# Lesson 4: Production Possibilities and Growth

**Big Ideas of the Lesson**

- Economists often use models in general to illustrate an abstract concept. A **production possibility curve or frontier (PPC or PPF)** is a model useful for illustrating the problem of scarcity and helping make choices.
- The **production possibility curve or frontier (PPC or PPF)** represents maximum possible combinations of the two goods without new technology or growth. Points inside the curve represent inefficient use of resources available to a society at that time. Points outside the curve are unattainable under present conditions.
- When you move along the PPC/PPF to gain more of one resource, there is an opportunity cost. The optimal or best product-mix will be some point on the PPC/PPF, but the exact point depends on society. It is a normative decision because it will be based on people's values.
- Not all resources are interchangeable. As people switch from one resource to another in the production of a good or service, the opportunity cost of using each resource is not same. This can be seen in a PPC/PPF that is bowed out from the origin as opposed to a PPC/PPF that is more of a straight line. This is known as the **Law of Increasing Opportunity Cost**.
- Using resources to produce consumer goods and services promotes less growth than using the resources to produce capital goods or to invest in technological advances. Education represents a choice for future growth and future goods over the consumption of present goods.
- To grow the PPC/PPF, a society will need more technology or resources. A nation can avoid the limits of its PPC /PPF through international specialization and trade. Specialization and trade have the same effect as having more or better resources with improved technology.

**Lesson Abstract:** Economists, governmental officials, businesses, and individuals continually strive to increase productivity and efficiency. This is because an economy has a limited amount of different resources which can be combined in multiple ways to produce a variety of goods and services. Economists use a simple model to describe an economy's possible production, current production, and potential production called the Production Possibilities Frontier or Production Possibilities Curve. This lesson introduces students to the production possibilities curve (also known as the production possibilities frontier) model and how it can be used to make economic decisions. Using practical examples, they review scarcity, choice, and opportunity cost. Through a simulation and interactive PowerPoint, students explore how the production possibilities curve/frontier represents the amount of two different goods that can be obtained by shifting resources from the production of one good to the production of the other. Students also explore how the production possibilities frontier can shift to illustrate economic growth beyond the current level of production.

**Content Expectations**: E1.1.1; E1.2.3

**Common Core State Standards for Literacy in History/Social Studies**: RH.9-10.4 and 7; WHST.9-10.4

**Key Concepts**: capital goods, choice, consumer goods, opportunity cost, Production Possibilities Frontier / Curve, scarcity

**Lesson Sequence**

1. Begin the lesson by asking students to think about ways they have learned to do homework or chores more "efficiently", i.e., accomplish more in a given period of time. Can they think of technology or tools that

have helped them to accomplish (or produce) more in a given period of time? After eliciting students' responses, ask students to think about what has caused the United States to be more productive since the time when their parents were young. Allow students a minute to brainstorm their thoughts in a quick write in their Decision Making notebooks (introduced in the previous lesson). Then, have students share their responses with the whole class. Record student responses on the board and add tally marks to ideas that were suggested by other classmates.

Explain to students that just as they try to utilize scarce resources in completing homework or chores, business and societies also face scarcity issues.

2. Explain to students that three economic questions determine the type of economic system of a society. The three economic questions are:
    - What to produce?
    - How to produce?
    - For whom?

    **Teacher Note:** These three economic questions should have been introduced in elementary school based on Michigan's social studies standards.

    Explain to students that how a country decides to use its scarce resources requires the same kind of thinking an individual or business would use in making a decision involving scarcity.

3. Use the following example to explain scarcity, choice, and opportunity costs at a societal level. **Teacher Note:** This should be a review for students if they have followed the Michigan Citizenship Collaborative Curriculum sequence which places US History in 9th grade.

    The United States during World War II converted the nation's factories from producing consumer goods, such as cars and clothing, to making tanks, guns and other goods necessary for the war effort. Explain that this scenario represents one of the fundamental economic questions — What goods should be produced? As a country, the United States determined that the war effort was more important and converted factories so that the country could produce tanks, guns and other military products. Explained in economic terms, the country took what limited resources it had, and allocated them to produce certain goods.

    Push students to think about the trade-offs between machinery or "guns" (capital goods) and "butter" (consumer goods). Explain the following to students:
    - With limited resources (land, labor, capital, and entrepreneurial ability), a nation can only produce a certain number of limited goods.
    - There is an opportunity cost or trade off to produce more tanks. With the production of more tanks, fewer resources are available to produce cars.
    - Thus, if a nation chooses to produce more tanks, less cars will be produced.

    Explain to students that they are going to investigate this economic problem in this lesson.

4. Distribute "**Handout #1: Economic Decision Making**," located in the *Supplemental Materials (Lesson 4, Unit 1)* to students. Be sure students recognize that the scarce resource in this example is time and they are going to use data to help determine how to allocate that resource. Have students work individually to complete questions 1-6 on the handout. When done, engage students in a class discussion, with a focus on question 6: "Describe the story the data above is telling you. What patterns do you notice? Why do

you see these?" Discuss results with the whole class. Students should see that the more time they spend earning money, the less time they will have for school work (and therefore earn a lower class grade).

5. Next, introduce students to the Production Possibilities Curve Model using **Slides 1-4** of the *PowerPoint (Lesson 4, Unit 1), "Economic Decision Making: Using a Production Possibility Curve to Think about Choice."* As a whole group, build data chart and construct PPC/PPF graph using **Slides 5-10.** Explain that the Production Possibilities Curve or Frontier is a simple model showing the alternatives of goods and services which a society can produce when it is using all of its resources fully and efficiently. Explain the PPC/PPF is a curve. It creates a boundary dividing points on the inside (which show under-utilization or inefficient use of resources) from those beyond the line which are yet unattainable given the current resources and technology of the country. Be sure students understand the difference between I (inefficient) and U (unattainable) on curve on **Slide 10**.

   **Teacher Note:** The independent and dependent variables used in economics are located on opposite axes than what students may be familiar with from mathematics. This is because the first economists did it that way, and all economists followed suit. This is one place where mathematics and economics differ and it may be important to point this out to students to avoid confusion.

6. **Teacher Note:** Prior to this step, make a box out of tape on the floor or use a real cardboard box or recycle bin. Designate a standard distance or starting point from the box from which the product will be moved.

   Show students **Slide 11** and explain to students that the class will conduct a small experiment to provide insight to the question: What is the best combination of resources that will provide the most satisfaction? Divide students into small group teams (2-4 students per team). Explain the directions of the game to students using **Slide 12**. Guide students through the list of rules (repeated below):
   - Each team has six pieces of paper to produce either paper airplanes or paper footballs.
   - Each team can produce one plane or two footballs with each sheet.
   - Once the product is made, the team will select one kicker/thrower.
   - The thrower/kicker's job is "move" the product to the identified location. Footballs will be "kicked" while airplanes will be "thrown" from an identified location (show students where they are kicking/throwing from and the desired location to which the product must be moved – the box or square on the floor).
   - Airplanes that make it into the box successfully are worth **two** points
   - Footballs that make it into the box successfully are worth **three** points.

7. Distribute the six sheets of paper to each group and allow teams two minutes to make their products. Have one member of each team assume the role of a thrower or kicker to move their product from a standard location into a designated box (recycle bin, etc.), one team at a time. Construct a chart on the board and after each team's turn, tally the points on the chart. **Teacher Note**: It is recommended to play the game first before returning to the student worksheet or PowerPoint.

8. After all teams have engaged in moving the products to the box, allow the groups time to reconvene and discuss what strategy they will use for Round 2. Encourage students to use the results from the first round to inform their decision making. Supply each group with six sheets of paper. Engage in Round 2 using the same kicker or thrower as the first round. Discuss the results with the class using the following questions:
   - Which group was the most successful? Why?
   - Did groups have excess resources?
   - What was the largest challenge they faced?

- Compare your new tally results with your old ones. Was your group more/less successful? Why?
- Did the highest point earning team create the best combination of products (airplanes and footballs)? How do we know what is the "best" or "right" combination?
- What other technology could your group use to improve your results?

9. Direct students to return to **Handout #1** and complete the data schedule and graph on numbers 8 and 9. Use the data from the application and **Slides 13-17** to explain the PPF/PPC.

10. Using **Slide 18** of the PowerPoint, ask students to think about the production possibility curve or frontier. Discuss the following with students:
    - Where are you on the curve?
    - Why did they pick that spot?
    - Was any group inefficient or inside the frontier? How would you determine this?

    Have students unfold a paper football and turn it into the other product to reinforce the idea that the PPC/PPF is a line which represents concepts of scarcity, choice, and opportunity cost.

11. Using **Slide 19**, explain that optimal or best product-mix will be some point on the curve, but the exact point depends on society. This decision may vary from society to society because different societies may place a higher value on one product than another. Introduce students to the term "normative decision" by using **Word Cards 20** and **21** to distinguish between normative and positive economic decisions. Explain to students that a normative decision means that a decision will vary based on the values the decision-makers attach to the alternatives. For example, using resources to produce consumer goods and services may increase current feelings of satisfaction but does not permit as much growth. On the other hand, using resources to produce capital goods or to invest in technological advances or education represent a choice for future growth and future goods. The ultimate decision each society makes will be based on what they value, so it is considered a normative decision. During the Cold War the USSR focused on the "guns" or factories and heavy industry while the US focused on the "butter" or consumer and luxury items. This allowed the USSR frontier to grow at a faster rate than the U.S. However, in the United States people tended to have more consumer choices in their daily lives, which reflected in a higher level of consumer satisfaction. Contrast this with a positive economic decision, which uses information about what is and what has been occurring in an economy as the basis for any decisions about the future. In other words, a positive economic decision uses scientific principles to arrive at objective testable conclusions, whereas a normative decision would be based on values and usually involves emotions.

12. Use **Slides 20-22** to explain that the angle and shape of the PPC or PPF line illustrates the law of increasing opportunity costs. To demonstrate this to students, display **Slide 20** and ask students to explain what the opportunity cost of producing one more unit of butter is. Elicit student answers and guide them to see that, according to the graph, for each additional unit of butter that is produced, one less unit of guns can be produced. However, this is usually not the case. Use **Slide 21** to help explain the premise that not all resources are interchangeable in the production of a good or service. It may be helpful to provide students with an example or ask students to provide examples that support the premise.

    Use **Slide 22** to explain that the differences in the angle and shape of the PPC/PPF curve. Explain that as people switch from one resource to another in the production of a good or service, the opportunity cost of using each resource is not same. This can be seen in a PPC curve that is bowed out from the origin as opposed to a PPC that is more of a straight line. This is known as the *Law of Increasing Opportunity Cost*. This is also noticeable on the data schedule as seen on **Slide 23.** Additional support for students for

learning the law of opportunity costs may be found at https://www.khanacademy.org/economics-finance-domain/microeconomics/choices-opp-cost-tutorial/production-possibilities/v/increasing-opportunity-cost.

13. Show students **Slide 24** and explain that new technology often leads to an outward shift of a PPF graph. Explain that a shift away from the origin in that boundary would reflect economic growth and an increase in available resources. Have students work with a partner to think of situations and strategies that could shift the PPF outward and inward. Allow students only a few minutes to brainstorm. Then, have students share ways they could "improve" their performance and earn more points given the limited resources. Guide students to recognize that these suggestions would be the new technology and would shift the PPF outward.

14. Wrap up the lesson by displaying **Slide 25** and having students write reflectively in their Decision-Making Notebook answering the following questions:
    - Where along the frontier would you choose between an after-school job and earning good grades?
    - Why is your choice a normative decision? Explain your thinking.
    - What other information would help you in your decision?

    **Teacher Note**: This is a normative decision because it will depend on each student's circumstances and values. If a student needs to work to support his/her family, they may choose a different choice than a student who does not have those concerns.

## Resource Section

**Content Expectations**:

*E1.1.1:* Scarcity, Choice, Opportunity Costs, and Comparative Advantage – Using examples, explain how scarcity, choice, opportunity costs affect decisions that households, businesses, and governments make in the market place and explain how comparative advantage creates gains from trade.[1]

*E1.2.3:* Investment, Productivity, and Growth – Analyze the role investments in physical and human capital (e.g., education) play in increasing productivity and how these influence the market.

**Common Core State Standards for Literacy in History/Social Studies**:

*RH.9-10.4:* Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science

*RH.9-10. 7:* Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

*WHST.9-10.4:* Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

**Instructional Resources**

Equipment/Manipulative
Decision-Making Notebook for each student
Computer with projector and PowerPoint capability

[1] The comparative advantage portion of this expectation is not addressed in this lesson.

Student Resource

Gustafson, Kathryn, Brian Pierce and Scott Warrow. *PowerPoint (Lesson 4, Unit 1).* Teacher-made materials. Oakland Schools, 2014.

- - -. *Supplemental Materials (Lesson 4, Unit 1).* Teacher-made materials. Oakland Schools, 2014.

Teacher Resource

"Increasing Opportunity Cost." *Scarcity, Possibilities, and Preferences and Opportunity Cost. Khan* Academy. 11 July 2014 <https://www.khanacademy.org/economics-finance-domain/microeconomics/choices-opp-cost-tutorial/production-possibilities/v/increasing-opportunity-cost>.