

Chapter 2

Why Do We Have to Choose?

Introduction

This chapter starts by asking three main questions that every economy must answer. Then we show how resources, and goods and services circulate in the economy. We also learn about absolute advantage and comparative advantage. Then we expand on some concepts that we learned in the previous chapter. We revisit the concepts of scarcity and opportunity cost and learn how to calculate opportunity cost. We draw and interpret the production possibility frontier.

Three Questions

We live a world with scarce resources. We must choose. We can't have it all.

Take the example of a country. Regardless of the country's political or economic system, each economy must answer the following three questions.

1. What to Produce
2. How to Produce
3. Who Gets the Output

Let us look at these questions one by one.

What to Produce

The country must decide which goods and services, or which combination of goods and services it should produce. Should the country produce capital goods—buildings, roads, bridges, machines, software, etc.—or should it produce consumption goods—food, clothes, entertainment, etc.? If the country decides to produce capital goods, how many miles of roads, how many bridges, how many machines, how many pieces of software? Not only that, if machines then what kind of machines—computers, cars, planes? If buildings then what kind of buildings—schools, hospitals, prisons, offices? These choices must be made.

How to Produce

Suppose the country decides to produce both capital goods and consumption goods in certain quantities. Suppose also that the given quantities of both capital goods and consumption goods can be produced using the three factors of production—land, labor, and capital—in various proportions. The next question it must answer is how to produce these capital goods and consumption goods? That is, in which proportion should the country use land, labor, and capital? Will the country be better off using more land, more labor, or more machines? It must decide.

Who Gets the Output

Now that the country has produced the quantities of capital goods and consumption goods that it wanted, how does it distribute these quantities among its residents? This is the next question that it must answer. Should the owners of land, the owners of machines, and labor get an equal share of the output, or should one factor of production get a larger share than the other two? If so, why? Not only that, should all workers get equal share of the output, or should some workers get a larger share of the output than others?

These are the questions that must be addressed in every economy, regardless of the country's political or economic system.

The Circular Flow Diagram

The Circular Flow Diagram shows how resources and goods and services flow in the economy. This is our first model. In this model we assume that the economy is closed and that there are only two sets of economic agents—firms and household. By a closed economy we mean that the economy does not trade with the rest of the world. We use a generic term—economic agent—to refer to any entity that participates in the economy. These assumptions are obviously strong, and the model is obviously overly simplistic. We start with the simplest of situations and add complications later.

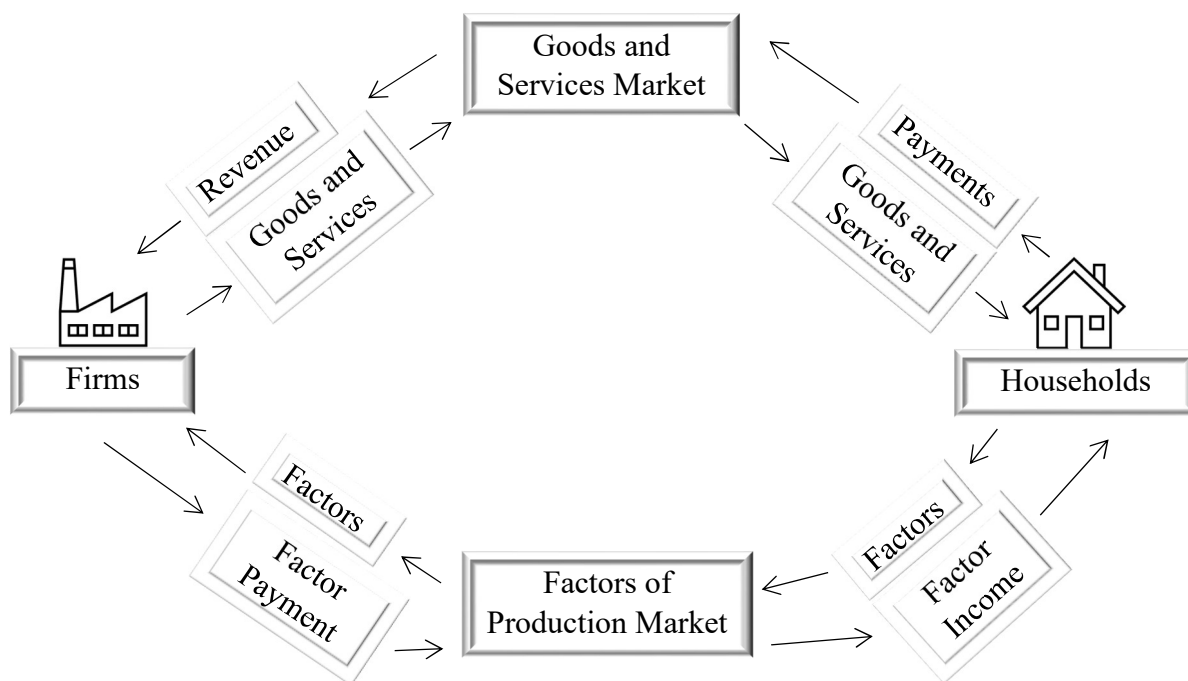


Figure 2.1: The Circular Flow Diagram

Source: M. Ashraf

Figure 2.1: Households demand goods and services and firms supply goods and services in the good and services market. The direction of the arrows shows the flow of goods and services. In return, households make payments which become the revenue of firms. Note the direction of the arrows. Households are the main consuming units and firms are the main producing units. To produce goods and services, firms demand and households supply factors of production—land, labor, and capital—in the factors of production market. Firms make payments for factors of production which become incomes of households who supply these factors of production. Note the direction of arrows indicating the flow of factors and payments.

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We assume that households own these factors of production. The assumption that households supply labor is understandable; most of us supply our labor and get paid in return. What about land and capital? After all firms do own land and capital.

This assumption may sound too restrictive. Upon reflection, however, it becomes clear that while firms own land and capital, those firms are owned by household. So, households do in fact own land and capital.

To further solidify this point, note that household earn income from supplying labor. Part of this income they consume and the rest they save. Some households may buy land and rent the land to firms. Other household may build buildings and machines, i.e., capital, and rent these buildings and machines to firms. Some households, of course, may lend their savings to firms in return for interest and firm can build buildings and machines to suit their needs. Note that interest is just another term that we use for the rent of savings.

Benefits from Trade

Should an economic agent trade with others or should it produce everything that it consumes and not depend upon any other economic agent? This question has been on the minds of scholars for hundreds of years.

David Ricardo, a British economist, presented an answer to this question in 1817 in his book *The Principles of Political Economy and Taxation*.¹ He argued that specialization and trade will benefit all trading parties. This idea is known as the Law of Comparative Advantage.

¹ David Ricardo, *On the Principles of Political Economy and Taxation* (London: Electric Book Co, 2001).

The Law of Comparative Advantage

When producers specialize in the production of a good or service in which they have a comparative advantage, and trade takes place both trading parties benefit, even the one which has an absolute advantage.

What is absolute advantage and what is comparative advantage?

Absolute Advantage

When a producer can produce a good or service using fewer resources as compared with the other producer, the producer is said to have an absolute advantage. That is, the producer has a lower absolute cost per unit as compared with the other producer.

Comparative Advantage

When a producer can produce a good or service at a lower opportunity cost as compared with the other producer, the producer is said to have a comparative advantage in the production of that good or service.

An example will help us understand these concepts better. Suppose that there are two states—Illinois and North Carolina. Suppose also that both states can produce rice and wheat. Table 2.1 shows data for both states.

Table 2.1: Production of Rice and Wheat

[1]	[2]	[3]
	<i>Rice</i>	<i>Wheat</i>
	(tons)	(tons)
North Carolina	50	50
Illinois	40	30

Source: M. Ashraf

Column [1] in Table 2.1 lists the name of the state, and Columns [2] and [3] list the amount (in tons) of each crop produced. The data in Table 2.1 show that when North Carolina uses all its resources—land, labor, and capital—to produce rice, it can produce 50 tons of rice. And when North Carolina uses all its resource to produce wheat, it can produce 50 tons of wheat.

When Illinois uses all its resources on the production of rice, it can produce 40 tons of rice. And Illinois uses all its resources on the production of wheat, it can produce 30 tons of wheat.

Of course, both states can produce any combination in between. But when either state produces more rice, it must give up some of wheat, and vice versa. This is because resources are being diverted from the production of one crop to the production of the other crop.

Looking at the data in Table 2.1 we notice that North Carolina can produce more of both rice and wheat. In this example, North Carolina has a lower absolute cost per unit of producing each product: North Carolina has an absolute advantage in the production of both crops.

Should North Carolina trade with Illinois? After all, North Carolina is better at producing both rice and wheat. What can North Carolina gain by trading with Illinois? So North Carolina should

not trade with Illinois. This conclusion, however, will be incorrect. For trade to take place what matters is comparative advantage, and not absolute advantage.

Which state has a comparative advantage? Recall that comparative advantage refers to the situation when a producer has a lower opportunity cost of producing a product as compared with the other producer. To figure out comparative advantage, we need to calculate opportunity cost.

Calculating Opportunity Cost

Recall that opportunity cost is the next-best alternative forgone. It is the amount of one thing that we give up, to get more of another thing. Opportunity cost exists because resources are scarce.

The next question is, how much of one crop must be forgone to get more of the other crop? That is, what is the opportunity cost of producing more of one crop in terms of the other crop? Using data in Table 2.1, we can calculate the opportunity cost of producing one more ton of one crop in terms of the other crop.

In calculating opportunity cost, the units of the product of which you want to calculate the opportunity cost, go in the denominator. And the units of the product in terms of which you want to calculate the opportunity cost go in the numerator.

Take a simple example. Suppose that you can buy two identical shirts with \$100.00 such that you do not have any money left over. How much is each shirt? Your answer will be that each shirt is \$50.00. How did you calculate this? You put the number of dollars, \$100.00, in the numerator and the number of shirts, two, in the denominator. That is, $\frac{100.00 \text{ dollars}}{2 \text{ shirts}} = \50.00 per shirt . This is the opportunity cost of each shirt in terms of dollars. That is, you give up 50.00 dollars to get one shirt. Price of a product is nothing more than the opportunity cost of the product in terms of currency.

We can use the same methodology to calculate opportunity cost of a good or service in terms of another good or service.

Let us start with North Carolina.

North Carolina

$$\text{Opportunity cost of Rice in terms of Wheat} = \frac{\text{Wheat}}{\text{Rice}} = \frac{50_W}{50_R} = 1_W$$

$$\text{Opportunity cost of Wheat in terms of Rice} = \frac{\text{Rice}}{\text{Wheat}} = \frac{50_R}{50_W} = 1_R$$

When North Carolina wants to produce one more ton of rice, it must forgo one ton of wheat— 1_W . Note that just as the dollar sign “\$” represented the price of shirt, the subscript “ W ” represents the price of rice. And when North Carolina opts to produce one more ton of wheat, it must forgo one ton of rice— 1_R .

Now let us perform the same calculations for Illinois.

Illinois

$$\text{Opportunity cost of Rice in terms of Wheat} = \frac{\text{Wheat}}{\text{Rice}} = \frac{30_W}{40_R} = 0.75_W$$

$$\text{Opportunity cost of Wheat in terms of Rice} = \frac{\text{Rice}}{\text{Whea}} = \frac{40_R}{30_W} = 1.33_R$$

When Illinois produces one ton of rice, it must forgo 0.75 ton of wheat. That is, for Illinois, the opportunity cost of producing one ton of rice 0.75 ton of wheat— 0.75_W . And when Illinois produces one ton of wheat, it must forgo 1.33 tons of rice. That is, for Illinois, the opportunity cost of producing wheat is 1.33 tons of rice— 1.33_R .

Now compare the opportunity costs of both crops for both states.

Note that Illinois has a lower opportunity cost of producing one ton of rice in terms of wheat, as compare with North Carolina. The opportunity cost of producing one ton of rice is one ton of wheat for North Carolina. On the other hand, North Carolina has a lower opportunity cost of producing wheat as compared with Illinois. North Carolina must give up one ton of rice to produce one ton of wheat. Whereas Illinois must give up 1.33 tons of rice to produce one tone of wheat.

These calculations show that North Carolina has a comparative advantage in the production of wheat, and Illinois has a comparative advantage in the production of rice.

To answer our question of whether North Carolina should trade with Illinois, the answer is yes. The reason is that what matters for trade to take place is comparative advantage, and not absolute advantage. And comparative advantage depends upon having a lower opportunity cost. Since North Carolina has a lower opportunity cost of producing wheat, in terms of rice—it has a comparative advantage in the production of wheat—North Carolina should specialize in the production of wheat. And since Illinois has a lower opportunity cost of producing rice, in terms of wheat—Illinois has a comparative advantage in the production of rice—Illinois should specialize in producing rice. When North Carolina and Illinois trade both states will benefit.

Production Possibilities Frontier

A Production Possibilities Frontier (PPF) is a graph that shows all the possible combinations of two goods and services, or two sets of goods and services, that an economy can produce.

Figure 2.2 shows a production possibility frontier of a hypothetical economy. This economy is producing two crops—rice and wheat.

In drawing a PPF we make the following assumptions. Later, we will relax these assumptions and see how our PPF changes.

1. The quantity of resources does not change. That is, we neither acquire more resources nor lose any.

2. The quality of resources does not change. That is, our resources neither become more productive nor do they become less productive.
3. Resources are being used efficiently. That is, we are wasting any resource.
4. Technology does not change. That is, our understanding of how to use these resources does not change. Recall that by technology we mean our pool of knowledge—our formulae, our recipes, and our understanding of how the universe works.
5. The opportunity cost is constant. Another way of stating this is that the slope of the PPF between any two points does not change.

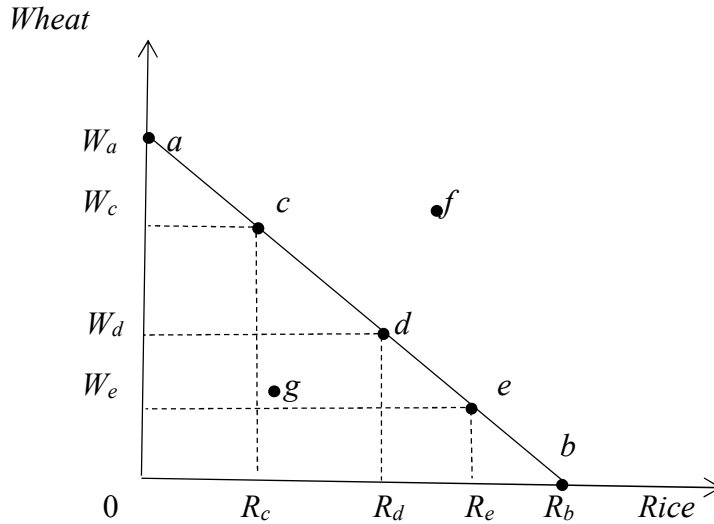


Figure 2.2: Production Possibility Frontier

Source: M. Ashraf

Figure 2.2: On the horizontal axis we have Rice. On the vertical axis we have Wheat. When we W_a units of Wheat are produced, zero units of Rice are produced. When R_b units of Rice are produced, zero units of Wheat are produced. The curve joining W_a and R_b is called a production possibilities frontier (PPF).

In Figure 2.2 I have plotted the units of Rice on the horizontal axis, and the units of wheat on the vertical axis. The curve ab is a production possibilities frontier. At point a , this economy is producing W_a units of wheat, and zero units of rice. At point b it is producing R_b units of rice and zero units of wheat. This economy can produce any combination between points a and b . Points such as c , d , and e are three of an infinite number of points between points a and b .

Suppose that this economy is producing W_a units of wheat and zero units of rice. It decides to produce more rice, say R_c units of rice. It must give up some wheat to produce more rice. If it this economy wants to produce R_c units of rice, it can only produce W_c units of wheat. Using our definition of opportunity cost, the opportunity cost of producing 0 - R_c rice is $W_a - W_c$ wheat. Suppose this economy wants to produce even more rice, say R_d units of rice. To do this, the economy must give up even more wheat. The opportunity cost of producing $R_d - R_c$ more rice is $W_c - W_d$, and so on.

The reverse will also be true. Suppose that this economy is producing R_e units of rice and W_e units of wheat. It wants to produce more wheat, say W_d units of wheat. It must give up some rice to produce more wheat. In this case, the opportunity cost of producing $W_d - W_e$ more units of wheat is $R_e - R_d$ units of rice.

Why does this economy must give up some wheat to produce more rice, and vice versa? The reason is that resources are scarce. Recall that opportunity cost exists because of the scarcity of resource. When we are using our resources efficiently, we must give up something to get more of something else.

Can this economy produce at some point to the right of its PPF, say at point f ? The answer is no. The reason is that this economy is already using its resources efficiently. The maximum it can do is produce on any point on its PPF. Any point to the right of its PPF is unattainable.

Tie the PPF and its implications to the Law of Comparative Advantage and benefits from trade. When we specialize and trade takes place, it is as though we are producing at some point to the right of PPF.

Can this economy produce at some point to the left of its PPF, say at point g ? Yes, it can. In this case the economy is not using its resources efficiently. It is wasting at least some of its resources. Any point to the left of its PPF is inefficient.

We can say then, that a PPF is the dividing line between unattainability and inefficiency.

Production Possibilities Frontiers for North Carolina and Illinois

Using the data in Table 2.1, we can draw production possibilities frontiers for North Carolina and Illinois. Figure 2.3 plots the PPF for North Carolina.

Wheat

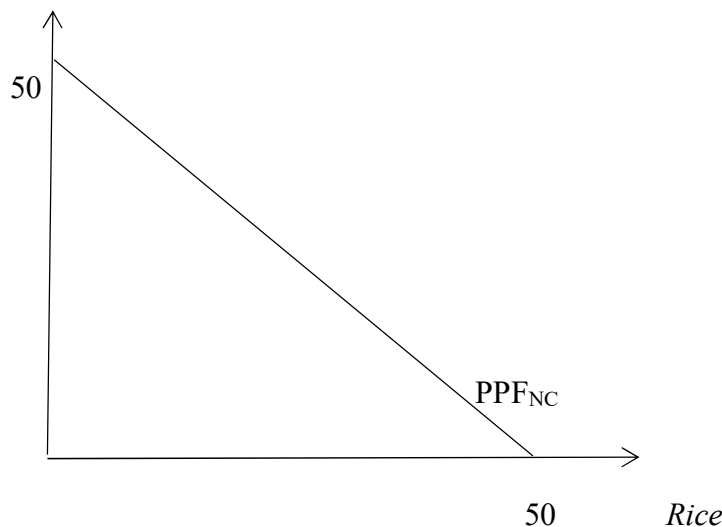


Figure 2.3: Production Possibilities Frontier for North Carolina

Source: M. Ashraf

Figure 2.3: On the horizontal axis we have Rice, and on the vertical axis we have Wheat. The curve PPF_{NC} represents the production possibilities frontier for North Carolina. It intersects the horizontal axis at 50 and the vertical axis at 50. This is because when North Carolina is using all its resources to produce Rice, it can produce 50 tons of Rice and zero tons of Wheat. And when North Carolina is using all its resources to produce Wheat, it can produce 50 tons of Wheat and zero tons of rice.

Figure 2.3 plots the production possibilities frontier for North Carolina. On the horizontal axis we have Rice, and on the vertical axis we have Wheat. The curve PPF_{NC} represents the production possibilities frontier for North Carolina. It intersects the horizontal axis at 50 and the vertical axis at 50. This is because when North Carolina is using all its resources to produce Rice, it can produce 50 tons of Rice, and zero tons of Wheat. And when North Carolina is using all its resources to produce Wheat, it can produce 50 tons of Wheat and zero tons of rice.

I will leave plotting the production possibilities frontier for Illinois for you.

Relaxing the Assumptions

Let us now relax the assumptions one at a time and see how it impacts our PPF and its implications.

Assumption 1: Changes in the Quantity of Resources

Suppose that we acquire more resources. One example may be of acquiring more land. If this were to happen, it would increase the production of one or both crops. This can be shown by shifting the PPF to the right. If the newly acquired land is equally suitable for both wheat and rice production, then there will be a parallel shift of the PPF to the right. This is shown in Figure 2.4.

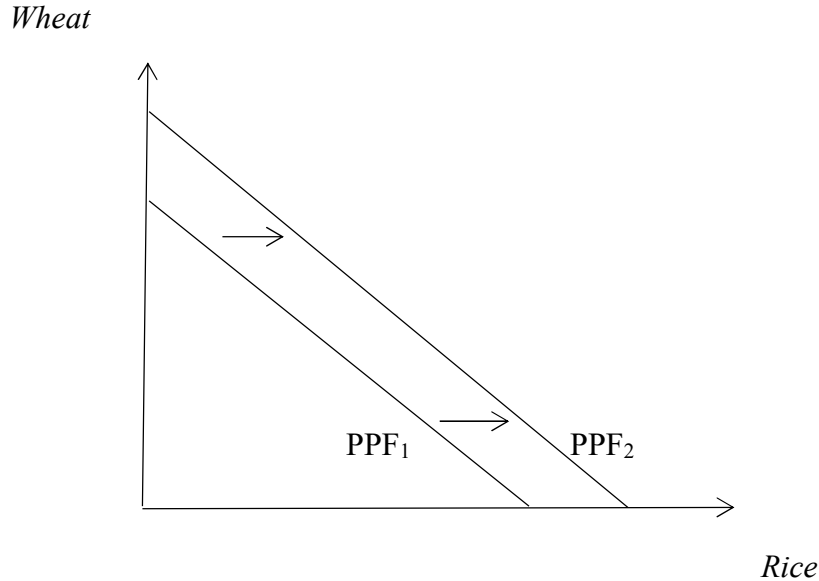


Figure 2.4: A Parallel Shift in Production Possibilities Frontier

Source: M. Ashraf

Figure 2.4: Due to acquisition of more resources, the production possibilities frontier shifts to the right, from PPF_1 to PPF_2 . Since the newly acquired land is equally well suited for both Rice and Wheat, the shift of the production possibilities frontier to the right is parallel.

With the acquisition of new land, the PPF has shifted to the right from PPF_1 to PPF_2 in a parallel fashion.

If, on the other hand, the newly acquired land is more suitable for, say rice production, then the PPF will rotate counterclockwise.

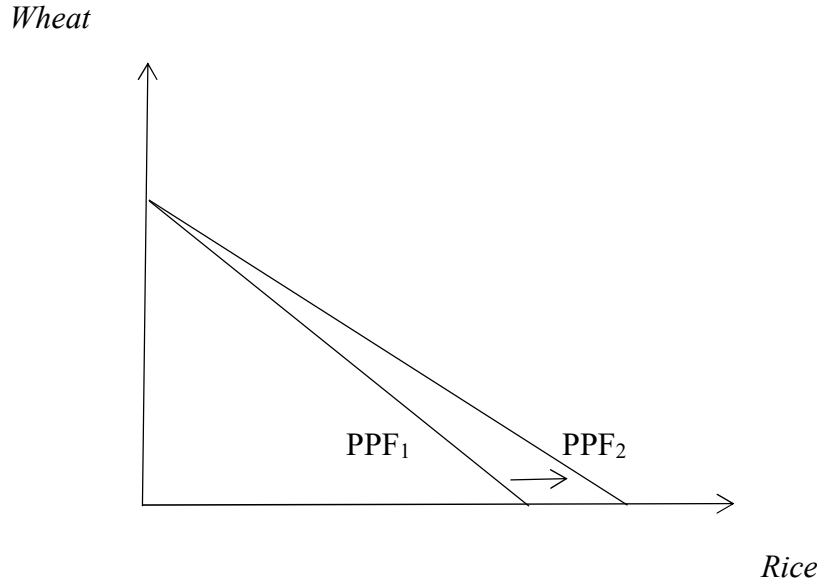


Figure 2.5: A Non-Parallel Shift in the Production Possibilities Frontier

Source: M. Ashraf

Figure 2.5: The newly acquired land is more suitable for the production of Rice, so the production possibilities frontier shifts counterclockwise; more Rice can be produced but the production of Wheat is not affected.

In Figure 2.5, the shift in PPF is not parallel. The newly acquired land is better suited for rice. As a result, the production of rice increases, while the production of wheat stays the same. Note also that the slope of PPF_1 is steeper than that of PPF_2 . This change in slope along a given PPF shows that the newly acquired land is better suited for rice.

Assumption 2: Changes in the Quality of Resources

How will changes in the quality of resources affect a PPF? Suppose that our land becomes more fertile. If the higher fertility of land is equally conducive to both rice and wheat, then the PPF will shift to the right in a parallel fashion. This can be shown using Figure 2.4.

If, on the other hand, the higher fertility only affects the production of, say, rice, then the PPF will rotate counterclockwise. Figure 2.5 may be used to show this change in fertility.

Assumption 3: Changes in Efficiency

Suppose that we start using resources less efficiently. It could be that some of the land is being wasted. Or that some workers are unemployed. It could also be that some machines are left idle. In this case the economy will be producing to the left of the PPF. As we saw earlier, in Figure 2.2, point g is representing such a case.

Assumption 4: Changes in Technology

Suppose that we learn new ways of combining inputs such that output increases. That is, our pool of knowledge increases and as a result output increases. In our example of rice and wheat, if this change in technology improves the production of both crops, it will shift the PPF outward in a parallel fashion. This may be represented by Figure 2.4.

If on the other hand, the improvement in technology only increases the production of, say, rice, then PPF will rotate counterclockwise as shown in Figure 2.5.

Assumption 5: Changes in Opportunity Cost

So far, we have assumed that the opportunity cost stays the same. That is, the slope of the PPF is constant. What if that is not the case? In fact, this is usually not the case. Often when we keep on producing more or less of a product, its opportunity cost in terms of the other product changes; the slope of the PPF does not stay constant.

The Law of Increasing Opportunity Cost

The Law of Increasing Opportunity Cost states that as we keep on producing more and more of a product, its opportunity cost in terms of the other product keeps on increasing. Data in Table 2.2 provide an example of the law of increasing opportunity cost.

Table 2.2: The Law of Increasing Opportunity Cost

[1]	[2]	[3]
Point	<i>Wheat</i>	<i>Rice</i>
<i>a</i>	620	0
<i>b</i>	600	100
<i>c</i>	550	225
<i>d</i>	450	350
<i>e</i>	400	400
<i>f</i>	210	525
<i>g</i>	100	575
<i>h</i>	0	600

Table 2.2 has three columns. Column [1] lists points on a given production possibilities frontier, and Columns [2] and [3] list the quantities of wheat and rice produced in this hypothetical economy, respectively. At point *a*, the economy is producing only wheat—it is producing 620 tons of wheat and zero ton of rice. At point *b*, the economy is producing 600 tons of wheat and 100 tons of rice. To produce 100 tons of rice, it gave up 20 tons of wheat. When we move to point *c*, the economy gave up 50 tons of wheat to produce 125 more tons of rice. To get to point *d*, the economy gave up 100 tons of wheat to produce 125 tons of more rice. At point *e*, the economy is producing 400 tons of wheat and 400 tons of rice. To get to point *e* from point *d*, the economy gave up 50 tons of wheat to produce 50 tons of more rice. You see the pattern; as we keep producing more and more of one product, its opportunity cost in terms of the other product

keeps on increasing. You see the same pattern moving from point *h*, to point *g*, to point *f*, and so on, only in the opposite direction. In this case you are giving up rice to produce more wheat.

Figure 2.6 plots these data.

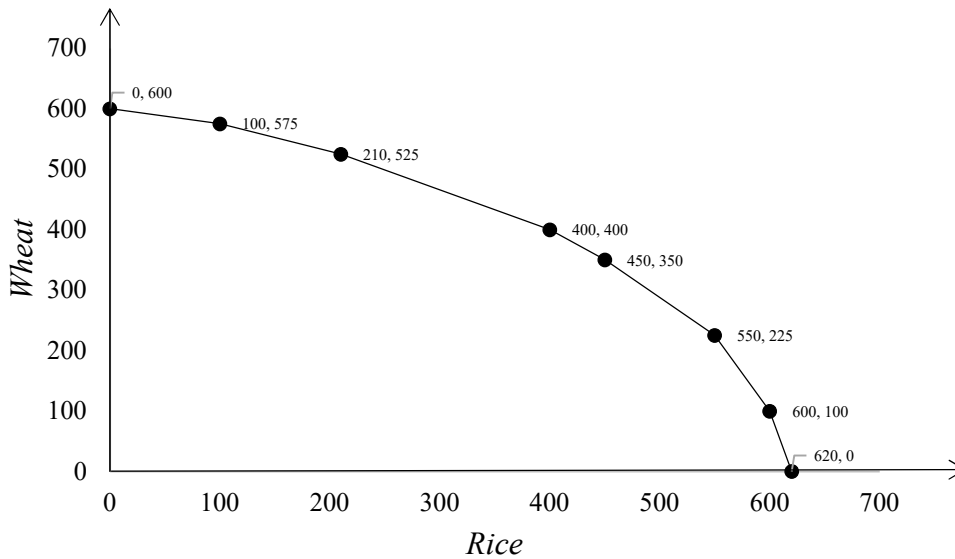


Figure 2.6: Production Possibilities Frontier Under Increasing Opportunity Cost

Source: M. Ashraf

Figure 2.6: The various quantities of Rice are on the horizontal axis, and quantities of Wheat are on the vertical axis. The production possibilities frontier is bowed out to show the increasing opportunity cost.

Figure 2.6 plots data presented in Table 2.2. Quantities of *Rice* are on the horizontal axis and quantities of *Wheat* are on the vertical axis. Compare the production possibilities frontier plotted in Figure 2.6 with that plotted in Figure 2.2. Note the difference in shape. In Figure 2.6, the production possibilities curve is bowed outside—it is not a straight line as it was in Figure 2.2. The reason is that in this case, as we produce more and more of a product, its opportunity cost in terms of the other product keeps on increasing. This shape better represents the reality.

Scarce versus Expensive, Revisited

In Chapter 1, we talked about the difference between a good or service is “scarce,” and it becomes “expensive.” Recall that a good or service is scarce when it carries a price. A good or service become expensive when its opportunity cost increases. The opportunity cost may be measured in terms of currency, which we refer to as the price of the good or service, or it may be measured in term of the other good or service. In the example of Rice versus Wheat, we are measuring the opportunity cost of one crop in terms of the other crop. In our everyday lives, we measure opportunity cost in terms of currency, which we call price of the product.

Chapter Conclusion

In this chapter we learned about the questions that each economy must answer. These are what to produce, how to produce, and who gets the output that is produced. We learned about the flow of resources and goods and services in the economy. We used the Circular Flow diagram to show this flow. Building upon our knowledge of opportunity cost from Chapter 1, we learned how to calculate opportunity cost. We learned about absolute advantage and comparative advantage. We learned about the role that opportunity cost played in determining comparative advantage. We also learned about the law of increasing opportunity cost and how this affected the shape of the production possibilities frontier.

Review of Terms

- Three main questions that each economy must answer—what to produce, how to produce, and who gets the output.
- The Circular Flow diagram shows how resources, and goods and services flow through the economy.
- Households are the main consuming units in the economy.
- Firms are the main producing units in the economy.
- Households supply factors of production in the factors market, and demand goods and services in the goods and services market.
- Firms supply goods and services in the goods and services market, and demand factors of production in the factors market.
- A Production Possibilities Frontier is a graph showing all the possible combinations of two goods and services, or two sets of goods and services, that can be produced using resources in an efficient manner.
- Absolute Advantage: When a producer can produce a good or service using fewer resources as compared with the other producer, the producer is said to have an absolute advantage. That is, the producer has a lower absolute cost per unit as compared with the other producer.
- Comparative Advantage: When a producer can produce a good or service at a lower opportunity cost as compared with the other producer, the producer is said to have a comparative advantage in the production of that good or service.
- What matters for trade is comparative advantage, not absolute advantage. And comparative advantage depends upon having a lower opportunity cost.
- The Law of Comparative Advantage states that when producers specialize in the production of a good or service in which they have a comparative advantage, and trade takes place both trading parties benefit, even the one which has an absolute advantage.
- The Law of Increasing Opportunity Cost states that as we keep on producing more of a product, its opportunity cost keeps on increasing.