

Extra Reading 3: Production Possibility Set, technology and resources

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“The PPS shows the possible combination of the quantities of every good, an individual/firm/country can produce, given the technology available to it.”

- Scarcity, OC and Trade

What we will review is how changes to technology can affect the PPS and the PPF of a country/firm/producer. Before that, let us understand, very briefly, what technology is. When we study production and costs, we will review technology in more details. For the time being, understand that technology in this case refers to how you produce something. Do you press a button and your output appears in front of you? Do you sit and crank a handle to manufacture the good? Do you spend an hour in the kitchen, carefully putting things together and then bake a pizza? All of these are technology.

So suppose you are making cookies. You take one hour to bake 10 cookies. Over time, your cooking skills improve and you can make 30 cookies in an hour. That is a technology change.

Of course, it means that you use more resources right? To make 30 cookies, you will need to use more milk, sugar etc. In fact, even if you are a good cook, if you don't have enough resources at hand, you will not be able to make more than 10 cookies per hour anyway. It works in the other direction. Even though you might have all the resources you want, if you are a slow cook, then you will keep producing 10 cookies per hour.

Look at the following examples. Let's think about our PPF and the PPS. Consider John.

- A. **RESOURCE CHANGE:** John is a good cook. Just that he doesn't have enough resources at first. If John suddenly had more flour and more vegetables and meat at his disposal, he could use it to make some more subs, but he could also use it to make more pizza. See, John's resources improved. He has an option to make more things if he wants to. So his PPF(which is the limit to what he can make) shifts out.(Figure A)



B. **TECHNOLOGY CHANGE:** Suppose John has enough resources. What if John becomes better at making pizza? What if he can make pizza faster? We won't formalize the concept of "being better" yet. But it is intuitive to understand that maybe, John can produce more pizza, without sacrificing any of the subs. So what does that mean? What it means is that John's OC of producing subs just went up (because now he can produce more pizza). Or in other words, his OC of producing pizza went down (since per pizza, he is giving up less subs).

Let's take a numerical example. Previously John could make 6 pizza or 4 subs. Now, he becomes a master pizza maker and can produce 10 pizza or 4 subs.

OLD OC (pizza) = $4/6$ subs/pizza

OLD OC (subs) = $6/4$ pizza/sub

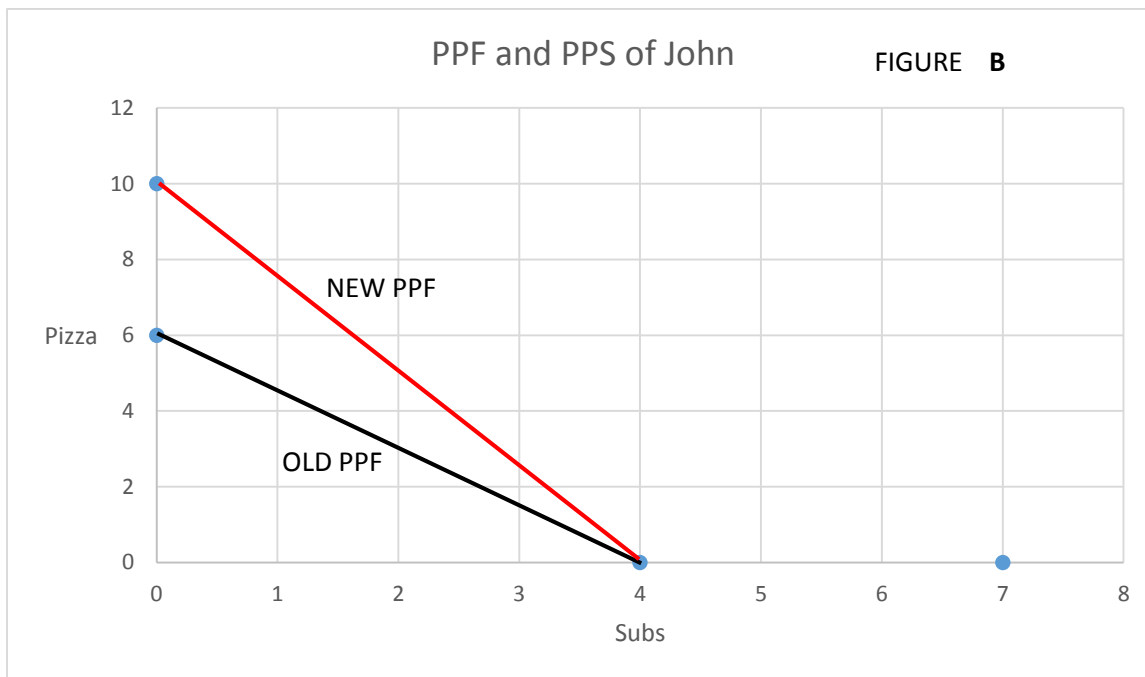
NEW OC (pizza) = $4/10$ subs/pizza

NEW OC (subs) = $10/4$ pizza/sub

OC (pizza) has gone down.

OC (sub) has gone up.

How do we visualize this in a graph? Look at Figure B.



C. What does this mean about the PPS?

Well, previously, in Figure A, with the old PPF, the combination (5, 2) or 5 subs and 2 pizza [remember how we write the X and Y variables? If not, read the Extra Reading on **Plotting Graphs**], was not feasible. When he was operating around the old PPF, John couldn't produce this combination of goods. Now, on the new PPF, he can.

Again in Figure B, the combination of (3, 2) was not feasible when John was operating around the old PPF. Now, he can produce (3, 2), when he is limited by the new PPF.

The idea is that, changes to technology or resources may affect the PPF, PPS. However, as you can see from the pictures, the way they make some combinations of output feasible, differs.

Consider the combination (5, 2). The resource increase changes the PPF (and thus the PPS) enough so that John can make this bundle if he wants to (Figure A). But in Figure B, changes to his technology doesn't make (5, 2) feasible. John still can't produce it.

Quick Note: Some of these line shifts may have been parallel. It doesn't have to be this way. This is just an example. So don't worry if you should shift the PPF parallel or swivel it. Also, if the technology change affected both Pizza and Sub, John could produce more of both.

So basically, positive changes to technology and/or resource can shift out the PPF. If the change is bad (say resources get damaged) or John suddenly forgets how to cook, then the PPF can shift **inwards!**

