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Problem Set 1 Solutions to Problems 1 and 2

Preliminary Stuff

Definition - The producer that requires less inputs to produce one unit of good X is said to have an absolute advantage in producing good X.

Corollary - If a producer has absolute advantage in producing good X, that producer can produce more X outputs than any other competing producer with a given amount of inputs.

Definition - The opportunity cost of an item is the next best option you could have taken using the resources spent to get that item.

Definition - The producer who has the smaller opportunity cost is said to have a comparative advantage in producing that good.

Suppose we want to see if H has comparative advantage over F in the production of M. We need to do the following:

a. Determine the resources spent by H to make 1M.
b. Determine how much W could be made by H with those resources. This is H's opportunity cost of making 1M.
c. Determine the resources spent by F to make 1M.
d. Determine how much W could be made by F with those resources. This is F's opportunity cost of making 1M.
e. Compare the opportunity costs. Lower opportunity cost producer has comparative advantage by definition.

Problem 1

Given: Let there be 100 acres each of hilly H and flat F fields.
Let output per acre for H be 3 wheat W or 2 milk M.
Let output per acre for F be 5 wheat W or 3 milk M.

1a. Do hilly fields have an absolute advantage in the production of milk?

H cannot produce more M per acre, so by the corollary H does not have an absolute advantage over F in the production of M.

1b. Do hilly fields have a comparative advantage in the production of milk?

a. H can make 2M per acre. Therefore H spends 0.5 acres to make 1M.
b. H can make 3W per acre. Therefore H could make 1.5W using 0.5 acres.
c. F can make 3M per acre. Therefore F spends 0.33 acres to make 1M.
d. F can make 5W per acre. Therefore F could make 1.66W using 0.33 acres.
e. Since 1.66 > 1.5, H is the lower opportunity cost producer and thus has comparative advantage in the production of M.

Problem 2

Given: Let Canada CAN have 10L. CAN is able to make 2 cars C or 30 wheat W using 1L.
Let the USA have 20L. USA is able to make 5 cars C or 40 wheat W using 1L.

2a. Draw the production possibilities frontier for each country, placing cars on the horizontal axis and wheat on the vertical axis. In each case, identify the intercepts and the slope of the production possibilities frontier.

2b. What is the opportunity cost of cars in CAN? What is the opportunity cost of cars in USA?

a. CAN makes 2C using 1L. Therefore CAN spends 0.5L to make 1C.
b. CAN makes 30W using 1L. Therefore CAN could make 15W using 1L.

a. USA makes 5C using 1L. Therefore USA spends 0.2L to make 1C.
b. USA makes 40W using 1L. Therefore USA could make 8W using 0.2L.

Hence, CAN's opportunity cost for 1C = 15W and USA's opportunity cost for 1C = 8W.

2c. Which country has a comparative advantage in the production of cars?

Since 15 > 8, USA is the lower opportunity cost producer and thus has comparative advantage in the production of C.

2d. In the absence of trade, if CAN consumes 150W, how many C can it consume? In the absence of trade, if USA consumes 50C, how much W can it consume?

We are forcing CAN to make 150W. Since CAN makes 30W using 1L, it uses 5L to make 150W. This leaves CAN with 5L to make C with. Since CAN makes 2C using 1L, it can make 10C using 5L. CAN ends up consuming 150W, 10C.

We are forcing USA to make 50C. Since USA makes 5C using 1L, it uses 10L to make 50C.

This leaves USA with 10L to make W with. Since USA makes 40W using 1L, it can make 400W using 10L. USA ends up consuming 400W, 50C.

2e. Someone now proposes that USA and CAN enter into a trade agreement that sends 10C from USA to CAN and sends 120W from CAN to USA. If CAN continues to consume 150W, how many C will it be able to consume under the proposal? If USA continues to consume 50C, how much W will it be able to consume under the proposal?

CAN must now make 150W to consume as well as 120W more to send to USA. To make this 150W + 120W = 270W, CAN must use 9L. This leaves 1L to make 2C. So before trade, CAN has produced 270W, 2C. This is not what it will end up consuming after trade.

USA must now make 50C to consume as well as 10C more to send to CAN. To make these 50C + 10C = 60C, USA must use 12L. This leaves 8L to make 320W. So before trade, USA has produced 320W, 60C. This is not what it will end up consuming after trade.

Now trade occurs.

USA sends 10C, leaving it with 60C - 10C = 50C.
USA receives 120W and ends up with 320W + 120W = 440W.
CAN sends 120W, leaving it with 270W - 120W = 150W.
CAN receives 10C and ends up with 2C + 10C = 12C.

So after trade, CAN consumes 150W, 12C and USA consumes 440W, 50C.

2f. Should CAN accept this proposal? Should USA accept this proposal?

Here, we assume more is better.

One possible bundle of goods CAN could have made was 150W, 10C. After the trade proposal, it ends up with 150W, 12C. So it would have the same amount of W but more C. Clearly, CAN would want to accept the proposal.

One possible bundle of goods USA could have made was 400W, 50C. After the trade proposal, it ends up with 440W, 50C. So it would have the same amount of C but more W. Clearly, USA would want to accept the proposal.