

## Suggested Solutions to Assignment 1

### Part B True/ False/ Uncertain Questions

**B1.**

The following table shows how many cars *or* airplanes can be produced with a unit of resources in Canada and Japan. We can conclude that Canada will export cars and Japan will export airplanes, if both countries trade based on the principle of comparative advantage.

Number of Cars OR Airplanes Produced Per Unit of Resources

	Cars	Airplanes
<b>Canada</b>	<b>9</b>	<b>3</b>
<b>Japan</b>	<b>20</b>	<b>4</b>

**FALSE**

Based on the given information on production opportunities I have calculated the opportunity costs of producing cars and airplanes in both countries. Table 1 shows these opportunity costs.

Table1: Opportunity Costs of Production

	Cars	Airplanes
<b>Canada</b>	1/3 Airplane	3 Cars
<b>Japan</b>	1/5 Airplane	5 Cars

The opportunity cost of producing cars is 1/3 airplane in Canada and 1/5 airplane in Japan. Since Japan has the lowest opportunity cost, it must have a comparative advantage in producing cars. On the other hand, the opportunity cost of producing airplanes is 3 cars in Canada and 5 cars in Japan. Since Canada has the lowest opportunity cost, it must have a comparative advantage in producing airplanes. Therefore, according to the principle of comparative advantage, Canada will specialize in producing airplanes and Japan will specialize in producing cars. Thus Canada will export airplanes and Japan will export cars.

**B2.**

**According to the specific-factors model, free trade benefits the mobile factors of a nation.**

**Uncertain**

See the Appendix to Chapter Four of Salvatore's text (A4.1) for explanation and graph.

**B3.**

**With the opening of free trade each country *completely* specializes on the good in which she has a comparative advantage.**

**Uncertain**

According to the comparative advantage theory of international trade, with the opening of free trade a country should specialize in production of the good in which she has a comparative advantage and export that good in exchange for the other good in the production of which she has a comparative disadvantage. Depending on the production technology, countries can either completely specialize or incompletely specialize with free trade. Generally, countries with constant opportunity costs technology (constant returns to scale technology) completely specialize under free trade. See Figure 3.3, 3.4 and 3.5 of Gerber's textbook for a graphical explanation. On the other hand, countries with increasing opportunity costs technology (decreasing returns to scale technology) incompletely specialize under free trade. See Figure 3.4 of Salvatore's textbook for a graphical explanation.

Two countries (Nation 1 and Nation 2) characterized by increasing returns to scale technology (decreasing opportunity costs technology) can engage themselves into a mutually beneficial trade even if they are identical in terms of production and demand conditions (i.e., there is no comparative advantage or disadvantage). In this case, with the opening of free trade Nation 1 would completely specialize in the production of one good and Nation 2 would then specialize completely in the production of other good. See Figure 4.2 of Slavatore's textbook for a graphical explanation.

**Part C****Problem Solving Question**

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*Answer all parts of the following three questions*

**C-1.**

**Suppose the following table shows how many personal computers (PC) or mainframe computers (MF) can be produced from a given amount of resources in Canada and the U.S.**

**Output per Unit of Resources**

	<b>PC</b>	<b>MF</b>
<b>Canada</b>	<b>6</b>	<b>1</b>
<b>U.S.</b>	<b>20</b>	<b>2</b>

- (a) **Which country has an absolute advantage in the production of PC's? MF's? Which country has a comparative advantage in the production of PC's? MF's? Why?**
- (b) **Show that "world" production of both PC's and MF's can increase if Canada moves 3 units of resources into MF production and the US moves one unit of resources into PC production. What is the range of possible trade prices for MF's in terms of PC's.**
- (c) **Show that a small (price taking) country with increasing opportunity costs technology need not change its production point to gain from trade, but that if it does, it can gain even more.**

(a)

The U.S. has an absolute advantage in the production of both goods since it can produce more of either good with the same amount of resources. The opportunity costs of production are shown in the following table:

**Opportunity Costs**

	<b>PC</b>	<b>MF</b>
<b>Canada</b>	1/6 MF	6 PCs
<b>U.S.</b>	1/10 MF	10 PCs

Therefore, Canada has a comparative advantage in MFs (lower opportunity cost), and the US has a comparative advantage in PCs (lower opportunity cost).

(b)

The following table shows one what happens when Canada moves 3 unit of resources into MF production and the US moves one unit of resources into PC production.

	<b>PC Change</b>	<b>MF Change</b>
<b>Canada</b>	-18	3
<b>U.S.</b>	+20	-2
<b>World</b>	+2	1

The countries would only be willing to make these changes (by moving resources from one sector to the other) if they could trade some of their increased production in one sector (i.e. export) for more than what they gave up in decreased production in other sector (i.e. import). Since Canada's opportunity cost for an MF is 6 PCs and the US opportunity cost of an MF is 10 PCs, then trade will take somewhere these two prices. Canada must get at least 6 PCs for each MF, while the US is willing to pay at most 10 PCs for each MF.

(c)

Figure 1 (see page 9) shows the PPF of a small country with increasing opportunity costs technology. If A is the no trade production and consumption point with the autarky relative price of  $\frac{P_x}{P_y} = 3$ , the ability to trade at a different relative price (say, at a free

trade relative price,  $\frac{P_x}{P_y} = 1.5$ ) opens the possibility to consume at point B even if the

production is unchanged. Since point B lies on a higher community indifference curve compared to point A, we can conclude that the welfare of the country has increased because of this trade with no change in production point. However, with trade if the country incompletely specializes in good Y and produces at point D, the country can consume at point C which lies on even a higher community indifference curve. So, the country is clearly better off with specialization and trade. The increase in country's welfare from the movement of consumption equilibrium from A to B is called the gains from exchange and the increase in country's welfare from the movement of consumption equilibrium from B to C is called the gains from specialization.

C-2.

The following table provides hypothetical data on the productivity of single unit of resource in producing wheat and microchips in both Canada and Japan.

Output per Unit of Resources

	Wheat (tons)	Microchips
Canada	50	20
Japan	2	12

- (a) Which country has an absolute advantage in the production of wheat? Of microchips?
- (b) What is the opportunity cost of producing a ton of wheat in Canada? In Japan?
- (c) Which country has a comparative advantage in the production of wheat? Of microchips?
- (d) Suppose that Canada is endowed with 2 units of this all-purpose resource while Japan is endowed with 10 units. Draw each country's production possibility curve. (Assume constant costs).
- (e) Suppose that prior to trade, each country allocated half of its resource endowment to the production of each good. Indicate the production and consumption points of each country in the graphs (for simplicity, assume that these are the only two countries in the world).
- (f) What is world output of each good?
- (g) Indicate the production points of each country after trade, and determine world production levels.
- (h) Suppose that the terms of trade are one microchip for one of wheat and that Canada consumes as much wheat after trade as it did before trade. Indicate the post-trade consumption points of each country and each country's imports and exports.
- (i) If the terms of trade changed to two microchips for one ton of wheat, which country would benefit? Explain.

**(a)**

Canada has an absolute advantage in both goods. This is because Canada can produce more of both goods compared to Japan using one unit of resources.

**(b)**

In Canada, the opportunity cost of producing a ton of wheat

$$\begin{aligned} &= \frac{20}{50} \text{ microchips} \\ &= 0.4 \text{ microchips} \end{aligned}$$

In Japan, the opportunity cost of producing a ton of wheat

$$\begin{aligned} &= \frac{12}{2} \text{ microchips} \\ &= 6 \text{ microchips} \end{aligned}$$

**(c)**

Canada has a comparative advantage in the production of wheat because she has a lower opportunity cost in the production of wheat.

In Canada, the opportunity cost of producing microchips

$$\begin{aligned} &= \frac{50}{20} \text{ tons of wheat} \\ &= 2.5 \text{ tons of wheat} \end{aligned}$$

In Japan, the opportunity cost of producing microchips

$$\begin{aligned} &= \frac{2}{12} \text{ tons of wheat} \\ &= 0.17 \text{ tons of wheat} \end{aligned}$$

The above calculations show that Japan has a lower opportunity cost in the production of microchips. So, we can conclude that Japan has a comparative advantage in the production of microchips.

**(d)**

See Figure 2 on page 10.

Canada's production possibility curve is denoted  $ab$  with vertical intercept at 100 and horizontal intercept at 40. The vertical intercept shows that Canada can produce 100 tons of wheat ( $50 \times 2$ ) if she employs all of her 2 units of resources in the production of wheat.

On the other hand, the horizontal intercept means that Canada can produce 40 microchips ( $20 \times 2$ ) if she employs all of her 2 units of resources in the production of microchips. The production possibility curve is linear because the opportunity cost of producing one microchip is assumed to be fixed at 2.5 tons of wheat.

Japan's production possibility curve is denoted  $a'b'$  with vertical intercept at 20 and horizontal intercept at 120. The vertical intercept shows that Japan can produce 20 tons of wheat ( $2 \times 10$ ) if she employs all of her 10 units of resources in the production of wheat. On the other hand, the horizontal intercept means that Canada can produce 120 microchips ( $12 \times 10$ ) if she employs all of her 10 units of resources in the production of microchips. The production possibility curve is linear because the opportunity cost of producing one microchip is assumed to be fixed at 0.17 tons of wheat.

**(e)**

See Figure 2

Canada would be producing and consuming 50 tons of wheat and 20 microchips (point  $c$  in the diagram), and Japan would be producing and consuming 10 tons of wheat and 60 microchips (point  $c'$ ).

**(f)**

Assuming that these are the only countries making up the world, total output of wheat is 60 tons and world production of microchips is 80 units.

**(g)**

Each country specializes in the commodity in which it has a comparative advantage. Thus Canada specializes completely in wheat production (see point  $a$  on Canada's PPF in Figure 2), and Japan specializes completely in microchip production (see point  $b$  on Canada's PPF in Figure 2). World output is now 100 tons of wheat and 120 microchips.

**(h)**

See Figure 2.

Terms of trade equal to one ton of wheat for one microchip mean that the free trade relative price of microchip in terms of wheat (price of microchips/price of wheat) is 1 ton of wheat. Canada can trade from its production point  $a$  to any point on the free trade price line (it is also called consumption possibility curve)  $ae$  which has a slope of -1, representing the terms of trade. Similarly, Japan can trade from point  $b'$  to any point on the free trade price line  $b'e'$  which has a slope of -1, representing the terms of trade. Since it was assumed that Canada consumes the same amount of wheat both before and after trade, its consumption bundle is represented by point  $d$ , which contains 50 units of each good. Therefore, Canada is exporting 50 tons of wheat in return for imports of 50

microchips. Japan, having exported 50 microchips to Canada, has 70 remaining for its own consumption. When this is combined with its 50 tons of wheat imports, Japan consumes at point  $d'$ .

(i)

Terms of trade equal to two microchips for one ton of wheat mean that the free trade relative price of microchip in terms of wheat (price of microchips/price of wheat) is  $1/2$  ton of wheat. That is, the free trade price line would flatter with a slope  $-1/2$ . Thus Canada's consumption possibilities would increase (the new free trade price line rotates outward on point  $a$ ), while Japan's decrease (the new free trade price line rotates inward on point  $b'$ ). Thus Canada would get a larger share of the gains from trade.



FIGURE 1: GAINS FROM TRADE AND SPECIALIZATION

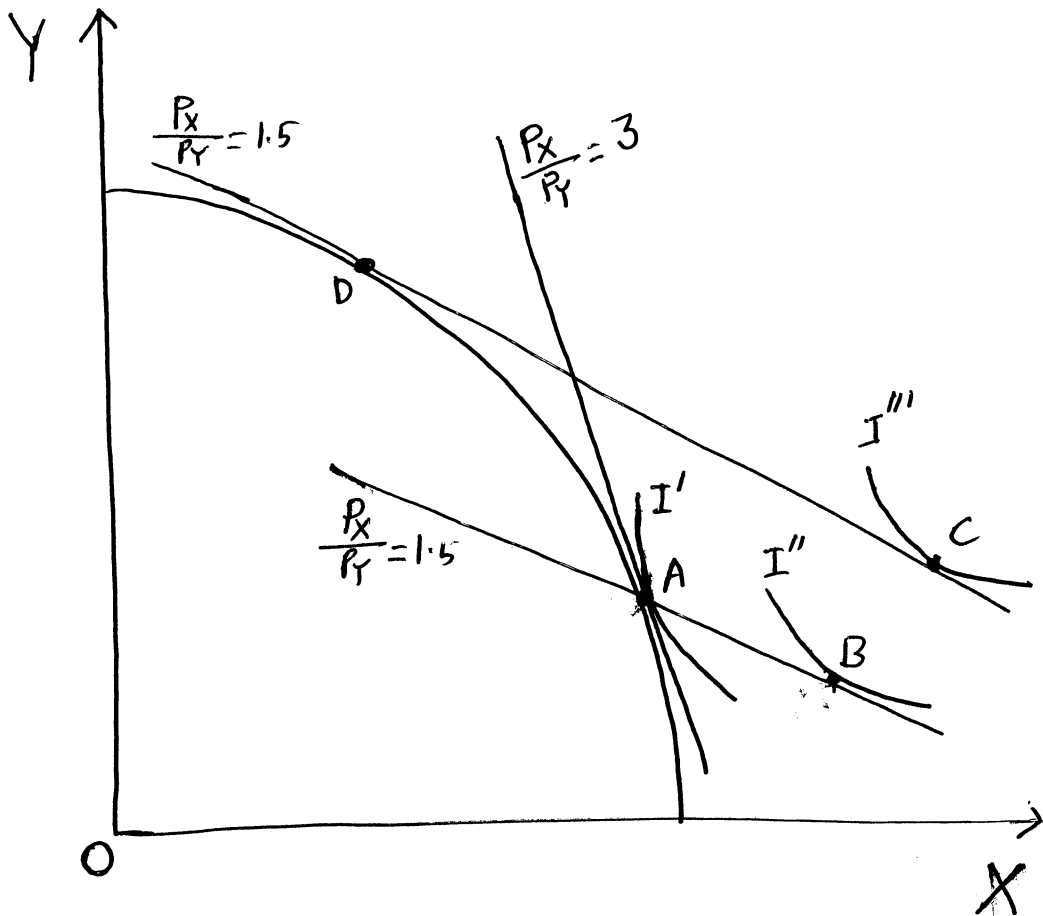


FIGURE 2 : TRADE BASED ON COMPARATIVE ADVANTAGE

