

McCONNELL BRUE FLYNN economics

AP EDITION

**AP[®] Teacher Manual
Sample Chapter**

**Mc
Graw
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Education

CHAPTER ONE LIMITS, ALTERNATIVES, AND CHOICES

CHAPTER OVERVIEW

This chapter, a critical introduction for both the microeconomics and macroeconomics course, begins with a discussion of the meaning and importance of economics. In this first chapter, however, we will not plunge into problems and issues; instead we consider some important preliminaries. We first look at the economic perspective—how economists think about problems. Next, we examine the specific methods economists use to examine economic behavior and the economy, including distinguishing between macroeconomics and microeconomics. We then look at the economizing problem from both an individual and societal perspective. For the individual, we develop the budget line; for society, the production possibilities model. In our discussion of production possibilities, the concepts of opportunity costs and increasing opportunity costs, unemployment, growth, and present versus future possibilities are all demonstrated. Finally, in the Last Word section of the chapter, some of the problems, limitations, and pitfalls that hinder sound economic reasoning are examined.

The Appendix to Chapter 1 provides an important introduction to graphical analysis. While this will be review material for most students, for some this may be new. Teachers are strongly urged to confirm that their students understand this section before proceeding.

Addressing the Updated Framework

The topics covered in this chapter fall under:

- Microeconomics:
 - Unit 1: Basic Economic Concepts
 - Unit 6: Market Failure and the Role of Government
- Macroeconomics:
 - Unit 1: Basic Economic Concepts
 - Unit 5: Long-Run Consequences of Stabilization Policies

Microeconomics:

- Students must understand that Economics is the study of how societies allocate scarce land, labor, and capital resources. They should recognize that scarcity forces people and societies to make choices about how to use resources. (*Topic 1.1: Scarcity*)
- Students must be able to identify and calculate opportunity costs associated with choices. They should recognize that rational agents consider these opportunity costs when making choices. (*Topic 1.5: Cost-Benefit Analysis*)
- Students must understand that rational actors use cost-benefit analysis to make decisions, and actions should be undertaken as long as the marginal benefit is greater than or equal to the marginal cost. The optimal quantity occurs where $MC = MB$. They should recognize that consumers face budget constraints which limit their ability to make choices. (*Topic 1.6: Marginal Analysis and Consumer Choice*)
- Students must recognize that the socially optimal quantity of a good for society occurs where the marginal social cost of producing the last unit equals the marginal social benefit of consuming the last unit. (*Topic 6.1: Socially Efficient and Inefficient Market Outcomes*)
- Students must be able to draw and interpret production possibilities curves to show the tradeoffs involved in allocating resources. They should recognize the reasons for differences in the shape of the PPC. They must use the PPC to illustrate opportunity cost,

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efficiency, unemployment, and economic growth. They should be able to identify factors – such as changes in the amount of resources, productivity, and technology – which promote economic growth. (*Topic 1.3: Production Possibilities Curve*)

- Students must be able to explain and illustrate how comparative advantage allows countries to specialize production and trade to consume beyond their own production possibilities curves. (*Topic 1.4: Comparative Advantage and Trade*)

Macroeconomics:

- Students must understand that Economics is the study of how societies allocate scarce land, labor, and capital resources. They should recognize that scarcity forces people and societies to make choices about how to use resources. (*Topic 1.1: Scarcity*)
- Students must be able to draw and interpret production possibilities curves to show the tradeoffs involved in allocating resources. They should recognize the reasons for differences in the shape of the PPC. They must be able to use the PPC to illustrate opportunity cost, efficiency, unemployment, and economic growth. They should be able to identify factors which shift the PPC. (*Topic 1.2: Opportunity Cost and the Production Possibilities Curve*)
- Students must recognize the factors which promote economic growth, including changes in the quantity and quality of resources, increases in productivity, and improvements in technology. They should be able to explain how government policies enhance economic growth. (*Topic 5.6: Economic Growth; Topic 5.7: Public Policy and Economic Growth*)
- Students must be able to explain and illustrate how comparative advantage allows countries to specialize production and trade to consume beyond their own production possibilities curves. (*Topic 1.3: Comparative Advantage and Gains from Trade*)

PACING GUIDE

Plan to spend about 4-5 class periods on Chapter 1. The focus should be on scarcity, marginal analysis, opportunity cost, and the production possibilities curve. Additional focus on the Appendix can be helpful to review and to prepare students for graphing throughout the course. Chapter 22 of the AP Macroeconomics course will refer back to the production possibilities curve and economic growth introduced in Chapter 1. Material from Chapter 1 appears in several multiple-choice questions and occasionally appears in free-response questions on both the AP Microeconomics and AP Macroeconomics exams.

INSTRUCTIONAL OBJECTIVES

After completing this chapter, students should be able to:

1. Define economics.
2. Describe the “economic way of thinking,” including definitions of scarcity, utility, opportunity costs, marginal costs, marginal benefits, and how these concepts may be used in decision making.
3. Explain how economists use the scientific method to formulate economic principles.
4. Explain the importance of *ceteris paribus* in formulating economic principles.
5. Differentiate between micro- and macroeconomics.
6. Differentiate between positive and normative economics.
7. Explain the economizing problem facing the individual.

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8. Describe the economizing problem facing society.
9. Identify types of economic resources.
10. Construct a production possibilities curve from data.
11. Illustrate economic growth, unemployment of resources, and increasing opportunity costs using a production possibilities curve.
12. Give real-world applications of the production possibilities concept.
13. Summarize the relationship between investment and economic growth.
14. Explain and give examples of the fallacy of composition, post hoc fallacy, and other logical pitfalls.
15. Explain and illustrate a direct relationship between two variables, and a positive slope.
16. Explain and illustrate an inverse relationship between two variables, and a negative slope.
17. Identify independent and dependent variables.
18. Define and identify terms and concepts listed at the end of the chapter and appendix.

COMMENTS AND TEACHING SUGGESTIONS

1. Generally, for high school students, economics presents a new way of learning. The typical social studies class involves a different skill set than is expected in economics. Often, the math/science students find economics to be the first social studies class they really enjoy. On the other hand, students who are uncomfortable with math need to be assured that the formulas and models are merely some of the tools used to understand the concepts in economics. For the benefit of those students uncomfortable with graphs, it can be helpful to explain concepts in words before drawing the graphs. Remind students that economics may be learned using words, pictures (graphs), and numbers. It is not a math class, but the models can help to paint a clearer picture of the concepts.
2. This chapter and related classroom activities will set the tone for the rest of the course. The methods used in the initial class meetings set the expectations and attitudes of the students. Making dramatic changes later can be confusing and compromise success. Students will benefit from making frequent connections between the concepts in the text and their personal lives.
3. Current news articles, such as those in the *Wall Street Journal Classroom Edition*, can serve many purposes in teaching economic principles. A term project focused on current issues such as health care, welfare reform, environmental problems, defense spending, or education can help students develop an appreciation of the problem of scarcity and the trade-offs that need to be considered when formulating public policy.
4. Budget constraints are not covered in the AP curriculum. Teachers often wonder if they should invest time on material that is not on the AP exam. If you can use such material to help students understand later microeconomic models, it may be worthwhile. If you face serious time constraints, the opportunity cost may be too large.
5. To personalize the issue of opportunity cost, ask students to list all of the economic choices they had to make that day or that week. This impresses upon them that, as Alfred Marshall said in the 1890s, “economics is the study of man in the ordinary business of life.” Ask students to analyze one or two of these choices in terms of the alternatives they gave up. What other choices did they have? What criteria were used to judge the alternatives? A discussion of the rationality of our decisions might also follow, providing

an opportunity to introduce problems such as imperfect information and short-term versus long-term objectives.

6. It is important for students to know that changes in opportunity costs can change behavior. For example, the choice to get a job involves a tradeoff between labor and leisure. A significant increase in the minimum wage may increase the opportunity cost of leisure, enticing more people to get a job.
7. Opportunity cost can also be taught in the context that resources should go to their most highly valued use. Consider an engineer who earns \$50 an hour. She plans to host a party and needs to clean her house. She could take four hours off work, or she could hire a cleaner who would do the work for \$15 per hour. What is her best choice? Her opportunity cost to take time off would be \$200 ($4 \times \50), while the cost of hiring the cleaner would only be \$60 ($4 \times \15). So she would be better off remaining at work and hiring a cleaner.
8. Students may consider many dimensions of “utility.” It is useful for students to understand that utility may be obtained through both material and nonmaterial means. Accordingly, it may be difficult to express how much one is willing to pay (or otherwise sacrifice) to obtain utility through a given activity.
9. It may be useful to discuss noneconomic examples to illustrate the importance of models and simplification—for example, explaining that a road map is a model or simplification of the real world. The amount of detail on any road map would be determined by the needs of the traveler (e.g., “I need to travel between Chicago and Denver as quickly as possible” versus “I would like to visit some historical museums as I am traveling through Nebraska”). Neither road map would have all the details of the real world. Devoting some time to this point can help students see the importance of using economic models to represent the real world.
10. When teaching about capital resources, it would be helpful to introduce both physical capital (the factory and equipment) and human capital (the training and education of workers that raises productivity). It is important for students to understand that businesses will invest in both forms of capital to increase production.
11. The problems of developing countries could be used to illustrate the seriousness of choosing between producing capital goods and consumer goods. Focusing a project on the problems of a developing country would allow students to make many comparisons, including the impact of differing economic systems, degree of government regulation, environmental quality standards, resource availability, climate, education levels, and the choice between producing consumer and capital goods.
12. The appendix prepares students for reading, analyzing, and constructing simple graphs in later chapters. For students who need additional help, software graphics tutorials are also very useful.
13. Students must be prepared to draw from memory a production possibilities curve and illustrate a point of unemployment, an unattainable point, and economic growth.
14. The *Focus Review Guide* contains student practice questions specifically designed to prepare students for AP Economics exams. Practice questions from this chapter include the concepts of the production possibilities curve and economic growth.
15. The Council for Economic Education’s *EconEdLink* website also provides several online lessons to reinforce topics from this chapter.

16. Frequent use of the College Board's released free-response questions can be very beneficial.
17. FRQ section of AP Economics exams 2014-2016: The 2016 AP Macroeconomics exam asked students to use given data to graph a production possibilities curve, and then to shift out only one end of the curve due to that producer using a new technology.

STUDENT STUMBLING BLOCKS

1. Teachers cannot take for granted students' background knowledge of economics. Students generally have no idea about the magnitude of common economic measurements and, therefore, their reading of the news may be colored by this lack of knowledge.
2. The specialized definitions in economics sometimes frustrate students, especially when they are familiar with a term in a different context. Students should be encouraged to study vocabulary before reading each chapter. In an indirect way, the specialized terms used in games such as soccer, baseball, and bowling provide insights on the study of economics. Consider the game of pool, for example. The following terms are used in pool, but have slightly or totally different meanings in everyday language: pool, cue, kiss, bank, bridge, rack, scratch, chalk, and rail. Economics, too, uses terms that have different meanings than in everyday usage. In economics "labor" usually means all productive effort, not simply factory workers; "capital" means human-made productive resources, not money used to buy resources. "Investment" means purchase of capital goods, not purchases of stocks and bonds; "public good" means goods that have special characteristics, not the good of society. Learning to communicate in any game requires learning the meaning of specialized terms. It's the same with economics! In economics, to communicate effectively (and to do well on exams), you must use the precise terms of the discipline.
3. Students can become frustrated by the apparent lack of precision and definitive answers in the discipline. Economists establish a framework of rational decision making based on maximizing utility, only to have that utility be immeasurable, or decision outcomes be less than optimal, because of imperfect information or seemingly irrational behavior. It is important to help students understand that, among other things, they are gaining more of an analytical toolkit than a set of hard and fast rules or immutable natural laws. To help students appreciate this, it is useful to refer students to the road map illustration. Using a road map, one can find the shortest (and presumably fastest) route from one point to another. Even if someone has driven a route many times, factors such as traffic, weather, and road construction may cause the otherwise quickest route to be less than ideal for that day's travel. Maps, like economic models, are often effective at telling people what they need to know. They are, however, limited in their effectiveness by factors beyond view.
4. Opportunity cost, which at first glance seems obvious, can be difficult for students to apply. It is important for students to clearly understand what opportunity costs are—and are not. The opportunity cost is only the *next* best choice forgone, not *all* potential choices forgone. It is also not the *price* of the product. If a student is choosing between buying a \$1 taco and a \$1 hot dog, he spends \$1 either way. The money isn't the opportunity cost; the item not chosen is.
5. In the discussion of marginal analysis, students often bring up examples that include sunk costs. Save the concept of sunk costs until later.

6. The concept of full employment is potentially problematic, particularly for those courses that will eventually cover macroeconomics. The use of the term in this chapter refers to the use of all available resources, human and non-human. In macroeconomics the concept is used to describe general conditions in labor markets and the economy as a whole, but is usually focused on the economy's use of its human resources. Even then it is recognized that under conditions of full employment, some labor is unemployed. There is also the potential for confusion as the concept applies to the land resource. Fully employed deposits of coal or petroleum do not imply exhaustion of those resources. It is more a question of whether there is an adequate amount of these non-human resources available to sustain full employment in labor markets. A full discussion of this is probably not appropriate with students at this point, but you may find it useful to emphasize here that the concept is most often applied to human resources. Then, when the topic arises again in macroeconomics, students will be less likely to feel that you are changing definitions.
7. The production possibilities curve (PPC) simplifies many concepts for students. However, for those who are uncomfortable with graphs, this model may confuse rather than simplify. Computerized tutorials can be helpful for these students. It is important to focus on marginal analysis—finding the cost of gaining one more product. Students must be able to identify a specific opportunity cost from a table or a graph. Frequent practice of this topic will pay off.
8. The “Consider This” feature on the economics of war includes discussion the September 11, 2001, terrorist attacks and subsequent wars in Afghanistan and Iraq, which may elicit emotional or politically charged responses from students. While one must be sensitive, especially regarding those directly impacted by those events, it presents an opportunity to demonstrate how economists attempt to detach their emotional and political biases to achieve a more objective economic analysis. It is also an opportunity to point out that the usual role of the economist is to tell us what choices are available, not what choices should be made.
9. It is critically important to teach students the proper way to construct a graph. Axis labels and curve labels are vital for FRQ points on the AP exam. Be sure students follow the conventions of economics graphs (e.g., price on the vertical axis and quantity on the horizontal axis). Students often place numbers on the axes of graphs to fit the information given (i.e., equally space crossbars and then enter the values 7, 13, 29, and 52 from the table). Be sure they set up equal increments on the edges of the graph and then fit the data into the model.

LECTURE NOTES

A deadly course will evolve if teachers attempt to lecture high school students with these types of notes. An outline is helpful, but students will only learn these concepts if they are given opportunities to apply them to real world examples.

I. The Economic Perspective

- A. Human wants are unlimited, but resources are limited, creating scarcity. Economics is a social science that studies how individuals, institutions, and society make optimal choices under conditions of scarcity.
- B. Scarcity and Choice
 1. Because our wants are greater than our resources, which are limited in supply, we face scarcity.

2. Scarcity requires us to make choices.
 3. Opportunity cost is the value of the next best thing we give up, when we make one choice instead of another.
- C. **CONSIDER THIS...** Free for All?
1. Products provided for “free” to an individual are not free for society because scarce resources are used to produce them.
 2. Companies provide “free” goods as a marketing strategy to promote brand awareness.
 3. Products that are promoted as “free” to the individual may actually be bundled with another good for which the consumer must pay. Because a purchase is required to obtain them, these products are not really free to the buyer.
 4. Therefore, “there is no such thing as a free lunch” is a common economic expression.
- D. Purposeful Behavior
1. Rational self-interest entails making decisions to achieve maximum utility.
 - a. Utility is the pleasure or satisfaction obtained from consuming a good or service.
 - b. Utility is measured in units called “utils.”
 2. Different preferences and circumstances (including errors) lead to different choices.
 3. Rational self-interest is not the same as selfishness.
- E. Marginal Analysis: Comparing Benefits and Costs
1. “Marginal” means one more; marginal analysis focuses on changing by one unit.
 2. Most decisions concern a change in current conditions; therefore, the economic perspective is largely focused on marginal analysis.
 3. Each option considered weighs the marginal benefit against the marginal cost.
 4. The marginal cost of an action should not exceed its marginal benefit.
 5. Opportunity costs are always present whenever a decision is made.
- F. **CONSIDER THIS...** Fast-Food Lines
1. People choose the shortest line to reduce time cost.
 2. Line lengths tend to equalize as people shift from longer to shorter lines in an effort to save time.
 3. Lines are chosen based on length without much other information, because the cost of obtaining more information is not worth the benefit.
 - a. Imperfect information may lead to an unexpected wait.
 - b. Imperfect information may cause some people to leave when they see a long line.
 4. When a customer reaches the counter, other economic decisions are made about what to order. From an economic perspective, these choices will be made after the consumer compares the costs and benefits of possible choices.

II. Theories, Principles, and Models

- A. Economists use the scientific method to establish theories, laws, and principles.
 - 1. The scientific method consists of:
 - a. The observation of facts (real data).
 - b. The formulation of an explanation of a cause and effect relationship (hypothesis) based upon the facts.
 - c. The testing of the hypothesis.
 - d. The acceptance, rejection, or modification of the hypothesis.
 - e. The continued testing with an eye toward determination of a theory, law, principle, or model.
 - 2. Theories, principles, and models are “purposeful simplifications.”
 - 3. Principles are used to explain or predict the behavior of individuals and institutions.
 - 4. Principles, laws, theories, and models are all terms that refer to generalizations about economic behavior. They are used synonymously in the text, with custom or convenience governing the choice in each particular case.
- B. Generalizations—Economic principles are expressed as the tendencies of the typical or average consumer, worker, or business firm.
- C. “Other things equal” or *ceteris paribus* assumption—In order to judge the effect one variable has upon another, it is necessary to hold other contributing factors constant. Natural scientists can test with much greater precision than can economists, because natural scientists have the advantage of controlled laboratory experiments. Economists must test their theories using the real world as their laboratory.
- D. Graphical Expression—Many economic relationships are quantitative and are demonstrated efficiently with graphs. The “key graphs” are the most important.

III. Microeconomics and Macroeconomics

- A. Microeconomics looks at specific economic units—the small picture.
 - 1. It is concerned with decision making by individual customers, workers, households, and business firms.
 - 2. It is an examination of the sand, rocks, and shells, not the whole beach.
- B. Macroeconomics examines the economy as a whole—the big picture.
 - 1. It includes measures of total output, total employment, total income, aggregate expenditures, and the general price level.
 - 2. It is a general overview examining the beach, not the sand, rocks, and shells.
- C. Many economic topics involve both macroeconomic and microeconomic concepts. For example, a high unemployment rate is a macroeconomic problem, but loss of income for an unemployed worker affects that individual’s demand for products in microeconomics.
- D. Positive and Normative Economics
 - 1. Positive economics describes the economy with facts, avoiding value judgments and attempting to establish scientific statements about economic behavior.

2. Normative economics involves value judgments about what the economy should be like and the desirability of the policy options available.
3. Most disagreements among economists involve normative, value-based questions.

IV. Individual's Economizing Problem

- A. Individuals are confronted with the need to make choices because their wants exceed their means to satisfy them.
- B. Limited income—Everyone, even the most wealthy, has a finite amount of money to spend.
- C. Unlimited wants—People have virtually unlimited wants.
 1. Wants include both necessities and luxuries (although many economists don't worry about this distinction).
 2. Wants change, especially as new products are introduced.
 3. Both goods and services satisfy wants.
 4. Even the wealthiest have wants that extend beyond their means (e.g., Bill Gates' charitable efforts).
- D. The combination of limited income and unlimited wants forces us to choose those goods and services that will maximize our utility.
 1. A budget line can show the attainable (on or inside the line) and unattainable (outside the line) levels of consumption between two goods (Figure 1.1).
 2. The budget line can be used to show trade-offs and opportunity costs of choices.
 3. The budget constraint forces consumers to make choices, as opportunity is limited.
 4. An income increase shifts the budget line outward; a decrease shifts it inward.
- E. **CONSIDER THIS...** Did Zuckerberg, Seacrest, and Swift Make Bad Choices?
 1. The college decision requires weighing future benefits, including projected lifetime earnings, against present costs, including direct costs (tuition) and indirect costs (forgone wages).
 2. Despite the success of celebrities such as Zuckerberg, Seacrest, and Swift, in general, those attending and completing college will earn greater lifetime earnings than those holding only high school diplomas.
 3. For these three, and others like them, the opportunity cost of college was extremely high, and it would be hard to argue that they made a wrong decision.

V. Society's Economizing Problem

- A. Scarce Resources
 1. Economic resources are limited relative to wants.
 2. Economic resources, known as factors of production, include all natural, human, and manufactured resources used to produce goods and services.
- B. Resource Categories
 1. Land—All natural resources ("gifts of nature"), such as trees and water

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2. Labor—The physical and mental abilities of humans used in production
3. Capital—All manufactured aids to production, such as tools, equipment, and factories
 - a. Investment is the spending that pays for the production of capital goods.
 - b. Capital does not refer to the money used for investment because money does not produce anything; it is only the means to purchase goods and services.
4. Entrepreneurial ability—A special kind of human resource that provides four important functions:
 - a. Combines resources needed for production
 - b. Makes strategic business decisions
 - c. Innovates new products, production techniques, and organizational forms
 - d. Bears the risk of time, effort, and funds

VI. Production Possibilities Model

- A. Tables and curves illustrate and clarify society's economizing problem.
- B. Assumptions
 1. The economy is employing all available resources (full employment) when on the curve.
 2. The available supply of resources is fixed in quantity and quality at this point in time.
 3. Technology is constant during analysis.
 4. The economy produces only two products.
 - a. While any two goods or services could be used, the example in the chapter assumes that one product is a consumer good (pizza), while the other is a capital good (industrial robots).
 - b. Consumer goods directly satisfy wants; capital goods, which are used to produce consumer goods, indirectly satisfy wants.
 5. Choices will be necessary, because resources and technology are fixed. If we produce more of one good, we must produce less of another.
- C. A production possibilities table (Table 1.1) lists different combinations that can be produced.
 1. The outputs provided are at the efficient level, on the curve or frontier.
 2. Choosing more of one good means having less of the other good.
- D. A production possibilities curve is a graphical representation of choices.
 1. **Figure 1.2 (Key Graph)** illustrates a production possibilities curve.
 2. Points on the curve represent maximum possible combinations of goods and services that can be produced, given current fixed resources and technology. Points on the curve also represent efficiency.
 3. Points inside the curve represent unemployment or underutilization of resources.

4. Points outside the curve are unattainable due to limited resources and technology.
- E. Law of Increasing Opportunity Costs
1. Opportunity cost is the amount of other products that must be forgone to obtain more of any given product.
 2. Opportunity costs are measured in real terms rather than money, because market prices are not part of the production possibilities model.
 3. The more of a product produced, the greater is its (marginal) opportunity cost.
 4. The slope of the production possibilities curve becomes steeper, demonstrating increasing opportunity cost. This makes the curve appear bowed out, concave from the origin.
5. Economic Rationale
- a. Economic resources are not completely adaptable to alternative uses.
 - b. Some land is better for growing crops used in pizza, while other land is of poorer quality. If society chooses to build its first robot factory on the poor farmland, few pizza-ingredient crops will be sacrificed. But building more robot factories on better and better farmland comes at a cost of losing more pizza-ingredient crops.
- F. Optimal Allocation
1. How does society decide its optimal point on the production possibilities curve?
 2. If the marginal benefit is greater than the marginal cost, it is advantageous to have the additional product.
 3. If the marginal cost is greater than the marginal benefit, it is not “worth” it to society to produce the extra unit.
 4. The optimal amount of production occurs where $MB = MC$ (Figure 1.3).
 5. Marginal benefits decline as society consumes more pizzas. Marginal costs rise as society produces more pizzas. In Figure 1.3 we can see that the optimal amount of pizza is 200,000 units, where marginal benefit just covers marginal cost.
 - a. At less than 200,000 pizzas, the added benefit to produce one more pizza will exceed the added cost, so it makes sense to produce more.
 - b. Beyond 200,000 pizzas, the added benefits would be less than the added cost, so society should not produce those pizzas.
 6. Generalization: The optimal production of any item is where its marginal benefit is equal to its marginal cost. Referring back to Figure 1.2, if society produces 200,000 pizzas, at point C, it should also produce 7,000 robots.
- G. **CONSIDER THIS...** The Economics of War
1. The costs of the war on terrorism at the end of 2015 were estimated to be more than \$1.7 trillion.
 2. The war on terrorism can be represented by a movement along the production possibilities curve, as resources are reallocated from civilian goods to defense

goods. The decision of how much to reallocate should be made by weighing the marginal benefits against the marginal costs of more defense goods.

3. Marginal benefit-marginal cost analysis is needed to find the optimal mix of defense and civilian goods. The September 11, 2001, terrorist attacks caused a perceived increase the MB curve for defense goods, and shifts in resources toward defense goods since the attacks reflected that perception. As the model reveals, however, it is possible to go too far, sacrificing too many civilian goods to obtain defense goods.

VII. Unemployment, Growth, and the Future

- A. Unemployment occurs when the economy is producing at less than full employment or inside the curve (point U in Figure 1.4).
 1. If it is possible for an economy to produce more of *both* products, using its fixed resources and technology, it *must* be operating inside the production possibilities curve.
 2. The short-run goal of a society is to resolve unemployment and produce on the curve.
- B. A Growing Economy
 1. Economic growth results in larger total output and is illustrated by an outward shift of the production possibilities curve (Figure 1.5).
 2. Drivers of a growing economy are as follows:
 - a. Increases in the quantity and quality of land, labor, and capital resources
 - b. Advances in technology employed in production
- C. Present Choices and Future Possibilities
 1. Using resources to produce consumer goods and services represents a choice for present over future consumption in Figure 1.6a.
 2. Using resources to invest in technological advance, education, and capital goods represents a choice for future over present goods in Figure 1.6b.
 3. The decision to produce more consumer goods and fewer capital goods will result in a relatively smaller amount of economic growth in the future.
- D. A Qualification: International Trade
 1. A nation can avoid the output limits of its domestic production possibilities through international specialization and trade.
 2. Nations specialize in producing the goods for which they have the lowest opportunity costs and sell them to other countries; they then buy other goods from countries that produce at a lower opportunity cost. As a result, a nation can buy imports for a lower opportunity cost than it can produce them domestically.
 3. Specialization and trade have the same effect as having more and better resources or improved technology.

VIII. LAST WORD: Pitfalls to Sound Economic Reasoning

- A. Biases—Preconceptions that are not based on facts
- B. Loaded Terminology—Terms that contain the prejudice and value judgments of others

1. It can be difficult to describe economic behavior without letting opinions about that behavior creep into the discussion. The distinction between positive and normative statements is not always clearly apparent.
 2. Often, the use of loaded terminology is a deliberate attempt to sway opinion (e.g., greedy owners, obscene profits, exploited workers, mindless bureaucrats, costly regulations, creeping socialism).
- C. Fallacy of Composition—What is true for one individual or part of a whole is not necessarily true for a group of individuals or the whole (e.g., one stockholder's sales of shares versus a large market sell-off; one rancher expanding a herd versus falling prices when a large group of cattle ranchers does so).
- D. Post Hoc Fallacy—When two events occur in time sequence, the first event is not necessarily the cause of the second event (e.g., the stock market crash of 1929 did not cause the Great Depression; the same recession that caused the stock market crash caused the Depression).
- E. Correlation but Not Causation—Events may be related without a causal relationship.
1. The positive relationship between education and income does not tell us which causes the increase in the other. (Which is the independent variable and which is the dependent variable?)
 2. It may be that the increase in income that occurs with increased education is due to some other third factor that is not under direct consideration.

APPENDIX TO CHAPTER 1: GRAPHS AND THEIR MEANING

I. Construction of a Graph

- A. Graphs help students to visualize and understand economic relationships. Most of our economic models explain relationships between just two sets of economic facts.
- B. Constructing a two-dimensional graph involves drawing a horizontal and a vertical axis.
 1. Mark the axis using convenient increments and fitting the data given.
 2. Each point on the graph yields two pieces of information, the quantity of the variable on the horizontal axis and the corresponding quantity of the variable on the vertical axis.

II. Direct and Inverse Relationships

- A. If two variables change in the same direction (an increase in one is associated with an increase in the other), it is a direct or positive relationship. It is graphed as an upward-sloping line (Figure 1).
- B. If the two sets of data move in opposite directions, they are inversely or negatively related. It is graphed as a downward-sloping line (Figure 2).

III. Dependent and Independent Variables

- A. Economists are often interested in determining which variable is the cause and which is the effect when two variables appear to be related.
- B. Mathematicians are always consistent in applying the rule that the independent variable (cause) is placed on the horizontal axis and the dependent variable (effect) is placed on the vertical axis.

- C. Economists are less tidy, and traditionally have put price and cost data on the vertical axis and quantities (of products or workers) on the horizontal axis.
- D. Note that inverse relationships slope downward and direct relationships slope upward, regardless of which variable is placed on the horizontal or vertical axis.

IV. Other Things Equal

- A. When economists plot the relationship between two variables, all other influences are assumed to remain exactly the same (*ceteris paribus*).
- B. If any of the other factors do change, a new plot of the relationship must be made.
- C. This point is extremely important for student understanding of the market model developed in Chapter 3. It provides the distinction between a slide along an existing curve, and the shift of a curve that is required if a variable not labeled on the axis is changed.

V. Slope of a Line

- A. The slope of a straight line is the ratio of the vertical change to horizontal change between any two points on the line. Some students will remember this as “rise over run.”
- B. The slope of a line will be positive if both variables change in the same direction (a direct or positive relationship).
- C. The slope of a line will be negative if the variables change in the opposite direction (an inverse or negative relationship).
- D. The numerical value of the slope will depend on the way the relevant variables are measured.
- E. Economic analysis is often concerned with marginal changes, the relative change in one variable with respect to another; it is this rate of change that is measured by the slope.
- F. Lines that are parallel with either the horizontal or vertical axis indicate that the two variables are unrelated; that is, a change in one variable has no effect on the value of the other (Figure 3).
 - 1. A vertical line has an infinite slope. It is worth noting that often students learn in mathematics courses that the slope of a vertical line has an undefined slope.
 - 2. A horizontal line has a zero slope.

VI. Vertical Intercept

- A. The vertical intercept of a line is the point where the line intersects the vertical axis.
- B. It indicates the point at which one variable (on the horizontal axis) has dropped to zero.

VII. Equation of a Linear Relationship

- A. If the vertical intercept and the slope are known, the general form $y = a + bx$ describes the line.
- B. y represents the variable on the vertical axis (the dependent variable in standard mathematical form), a is the vertical intercept, b is the slope of the line, and x represents the variable on the horizontal axis (the independent variable in standard mathematical form).

Limits, Alternatives, and Choices

- C. The income-consumption example places the dependent and independent variables in proper mathematical form.
- D. The price-quantity example reverses their position and places price (the independent variable) on the vertical axis and quantity (the dependent variable) on the horizontal axis.

VIII. Slope of a Nonlinear Curve

- A. The slope of a nonlinear relationship changes from one point to another.
- B. The slope of a curve at point A is equal to the slope of a line tangent to the curve at that point (Figure 4).

ANSWERS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS

Chapter 01 – Limits, Alternatives, and Choices

DISCUSSION QUESTIONS

1. What is an opportunity cost? How does the idea relate to the definition of economics? Which of the following decisions would entail the greater opportunity cost: allocating a square block in the heart of New York City for a surface parking lot or allocating a square block at the edge of a typical suburb for such a lot? Explain.

Answer: An opportunity cost is what was sacrificed to do or acquire something else. The condition of scarcity creates opportunity cost. If scarcity did not exist, there would be no need to sacrifice one thing to acquire another. The opportunity cost would be much higher in New York City, as the alternative uses for that square block are much more valuable than for a typical suburban city block.

2. Cite three examples of recent decisions that you made in which you, at least implicitly, weighed marginal cost and marginal benefit.

Answer: Student answers will vary, but may include the decision to come to class, to skip breakfast to get a few extra minutes of sleep, to attend college, or to make a purchase. Marginal benefits of attending class may include the acquisition of knowledge, participation in discussion, and better preparation for an upcoming exam. Marginal costs may include lost opportunities for sleep, meals, or studying for other classes. In evaluating the discussion of marginal benefits and marginal costs, be careful to watch for sunk costs offered as a rationale for marginal decisions.

3. What is meant by the term “utility” and how does the idea relate to purposeful behavior?

Answer: “Utility” refers to the pleasure, happiness, or satisfaction gained from engaging in an activity, such as eating a meal or attending a ball game. It is an important component of purposeful behavior because people will allocate their scarce time, energy, and money in an attempt to gain the most utility possible.

Limits, Alternatives, and Choices

4. What are the key elements of the scientific method and how does this method relate to economic principles and laws?

Answer: The key elements include the gathering of data (observation), the formulation of possible explanations (hypothesis), testing the hypothesis, determining the validity of the hypothesis, and repeated testing of hypotheses that have appeared to be valid in prior tests. The scientific method is the technique used by economists to determine economic laws or principles. These laws or principles are formulated to explain or predict the behavior of individuals or institutions.

5. State (a) a positive economic statement of your choice, and then (b) a normative economic statement relating to your first statement.

Answer: Student answers will vary. Example: (a) The unemployment rate is 4.8 percent; (b) the unemployment rate is too high. In general we treat “what is” statements as positive and “what should be” as normative, but keep an eye out for statements like “at full employment, an increase in the production of pizzas should come at the cost of fewer robots.” Some students may incorrectly identify the statement as normative because of the term “should.”

6. How does the slope of a budget line illustrate opportunity costs and trade-offs? How does a budget line illustrate scarcity and the effect of limited incomes?

Answer: Budget lines always slope downward, showing an inverse relationship between the two goods. The opportunity cost is what you are giving up (the trade-off) in order to get more of the other good. Budget lines illustrate scarcity in that they show you are limited by your income. Since they slope downward, they show you cannot keep getting more and more of both goods. The area beyond the budget line represents combinations of the goods that are beyond your income.

7. What are economic resources? What categories do economists use to classify them? Why are resources also called factors of production? Why are they called inputs?

Answer: Economic resources are the natural, human, and manufactured inputs used to produce goods and services. Economic resources fall into four main categories: labor, land (natural resources), capital (plants and equipment), and entrepreneurs. Economic resources are also called factors of production because they are used to produce goods and services. They are called inputs because they go in to a production process (like ingredients go into a bowl to make a cake), with the resulting goods and services referred to as output.

8. Why is money not considered to be a capital resource in economics? Why is entrepreneurial ability considered a category of economic resource, distinct from labor? What are the major functions of the entrepreneur?

Answer: Money is not considered a capital resource because money is not productive. It provides access to resources, but does not directly contribute to the production of goods and services. Additionally, the quantity of money in circulation does not determine an economy’s productive capacity, while the amount of capital and other resources does. Doubling the amount of money in circulation does not change the economy’s physical

capacity to produce goods and services. Money is, however, referred as a financial resource and financial capital, reflecting its ability to acquire real economic resources.

Entrepreneurial ability and labor are both human resources, but they perform different functions in the productive process. Entrepreneurial ability does not directly produce goods and services; it organizes the resources that do. Labor refers to the human inputs that directly engage in production.

Entrepreneurs are risk-takers. They coordinate the activities of the other three inputs for profit—or loss, which is why they are called risk-takers. Entrepreneurs sometimes manage companies that they own, but a manager who is not an owner may be performing some of the entrepreneurial functions for the company. Entrepreneurs are also innovators or inventors, and profits help to motivate such activities.

9. Specify and explain the typical shapes of marginal-benefit and marginal-cost curves. How are these curves used to determine the optimal allocation of resources to a particular product? If current output is such that marginal cost exceeds marginal benefit, should more or fewer resources be allocated to this product? Explain.

Answer: The marginal benefit curve is downward sloping. MB falls as more of a product is consumed because additional units of a good yield less satisfaction than previous units. The marginal cost curve is upward sloping. MC increases as more of a product is produced because additional units require the use of increasingly unsuitable resources. The optimal amount of a particular product occurs where $MB = MC$. If MC exceeds MB, fewer resources should be allocated to this use, as the additional cost is more than the additional benefit.

10. Suppose that, on the basis of a nation's production possibilities curve, an economy must sacrifice 10,000 pizzas domestically to get the 1 additional industrial robot it desires but that it can get the robot from another country in exchange for 9,000 pizzas. Relate this information to the following statement: "Through international specialization and trade, a nation can reduce its opportunity cost of obtaining goods and thus 'move outside its production possibilities curve.'"

Answer: The message of the production possibilities curve is that an individual nation is limited to the combinations of output indicated by its production possibilities curve. International specialization means directing domestic resources to output which a nation is highly efficient at producing. International trade involves the exchange of these goods for goods produced abroad. Specialization and trade have the same effect as having more and better resources or discovering improved production techniques. The output gains from greater international specialization and trade are the equivalent of economic growth.

11. **LAST WORD** Studies indicate that married men on average earn more income than unmarried men of the same age and education level. Why must we be cautious in concluding that marriage is the cause and higher income is the effect?

Answer: Correlation does not necessarily mean that there is causation. The relationship could be purely coincidental or dependent on some other factor not included in the analysis. It is also possible that higher income is the variable that "causes" marriage.

AP REVIEW QUESTIONS

1. Match each term with the correct definition.

economics

opportunity cost

marginal analysis

utility

- a. The next-best thing that must be forgone in order to produce one more unit of a given product.
- b. The pleasure, happiness, or satisfaction obtained from consuming a good or service.
- c. The social science concerned with how individuals, institutions, and society make optimal (best) choices under conditions of scarcity.
- d. Making choices based on comparing marginal benefits with marginal costs.

Answer: a. Opportunity cost; b. Utility; c. Economics; d. Marginal analysis

2. Indicate whether each of the following statements applies to microeconomics or macroeconomics:

- a. The unemployment rate in the United States was 5.1 percent in September 2015.
- b. A U.S. software firm discharged 15 workers last month and transferred the work to India.
- c. An unexpected freeze in central Florida reduced the citrus crop and caused the price of oranges to rise.
- d. U.S. output, adjusted for inflation, increased by 2.4 percent in 2014.
- e. Last week Wells Fargo Bank lowered its interest rate on business loans by one-half of 1 percentage point.
- f. The consumer price index rose by 0.2 percent from August 2014 to August 2015.

Answer: a. Macro; b. Micro; c. Micro; d. Macro; e. Micro; f. Macro

3. Suppose that you initially have \$100 to spend on books or movie tickets. The books start off costing \$25 each and the movie tickets start off costing \$10 each. For each of the following situations, would the attainable set of combinations that you can afford increase or decrease?
- a. Your budget increases from \$100 to \$150 while the prices stay the same.
 - b. Your budget remains \$100, the price of books remains \$25, but the price of movie tickets rises to \$20.
 - c. Your budget remains \$100, the price of movie tickets remains \$10, but the price of a book falls to \$15.

Answer: a. Increase; b. Decrease; c. Increase

- a. A larger budget allows you to purchase not only the combinations that you could afford before, but also new combinations that you could not afford before (for example, you can now afford to purchase 4 books and 5 movie tickets).

Limits, Alternatives, and Choices

- b. Certain combinations are no longer affordable (for example, you can no longer purchase 10 movie tickets with your \$100 budget),
 - c. The lower price allows you to purchase combinations that you could not afford before (for example, you can now purchase 6 books and 1 movie ticket).
- 4. Suppose that you are given a \$100 budget at work that can be spent only on two items: staplers and pens. If staplers cost \$10 each and pens cost \$2.50 each, then the opportunity cost of purchasing one stapler is:
 - a. 10 pens.
 - b. 5 pens.
 - c. zero pens.
 - d. 4 pens.
 - e. 2 pens.

Answer: d

You must forgo purchasing 4 pens if you are to free up enough money ($4 \times \$2.50 = \10) to purchase a stapler.

- 5. For each of the following situations involving marginal cost (MC) and marginal benefit (MB), indicate whether it would be best to produce more, fewer, or the current number of units.
 - a. 3,000 units at which $MC = \$10$ and $MB = \$13$.
 - b. 11 units at which $MC = \$4$ and $MB = \$3$.
 - c. 43,277 units at which $MC = \$99$ and $MB = \$99$.

Answer: a. More; b. Fewer; c. Current number

- a. $MB > MC$. The benefit of consuming one more unit exceeds the opportunity cost (scarce resources used elsewhere) of producing that additional unit.
 - b. $MC > MB$. The opportunity cost (scarce resources used elsewhere) of producing one more unit exceeds the benefit of consuming that additional unit.
 - c. $MB = MC$. There is no net gain in using scarce resources to produce and consume one more unit.
- 6. Explain how (if at all) each of the following events affects the location of a country's production possibilities curve:
 - a. The quality of education increases.
 - b. The number of unemployed workers increases.
 - c. A new technique improves the efficiency of extracting copper from ore.
 - d. A devastating earthquake destroys numerous production facilities.
 - e. The flow of oil, an essential resource, is decreased due to bad weather in the Gulf of Mexico.

Answer: a. Shift out; b. No movement; c. Shift out; d. Shift in; e. No movement

Limits, Alternatives, and Choices

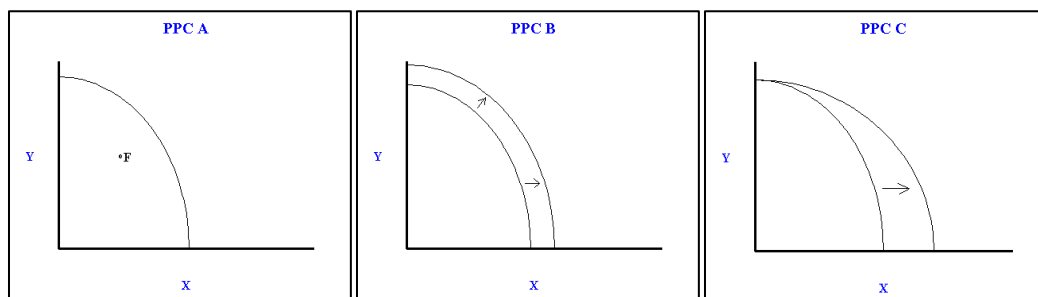
- a. Better education translates into better work skills, raising productivity.
 - b. Production moves inward, away from the curve.
 - c. More production is possible with existing resources.
 - d. Resources (capital) have been destroyed.
 - e. The resource still exists; its flow has just been temporarily reduced.
7. Which of the following shows two major ways in which an economy can grow and push out its production possibilities curve?
- a. Better weather and nicer cars.
 - b. Higher taxes and lower spending.
 - c. Increases in resource supplies and advances in technology.
 - d. Increases in trade and lower investment spending.
 - e. Lower taxes and government subsidies.

Answer: c

The economy produces output from resource inputs like land, labor, and capital. So one major way for an economy to grow and push out its production possibilities curve is for it to obtain more resources. The second major way is to develop new and better technologies so that the economy can produce more from any given amount of resources.

8. Begin each question with a new production possibilities curve (PPC) for country Nicola. Assume two goods (X measured on the horizontal axis and Y on the vertical axis) and increasing opportunity costs. Show the following:
- a. Use point F to show a possible situation in which country Nicola has significant unemployment of resources.
 - b. Show both the original PPC and a new PPC if there is an increase in Nicola's labor force.
 - c. Show both the original PPC and a new PPC if there is technological change in the production of good X.

Answer: See graphs



PROBLEMS

Limits, Alternatives, and Choices

1. Potatoes cost Janice \$1 per pound, and she has \$5.00 that she could possibly spend on potatoes or other items. If she feels that the first pound of potatoes is worth \$1.50, the second pound is worth \$1.14, the third pound is worth \$1.05, and all subsequent pounds are worth \$0.30, how many pounds of potatoes will she purchase? What if she only had \$2 to spend?

Answer: 3; 2

Janice will purchase potatoes until the value of potatoes is less than the cost of potatoes or until her income has been exhausted. Janice will purchase the first pound because the value (\$1.50) is greater than the cost (\$1). She will purchase the second and third pounds, as well, because the value exceeds the cost. If all remaining pounds are worth \$0.30, then Janice will not purchase them because the value is less than the cost. So Janice will purchase 3 pounds of potatoes.

If Janice only has \$2 to spend on potatoes, she will purchase the first and second pounds because the value is greater than the cost. She has now spent her entire income. She would like to purchase the third pound because the value is greater than the cost, but she does not have any income left. So Janice will purchase 2 pounds of potatoes.

2. Pham can work as many or as few hours as she wants at the college bookstore for \$9 per hour. But due to her hectic schedule, she has just 15 hours per week that she can spend working at either the bookstore or other potential jobs. One potential job, at a café, will pay her \$12 per hour for up to 6 hours per week. She has another job offer at a garage that will pay her \$10 an hour for up to 5 hours per week. And she has a potential job at a daycare center that will pay her \$8.50 per hour for as many hours as she can work. If her goal is to maximize the amount of money she can make each week, how many hours will she work at the bookstore?

Answer: 4

Pham will choose to work at the bookstore as long as the wage rate at the bookstore exceeds her other opportunities. However, if another job offers a higher wage rate, she will choose employment there. She will work until her total time allotment (for work) is exhausted.

She will choose to work at the café for the full 6 hours because the wage rate at the café is \$12 per hour, which is greater than the \$9 wage rate at the bookstore. This leaves her with 9 hours of work time remaining. Next, she will choose to work at the garage for the full 5 hours because the wage rate there is \$10, which again is greater than the \$9 bookstore wage rate. After this decision, she only has 4 hours of work time remaining. She will choose to work these last 4 hours at the bookstore, because the bookstore wage rate of \$9 exceeds the daycare center wage rate of \$8.50.

3. Suppose you won \$15 on a lotto ticket at the local 7-Eleven and decided to spend all the winnings on candy bars and bags of peanuts. Candy bars cost \$0.75 each, while bags of peanuts cost \$1.50 each.
 - a. Construct a table showing the alternative combinations of the two products that are available.

Limits, Alternatives, and Choices

- Plot the data in your table as a budget line in a graph. What is the slope of the budget line? What is the opportunity cost of one more candy bar? Of one more bag of peanuts? Do these opportunity costs rise, fall, or remain constant as additional units are purchased?
- Does the budget line tell you which of the available combinations of candy bars and bags of peanuts to buy?
- Suppose that you had won \$30 on your ticket, not \$15. Show the \$30 budget line in your diagram. Has the number of available combinations increased or decreased?

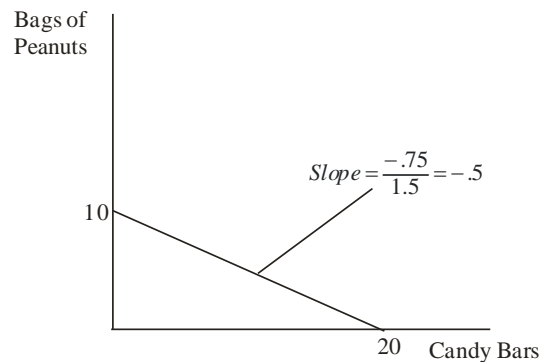
Answer: a. See table; b. See graph, -0.5 , $1/2$ bag of peanuts, 2 candy bars, Remain constant; c. No; d. Increased

a.

Consumption Alternatives

Goods	A	B	C	D	E	F	G	H	I	J	K
Candy Bars	0	2	4	6	8	10	12	14	16	18	20
Bags of Peanuts	10	9	8	7	6	5	4	3	2	1	0

b.

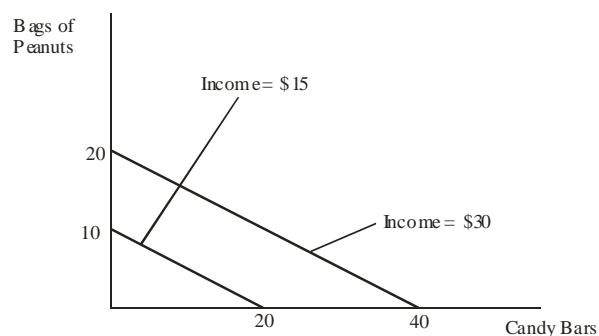


The slope for the budget line above, with candy bars on the horizontal axis, is -0.5 ($= -P_{cb}/P_{bp}$). Note that the figure could also be drawn with bags of peanuts on the horizontal axis. The slope of that budget line would be -2 .

The opportunity costs can be found by comparing any two of the consumption alternatives for the two goods.

- The budget line only shows what is possible. The budget line does not tell you which of the available combinations of candy bars and bags of peanuts to buy. You will need to use your preference relationship for candy bars and bags of peanuts to determine which combination to buy.
- The budget line at \$30 would be preferable because it would allow greater consumption of both goods.

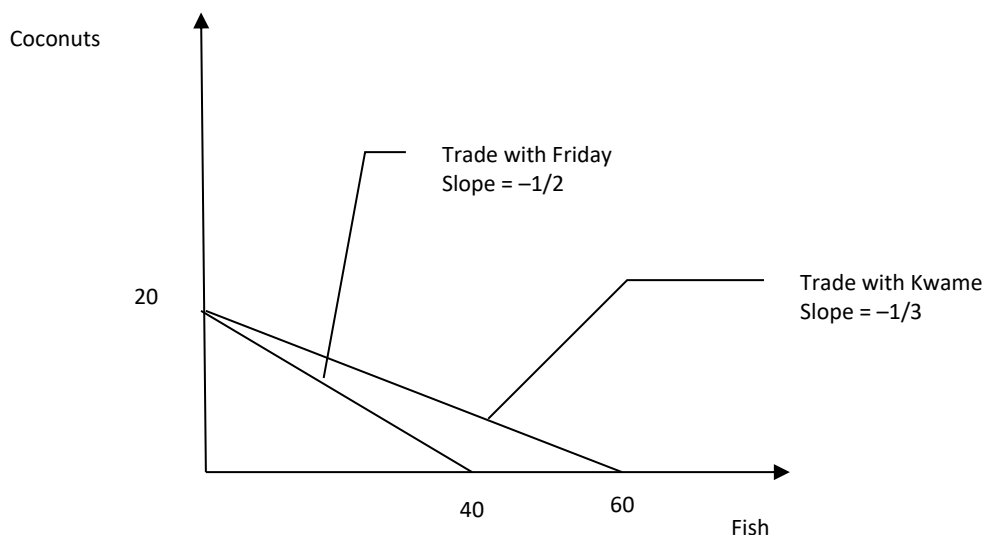
Limits, Alternatives, and Choices



4. Suppose that you are on a desert island and possess exactly 20 coconuts. Your neighbor, Friday, is a fisherman, and he is willing to trade 2 fish for every 1 coconut that you are willing to give him. Another neighbor, Kwame, is also a fisherman, and he is willing to trade 3 fish for every 1 coconut.
- On a single figure, draw budget lines for trading with Friday and for trading with Kwame. (Put coconuts on the vertical axis.)
 - What is the slope of the budget line from trading with Friday?
 - What is the slope of the budget line from trading with Kwame?
 - Which budget line features a larger set of attainable combinations of coconuts and fish?
 - If you are going to trade coconuts for fish, would you rather trade with Friday or Kwame?

Answer: a. See graph; b. $-1/2$; c. $-1/3$; d. Kwame's; e. Kwame

a.



- This implies that for every coconut you give up, Friday must give up two fish. For every fish that Friday gives up, you must give up $1/2$ coconut.
- This implies that for every coconut you give up, Kwame must give up three fish. For every fish that Friday gives up, you must give up $1/3$ coconut.
- Because Kwame is willing to give up more fish per coconut, his budget line has a larger set of combinations.

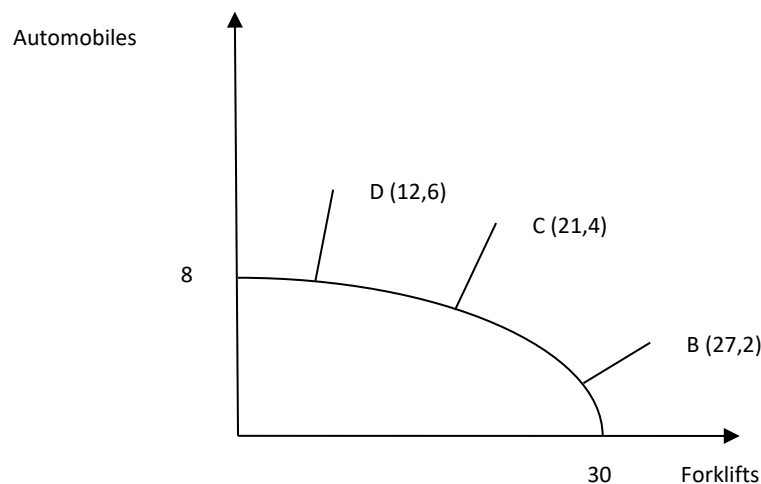
Limits, Alternatives, and Choices

- e. Because Kwame is willing to give up more fish per coconut, you can consume more of both. This implies that you would prefer to trade with Kwame.
5. Refer to the following production possibilities table for consumer goods (automobiles) and capital goods (forklifts):
- Show these data graphically. Upon what specific assumptions is this production possibilities curve based?
 - If the economy is at point C, what is the cost of one more automobile? Of one more forklift? Which characteristic of the production possibilities curve reflects the law of increasing opportunity costs: its shape or its length?
 - If the economy characterized by this production possibilities table and curve were producing 3 automobiles and 20 forklifts, what could you conclude about its use of its available resources?
 - Is production at a point outside the production possibilities curve currently possible? Could a future advance in technology allow production beyond the current production possibilities curve? Could international trade allow a country to consume beyond its current production possibilities curve?

Type of Production	Production Alternatives				
	A	B	C	D	E
Automobiles	0	2	4	6	8
Forklifts	30	27	21	12	0

Answer: a. See graph, Full employment, Fixed resources and technology, Two goods; b. 4.5 forklifts, 1/3 automobile, Shape; c. Underutilized; d. No, Yes, Yes

- a. See the graph below. The assumptions of the production possibilities model are that society can only produce two goods, that the amount of resources and technology are fixed, and that all resources are fully employed.



- b. Assume the economy is at point C, producing 4 automobiles and 21 forklifts. The cost of producing one more automobile can be found by moving to point D and calculating the number of forklifts given up for the 2 additional automobiles. At point D the economy is producing 12 forklifts, which is a loss of 9 forklifts (moving

from C to D) for the 2 additional automobiles. Thus the cost of 1 more automobile equals 9 forklifts divided by 2 automobiles, or $9/2 = 4.5$ forklifts.

The cost of producing one more forklift can be found in the same way. First, we will move to point B (from point C), giving up 2 automobiles to get 6 forklifts. Thus, the cost of 1 more forklift equals 2 automobiles divided by 6 forklifts, which is $2/6 = 1/3$ automobile.

Increasing opportunity cost implies that we must give up more of a particular good to get an additional unit of a different good. As we move along the production possibilities curve (from left to right) we must give up more automobiles to get an additional forklift. Thus, the shape of the schedule captures the increasing opportunity cost.

- c. The economy is underutilizing resources because it is producing at a point inside the PPC.
 - d. A country cannot produce outside its PPC because it is limited by resources and technology. But a technological advance would shift the PPC outward, allowing the country produce more with a given amount of inputs. And by specializing in goods for which a country has a comparative advantage, the country can trade to gain access to goods beyond its own PPC.
6. Look at Figure 1.3. Suppose that the cost of cheese falls, so that the marginal cost of producing pizza decreases. Will the MC curve shift up or down? Will the optimal amount of pizza increase or decrease?

Answer: Down; Increase

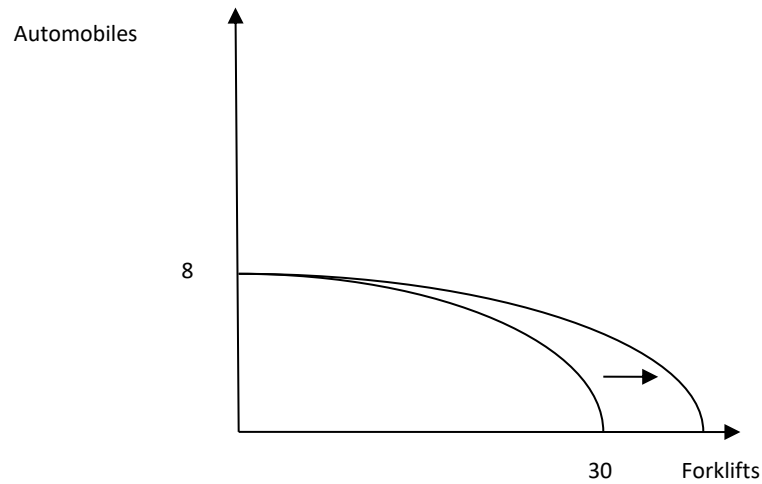
If the cost of cheese falls, then the cost of making pizza is cheaper. This implies that the marginal cost schedule will shift down, reflecting the lower input cost. For a given demand schedule, the optimal amount pizza produced and sold will increase and the equilibrium price would fall.

7. Referring to the table in problem 5, suppose improvement occurs in the technology of producing forklifts but not in the technology of producing automobiles. Draw the new production possibilities curve. Now assume that a technological advance occurs in producing automobiles but not in producing forklifts. Draw the new production possibilities curve. Now draw a production possibilities curve that reflects technological improvement in the production of both goods.

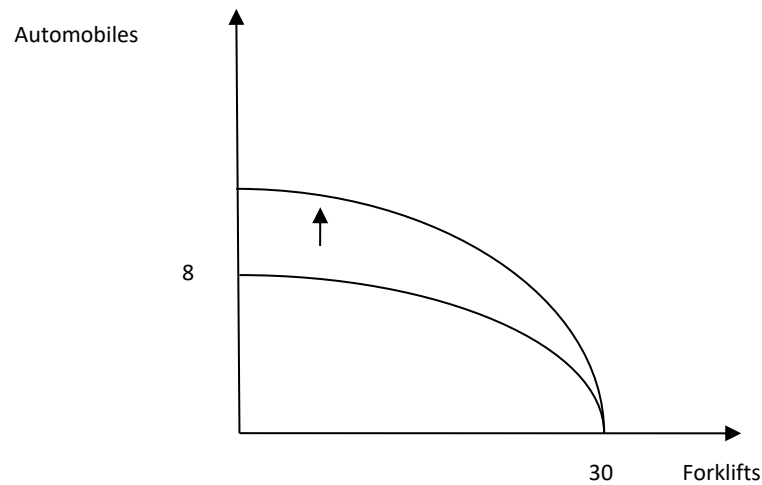
Answer: See graphs

A technological advance in producing forklifts, but not automobiles, would result in the PPC shifting out along the horizontal axis.

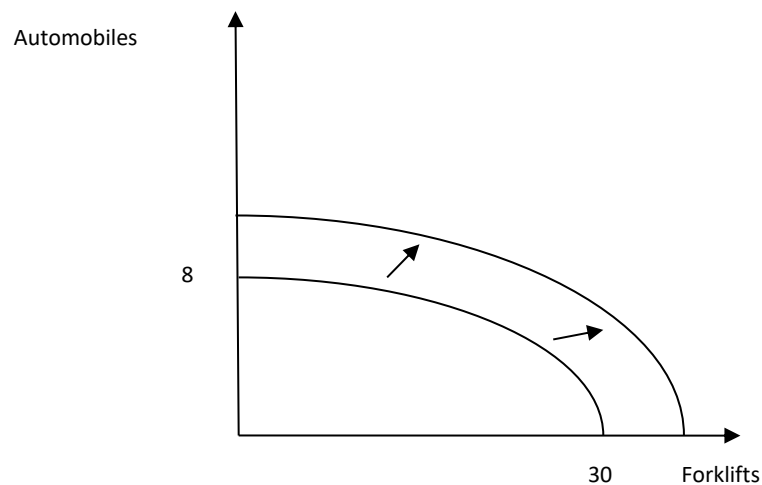
Limits, Alternatives, and Choices



A technological advance in producing automobiles, but not forklifts, would result in the PPC shifting up along the vertical axis.



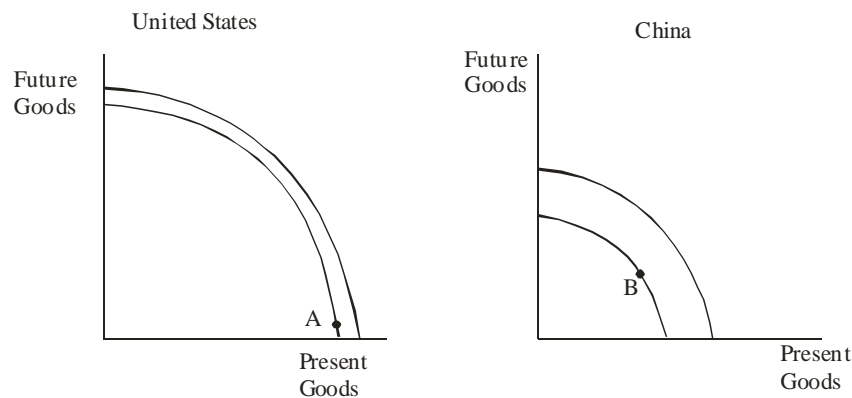
A technological advance in producing both automobiles and forklifts would result in the PPC shifting up and out along the vertical and horizontal axes.



8. Because investment and capital goods are paid for with savings, higher savings rates reflect a decision to consume fewer goods for the present in order to be able to invest in more goods for the future. Households in China save 40 percent of their annual incomes each year, whereas U.S. households save less than 5 percent. At the same time, production possibilities are growing at roughly 9 percent per year in China but only about 3.5 percent per year in the United States. Use graphical analysis of “present goods” versus “future goods” to explain the difference between China’s growth rate and the U.S. growth rate.

Answer: See graphs

Because the United States is consuming more today rather than saving, point A indicates the economy is producing more present goods and fewer future goods. Its production possibilities curve will shift out more slowly because it is accumulating less capital. China's point B indicates the economy is producing fewer present goods in order to produce more future goods. Its production possibilities curve will shift out more quickly because it is accumulating more capital.



ANSWERS TO APPENDIX QUESTIONS AND PROBLEMS

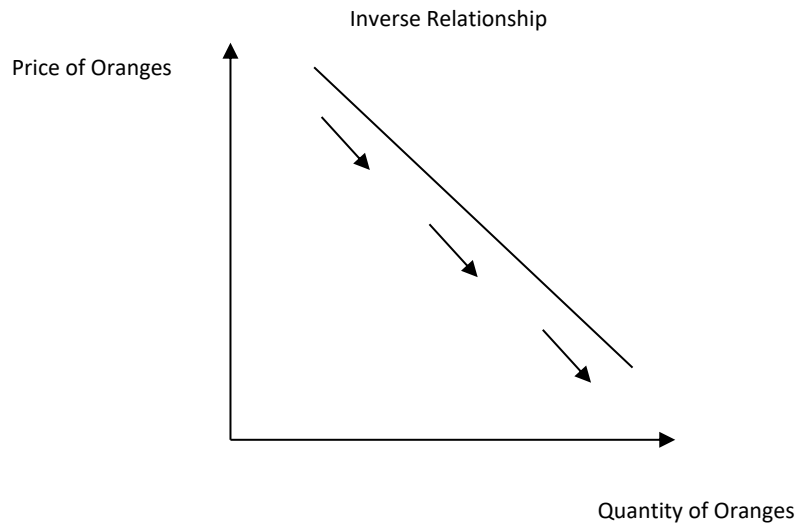
Chapter 01 Appendix

APPENDIX DISCUSSION QUESTIONS

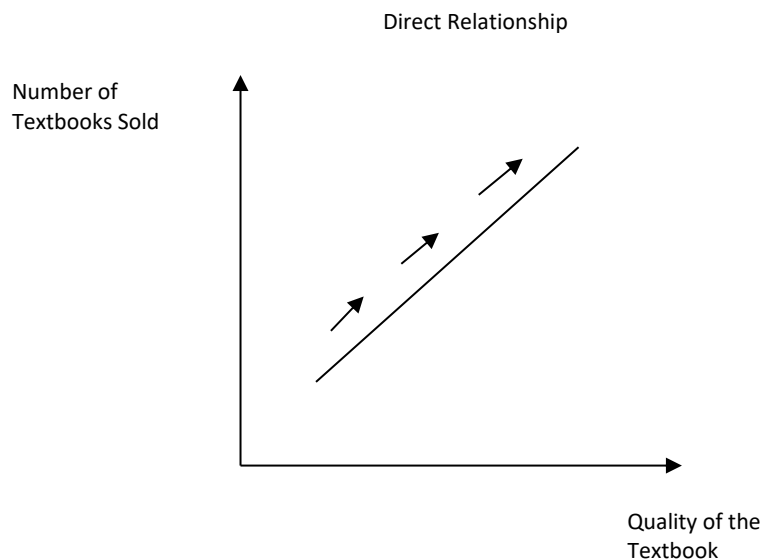
1. Briefly explain the use of graphs as a way to represent economic relationships. What is an inverse relationship? How does it graph? What is a direct relationship? How does it graph?

Answer: Graphs help us visualize relationships between key economic variables in the data. For example, the relationship between the price of oranges and the number of oranges purchased is likely to be an inverse relationship. An inverse relationship is one where one variable increases, causing the other variable to decrease (moving in opposite directions). Thus, as the price of oranges increases, we would expect to see a decrease in the quantity of oranges purchased. Graphically, we represent this inverse relationship as follows.

Limits, Alternatives, and Choices



The relationship between the quality of a textbook and the number of textbooks sold is likely to be direct. A direct relationship is one where one variable increases, causing the other variable to increase (moving in the same direction). As the quality of the textbook increases, the number of books sold also increases. Graphically, we represent this direct relationship as follows.



2. Describe the graphical relationship between ticket prices and the number of people choosing to visit amusement parks. Is that relationship consistent with the fact that, historically, park attendance and ticket prices have both risen? Explain.

Answer: There is likely an inverse relationship between ticket prices and the number of people visiting amusement parks. As ticket prices increase relative to other goods, people will spend their income on these other goods. For example, they may decide to go to the movies instead of visiting the now more expensive amusement park.

Limits, Alternatives, and Choices

The fact that, historically, park attendance and ticket prices have both risen over time does not change our story. This relationship is most likely the result of a change in demand, not a change in quantity demanded. The demand schedule for amusement parks has probably shifted to the right (an increase in demand) over time, leading to an increase in attendance and prices.

3. Look back at Figure 2, which shows the inverse relationship between ticket prices and game attendance at Gigantic State University. (a) Interpret the meaning of both the slope and the intercept. (b) If the slope of the line were steeper, what would that say about the amount by which ticket sales respond to increases in ticket prices? (c) If the slope of the line stayed the same but the intercept increased, what can you say about the amount by which ticket sales respond to increases in ticket prices?

Answer:

- The slope of this relationship tells us how much the price of a ticket must fall to induce someone to buy an additional ticket. In this case, the slope of -2.5 tells us that the price must fall by \$2.50 to induce someone to buy one more ticket. The vertical intercept tells us the price at which no tickets will be sold. Here, this price is \$50. Combining these two components tells us that if the initial price is \$50 per ticket and the price falls to \$40, then 4 tickets will be purchased (one for each reduction in price of \$2.50, which is the slope).
- If the slope of this line were steeper, this would imply that the price must fall by more than \$2.50 to sell one more ticket. A steeper line would result in a smaller decrease in tickets purchased for a given increase in price; ticket sales are less responsive to price movements.
- If the vertical intercept increased, this would imply that individuals are willing to purchase more tickets at every price. This will be an increase in the demand for tickets. This will not affect the slope or the quantity response to a change in the price of tickets. We still have the relationship that the price must fall by \$2.50 to induce someone to buy one more ticket.

APPENDIX REVIEW QUESTIONS

- Indicate whether each of the following relationships is usually a direct relationship or an inverse relationship.
 - A sports team's winning percentage and attendance at its home games.
 - Higher temperatures and sweater sales.
 - A person's income and how often he or she shops at discount stores.
 - Higher gasoline prices and miles driven in automobiles.

Answer: a. Direct; b. Inverse; c. Inverse; d. Inverse

- Winning teams are typically more popular.
- At higher temperatures, people usually purchase fewer sweaters.
- As people get richer, they typically shop less often at discount stores.

- d. Higher gas prices cause most people to cut back on their driving.
2. Erin grows pecans. The number of bushels (B) that she can produce depends on the number of inches of rainfall (R) that her orchards get. The relationship is given algebraically as follows: $B = 3,000 + 800R$. Match each part of this equation with the correct term.

B	slope
3,000	dependent variable
800	vertical intercept
R	independent variable

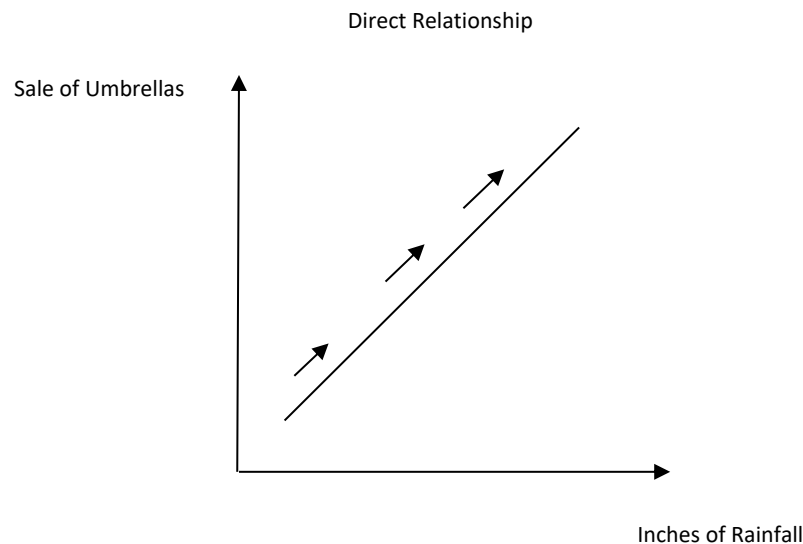
Answer: B = Dependent variable; 3,000 = Vertical intercept; 800 = Slope; R = Independent variable

APPENDIX PROBLEMS

1. Graph and label as either direct or indirect the relationships you would expect to find between (a) the number of inches of rainfall per month and the sale of umbrellas, (b) the amount of tuition and the level of enrollment at a university, and (c) the popularity of an entertainer and the price of her concert tickets.

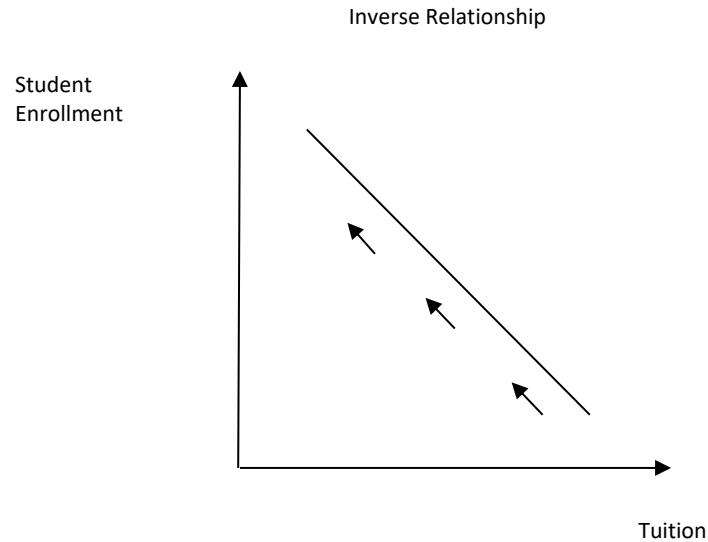
Answer: a. Direct; b. Inverse; c. Direct

- a. More rain would induce people to buy more umbrellas.

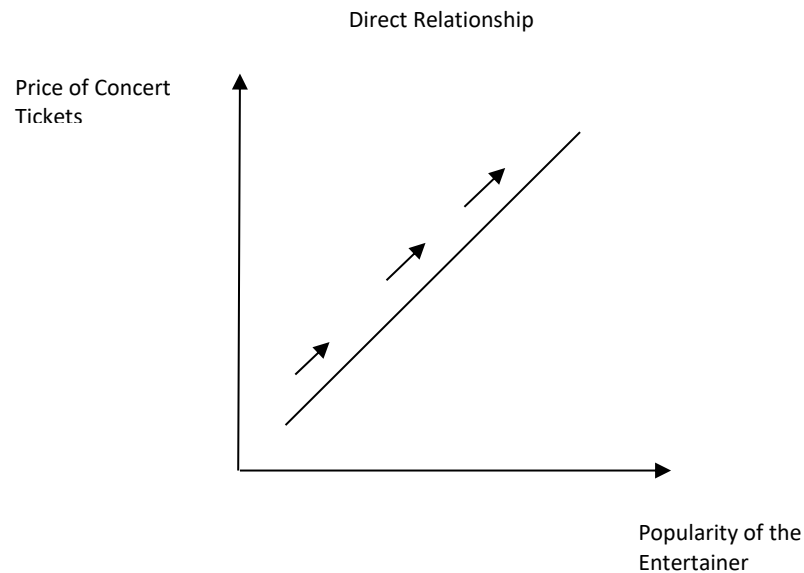


- b. As tuition increases, fewer students will enroll at the university.

Limits, Alternatives, and Choices



- c. The more popular the entertainer, the more willing people are to pay to see her concert.



2. Indicate how each of the following might affect the data shown in the table and graph in Figure 2 of this appendix:
- GSU's athletic director schedules higher-quality opponents.
 - An NBA team locates in the city where GSU plays.
 - GSU contracts to have all its home games televised.

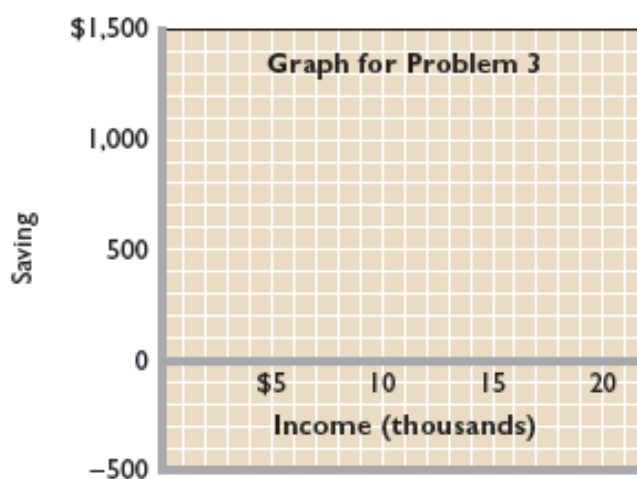
Answer: a. Increase in demand; b. Decrease in demand; c. Decrease in demand

- a. The increase in the quality of games will increase fan interest, so more tickets will be purchased at every price. Demand will shift to the right.

Limits, Alternatives, and Choices

- b. The NBA team's games are likely a substitute for GSU's games, so fewer tickets will be purchased at every price. Demand will shift to the left.
 - c. Fans can watch the game on television, so fewer tickets will be purchased at every price. Demand will shift to the left.
3. The following table contains data on the relationship between saving and income. Rearrange these data into a meaningful order and graph them on the accompanying grid. What is the slope of the line? The vertical intercept? Write the equation that represents this line. What would you predict saving to be at the \$12,500 level of income?

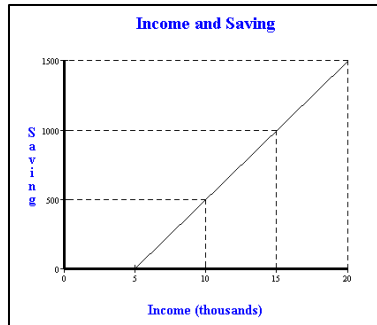
Income per Year	Saving per Year
\$15,000	\$1,000
0	−500
10,000	500
5,000	0
20,000	1,500



Answer: 0.1; −\$500; Saving = −\$500 + (0.1 x Income); \$750

To rearrange the above data into a meaningful order, we start with the lowest income and saving pair. We then continue with sequentially higher values of both income and saving. The reason for this ordering is that economic theory and data suggest that as income increases, so does saving.

Income per Year	Saving per Year
\$0	−\$500
5,000	0
10,000	500
15,000	1,000
20,000	1,500

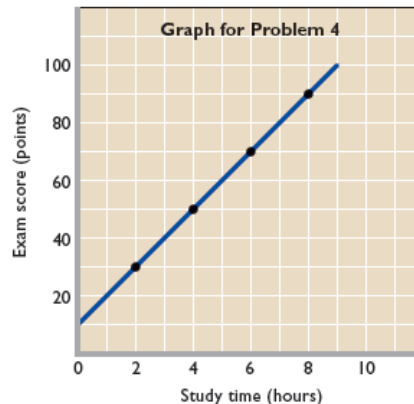


The slope of the saving line can be found by dividing the change in saving by the change in income between any two points. For example we have the entry (5,000 income, 0 savings) and the entry (10,000 income, 500 savings). This implies that the change in saving equals 500 ($= 500 - 0$) and the change in income equals 5,000 ($= 10,000 - 5,000$); therefore, the slope equals $(500/5,000)$ or 0.1. That is, for every additional dollar an individual earns, he or she will save 10 cents and consume 90 cents. The vertical intercept equals $-\$500$. This implies that if the individual does not earn an income, he or she either borrows \$500 or reduces past savings by \$500.

The equation representing this data is: $\text{Saving} = -\$500 + (0.1 \times \text{Income})$

To find the predicted amount of saving for a given level of income, we substitute the income level into the equation above. For example, if income equals \$12,500, then the predicted level of saving equals $-\$500 + (0.1 \times \$12,500)$. Thus the predicted level of saving is \$750 ($= -\$500 + \$1,250$).

4. Construct a table from the data shown in the accompanying graph. Which is the dependent variable and which is the independent variable? Summarize the data in equation form.



Answer: Exam score; Study time; Exam Score = 10 + (10 x Study Time)

Study Time (hours)	Exam Score (points)
0	10
2	30
4	50
6	70
8	90

Limits, Alternatives, and Choices

The dependent variable is the exam score because we assume study time influences your score. More hours of studying will increase your exam score. This means that study time is the independent variable.

The vertical intercept for this relationship is your exam score if you choose not to study (zero hours). From the table above, this value is 10.

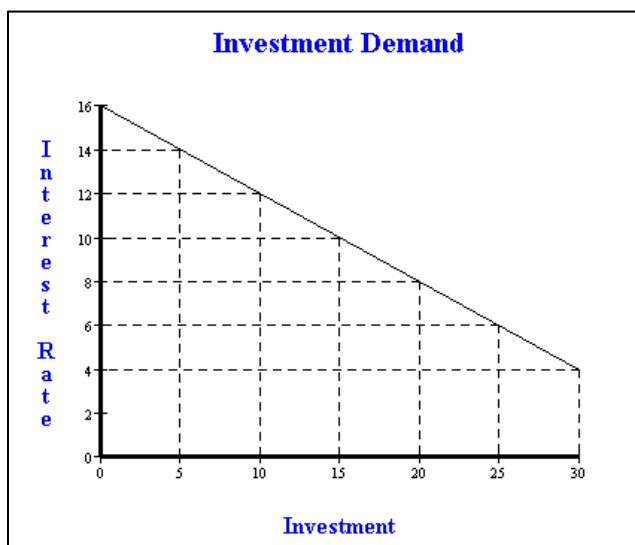
To find the slope, we divide the change in your exam score by the change in study time for any two points. For example, we have the entry (2 study time, 30 exam score) and the entry (4,50). This implies the slope equals $(50 - 30) / (4 - 2)$, which equals $20/2 (= 10)$. For every additional hour you spend studying, your exam score will increase by 10 points.

Thus, the equation representing this relationship is: $\text{Exam Score} = 10 + (10 \times \text{Study Time})$

5. Suppose that when the interest rate on loans is 16 percent, businesses find it unprofitable to invest in machinery and equipment. However, when the interest rate is 14 percent, \$5 billion worth of investment is profitable. At 12 percent interest, a total of \$10 billion of investment is profitable. Similarly, total investment increases by \$5 billion for each successive 2-percentage-point decline in the interest rate. Describe the relevant relationship between the interest rate and investment in a table, on a graph, and as an equation. Put the interest rate on the vertical axis and investment on the horizontal axis. In your equation use the form $i = a + bI$, where i is the interest rate, a is the vertical intercept, b is the slope of the line (which is negative), and I is the level of investment.

Answer: $i = 16 - (0.4 \times I)$

Interest Rate (in percent)	Amount of Investment (billions of dollars)
16	\$0
14	5
12	10
10	15
8	20
6	25
4	30



Limits, Alternatives, and Choices

Using the equation $i = a - bI$:

$$\begin{aligned} i &= 16 - [(16 - 14) / (5 - 0)] \times I \\ &= 16 - (2/5)I \\ &= 16 - 0.4I \end{aligned}$$

6. Suppose that $C = a + bY$, where C = consumption, a = consumption at zero income, b = slope, and Y = income.
- Are C and Y positively related or are they negatively related?
 - If graphed, would the curve for this equation slope upward or slope downward?
 - Are the variables C and Y inversely related or directly related?
 - What is the value of C if $a = 10$, $b = 0.50$, and $Y = 200$?
 - What is the value of Y if $C = 100$, $a = 10$, and $b = 0.25$?

Answer: a. Positively related; b. Upward; c. Directly related; d. 110; e. 360

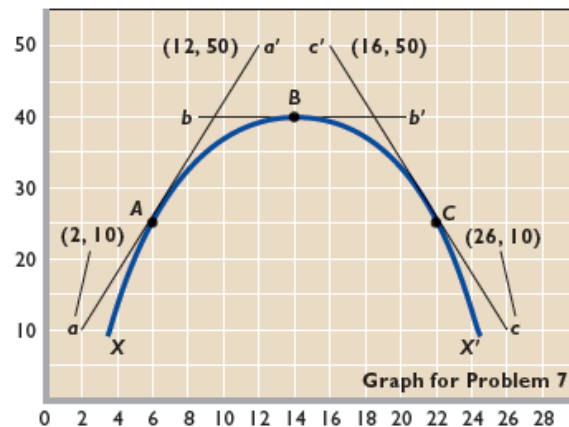
- The slope, b , is positive by assumption. As individual income increases, the individual will spend some of this additional income on consumption.
- The slope is positive.
- Consumption and income move in the same direction.
- The consumption function is: $C = 10 + (0.50 \times 200)$; $C = 110$.
- The consumption function is: $100 = 10 + (0.25 \times Y)$.

$$\text{Step 1: } 0.25 \times Y = 100 - 10$$

$$\text{Step 2: } Y = (1/0.25) \times 90$$

$$\text{Step 3: } Y = 4 \times 90 = 360$$

7. The accompanying graph shows curve XX' and tangents at points A , B , and C . Calculate the slope of the curve at these three points.



Answer: a. 4; b. 0; c. -4

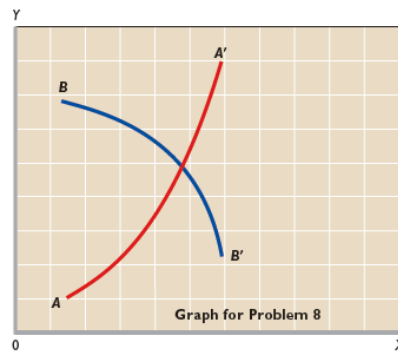
To calculate the slope of the function, use the “rise-over-run” approach. The “rise” is the change in the variable on the vertical axis as you move between points, and the “run” is the change in the variable on the horizontal axis as you move between the *same* two points.

At Point A, use the two entries (2,10) and (12,50). The “rise” equals $50 - 10 = 40$. The “run” equals $12 - 2 = 10$. To find the slope, use the rule “(rise/run)”, which is $(40/10) = 4$.

At Point B, there is no “rise,” so we do not need coordinates to calculate this value.

At Point C, use the two entries (16,50) and (26,10). The “rise” equals $10 - 50 = -40$ (note that “rise” can be negative). The “run” equals $26 - 16 = 10$. To find the slope, use the rule “(rise/run)”, which equals $(-40/10) = -4$.

8. In the accompanying graph, is the slope of curve AA' positive or negative? Does the slope increase or decrease as we move along the curve from A to A'? Answer the same two questions for curve BB' .



Answer: Positive; Increase; Negative; Decrease

CHAPTER THIRTY-TWO EXTENDING THE ANALYSIS OF AGGREGATE SUPPLY

CHAPTER OVERVIEW

This macroeconomics chapter explains the difference between long-run and short-run aggregate supply. The recent focus on long-run adjustments and economic outcomes has renewed debates about stabilization policy and causes of instability. The extended model develops new insights about demand-pull and cost-push inflation. The chapter then examines the relationship between unemployment and inflation with the short-run and long-run Phillips Curves. The chapter concludes with an assessment of the effect of taxes on aggregate supply, including a critical look at the Laffer Curve and Supply-Side Theory.

Addressing the Updated Framework

The topics covered in this chapter fall under:

- Microeconomics:
 - *Unit 1: Basic Economic Concepts*
- Macroeconomics:
 - *Unit 1: Basic Economic Concepts*
 - *Unit 2: Economic Indicators and the Business Cycle*
 - *Unit 3: National Income and Price Determination*
 - *Unit 4: Financial Sector*
 - *Unit 5: Long-Run Consequences of Stabilization Policies*

Microeconomics:

- Students must be able to illustrate economic growth using the production possibilities curve. (*Topic 1.3: Production Possibilities Curve*)

Macroeconomics:

- Students must be able to explain and illustrate economic growth with a production possibilities curve and a long-run aggregate supply curve. They should be able to list the factors that promote economic growth, including physical capital, human capital, technology, productivity increases, and public policies such as tax cuts and increased investment in infrastructure. (*Topic 1.2: Opportunity Cost and the Production Possibilities Curve; Topic 3.4: Long-Run Aggregate Supply; Topic 3.7: Long-Run Self-Adjustment; Topic 5.6: Economic Growth; Topic 5.7: Public Policy and Economic Growth*)
- Students must be able to explain and illustrate business cycles of recession and expansion as the result of changes in aggregate demand or aggregate supply. (*Topic 2.7: Business Cycles; Topic 3.1: Aggregate Demand; Topic 3.3: Short-Run Aggregate Supply*)
- Students must be able to explain and illustrate how changes in aggregate supply and aggregate demand affect output, employment, and the price level. An increase in aggregate demand causes demand-pull inflation, while a decrease in short-run aggregate supply causes cost-push inflation. (*Topic 3.6: Changes in the AD-AS Model in the Short Run*)
- Students must be able to explain and illustrate how short-run equilibrium may differ from the full-employment level of output. They must also be able to explain and illustrate how, without government intervention in the long run, flexible wages and prices adjust to restore the economy to full-employment output. (*Topic 3.5: Equilibrium in the Aggregate Demand – Aggregate Supply Model; Topic 3.7: Long-Run Self-Adjustment*)

Extending the Analysis of Aggregate Supply

- Students must be able to explain and illustrate the short-run Phillips Curve, which shows a short-run tradeoff between inflation and unemployment exists. They must be able to show the effects of demand shocks and supply shocks on the short-run Phillips Curve. They must also be able to explain and illustrate the long-run Phillips Curve, which is vertical because prices and wages are flexible in the long run, so there is no such tradeoff in the long run. (*Topic 3.3: Short-Run Aggregate Supply; Topic 3.4: Long-Run Aggregate Supply; Topic 5.2: The Phillips Curve*)
- Students must be able to explain and illustrate how governments use expansionary or contractionary fiscal policies of taxes and government spending to achieve macroeconomic goals, such as full employment. Fiscal policies affect aggregate demand, causing changes in real output and the price level. (*Topic 3.8: Fiscal Policy*)
- Students must recognize that central banks implement expansionary and contractionary monetary policies to achieve macroeconomic goals, such as price stability. They must be able to explain how the Federal Reserve uses its tools of monetary policy to change the money supply, which in turn affects investment and consumption. They must recognize that the Fed must be careful not to increase the money supply too rapidly because it causes inflation. (*Topic 4.6: Monetary Policy; Topic 5.3: Money Growth and Inflation*)

PACING GUIDE

Plan to spend about 11-12 class periods on Chapter 32. The focus should be on short-run and long-run aggregate supply analysis, movement from short-run to long-run macroeconomic equilibrium, “sticky” and flexible wages and prices, the mix of fiscal and monetary policies, the effects of stabilization policies, short-run and long-run Phillips Curves, and supply-side theory and the Laffer Curve. Material from Chapter 32 frequently appears in several multiple-choice questions and as a free-response question on the AP Macroeconomics exam.

INSTRUCTIONAL OBJECTIVES

After completing this chapter, students should be able to:

1. Explain the difference between the short-run and long-run aggregate supply curves and their significance for economic policy.
2. Distinguish between demand-pull and cost-push inflation using the extended aggregate demand-aggregate supply (AD-AS) model.
3. Illustrate economic growth using the AD-AS model.
4. Use the AD-AS model to explain why ongoing inflation occurs during economic growth.
5. Explain and construct a traditional short-run Phillips Curve using the AD-AS model.
6. Differentiate between the short-run and long-run Phillips Curves, and explain why there is no tradeoff between inflation and the natural rate of unemployment in the long run.
7. Identify the supply-side shocks to the American economy in the 1970s and 1980s.
8. Use an AD-AS model to show how supply-side shocks led to stagflation in the 1970s and 1980s.
9. Explain why demand-management policies cannot eliminate stagflation.
10. Explain possible effects of taxation on aggregate supply.
11. Explain the Laffer Curve and list three criticisms of this theory.
12. Define and identify terms and concepts listed at the end of the chapter.

COMMENTS AND TEACHING SUGGESTIONS

1. You may want to incorporate the (Chapter 20) discussion of sticky prices into this chapter's content on short-run and long-run aggregate supply analysis because it consolidates the sticky wage and price discussion.
2. You may want to move this chapter's discussion of government incentives to save and invest into the (Chapter 22) content on growth policy because such government policies can promote economic growth.
3. You may want to incorporate this chapter's discussion of short-run to long-run aggregate supply analysis and the Phillips Curve into the (Chapter 26) content on short-run aggregate supply analysis because it provides a natural flow directly from short-run to long-run equilibrium.
4. You may want to move this chapter's discussion of Supply-Side Theory into the (Chapter 33) content on economic theories because it consolidates the competing macroeconomic theories into one content area.
5. It is important to have students focus on the level of employment, rather than unemployment. That way, if AD changes, output, employment, and prices are all moving the same direction. The AP exam questions generally ask what happens to employment (not unemployment) during swings in the business cycle.
6. Students should be familiar with demand-pull and cost-push inflation, which were introduced earlier. However, a review of the AD-AS model would be a useful way to begin the discussion. Explain that it is difficult to distinguish the two types of inflation in the real world, because the causes of inflation are complex.
7. A commonly-asked AP exam question that **you need to be sure to cover** is for students to draw a graph with AD, SRAS, and LRAS, demonstrating equilibrium at less than full-employment output. Then they must demonstrate how the use of fiscal or monetary policy will return the economy to long-run equilibrium. Students must draw AD and SRAS first intersecting to the left of the vertical LRAS, and then show AD increasing until AD=SRAS at the LRAS curve.
8. It can be helpful to teach the basics of the Phillips Curve early in the macroeconomics course during the discussion of business cycles. Students are very often confused about prices, believing that prices tend to rise during periods of recession because merchants must "make up" for lost sales. A very basic understanding of the short-run Phillips Curve can help to dispel that notion. Then, when you reach the AD-AS model of this chapter, align the Phillips Curve with the AD-AS model and teach the principles of the Phillips Curve in depth. It is important for students to understand the difference between the long-run and short-run Phillips Curves.
9. Throughout the discussion of the Phillips Curve, be sure to point out that the vertical axis measures *changes* in the price level, not the price level itself (as in AD-AS model).
10. The AD-AS model can also be helpful in explaining why fiscal and monetary policies might entail supply-side effects that limit the attainment of policy goals, such as crowding out. Students must consider that if the government has simultaneous goals of increasing aggregate demand and long-run economic growth, expansionary monetary policy can promote both goals (by lowering interest rates), but expansionary fiscal policy raises interest rates, hindering growth.

Extending the Analysis of Aggregate Supply

11. Students must be prepared to draw from memory the long-run AD-AS model illustrating demand-pull inflation, cost-push inflation, recession, and long-run economic growth. They must also be prepared to draw economic growth via the production possibilities curve, as well as the short-run and long-run Phillips Curves.
12. We strongly recommend that the corresponding lesson(s) in the **Focus Review Guide** be assigned as homework each night as you complete a respective section from the book. Oftentimes, students are able to comprehend the material in class, but then cannot remember or apply the content at home on their own. You will then, also, be able to get feedback for reteaching right away.
13. The **Focus Review Guide** contains student practice questions specifically designed to prepare students for AP Economics exams. Practice questions from this chapter include the concepts of short-run and long-run aggregate supply, long-run equilibrium, demand-pull inflation, cost-push inflation, recession, economic growth, the short-run and long-run Phillips Curves, and the Laffer Curve.
14. The Council for Economic Education's *EconEdLink* website also provides several online lessons to reinforce topics from this chapter.
15. Frequent use of the College Board's released free-response questions can be very beneficial.
16. FRQ section of AP Economics exams 2014-2016: The 2014 and 2015 AP Macroeconomics exams asked students to graph the economy at equilibrium below full-employment GDP. The 2016 AP Macroeconomics exam asked students to graph the short-run and long-run Phillips Curves with an unemployment rate higher than NAIRU. The question went on to ask how the short-run Phillips Curve would shift if no policy action were taken, while the 2014 AP Macroeconomics exam asked how fiscal policy would affect cyclical unemployment and NAIRU.

STUDENT STUMBLING BLOCKS

1. Students may have difficulty with the extended AD-AS model. Have them review the graphs provided in the chapter carefully. Current events may give practice in deciding how each event will impact the economy, through aggregate demand or aggregate supply. Because the AP curriculum in macroeconomics stresses discretionary fiscal and monetary policy, students should not use supply-side economics to answer free-response questions.
2. Students may not see why employment usually declines when policies to reduce inflation are implemented. Many students are under the impression that policies to make the economy "better" will improve *all* aspects of the economy, not recognizing the tradeoff.
3. Because the axes for the Phillips Curve are so different from the other graphs throughout the course, students often have trouble remembering which label goes on which axis. A trick to remembering that the unemployment rate is on the horizontal axis is that the unemployment axis label goes under the graph, keeping the "un"s together.

LECTURE NOTES

I. From Short Run to Long Run

Extending the Analysis of Aggregate Supply

- A. In the short run, wages and other input prices are fixed; in the long run, they are flexible. As a result, the short-run aggregate supply curve is upward sloping, while the long-run aggregate supply curve is vertical at full-employment output.
- B. Short-Run Aggregate Supply
 - 1. The AS_1 curve is constructed with three assumptions (Figure 32.1a):
 - a. The initial price level is P_1 .
 - b. Firms and workers have established nominal wages on the expectation that this price level will persist.
 - c. The price level is flexible both upward and downward.
 - 2. If the price level rises, higher product prices with constant wages will bring higher profits, leading firms to increase output. The economy operates beyond full employment by extending work hours, enticing more workers into the workforce, and hiring the unemployed. In Figure 32.1a, the economy moves from a_1 to a_2 on curve AS_1 .
 - 3. If the price level falls, lower product prices with constant wages will bring lower profits, leading firms to reduce output and employment, creating cyclical unemployment. In Figure 32.1a, the economy moves from a_1 to a_3 on curve AS_1 .
- C. Long-Run Aggregate Supply
 - 1. The long-run aggregate supply curve is formed by long-run equilibrium points a_1 , b_1 , and c_1 and forms a vertical line at the full-employment GDP (Figure 32.1b).
 - 2. In the long run, nominal wages are fully responsive to price level changes.
 - 3. If the price level rises, the increased demand for workers (beyond full-employment output) increases wages, which will in turn increase the cost of production. As a result, aggregate supply shifts to the left, output falls back to full-employment output, and employment returns to the natural rate of unemployment. In Figure 32.1b, the economy moves from a_1 to a_2 and then to b_1 .
 - 4. If the price level falls, the firm's profits are reduced or eliminated in the short run, because wages are inflexible, and the firm reduces output and employment. But in the long run, workers will begin to accept lower wages to have any employment at all, so wages will fall. At this lower cost of production, firms hire more workers, increasing aggregate supply and output back to full-employment output. In Figure 32.1b, the economy moves from a_1 to a_3 and then to c_1 .
- D. Long-Run Equilibrium in the AD-AS Model
 - 1. The extended AD-AS model makes a distinction between the short-run and long-run aggregate supply curves (Figure 32.2).
 - 2. In the short run, equilibrium occurs wherever short-run aggregate supply equals aggregate demand.
 - 3. In the long run, after any adjustments, equilibrium occurs where aggregate demand intersects both the vertical long-run aggregate supply curve and the upward-sloping short-run aggregate supply curve at full-employment output.
 - 4. A negative GDP gap (recessionary gap) or positive GDP gap (inflationary gap) is possible in the short run. But after long-run adjustments are made, no such gaps

occur and the economy remains stable at the natural rate of unemployment (full-employment output).

II. Applying the Extended AD-AS Model

A. Demand-Pull Inflation in the Extended AD-AS Model

1. In the short run, an increase in aggregate demand drives up the price level and increases real output, so a positive GDP gap occurs (Figure 32.3).
2. With the economy producing above potential output, inputs will be in high demand, so the price of inputs, including nominal wages, will rise.
3. In the long run, wage increases cause a decrease in the short-run aggregate supply, returning equilibrium to full-employment output, so only prices and wages rise, and the economy is restored to the natural rate of unemployment.

B. Cost-Push Inflation in the Extended AD-AS Model

1. In the short run, an increase in the cost of production shifts the short-run aggregate supply curve to the left, not as a *response* to a price level increase, but as its *initiating cause* (Figure 32.4).
2. Cost-push inflation creates a dilemma for policymakers.
 - a. If government attempts to maintain full employment through fiscal and monetary policy, increasing aggregate demand during cost-push inflation, even more inflation will occur.
 - b. If government takes a hands-off approach to cost-push inflation, a recession will occur. Widespread unemployment will result in a decrease in nominal wages. The recession may eventually undo the initial rise in per-unit production costs, but in the meantime, unemployment and loss of real output will occur. Eventually, workers will accept lower wages, and aggregate supply will again increase until the economy is restored to full-employment output and the natural rate of unemployment.

C. Recession and the Extended AD-AS Model

1. When aggregate demand shifts leftward, a recession occurs. If prices and wages are downwardly flexible, the price level falls. The decline in the price level reduces nominal wages, which then eventually shifts the aggregate supply curve to the right. The price level declines and output returns to the full employment level (Figure 32.5).
2. This is the most controversial application of the extended AD-AS model. The key point of dispute is how long it would take in the real world for the necessary price and wage adjustments to take place to achieve the indicated outcome. This is why most economists advocate the use of fiscal and monetary policy to address recessionary gaps.
 - a. Those who believe the economy will “self-correct” also believe that wages and prices are not sticky and that they will adjust, resulting in full employment.
 - b. Those who believe that wages and prices are sticky believe that the economy could stay in recession for a prolonged, politically untenable length of time. When Keynes was asked, “how long,” he replied that the Dark Ages lasted a thousand years.

D. Economic Growth with Ongoing Inflation

1. The AD-AS framework can also be used to illustrate growth (Figure 32.6). The long-run aggregate supply curve shifts outward, resulting in economic growth. Economic growth can also be illustrated by an outward shift of the production possibilities curve.
 - a. It is important to distinguish between increased output caused by an AD shift and economic growth, which is an outward shift of long-run aggregate supply.
 - b. In both cases, real GDP may increase, but one is a change in output, and the other is growth.
2. Increases in LRAS are driven by factors such as improved technology, increased and better labor, and easier access to raw materials. Increased LRAS alone should increase output and cause a general decline in prices.
3. In recent decades, aggregate demand has shifted outward by an even greater amount than aggregate supply. The increased demand increases prices slightly more than the increased supply lowers prices, so nominal GDP rises faster than real GDP (Figure 32.7).

III. The Inflation–Unemployment Relationship

A. The Phillips Curve

1. Both low inflation and low unemployment are major goals. But are they compatible?
2. Under normal circumstances, there is a short-run tradeoff between inflation and unemployment.
3. Aggregate supply shocks cause both higher prices and lower employment.
4. Over the longer term, there is no tradeoff between inflation and unemployment.

B. The Phillips Curve illustrates the inverse relationship between the unemployment rate and the inflation rate (Figure 32.8a). When the inflation rate is high, the unemployment rate is low, and vice versa. Empirical work in the 1960s verified the stable, predictable tradeoff in the relationship in the United States for 1961–1969 (see Figure 32.8b).

C. Given a fixed short-run aggregate supply curve, an increase in aggregate demand will cause the price level to increase and real output and employment to expand. A decrease in aggregate demand reduces output, employment, and the price level (Figure 32.9). Therefore, the use of fiscal and monetary policy to change aggregate demand could reduce inflation or unemployment, but only at the cost of increasing the other.

D. Aggregate Supply Shocks and the Phillips Curve

1. The stable Phillips Curve of the 1960s gave way to great instability of the curve in the 1970s and 1980s (Figure 32.10). The economy experienced increasing inflation and rising unemployment—stagflation—which was caused by a series of adverse aggregate supply shocks (rapid and significant increases in resource costs).
 - a. The most significant of these supply shocks was a quadrupling of oil prices by OPEC.
 - b. Other factors included major agricultural shortfalls, a greatly depreciated dollar, wage increases, and slower rates of productivity growth.

- c. The leftward shift of the short-run aggregate supply curve caused the Phillips Curve to shift outward to the right, increasing both inflation and unemployment. This stagflation made it clear that the Phillips Curve did not represent a stable inflation-unemployment relationship.
2. Stagflation's Demise: Figure 32.10 shows an inward movement of the inflation and unemployment points between 1982 and 1989 due to a reduction in per-unit production costs, shifting aggregate supply back to the right.
 - a. The recession of 1981–1982, largely caused by a tight money policy, reduced double-digit inflation and raised the unemployment rate to 9.7% in 1982. With so many workers unemployed, wage increases were smaller, and in some cases, reduced wages were accepted.
 - b. Firms limited price increases to retain their relative shares of diminished markets. Foreign competition throughout this period held down wages and price hikes.
 - c. Deregulation of the airline and trucking industries also reduced wages and prices.
 - d. A significant decline in OPEC's monopoly power produced a stunning fall in oil price.
3. Global Perspective 32.1 portrays the “misery index” between 2004 and 2014 for several nations. The index is the sum of a nation's unemployment and inflation rates.

IV. The Long-Run Phillips Curve

A. Short-Run Phillips Curve

1. Data support the view that the economy is generally stable at its natural rate of unemployment (or full-employment output), where cyclical unemployment is zero.
2. Nominal wages are set on the assumption that output prices will rise at the same rate as the nominal wage, keeping the real wage the same.

B. Long-Run Vertical Phillips Curve

1. While a short-run inverse relationship exists between the rate of unemployment and the rate of inflation, no long-run tradeoff exists (Figure 32.11).
2. In the short run, people form their expectations of future inflation based on previous and present inflation rates and only gradually change expectations and wage demands.
3. When the actual rate of inflation is higher than expected, profits temporarily rise, firms are incentivized to expand production, and the unemployment rate temporarily falls.
4. Over time, workers recognize that their real wages have fallen. When they fully anticipate inflation and increase their nominal wage demands, business profits fall and firms reduce employment back to the natural rate of unemployment. Over time, such adjustments generate a vertical Phillips Curve (Figure 32.11).

- C. The long-run Phillips Curve is a vertical line at the natural rate of unemployment (NAIRU). Short-term equilibria on either side of this line will be resolved as wages and prices change to reflect either insufficient or excessive demand for workers.

Extending the Analysis of Aggregate Supply

1. Given sufficient time to adjust, an increase in AD will cause an inflationary gap, which resolves itself with a higher price level and return to the natural rate of unemployment.
 2. Likewise, a decrease in AD will cause a recessionary gap that will resolve itself with a lower price level and a return to the natural rate of unemployment.
- D. Disinflation
1. The Philips Curve also explains disinflation—a reduction in the inflation rate from year to year.
 2. If AD shifts outward at a slower rate than AS, the actual rate of inflation will be lower than expected, profits temporarily fall, and the unemployment rate temporarily rises.
 3. Firms and workers reduce their inflationary expectations, and prices fall while employment adjusts back to the natural rate of unemployment.
- E. Interpretations of the Phillips Curve have changed dramatically since 1970.
1. The original idea of a stable tradeoff between inflation and unemployment has given way to other views that focus more on long-run effects.
 2. Most economists accept the idea of a short-run tradeoff—where the short run may last years, depending upon how sticky expectations and wages actually are—while recognizing that in the long run, such a tradeoff is much less likely.

V. Taxation and Aggregate Supply

- A. Supply-side economists advocate government policies that promote output growth through an increase in aggregate supply. Much of their effort is focused on marginal tax rates.
- B. Taxes and Incentives to Work
1. Supply-siders argue that the American tax system has negatively affected incentives to work, save, and invest.
 2. They believe that in order to induce more work, government should reduce marginal tax rates on earned income and encourage more people to enter the labor force and work longer. They believe lower tax rates would reduce periods of unemployment.
- C. Incentives to Save and Invest
1. Supply-siders argue that the rewards for saving and investing have also been reduced by high marginal tax rates. A critical determinant of investment spending is the expected after-tax return, so a reduction in marginal tax rates promotes saving and investment.
 2. They believe that lower marginal tax rates may increase capital investment, which increases worker productivity. Aggregate supply would expand and keep inflation low.
- D. The Laffer Curve

1. The Laffer Curve shows the theoretical reaction of tax revenues to changes in tax rates.
 2. As tax rates increase from zero, tax revenues increase from zero to some maximum level (m) and then decline to zero again. Tax rates above or below this maximum rate will cause a decrease in tax revenue (Figure 32.12).
 3. In the early 1980s Laffer argued that tax rates were above the optimal level, causing a work disincentive. By lowering tax rates, government could increase work incentive and raise the tax revenue collected.
 4. Lower tax rates would trigger an expansion of real output and income, enlarging the tax base. The main impact would be on aggregate supply rather than aggregate demand.
 5. Tax avoidance (legal) and tax evasion (illegal) both decline when taxes are reduced.
 6. Increased employment would reduce the need for transfer payments such as welfare.
 7. **CONSIDER THIS...** Sherwood Forest
 - a. Laffer likened tax payments to passing through Sherwood Forest. To avoid Robin Hood's "taxation," people avoided going through the forest whenever possible.
 - b. If Robin Hood had confiscated only a portion, his band's revenue might have been higher, as fewer people would have avoided or evaded the forest (taxes).
- E. Criticisms of the Laffer Curve
1. Empirical evidence shows that the impacts of a tax cut on incentives to work, save, and invest are small, of uncertain direction, and relatively slow to emerge. While lower taxes may inspire some people to work more, others will choose to work less because they can earn the same income with less work.
 2. The demand-side effects of a tax cut are more immediate and certain than longer-term supply-side effects. Demand impacts may exceed supply impacts, fueling inflation. Real interest rates will rise, causing a decline in investment, defeating the purpose of the supply-side tax cuts.
 3. The Laffer Curve is based on a logical premise, but where the economy is actually located on the curve is an empirical question and difficult to determine. It is hard to know in advance the impact of a tax cut on supply. If the economy is performing on the lower side of the curve, a reduction in tax rates reduces government revenue. Current research shows no developed nation with overall tax rates beyond the optimal level.
- F. Rebuttal and Evaluation
1. Supply-side economists argue that when the top marginal tax rate was cut from 50 percent to 28 percent, government revenues increased within ten years.
 2. The general view among economists is that the increased revenues resulted from an increase in aggregate demand, not aggregate supply.

3. The tax rate cuts did not produce large rightward shifts of long-run aggregate supply. Saving fell as a percentage of personal income and productivity growth was sluggish.
4. The results from a series of tax rate increases and decreases in the 1990s and 2000s has created general agreement that the economy is operating on the lower portion of the Laffer Curve, and reductions in taxes cause increases in aggregate demand rather than aggregate supply.

VI. LAST WORD: Do Tax Increases Reduce Real GDP?

- A. Most significant tax changes have been motivated by the need to counteract other influences in the economy, pay for increases in government spending, address an inherited budget deficit, or promote long-run economic growth.
- B. A tax increase of 1 percent of real GDP lowers real GDP by 2 to 3 percent. Investment falls sharply in response to tax increases, explaining why output changes so much in response to the tax change. Evidence suggests that these output changes are relatively permanent.
- C. Tax increases that are used to reduce the deficit tend to reduce economic activity less than tax increases for other reasons, because they have important expansionary effects through improved expectations, lower long-term interest rates, or enhanced confidence.

ANSWERS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS

Chapter 32 – Extending the Analysis of Aggregate Supply

DISCUSSION QUESTIONS

1. Distinguish between the short run and the long run as they relate to macroeconomics. Why is the distinction important?

Answer: For macroeconomists, the short run is a period in which wages (and other input prices) do not respond to price level changes. Workers may not be aware of price level changes or are hired under fixed wage contracts. Once sufficient time has elapsed for contracts to expire and nominal wage adjustments to occur, the economy enters the long run, a period in which nominal wages are fully responsive to changes in the price level.

The economy will adjust itself to a long-run equilibrium, but in the short run, there may be an important role for fiscal and monetary policy to stabilize the economy.

2. Which of the following statements are true? Which are false? Explain why the false statements are untrue.
 - a. Short-run aggregate supply curves reflect an inverse relationship between the price level and the level of real output.
 - b. The long-run aggregate supply curve assumes that nominal wages are fixed.
 - c. In the long run, an increase in the price level will result in an increase in nominal wages.

Answer: a. False; b. False; c. True

Extending the Analysis of Aggregate Supply

- a. Short-run aggregate supply curves reflect a *direct* relationship between the price level and the level of real output. An increase in the price level brings an increase in sales revenue to firms. Because nominal wages are fixed, their profits rise. In response, firms collectively increase output.
 - b. Nominal wages, in the long run, are fully *responsive* to changes in the price level.
 - c. Workers will demand higher nominal wages in order to keep their real wages the same.
3. Suppose the government misjudges the natural rate of unemployment to be much lower than it actually is, and thus undertakes expansionary fiscal and monetary policies to try to achieve the lower rate. Use the concept of the short-run Phillips Curve to explain why these policies might at first succeed. Use the concept of the long-run Phillips Curve to explain the long-run outcome of these policies.

Answer: In the short run, the government's expansionary policy should reduce unemployment as aggregate demand increases. However, the government will continue its expansionary policy beyond the point of the natural level of unemployment. Any reduction of unemployment below the natural rate is only temporary and involves a short-run rise in inflation. As aggregate demand continues to rise, prices begin to rise. In the long run, workers demand higher wages to compensate for these higher prices. This, in turn, causes long-run costs to rise and a decrease in aggregate supply, shifting left toward the natural rate of unemployment. The result should be equilibrium at the natural rate of unemployment and a higher price level than the beginning level. The long-run Phillips Curve is thus a vertical line connecting the price levels possible at the natural rate of unemployment found on the horizontal axis.

4. What do the distinctions between short-run aggregate supply and long-run aggregate supply have in common with the distinction between the short-run Phillips Curve and the long-run Phillips Curve? Explain.

Answer: In the short-run, economists assume that production costs don't change, so the aggregate supply curve is fixed. Therefore, changes in aggregate demand are the sole determinant of unemployment and inflation rates. In the long-run, wages and input prices adjust to price changes, causing changes in production costs and aggregate supply. The long-run relationship between price level and output is vertical at the full-employment level of output.

The long-run Phillips Curve illustrates this latter point, with the natural rate of unemployment being measured on the horizontal axis and price level on the vertical axis. The long-run curve is vertical. However, the short-run Phillips Curve reflects what happens with unemployment at different price levels, assuming the short-run aggregate supply curve is fixed.

5. What is the Laffer Curve, and how does it relate to supply-side economics? Why is determining the economy's location on the curve so important in assessing tax policy?

Answer: Tax revenues would be zero when the tax rate was either at 0% or 100%. As the tax rate rises from zero, tax revenues rise until some point, where tax rate increases begin to yield less revenue. Supply-side analysis attempts to determine the optimum tax rate for producing both maximum tax revenue and maximum economic output. Laffer argued

Extending the Analysis of Aggregate Supply

that low tax rates would increase tax revenues because low rates improved productivity, saving, and investment incentives. The expansion in output, employment, and revenue would more than compensate for lower tax rates. Finding the proper location on the curve could maximize all these effects.

6. Why might one person work more, earn more, and pay more income tax when his or her tax rate is cut, while another person will work less, earn less, and pay less income tax under the same circumstance?

Answer: Proponents of supply-side economics argue that cuts in the marginal tax rate on earned income will make work more attractive because the opportunity cost of leisure is higher. Thus, individuals choose to substitute work for leisure. Critics of supply-side reasoning contend that workers are just as likely to reduce their efforts because the after-tax pay increases their ability to “buy leisure.” They can meet their after-tax income goals by working fewer hours.

7. **LAST WORD** On average, does an increase in taxes raise or lower real GDP? If taxes as a percent of GDP go up 1 percent, by how much does real GDP change? Are the decreases in real GDP caused by tax increases temporary or permanent? Does the intention of a tax increase matter?

Answer: C. Romer and D. Romer show that tax increases reduce real GDP. On average, a 1 percent tax increase (as percentage of real GDP) reduces real GDP by 2 to 3 percent. The decreases appear to be permanent. It appears that the intent of the tax increase matters. Tax increases to reduce the deficit tend to have a lower negative effect on economic activity.

AP REVIEW QUESTIONS

1. What will each of the following do to the short-run aggregate supply curve, long-run aggregate supply curve, and/or aggregate demand curve?
- An increase in government spending.
 - Expansionary monetary policy over the short run and long run.
 - Increase in overall productivity.
 - Decrease in the labor force.
 - Decrease in personal income tax rates.
 - Increase in autonomous consumption.
 - Central Bank’s selling of government bonds.
 - Reduction in this country’s average tariff rate.

Answer:

- Aggregate demand increases.
- Aggregate demand increases in the short run; long-run aggregate supply increases in the long run.

Extending the Analysis of Aggregate Supply

- c. Short-run and long-run aggregate supply increase.
 - d. Short-run and long-run aggregate supply decrease.
 - e. Aggregate demand increases.
 - f. Aggregate demand increases.
 - g. Aggregate demand decreases; long-run aggregate supply decreases.
 - h. Aggregate demand decreases.
2. Suppose that AD and AS intersect at an output level that is higher than the full-employment output level. After the economy adjusts back to equilibrium in the long run, the price level and the nominal wage will change in which way?
- a. Nominal wage will be the same and the price level higher.
 - b. Nominal wage and the price level will be both unchanged.
 - c. Nominal wage will be higher and the price level unchanged.
 - d. Nominal wage and the price level will each be higher.
 - e. Nominal wage will be higher, but the effect on the price level is indeterminate.

Answer: d

When the economy is producing at a rate that is higher than the full-employment output level, wages will rise because inputs will be in high demand. That, in turn, will raise output prices (and make the AS curve shift left). The AS curve will continue to shift left and the price level will continue to rise until the economy has returned to long-run equilibrium.

3. Suppose that an economy is in long-run equilibrium. If the price level and real GDP both decline simultaneously and those changes were caused by only one curve shifting, then those changes are best explained as the result of:
- a. The AD curve shifting right.
 - b. The SAS curve shifting right.
 - c. The AD curve shifting left.
 - d. The SAS curve shifting left.
 - e. The LRAS curve shifting right.

Answer: c

4. In the extended analysis of aggregate supply, the long-run aggregate supply curve is:
- a. Vertical and the short-run aggregate supply curve is also vertical.
 - b. Horizontal and the short-run aggregate supply curve is vertical.
 - c. Horizontal and the short-run aggregate supply curve is upward sloping.
 - d. Vertical and the short-run aggregate supply curve is upward sloping.
 - e. Upward sloping and the short-run aggregate supply curve is vertical.

Answer: d

5. Use graphical analysis to show how each of the following would affect the economy first in the short run and then in the long run. Assume that the United States is initially operating at its full-employment level of output, that prices and wages are eventually flexible both upward and downward, and that there is no counteracting fiscal or monetary policy.
- Because of a war abroad, the oil supply to the United States is disrupted, sending oil prices rocketing upward.
 - Construction spending on new homes rises dramatically, greatly increasing total U.S. investment spending.
 - Economic recession occurs abroad, significantly reducing foreign purchases of U.S. exports.
 - Short run: The aggregate supply curve shifts to the left, the price level rises, and real output declines. Long run: The aggregate supply curve shifts back rightward (due to declining nominal wages), the price level falls, and real output increases.
 - Short run: The aggregate demand curve shifts to the right, and both the price level and real output increase. Long run: The aggregate supply curve shifts to the left (due to higher nominal wages), the price level rises, and real output declines.
 - Short run: The aggregate demand curve shifts to the left, and both the price level and real output decline. Long run: The aggregate supply curve shifts to the right (due to lower nominal wages), the price level falls further, and real output increases.
6. A major adverse (decrease in) aggregate supply shock:
- Automatically shifts the aggregate demand curve rightward.
 - Automatically shifts the aggregate demand curve leftward.
 - Causes the Phillips Curve to shift rightward and upward.
 - Can be caused by rising productivity.
 - Can be caused by falling wages.

Answer: c

7. The short-run Phillips Curve suggests that, if government uses an expansionary fiscal policy to stimulate output and employment:
- Unemployment may actually increase because of the crowding-out effect.
 - Tax revenues may increase even though tax rates have been reduced.
 - Inflation will increase in the short run.
 - The natural rate of unemployment may fall.
 - Both unemployment and inflation may rise.

Answer: c

Extending the Analysis of Aggregate Supply

8. In the extended aggregate demand-aggregate supply model:
- a. Long-run equilibrium occurs wherever the aggregate demand curve intersects the short-run aggregate supply curve.
 - b. The long-run aggregate supply curve is horizontal.
 - c. The price level is the same regardless of the location of the aggregate demand curve.
 - d. The price level is the same regardless of the location of the aggregate supply curve.
 - e. Long-run equilibrium occurs at the intersection of the aggregate demand curve, the short-run aggregate supply curve, and the long run aggregate supply.

Answer: e

9. Suppose that firms are expecting 6 percent inflation while workers are expecting 9 percent inflation. How much of a pay raise will workers demand if their goal is to maintain the purchasing power of their incomes?
- a. 3 percent.
 - b. 6 percent.
 - c. 9 percent.
 - d. 12 percent.
 - e. 15 percent.

Answer: c

10. Which of the following describes the basis of supply-side economics?
- a. High marginal tax rates discourage work, saving, and investment.
 - b. High marginal tax rates encourage work, saving, and investment.
 - c. Increases in social security taxes and other business taxes shift the aggregate supply curve to the right.
 - d. The Federal Reserve should adhere to a monetary rule that limits increases in the money supply to a 5 percent annual rate.
 - e. Transfer payments increase incentives to work.

Answer: a

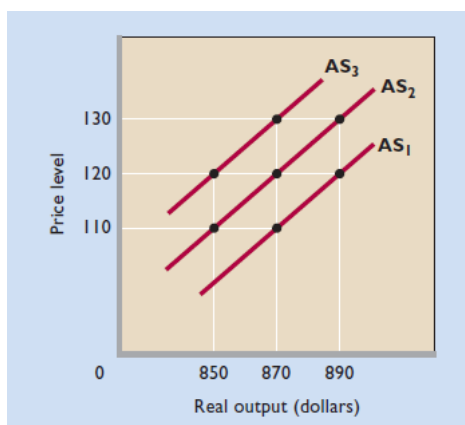
11. Assume that an economy is operating below full employment in the short run.
- a. With aggregate supply and demand analysis, show this short-run equilibrium.
 - b. Using a graph of the short-run and long-run Phillips curve, label on the short-run Phillips curve as Point A, a possible point of rest for the economy described here.
 - c. State a specific fiscal policy action that could help move this economy to full employment.
 - d. If the policy described in part C is implemented, show a new possible point of rest on the Phillips Curve and label in point C.

Extending the Analysis of Aggregate Supply

- e. Assume no policy action is taken, describe the mechanism by which this economy could reach full employment.
- f. If the process described above were to occur, show with your Phillips Curve analysis how the economy reaches full employment.
 - a. Aggregate demand and short-run aggregate supply intersect to the left of the vertical long-run aggregate supply curve.
 - b. Point A would be on the short-run Phillips Curve, to the right of the long-run curve.
 - c. Government spending could be increased or taxes could be reduced.
 - d. Point C would be on the short-run Phillips Curve, to the left of point A.
 - e. In the long run, wages would fall and short-run aggregate supply would increase.
 - f. The economy would move to the left along the short-run Phillips Curve until it reached the point where the short-run Phillips Curve intersects the long-run Phillips Curve.

PROBLEMS

1. Use the figure below to answer the follow questions. Assume that the economy initially is operating at price level 120 and real output level \$870. This output level is the economy's potential (or full-employment) level of output. Next, suppose that the price level rises from 120 to 130. By how much will real output increase in the short run? In the long-run? Instead, now assume that the price level dropped from 120 to 110. Assuming flexible product and resource prices, by how much will real output fall in the short run? In the long run? What is the long-run level of output at each of the three price levels shown?



Answer: \$20; \$0; \$20; \$0; \$870

In the first scenario short run, the economy will move along AS_2 and output will increase to \$890, an increase of \$20. In the long run, the aggregate supply curve will shift from AS_2 to AS_3 as wages adjust. This moves the economy back to full-employment output \$870 at the price level 130.

In the second scenario short run, the economy will move along AS_2 and output will fall to \$850, a decrease of \$20. In the long run, the aggregate supply curve will shift from AS_2 to AS_1 as wages adjust. This moves the economy back to full-employment output \$870 at the price level 110.

The long-run level of output is \$870 at each of the three price levels.

2. **ADVANCED ANALYSIS** Suppose that the equation for a particular short-run AS curve is $P = 20 + 0.5Q$, where P is the price level and Q is real output in dollar terms. What is Q if the price level is 120? Suppose that the Q in your answer is the full-employment level of output. By how much will Q increase *in the short run* if the price level unexpectedly rises from 120 to 132? By how much will Q increase *in the long run* due to the price level increase?

Answer: \$200; \$24; \$0

$P = (20 + .5Q)$ or $Q = [(P - 20) / 0.5]$.

If the price level is 120, Q is 200 $[= (120 - 20) / 0.5] = (100 / 0.5)$.

In the short run, Q is 224 $[= (132 - 20) / 0.5] = (112 / 0.5)$. Q increases by 24 $(= 224 - 200)$.

In the long run, Q will return to the full-employment level of output defined above, $Q = 200$. Thus, the long-run change is zero.

3. Suppose that over a 30-year period Buskerville's price level increased from 72 to 138, while its real GDP rose from \$1.2 trillion to \$2.1 trillion. Did economic growth occur in Buskerville? If so, by what average yearly rate in percentage terms (rounded to one decimal place)? Did Buskerville experience inflation? If so, by what average yearly rate in percentage terms (rounded to one decimal place)? Which shifted rightward faster in Buskerville: its long-run aggregate supply curve (AS_{LR}) or its aggregate demand curve (AD)?

Answer: Yes; 2.5%; Yes; 3.1%; AD

Growth $= [(2.1 - 1.2) / 1.2] = (.9 / 1.2) = 0.75$ (75%).

Average Annual Growth $= (\text{Growth} / 30) = 2.5\%$.

Inflation $= [(138 - 72) / 72] = (66 / 72) = 0.9167$ (91.67%)

Average Annual Inflation $= (\text{Inflation} / 30) = 3.1\%$.

The AD curve shifted faster because the price level increased over this period of time.

4. Suppose that for years East Confetti's short-run Phillips Curve was such that each 1 percentage point increase in its unemployment rate was associated with a 2 percentage point decline in its inflation rate. Then, during several recent years, the short-run pattern changed such that its inflation rate rose by 3 percentage points for every 1 percentage point drop in its unemployment rate. Graphically, did East Confetti's Phillips Curve shift upward or did it shift downward?

Answer: Upward

With the new tradeoff, each reduction in either unemployment or inflation is associated with an even greater increase in the other. Thus, the new Phillips Curve must lie above the original.

CHAPTER THIRTY-TWO EXTENDING THE ANALYSIS OF AGGREGATE SUPPLY

CHAPTER OVERVIEW

This macroeconomics chapter explains the difference between long-run and short-run aggregate supply. The recent focus on long-run adjustments and economic outcomes has renewed debates about stabilization policy and causes of instability. The extended model develops new insights about demand-pull and cost-push inflation. The chapter then examines the relationship between unemployment and inflation with the short-run and long-run Phillips Curves. The chapter concludes with an assessment of the effect of taxes on aggregate supply, including a critical look at the Laffer Curve and Supply-Side Theory.

Addressing the Updated Framework

The topics covered in this chapter fall under:

- Microeconomics:
 - *Unit 1: Basic Economic Concepts*
- Macroeconomics:
 - *Unit 1: Basic Economic Concepts*
 - *Unit 2: Economic Indicators and the Business Cycle*
 - *Unit 3: National Income and Price Determination*
 - *Unit 4: Financial Sector*
 - *Unit 5: Long-Run Consequences of Stabilization Policies*

Microeconomics:

- Students must be able to illustrate economic growth using the production possibilities curve. (*Topic 1.3: Production Possibilities Curve*)

Macroeconomics:

- Students must be able to explain and illustrate economic growth with a production possibilities curve and a long-run aggregate supply curve. They should be able to list the factors that promote economic growth, including physical capital, human capital, technology, productivity increases, and public policies such as tax cuts and increased investment in infrastructure. (*Topic 1.2: Opportunity Cost and the Production Possibilities Curve; Topic 3.4: Long-Run Aggregate Supply; Topic 3.7: Long-Run Self-Adjustment; Topic 5.6: Economic Growth; Topic 5.7: Public Policy and Economic Growth*)
- Students must be able to explain and illustrate business cycles of recession and expansion as the result of changes in aggregate demand or aggregate supply. (*Topic 2.7: Business Cycles; Topic 3.1: Aggregate Demand; Topic 3.3: Short-Run Aggregate Supply*)
- Students must be able to explain and illustrate how changes in aggregate supply and aggregate demand affect output, employment, and the price level. An increase in aggregate demand causes demand-pull inflation, while a decrease in short-run aggregate supply causes cost-push inflation. (*Topic 3.6: Changes in the AD-AS Model in the Short Run*)
- Students must be able to explain and illustrate how short-run equilibrium may differ from the full-employment level of output. They must also be able to explain and illustrate how, without government intervention in the long run, flexible wages and prices adjust to restore the economy to full-employment output. (*Topic 3.5: Equilibrium in the Aggregate Demand – Aggregate Supply Model; Topic 3.7: Long-Run Self-Adjustment*)

Extending the Analysis of Aggregate Supply

- Students must be able to explain and illustrate the short-run Phillips Curve, which shows a short-run tradeoff between inflation and unemployment exists. They must be able to show the effects of demand shocks and supply shocks on the short-run Phillips Curve. They must also be able to explain and illustrate the long-run Phillips Curve, which is vertical because prices and wages are flexible in the long run, so there is no such tradeoff in the long run. (*Topic 3.3: Short-Run Aggregate Supply; Topic 3.4: Long-Run Aggregate Supply; Topic 5.2: The Phillips Curve*)
- Students must be able to explain and illustrate how governments use expansionary or contractionary fiscal policies of taxes and government spending to achieve macroeconomic goals, such as full employment. Fiscal policies affect aggregate demand, causing changes in real output and the price level. (*Topic 3.8: Fiscal Policy*)
- Students must recognize that central banks implement expansionary and contractionary monetary policies to achieve macroeconomic goals, such as price stability. They must be able to explain how the Federal Reserve uses its tools of monetary policy to change the money supply, which in turn affects investment and consumption. They must recognize that the Fed must be careful not to increase the money supply too rapidly because it causes inflation. (*Topic 4.6: Monetary Policy; Topic 5.3: Money Growth and Inflation*)

PACING GUIDE

Plan to spend about 11-12 class periods on Chapter 32. The focus should be on short-run and long-run aggregate supply analysis, movement from short-run to long-run macroeconomic equilibrium, “sticky” and flexible wages and prices, the mix of fiscal and monetary policies, the effects of stabilization policies, short-run and long-run Phillips Curves, and supply-side theory and the Laffer Curve. Material from Chapter 32 frequently appears in several multiple-choice questions and as a free-response question on the AP Macroeconomics exam.

INSTRUCTIONAL OBJECTIVES

After completing this chapter, students should be able to:

1. Explain the difference between the short-run and long-run aggregate supply curves and their significance for economic policy.
2. Distinguish between demand-pull and cost-push inflation using the extended aggregate demand-aggregate supply (AD-AS) model.
3. Illustrate economic growth using the AD-AS model.
4. Use the AD-AS model to explain why ongoing inflation occurs during economic growth.
5. Explain and construct a traditional short-run Phillips Curve using the AD-AS model.
6. Differentiate between the short-run and long-run Phillips Curves, and explain why there is no tradeoff between inflation and the natural rate of unemployment in the long run.
7. Identify the supply-side shocks to the American economy in the 1970s and 1980s.
8. Use an AD-AS model to show how supply-side shocks led to stagflation in the 1970s and 1980s.
9. Explain why demand-management policies cannot eliminate stagflation.
10. Explain possible effects of taxation on aggregate supply.
11. Explain the Laffer Curve and list three criticisms of this theory.
12. Define and identify terms and concepts listed at the end of the chapter.

COMMENTS AND TEACHING SUGGESTIONS

1. You may want to incorporate the (Chapter 20) discussion of sticky prices into this chapter's content on short-run and long-run aggregate supply analysis because it consolidates the sticky wage and price discussion.
2. You may want to move this chapter's discussion of government incentives to save and invest into the (Chapter 22) content on growth policy because such government policies can promote economic growth.
3. You may want to incorporate this chapter's discussion of short-run to long-run aggregate supply analysis and the Phillips Curve into the (Chapter 26) content on short-run aggregate supply analysis because it provides a natural flow directly from short-run to long-run equilibrium.
4. You may want to move this chapter's discussion of Supply-Side Theory into the (Chapter 33) content on economic theories because it consolidates the competing macroeconomic theories into one content area.
5. It is important to have students focus on the level of employment, rather than unemployment. That way, if AD changes, output, employment, and prices are all moving the same direction. The AP exam questions generally ask what happens to employment (not unemployment) during swings in the business cycle.
6. Students should be familiar with demand-pull and cost-push inflation, which were introduced earlier. However, a review of the AD-AS model would be a useful way to begin the discussion. Explain that it is difficult to distinguish the two types of inflation in the real world, because the causes of inflation are complex.
7. A commonly-asked AP exam question that **you need to be sure to cover** is for students to draw a graph with AD, SRAS, and LRAS, demonstrating equilibrium at less than full-employment output. Then they must demonstrate how the use of fiscal or monetary policy will return the economy to long-run equilibrium. Students must draw AD and SRAS first intersecting to the left of the vertical LRAS, and then show AD increasing until AD=SRAS at the LRAS curve.
8. It can be helpful to teach the basics of the Phillips Curve early in the macroeconomics course during the discussion of business cycles. Students are very often confused about prices, believing that prices tend to rise during periods of recession because merchants must "make up" for lost sales. A very basic understanding of the short-run Phillips Curve can help to dispel that notion. Then, when you reach the AD-AS model of this chapter, align the Phillips Curve with the AD-AS model and teach the principles of the Phillips Curve in depth. It is important for students to understand the difference between the long-run and short-run Phillips Curves.
9. Throughout the discussion of the Phillips Curve, be sure to point out that the vertical axis measures *changes* in the price level, not the price level itself (as in AD-AS model).
10. The AD-AS model can also be helpful in explaining why fiscal and monetary policies might entail supply-side effects that limit the attainment of policy goals, such as crowding out. Students must consider that if the government has simultaneous goals of increasing aggregate demand and long-run economic growth, expansionary monetary policy can promote both goals (by lowering interest rates), but expansionary fiscal policy raises interest rates, hindering growth.

Extending the Analysis of Aggregate Supply

11. Students must be prepared to draw from memory the long-run AD-AS model illustrating demand-pull inflation, cost-push inflation, recession, and long-run economic growth. They must also be prepared to draw economic growth via the production possibilities curve, as well as the short-run and long-run Phillips Curves.
12. We strongly recommend that the corresponding lesson(s) in the **Focus Review Guide** be assigned as homework each night as you complete a respective section from the book. Oftentimes, students are able to comprehend the material in class, but then cannot remember or apply the content at home on their own. You will then, also, be able to get feedback for reteaching right away.
13. The **Focus Review Guide** contains student practice questions specifically designed to prepare students for AP Economics exams. Practice questions from this chapter include the concepts of short-run and long-run aggregate supply, long-run equilibrium, demand-pull inflation, cost-push inflation, recession, economic growth, the short-run and long-run Phillips Curves, and the Laffer Curve.
14. The Council for Economic Education's *EconEdLink* website also provides several online lessons to reinforce topics from this chapter.
15. Frequent use of the College Board's released free-response questions can be very beneficial.
16. FRQ section of AP Economics exams 2014-2016: The 2014 and 2015 AP Macroeconomics exams asked students to graph the economy at equilibrium below full-employment GDP. The 2016 AP Macroeconomics exam asked students to graph the short-run and long-run Phillips Curves with an unemployment rate higher than NAIRU. The question went on to ask how the short-run Phillips Curve would shift if no policy action were taken, while the 2014 AP Macroeconomics exam asked how fiscal policy would affect cyclical unemployment and NAIRU.

STUDENT STUMBLING BLOCKS

1. Students may have difficulty with the extended AD-AS model. Have them review the graphs provided in the chapter carefully. Current events may give practice in deciding how each event will impact the economy, through aggregate demand or aggregate supply. Because the AP curriculum in macroeconomics stresses discretionary fiscal and monetary policy, students should not use supply-side economics to answer free-response questions.
2. Students may not see why employment usually declines when policies to reduce inflation are implemented. Many students are under the impression that policies to make the economy "better" will improve *all* aspects of the economy, not recognizing the tradeoff.
3. Because the axes for the Phillips Curve are so different from the other graphs throughout the course, students often have trouble remembering which label goes on which axis. A trick to remembering that the unemployment rate is on the horizontal axis is that the unemployment axis label goes under the graph, keeping the "un"s together.

LECTURE NOTES

I. From Short Run to Long Run

Extending the Analysis of Aggregate Supply

- A. In the short run, wages and other input prices are fixed; in the long run, they are flexible. As a result, the short-run aggregate supply curve is upward sloping, while the long-run aggregate supply curve is vertical at full-employment output.
- B. Short-Run Aggregate Supply
 - 1. The AS_1 curve is constructed with three assumptions (Figure 32.1a):
 - a. The initial price level is P_1 .
 - b. Firms and workers have established nominal wages on the expectation that this price level will persist.
 - c. The price level is flexible both upward and downward.
 - 2. If the price level rises, higher product prices with constant wages will bring higher profits, leading firms to increase output. The economy operates beyond full employment by extending work hours, enticing more workers into the workforce, and hiring the unemployed. In Figure 32.1a, the economy moves from a_1 to a_2 on curve AS_1 .
 - 3. If the price level falls, lower product prices with constant wages will bring lower profits, leading firms to reduce output and employment, creating cyclical unemployment. In Figure 32.1a, the economy moves from a_1 to a_3 on curve AS_1 .
- C. Long-Run Aggregate Supply
 - 1. The long-run aggregate supply curve is formed by long-run equilibrium points a_1 , b_1 , and c_1 and forms a vertical line at the full-employment GDP (Figure 32.1b).
 - 2. In the long run, nominal wages are fully responsive to price level changes.
 - 3. If the price level rises, the increased demand for workers (beyond full-employment output) increases wages, which will in turn increase the cost of production. As a result, aggregate supply shifts to the left, output falls back to full-employment output, and employment returns to the natural rate of unemployment. In Figure 32.1b, the economy moves from a_1 to a_2 and then to b_1 .
 - 4. If the price level falls, the firm's profits are reduced or eliminated in the short run, because wages are inflexible, and the firm reduces output and employment. But in the long run, workers will begin to accept lower wages to have any employment at all, so wages will fall. At this lower cost of production, firms hire more workers, increasing aggregate supply and output back to full-employment output. In Figure 32.1b, the economy moves from a_1 to a_3 and then to c_1 .
- D. Long-Run Equilibrium in the AD-AS Model
 - 1. The extended AD-AS model makes a distinction between the short-run and long-run aggregate supply curves (Figure 32.2).
 - 2. In the short run, equilibrium occurs wherever short-run aggregate supply equals aggregate demand.
 - 3. In the long run, after any adjustments, equilibrium occurs where aggregate demand intersects both the vertical long-run aggregate supply curve and the upward-sloping short-run aggregate supply curve at full-employment output.
 - 4. A negative GDP gap (recessionary gap) or positive GDP gap (inflationary gap) is possible in the short run. But after long-run adjustments are made, no such gaps

occur and the economy remains stable at the natural rate of unemployment (full-employment output).

II. Applying the Extended AD-AS Model

A. Demand-Pull Inflation in the Extended AD-AS Model

1. In the short run, an increase in aggregate demand drives up the price level and increases real output, so a positive GDP gap occurs (Figure 32.3).
2. With the economy producing above potential output, inputs will be in high demand, so the price of inputs, including nominal wages, will rise.
3. In the long run, wage increases cause a decrease in the short-run aggregate supply, returning equilibrium to full-employment output, so only prices and wages rise, and the economy is restored to the natural rate of unemployment.

B. Cost-Push Inflation in the Extended AD-AS Model

1. In the short run, an increase in the cost of production shifts the short-run aggregate supply curve to the left, not as a *response* to a price level increase, but as its *initiating cause* (Figure 32.4).
2. Cost-push inflation creates a dilemma for policymakers.
 - a. If government attempts to maintain full employment through fiscal and monetary policy, increasing aggregate demand during cost-push inflation, even more inflation will occur.
 - b. If government takes a hands-off approach to cost-push inflation, a recession will occur. Widespread unemployment will result in a decrease in nominal wages. The recession may eventually undo the initial rise in per-unit production costs, but in the meantime, unemployment and loss of real output will occur. Eventually, workers will accept lower wages, and aggregate supply will again increase until the economy is restored to full-employment output and the natural rate of unemployment.

C. Recession and the Extended AD-AS Model

1. When aggregate demand shifts leftward, a recession occurs. If prices and wages are downwardly flexible, the price level falls. The decline in the price level reduces nominal wages, which then eventually shifts the aggregate supply curve to the right. The price level declines and output returns to the full employment level (Figure 32.5).
2. This is the most controversial application of the extended AD-AS model. The key point of dispute is how long it would take in the real world for the necessary price and wage adjustments to take place to achieve the indicated outcome. This is why most economists advocate the use of fiscal and monetary policy to address recessionary gaps.
 - a. Those who believe the economy will “self-correct” also believe that wages and prices are not sticky and that they will adjust, resulting in full employment.
 - b. Those who believe that wages and prices are sticky believe that the economy could stay in recession for a prolonged, politically untenable length of time. When Keynes was asked, “how long,” he replied that the Dark Ages lasted a thousand years.

D. Economic Growth with Ongoing Inflation

1. The AD-AS framework can also be used to illustrate growth (Figure 32.6). The long-run aggregate supply curve shifts outward, resulting in economic growth. Economic growth can also be illustrated by an outward shift of the production possibilities curve.
 - a. It is important to distinguish between increased output caused by an AD shift and economic growth, which is an outward shift of long-run aggregate supply.
 - b. In both cases, real GDP may increase, but one is a change in output, and the other is growth.
2. Increases in LRAS are driven by factors such as improved technology, increased and better labor, and easier access to raw materials. Increased LRAS alone should increase output and cause a general decline in prices.
3. In recent decades, aggregate demand has shifted outward by an even greater amount than aggregate supply. The increased demand increases prices slightly more than the increased supply lowers prices, so nominal GDP rises faster than real GDP (Figure 32.7).

III. The Inflation–Unemployment Relationship

A. The Phillips Curve

1. Both low inflation and low unemployment are major goals. But are they compatible?
2. Under normal circumstances, there is a short-run tradeoff between inflation and unemployment.
3. Aggregate supply shocks cause both higher prices and lower employment.
4. Over the longer term, there is no tradeoff between inflation and unemployment.

B. The Phillips Curve illustrates the inverse relationship between the unemployment rate and the inflation rate (Figure 32.8a). When the inflation rate is high, the unemployment rate is low, and vice versa. Empirical work in the 1960s verified the stable, predictable tradeoff in the relationship in the United States for 1961–1969 (see Figure 32.8b).

C. Given a fixed short-run aggregate supply curve, an increase in aggregate demand will cause the price level to increase and real output and employment to expand. A decrease in aggregate demand reduces output, employment, and the price level (Figure 32.9). Therefore, the use of fiscal and monetary policy to change aggregate demand could reduce inflation or unemployment, but only at the cost of increasing the other.

D. Aggregate Supply Shocks and the Phillips Curve

1. The stable Phillips Curve of the 1960s gave way to great instability of the curve in the 1970s and 1980s (Figure 32.10). The economy experienced increasing inflation and rising unemployment—stagflation—which was caused by a series of adverse aggregate supply shocks (rapid and significant increases in resource costs).
 - a. The most significant of these supply shocks was a quadrupling of oil prices by OPEC.
 - b. Other factors included major agricultural shortfalls, a greatly depreciated dollar, wage increases, and slower rates of productivity growth.

- c. The leftward shift of the short-run aggregate supply curve caused the Phillips Curve to shift outward to the right, increasing both inflation and unemployment. This stagflation made it clear that the Phillips Curve did not represent a stable inflation-unemployment relationship.
2. Stagflation's Demise: Figure 32.10 shows an inward movement of the inflation and unemployment points between 1982 and 1989 due to a reduction in per-unit production costs, shifting aggregate supply back to the right.
 - a. The recession of 1981–1982, largely caused by a tight money policy, reduced double-digit inflation and raised the unemployment rate to 9.7% in 1982. With so many workers unemployed, wage increases were smaller, and in some cases, reduced wages were accepted.
 - b. Firms limited price increases to retain their relative shares of diminished markets. Foreign competition throughout this period held down wages and price hikes.
 - c. Deregulation of the airline and trucking industries also reduced wages and prices.
 - d. A significant decline in OPEC's monopoly power produced a stunning fall in oil price.
3. Global Perspective 32.1 portrays the “misery index” between 2004 and 2014 for several nations. The index is the sum of a nation's unemployment and inflation rates.

IV. The Long-Run Phillips Curve

A. Short-Run Phillips Curve

1. Data support the view that the economy is generally stable at its natural rate of unemployment (or full-employment output), where cyclical unemployment is zero.
2. Nominal wages are set on the assumption that output prices will rise at the same rate as the nominal wage, keeping the real wage the same.

B. Long-Run Vertical Phillips Curve

1. While a short-run inverse relationship exists between the rate of unemployment and the rate of inflation, no long-run tradeoff exists (Figure 32.11).
2. In the short run, people form their expectations of future inflation based on previous and present inflation rates and only gradually change expectations and wage demands.
3. When the actual rate of inflation is higher than expected, profits temporarily rise, firms are incentivized to expand production, and the unemployment rate temporarily falls.
4. Over time, workers recognize that their real wages have fallen. When they fully anticipate inflation and increase their nominal wage demands, business profits fall and firms reduce employment back to the natural rate of unemployment. Over time, such adjustments generate a vertical Phillips Curve (Figure 32.11).

- C. The long-run Phillips Curve is a vertical line at the natural rate of unemployment (NAIRU). Short-term equilibria on either side of this line will be resolved as wages and prices change to reflect either insufficient or excessive demand for workers.

Extending the Analysis of Aggregate Supply

1. Given sufficient time to adjust, an increase in AD will cause an inflationary gap, which resolves itself with a higher price level and return to the natural rate of unemployment.
 2. Likewise, a decrease in AD will cause a recessionary gap that will resolve itself with a lower price level and a return to the natural rate of unemployment.
- D. Disinflation
1. The Philips Curve also explains disinflation—a reduction in the inflation rate from year to year.
 2. If AD shifts outward at a slower rate than AS, the actual rate of inflation will be lower than expected, profits temporarily fall, and the unemployment rate temporarily rises.
 3. Firms and workers reduce their inflationary expectations, and prices fall while employment adjusts back to the natural rate of unemployment.
- E. Interpretations of the Phillips Curve have changed dramatically since 1970.
1. The original idea of a stable tradeoff between inflation and unemployment has given way to other views that focus more on long-run effects.
 2. Most economists accept the idea of a short-run tradeoff—where the short run may last years, depending upon how sticky expectations and wages actually are—while recognizing that in the long run, such a tradeoff is much less likely.

V. Taxation and Aggregate Supply

- A. Supply-side economists advocate government policies that promote output growth through an increase in aggregate supply. Much of their effort is focused on marginal tax rates.
- B. Taxes and Incentives to Work
1. Supply-siders argue that the American tax system has negatively affected incentives to work, save, and invest.
 2. They believe that in order to induce more work, government should reduce marginal tax rates on earned income and encourage more people to enter the labor force and work longer. They believe lower tax rates would reduce periods of unemployment.
- C. Incentives to Save and Invest
1. Supply-siders argue that the rewards for saving and investing have also been reduced by high marginal tax rates. A critical determinant of investment spending is the expected after-tax return, so a reduction in marginal tax rates promotes saving and investment.
 2. They believe that lower marginal tax rates may increase capital investment, which increases worker productivity. Aggregate supply would expand and keep inflation low.
- D. The Laffer Curve

1. The Laffer Curve shows the theoretical reaction of tax revenues to changes in tax rates.
 2. As tax rates increase from zero, tax revenues increase from zero to some maximum level (m) and then decline to zero again. Tax rates above or below this maximum rate will cause a decrease in tax revenue (Figure 32.12).
 3. In the early 1980s Laffer argued that tax rates were above the optimal level, causing a work disincentive. By lowering tax rates, government could increase work incentive and raise the tax revenue collected.
 4. Lower tax rates would trigger an expansion of real output and income, enlarging the tax base. The main impact would be on aggregate supply rather than aggregate demand.
 5. Tax avoidance (legal) and tax evasion (illegal) both decline when taxes are reduced.
 6. Increased employment would reduce the need for transfer payments such as welfare.
 7. **CONSIDER THIS...** Sherwood Forest
 - a. Laffer likened tax payments to passing through Sherwood Forest. To avoid Robin Hood's "taxation," people avoided going through the forest whenever possible.
 - b. If Robin Hood had confiscated only a portion, his band's revenue might have been higher, as fewer people would have avoided or evaded the forest (taxes).
- E. Criticisms of the Laffer Curve
1. Empirical evidence shows that the impacts of a tax cut on incentives to work, save, and invest are small, of uncertain direction, and relatively slow to emerge. While lower taxes may inspire some people to work more, others will choose to work less because they can earn the same income with less work.
 2. The demand-side effects of a tax cut are more immediate and certain than longer-term supply-side effects. Demand impacts may exceed supply impacts, fueling inflation. Real interest rates will rise, causing a decline in investment, defeating the purpose of the supply-side tax cuts.
 3. The Laffer Curve is based on a logical premise, but where the economy is actually located on the curve is an empirical question and difficult to determine. It is hard to know in advance the impact of a tax cut on supply. If the economy is performing on the lower side of the curve, a reduction in tax rates reduces government revenue. Current research shows no developed nation with overall tax rates beyond the optimal level.
- F. Rebuttal and Evaluation
1. Supply-side economists argue that when the top marginal tax rate was cut from 50 percent to 28 percent, government revenues increased within ten years.
 2. The general view among economists is that the increased revenues resulted from an increase in aggregate demand, not aggregate supply.

3. The tax rate cuts did not produce large rightward shifts of long-run aggregate supply. Saving fell as a percentage of personal income and productivity growth was sluggish.
4. The results from a series of tax rate increases and decreases in the 1990s and 2000s has created general agreement that the economy is operating on the lower portion of the Laffer Curve, and reductions in taxes cause increases in aggregate demand rather than aggregate supply.

VI. LAST WORD: Do Tax Increases Reduce Real GDP?

- A. Most significant tax changes have been motivated by the need to counteract other influences in the economy, pay for increases in government spending, address an inherited budget deficit, or promote long-run economic growth.
- B. A tax increase of 1 percent of real GDP lowers real GDP by 2 to 3 percent. Investment falls sharply in response to tax increases, explaining why output changes so much in response to the tax change. Evidence suggests that these output changes are relatively permanent.
- C. Tax increases that are used to reduce the deficit tend to reduce economic activity less than tax increases for other reasons, because they have important expansionary effects through improved expectations, lower long-term interest rates, or enhanced confidence.

ANSWERS TO END-OF-CHAPTER QUESTIONS AND PROBLEMS

Chapter 32 – Extending the Analysis of Aggregate Supply

DISCUSSION QUESTIONS

1. Distinguish between the short run and the long run as they relate to macroeconomics. Why is the distinction important?

Answer: For macroeconomists, the short run is a period in which wages (and other input prices) do not respond to price level changes. Workers may not be aware of price level changes or are hired under fixed wage contracts. Once sufficient time has elapsed for contracts to expire and nominal wage adjustments to occur, the economy enters the long run, a period in which nominal wages are fully responsive to changes in the price level.

The economy will adjust itself to a long-run equilibrium, but in the short run, there may be an important role for fiscal and monetary policy to stabilize the economy.

2. Which of the following statements are true? Which are false? Explain why the false statements are untrue.
 - a. Short-run aggregate supply curves reflect an inverse relationship between the price level and the level of real output.
 - b. The long-run aggregate supply curve assumes that nominal wages are fixed.
 - c. In the long run, an increase in the price level will result in an increase in nominal wages.

Answer: a. False; b. False; c. True

Extending the Analysis of Aggregate Supply

- a. Short-run aggregate supply curves reflect a *direct* relationship between the price level and the level of real output. An increase in the price level brings an increase in sales revenue to firms. Because nominal wages are fixed, their profits rise. In response, firms collectively increase output.
 - b. Nominal wages, in the long run, are fully *responsive* to changes in the price level.
 - c. Workers will demand higher nominal wages in order to keep their real wages the same.
3. Suppose the government misjudges the natural rate of unemployment to be much lower than it actually is, and thus undertakes expansionary fiscal and monetary policies to try to achieve the lower rate. Use the concept of the short-run Phillips Curve to explain why these policies might at first succeed. Use the concept of the long-run Phillips Curve to explain the long-run outcome of these policies.

Answer: In the short run, the government's expansionary policy should reduce unemployment as aggregate demand increases. However, the government will continue its expansionary policy beyond the point of the natural level of unemployment. Any reduction of unemployment below the natural rate is only temporary and involves a short-run rise in inflation. As aggregate demand continues to rise, prices begin to rise. In the long run, workers demand higher wages to compensate for these higher prices. This, in turn, causes long-run costs to rise and a decrease in aggregate supply, shifting left toward the natural rate of unemployment. The result should be equilibrium at the natural rate of unemployment and a higher price level than the beginning level. The long-run Phillips Curve is thus a vertical line connecting the price levels possible at the natural rate of unemployment found on the horizontal axis.

4. What do the distinctions between short-run aggregate supply and long-run aggregate supply have in common with the distinction between the short-run Phillips Curve and the long-run Phillips Curve? Explain.

Answer: In the short-run, economists assume that production costs don't change, so the aggregate supply curve is fixed. Therefore, changes in aggregate demand are the sole determinant of unemployment and inflation rates. In the long-run, wages and input prices adjust to price changes, causing changes in production costs and aggregate supply. The long-run relationship between price level and output is vertical at the full-employment level of output.

The long-run Phillips Curve illustrates this latter point, with the natural rate of unemployment being measured on the horizontal axis and price level on the vertical axis. The long-run curve is vertical. However, the short-run Phillips Curve reflects what happens with unemployment at different price levels, assuming the short-run aggregate supply curve is fixed.

5. What is the Laffer Curve, and how does it relate to supply-side economics? Why is determining the economy's location on the curve so important in assessing tax policy?

Answer: Tax revenues would be zero when the tax rate was either at 0% or 100%. As the tax rate rises from zero, tax revenues rise until some point, where tax rate increases begin to yield less revenue. Supply-side analysis attempts to determine the optimum tax rate for producing both maximum tax revenue and maximum economic output. Laffer argued

Extending the Analysis of Aggregate Supply

that low tax rates would increase tax revenues because low rates improved productivity, saving, and investment incentives. The expansion in output, employment, and revenue would more than compensate for lower tax rates. Finding the proper location on the curve could maximize all these effects.

6. Why might one person work more, earn more, and pay more income tax when his or her tax rate is cut, while another person will work less, earn less, and pay less income tax under the same circumstance?

Answer: Proponents of supply-side economics argue that cuts in the marginal tax rate on earned income will make work more attractive because the opportunity cost of leisure is higher. Thus, individuals choose to substitute work for leisure. Critics of supply-side reasoning contend that workers are just as likely to reduce their efforts because the after-tax pay increases their ability to “buy leisure.” They can meet their after-tax income goals by working fewer hours.

7. **LAST WORD** On average, does an increase in taxes raise or lower real GDP? If taxes as a percent of GDP go up 1 percent, by how much does real GDP change? Are the decreases in real GDP caused by tax increases temporary or permanent? Does the intention of a tax increase matter?

Answer: C. Romer and D. Romer show that tax increases reduce real GDP. On average, a 1 percent tax increase (as percentage of real GDP) reduces real GDP by 2 to 3 percent. The decreases appear to be permanent. It appears that the intent of the tax increase matters. Tax increases to reduce the deficit tend to have a lower negative effect on economic activity.

AP REVIEW QUESTIONS

1. What will each of the following do to the short-run aggregate supply curve, long-run aggregate supply curve, and/or aggregate demand curve?
- An increase in government spending.
 - Expansionary monetary policy over the short run and long run.
 - Increase in overall productivity.
 - Decrease in the labor force.
 - Decrease in personal income tax rates.
 - Increase in autonomous consumption.
 - Central Bank’s selling of government bonds.
 - Reduction in this country’s average tariff rate.

Answer:

- Aggregate demand increases.
- Aggregate demand increases in the short run; long-run aggregate supply increases in the long run.

Extending the Analysis of Aggregate Supply

- c. Short-run and long-run aggregate supply increase.
 - d. Short-run and long-run aggregate supply decrease.
 - e. Aggregate demand increases.
 - f. Aggregate demand increases.
 - g. Aggregate demand decreases; long-run aggregate supply decreases.
 - h. Aggregate demand decreases.
2. Suppose that AD and AS intersect at an output level that is higher than the full-employment output level. After the economy adjusts back to equilibrium in the long run, the price level and the nominal wage will change in which way?
- a. Nominal wage will be the same and the price level higher.
 - b. Nominal wage and the price level will be both unchanged.
 - c. Nominal wage will be higher and the price level unchanged.
 - d. Nominal wage and the price level will each be higher.
 - e. Nominal wage will be higher, but the effect on the price level is indeterminate.

Answer: d

When the economy is producing at a rate that is higher than the full-employment output level, wages will rise because inputs will be in high demand. That, in turn, will raise output prices (and make the AS curve shift left). The AS curve will continue to shift left and the price level will continue to rise until the economy has returned to long-run equilibrium.

3. Suppose that an economy is in long-run equilibrium. If the price level and real GDP both decline simultaneously and those changes were caused by only one curve shifting, then those changes are best explained as the result of:
- a. The AD curve shifting right.
 - b. The SAS curve shifting right.
 - c. The AD curve shifting left.
 - d. The SAS curve shifting left.
 - e. The LRAS curve shifting right.

Answer: c

4. In the extended analysis of aggregate supply, the long-run aggregate supply curve is:
- a. Vertical and the short-run aggregate supply curve is also vertical.
 - b. Horizontal and the short-run aggregate supply curve is vertical.
 - c. Horizontal and the short-run aggregate supply curve is upward sloping.
 - d. Vertical and the short-run aggregate supply curve is upward sloping.
 - e. Upward sloping and the short-run aggregate supply curve is vertical.

Answer: d

5. Use graphical analysis to show how each of the following would affect the economy first in the short run and then in the long run. Assume that the United States is initially operating at its full-employment level of output, that prices and wages are eventually flexible both upward and downward, and that there is no counteracting fiscal or monetary policy.
- Because of a war abroad, the oil supply to the United States is disrupted, sending oil prices rocketing upward.
 - Construction spending on new homes rises dramatically, greatly increasing total U.S. investment spending.
 - Economic recession occurs abroad, significantly reducing foreign purchases of U.S. exports.
 - Short run: The aggregate supply curve shifts to the left, the price level rises, and real output declines. Long run: The aggregate supply curve shifts back rightward (due to declining nominal wages), the price level falls, and real output increases.
 - Short run: The aggregate demand curve shifts to the right, and both the price level and real output increase. Long run: The aggregate supply curve shifts to the left (due to higher nominal wages), the price level rises, and real output declines.
 - Short run: The aggregate demand curve shifts to the left, and both the price level and real output decline. Long run: The aggregate supply curve shifts to the right (due to lower nominal wages), the price level falls further, and real output increases.
6. A major adverse (decrease in) aggregate supply shock:
- Automatically shifts the aggregate demand curve rightward.
 - Automatically shifts the aggregate demand curve leftward.
 - Causes the Phillips Curve to shift rightward and upward.
 - Can be caused by rising productivity.
 - Can be caused by falling wages.

Answer: c

7. The short-run Phillips Curve suggests that, if government uses an expansionary fiscal policy to stimulate output and employment:
- Unemployment may actually increase because of the crowding-out effect.
 - Tax revenues may increase even though tax rates have been reduced.
 - Inflation will increase in the short run.
 - The natural rate of unemployment may fall.
 - Both unemployment and inflation may rise.

Answer: c

Extending the Analysis of Aggregate Supply

8. In the extended aggregate demand-aggregate supply model:
- a. Long-run equilibrium occurs wherever the aggregate demand curve intersects the short-run aggregate supply curve.
 - b. The long-run aggregate supply curve is horizontal.
 - c. The price level is the same regardless of the location of the aggregate demand curve.
 - d. The price level is the same regardless of the location of the aggregate supply curve.
 - e. Long-run equilibrium occurs at the intersection of the aggregate demand curve, the short-run aggregate supply curve, and the long run aggregate supply.

Answer: e

9. Suppose that firms are expecting 6 percent inflation while workers are expecting 9 percent inflation. How much of a pay raise will workers demand if their goal is to maintain the purchasing power of their incomes?
- a. 3 percent.
 - b. 6 percent.
 - c. 9 percent.
 - d. 12 percent.
 - e. 15 percent.

Answer: c

10. Which of the following describes the basis of supply-side economics?
- a. High marginal tax rates discourage work, saving, and investment.
 - b. High marginal tax rates encourage work, saving, and investment.
 - c. Increases in social security taxes and other business taxes shift the aggregate supply curve to the right.
 - d. The Federal Reserve should adhere to a monetary rule that limits increases in the money supply to a 5 percent annual rate.
 - e. Transfer payments increase incentives to work.

Answer: a

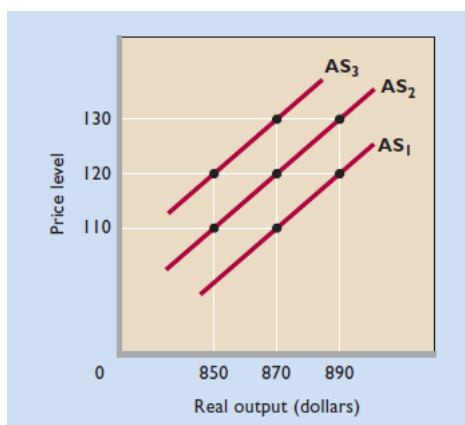
11. Assume that an economy is operating below full employment in the short run.
- a. With aggregate supply and demand analysis, show this short-run equilibrium.
 - b. Using a graph of the short-run and long-run Phillips curve, label on the short-run Phillips curve as Point A, a possible point of rest for the economy described here.
 - c. State a specific fiscal policy action that could help move this economy to full employment.
 - d. If the policy described in part C is implemented, show a new possible point of rest on the Phillips Curve and label in point C.

Extending the Analysis of Aggregate Supply

- e. Assume no policy action is taken, describe the mechanism by which this economy could reach full employment.
- f. If the process described above were to occur, show with your Phillips Curve analysis how the economy reaches full employment.
 - a. Aggregate demand and short-run aggregate supply intersect to the left of the vertical long-run aggregate supply curve.
 - b. Point A would be on the short-run Phillips Curve, to the right of the long-run curve.
 - c. Government spending could be increased or taxes could be reduced.
 - d. Point C would be on the short-run Phillips Curve, to the left of point A.
 - e. In the long run, wages would fall and short-run aggregate supply would increase.
 - f. The economy would move to the left along the short-run Phillips Curve until it reached the point where the short-run Phillips Curve intersects the long-run Phillips Curve.

PROBLEMS

1. Use the figure below to answer the follow questions. Assume that the economy initially is operating at price level 120 and real output level \$870. This output level is the economy's potential (or full-employment) level of output. Next, suppose that the price level rises from 120 to 130. By how much will real output increase in the short run? In the long-run? Instead, now assume that the price level dropped from 120 to 110. Assuming flexible product and resource prices, by how much will real output fall in the short run? In the long run? What is the long-run level of output at each of the three price levels shown?



Answer: \$20; \$0; \$20; \$0; \$870

In the first scenario short run, the economy will move along AS_2 and output will increase to \$890, an increase of \$20. In the long run, the aggregate supply curve will shift from AS_2 to AS_3 as wages adjust. This moves the economy back to full-employment output \$870 at the price level 130.

In the second scenario short run, the economy will move along AS_2 and output will fall to \$850, a decrease of \$20. In the long run, the aggregate supply curve will shift from AS_2 to AS_1 as wages adjust. This moves the economy back to full-employment output \$870 at the price level 110.

The long-run level of output is \$870 at each of the three price levels.

2. **ADVANCED ANALYSIS** Suppose that the equation for a particular short-run AS curve is $P = 20 + 0.5Q$, where P is the price level and Q is real output in dollar terms. What is Q if the price level is 120? Suppose that the Q in your answer is the full-employment level of output. By how much will Q increase *in the short run* if the price level unexpectedly rises from 120 to 132? By how much will Q increase *in the long run* due to the price level increase?

Answer: \$200; \$24; \$0

$P = (20 + .5Q)$ or $Q = [(P - 20) / 0.5]$.

If the price level is 120, Q is 200 $[= (120 - 20) / 0.5] = (100 / 0.5)$.

In the short run, Q is 224 $[= (132 - 20) / 0.5] = (112 / 0.5)$. Q increases by 24 $(= 224 - 200)$.

In the long run, Q will return to the full-employment level of output defined above, $Q = 200$. Thus, the long-run change is zero.

3. Suppose that over a 30-year period Buskerville's price level increased from 72 to 138, while its real GDP rose from \$1.2 trillion to \$2.1 trillion. Did economic growth occur in Buskerville? If so, by what average yearly rate in percentage terms (rounded to one decimal place)? Did Buskerville experience inflation? If so, by what average yearly rate in percentage terms (rounded to one decimal place)? Which shifted rightward faster in Buskerville: its long-run aggregate supply curve (AS_{LR}) or its aggregate demand curve (AD)?

Answer: Yes; 2.5%; Yes; 3.1%; AD

Growth $= [(2.1 - 1.2) / 1.2] = (.9 / 1.2) = 0.75$ (75%).

Average Annual Growth $= (\text{Growth} / 30) = 2.5\%$.

Inflation $= [(138 - 72) / 72] = (66 / 72) = 0.9167$ (91.67%)

Average Annual Inflation $= (\text{Inflation} / 30) = 3.1\%$.

The AD curve shifted faster because the price level increased over this period of time.

4. Suppose that for years East Confetti's short-run Phillips Curve was such that each 1 percentage point increase in its unemployment rate was associated with a 2 percentage point decline in its inflation rate. Then, during several recent years, the short-run pattern changed such that its inflation rate rose by 3 percentage points for every 1 percentage point drop in its unemployment rate. Graphically, did East Confetti's Phillips Curve shift upward or did it shift downward?

Answer: Upward

With the new tradeoff, each reduction in either unemployment or inflation is associated with an even greater increase in the other. Thus, the new Phillips Curve must lie above the original.