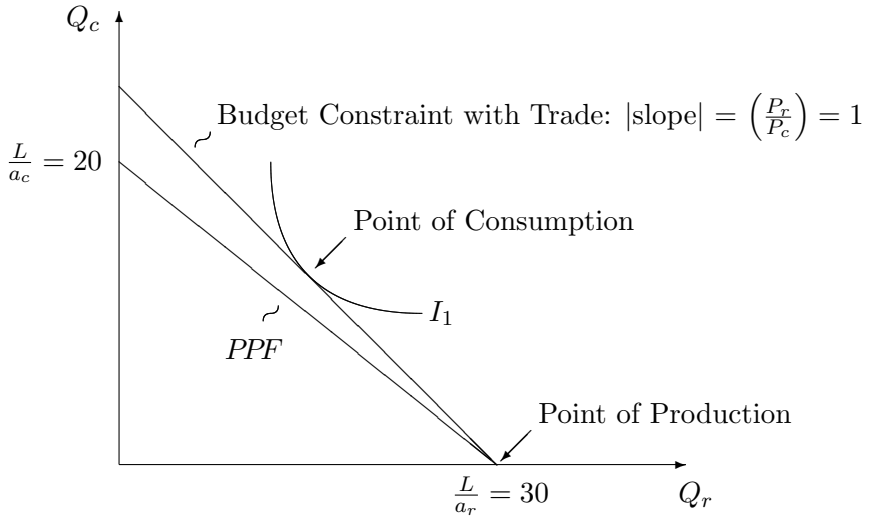
If there is no trade, then the relative price of rugs to cameras is equal to the opportunity cost of producing rugs in terms of cameras, or: $\frac{P_r}{P_c} = \frac{a_r}{a_c} = \frac{10}{15} = \frac{2}{3}$.

(b) Suppose that Malaysia and Indonesia are completely specialized when they trade. Which product will Malaysia produce.

If both Malaysia and Indonesia are completely specialized we can tell production by focusing on comparative advantage. Since $\left(\frac{a_r}{a_c}\right)_M < \left(\frac{a_r}{a_c}\right)_I$, *or* $\frac{2}{3} < 1$, *Malaysia has a comparative advantage in rug production, and will specialize in producing rugs.*

(c) Draw the production possibility frontier for Malaysia. If Malaysia only produces the good in which it has a comparative advantage, where will its production point be on the production possibility frontier? If the post-trade world price will be at 1, can you show that there are gains from trade? (HINT: the point of production and consumption is not the same.)

Figure 1: Malaysian Production Possibility Frontier



Notice that trade creates a separation between the PPF and the budget constraint. Also, since the world relative price of rugs in terms of cameras is higher than the opportunity cost of production, Malaysia will specialize in the production of rugs, and trade them for cameras. Gains from trade are clearly seen by the ability to reach a higher level of consumption, and hence, a higher indifference curve.

(d) Does Indonesia benefit from trade when the world price for rugs to cameras is 1? Explain.

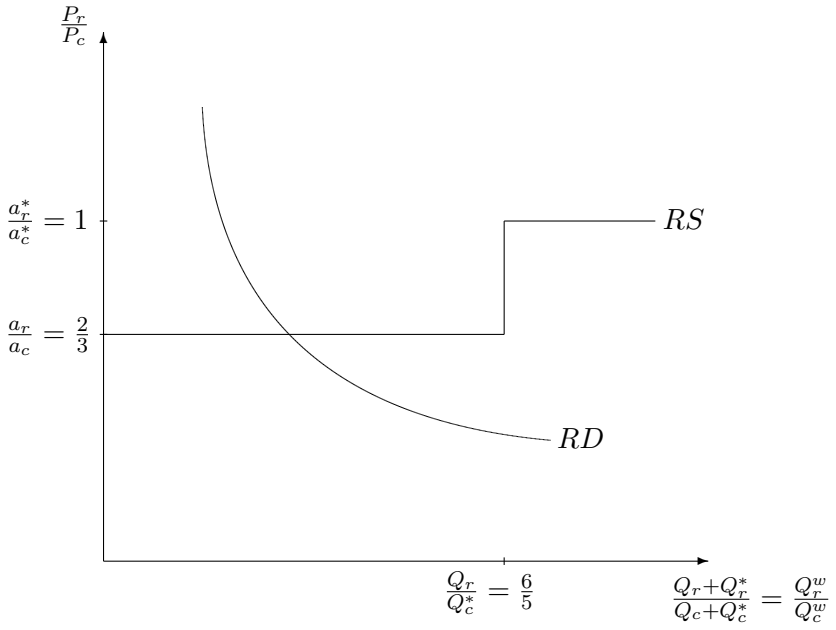
No. When the world relative price is the same as it was in autarky for any country, then there are no gains from trade for that particular country. This can easily be seen by noticing that there is no separation between the PPF and the Budget constraint after Indonesia opens to trade.

(e) Draw a world supply schedule which shows rug production relative to cameras. Label all axes, curves, intercepts, and kink points.

(f) Add a relative demand schedule to your diagram that implies that Malaysia is incompletely specialized.

First assume that Malaysia is home and Indonesia is Foreign. Then the relative supply and demand schedules are given in the following graph. Notice also that the RD curve is drawn to show that Malaysia will be incompletely specialized.

Figure 2: Relative World Supply and Relative World Demand

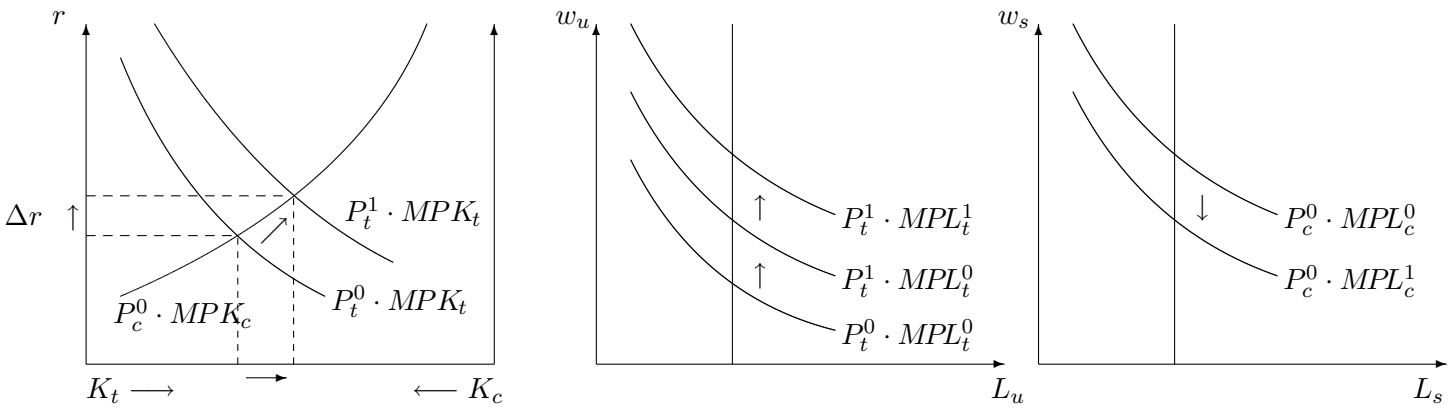


3 The Specific Factor Model (25 points)

According to an article that appeared in the New York Times this week, China has encouraged the growth of tea exports as one way to help the rural poor and decrease inequality. We can describe what is happening in China using the Specific Factor Model. Assume that there are two goods, tea and computers. Assume that there are two specific factors in China, unskilled labor (which is specific to tea production) and skilled labor (which is specific to computer production). Assume that capital is the mobile factor.

(A) (15 points) Show what happens to skilled and unskilled nominal as well as real wages if the price of tea rises. Assume that there has been no change in the price of computers.

Figure 3: Factor Markets



The first change can be seen in the mobile factor, or capital. The increase in the price of tea causes an increase in the demand for capital in the tea sector. This causes nominal returns for capital to increase and capital moves from the computer to tea sector. Now, looking at the specific factors, the movement of capital from computers to tea causes the marginal product of skilled labor to fall and the marginal product of unskilled labor to rise. Therefore, the nominal return for skilled labor will fall and the nominal return to unskilled labor will increase. Furthermore, the increase in the price of tea causes the demand for unskilled labor to increase, which causes the nominal return for unskilled labor to increase even more. The effect on real returns is given in the following table:

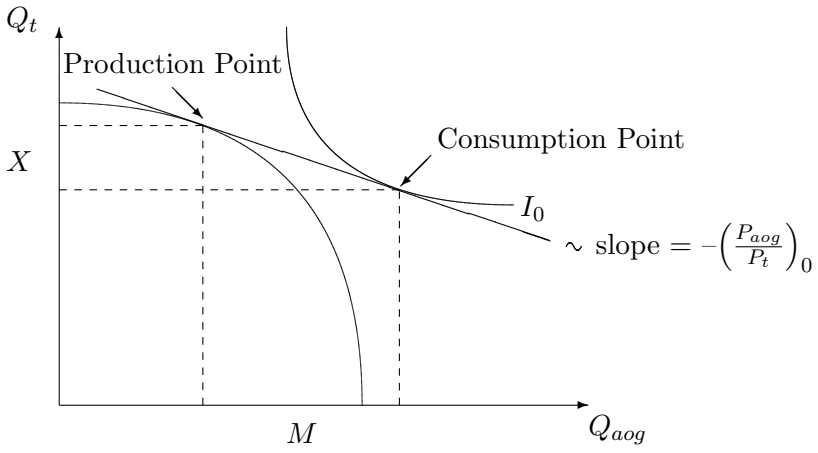
Real Return w.r.t Good	Overall Change w.r.t Good	Change in Income w/trade
$\frac{r\uparrow}{P_t\uparrow\uparrow}$	$\downarrow$	Ambiguous
$\frac{r\uparrow}{P_c-}$	$\uparrow$	Ambiguous
$\frac{w_u\uparrow\uparrow}{P_t\uparrow}$	$\uparrow$	Increase
$\frac{w_u\uparrow}{P_c-}$	$\uparrow$	Increase
$\frac{w_s\downarrow}{P_t\uparrow}$	$\downarrow$	Decrease
$\frac{w_s\downarrow}{P_c-}$	$\downarrow$	Decrease

(B) (10 points) If the price of tea rises, show what happens to the real return to capital in China. If you are told that owners of capital use computers but refuse to drink tea, how does this affect your answer?

We have already looked at the real returns for all factors in the previous table. Notice that the real return to capital increased with respect computers, but decreased with respect to tea. Therefore, before we know the preferences of capital owners, the overall effect is ambiguous. However, if we know they only consume computers, since their real returns increased with respect to computers, they are unambiguously better off.

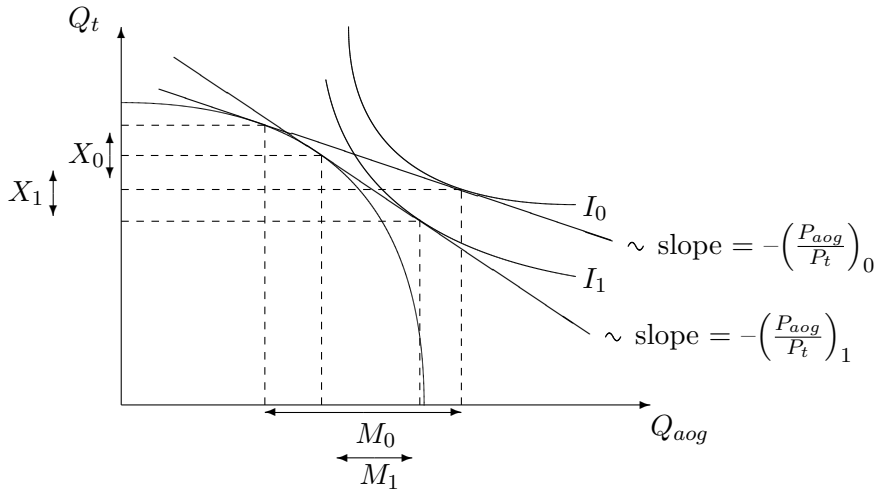
4 The Standard Trade Model (30 points)

(15 points) In this week's New York Times, an article appeared which indicates that China is now a net exporter of tea. Using the standard trade model, draw a production possibility frontier with tea products on the vertical axis and all other goods (labeled AOG for all other goods) on the horizontal axis. Draw a line tangent to the production possibility frontier and show the slope (you may label the price of tea as P_t and the price of All Other Goods as P_{aog}). Choose a production point and a consumption point which shows that China is a net exporter of tea. Label your graph to show clearly how much tea China exports and how much of All Other Goods it imports.



The above graph shows that China is a net exporter of tea and a net importer of all other goods.

(15 points) India is very concerned about the increase in China's tea exports. Using a standard trade model for India, show India as a net exporter of tea, labeling its exports and imports. Also show the initial relative price line. Then show what will happen to India if (due to the surge in Chinese exports of tea) it experiences a decline in its terms of trade for its export (tea) versus all other goods (AOG). Is India made worse off by the increase in tea exports out of China? Does this mean that India does (or does not) gain from trade?



Notice, the terms of trade for India are given by: $\frac{P_X}{P_M} = \frac{P_t}{P_{aog}}$. *We are told that they go down, which we see in the above graph by the steeper slope. The decrease in terms of trade decreases utility, but notice, as long as India remains a net exporter of tea, it still obtains a utility level higher than autarky. Therefore, even though China's exports of tea hurt India, they still gain from trade.*