Econ 2301-02/03: Introductory Macroeconomics

Chapter 1: On Choice between Future and Present

Instructor: Hiroki Watanabe*

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As we discussed in class, production-possibility frontier (PPF) is a highly versatile tool to identify what we can produce out of the limited resources we have. Remember that the term "limited" is very important here. If Katy Perry and I have *un*limited hours to work like a perpetual motion machine, PPF explodes because we can produce *any* number of lectures and concerts, which falls out of the realm of economics. PPF is there to tell us about the nature of our limitations, i.e., what we can do, given the technology we have and the factors of production we are endowed with.

1 Future vs Present

Now, PPF does't have to be static. It can even address economic growth, i.e., the choice between what we can have today and tomorrow. The trade-off we face here is that if you use your cream cheese today to bake a cheesecake for your dessert tonight, that same cream cheese cannot give you a cheesecake tomorrow night because it's already gone. The opportunity cost of turning cream cheese for tonight's dessert is the missed opportunity to have a cheesecake tomorrow night. Vice versa, if you are going to use the cream cheese tomorrow, you can't use it today.

This example is not all that exciting. PPF can reveal more than this simple eat now, gone tomorrow scenario above. Let me fill you in on the details using a farmer. Now, suppose that we have an economy where Kenneth have harvested 105 pounds of wheat this year. And this is a factor of production in this economy. Out of these 105 pounds of wheat, Kenneth can either "produce" this year's wheat for consumption or save them for spring planting to produce wheat next year (I put a quotation mark on "produce" because this year's harvest is already here and thus, input and output are the *same* thing. For Katy Perry and me, we have to turn our input (labor) into output (lecture) and labor and lecture are *not* the same thing. To align us with other examples we used, we say this year's harvest "produces" this year's wheat just like Katy Perry's labor produces concerts).

Now that we know the factor of production (105 pounds of wheat right now), the next step is to figure out the technology, before we can identify Kenneth's PPF. I sketched one example of Kenneth's technology in figure 1. Recall that the opportunity cost of lecture changes depending on how many lectures you are going to produce (in particular, recall that the opportunity cost increases beyond 10 lectures). Similarly, the opportunity cost of this year's wheat (i.e., the price of consuming the wheat this year rather than saving for planting) differs depending on how much you are going to "produce" this year. For instance, the opportunity cost of producing the 91st pound of wheat this year is much higher than that of producing the 20th pound of wheat this year. Notice that the

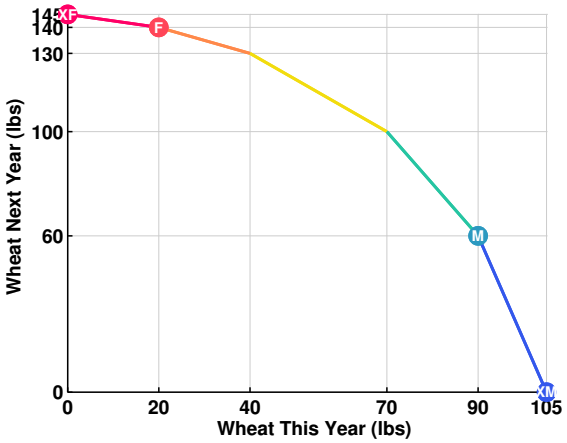

Figure 1.

red potion of the PPF is much less steep than the blue portion, which is the opportunity cost of wheat this year. Here is the reason behind the difference: When Kenneth decides to produce point **M** in figure 1, he will be saving $105-90=15$ pounds for planting next year. This 15 pounds of wheat will yield 60 pounds of wheat next year. Thus, the opportunity cost of using this year's wheat to "produce" (and hence consume) one pound of this year's wheat is $60/15=4$, i.e., for each pound of wheat Kenneth uses to "produce" this year's wheat, he misses the opportunity to produce four pounds next year. Observe that this is the slope of the blue portion in figure 1. By the same token, if he goes for point **F**, one pound of wheat he saved will only generate a quarter of a pound.[1]

But then why would the *same* pound of wheat sometimes yields four pounds and sometimes, just a quarter pound? The rationale is as follows: On point **M**, there are only 15 pounds to fill the field Kenneth owns. Each grain will have plenty of room to grow to its full potential. On point **F**, there are as many as 140 pounds to fill the *same*[2] size of the field, which is probably too crowded (Try breathing in the middle of a crowded Japanese commuter train. You can't do anything productive in there. Neither can a grain of wheat). Each grain will not have enough space to its own, resulting in a reduced yield next year. This essentially leads to the convex shape of Kenneth's PPF as we had with the PPF of Katy Perry and me.

*Department of Economics and Finance, Lamar University

[1] Recall that the opportunity cost appears as the slope of the PPF at each point. To "produce" the 20th pound of wheat this year, Kenneth needs to give up a quarter pound of wheat next year, which is (the absolute value of) the slope of the red segment in figure 1 (rise over run: $(145-140)/(20-0)=1/4$).

[2] Remember that ceteris paribus appears in the definition of PPF.

2 The Choice and Its Consequence

Now, with the PPF at hand, we can examine the choice Kenneth makes and its consequences. To keep the matter simple, I picked four potential choices that Kenneth can make: point **XM**, **M**, **F** and **XF** in figure 1. I will refer to them as

XM Extremely myopic
M Myopic
F Far-sighted
XF Extremely far-sighted

each.

Let us start with **XM**. This is the case where Kenneth can eat the maximum amount possible this year in exchange for no harvest next year, i.e., he will die next year. Hence, extremely myopic.

What about **XF**? Now he can eat the maximum amount this year in exchange for no consumption this year, i.e., he dies this year. Hence, extremely far-sighted.

These two were a bit too extreme to examine the consequences (sooner or later, he will die anyway). Let us talk about something in between instead. If he goes for **M**, he will have 70 pounds this year and he will have 10 pounds less than 70 pounds next year. He won't die next year but it is still closer to **XM** than **XF**. Hence, he is myopic.

On the contrary, if he goes for **F**, he will have only 20 pounds (much less than 70 pounds) this year but he will have as many as 140 pounds next year. He won't die this year but it is still closer to **XF** than **XM**. Hence, he is far-sighted.

This is where things get more insightful. Let us talk about the economic growth associated with **M** and **F**. If he opts in for **M**, he will start with 60 pounds next year rather than 105 pounds, from which he "produces" next year's wheat and save some to produce wheat year after next year (i.e., the third year). In this case, his next year's PPF will be the innermost one in figure 2. Note that the x-intercept is 60 pounds.

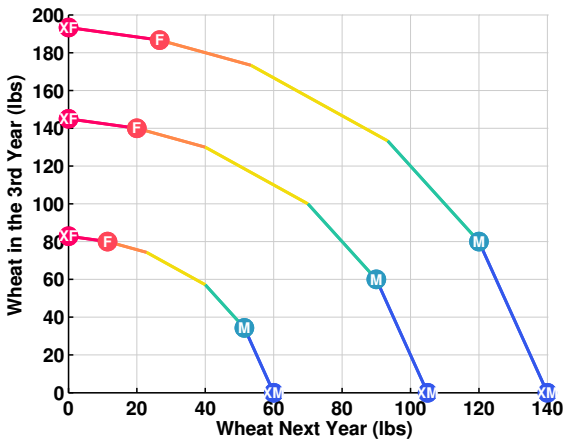

Figure 2. I added this year's PPF in the middle just as a reference line.

This is how much he will have harvested next year. Hence, his PPF actually *shrinks* next year because he ate too much this year and he will have to start with a smaller number of wheat next year than this year.

Imagine what happens if he keeps choosing **M** in the third year. His PPF for the third and fourth year's wheat will shrink even further. Thus, at this rate, his economy keeps shrinking unless he starts saving a bit more every year.

The exact opposite will happen to **F**. Since his harvest next year is 140 pounds, he will start with 140 pounds when he make a choice between the next years "production" and the third year's production. This gives him a head start in the second year as you can see in figure 2. His PPF is the outermost one in this case. Notice that x-intercept is 140, which used to be 105 in the previous year (i.e., this year). This expansion in his PPF is called an *economic growth*. He gets a reward in the form of extended PPF next year because an **F**-Kenneth saved more than an **M**-Kenneth. As you can see, saving is one of the major determinant behind the economic growth. What does his PPF for the third and fourth year's wheat production look like? (You guessed it right. It will expand even further than the outermost one in figure 2).

3 Afterthoughts

Does the observation above mean that we should always go for **F** to promote our economic growth? – Not necessarily. Replace Kenneth with the United States and wheat with our consumption in general (not just wheat but everything we consume). Note that if you push too hard and get closer to **XF**, you will be half-starved this year. Next year's increase in consumption comes at the cost of reduced consumption this year (yes, the trade-off lies at the root of economics and that's what PPF is for). We, as an economy, have to maintain a healthy balance between present consumption and future consumption. How do we strike the ideal balance? Let us discuss it in chapter 28 and onwards. As you will see, it's not just Kenneth, you and I, but businesses, the government and the Federal Reserve are also actively involved in this decision making. Meanwhile, I will leave you with the following question: Sketch Kenneth's PPF for next year and third year's wheat in figure 2 after he went for **XM** and **XF** this year (just pin down the exact location of their x-intercept. You can hand draw the rest).