ECON203: Principles of Microeconomics **Fall 2022**

Note 1: Questions in PS1 and PS2

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Key points:

- Decision tables give all the information needed to make a decision
- Production function tables and labor inputs give all the information needed to figure out trading in this setting.
- Be careful with math deductions, but focus more on the intuition :)

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1.1 NB (net benefit), OC (opportunity cost), ER (economic rent)

Consider this general decision table:

Alternative	Willingness to pay (WTP)	Explicit cost (EC)
Choice 1	WTP_1	EC_1
Choice 2	WTP_2	EC_2
Choice 3	WTP_3	EC_3

Table 1.1: A general decision table

Then we can have

- **Net benefit** ($NB_i = WTP_i - EC_i, i = 1, 2, 3$)

Alternative	Net benefit (NB)
Choice 1	$NB_1 = WTP_1 - EC_1$
Choice 2	$NB_2 = WTP_2 - EC_2$
Choice 3	$NB_3 = WTP_3 - EC_3$

  Hereafter, we assume $NB_1 > NB_2 > NB_3$.

- **Implicit cost**: the **highest net benefit** of outside options, e.g., the IC of Choice 1 is the highest NB of Choice 2 and 3 ($IC_i = \max_{j \neq i}\{NB_j\}, i, j = 1, 2, 3$)

Alternative	Implicit cost (IC)
Choice 1	$IC_1 = \max\{NB_2, NB_3\} = NB_2$
Choice 2	$IC_2 = \max\{NB_1, NB_3\} = NB_1$
Choice 3	$IC_3 = \max\{NB_1, NB_2\} = NB_1$

- **Economic rent** can be calculated as

$$\begin{aligned} ER_i &= WTP_i - OC_i \\ &= WTP_i - (EC_i + IC_i) = WTP_i - EC_i - IC_i \\ &= NB_i - IC_i \end{aligned}$$

  go back to the example, we have

Alternative	Economic rent (ER)
Choice 1	$ER_1 = NB_1 - IC_1 = NB_1 - NB_2$
Choice 2	$ER_2 = NB_2 - IC_2 = NB_2 - NB_1$
Choice 3	$ER_3 = NB_3 - IC_3 = NB_3 - NB_1$

We have all the information we need!

Some interesting questions

The sum of economic rent (ER)

- **2-choice** menu (only 2 choices to be considered): The sum of economic rent of the 2 choices is 0.

Alternative	Economic rent (ER)
Choice 1	$ER_1 = NB_1 - IC_1 = NB_1 - NB_2$
Choice 2	$ER_2 = NB_2 - IC_2 = NB_2 - NB_1$

- **multiple-choice** menu (at least 3 choices to be considered): If the **top 2 choices** ranked by net benefit have the **same net benefit**, i.e., they both have the highest net benefit, the economic rent of **these 2 choices** is 0, naturally, the sum of them is obviously also 0.

Alternative	Economic rent (ER) if $NB_1 = NB_2 > NB_3$
Choice 1	$ER_1 = NB_1 - IC_1 = NB_1 - NB_2 = 0$
Choice 2	$ER_2 = NB_2 - IC_2 = NB_2 - NB_1 = 0$
Choice 3	$ER_3 = NB_3 - IC_3 = NB_3 - NB_1 = NB_3 - NB_2$

NB and ER generate same ranking

Again, we have this table

Alternative	Net benefit (NB)	Economic rent (ER)
Choice 1	NB_1	$ER_1 = NB_1 - IC_1 = NB_1 - NB_2$
Choice 2	NB_2	$ER_2 = NB_2 - IC_2 = NB_2 - NB_1$
Choice 3	NB_3	$ER_3 = NB_3 - IC_3 = NB_3 - NB_1$

and still, we assume $NB_1 > NB_2 > NB_3$, then $NB_1 - NB_2 > NB_2 - NB_1 > NB_3 - NB_1$, that is exactly $ER_1 > ER_2 > ER_3$.

You can see here, net benefit and economic rent give the same ranking for the alternatives. I've used a 3-choice menu as an example but this conclusion can be easily extended to menus with more than 3 choices. In the end, it's the intuition and the deduction that matter.

1.2 Use PPF to understand trades

Here, I'll lay out the procedures to consider for questions like Q8/9 in Problem Set 2, and the intuition behind it.

Consider a **production function table**:

	Good X	Good Y
Country A	2	4
Country B	3	3

If country A and B both have **10 units of labor**, we have **PPF without trade**:

	Good X	Good Y
Country A	20	40
Country B	30	30

and we can find the **opportunity cost table**:

	Good X	Good Y
Country A	2	0.5
Country B	1	1

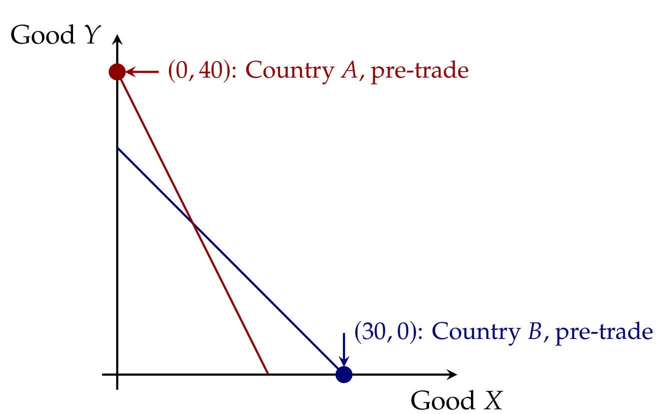
From the opportunity table, we know (remember? look for the smallest number in each column):

- **Country B** has comparative advantage in producing **Good X**
- **Country A** has comparative advantage in producing **Good Y**

let's assume full specialization: **Country B** only produces **Good X** and **Country A** only produces **Good Y**, which means that the pre-trade bundles of these countries are:

	Country A	**Country B**
Pre-trade	(0, **40**)	(**30**, 0)

Now, we can draw the PPF graph:



You might have already noticed that this PPF graph is exactly the specification used in Question 8 of Problem set 2, where the no-trade PPFs are:

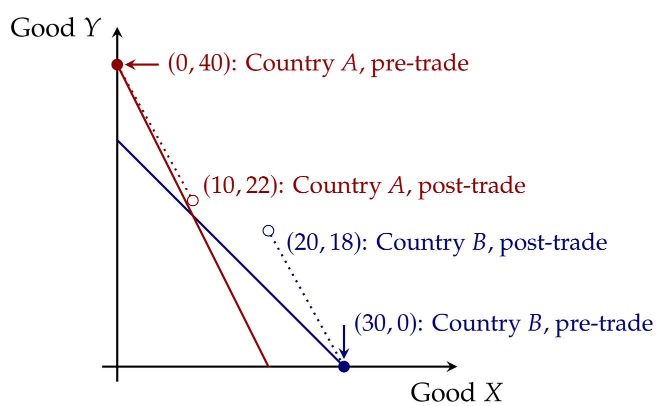
	Country A	**Country B**
PPF	$Y = -2x + 40$	$Y = -x + 30$

Now we understand how the PPF is derived, we can just start from there from now on!

The 2 most important things of a PPF function is

- **slope**:
  - The country with the **flattest** line has the comparative advantage in producing the good on **x-axis**. In this example, **Country B**.
  - The country with the **steepest** line has the comparative advantage in producing the good on **y-axis**. In this example, **Country A**.
- **intersection with x- and y-axis**: assume full specialization, countries will only produce the good that they have a comparative advantage in producing (**Good X** for **Country B**, **Good Y** for **Country A**), hence we have
  - The pre-trade bundle for **Country B** is $(30, 0)$, the intersection of **Country B**'s line with **x-axis**, which represents **Good X**
  - The pre-trade bundle for **Country A** is $(0, 40)$, the intersection of **Country A**'s line with **y-axis**, which represents **Good Y**

Now we can test whether a bundle can be achieved by trade or not. In Question 8, the potential post-trade bundle for Country A is $(10, 22)$, let plot it



Can this trade happen? Check 3 conditions:

C1 ***Is the new bundle achievable?***

We have 30 Good X, 40 Good Y, the new bundle for A is $(10, 22)$, $10 < 30, 22 < 40$, so it is achievable!

You can also calculate B's post trade bundle: $30 - 10 = 20 > 0$, $40 - 22 = 18 > 0$, same logic.

C2 ***Are both party happy?***[1]

This is easy, just check whether the **new bundles** are **above** the pre-trade PPF lines respectively. Here, they both are!

[1]Here, the more they produce, the happier they are. Later, we will reconsider "happy" with utility.

C3 ***Is the price reasonable?*** This is also easy, we verify it in 2 steps:

- Step 1: calculate the price of trade, i.e., the slope of the dotted line in the graph

$$\frac{|22-40|}{|10-0|} = \frac{18}{10} = 1.8$$

- Step 2: check whether it is in between the slopes of the 2 pre-trade PPFs: $1.8 < 2$, $1.8 > 1$, hence it is.

So the price is reasonable!

After checking the 3 conditions, we know this new bundle can be achieved by trade!

Special remarks: The most confusing part of this procedure is probably the calculation of price. Just remember: **the opportunity cost is the slope, also the price**.

Let's look at the opportunity cost table again:

	Good X	Good Y
Country A	2	0.5
Country B	1	1

To produce 1 unit of Good X,

- Country A needs to give up 2 units of Good Y
- Country B needs to give up 1 units of Good Y

The price we calculated means that:

$$\frac{|22-40|}{|10-0|} = \frac{18}{10} = \frac{\text{18 units of Y given up}}{\text{in exchange of 10 units of X}} = 1.8$$

this price has to be in between 1 and 2 here, because:

- if > 2: Country can just give 2 units of Y and produce 1 unit of X, instead of giving up more in trade to get 1 unit of X.
- if < 1: Country can just give 1 unit of Y and produce 1 unit of X, instead of giving up 1 unit of Y but get less than 1 of unit of X in trade.

Mathematically, it's easy: just calculate and compare the slopes. But the intuition behind these calculations is more important :)