

DEMAND AND SUPPLY IN FACTOR MARKETS

Study Session 5

EXAM FOCUS

Here, you want to gain an understanding of how the demand for inputs to production is determined and which factors influence the elasticity of demand for inputs, especially labor. The second key topic is how the market for financial capital establishes the price

(interest rate) for financial capital and the factors that influence the supply of and demand for financial capital. Finally, you should gain an understanding of two components of the payments to productive resources, opportunity cost and economic rent.

LOS 21.a: Explain the difference between marginal revenue and marginal revenue product.

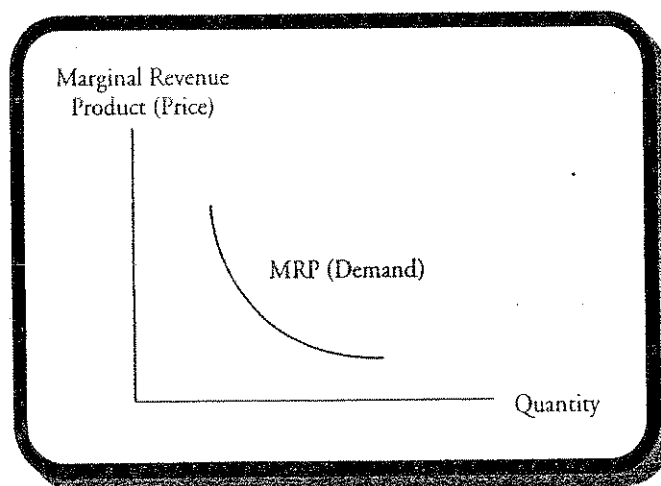
The **marginal product** of a resource is the additional output of a final product produced by using one more unit of a productive input (resource) and holding the quantities of other inputs constant. This is measured in output units and is sometimes called the marginal physical product of the resource. The **marginal revenue** is the addition to total revenue from selling one more unit of output. For a price taker, marginal revenue is equal to price. For a producer facing a downward sloping demand curve, marginal revenue is less than price, since price must be reduced in order to sell additional units of output.

The **marginal revenue product (MRP)** is the addition to total revenue gained by selling the marginal product (additional output) from employing one more unit of a productive resource. The interpretation of MRP is that it is the addition to total revenue from selling the additional output produced by using one more unit of a productive input, holding the quantities of other inputs constant.

LOS 21.b: Discuss how the labor demand curve is derived from the marginal revenue product curve, the conditions of profit maximization, the factors determining the demand and for labor, elasticity of the demand for labor, and labor market equilibrium.

The MRP is downward sloping in any range of output for which diminishing marginal returns are realized from using additional units of a productive resource. This downward-sloping MRP curve is in fact the firm's short-run demand curve for the productive resource or input, as illustrated in Figure 1. This is true of any productive input, of which labor is one.

Figure 1: Marginal Revenue Product (Demand for a Productive Resource)



The intuition here is that a profit-maximizing firm will be willing to pay an amount for one more unit of labor (e.g., one more employee day) equal to the addition to total revenue from employing that additional labor in the production process and selling the resulting additional output. The condition for maximizing profits with respect to hiring additional units of labor is to continue to add additional units of labor until

$$MRP_{\text{Labor}} = \text{price}_{\text{Labor}}$$

Once this condition is met, at any level of production that employed less labor (holding other inputs constant), there would be additional profits to be made. One more unit of labor would cost less than the value of the additional output from hiring an additional unit of labor (the MRP_{Labor}). For additional units of labor beyond the amount that satisfies $MRP_{\text{Labor}} = \text{price}_{\text{Labor}}$, each unit of labor costs more than the additional revenue gained from the output of that unit of labor.

So we can say that a profit-maximizing firm will use additional units of a productive resource as long as its MRP is greater than its price. This supports the conclusion that the MRP curve is a firm's short-run demand curve for a productive resource (short-run, because quantities of other factors are held fixed).

Factors that Determine the Demand for Labor

Now that we understand how a profit-maximizing firm determines the optimal quantity of an input to employ, we can examine the factors that will influence the firm's demand for labor.

An increase (decrease) in the price of the firm's output will increase (decrease) the demand for labor. An increase in the product price will increase the firm's marginal revenue, which increases the MRP of labor, increasing the demand for labor at each wage level, i.e., the demand curve for labor (the MRP curve) shifts upward. A decrease in the price of the firm's output will have the opposite effect, by the same logic.

The effect on the demand for labor of a change in the price of another factor of production will depend on whether that factor is a complement to labor or a substitute for it. The decrease in the price of computers over time has decreased the demand for many types of labor for which a computer is a substitute (e.g., customer service personnel). The demand for IT professionals, however, has increased tremendously, since they are a complement to computers in the production of the final good.

This example also illustrates the effect of technological improvements on the demand for labor. Demand for some types of labor has increased and the demand for other types of labor has decreased. Over time, the effect of technological improvements has been a net increase in the demand for labor. A rising real wage rate (wage rate adjusted for inflation) over time has provided evidence of this.

Elasticity of Demand for Labor

The demand for labor, like other types of demand, is more elastic in the long run than in the short run. This is simply because we define the short run in production as a period over which the quantities of other factors of production are fixed. If the wage rate rises, we will see a greater decrease in the quantity of labor employed when the firm can substitute (demand) other factors of production for labor (e.g., get more automated machinery).

The elasticity of labor will be greater for firms with production processes that are more labor-intensive. A warehouse operation that relies heavily on manpower to fill and ship orders will have a relatively elastic demand for labor because labor represents a large proportion of the total cost of the service it provides. For an airline, on the other hand, labor costs represent a much smaller proportion of total costs. We would expect the airline's demand for pilots to be much less elastic than a warehouse operation's demand for workers.

A third factor affecting the elasticity of demand for labor is the degree to which labor and capital can be substituted. While airplanes may, one day, have the technology to fly themselves, pilots are actually quite difficult

to replace with automation (as are flight attendants). In contrast, warehouse operations and manufacturing assembly plants have found many ways to substitute capital for labor through automation and robotics. The elasticity of demand for assembly workers is much more elastic than the demand for airline pilots and flight attendants as a result of this difference in the opportunities to substitute capital for labor in production.

LOS 21.c: Explain the difference between physical and financial capital, and how the demand for physical and financial capital are related to each other.

Physical capital is the physical assets of a firm, including property, plant, and equipment, as well as its inventory of finished goods and goods in process. The greater the demand for physical capital, the greater the demand for the financial capital (money raised through issuing securities) necessary to purchase the physical capital.

LOS 21.d: Discuss how a firm compares the future marginal revenue product of capital with the current price of capital, and the relationship between the quantity of financial capital demanded and the interest rate.

A firm employs physical capital as a factor of production because it is necessary to produce the firm's output and meet customer orders. We can think, in a simple sense, of two primary factors of production: labor and physical capital (people, and machines and goods). In this sense, just as a profit-maximizing firm equates the MRP_{Labor} to the wage rate, it will also equate the $MRP_{Capital}$ to the cost of capital. Since the production of capital assets comes over many periods, the $MRP_{Capital}$ is actually a future MRP. The cost of capital relevant to this decision is the cost of the funds that the firm must raise to buy physical capital. Just think of the $MRP_{Capital}$ as the returns over time (in percentage terms) on the funds necessary to purchase additional physical capital. Viewed in this way, we can say that the future $MRP_{Capital}$ must equal the interest rate the firm must pay to raise the financial capital in order to maximize profits.

Similar to the demand for labor, the demand for capital will be a downward sloping curve derived from its MRP curve. A profit-maximizing firm will employ additional physical capital until its MRP is equal to its cost, the interest rate that the firm must pay on the funds (financial capital) necessary to purchase the physical capital. At higher (lower) interest rates, firms will demand less (more) capital, both physical and financial.

LOS 21.e: Discuss the main influences on demand and supply of capital, and capital market equilibrium.

We need to add one additional point here to account for an important difference between the MRP of capital and the MRP of labor. The additional output from employing an additional unit of labor is produced at the time that the labor is employed. With physical capital—a bulldozer, for example—the additional output will come over many periods into the future. For this reason, it is actually the present value of the future MRP of capital that will determine the return on a current investment in (physical) capital assets. In any event, the demand for financial capital will be a downward sloping function of the interest rate (the cost of financial capital).

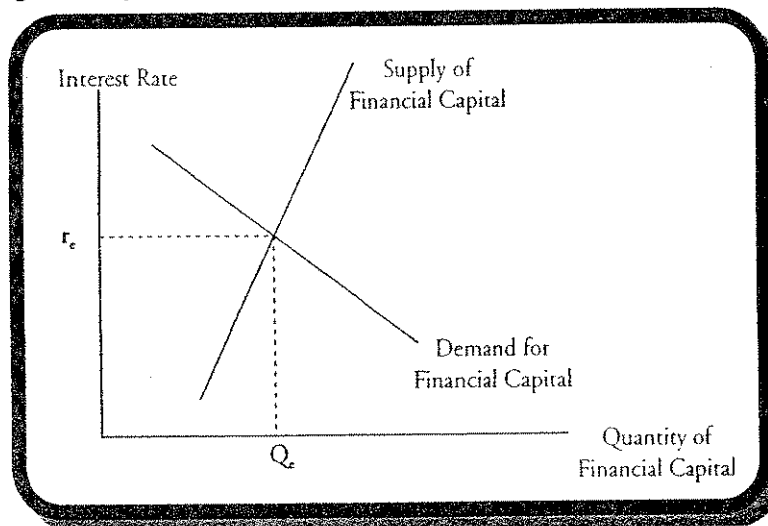
Professor's Note: We saw the concept of net present value of an investment in Quantitative Methods and we will see examples of discounting the value of the future output of an asset to evaluate an investment opportunity in Corporate Finance.

Now that we have explained that the demand for financial capital is derived from the present value of MRP of physical capital in production, we can turn our attention to the supply of financial capital. Since the interest rate is the price of capital, the supply curve will be an upward sloping function of interest rates. The suppliers of capital are savers, and they have the choice of consuming now or saving to consume later. Three primary factors influence savings and the supply of financial capital: interest rates, current incomes, and expected future incomes.

- At higher rates of interest, individuals are willing to save more because they will receive greater future amounts. Savers will save more (forego more consumption now) if they can consume 10% more next year than if they are only rewarded with 2% more consumption next year for foregoing consumption now.
- Increases in current income induce individuals to save more (increase the supply of capital), while decreases in current income have the opposite effect.
- If expected future incomes increase, individuals' willingness to trade current consumption for future consumption will decrease. Workers anticipating a decline in their incomes in retirement are motivated to save more now to smooth out their consumption over time. They will save more now (consume less) so that they can consume more in the future when their incomes are lower. College students are in the opposite situation and save little (or go into debt) in anticipation of rising incomes in the future. We can say that, in general, an increase (decrease) in expected future incomes will decrease (increase) the current supply of capital. Changes in current income and expected future income will shift the supply of capital curve; that is, at each interest rate, more or less capital will be supplied.

Equilibrium in the capital market determines interest rates. The interest rate where the quantity of capital supplied equals the quantity of capital demanded is the equilibrium (market) interest rate. Capital market equilibrium is illustrated in Figure 2.

Figure 2: Capital Market Equilibrium



LOS 21.f: Distinguish between the supply of renewable and non-renewable natural resources, and explain how equilibrium in a natural resource market is achieved.

To understand the difference between the supply of renewable and non-renewable resources, assume you own two wells. One well is an oil well and one is a water well. When you take a barrel of oil out of the oil well, it's gone forever—a non-renewable resource. When you take water out of the water well at a sustainable rate, it will be replaced by nature—a renewable resource.

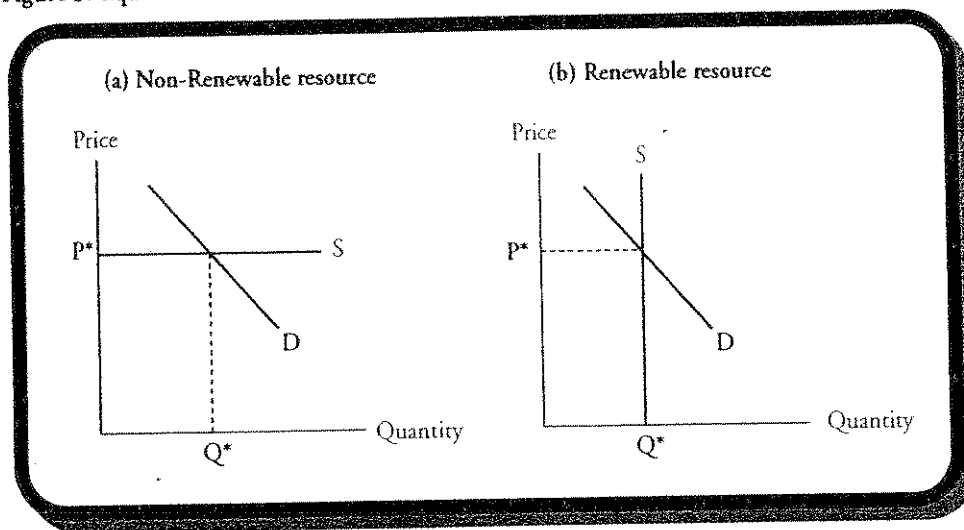
Assuming a competitive market for water, the price will be determined by demand. The supply of renewable resources at a point in time, or per time period, is fixed. Land is also considered a renewable resource—using it now does not mean we cannot use it later, and its quantity is also fixed. The supply of a renewable resource is, therefore, independent of price and is perfectly inelastic.

The quantity of a non-renewable natural resource that has already been discovered is called the **known stock** of the resource. Though the known stock is fixed at any point in time, it tends to increase over time as technological advances make more resources accessible. The rate at which this resource is supplied, also called “flow supply,” is perfectly elastic at a price that equals the *present value* of the expected next-period price.

To understand this concept, assume that the price of oil is expected to rise at a rate greater than the interest rate. Oil producing nations would curtail current production and produce more in the next period when the prices are expected to be higher. If the price of oil is expected to rise at a rate lower than the interest rate, oil producing nations are better off increasing their current production and investing the proceeds in a risk-free asset. Based on this principle (the Hotelling Principle), the equilibrium price of oil is expected to rise at a rate equal to the risk-free rate of interest.

Figure 3 illustrates, for a non-renewable resource, that the supply curve is perfectly elastic and the quantity supplied depends only on the demand at that price. For a renewable resource, supply is fixed (perfectly inelastic) and the price is determined by demand.

Figure 3: Equilibrium in Natural Resource Markets



LOS 21.g: Explain how differences occur between large and small incomes.

LOS 21.h: Distinguish between economic rent and opportunity costs.

Differences in incomes are due to differences in workers' marginal revenue products. An actor who can star in a movie and fill theaters has a high marginal revenue product. A worker in a car wash has a low marginal revenue product.

The opportunity cost of an employee is what he could make in his next highest-paying alternative employment. For the worker in the car wash, this may be very close to the wage rate at the car wash. There are many opportunities for employment in low skill/low marginal revenue product jobs.

The difference between what successful actors earn and what they could earn in their next highest-paying alternative may be quite large. This difference between a factor of production's earnings and opportunity cost is called **economic rent**. For many successful actors, a very large part of what they earn is economic rent.

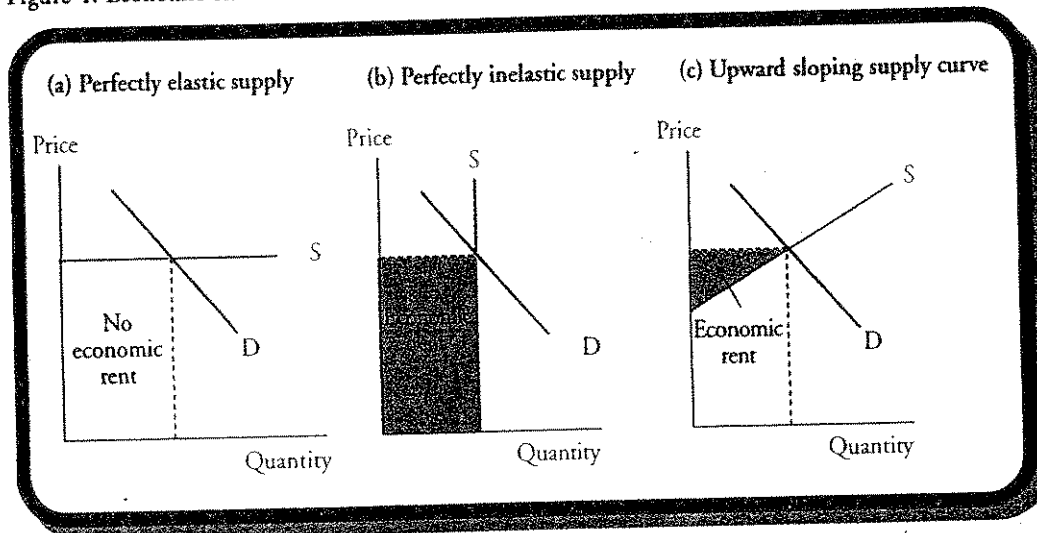
Kesley Grammer (star of the U.S. television show *Frasier*) earned \$1.6 million per half-hour episode. Assuming that Grammer's opportunity cost for a week of work (his weekly earnings in his next highest-paying alternative occupation) was considerably less, he would have continued to be a television actor even if the weekly pay were considerably less than \$1.6 million. We can think of the opportunity cost as the amount required to induce a person to do particular work or, alternatively, as the amount necessary to bid a factor of production away from its next highest-valued alternative use.

Economic rent is similar to the concept of producer's surplus and depends to a large extent on the shape of the supply curve for the resource. When the supply curve is perfectly elastic, as it is with a non-renewable resource,

there is no economic rent. When the supply is perfectly inelastic, as it is with a renewable resource, the entire payment for the factor is economic rent. For an upward sloping supply curve economic rent is part of the total paid for the factor of production. These cases are illustrated in Figure 4.

If the factor of production is relatively easy to create or supply, economic rent is reduced by competition. If a factor of production is very difficult to supply or reproduce (like the skills of a professional athlete or musical performer), *and the factor has a high marginal revenue product*, the factor will receive significant economic rent. Scarcity is not enough. The skill of a top-flight curling player may be in very short supply, but they do not receive anywhere near the rent that a soccer star does.

Figure 4: Economic Rent to Factors of Production



KEY CONCEPTS

1. The marginal revenue product is the addition to total revenue from selling the additional output that results from using one more unit of a productive resource (input), holding the quantities of other inputs constant.
2. Profit is maximized when the cost of the last unit of a productive resource employed is equal to its marginal revenue product.
3. An increase in product price, an increase in the price of a substitute resource, and a decrease in the price of a complementary resource will all increase the demand for labor (or any productive resource in general).
4. The elasticity of demand for labor will be greater the longer the adjustment period, the greater the proportion of labor in the production process, and the greater degree to which other factors of production (capital) can be substituted for labor.
5. As a firm's demand for physical capital to expand production increases, so does its demand for financial capital to fund expansion.
6. A firm will invest in more physical capital when the returns, based on the present value of the future marginal revenue product of additional physical capital, are greater than the cost of the financial capital required to fund the additional physical capital.
7. The equilibrium interest rate in the market for financial capital is determined by the demand for financial capital for funding investment by businesses, and the supply of capital by savers, which depends primarily on interest rates, current incomes, and expected future incomes.
8. For non-renewable natural resources, supply is elastic at the present value of the expected future price, while for renewable natural resources, supply is inelastic at the sustainable quantity of production.
9. Incomes are determined by individuals' marginal revenue products and opportunity costs, but skills in limited supply can also be rewarded with economic rent.

CONCEPT CHECKERS: DEMAND AND SUPPLY IN FACTOR MARKETS

1. The marginal revenue product is *best defined* as the:
 - A. price of one more unit of a productive input.
 - B. addition to total revenue from selling one more unit of output.
 - C. additional output produced by using one more unit of a productive input.
 - D. gain in revenue from selling the output produced by using one more unit of an input.
2. For a firm that holds all other resource inputs constant, a curve depicting the marginal revenue product of a resource will be:
 - A. the mirror image of the firm's demand curve for the resource.
 - B. identical to the firm's supply curve of the final product.
 - C. identical to the firm's demand curve for the resource.
 - D. the mirror image of the firm's supply curve of the final product.
3. In a given firm, skilled workers currently produce twice as much of its product as unskilled workers do per hour worked. Skilled workers earn \$20 per hour, and unskilled workers earn \$8 per hour. Based on this information, the firm should:
 - A. keep things as they are.
 - B. increase the use of skilled workers and/or decrease the use of unskilled workers.
 - C. increase the use of unskilled workers and/or decrease the use of skilled workers.
 - D. increase the salary of skilled workers to attract more of them.
4. Which of the following is *most likely* to cause an increase in the demand for labor?
 - A. An increase in the labor force.
 - B. An increase in the demand for final goods or services.
 - C. A decrease in the price of substitute technologies.
 - D. A decrease in the productivity of labor.
5. Which of the following will be *most likely* to cause a decrease in the demand for a specific type of labor?
 - A. A decrease in the number of workers who specialize in that type of labor.
 - B. An increase in the demand for the final good or service they produce.
 - C. A decrease in the prices of machines that are substitutes in production for that type of labor.
 - D. An increase in the productivity of workers who specialize in doing that type of labor.
6. If firms decide to increase their production capacity, what is the *most likely* effect on the demand for physical and financial capital?

<u>Physical capital</u>	<u>Financial capital</u>
A. Increase	Increase
B. Increase	Decrease
C. Decrease	Increase
D. Decrease	Decrease
7. A firm will employ physical capital up to the level where the present value of the marginal revenue product of capital is equal to the:
 - A. wage rate.
 - B. firm's cost of capital.
 - C. unit price of the firm's output.
 - D. marginal revenue product of labor.

8. The supply of financial capital is *least likely* to be influenced by which of the following?
 - A. Interest rates.
 - B. MRP of physical capital.
 - C. Consumers' current incomes.
 - D. Consumers' expected incomes.
9. The supply of a renewable resource is:
 - A. the known stock.
 - B. perfectly elastic.
 - C. perfectly inelastic.
 - D. a function of the price.
10. The difference between what a worker earns and what he could earn from his next best alternative employment is called:
 - A. productivity.
 - B. economic rent.
 - C. opportunity cost.
 - D. marginal revenue product.

ANSWERS – CONCEPT CHECKERS: DEMAND AND SUPPLY IN FACTOR MARKETS

1. D The marginal revenue product is the addition to total revenue gained by selling the marginal product (additional output) from employing one more unit of a productive resource.
2. C This is true because the firm will maximize profits in this case by employing the variable resource until price equals marginal revenue product. As it increases the use of the resource, marginal revenue product falls. The negative relationship between quantity used and marginal revenue product is identical to the relationship between quantity demanded and price.
3. C The firm should try to equate hourly output with hourly wage for both types of workers. As it is, that ratio is higher for unskilled workers. The firm should substitute away from skilled workers toward unskilled workers. To maximize profits, wage must equal a worker's MRP; skilled workers should not have more than twice the wage of unskilled workers when their MRP is only twice as much.
4. B The demand for labor is a derived demand. When the demand for the final good or service increases, the price of that final good or service increases, which increases the MRP (and demand) for labor.
5. C If the prices of substitutes for a specific type of labor fall, the firm will substitute away from that type of labor. This means the demand for that type of labor will decrease.
6. A If firms are increasing their production capacity, they need to acquire equipment, so the demand for physical capital increases. To buy that equipment they need to raise funds, so the demand for financial capital increases. The greater the demand for physical capital, the greater the demand for the financial capital (money raised through issuing securities) necessary to purchase the physical capital.
7. B A profit-maximizing firm will equate the present value of the MRP_{Capital} to the cost of capital.
8. B The MRP of physical capital determines the demand for financial capital. Interest rates and consumers' current and expected incomes are the primary factors that determine the supply of financial capital.
9. C For a renewable resource, supply is independent of price and is therefore perfectly inelastic. Known stock is the quantity of a non-renewable resource that has been discovered.
10. B Economic rent is what a worker earns above what he could earn from his next best alternative employment. Opportunity cost is what he could earn from his next best alternative employment.

The following is a review of the Economics principles designed to address the learning outcome statements set forth by CFA Institute®. This topic is also covered in:

MONITORING CYCLES, JOBS, AND THE PRICE LEVEL

Study Session 5

EXAM FOCUS

Nothing too difficult or complex here, but you should learn the terminology related to business cycles, employment statistics and sources of unemployment. Get a good understanding of how the various measures introduced are related to the business cycle.

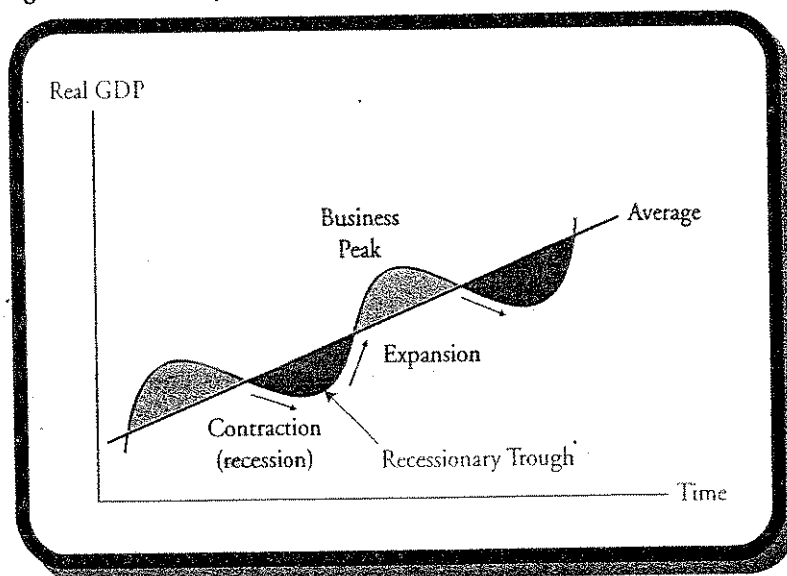
There is a full topic review devoted to the phenomenon of price inflation, so here you just need to understand how the consumer price index is constructed and used to measure inflation.

LOS 22.a: Discuss the phases of the business cycle, how the start and end of a recession can be identified, and interpret the main labor market indicators and the relationship of the labor market indicators with the business cycle.

The **business cycle** is characterized by fluctuations in economic activity. Real gross domestic product (GDP) and the rate of unemployment are the key variables used to determine the current *phase* of the cycle.

The business cycle has two phases, **expansion** (real GDP is increasing) and **contraction** or **recession** (real GDP is decreasing). The turning points between the phases are called the **peak** and the **trough** of the business cycle. The phases and turning points are illustrated in Figure 1.

Figure 1: Business Cycle



The National Bureau of Economic Research (NBER) is the agency that tracks the phases of the U.S. business cycle. NBER defines a recession as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and

wholesale-retail sales.”¹ The NBER primarily uses measures of employment, industrial production, and personal income to determine whether the economy is expanding or contracting.

Labor Market Indicators

Three important labor market indicators are the unemployment rate, the labor force participation rate, and the employment-to-population ratio.

The **unemployment rate** is the percentage of people in the labor force who are unemployed. The **labor force** includes all people who are either employed or actively seeking employment.

$$\text{unemployment rate} = \frac{\text{number of unemployed}}{\text{labor force}} \times 100$$

The unemployment rate decreases during expansions and increases during recessions.

The **labor-force participation rate** is the percentage of the working-age population who are either employed or actively seeking employment. The **working-age population** is all people 16 years of age or older who are not living in institutions.

$$\text{labor force participation rate} = \frac{\text{labor force}}{\text{working-age population}} \times 100$$

Short-term fluctuations in the labor-force participation rate can occur because of changes in the number of **discouraged workers**, those who are available for work but are neither employed nor actively seeking employment. The labor force participation rate tends to increase when the economy expands and decrease during recessions. Discouraged workers who stopped seeking jobs during a recession are motivated to seek work again once the expansion takes hold and they believe their prospects of finding work are better.

The **employment-to-population ratio** is the percentage of the working-age population who are employed.

$$\text{employment-to-population ratio} = \frac{\text{number of employed}}{\text{working-age population}} \times 100$$

The employment-to-population ratio tends to go up during expansions (when unemployment is low) and down during recessions (when unemployment is high).

LOS 22.b: Discuss the concepts of aggregate hours and real wage rates, and how they relate to GDP.

The employment indicators we have discussed so far reflect the number of people who have jobs, but to know how much total labor is being performed, we also need to consider how much time workers are working on average. To capture the effects of part-time work and overtime, we measure **aggregate hours**, the total number of hours worked in a year by all employed people.

Aggregate hours have shown a long-term upward trend, but they have not grown as fast as the labor force because the *average workweek* (weekly hours worked per person) has been declining over time. Both aggregate hours and the workweek tend to increase during expansions and decrease during recessions.

1. “The NBER’s Recession Dating Procedure,” October 21, 2003, available from the NBER Web site (www.nber.org/cycles/recessions.html).

Aggregate hours worked is an important measure because it allows us to estimate the *productivity* of labor, the amount of output produced per hour worked. The more productive an hour of labor is, the higher the *wage rate* labor can receive. Real wage rates are money wage rates adjusted for changes in the overall price level. Real wage rates tell us what an hour's labor is paid in terms of goods and services.

Real wage rates tend to fluctuate with the productivity of labor and are calculated using *total labor compensation*, which includes wages, salaries and employer-paid benefits.

LOS 22.c: Discuss the types of unemployment, full employment, and the relationship between unemployment and real GDP.

There are three types of unemployment:

- **Frictional unemployment** results from constant changes in the economy that prevent *qualified* workers from being matched with existing job openings in a timely manner. Employees spend time and effort seeking work and employers spend time and effort seeking workers. Unemployment resulting from this job search activity, is referred to as frictional unemployment, is always with us as employers expand or contract their businesses and workers move, are fired, or quit to seek other opportunities.
- **Structural unemployment** is caused by (structural) changes in the economy that eliminate some jobs while generating others for which unemployed workers are not qualified. Structural unemployment differs from frictional unemployment in that the unemployed workers do not currently have the skills needed to perform the newly created jobs.
- **Cyclical unemployment** is caused by changes in the general level of economic output. When the economy is operating at less than full capacity, cyclical unemployment is present.

Full employment is the condition that exists when the economy has no *cyclical* unemployment. Note, however, that both structural and frictional unemployment continue to exist even when the economy is at full employment. In other words, some level of unemployment is expected when the economy is at "full employment."

The sum of the frictional and structural unemployment rates is called the **natural rate of unemployment**. **Potential GDP** is the (theoretical) level of output the economy can produce when unemployment is at the natural rate. When real GDP falls below potential GDP, cyclical unemployment increases. When real GDP rises toward and beyond potential GDP, cyclical unemployment decreases. Economists have a range of opinions on what the "natural" rate of unemployment really is, so estimates of potential GDP and cyclical unemployment will differ.

LOS 22.d: Explain the construction of the CPI, calculate CPI, discuss the relationship between CPI and the inflation rate, and discuss the problems associated with CPI bias.

The consumer price index (CPI) is the best known indicator of U.S. inflation. The CPI measures the average price for a defined "basket" of goods and services that represents the purchasing patterns of a typical urban household. The Bureau of Labor Statistics (BLS) reports the CPI monthly.

The BLS constructs the CPI in three stages:

1. **Select the CPI basket.** The first step is to determine what goods and services a typical household buys. The BLS surveys a large sample of consumers to find out what percentage of their income they spend on which items. These percentages become the weights for each of the more than 80,000 goods in the overall index. The current weights for the eight major categories in the CPI are shown in Figure 2.

Figure 2: Relative Importance in the CPI as of December 2005*

<i>Category</i>	<i>Percent of Index</i>
Housing	42.4%
Transportation	17.4%
Food and beverages	15.1%
Medical care	6.2%
Recreation	5.6%
Education and communications	6.0%
Apparel	3.8%
Other goods and services	3.5%

*Source: Bureau of Labor Statistics, U.S. Department of Labor

2. **Conduct a monthly price survey.** Every month the BLS records the prices of every item in the CPI in 30 urban areas. The surveyors also record any changes in the individual products, such as package sizes, and adjust prices to make them comparable to past prices.
3. **Calculate the CPI.** This calculation is done in three steps.

Step 1: Find the cost of the CPI basket for the base period.

Step 2: Find the cost of the CPI basket for the current period.

Step 3: Calculate the CPI for both periods. The formula for the index is:

$$\text{CPI} = \frac{\text{cost of basket at current prices}}{\text{cost of basket at base period prices}} \times 100$$

Example: Calculating a consumer price index

The following table shows price information for a simplified basket of goods. Calculate a CPI for this basket in the current period.

<i>Item</i>	<i>Quantity</i>	<i>Price in Base Period</i>	<i>Current Price</i>
Cheeseburgers	200	2.50	3.00
Movie tickets	50	7.00	10.00
Gasoline, gallons	300	1.50	3.00
Digital watches	100	12.00	9.00

Answer:

Base period

Cheeseburgers	200 × 2.50	=	500
Movie tickets	50 × 7.00	=	350
Gasoline	300 × 1.50	=	450
Watches	100 × 12.00	=	<u>1,200</u>
Cost of CPI basket			2,500

Current period

Cheeseburgers	200 × 3.00	=	600
Movie tickets	50 × 10.00	=	500
Gasoline	300 × 3.00	=	900
Watches	100 × 9.00	=	<u>900</u>
Cost of CPI basket			2,900

$$CPI_{\text{current}} = \frac{\text{cost of basket in current period}}{\text{cost of basket in base period}} \times 100$$

$$CPI_{\text{current}} = \frac{2900}{2500} \times 100 = 116$$

The **inflation rate** is the percentage change in the price level from a year ago. The CPI is one of the primary indicators used to measure the inflation rate. As measured by the CPI, the inflation rate is given by the following formula:

$$\text{inflation rate} = \frac{\text{current CPI} - \text{year-ago CPI}}{\text{year-ago CPI}} \times 100$$

Example: Calculating the inflation rate based on CPI

The CPI for all items was 202.9 in June 2006 and 194.5 in June 2005. The CPI for all items less energy was 203.6 in June 2006 and 198.5 in June 2005. Calculate and interpret the inflation rate based on these two measures.

Answer:

$$\text{all items: } \frac{202.9 - 194.5}{194.5} \times 100 = 4.3\%$$

$$\text{all items ex-energy: } \frac{203.6 - 198.5}{198.5} \times 100 = 2.6\%$$

As measured by the CPI, the inflation rate for goods excluding energy was less than the inflation rate for all items over this 12-month period. This means energy prices must have been increasing faster than the overall price level.

CPI Bias

The CPI is widely believed to overstate the true rate of inflation. The price data the BLS collects reflect long-term structural shifts that should not be included in a measure of the price level. The most significant biases in the CPI data include:

- **New goods.** Older products are often replaced by newer but initially more expensive products. This biases the index because some newly-available goods perform the same function as different lower-priced goods in the base-year market basket.
- **Quality changes.** If the price of a product increases because the product has improved, the price increase is not due to inflation, but still causes an increase in the price index.
- **Commodity substitution.** Even in an inflation-free economy, prices of goods relative to each other change all the time. When two goods are substitutes for each other, consumers increase their purchases of the relatively cheaper good and buy less of the relatively more expensive good. Over time such changes can make the CPI's fixed basket of goods a less accurate measure of typical household spending.
- **Outlet substitution.** When consumers shift their purchases toward discount outlets and away from convenience outlets, they reduce their cost of living in a way the CPI does not capture.

Estimates are that the CPI overstates inflation by about 1% per year. This upward bias in the CPI distorts economic decisions. Many employment contracts with cost-of-living adjustments are based on the rate of increase in the CPI. A substantial portion of government spending, such as entitlement payments, increases automatically with the CPI. The BLS is attempting to reduce the bias by surveying consumers and updating the index weights more frequently.

KEY CONCEPTS

1. The business cycle refers to fluctuations in economic activity and consists of an expansion phase leading to a peak and a recession phase ending at a trough.
2. The primary measures used to determine whether the economy is expanding or contracting are measures of employment, industrial production, and personal income.
3. The main labor market indicators for business cycle analysis are the unemployment rate, the labor force participation rate, and the employment-to-population ratio.
4. The unemployment rate decreases in expansions and increases in recessions, while the employment-to-population ratio and labor force participation rate both tend to increase during expansions and decrease during recessions.
5. Increases in aggregate hours worked and the real wage rate, which is primarily determined by labor productivity, both lead to increases in real GDP and economic expansion.
6. Frictional unemployment results from the time it takes for employers and employees to find each other, structural unemployment results from long-term changes in the economy that require workers to gain new skills to fill new jobs, and cyclical unemployment results from the recession phase of the business cycle.
7. "Full employment" refers to a situation where the economy has reached its potential level of GDP because cyclical unemployment is zero, although both frictional and structural unemployment are always present and positive.
8. The inflation rate is measured as the percentage change in the CPI, which is based on prices of a basket of goods and services that a typical urban consumer purchases.
9. Because of biases that arise from new goods, quality improvements, and consumers' decisions to make substitutions among goods and seek lower-priced shopping outlets, the CPI is believed to overstate the true rate of inflation by about 1% per year.

CONCEPT CHECKERS: MONITORING CYCLES, JOBS, AND THE PRICE LEVEL

1. The phases of the business cycle are:
 - A. peak and trough.
 - B. inflation and deflation.
 - C. expansion and contraction.
 - D. employment and unemployment.
2. NBER includes declines in all of the following in its definition of a recession EXCEPT:
 - A. employment.
 - B. industrial production.
 - C. wholesale and retail sales.
 - D. real GDP for two consecutive quarters.
3. The unemployment rate is defined as the number of unemployed as a percentage of the:
 - A. labor force.
 - B. number of employed.
 - C. working-age population.
 - D. civilian noninstitutional population.
4. Which of the following indicators moves inversely with the business cycle?
 - A. Aggregate hours.
 - B. Unemployment rate.
 - C. Labor force participation rate.
 - D. Employment-to-population ratio.
5. In which measure(s) of the labor market is a "discouraged worker" included?

	<u>Working age population</u>	<u>Labor force</u>	<u>Number of unemployed</u>
A. No	No	No	No
B. Yes	No	No	No
C. Yes	Yes	No	No
D. Yes	Yes	Yes	Yes
6. Which of the following would be counted as frictional unemployment?
 - A. Due to the negative growth of GDP, Smith was laid off.
 - B. Johnson was fired from his job after he got into an argument with his foreman, and has not sought a new job.
 - C. Although there were jobs available, Jones was unable to find an employer with an opening.
 - D. When the plant was modernized, Jones lost her job because she did not have the skill needed to operate the new equipment.
7. Which of the following would be counted as structural unemployment?
 - A. Due to the negative growth of GDP, Smith was laid off.
 - B. Johnson was fired from his job after he got into an argument with his foreman.
 - C. Although there were jobs available, Jones was unable to find an employer with an opening.
 - D. When the plant was modernized, Jones lost her job because she did not have the skill needed to operate the new equipment.

Use the following hypothetical information about the conditions in the labor market to answer Question 8.

Employed	177,000
Discouraged workers	2,000
Unemployed	13,000
Household workers	20,000
Students	15,000
Retirees	19,000
Disabled	5,000
Labor force	190,000
Civilian population 16 and over	249,000

8. What is the unemployment rate?
- 5.3%.
 - 6.0%.
 - 6.8%.
 - 7.9%.
9. The value of an hour's labor in terms of goods and services is called:
- productivity.
 - the real wage rate.
 - the nominal wage rate.
 - total labor compensation.

Use the following table to answer Questions 10 to 12.

CPI data for a recent 12-month period:

Category	Percent of Index	Current Level	Year-ago Level
Commodities	40.0	160	151
Services	60.0	230	223
All items	100.0	?	?

10. The current level of the CPI for all items is *closest to*:
- 194.2.
 - 197.8.
 - 202.0.
 - 390.0.
11. The annual inflation rate as measured by CPI was *closest to*:
- 3%.
 - 4%.
 - 5%.
 - 6%.
12. Given the bias that is generally believed to exist in the CPI, the true rate of inflation was *most likely*:
- 3%.
 - 4%.
 - 5%.
 - 6%.

ANSWERS – CONCEPT CHECKERS: MONITORING CYCLES, JOBS, AND THE PRICE LEVEL

1. C The phases of the business cycle are called expansion and contraction (or recession).
2. D While popular among analysts, the idea that two consecutive quarters of negative GDP growth constitute a recession is not a part of NBER's definition.
3. A The unemployment rate is the number of unemployed as a percentage of the labor force.
4. B The unemployment rate increases when GDP decreases, and decreases when GDP increases. The other three indicators move in the same direction as the business cycle.
5. B Discouraged workers are not employed and not seeking employment, and are therefore not counted as part of the labor force or among the unemployed. They are, however, included in the working-age population.
6. C One of the causes of frictional unemployment is that information regarding prospective employees and employers is costly and sometimes hard to find. The other cause of frictional unemployment is that both employees and employers may spend some time looking for information that will match them up.
7. D Structural unemployment exists when changes in the economy eliminate some jobs while generating new job openings for which unemployed workers are not qualified.
8. C Unemployment rate = (number of unemployed) / (number in the labor force). In this problem, household workers, students, retirees, and the disabled are not considered unemployed. Thus, the unemployment rate is calculated as:
 $(13,000) / (190,000) = 6.8\%$.
9. B The real wage rate measures the purchasing power of an hour's labor. The nominal wage rate is the money value of an hour's labor. Productivity is output per hour of labor, one of the determinants of the real wage rate. Total labor compensation is one of the measures of the real wage rate.
10. C $0.4(160) + 0.6(230) = 202.0$
11. B current index level = 202.0 (from Question #10)
year-ago index level = $0.4(151) + 0.6(223) = 194.2$
$$\text{inflation rate} = \frac{202.0 - 194.2}{194.2} \times 100 = 4.0\%$$
12. A The CPI calculation is generally believed to add about 1% to the actual inflation rate.

AGGREGATE SUPPLY AND AGGREGATE DEMAND

Study Session 5

EXAM FOCUS

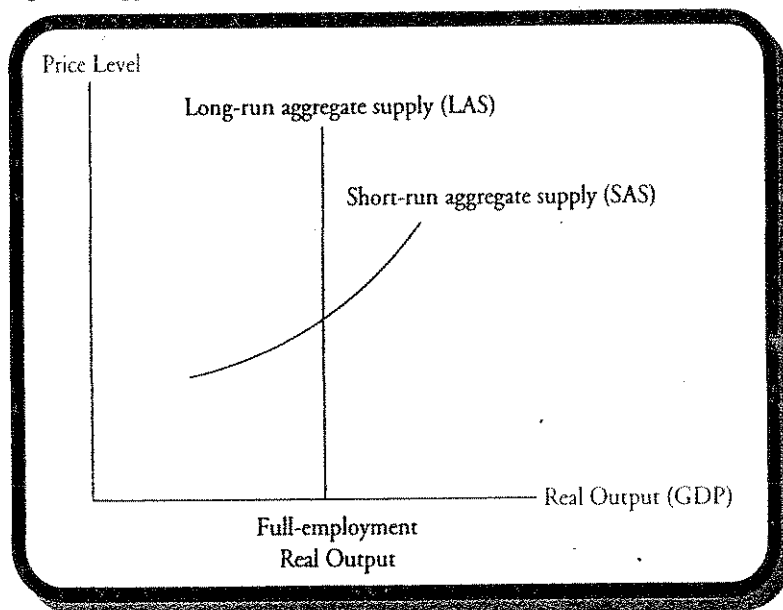
The title says it all, but you should spend some quality time here getting the details down. This is the model of equilibrium output and price level for the overall economy and it is used repeatedly for analysis in the

topic reviews that follow. Learn it well; no breaks here. Learn the differences between the classical, Keynesian, and monetarist views of economic equilibrium and growth too.

LOS 23.a: Explain the fundamentals of aggregate supply in the long run and in the short run, and discuss different reasons for changes in aggregate supply and the associated movements along the LAS and SAS curves.

Aggregate supply refers to the amount of goods and services produced by an economy. Aggregate supply is a function of the price level. Just as in goods markets, higher prices bring about a greater amount of supply in the short run. Figure 1 illustrates a short run aggregate supply (SAS) curve and a long run aggregate supply (LAS) curve. The overall price level in the economy is on the vertical axis and the real level of output of goods and services (real GDP) is on the horizontal axis.

Figure 1: Aggregate Supply in the Long Run and Short Run



First we will address the questions of why the LAS curve is a vertical line and why the SAS curve is upward sloping. Then we will discuss the factors that cause the curves to shift over time.

LAS is not affected by the price level. LAS is the potential (full-employment) real output of the economy. The potential output of an economy will primarily depend on three factors. Potential output is positively related to:

1. The quantity of labor in the economy.

2. The quantity of capital (productive resources) in the economy.
3. The technology that the economy possesses.

The quantity of labor available at any point in time can vary as unemployment varies. As employees change jobs, businesses expand or fail, and employees decide to enter or leave the work force, the number of people employed and their hours worked will fluctuate. The level of real GDP on the LAS curve is the economy's level of production when the economy is operating at full employment. Full employment does not mean zero unemployment. There will always be some unemployment as workers search for the best available job, employers search for the best available employee, and changes in the economy leave workers from industries with decreasing employment without the necessary skills to work in expanding industries. There is a natural rate of unemployment corresponding to the level of real GDP along the LAS curve. That level of output is referred to as full-employment GDP. As we will see, the economy can operate at less than full employment GDP during a recession when cyclical unemployment is high, and (temporarily) at above full-employment GDP during periods of rapid economic growth.

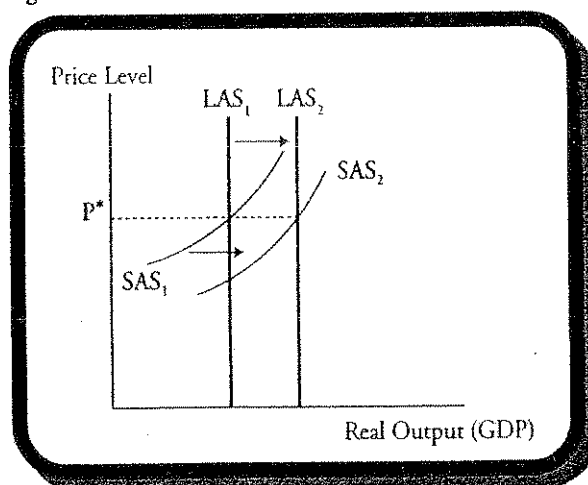
Over time, the LAS curve may shift as the full-employment quantity of labor changes, as the amount of available capital in the economy changes, or as technology improves the productivity of capital, labor, or both.

In the short run, firms will respond to changes in the prices of goods and services. The key to understanding movements *along* the SAS curve is to understand that we are allowing the prices of final goods and services to vary, while holding the wage rate and the price of other productive resources constant in the short run. When goods and services prices rise (fall), businesses have an incentive to expand (reduce) production, and real GDP will increase (decrease) above (below) the full-employment level shown by the LAS curve. This is why we show real GDP as an upward sloping function of the price level along the SAS curve. Again, in the macroeconomic short run, we are holding the money wage rate, other resource prices, and potential GDP (LAS) constant.

Next we turn our attention to the factors that will shift the SAS curve. Our list begins with those factors that also shift the LAS curve. The SAS and LAS curves will both shift when the full-employment quantity of labor changes, the amount of available capital in the economy changes, or as technology improves the productivity of capital, labor, or both.

In Figure 2, we illustrate the effects on LAS and SAS that would result from an increase in full-employment GDP, due to an increase in labor, capital, or an advance in technology. Long-run aggregate supply increases to LAS_2 and short-run aggregate supply increases to SAS_2 .

Figure 2: An Increase in Potential GDP



There are some factors that will shift SAS, but not affect LAS. We held the money wage rate and other resource prices constant in constructing the SAS curve. If the wage rate or prices of other productive inputs increase, the SAS curve will shift to the left, a decrease in short-run aggregate supply. When businesses observe a rise in resource prices, they will decrease their output as the profit maximizing level of output declines.

Two important factors influence the change in money wage rates. One is unemployment; when unemployment rises, it puts downward pressure on the money wage rate as there is an excess supply of labor at the current rate. Conversely, if the economy is temporarily operating above full-employment levels, there will be upward pressure on the money wage rate. The second factor that can influence the money wage rate is inflation expectations. An expected increase in inflation will lead to increases in the money wage rate and an expected decrease in inflation will slow the increase of money wages.

LOS 23.b: Explain the effects that cause the aggregate demand curve to slope downwards, the main factors influencing aggregate demand, and how changes in these factors influence aggregate demand and the aggregate demand curve.

We turn our attention now to the aggregate demand curve. The aggregate demand curve shows the relation between the price level and the real quantity of final goods and services (real GDP) demanded. The components of aggregate demand are:

- Consumption (C).
- Investment (I).
- Government spending (G).
- Net exports (X), which is exports minus imports.

$$\text{aggregate demand} = C + I + G + X$$

The aggregate demand curve is downward sloping (a good thing for a demand curve!) because at higher price levels, consumption, business investment, and exports will all likely decrease. There are two effects here to consider. First, when the price level rises, individuals' real wealth decreases. Since they have less accumulated wealth in real terms, individuals will spend less. This is referred to as the "wealth effect." Second, when the price level increases, interest rates will rise. An increase in interest rates decreases business investment (I) as well as consumption (C) as consumers delay or forego purchases of consumer durables such as cars, appliances and home repairs. This is a substitution effect, as consumers substitute consumption later for consumption now because the cost of consuming goods now instead of later (the interest rate) has increased. This is referred to as "intertemporal substitution," substitution between time periods.

So changes in the price level cause changes in (the quantity of) aggregate demand. What factors will shift the aggregate demand curve? Among the many things that can affect aggregate demand there are three primary factors:

- Expectations about future incomes, inflation, and profits.
- Fiscal and monetary policy.
- World economy.

An increase in expected inflation will increase aggregate demand as consumers accelerate purchases to avoid higher prices in the future. An expectation of higher incomes in the future also will cause consumers to increase purchases in anticipation of these higher incomes. An increase in expected profits will lead businesses to increase their investment in plant and equipment.

Fiscal policy refers to government policy with regard to spending, taxes, and transfer payments. An increase in spending increases the government component (G) of aggregate demand. A decrease in taxes or an increase in transfer payments (e.g. social security benefits or unemployment compensation) will increase the amount that

consumers have to spend (their disposable income) and increase aggregate demand through an increase in consumption (C).

Monetary policy refers to the central bank's decisions to increase or decrease the money supply. An increase in the money supply will tend to decrease interest rates and increase consumption and investment spending, increasing aggregate demand. We will look at both monetary and fiscal policy effects more closely in subsequent topic reviews.

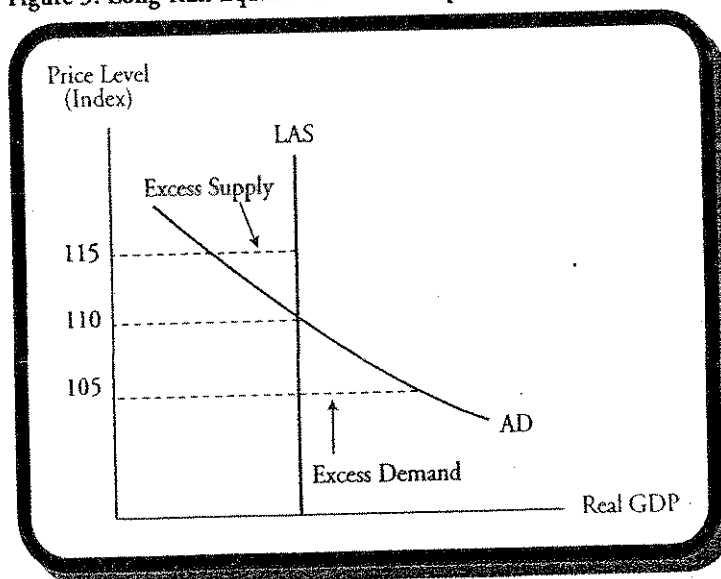
The state of the world economy will influence aggregate demand through the net exports (X) component. If foreign incomes increase, foreign demand for exports will increase, increasing X. If the country's exchange rate increases (foreign currency buys fewer domestic currency units), its goods are relatively more expensive to foreigners, and exports will decrease. At the same time, imports will be relatively cheaper and the quantity of imported goods demanded will increase. Both effects will decrease net exports (exports minus imports, X) and consequently aggregate demand. As we will examine later in more detail, a decrease in the exchange rate will have the opposite effects on exports, imports, and net exports.

LOS 23.c: Discuss the difference between short-run and long-run macroeconomic equilibrium, and explain how the relationship between economic growth, inflation and changes in aggregate demand and aggregate supply influence short- and long-run macroeconomic equilibrium.

Now we examine macroeconomic equilibrium in the short run and in the long run.

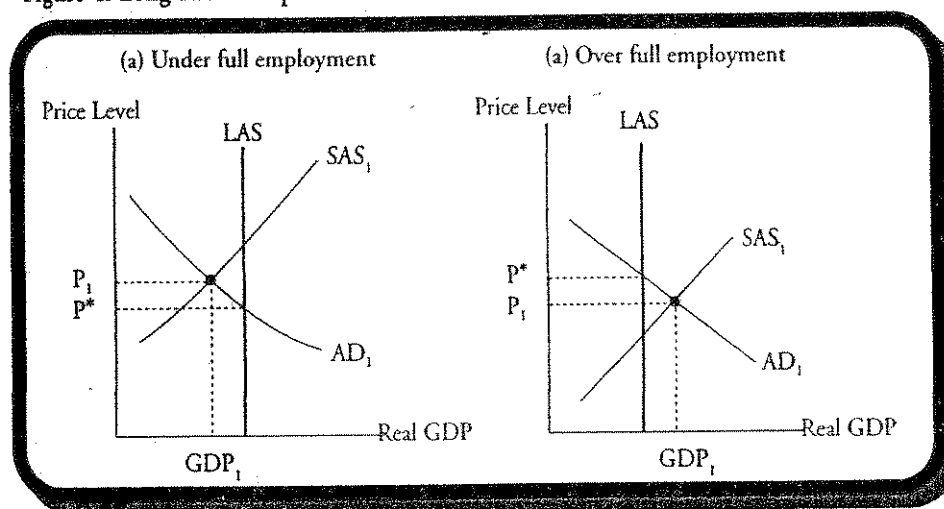
In Figure 3, we illustrate long-run equilibrium at the intersection of the LAS curve and the aggregate demand curve. Just as we saw that price was the variable that led us to equilibrium in the goods market in microeconomics, here changes in the price level of final goods and services can move the economy to long-run macroeconomic equilibrium. In Figure 3, equilibrium is at a price level of 110. If we are at a short-run disequilibrium with the price level at 115, there is excess supply; the quantity of real goods and services supplied exceeds the (aggregate) demand for real goods and services. This is sometimes termed a recessionary gap, and there will be downward pressure on prices. Businesses will see a build-up of inventories and will decrease both production and prices in response. This will result in a decrease in the price level, which will move the economy toward long-run equilibrium at a price level of 110. If the price level were 105, there would be excess demand for real goods and services. This is sometimes referred to as an "inflationary gap." Businesses will experience unintended decreases in inventories and respond by increasing output and prices. As the price level increases, the economy moves along the aggregate demand curve toward long-run equilibrium.

Figure 3: Long-Run Equilibrium Real Output



We will now extend this analysis to include shifts in short-run aggregate supply that are part of the process of moving toward the long-run equilibrium output and price level. Recall that in constructing the SAS curve we held money wages and other resource prices constant. If the economy is in short-run equilibrium, but at a level of output above or below full-employment GDP, it is in long-run disequilibrium. In Figure 4, we illustrate two situations where the economy is in short-run equilibrium but not in long-run equilibrium. In panel (a), short-run equilibrium real GDP, GDP_1 , is less than full employment GDP (along the LAS curve) and we would interpret this as a recession. As we will detail, this brings downward pressure on money wages and resource prices that will decrease the equilibrium price level from P_1 to P^* . The opposite situation is illustrated in panel (b), where the short-run equilibrium real GDP, GDP_1 , is above the full-employment level. This would be the situation in an economic expansion where aggregate demand has grown faster than LAS. The result will be upward pressure on prices that will result in inflation as the general price level increases from P_1 to P^* .

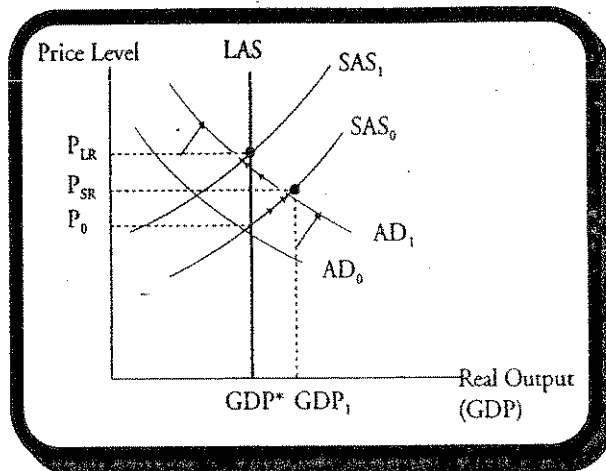
Figure 4: Long-Run Disequilibrium



We have essentially described the phases of a business cycle here as deviations of short-run equilibrium real GDP below full-employment GDP (recession) and above full-employment GDP (expansion leading to inflationary pressure). How does this happen? Changes in aggregate demand can drive these business cycles.

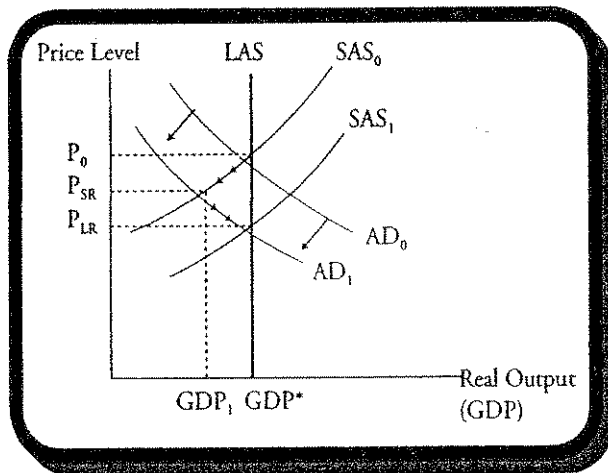
Consider the short-run and long-run adjustment to an increase in aggregate demand illustrated in Figure 5. From an initial state of long-run equilibrium at the intersection of AD_0 with LAS, assume that aggregate demand increases to AD_1 . The new short-run equilibrium will be at over-full employment with real GDP, GDP_1 , above full-employment GDP, GDP^* . The increase in the price level (from P_0 to P_{SR}) at the new equilibrium level means that workers' real wages have decreased (we are holding money wages constant in the short run). At the same time, the increase in demand will cause businesses to attempt to increase production, which will require hiring more workers. These two factors both lead to increased money wage demands. As these demands are met, we get a shift in the SAS curve from SAS_0 to SAS_1 , which will restore long-run macroeconomic equilibrium at full-employment real GDP and at a new price level of P_{LR} . Note that an increase in the money wage and other resource prices means that business will be willing to supply less real goods and services at each price level (prices of final goods and services). It is the increase in resource prices that causes SAS to decrease.

Figure 5: Adjustment to an Increase in Aggregate Demand



In Figure 6, we illustrate how a decrease in aggregate demand from AD_0 to AD_1 will lead to a new short-run equilibrium with the price level at P_{SR} and real GDP at GDP_1 . GDP_1 is less than full-employment GDP (a recession). The resulting excess supply of labor (workers seeking jobs) will put downward pressure on money wage rates and other resource prices. This will lead to a shift in SAS to SAS_1 (an increase in supply), restoring long-run equilibrium at full-employment GDP along the LAS curve and at a new, lower price level of P_{LR} . Remember, a decrease in wages and other input prices increases short-run aggregate supply.

Figure 6: Adjustment to a Decrease in Aggregate Demand



LOS 23.d: Compare and contrast the main schools of macroeconomic thought in relation to aggregate demand and aggregate supply.

While our discussion of the forces leading to short-run and long-run macroeconomic equilibrium gives a basic description of business cycles and the forces that tend to move the economy toward full employment in the long run, there are differences of opinion on how well this process works and the time lags between the short run and the long run.

The classical economists believed that shifts in both aggregate demand and aggregate supply were primarily driven by changes in technology over time. Although classical economists did not use the aggregate supply–aggregate demand analysis we have presented, their view of macroeconomic equilibrium is consistent with this analysis. We just need to add the assumption that the long-run adjustment of money wages to restore full-employment equilibrium happens fairly rapidly and that the economy therefore has a strong tendency toward

full-employment equilibrium, as either recession or over-full employment lead to decreases or increases in the money wage rate. Their analysis concluded that taxes were the primary impediment to long-run equilibrium and that if the distortions in incentives from taxes were minimized, the economy would grow in an efficient manner with increases in labor and capital and with improvements in technology.

The great depression of the 1930s did not support the view of the classical economists. The economy in the U.S. operated significantly below its full-employment level for many years. Additionally, business cycles in general were more severe and more prolonged than the classical model would suggest. John Maynard Keynes was an economist who attempted to explain the depression and the nature of business cycles and to provide policy recommendations for moving the economy toward full-employment GDP and reducing the severity and duration of business cycles.

Keynes believed that shifts in aggregate demand due to changes in expectations were the primary cause of business cycles and that wages were “downward sticky,” decreasing the ability of a decrease in money wages to shift the SAS curve up and move the economy from recession (or depression) back to the full-employment equilibrium level of output. The *New Keynesians* added to this model, asserting that the prices of other productive inputs in addition to labor are also “downward sticky,” presenting another barrier to the restoration of full-employment equilibrium.

The policy prescription of Keynesian economists was to directly increase aggregate demand through monetary policy (increasing the money supply) or through fiscal policy (increasing government spending, decreasing taxes, or both).

A third view of macroeconomic equilibrium is that held by monetarists. Monetarists believe that the main factor leading to business cycles and deviations from full-employment equilibrium is monetary policy. They suggest that to keep aggregate demand stable and growing, the central bank should follow a policy of a steady and predictable increases in the money supply. Monetarists believe that recessions are caused by inappropriate decreases in the money supply and that recessions can be persistent because money wage rates are downward sticky (as do the Keynesians). Like the classical economists, however, they believe that the best tax policy is to keep taxes low to minimize the disruption and distortion that they introduce into the economy and the resulting decrease in full-employment GDP.

KEY CONCEPTS

1. Long-run aggregate supply is vertical at potential (full-employment) real GDP and can change as a result of changes in the labor force, the amount of capital in the economy, or in technology.
2. Short-run aggregate supply is an increasing function of the price level, is affected by the same factors that affect long-run aggregate supply, and is constructed holding the money wage rate constant.
3. Aggregate demand is a decreasing function of the price level. Aggregate demand will increase with increases in incomes, a decrease in a country's exchange rate, or a rise in the expected rate of inflation. Expansionary monetary or fiscal policy can both increase aggregate demand.
4. From an initial long-run equilibrium, an increase (decrease) in aggregate demand will increase (decrease) prices and output in the short run, and the resulting increase (decrease) in money wages will decrease (increase) short-run aggregate supply, resulting in further price increases (decreases) and a return to full-employment long-run equilibrium.
5. The classical economists believed that the adjustment of money wages to restore full-employment equilibrium is rapid and that without the distorting effects of taxes, long-run equilibrium real output would increase with increases in the labor force and accumulated capital, and with improvements in technology.
6. Keynesian economists believe that changes in expectations shift aggregate demand, which causes business cycles, and that because wages are "downward sticky," the economy may not return rapidly from recession to full-employment real GDP. Their policy prescription is to increase aggregate demand directly by expanding the money supply or increasing the government deficit.
7. Monetarists believe that economic cycles are caused by inappropriate monetary policy and that a policy of steady and predictable increases in the money supply, together with low taxes, will lead to stability and maximum growth of real GDP.

CONCEPT CHECKERS: AGGREGATE SUPPLY AND AGGREGATE DEMAND

1. The economy's potential rate of output is *best represented* by:
 - A. long-run aggregate supply.
 - B. short-run aggregate supply.
 - C. long-run aggregate demand.
 - D. short-run aggregate demand.

2. Which of these factors is *least likely* to cause a shift in long-run aggregate supply?
 - A. Warfare destroys a large number of factories.
 - B. Prices of raw materials for production decrease.
 - C. An advance in technology increases the rate of productivity.
 - D. Older workers retire faster than younger workers enter the labor force.

3. Aggregate demand includes all of the following EXCEPT:
 - A. investment spending.
 - B. government purchases.
 - C. consumption expenditures.
 - D. foreign trade, exports plus imports.

4. Which of the following factors would *most likely* change the quantity of aggregate demand *without* shifting the AD curve?
 - A. The federal deficit expands.
 - B. Expected inflation decreases.
 - C. Domestic interest rates increase.
 - D. Global economic growth accelerates.

5. In short-run equilibrium, if aggregate demand is increasing faster than long-run aggregate supply:
 - A. the economy is in recession.
 - B. the price level is likely to increase.
 - C. downward pressure on wages should ensue.
 - D. supply will increase to meet the additional demand.

6. Which school of economic thought holds that unpredictable changes in central bank policy are the primary cause of business cycles?
 - A. Classical.
 - B. Keynesian.
 - C. Monetarist.
 - D. Neo-Keynesian.

ANSWERS – CONCEPT CHECKERS: AGGREGATE SUPPLY AND AGGREGATE DEMAND

1. A The LRAS curve is vertical at the level of potential GDP.
2. B Price changes for productive resources shift the short-run aggregate supply curve but they do not affect long-run aggregate supply. LAS is influenced by changes in the quantity of labor, the quantity of capital, and the level of technology.
3. D The foreign trade component of aggregate demand is net exports, or exports minus imports.
4. C Increasing interest rates would decrease investment and delay consumption spending, which would be seen as a movement along the AD curve to a lower quantity and a higher price level. Changes in expected inflation, fiscal policy, and world economic growth all shift the AD curve.
5. B If AD is increasing faster than LAS, the economy is expanding faster than its full-employment rate of output. This will cause pressure on wages and resource prices and lead to an increase in the price level. The SAS curve will shift to the left—a decrease in supply for any given price level—until the rate of output growth slows to its full-employment potential.
6. C Monetarists believe that monetary policy is the main factor leading to business cycles and deviations from full-employment equilibrium.

MONEY, BANKS, AND THE FEDERAL RESERVE

Study Session 5

EXAM FOCUS

Not a lot of material here. Know the functions of money, how a fractional reserve banking system creates money, the money expansion multiplier, and the tools that a central bank can use to increase or decrease the money supply.

LOS 24.a: Discuss the functions of money, and the problems that arise when using commodities as money.

Money has three basic functions:

- Money functions as a **medium of exchange** because it is accepted as payment for goods and services. Compare this to a barter economy, where if someone has a goat and wants an ox, they have to find someone willing to trade one for the other (and imagine no eBay). With money, it is possible to sell the goat and buy the ox with the money received.
- Money functions as a **unit of account** because prices of all goods and services are expressed in units of money; dollars, yen, rupees, pesos, and so forth. This allows us to determine how much of any good we are foregoing when consuming another.
- Money functions as a **store of value** because I can work for money now, save it, and use the value of my labor later. Money preserves value better when inflation is low.

LOS 24.b: Compare and contrast the different depository institutions, their economic function, and the impact of financial regulation, deregulation, and innovation.

There are three primary types of depository institutions.

- **Commercial banks** essentially operate as intermediaries between savers and borrowers. Savers make deposits in banks to keep their money safe, but also to earn a return on their savings. Banks take the deposits and put a proportion of those deposits to work by buying short-term securities such as Treasury bills, by investing in longer-term securities such as Treasury and corporate bonds, and by making loans. In a fractional reserve banking system, the bank must hold a specified proportion of deposits in reserve, as cash or (in the U.S.) deposits with the Federal Reserve Bank. This allows the bank to meet customer needs for withdrawals and still earn a return on the deposits not committed to reserves. The bank must manage the risk of its portfolio of loans and other assets to make sufficient interest income to be competitive but, at the same time, not take on risk that its depositors would consider excessive.
- The terms **thrifts** and **thrift institutions** refer to savings banks, credit unions, and savings and loan associations (S&Ls). An S&L offers both checking and savings accounts and makes loans of various types using customer deposits. A savings bank is quite similar but does not offer checking accounts and makes primarily home loans for individuals. A **credit union** typically takes savings deposits from, and makes consumer loans to, specific group of individuals, such as a group consisting of the employees of one company. Groups can also be defined more broadly.
- A **money market mutual fund** is technically an investment company. "Money market" usually is used to refer to debt securities with maturities of one year or less. A money market mutual fund manages the pooled funds of many investors, investing it in short-term debt securities to preserve the funds' value and earn returns for

the investors. Investors (depositors) have ready access to their funds, but some funds restrict liquidity by imposing minimum check amounts or a maximum number of withdrawals each month. Offering less liquidity keeps expenses down and consequently increases returns (interest earned).

Depository institutions have four main economic functions:

- They *create liquidity* by using the funds from (short-term) deposits to make (longer-term) loans.
- By acting as *financial intermediaries*, depository institutions lower the cost of funds for borrowers, compared to the cost if borrowers had to seek out lenders on their own.
- Depository institutions are in a better position than individuals would be to *monitor the risk* of loans.
- Institutions *pool the default risks* of individual loans by holding a portfolio of loans.

In the U.S., bank and S&L deposits are insured in the event of failure of the institution to a maximum of \$100,000 by the Federal Deposit Insurance Corporation (FDIC). The FDIC imposes restrictions on the institutions to manage the risk of insuring them against failure. Since the existence of deposit insurance significantly reduces the incentive for depositors to monitor the risk of an institution's portfolio, there is significant regulation of banks with respect to their balance sheets in four primary areas:

- A minimum amount of equity (owners') capital must be maintained to give owners strong incentives to manage the risk of their asset portfolio well.
- Reserve requirements set a minimum percentage of deposits (different for different types of accounts) that must be retained by the institution, either in cash or as deposits with the (U.S.) Federal Reserve.
- There are restrictions on the types of deposits (e.g. savings deposits versus checking deposits) that the various institutions may accept.
- There are rules about the proportions of various types of loans that the institutions can make. An example would be a restriction on the proportion of, or prohibition of, commercial loans. These restrictions differ by type of institution as well.

During the 1980s and 1990s many of the restrictions that made commercial banks different from savings banks and thrifts were relaxed, allowing the latter to compete more directly with the former, and allowed other institutions to participate in activities which were formerly only permitted to banks and savings institutions. Another area of deregulation was the repeal of earlier laws which restricted banks from opening branches nationwide. Permitting banks to open branch offices in any state has led to consolidation of banks, the emergence of a few very large national banks, many mergers and acquisitions, and a resulting increase in the efficiency of bank operations.

This decrease in regulation was accompanied by a high degree of financial innovation. Financial innovation refers to the introduction of new financial products, both for depositors and for those seeking debt capital. By introducing variable-rate mortgages, S&Ls were able to transfer some of the risk of rising inflation and rising interest rates to the borrowers of the funds. Computers have significantly reduced the cost of credit and debit card transactions and led to huge growth in these markets. The capacity of large banks to process millions of electronic transactions and checks at low cost with innovative computer systems was also a factor in the wave of mergers and acquisitions. Cost savings were realized when all institutions did not have to provide this capacity individually. The widespread use of ATMs and internet banking are further examples of the financial innovation that has grown out of technological advances.

Some innovation has been specifically adopted to avoid or circumvent regulation. New account types have been introduced to circumvent Regulation Q, which prohibits banks from paying interest on checking account deposits.

LOS 24.c: Explain how banks create money, and calculate the amount of loans a bank can generate, given a certain amount of deposits.

In a fractional reserve banking system, such as the Fed system, a bank is only required to hold a fraction of its deposits in reserve. The required reserve ratio is used to measure the reserve requirement. Deposits in excess of the required reserve (excess reserves) may be loaned.

When a bank makes a loan, the borrower spends the money. The sellers who received the cash may deposit it in their banks. This action creates additional loanable funds, because only a fractional amount of the deposit is required by law to be held in reserve. This process of lending, spending, and depositing can continue until the amount of excess reserves available for lending is zero. This is referred to as the *multiplier effect*.

The potential deposit expansion multiplier is the maximum potential increase in the money supply due to the multiplier effect. The actual deposit expansion multiplier will be less than the potential deposit expansion multiplier if some people decide to hold currency rather than deposit it into the bank, and if banks fail to loan out excess reserves. It is important to note that *money is created only when banks make loans*, and a single bank can only lend out its excess reserves. It is the *banking system* as a whole that expands the money supply. There is also a multiplier effect when the Fed decreases the monetary base through open market sales of Treasury securities. Since this removes reserves from the banking system, the amount of loans must contract by an even greater amount.

To calculate the potential deposit expansion multiplier and the potential increase in the money supply, we use the following formulas:

$$\text{potential deposit expansion multiplier} = 1 / (\text{required reserve ratio})$$

$$\text{potential increase in money supply} = \text{potential deposit expansion multiplier} \times \text{increase in excess reserves}$$

For example, assume that the required reserve ratio is 25%, and a bank finds itself with \$1,000 in excess reserves. The bank can only lend out its own excess reserves of \$1,000. If the borrower of the \$1,000 deposits the cash in a second bank, the second bank will be able to lend its excess reserves of $(0.75 \times \$1,000) = \750 . Those funds may be deposited in a third bank, which can then lend its excess reserve of $(0.75 \times \$750) = \563 . If this lending and depositing continues, the money supply may eventually expand to $[(1/0.25) \times \$1,000] = \$4,000$. If no other banks took deposits or made loans, there would be no increase in the money supply.

LOS 24.d: Discuss the goals and targets of the U.S. Fed, the balance sheet, and compare and contrast the policy tools.

The goals of the U.S. Federal Reserve are to manage the money supply in such a way as to keep inflation low and at the same time, promote economic growth and full employment. Additionally, the Fed attempts to reduce the magnitude of the expansions and recessions that make up business cycles.

One of the ways the Fed attempts to reach these goals is to target the **federal funds rate**. This is the rate at which banks make short-term (typically overnight) loans of reserves to other banks. The Fed influences the federal funds rate, which is a market-determined rate, through changes in the money supply.

The three policy tools of the Federal Reserve are:

1. In the U.S., banks can borrow funds from the Fed if they have temporary shortfalls in reserves. The **discount rate** is the rate at which banks can borrow reserves from the Fed. A lower rate makes reserves less costly to banks, encourages lending, and tends to decrease interest rates. A higher discount rate has the opposite effect, raising interest rates.

2. Bank reserve requirements are the percentage of deposits that banks must retain (not loan out). By increasing the percentage of deposits banks are required to retain as reserves, the Fed effectively decreases the funds that are available for lending. This decrease in the amount available for lending will tend to increase interest rates. A decrease in the percentage reserve requirement will increase the funds available for loans, which tends to decrease interest rates. This tool only works well if banks are willing to lend, and customers are willing to borrow, the additional funds made available by reducing the reserve requirement.
3. Open market operations are the buying or selling of Treasury securities by the Fed in the open market. When the Fed buys securities, cash replaces securities in investor accounts, banks have excess reserves, more funds are available for lending, and interest rates decrease. Sales of securities by the Fed have the opposite effect, reducing cash balances and funds available for lending, and increasing interest rates. This is the Fed's most commonly used tool and is important in achieving the federal funds target rate.

The Fed's Balance Sheet

The assets of the U.S. Federal Reserve consist of:

- Gold, deposits with other central banks, and special drawing rights at the International Monetary Fund.
- U.S. Treasury bills, notes, and bonds.
- Loans to banks (reserves loaned at the discount rate).

The most important of these is U.S. government securities, which are almost 90% of the Fed's assets.

The great majority (over 90%) of the liabilities of the Federal Reserve are Federal Reserve notes, that is, U.S. currency in circulation. Bank reserve deposits are a small part of the Fed's liabilities.

Coins are issued by the U.S. Treasury and, together with currency and bank deposits at the Fed, make up what is called the monetary base.

KEY CONCEPTS

1. The functions of money are as a medium of exchange, a store of value, and a unit of account.
2. Commercial banks, thrift institutions, and money market funds all act as intermediaries in lending the funds of savers to borrowers of various types.
3. A fractional reserve banking system allows banks to loan out a maximum proportion of deposits, and thereby increase the money supply by a multiple equal to the reciprocal of the required reserve ratio.
4. The U.S. Fed has a mandate to manage the money supply in such a way as to produce low inflation, full employment, and economic growth.
5. The U.S. Fed can increase (decrease) the money supply by buying (selling) Treasury securities in the open market, decreasing (increasing) the discount rate, or decreasing (increasing) the required reserve ratio.

CONCEPT CHECKERS: MONEY, BANKS, AND THE FEDERAL RESERVE

1. Which of the following statements is *least accurate*? The existence and use of money:
 - A. permits individuals to perform economic calculations.
 - B. requires the central bank to control the supply of currency.
 - C. increases the efficiency of transactions as against a barter system.
 - D. provides a means of preserving the value of labor until it can best be used.
2. Depository institutions include all of the following EXCEPT:
 - A. growth funds.
 - B. credit unions.
 - C. savings banks.
 - D. commercial banks.
3. Banks and savings institutions lower the cost of funds for borrowers by saving them the time and expense of finding numerous individuals who are willing to lend to them. This statement *best describes* the depository institutions' function as:
 - A. risk poolers.
 - B. exchange media.
 - C. liquidity creators.
 - D. financial intermediaries.
4. Assume the Federal Reserve purchases \$1 billion in securities in the open market. What is the maximum amount of money the banking system can create as a result, if the required reserve ratio is 15%?
 - A. \$66.7 million.
 - B. \$850 million.
 - C. \$1 billion.
 - D. \$6.67 billion.
5. The policy tool the Federal Reserve uses *most often* is:
 - A. the discount rate.
 - B. issuance of currency.
 - C. reserve requirements.
 - D. open market operations.
6. The goals and targets of Federal Reserve policy include all of the following EXCEPT:
 - A. Promote economic growth and full employment.
 - B. Reduce the magnitude of expansions and recessions.
 - C. Maintain the balance in the current and capital accounts.
 - D. Manage the money supply in such a way as to keep inflation low.

ANSWERS – CONCEPT CHECKERS: MONEY, BANKS, THE FEDERAL RESERVE

1. B Money functions as a unit of account, a medium of exchange, and a store of value. Money existed long before central banking was conceived of.
2. A The only kind of investment company that would be considered a depository institution is a money market mutual fund.
3. D By acting as financial intermediaries, depository institutions lower the cost of funds for borrowers from what they would be if they had to seek out individuals willing to lend.
4. D The potential deposit expansion multiplier is $1 / 0.15 = 6.67$, so the banking system can create a maximum of \$6.67 billion in new money.
5. D Open market operations are the Fed's most commonly used tool.
6. C The current and capital accounts apply to foreign trade and are not among the explicit policy goals of the Fed.

MONEY, INTEREST, REAL GDP, AND THE PRICE LEVEL

Study Session 5

EXAM FOCUS

The interest rate here is the equilibrium price (opportunity cost) of holding money instead of interest bearing securities. You need to know the factors that influence money demand and the process by which equilibrium interest rates are reached. Then

focus on the short-run and long-run effects of changes in the money supply by the central bank and their effect on real output based on the aggregate supply-aggregate demand model.

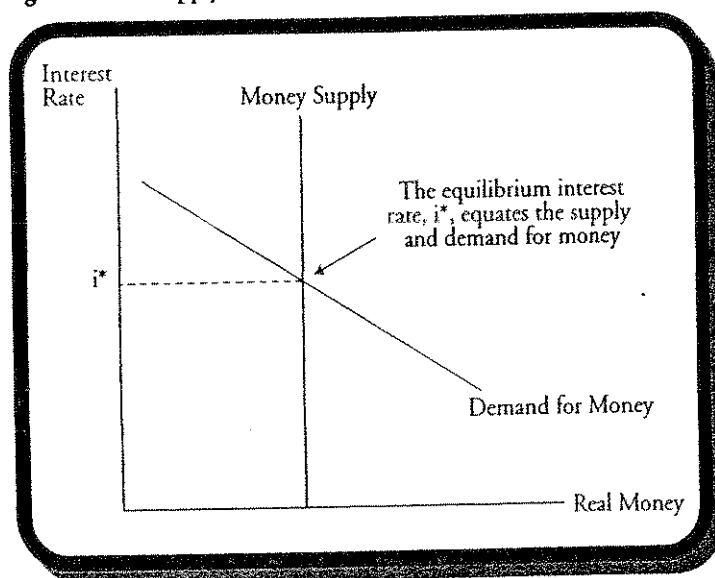
LOS 25.a: Discuss the factors determining the demand for money, define the demand for money curve, and the effects of changes in real GDP and financial innovation on the demand for money curve.

There are different definitions of money. For our purposes here, we define it as currency in circulation, checking account deposits, and travelers checks. The demand for money is largely determined by interest rates. Think of the interest that could be earned on money deposited in a savings account or money market fund as the opportunity cost of holding money.

The relation between short-term interest rates and the quantity of money that firms and households demand to hold is illustrated in Figure 1, where the downward slope indicates that at lower interest rates, firms and households choose to hold more money. At higher interest rates, the opportunity cost of holding money increases, and firms and households will desire to hold less money and more interest bearing financial assets.

The supply of money is determined by the central bank (the Fed in the U.S.) and is independent of the interest rate. This accounts for the vertical (perfectly inelastic) supply curve in Figure 1.

Figure 1: The Supply and Demand for Money



Now if we measure the money supply in nominal currency units, it will be sensitive to the price level. As inflation increases, households and businesses need more money to buy costlier goods and services. If prices doubled, firms and households would need approximately twice the amount of money to fund their purchases and to meet their needs for money in reserve. If we divide the nominal supply of money by the price level (a price index), we have the money supply in real terms. We can think of the real money supply as the money supply in terms of constant purchasing power. The equilibrium interest rate in Figure 1, i^* , is the interest rate for which the demand to hold real money balances is just equal to the real money supply.

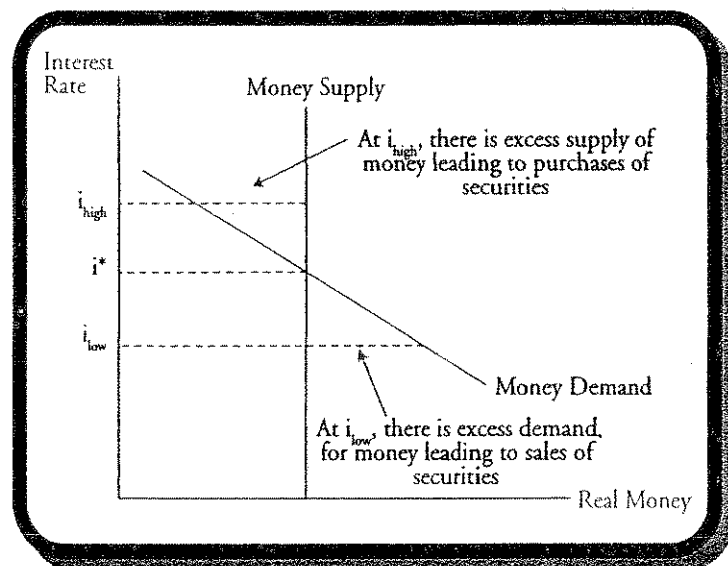
If real gross domestic product (GDP) rises, more goods and services are bought and sold, and more money is needed to conduct these transactions. Increases in real GDP shift the money demand curve up. Decreases in real GDP shift it down so that less money is demanded at each level of interest rates.

The increased use of credit cards and debit cards, the availability of interest bearing checking accounts, easier transfer of funds from savings to checking, the proliferation of ATMs, and internet banking and bill paying are all financial innovations that have affected the demand for money curve. Overall, financial innovation has reduced the demand for money below what it would have been if only the increase in real GDP was at work. The increased use of credit cards and the proliferation of ATMs have likely been the most important innovations with respect to the demand for money.

LOS 25.b: Explain how interest rates are determined, the influence on the money market equilibrium, and the interaction between interest rate changes and the money supply.

Interest rates are determined by the equilibrium between money supply and money demand. As illustrated in Figure 2, if the interest rate is above the equilibrium rate (i_{high}), there is excess supply of real money. Firms and households are holding more real money balances than they desire to, given the opportunity cost of holding money balances. They will purchase securities to reduce their money balances, which will decrease the interest rate as securities prices are bid up. If interest rates are below equilibrium (i_{low}), there is excess demand for real money balances, as illustrated in Figure 2. Firms and households will sell securities to increase their money holdings to the desired level, decreasing securities prices and increasing the interest rate.

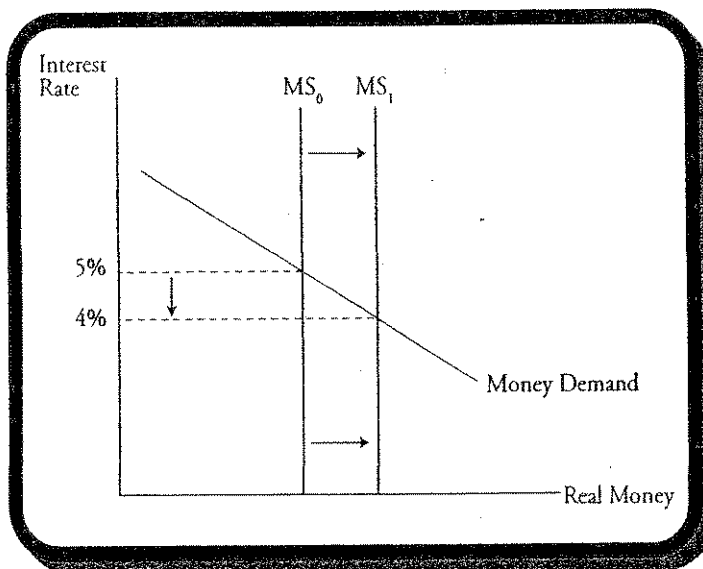
Figure 2: Disequilibrium in the Money Market



Let's look at how the central bank can affect interest rates by examining the effects of open market operations on the equilibrium interest rate when the money supply is changed. Consider a situation where the central bank wants to decrease short-term interest rates and will do so by buying securities in the open market. The cash paid

for the securities increases the real money supply and bank reserves, which leads to a further increase in the real money supply as banks make loans based on the increase in excess reserves. This shifts the real money supply curve to the right as illustrated in Figure 3. At the previous equilibrium interest rate of 5%, there is now excess supply of money balances. To reduce their money holdings, firms and households buy securities, increasing securities prices and decreasing interest rates until the new equilibrium interest rate in Figure 3 (4%) is achieved. Of course, if the central bank sold securities to decrease the money supply, excess demand for real money balances would result in sales of securities and an increase in the interest rate.

Figure 3: An Increase in the Money Supply Lowers the Interest Rate



LOS 25.c: Discuss the short-run and long-run effects of money on real GDP.

Now that we have determined the effects of monetary policy changes (changes in the money supply) on nominal interest rates, we turn our attention to the effect on the overall economy. In the short run, the effects of money supply changes on nominal interest rates will be the same for real interest rates. Let's first consider the effects of an increase in the money supply that leads to decreases in nominal and real interest rates.

Lower real rates will cause businesses to invest more and households to increase purchases of durable goods, automobiles, and other items that are typically financed at short-term rates. Thus, the business investment (I) and consumer spending (C) components of aggregate demand both increase.

Lower real interest rates will make investment less attractive to foreigners, who will tend to move money out of the country, selling the domestic currency and decreasing domestic currency/foreign currency exchange rates. This will make exports less expensive to foreign buyers and exports will increase. At the same time, imports will decrease as the domestic currency price of foreign goods increases. Thus, the net exports (X) component of aggregate demand increases.

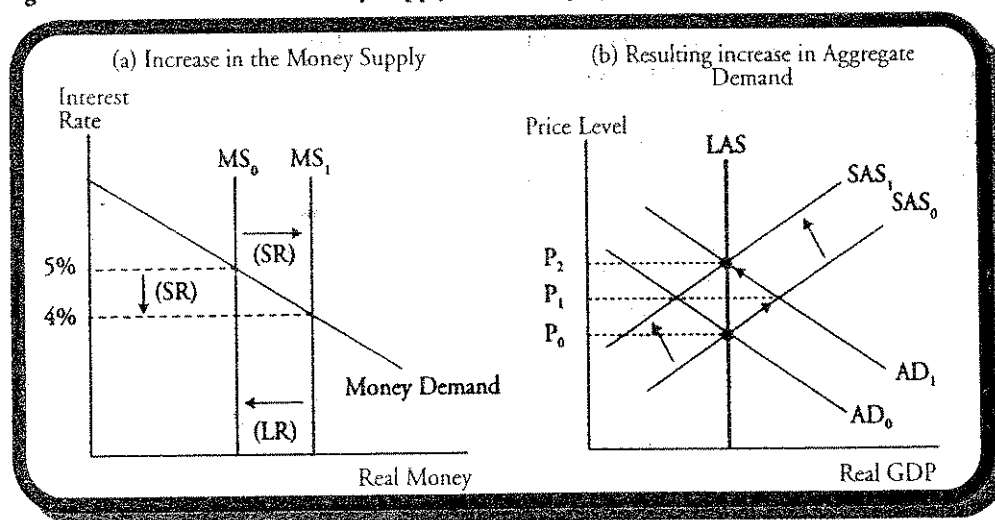
The effect of the interest rate decrease in the short run will be even stronger because there is a **multiplier effect**. The increase in aggregate demand and expenditures will cause incomes to go up, which further increases consumption and investment. This spending on investment and consumption, in turn, also increases (someone's) income. This process is repeated and, even though not all of each consumer's increase in income is used to increase consumption, the eventual effect on consumption and aggregate demand will be much greater than the initial increase in consumption and aggregate demand.

This increase in aggregate demand will increase real GDP and the price level, as we saw in our analysis of the aggregate supply-aggregate demand model. Action by the central bank to decrease the money supply and increase

rates will have the opposite effect. Rising rates will reduce household purchases, business investment, net exports, and aggregate demand, resulting in a decrease in real GDP and the price level.

If the economy is operating at the full-employment level (long-run aggregate supply) when the central bank increases the money supply, the increase in real GDP must be temporary. Recall that when an increase in aggregate demand increases real GDP above full-employment GDP, money wages and the cost of other productive resources will rise, causing a shift to a new short-run aggregate supply curve. Thus, the long-run effect of an increase in the money supply will simply be an increase in the price level (rate of inflation) as the economy returns to full-employment GDP on the long-run aggregate supply curve. This is illustrated in Figure 4. The right-hand side of the figure is the same initial and long-run response to an increase in aggregate demand (from AD_0 to AD_1) that we saw in the review of aggregate supply and aggregate demand. Initially, the price level rises to P_1 , and the resulting increase in inflation decreases the real wage so that SAS shifts from SAS_0 to SAS_1 . The new long-run equilibrium real GDP is back to potential real GDP (along LAS) and the price level has increased to P_2 . Note that when the price level has increased to P_2 , the increase in the price level has just offset the increase in the nominal money supply, so the real money supply returns to MS_0 . This long-run adjustment is illustrated in panel (a) of Figure 4. As a result of this decrease in the real money supply, the equilibrium interest rate returns to its original equilibrium level of 5% in Figure 4.

Figure 4: An Increase in the Money Supply at Full-Employment GDP



LOS 25.d: Explain the quantity theory of money.

If we break GDP into the price level and its real output component (price \times real output), we obtain an identity known as the equation of exchange, which is:

$$\text{money supply} \times \text{velocity} = \text{GDP} = \text{price} \times \text{real output}$$

Velocity is the average number of times per year each dollar is used to buy goods and services (velocity = GDP / money). Therefore, the money supply multiplied by velocity must equal nominal GDP. The equation of exchange must hold with velocity defined in this way. Letting money supply = M , velocity = V , price = P , and real output = Y , the equation of exchange may be symbolically expressed as:

$$MV = PY$$

The quantity theory of money states that an increase in the money supply will cause a proportional increase in prices. The original proponents of the quantity theory felt that velocity and output were determined by

institutional factors other than the money supply and were thus nearly constant. Therefore, if the money supply increases while velocity and quantities are fixed, prices must rise. Rearranging the equation of exchange, we get:

$$\text{price} = \frac{MV}{Y}$$

Since velocity (V) and real output (Y) change very slowly, an increase in the money supply (M) must result in a proportional increase in prices (inflation). If we increase M by 5%, nominal GDP (=PY) will increase 5% as well. Under the assumption that real GDP (Y) changes only very slowly in the short run, the entire increase must be reflected in the price level (P). Monetarists believe, based on this relation, that the money supply (M) should be increased only at the growth rate of real output (Y) so as to maintain price stability.

In the long run the quantity theory of money will describe the results of money supply growth in excess of the growth rate of real output. If real GDP grows at 3% over time and the money supply is increasing at 5%, we can expect long-run inflation of 2% (5% – 3%). This result parallels the result we obtained using the aggregate supply-aggregate demand model.

KEY CONCEPTS

1. The demand to hold money is a decreasing function of the interest rate that can be earned on securities.
2. The demand for money increases with higher incomes, and with the price level.
3. The money supply is determined by the central bank and equilibrium interest rates are determined by the intersection of the supply and demand for money.
4. An increase (decrease) in the money supply will result in an excess supply of (demand for) money, leading individuals and businesses to buy (sell) securities, driving securities prices up (down) and decreasing (increasing) interest rates.
5. In the short run, decreases (increases) in the equilibrium interest rate from increases (decreases) in the money supply will increase (decrease) aggregate demand, which will increase (decrease) real GDP and the price level.
6. In the long run, money supply growth has no effect on real GDP and, as the quantity theory of money suggests, increases in the money supply, when the economy is operating at potential (full-employment) GDP, will lead to a proportional increase in prices.

CONCEPT CHECKERS: MONEY, INTEREST, REAL GDP, AND THE PRICE LEVEL

1. The money demand schedule slopes downward to the right showing that:
 - A. an expansion in the money supply increases interest rates.
 - B. as the opportunity cost of holding money rises, people want to hold less money.
 - C. when the Fed sells securities, bond prices fall.
 - D. a reduction in the money supply reduces the interest rate.
2. The money supply schedule is vertical because the:
 - A. money supply is dependent upon interest rates.
 - B. demand schedule is downward sloping.
 - C. money supply is independent of interest rates.
 - D. money supply is set by Congress.
3. Which of the following statements is TRUE? Money:
 - A. demand rises with nominal interest rates.
 - B. demand rises with nominal income.
 - C. supply rises with nominal interest rates.
 - D. supply rises with nominal income.
4. If money supply and demand are in equilibrium and the central bank sells securities in the open market:
 - A. bank reserves will increase.
 - B. short-term interest rates will decrease.
 - C. the money supply curve shifts to the right.
 - D. firms and households will sell securities for cash.
5. The effect of an anticipated increase in the money supply in a full-employment economy is:
 - A. lower output.
 - B. higher unemployment.
 - C. higher prices.
 - D. lower unemployment.
6. If the money supply is rising and velocity is falling:
 - A. prices will rise.
 - B. prices will fall.
 - C. real GDP will rise.
 - D. the impact on prices and real GDP is uncertain.
7. According to the quantity theory of money:
 - A. real output and velocity are independent of the money supply.
 - B. real output and velocity increase with the money supply.
 - C. an increase in the money stock will decrease prices.
 - D. an increase in the money stock will decrease gross domestic product (GDP).
8. According to the quantity theory of money, if nominal GDP is \$7.0 trillion and the money supply is \$1.0 trillion, then the velocity of the money supply is:
 - A. 0.100.
 - B. 0.143.
 - C. 7.0.
 - D. 8.0.

ANSWERS – CONCEPT CHECKERS: MONEY, INTEREST, REAL GDP, AND THE PRICE LEVEL

1. B With interest rates on the vertical axis and the quantity of real money on the horizontal axis, the downward slope of the money demand schedule shows that as the opportunity cost of holding money rises, people want to hold less money. People would prefer to invest money in bonds and CDs rather than hold cash when interest rates are high.
2. C The money supply schedule is vertical because the money supply is independent of interest rates. The Fed controls the money supply.
3. B Money demand rises with nominal income. As income increases, either because of inflation or increases in real output, more money is needed in the economy to conduct transactions.
4. D If the central bank sells securities, it is decreasing the money supply. This will reduce bank reserves and shift the money supply curve to the left. Firms and households will have lower cash balances than they wish to hold at equilibrium, so they sell securities, decreasing securities prices and increasing interest rates to their new equilibrium level.
5. C The effect of an anticipated increase in the money supply in a full-employment economy will be higher prices. When people expect the money supply to increase, they will expect inflation to result. Therefore, wages and prices will rise. There will be no increase in output or employment, even in the short run.
6. D An increase in the money supply is consistent with an increase in nominal GDP. However, a decrease in velocity is consistent with a decrease in nominal GDP. Unless we know the size of the changes in the two variables, there is no way to tell what the net impact is on real GDP and prices.
7. A According to the quantity theory of money, real output and velocity are independent of the money supply. As a result, an increase in the money supply increases prices.
8. C The equation of exchange is: $MV = PY$

Here, $GDP = PY$, so that $MV = GDP$

Therefore, $(\$1.0 \text{ trillion})(V) = \7.0 trillion

$V = \$7.0 \text{ trillion} / \1.0 trillion

$V = 7.0$

INFLATION

Study Session 5

EXAM FOCUS

This is all key material. Defining inflation, measuring inflation, and knowing the difference in the effects of anticipated and unanticipated inflation are all important. Take the time to understand the difference between demand-pull and cost-push inflation in the

context of the aggregate supply-aggregate demand model. This review ties together earlier material on nominal interest rates, expected inflation, and the rate of growth of the money supply.

LOS 26.a: Discuss the difference between inflation and price-level, and calculate the inflation rate.

Inflation is a persistent increase in the price level over time. Inflation erodes the purchasing power of a currency. If it accelerates unchecked, inflation ultimately can destroy a country's monetary system, forcing individuals and businesses to adopt foreign money or revert to bartering physical goods.

The key word in our definition is "persistent." If the price level increases in a single jump but does not continue rising, the economy is not experiencing inflation. An increase in the price of a single good or in *relative* prices of some goods are not inflation. If inflation is present, the prices of almost all goods and services are increasing.

In Topic Review 22 we introduced the *inflation rate*, which we defined as the percentage change in the price level from a year ago. Using a numeric measure of the price level, such as the consumer price index or the GDP deflator, we can calculate the inflation rate:

$$\text{inflation rate} = \frac{\text{current price level} - \text{year-ago price level}}{\text{year-ago price level}} \times 100$$

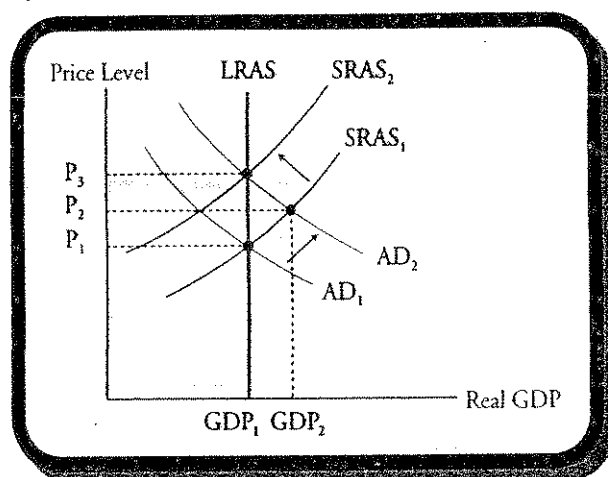
LOS 26.b: Distinguish between the factors resulting in demand-pull and cost-push inflation, and the impact on price levels, and aggregate demand and supply.

The two types of inflation are **demand-pull** and **cost-push**. Demand-pull inflation results from an increase in aggregate demand, while cost-push inflation results from a decrease in aggregate supply.

Demand-Pull Inflation

Demand-pull inflation can result from an increase in the money supply, increased government spending, or any other cause that increases aggregate demand. Figure 1 shows the effect on the price level when aggregate demand increases (shifts to the right). In Figure 1, the economy begins at equilibrium with output at GDP_1 and the price level at P_1 . The aggregate demand and short-run aggregate supply curves are AD_1 and $SRAS_1$. Real GDP is equal to potential GDP, which is represented by the long-run aggregate supply curve $LRAS$.

Figure 1: Demand-Pull Inflation



Now suppose the central bank increases the money supply, which increases aggregate demand to AD_2 . With no initial change in aggregate supply, output increases to GDP_2 and the price level increases to P_2 . Prices rise, and real GDP is above potential (full-employment) GDP.

With real GDP above its full-employment level, the increase in GDP is not sustainable. Unemployment falls below its natural rate, which puts upward pressure on real wages. Rising real wages result in a decrease in short-run aggregate supply (the curve shifts left from $SRAS_1$) until real GDP reverts back to full-employment GDP. The boom turns into a bust as output falls back to GDP_1 , and the price level increases further to P_3 .

In the absence of other changes, the economy would reach a new equilibrium price level at P_3 . But what would happen if the central bank tried to keep GDP above the full employment level with further increases in the money supply? The same results would occur repeatedly. Output could not remain above its potential in the long run, but the induced increase in aggregate demand and the resulting pressure on wages would keep the price level rising ever higher. Demand-pull inflation would persist until the central bank reduced the growth rate of the money supply and allowed the economy to return to full employment equilibrium at a level of real GDP equal to potential GDP.

Cost-Push Inflation

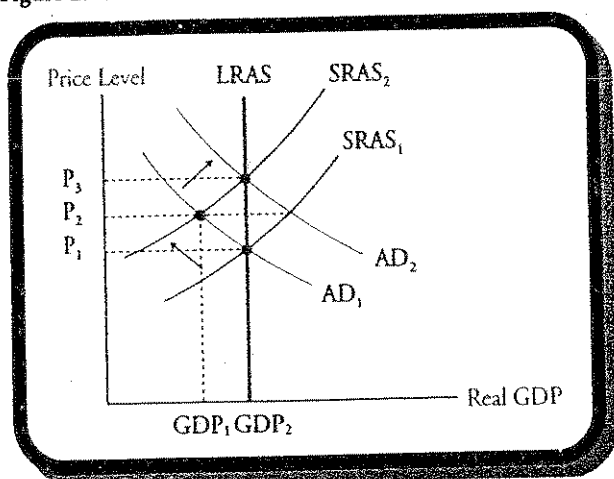
Inflation can also result from an initial decrease in aggregate supply caused by an increase in the real price of an important factor of production, such as wages or energy.

Figure 2 illustrates the effect on output and the price level of a decrease in aggregate supply. The reduction from $SRAS_1$ to $SRAS_2$ increases the price level to P_2 and with no initial change in aggregate demand, reduces output to GDP_2 . The impact on output is the key difference between the demand-pull and cost-push effects: the demand-pull effect increases GDP above full-employment GDP, while cost-push inflation from a decrease in aggregate supply initially decreases GDP.

If the decline in GDP brings a policy response that stimulates aggregate demand so output returns to its long-run potential, the result would be a further increase in the price level to P_3 .

The increase in the price level would only represent inflation if it persisted. For that to happen, the supply shock that caused $SRAS$ to decrease would have to be repeated, and policy makers would have to keep responding. The oil crisis of the 1970s is an example of a cost-push inflation spiral.

Figure 2: Cost-Push Inflation



LOS 26.c: Discuss the effects of unanticipated inflation on the labor market and the market for financial capital.

Unanticipated inflation represents an unexpected decrease in the purchasing power of (real value of) currency in the future so that the real present value of a dollar to be received in the future is reduced. Therefore, long-term contracts which entitle their holders to *fixed future payments* decrease in value. Fixed-rate mortgages, fixed-payment annuities, and other fixed-rate loans are examples of such contracts. Individuals and institutions that are obligated to make fixed future payments will gain from unanticipated inflation. Unanticipated increases in inflation decrease the value of a fixed-payment mortgage held by a bank, and benefit borrowers because their future payments will have less real value; that is, borrowers will give up less in real goods in order to make their payments.

Unanticipated inflation causes gains and losses in the labor market as well. When inflation increases unexpectedly, the real value of the wages employees agreed to is less. This represents a gain for employers at the expense of employees as real wage costs decrease. If inflation decreases unexpectedly instead, real wage rates are higher than employers expected to pay, and employees have unexpected gains at the expense of their employers.

LOS 26.d: Distinguish between anticipated and unanticipated inflation, and discuss the adverse effects of anticipated inflation.

In most cases, unanticipated changes have greater impacts on real economic outcomes than anticipated changes. But even when inflation is correctly anticipated, inflation can have adverse effects. While these adverse effects are small when inflation is around its target range of 3% or less, they can be significant when inflation is high.

High anticipated inflation makes currency a poor store of value, since its value decreases rapidly over time. The rational response to this is to spend it as rapidly as possible. Transaction costs are increased with high inflation since money functions less well. Potential GDP is reduced (the LRAS curve shifts to the left) and the growth rate of the economy is decreased. Time and effort spent to deal with the effects of high inflation is time and effort not spent in other economically productive activity.

High anticipated inflation also has adverse effects on an economy's output due to tax effects. To understand this effect, consider a tax rate of 40% on investment gains. With 2% inflation and a 10% return on an investment, the after-tax return is $10\% \times (1 - 0.40) = 6\%$. The real after-tax return after adjusting for inflation is $6\% - 2\% = 4\%$. Now consider a situation with 10% inflation and an 18% nominal return on investment. The after-tax return is $18\% \times (1 - 0.40) = 10.8\%$. The real after-tax return after adjusting for inflation is $10.8\% - 10\% = 0.8\%$. In both examples, the nominal rate of return is 8% higher than the inflation rate, so the real return without taking account of taxes is 8%. Taxes, however, distort real after-tax returns and affect investment and

saving decisions as a consequence. Low real after-tax returns will reduce savings, which will further increase interest rates and reduce business investment. The net effect is to reduce both investment and the long-term rate of growth of GDP.

The uncertainty about long-term inflation can be great when rates of inflation are high. This uncertainty makes long-term planning and investment decision making more difficult. This also decreases investment and reduces the long-term growth rate of the economy.

To sum up, high inflation, even when anticipated, reduces economic output and the growth rate of GDP because it:

- Diverts resources from other productive activities to deal with inflation's effects and uncertainty.
- Decreases the value of currency in transactions and as a store of value.
- Distorts returns in the investment and savings market and reduces capital investment in the economy.

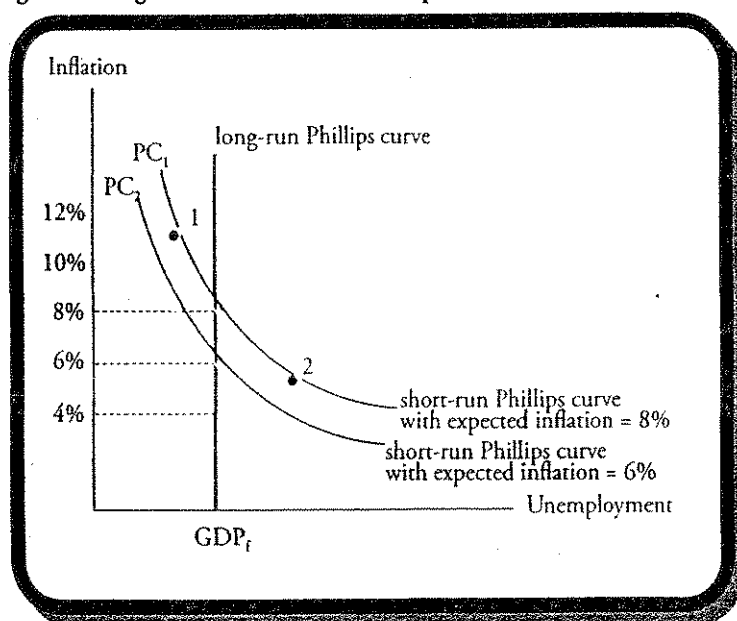
Unanticipated increases in inflation have additional adverse effects on economic output and GDP growth, because they effectively transfer wealth from:

- Lenders to borrowers.
- Workers to employers.

LOS 26.e: Discuss the impact of inflation on unemployment, define the short-run and long-run Phillips curve, and discuss changes in the natural rate of unemployment.

Our analysis using the AS-AD model indicated that if expected inflation and actual inflation (based on the increase in aggregate demand) are equal, the economy remains at full-employment GDP and the price level rises. If the increase in aggregate demand is greater than expected, two things happen. The price level increases more than expected (actual inflation is greater than expected inflation), and unemployment decreases to a level below its natural rate. This negative relationship between unexpected inflation and unemployment is depicted in the short-run Phillips curve shown in Figure 3. The decrease in unemployment in the short run changes unemployment from its natural rate along the long-run Phillips curve to a point like 1. Note that each short-run Phillips curve is constructed holding the expected rate of inflation constant and for a particular natural rate of unemployment.

Figure 3: Long-Run and Short-Run Phillips Curve



In the long run, expected inflation and actual inflation are equal so the economy is at full employment and the rate of unemployment is equal to its natural rate.

Recall from our previous discussion that when a central bank unexpectedly decreases the rate of money supply growth to reduce inflation, that the initial effect is to decrease aggregate supply as real wages fall and to reduce both GDP and employment. In this case, actual inflation is less than anticipated inflation, and unemployment increases as a result. This situation is represented by a movement along the short-run Phillips curve to a point such as 2.

If the reduced rate of growth of the money supply is maintained, eventually the new lower rate of inflation is correctly anticipated and the decrease in aggregate supply and increase in aggregate demand are such that the economy remains at full-employment GDP. We represent this situation as a shift in the short-run Phillips curve to PC_2 . Note that the short-run Phillips curve intersects the long-run Phillips curve at the expected rate of inflation. It is the short-run differences between expected inflation and actual inflation that are driving the relationship between inflation and unemployment in the short run.

Changes in the Natural Rate of Unemployment

Recall that the natural rate of unemployment consists of the frictional and structural unemployment that exists when cyclical unemployment is zero and output is at potential (full-employment) GDP. Changes in the natural rate can come from many sources, including the size and makeup of the labor force, changes that affect labor mobility, and advances in technology that replace some jobs and create new ones. An increase (decrease) in the natural rate would be represented as a shift to the right (left) in the long-run Phillips curve.

LOS 26.f: Explain the impact of inflation on the nominal interest rate, and discuss how this is related to the money supply discussed in the previous reading.

Recall that we previously defined the **nominal risk-free interest rate** as the sum of the real risk-free rate and the expected inflation rate. We now examine why this is necessarily so.

The nominal rate of interest is the equilibrium rate determined in the market for savings and investment. If expected inflation is higher, business will expect greater returns on their investments because they will factor in higher prices for their output in the future. At the same time, savers will require a greater rate of return on their savings because they are considering the trade-off between current consumption and future consumption. Since they are concerned with real consumption, they will require a greater nominal rate of return when the expected rate of inflation is higher, so that the real consumption that they receive in the future in return for not consuming now (saving) is the same. When presented in terms of nominal interest rates, this combination of an increase in demand for financial capital and a decrease in the supply of financial capital (savings) increases the equilibrium nominal rate of interest.

We have also related the actual inflation rate and, eventually, the expected inflation rate to the rate of growth of the money supply. We can conclude that higher rates of growth of the money supply lead to higher rates of inflation, higher rates of expected inflation, and higher nominal interest rates.

KEY CONCEPTS

1. Inflation is a persistent increase in the price level over time.
2. The rate of inflation is calculated as:

$$\text{inflation rate} = \frac{\text{current price level} - \text{year-ago price level}}{\text{year-ago price level}} \times 100$$

3. Demand-pull inflation results from an unexpected increase in aggregate demand that increases the price level and pulls economic output above its potential or full-employment level.
4. Cost-push inflation arises from an unexpected decrease in aggregate supply from equilibrium, usually the result of an increase in the cost of an important factor of production.
5. Unanticipated increases in inflation create losses (gains) for fixed-rate lenders (borrowers) and gains for employers at the expense of their workers, who see their real wages fall.
6. High anticipated inflation reduces the level and growth rate of GDP by reducing real after-tax returns on investment, increasing transaction costs as currency is less valuable, and decreasing productive activity as individuals and businesses devote time and effort to dealing with the effects of and uncertainty caused by inflation.
7. The short-run Phillips curve is constructed holding expected inflation and the natural rate of unemployment constant, and illustrates the negative relationship between unexpected inflation and unemployment.
8. The long-run Phillips curve is vertical at the natural rate of unemployment, which can be affected by the size and makeup of the labor force, changes that affect labor mobility, and advances in technology that replace some jobs and create new ones.
9. A premium for the expected inflation rate is reflected in all nominal interest rates and will depend in the long run on the rate of growth of the money supply.

CONCEPT CHECKERS: INFLATION

1. A price index for the broad economy was at the following year-end levels over a 5-year period:

Year 1	106.5
Year 2	114.2
Year 3	119.9
Year 4	124.8
Year 5	128.1

Which statement *best describes* the behavior of inflation as measured by this index?

- A. Stable
 - B. Accelerating
 - C. Decelerating
 - D. Accelerating then decelerating
2. For a demand-pull effect or a cost-push effect to cause inflation:
- A. the AS curve has to shift in response to a shift of the AD curve.
 - B. the AD curve has to shift in response to a shift of the AS curve.
 - C. the cause of the shift in AD or AS must be repeated or sustained.
 - D. economic equilibrium must be re-established at a higher price level.
3. Which groups are left better off and which groups are left worse off after an unexpected increase in inflation?
- | <u>Better off</u> | <u>Worse off</u> |
|-------------------------|------------------|
| A. Fixed rate borrowers | Workers |
| B. Fixed rate borrowers | Employers |
| C. Fixed rate lenders | Workers |
| D. Fixed rate lenders | Employers |
4. Which of the following statements about anticipated inflation is *least likely* accurate?
- A. High anticipated inflation makes a currency less effective as a store of value.
 - B. The rational response to high anticipated inflation is to delay cash purchases until the price level stabilizes.
 - C. The actions people take to avoid the anticipated effects of inflation tend to divert them from productive activity.
 - D. Anticipated inflation discourages investment by increasing the uncertainty of long-term planning and reducing real after-tax returns on investments.
5. An unexpected change in the rate of inflation causes:
- A. the long-run Phillips curve to shift.
 - B. the short-run Phillips curve to shift.
 - C. movement along the short-run Phillips curve.
 - D. no change in the short-run or long-run Phillips curves.

Use the following data to answer Questions 6 and 7.

The unemployment rate in Fredonia is 7%, which economists estimate to be its natural rate. The inflation rate for the past year was 3%. Fredonia's policy makers believe they can reduce unemployment to a permanently lower rate by continually stimulating aggregate demand.

6. If Fredonia adopts this policy, what are the *most likely* short-run effects on inflation and unemployment?
- | <u>Unemployment rate</u> | <u>Inflation rate</u> |
|--------------------------|-----------------------|
| A. Less than 7% | Less than 3% |
| B. Less than 7% | More than 3% |
| C. Remains at 7% | Less than 3% |
| D. Remains at 7% | More than 3% |
7. If Fredonia adopts this policy, what are the *most likely* long-run effects on inflation and unemployment?
- | <u>Unemployment rate</u> | <u>Inflation rate</u> |
|--------------------------|-----------------------|
| A. Less than 7% | Less than 3% |
| B. Less than 7% | More than 3% |
| C. Remains at 7% | Less than 3% |
| D. Remains at 7% | More than 3% |
8. In year 1 the nominal interest rate was 10% and the expected rate of inflation was 7%. One year later, the nominal interest rate is 8% and inflation expectations are 6%. What has happened to real interest rates between year 1 and year 2? They:
- A. increased by 1%.
 - B. decreased by 1%.
 - C. increased by 2%.
 - D. decreased by 2%.

ANSWERS – CONCEPT CHECKERS: INFLATION

1. C Using the formula for the inflation rate, we can calculate the inflation rate for years 2 to 5.
- | | |
|--------|------|
| Year 2 | 7.2% |
| Year 3 | 5.0% |
| Year 4 | 4.1% |
| Year 5 | 2.6% |

Inflation was decelerating over this period.

2. C To cause more than a one-time increase in the price level, whatever caused the AD curve to shift to the right (demand-pull) or the AS curve to shift to the left (cost-push) must be sustained over time.
3. A Borrowers who pay fixed rates are left better off by unanticipated inflation because they are repaying their loans with cheaper currency than they borrowed. (But note that *anticipated* inflation would have been reflected in the interest rate.) Workers are left worse off because they receive less real compensation for their labor.
4. B The rational response to high anticipated inflation is to spend cash as rapidly as possible.
5. C An unexpected change in inflation causes the unemployment rate to move in the opposite direction. This represents movement along the short-run Phillips curve.
6. B If unemployment is at its natural rate, GDP growth is at its potential rate. Stimulating AD from this level increases output in the short run, which reduces unemployment, but also increases the price level.
7. D In the long run, unemployment cannot be held below its natural rate. The stimulus to AD will result in wage pressures, forcing the AS curve to the left, reducing output back to its potential rate, increasing unemployment back to its natural rate, and increasing the price level further. As the vertical long-run Phillips curve shows, the higher inflation rate has no beneficial effect on the natural rate of unemployment.
8. B Because the nominal interest rate was 10% and the expected rate of inflation was 7% in the first year, the real rate of interest was 3% ($10\% - 7\%$). One year later with the nominal interest rate at 8% and inflation expectations at 6%, the real rate of interest was 2% ($8\% - 6\%$). Therefore, the real interest rate decreased by 1% between year 1 and year 2.

FISCAL POLICY

Study Session 5

EXAM FOCUS

This topic review focuses on fiscal policy, which refers to the taxing and spending decisions of the government. Understand well how changes in taxing and government spending affect economic growth through their effect on the consumption and saving decisions of individuals and the investment spending

of businesses. Be sure to understand the different multiplier effects and be able to distinguish between discretionary fiscal policy and automatic fiscal policy stabilizers. Understand the lags involved in the implementation and eventual effects of discretionary fiscal policy decisions.

FISCAL POLICY, BUDGET DEFICITS, AND BUDGET SURPLUSES

Fiscal policy refers to the federal government's use of spending and taxation to meet macroeconomic goals. The federal budget is said to be *balanced* when tax revenues equal federal government expenditures. A *budget surplus* occurs when government tax revenues exceed expenditures, and a *budget deficit* occurs when government expenditures exceed tax revenues. The Administration, through action of the President and Congress, enact fiscal policy laws designed to stabilize the economy. Decisions are made to increase taxes or reduce government spending during inflationary periods, and to reduce taxes or increase government spending during recessionary periods.

LOS 27.a: Interpret potential GDP, and the effects of income tax and tax on expenditure on potential GDP.

Gross Domestic Product (GDP) is the standard measure of the size of a national economy. GDP equals the total market value of all goods and services produced in a given country in a given year. Potential (or natural) GDP is the highest level that real GDP output can reach and sustain for long periods of time, given the existing supply of the factors of production (capital, workers, natural resources, technology, etc.). When real GDP equals potential GDP, the economy is said to be at full employment. The economy is in a recession phase if actual real GDP is less than potential GDP. The economy is in an inflationary state if actual real GDP is greater than potential GDP.

Income taxes dampen the incentive to work. An increase in income taxes causes after-tax wages per hour to fall. Consequently, workers will be less likely to work the same number of hours as they did when their after-tax wages per hour were higher. As income taxes rise, the full-employment supply of labor (a key factor of production) falls, which reduces potential GDP. These effects are illustrated in Figure 1.

Figure 1: Taxes and Potential GDP

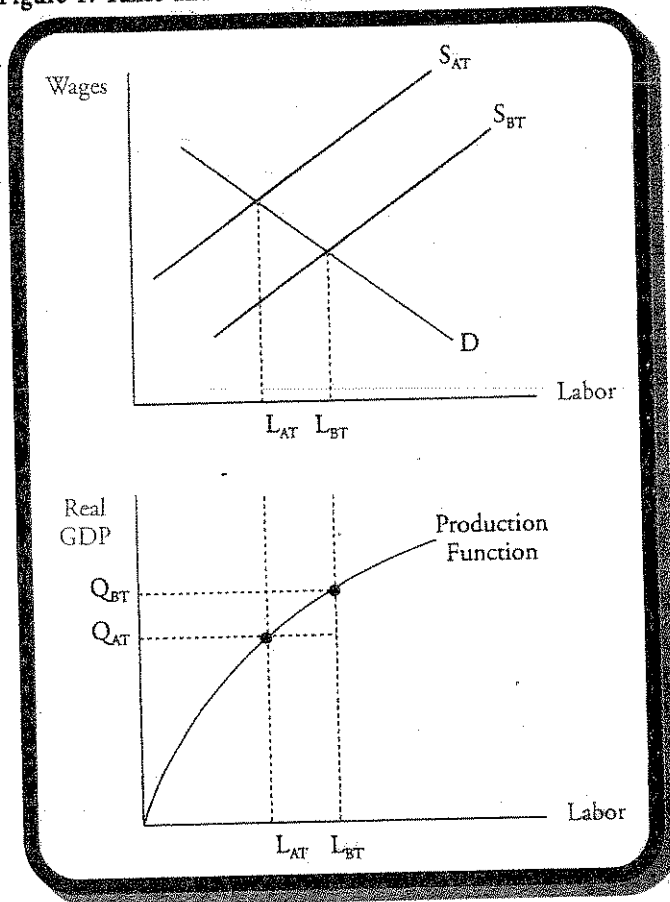


Figure 1 demonstrates that the full-employment quantity of labor hours falls as a result of the tax increase. The tax increase causes the labor supply curve to shift to the left, from the before-tax supply curve S_{BT} to after-tax supply curve S_{AT} , resulting in a drop in the equilibrium (full-employment) quantity of labor from L_{BT} (labor hours before tax) to L_{AT} (labor hours after tax). The figure also shows that potential GDP drops as a result of the decrease in the full-employment quantity of labor hours. The production function in Figure 1 shows real GDP (the output of the economy adjusted for price level changes) as a function of the labor supply. Potential GDP drops from Q_{BT} to Q_{AT} when the labor supply is decreased.

An increase in taxes on consumption expenditures (e.g., sales tax) also causes the supply of labor and potential GDP to drop. Workers “convert” hours of work into purchases of goods and services. An increase in expenditure taxes decreases the amount of goods and services that each hour of labor can buy. This disincentive to work reduces the supply of labor, which causes potential GDP to fall.

LOS 27.b: Discuss the sources of investment sources, and the influence of fiscal policy on capital markets.

Total investment is one of the major components of GDP (the others are consumption, government spending, and net exports). Investment is defined as expenditures for fixed productive assets and inventory. The sources of financing for investment are (1) national savings, (2) borrowing from foreigners, and (3) government savings.

The first two components are private sources of financing. The third source, government savings, equals the difference between government tax revenues and expenditures. Government budget surpluses increase the sources of total investment, but government budget deficits decrease them.

Investment directly affects the growth rate in real GDP. As investment declines, less capital is created, causing the growth rate in real GDP to fall. Conversely, as investment rises, more capital is created, causing the growth rate in real GDP to rise. This is analogous to capital expenditures of a corporation. Corporations invest in capital to increase output.

Fiscal policy decisions (government taxing and spending decisions) have significant impacts on markets for investment capital. Taxes on capital income affect the quantity of savings and investment, leading to changes in real GDP growth. The incentive to save falls as taxes imposed on capital income rise (after-tax earnings on savings fall). Therefore, as taxes on capital income rise, private savings likely will fall.

Fiscal policy also affects the supply of government savings. Just as budget surpluses represent government saving, budget deficits require government borrowing (negative saving or dissaving). Larger budget deficits decrease the quantity of savings, which increases the real interest rate, leading firms to reduce their borrowing of financial capital and their investment in physical capital. This adverse effect of a budget deficit on private investment in capital is referred to as the crowding out effect. The decrease in the growth rate of capital will reduce potential GDP.

LOS 27.c: Define the generational effects of fiscal policy.

Generational effects of fiscal policy refer to the effects of postponing fiscal imbalances, defined as the present value of future expected government deficits. Eventually, the fiscal imbalance must be corrected by increasing taxes or decreasing government spending. Studies show that over half of the fiscal imbalance will be paid by future generations. The major source of the fiscal imbalance in the U.S. is payments for Medicare. Since the costs of funding Medicare expenditures are not supported by current federal taxes, the burden of these expenditures will fall on taxpayers in the future. This is a generational effect (or imbalance); the present value of government benefits to the current generation is not fully paid by the taxes levied on the current generation. In effect, current policy is to postpone the payment of taxes so the burden of government expenditures (to pay for current promises) falls on a future generation (one that isn't around yet to vote!).

LOS 27.d: Compare and contrast how the government purchases multiplier, the tax multiplier, the balanced budget multiplier, and discretionary fiscal policy can assist in stabilizing the business cycle.

Discretionary fiscal policy refers to the spending and taxing decisions of a national government that are intended to stabilize the economy. During recessions, actions can be taken to increase government spending or decrease taxes. Both decisions strengthen the economy by increasing aggregate demand, putting more money in the hands of corporations and consumers to invest and spend. During inflationary economic booms, actions can be taken to decrease government spending or increase taxes. Both decisions slow the economy by decreasing aggregate demand, taking money out of the hands of corporations and consumers, causing both investment and consumption spending to fall.

Discretionary fiscal policy decisions produce *multiplier* or magnified effects. The government purchases multiplier refers to the disproportionate effect of government purchases on aggregate demand. A dollar of government spending causes more than a \$1 change in aggregate demand. Initially, aggregate demand increases by a full \$1 after the government spends the money. Subsequently, because of the new program, additional workers might be hired. The new workers will use their new wages to consume more, which might induce corporations to hire more workers, who then will use their new wages for additional consumption. The process continues to multiply until all the effects of the original \$1 of government spending have been realized.

Similarly, the tax multiplier refers to the disproportionate effects of tax policy changes on aggregate demand. An increase in taxes causes a magnified negative effect on aggregate demand, and a decrease in taxes causes a magnified positive effect on aggregate demand. The magnitude of the tax multiplier will be smaller than the government purchases multiplier because not all of the tax cut will be spent. A portion of the tax cut will be saved

(determined by the marginal propensity to save). The remainder will be spent and then magnified through additional rounds of spending by subsequent parties.

The **balanced budget multiplier** refers to the disproportionate effects that a combined government purchase and tax program has on aggregate demand. The combined program has no effect on the budget because the amount of government purchases is equal to the increase in taxes. The increased government purchases have a positive multiplier effect and the increased taxes have a negative multiplier effect. However, as noted above, the government purchase multiplier is stronger than the tax multiplier. Consequently, the multiplier from the combined program is positive.

LOS 27.e: Discuss the limitations of discretionary stabilizers, and distinguish between discretionary fiscal policy and automatic stabilizers.

Discretionary fiscal policy is not an exact science. First, economic forecasts might be wrong, leading to incorrect policy decisions. Second, complications arise in practice that delay the effects of the discretionary stabilizers.

- *Recognition delay.* Discretionary fiscal policy decisions are made by the President and voted on by Congress. The state of the economy is complex and it may take the Administration time to recognize the extent of the economic problems.
- *Administrative or law-making delay.* The Administration and Congress cannot vote and enact decisions overnight. Legal changes are delayed while elected officials debate the issues.
- *Impact delay.* Time passes before the effects of the fiscal policy changes are felt. Delays occur in implementing increases and decreases in government spending and taxing. Moreover, it takes time for corporations and individuals to act on the fiscal policy changes.

In contrast to discretionary fiscal policy stabilizers, **automatic stabilizers** are built-in fiscal devices triggered by the state of the economy. Automatic fiscal stabilizers minimize timing problems encountered by discretionary fiscal policy stabilizers. Automatic fiscal stabilizers fall into two main categories: induced taxes and needs-tested spending.

- *Induced taxes* refer to the amount of taxes collected as a percentage (i.e., income tax rate) of income. Incomes are positively related to GDP. Incomes rise during an economic boom. As incomes rise, the total amount of taxes collected automatically increases. The increase in taxes paid by corporations and individuals slows down the economy. Conversely, incomes fall during a recession. As incomes fall, the total amount of taxes collected automatically falls. The decline in taxes paid by corporations and individuals stimulates the economy.
- *Needs-tested spending* refers to government expenditures for programs that pass a “needs” test, such as unemployment. During a recession, unemployment is high. The government automatically pays out more in unemployment compensation. The increase in unemployment compensation stimulates the economy. During an expansion, unemployment payments automatically drop. The decline in unemployment compensation dampens the economy.

Together, induced taxes and needs-tested spending offer automatic stability to the economy. Both actions are countercyclical: taxes rise and needs-based spending falls during expansions, and taxes fall and needs-based spending rises during recessions.

Professor's Note: The automatic stabilizers mentioned here are based on the U.S. tax law and entitlement programs.

KEY CONCEPTS

1. Potential GDP is the highest sustainable, or full employment, level of real GDP, given the existing supply of the factors of production.
2. An increase in taxes on income and expenditures reduces the incentive to work and the equilibrium quantity of labor falls, reducing potential GDP.
3. The sources of financing for total investment in an economy are national savings, foreign borrowing, and government savings. Government budget surpluses contribute to total investment, but government budget deficits detract from total investment.
4. Tax and spending decisions have significant impacts on capital markets. Budget deficits and increases in taxes on capital cause savings and investment to decline. Taxes on savings make saving less attractive. Budget deficits indicate negative savings by the government. Increased taxes and budget deficits reduce the sources of financing for investment, causing a decrease in the long-run growth rate of real GDP.
5. Generational effects of fiscal policy refer to the effects of postponing fiscal imbalances. Eventually, the fiscal imbalance must be corrected by increased taxes or decreased government spending. Studies show that over half of the fiscal imbalance will be paid by future generations.
6. The government purchases multiplier, tax multiplier, and balanced budget multiplier determine how large an effect different fiscal policy tools will have on aggregate demand.
7. The government purchases multiplier is stronger than the tax multiplier because aggregate demand is affected by the full amount of government expenditure, whereas aggregate demand is affected by only the portion of a tax cut that is spent; the remainder will be saved.
8. Discretionary fiscal policy refers to government spending and taxing decisions designed to stabilize the economy. Automatic fiscal policy refers to built-in fiscal stabilizers that are triggered by the state of the economy. Automatic fiscal stabilizers smooth out economic fluctuations.
9. Discretionary fiscal policy is plagued by delays. A recognition delay occurs in which time passes before the Administration recognizes the extent of the economic problem. A law-making delay occurs during the time needed to enact the legal changes. And an impact delay occurs during the time needed for a change in fiscal policy to be implemented and for its effects on the economy to be felt.
10. Automatic fiscal stabilizers minimize the timing problems encountered by discretionary fiscal policy stabilizers. Two types of automatic fiscal stabilizers are induced taxes and needs-tested spending.

CONCEPT CHECKERS: FISCAL POLICY

1. Which of the following statements is **TRUE** regarding the economic effects of taxes?
 - A. An increase in income taxes creates an incentive to work more hours.
 - B. A decrease in sales taxes reduces the supply of labor and potential GDP.
 - C. Decreasing the income tax rate increases the long-term growth rate of the economy.
 - D. Taxing consumption instead of income would eliminate the negative effect of taxes on economic growth.

2. All of the following factors reduce the level of investment **EXCEPT**:
 - A. lower savings rates.
 - B. fiscal crowding out.
 - C. federal budget surpluses.
 - D. increased taxes on capital income.

3. Sales in the retail sector have been sluggish and consumer confidence has recently declined, indicating fewer planned purchases. In response, the President sends an expansionary government spending plan to Congress. The plan is submitted on March 30 and Congress refines and approves the terms of the spending plan on June 30. What type of fiscal plan is being considered, and what type of delay did the plan experience between March 30 and June 30?

<u>Fiscal Plan</u>	<u>Type of Delay</u>
A. Automatic	Recognition delay
B. Automatic	Law-making delay
C. Discretionary	Impact delay
D. Discretionary	Law-making delay

4. Congress is concerned about delays in the effects of fiscal policy, and is considering requiring the compilation and reporting of economic statistics weekly, rather than quarterly. The new reporting period is intended to decrease:
 - A. the impact delay.
 - B. the information cost.
 - C. the law making delay.
 - D. the recognition delay.

5. Congress recently passed an income tax rate hike on all income levels at a time when the economy was at the full employment level. As a result of the tax increase, what are the *most likely* changes in the quantity of labor and potential GDP?

<u>Quantity of Labor</u>	<u>Potential GDP</u>
A. Increases	Increases
B. Increases	Decreases
C. Decreases	Increases
D. Decreases	Decreases

6. Congress enacts a program to subsidize farmers in the Midwest with an expansive spending program of \$10 billion. At the same time, Congress enacts a \$10 billion tax increase. Which of the following *best describes* the impact on the economy?
 - A. Lower growth due to the negative tax multiplier.
 - B. Higher growth due to the net positive balanced budget multiplier.
 - C. Higher growth due to the positive government spending multiplier.
 - D. No effect on growth because the tax and spending multiplier effects offset.

7. Recent reports indicate that real GDP growth was negative over the past two quarters. To counter the recent trend, Congress is considering a \$10 billion cut in taxes. However, there is also severe pressure to maintain a balanced budget, so Congress decides to create a balanced budget tax cut plan. Which of the following *best describes* whether the plan is likely to succeed in countering the recent economic trend?
- A. Likely, because of the positive multiplier effect.
 - B. Unlikely, because of the negative multiplier effect.
 - C. Likely, because the plan has no net multiplier effect.
 - D. Unlikely, because the plan has no net multiplier effect.

ANSWERS – CONCEPT CHECKERS: FISCAL POLICY

1. C Income taxes reduce the incentive to work. Decreasing income taxes encourages workers to work more hours, which increases potential GDP. Consumption taxes also create a disincentive to work because they reduce the amount of goods and services an hour of labor is worth.
2. C Federal budget surpluses represent government savings, a source from which investment can increase.
3. D The expansionary plan initiated by the President and approved by Congress is an example of discretionary fiscal policy. The lag from the time of the submission (March 30) through time of the vote (June 30) is known as law-making delay. It took Congress three months to write and pass the necessary laws.
4. D More frequent and current economic data would make it easier for authorities to monitor the economy and to recognize problems. The reduction in the time lag between economic reports would reduce the recognition delay.
5. D The increase in income taxes shifts the labor supply curve to the left, resulting in a lower equilibrium quantity of labor. Labor is one of the input factors of production for the economy. Therefore, the lower quantity of labor causes potential GDP to fall.
6. B The amount of the spending program exactly offsets the amount of the tax increase, leaving the budget unaffected. The multiplier effect is stronger for government spending than for the tax increase. Therefore, the multiplier will be positive. All of the government spending enters the economy as increased expenditure, whereas only a portion of the tax increase results in lessened expenditure.
7. B The economy is in recession as indicated by the weak GDP growth. The balanced budget program is unlikely to end the recession because the multiplier will be negative. The multiplier effect is stronger for government spending versus the tax increase. Only a portion of the tax increase will be spent, but all of the decrease in government expenditure will be taken out of the economy. Both changes will then be magnified through their multiplier effects.

MONETARY POLICY

Study Session 5

EXAM FOCUS

Monetary policy refers to attempts by a central bank to influence inflation and the growth rate of the economy through changes in the money supply and interest rates. Understand how changes in monetary policy affect inflation and economic growth in the context of the aggregate supply-aggregate demand model. Know the differences among fixed-rule, feedback-rule, and discretionary approaches to

monetary policy and the difference between the new Monetarist feedback rule and the new Keynesian feedback rule. Be able to explain the difference between the effects of announced, credible monetary policy changes and the effects of surprise monetary policy changes on inflation and real output and how these differences are related to the short-run Phillips curve.

LOS 28.a: Distinguish between price level stability, and sustainable real GDP growth.

The primary objective of the Federal Reserve is to maintain *price level stability*, defined as a stable inflation rate between zero and three percent. By maintaining a stable inflation rate, the Fed reduces uncertainty in the marketplace, which is important for many reasons. In particular, consumers and lenders can plan more appropriately and efficiently if there are few inflation surprises. The more stable the inflation rate becomes, the closer real interest rates and real wages are to their expected values.

Price level stability also creates an environment with incentives to save and invest, which strengthens the economy. For example, consider a period of price instability in which inflation rises higher than expected. During this period of price instability, consumers likely will not exchange consumption for saving because the real interest rate earned on savings will fall. Therefore, by keeping the inflation rate stable, the Federal Reserve encourages savings. That, in turn, improves long-run economic growth, which brings us to the next major point.

The broader outcome of price level stability desired by the Fed is to maintain the long-term strength of the economy. Perhaps the most popular measure of the performance of the economy is the growth rate in real GDP. As discussed in a previous topic review, an increase in savings and investment causes an increase in *sustainable real GDP growth*, defined as the growth rate in real GDP that is sustainable over the long term, given the state of technology, natural resources, and the propensity to save and invest. Recent technological advances and the resulting productivity gains have increased the sustainable annual growth rate in real GDP in the U.S. to over 3%. Sustainable real GDP growth is achieved when real GDP equals potential GDP. Therefore, while the Fed's primary goal is to achieve price level stability, the broader objective is to create and maintain a strong and growing economy.

LOS 28.b: Compare and contrast the policies that can be implemented to achieve price level stability.

The Federal Reserve can pursue various monetary policies designed to achieve price level stability. These policies fall into three categories:

- *Fixed-rule policies* refer to actions of the Fed that are taken regardless of the health of the economy. Examples include rules ensuring stable money supply growth. Nobel laureate economist Milton Friedman is a well-known proponent of increasing the money supply only at a constant rate equal to the long-term growth rate

in real GDP. Fixed rules are often recommended because of lags and credibility problems associated with more active monetary policy.

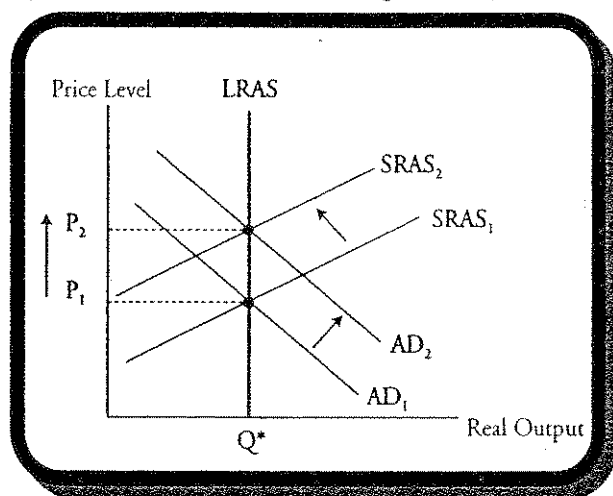
- *Feedback-rule policies* refer to a set of rules dictating actions to be taken by the Federal Reserve in response to the changing health of the economy. Examples include actions to increase the money supply or decrease interest rates if the unemployment rate rises above the natural rate (full employment rate) or if real GDP growth is less than potential real GDP growth for a particular span of time.
- *Discretionary policies* are similar to feedback policies in that they also refer to actions taken in response to changes in the economy, but they do not follow a strict set of rules, but rather use subjective judgment to treat each situation in a unique manner. In practice, most policy changes are discretionary in nature.

LOS 28.c: Discuss policy credibility in relation to aggregate demand and aggregate supply, and the Phillips curve.

Macroeconomists often examine theories related to *policy credibility*, which refers to whether decision makers in the economy (individuals and businesses) believe announced monetary policy changes will actually be implemented as claimed. We will illustrate the difference in effects between an announced, credible policy change and a policy change that comes as a surprise, either because it was not announced or because it was announced but it was not credible (believed by decision makers).

Our scenario here involves an economy with relatively high expected and actual inflation. Consider that the central bank wants to reduce this inflation rate and will do so by reducing the growth rate of the money supply. The current (inflationary) situation is illustrated in Figure 1 by the aggregate demand and short-run aggregate supply curve pairs, $AD_1 - SRAS_1$ and $AD_2 - SRAS_2$.

Figure 1: AD – AS Curves: No Change in Policy



The current situation is represented by AD_1 and $SRAS_1$ which intersect at a real output level of Q^* , which is full employment GDP and is therefore on the LRAS curve as shown. With the money supply growing at its current rate, over time inflation will increase the price level from its current level of P_1 to P_2 . If current inflation expectations are correct and inflation increases the price level from P_1 to P_2 , aggregate demand a year from now will be at AD_2 as incomes and the components of aggregate demand (consumption, government expenditures, investment, and net exports) all increase because of inflation. Real aggregate demand is actually the same in the future, but the price level is higher.

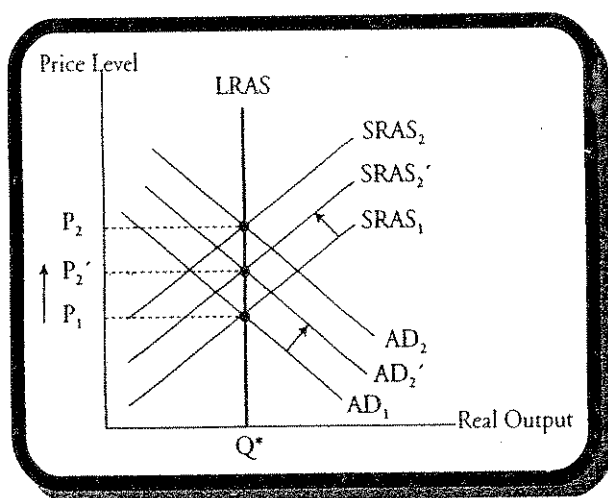
Aggregate supply depends importantly on the real wage rate and the amount of labor supplied. If increases in nominal (money) wages do not keep pace with inflation in the prices of goods and services, the real wage falls, and less labor will be supplied. In our current situation, workers require nominal wage increases (wage inflation)

that correspond to the same increase as that of the price level of goods and services, from P_1 to P_2 . If the expectations for wage and goods inflation are met over the next year, the new equilibrium is at the intersection of AD_2 and $SRAS_2$, at the new price level P_2 , and at the same (full employment level) Q^* . So that's the initial situation for our example inflation will be just as expected over the next year, raising the price level from P_1 to P_2 , and aggregate demand and aggregate supply will both shift so that equilibrium output is still at the full employment level.

Now we want to look at a change in monetary policy, a decrease in the growth rate of the money supply, designed to reduce the inflation rate. The point we will illustrate is that the outcome will be different if the policy change is announced and credible, than it will be if the policy change is a surprise (unannounced) or is announced but is not believed (not credible).

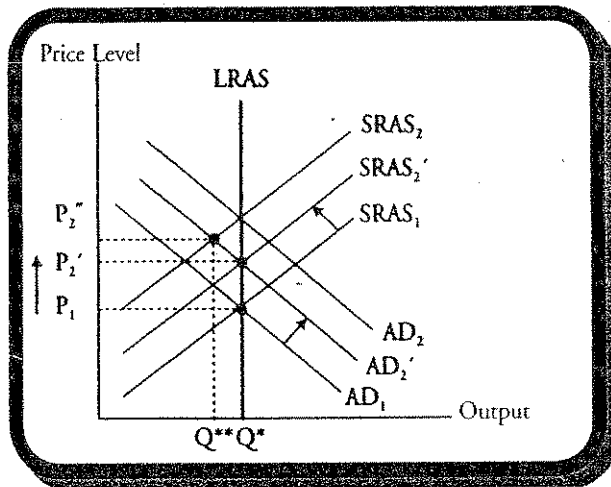
Figure 2 illustrates the new equilibrium if the policy change is announced and credible. In response to an announcement that the central bank will slow the growth of the money supply, which will increase interest rates and slow aggregate demand growth, decision makers revise their inflation expectations downward. Based on the new (lower) expected rate of inflation, workers require smaller nominal wage increases so that aggregate supply does not decrease as much over the next year, it falls only to $SRAS_2'$. Because of the decrease in the rate of growth of the money supply, aggregate demand increases only to AD_2' . Because the policy change was announced and credible, inflation is less than it would have been, and the policy change has been a success. The increase in the price level (inflation) has been reduced and the economy is still at full employment equilibrium along the LRAS curve.

Figure 2: AD-AS Curves: Credible Policy Change



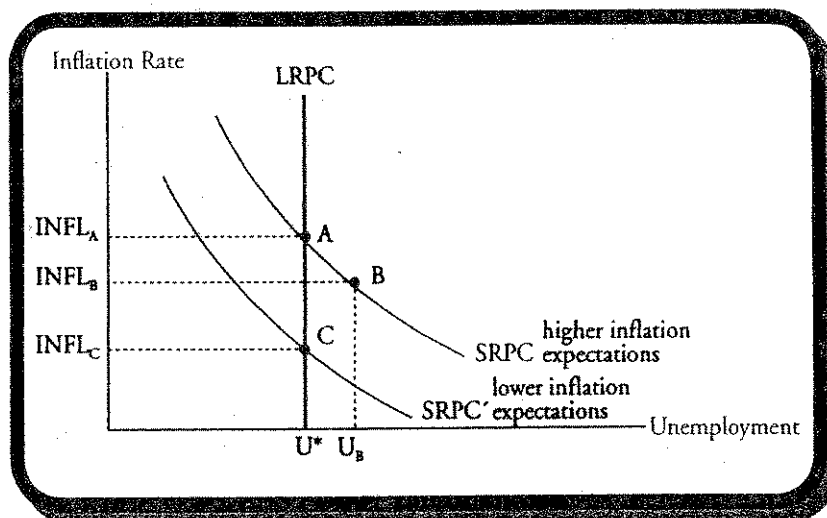
In contrast, let's now consider what happens if the monetary policy change is not clear or credible. Figure 3 illustrates these effects. If the central bank institutes the same reduction in the growth rate of the money supply as in the previous example, aggregate demand will increase to AD_2' , just as it did when the policy change was announced and credible. Because workers either do not know or do not believe that the central bank will slow the growth rate of the money supply, required wages will be based on the old (unchanged) expectations of inflation. Thus the SRAS curve shifts just as it would with no policy change, from $SRAS_1$ to $SRAS_2$. The smaller increase in aggregate demand combined with the large drop in aggregate supply causes the economy to fall into recession, in which real GDP is less than potential GDP ($Q^{**} < Q^*$), as represented by the intersection of AD_2' and $SRAS_2$. Moreover, the new price level (P_2'') exceeds the price level one would expect from a credible policy change (P_2'). When the central bank policy change is unannounced or not credible, it has the unintended effect of reducing output below full-employment output, and the reduction in the inflation rate is less than when the policy change was announced and credible.

Figure 3: AD-AS Curves: Policy Change Lacking Credibility



The effects of Fed policy changes also can be demonstrated using the Phillips curve, which is a graph of the (historically observed) negative short-run relationship between the inflation rate and the unemployment rate.

Figure 4: Phillips Curve



Because the Fed policy change is unexpected or lacks credibility, individuals will continue to have high inflation expectations, as represented by the intersection of the higher short-run Phillips curve (SRPC) with the long-run Phillips curve (LRPC). But the Fed policy actually causes the inflation rate to be less than expected ($INFL_B$ rather than originally expected $INFL_A$). The effect on the economy is illustrated as a movement along the SRPC from point A to point B. Point B represents lower inflation, but comes at a cost of a higher unemployment rate (increase in the unemployment rate from the full-employment rate, U^* , to U_B). Therefore, the unexpected change in Fed policy causes the unemployment rate to increase.

On the other hand, if the policy change is clearly understood and credible, individuals will revise their inflation expectations downward and the short-run Phillips curve will shift down to SRPC'. The inflation rate will drop all the way to $INFL_C$ and the unemployment rate will remain at the full-employment level. Therefore, the clear and credible tightened Fed policy causes the inflation rate to drop, and does so without increasing the unemployment rate (without decreasing employment and output).

LOS 28.d: Compare and contrast the new Monetarist and new Keynesian feedback rules.

The new Monetarist feedback rule places emphasis on price level stability. The rule uses the quantity theory of money, which states that increases in the money supply cause proportional increases in the price level. The quantity theory of money equation is:

$$MV = PY$$

where M is the money supply, V is the velocity of money, P is the price level, and Y is the quantity of output (goods and services). The equation often is rewritten in terms of growth rates:

$$\text{growth rate in } M + \text{growth rate in } V = \text{growth rate in } P + \text{growth rate in } Y$$

Solving for the money supply growth rate:

$$\text{growth rate in } M = \text{growth rate in } P + \text{growth rate in } Y - \text{growth rate in } V$$

Based on this equation, the new Monetarist feedback rule sets the money supply growth rate equal to the target inflation rate plus the 10-year moving average real GDP growth rate minus the 4-year moving average velocity growth rate. Therefore, money supply growth is triggered by changes in the target inflation rate and changes in the moving average growth rates in real GDP and money supply velocity. Notice that the new Monetarist feedback rule adjusts rather slowly to changes in the business cycle since it is based on longer-term moving averages of the growth rates of real GDP and velocity.

In contrast, the new Keynesian feedback rule places emphasis on both price level stability and business cycle stability (i.e., reducing deviations of real GDP from potential real GDP). The rule changes the federal funds target rate in response to changes in the inflation rate, and in response to changes in other premiums associated with the differences between actual inflation and target inflation and to the difference between actual real GDP and full-employment real GDP. Therefore, the new Keynesian rule increases the federal funds target rate as inflation and inflation indicators increase and as real GDP rises above potential GDP.

The main differences between the two rules are:

- The new Keynesian rule is directly and immediately affected by the business cycle. Gaps between GDP and potential GDP bring quick action under the new Keynesian rule. In contrast, the new Monetarist rule produces a slow response to changes in real GDP.
- The new Keynesian rule uses the federal funds target rate as the policy variable, whereas the new Monetarist rule uses the growth rate of the money supply as the policy variable.

The Fed's actions have more closely followed the new Keynesian rule over the past two decades.

KEY CONCEPTS

1. The Fed defines price level stability as a stable inflation rate between zero and three percent.
2. Sustainable real GDP growth is defined as the growth rate in real GDP that is sustainable over the long term, given the state of technology, natural resources, and propensity to save and invest.
3. While the Fed's primary goal is to achieve price level stability, its broader objective is to create and maintain a strong and vibrant economy.
4. The Fed can pursue various monetary policies designed to achieve price level stability. Fixed-rule policies refer to actions of the Fed that are taken regardless of the health of the economy. Feedback-rule policies refer to a set of rules dictating actions to be taken in response to the changing health of the economy. Discretionary policies are similar to feedback policies, but rather than follow a strict set of rules, they use subjective judgment to treat each situation in a unique manner.
5. Monetary policy may fail as a result of a lack of credibility. If policy changes are not credible, individuals will not revise expectations correctly. Consequently, Fed policy can produce unwanted results. Fed policy designed to slow the inflation rate may throw the economy into recession (as demonstrated by the aggregate demand and supply curves) and high levels of unemployment (as demonstrated by the Phillips curve).
6. The new Monetarist feedback rule sets the growth rate in money supply as a function of the target inflation rate and of the moving average growth rates in GDP and money velocity.
7. The new Keynesian feedback rule sets the federal funds target rate as a function of the inflation rate and the differences between actual and target inflation and actual and potential real GDP.
8. The new Keynesian rule is directly and immediately affected by the business cycle, whereas the new Monetarist rule reacts slowly to changes in real GDP. The new Keynesian rule uses the federal funds target rate as the decision variable, while the new Monetarist rule uses growth in the money supply.

CONCEPT CHECKERS: MONETARY POLICY

- The Federal Reserve's primary objective is to:
 - reduce the inflation rate to zero in the long run.
 - encourage savings by increasing nominal interest rates.
 - prevent economic growth from falling below its sustainable rate.
 - maintain price level stability and thereby improve the long-term strength of the economy.
- The Federal Reserve is debating two alternative policies. Policy 1 maintains the same growth rate in the money supply during inflationary periods and during recession periods. Policy 2 increases the money supply growth rate during recession periods and decreases the money supply growth rate during inflationary periods. Indicate which policy is an example of a feedback rule policy and indicate which policy, if implemented correctly, is likely to shorten the duration of a recession.

<u>Feedback rule policy</u>	<u>Shortened recession</u>
-----------------------------	----------------------------

- | | |
|-------------|----------|
| A. Policy 1 | Policy 1 |
| B. Policy 1 | Policy 2 |
| C. Policy 2 | Policy 1 |
| D. Policy 2 | Policy 2 |
- The business cycle is experiencing a recession, and monetary authorities are considering taking action to counter the downtrend. Proper discretionary policy actions taken by the Federal Reserve should have the following effects on the aggregate demand curve and on the price level:

<u>Aggregate demand</u>	<u>Price level</u>
-------------------------	--------------------

- | | |
|-------------|----------|
| A. Increase | Increase |
| B. Increase | Decrease |
| C. Decrease | Increase |
| D. Decrease | Decrease |
- With the economy at full employment, the Federal Reserve unexpectedly decides to decrease the money supply and increase interest rates. The *most likely* effects of the Fed policy change on the economy and on the unemployment rate are:

<u>Economy</u>	<u>Unemployment</u>
----------------	---------------------

- | | |
|----------------------------------|----------------------------------|
| A. Real GDP < potential real GDP | Unemployment rate > natural rate |
| B. Real GDP < potential real GDP | Unemployment rate < natural rate |
| C. Real GDP > potential real GDP | Unemployment rate > natural rate |
| D. Real GDP > potential real GDP | Unemployment rate < natural rate |
- In the past two quarters, real GDP dropped below potential GDP. Two competing policy rules have been proposed to counter adverse movements in price levels and real GDP: the new Monetarist feedback rule and the new Keynesian feedback rule. Indicate which rule places more emphasis on the supply of money, and which policy is better equipped to address the GDP gap.

<u>Emphasis on supply of money</u>	<u>Emphasis on GDP gap</u>
------------------------------------	----------------------------

- | | |
|-------------------|----------------|
| A. New Monetarist | New Monetarist |
| B. New Monetarist | New Keynesian |
| C. New Keynesian | New Monetarist |
| D. New Keynesian | New Keynesian |

ANSWERS – CONCEPT CHECKERS: MONETARY POLICY

1. D The Fed's primary objective is to maintain price stability, which it defines as an inflation rate between zero and three percent. Keeping the inflation rate low and stable encourages savings, which improves long-run economic growth.
2. D Policy 2 is a monetary policy change made based on the state of the economy, which is the definition of a feedback rule policy. In contrast, a fixed rule policy refers to action that does not depend on the state of the economy. If implemented well, the feedback policy is expected to stabilize the economy. It is designed to increase aggregate demand during recessions and to decrease aggregate demand during inflationary periods.
3. A Discretionary policy refers to actions taken by the Fed that address each economic situation in a unique manner. To counter the recession, the Fed likely will increase the money supply and decrease interest rates. If implemented properly, the action is expected to stimulate the economy by increasing the aggregate demand curve. The increase in aggregate demand will cause the price level to rise.
4. A With the economy at full employment, real GDP equals potential real GDP and the unemployment rate equals the natural (full employment) rate. The unexpected decrease in the money supply causes aggregate demand to drop. Because the action was unexpected, individuals have not renegotiated their wage rates, so aggregate supply remains unaffected. The drop in aggregate demand with no change in aggregate supply causes a recession, implying that real GDP will drop below potential GDP and that the unemployment rate will increase above the natural rate.
5. B The new Monetarist feedback rule is based on the quantity theory of money. Under this rule, the Federal Reserve changes the growth rate of the money supply only slowly, based on the target inflation rate, the moving average growth rate of real GDP, and the moving average growth rate of the velocity of money. In contrast, the new Keynesian feedback rule changes the federal funds target rate in response to the gap between actual inflation and target inflation and the gap between actual real GDP and potential real GDP. The new Keynesian feedback rule produces more and quicker responses to changes in inflation and real GDP.

TRADING WITH THE WORLD

Study Session 6

EXAM FOCUS

You should understand the principle of comparative advantage as that is the basis of the case for free trade. Make sure you understand the difference between the effects of tariffs and the effects of quotas, and how restrictions on trade in general decrease the wealth of a

country. Know who gains and who loses from trade restrictions and that trade restrictions are considered to be primarily driven by the political activity of those who stand to gain from specific trade restrictions.

LOS 29.a: Discuss opportunity cost associated with trade, how countries can gain from international trade, how countries determine whether to import, export or produce goods and services, and explain the gains of trade for all parties.

Comparative advantage refers to the lowest *opportunity cost* to produce a product.

The law of comparative advantage holds that *trading partners can be made better off if they specialize* in the production of goods for which they are the low-opportunity-cost producer (have a comparative advantage) and trade for those goods for which they are the high-opportunity-cost producer. A country gains (i.e., it realizes expanded consumption possibilities) from international trade when it *exports* those goods for which it has a comparative advantage and *imports* those goods for which it does *not*.

An example will illustrate the gains from trade in terms of expanded consumption opportunities for two countries. Figures 1 and 2 show the production possibility frontiers (PPF) for two countries, Alton and Borton, for two generic goods, food and machinery.

Figure 1: Production Possibility Frontier for Alton

