7. Business Cycles

Learning Objectives

This summary includes a review and an analysis of the principles set forth by CFA Institute. Upon review of this summary, you should be able to:

- ***Discuss the business cycle .....pg. 108***
- ***Explain the typical patterns of resource use fluctuation, housing sector activity, and external trade sector activity, as an economy moves through the business cycle .....pg. 108***
- ***Discuss business cycle theories .....pg. 110***
- ***Discuss types of unemployment and describe the various measures of unemployment .....pg. 115***
- ***Discuss inflation, disinflation, deflation, and hyperinflation .....pg. 119***
- ***Discuss the construction of indices for measuring inflation .....pg. 119***
- ***Compare inflation measures, including uses and limitations .....pg. 119***
- ***Discuss cost-push versus demand-pull inflation .....pg. 121***
- ***Discuss the uses and limitations of economic indicators. .....pg. 122***

Overview

The focus of this summary is short-term economic activity, and how various factors impact it to drive the short-term fluctuations that become what is known as the business cycle.

The Business Cycle

Learning Objective: Discuss the business cycle.

Learning Objective: Explain the typical patterns of resource use fluctuation, housing sector activity, and external trade sector activity, as an economy moves through the business cycle.

The **business cycle** is *the term used to describe fluctuations in the overall level of economic activity, as measured by changes to real GDP or the unemployment rate*. Generally, there are four phases to the business cycle:

1. trough
2. expansion
3. peak
4. contraction

The "starting point" is the end of an economic slowdown; this is the lowest point of the overall cycle, which is called the trough. The top point is the peak, where the highest level of economic activity is achieved. The economy grows from trough to peak in the expansion phase. Once the economy has passed its peak and begins to slow down, it goes through a period of contraction until it reaches the next trough. The contraction can often become a recession - technically when two or more consecutive quarterly GDP declines occur. If aggregate activity severely contracts, it can be called a depression.

Though various indicators are used to gauge the current phase of the business cycle, each phase is marked by certain recurring characteristics:

- *Contraction* - Economic activity (GDP) overall declines, the unemployment rate decline stops early on and will again increase as the contraction phase persists, consumer spending declines as unemployment rises, business capital spending also drops. The rate of inflation will also decline; in periods of severe contraction, central banks will worry about deflation. Banks will tend to intervene with stimulatory measures such as lowering interest rates.
- *Early expansion* - Economic activity begins to improve, unemployment tends to lag as companies are not yet hiring again; however, spending by consumers and businesses starts to improve. Inflation also tends to lag, so it will stay low during this phase. Central bank measures taken during the downturn are likely still in place.

- *Late expansion* - Economic improvement and growth are now well under way. Unemployment begins to decline, and consumer and business spending picks up again. Central banks may begin raising interest rates again, and inflation begins to increase with economic activity.
- *Peak* - Growth in the economy is at its highest point, and will subsequently show a decreasing rate of growth. Unemployment keeps falling but at this point business hiring starts to slow. Spending is also at its peak, but like other measures, it too begins to slow. Inflation is at its highest, and central banks will use restrictive measures (higher rates) to curb excessive growth.

Resource Use through the Business Cycle

As discussed earlier, each phase of the business cycle is marked by certain characteristics in regards to economic growth, inflation, unemployment, etc. Similarly, the use of resources follows a predictable pattern at each phase of the cycle.

Labor usage tends to somewhat lag the business cycle. Companies do not start to reduce headcount at the first sign of contraction; rather, they prefer to wait until they know with reasonable certainty whether a downturn is brief and slight, or long and/or severe. Companies will first exercise other options, like ordering less inventory or slowing down production, before they start to reduce the number of workers. Once it becomes clear that a contraction will be more extended, they will increase cost-cutting measures, such as layoffs and firings. Similarly, as the business cycle moves through the trough and into early expansion, companies will not immediately start hiring. Companies will wait until they need to rebuild their inventories or wish to start making capital investments again. Once this happens, labor usage will start to increase again.

Capital spending will also change in conjunction with the business cycle. Economic contraction abruptly reduces business spending, since companies first rely on reducing spending before making deeper cuts. Items with short lead times (technology, light equipment) are cut first, followed by larger projects. Capacity utilization will be low throughout the contraction phase. Once the recovery starts, utilization is still low, but will quickly move up as consumer spending picks up and companies begin to see improved cash flows. In fact, companies will often seek to increase capacity well before the cyclical peak, in an attempt to upgrade to new market conditions.

Inventory levels change in three broad steps:

1. After the peak of economic activity, inventories will keep accumulating, since consumer spending starts to quickly decline but production takes longer to scale down. The unintended inventory buildup will falsely signal an improvement in economic conditions, and the only way to reduce inventory at this stage will be to reduce production even further; this will now be interpreted as a worse-than-anticipated downturn.
2. Once inventories have been reduced to desirable levels, production will pick up again just to maintain the current inventory levels. This often forces companies to start hiring once again, which will act as a signal of economic improvement.

3. In a reversal of the first step, economic expansion often means companies are trying to keep up with increased demand, so they suddenly have to replenish inventories and keep up with sales simultaneously. At this point, production will dramatically increase.

Business Cycle Theories

Learning Objective: Discuss business cycle theories.

There are several prevailing theories that attempt to describe the workings of the business cycle:

- Neoclassical/Austrian Theory
- Keynesian Theory
- Monetarist Theory

Neoclassical/Austrian

The Classical view of the economy: Market prices and wages decline during a recession quickly enough to bring the economy back to full employment within a short period of time. Classicists adopted **Say's Law**, which *states that production creates it own demand*. Over-production relative to demand is impossible because the purchasing power (income) generated by production to resource suppliers will be sufficient to purchase the goods produced.

The advocates of neoclassical thought believe in the concept of the "invisible hand," where markets will find an equilibrium price where supply equals demand. Any shocks in the economy will be swiftly corrected within the free market, through changes in prices, rates, and/or wages. Neoclassical theory suffered a large setback during the Great Depression, since the theory implies that prolonged downturns should not be possible.

The Austrian school of thought expanded on neoclassical theory, by acknowledging the impact that government policies (most notably, changes in rates and money supply) will have on the economy. The Austrian school believes the business cycle is caused by "misguided" government intervention, and treats it as a series of temporary shifts in equilibrium. This theory also does not require money to exist, as its proponents believe that market equilibrium can also be achieved by bartering; they believe money is merely another tool that helps simplify exchange.

Keynesian Theory

Keynes disagreed with both neoclassical and Austrian beliefs. During the Depression, he noticed how the sustained downturn prevailed despite market measures such as wage reductions, because this in turn further reduced consumer spending, which in turn forced further contraction. He also argued that there would be instances where lower interest rates would not stimulate growth.

Keynesian economists believe that the markets will not always be able to efficiently correct deviations from equilibrium, and in these cases advocate for government intervention through fiscal policy as a way to mitigate prolonged economic shifts. During downturns, the government

should deliberately run fiscal deficits through higher spending and tax cuts. It should be noted, Keynesian thought completely disagrees with neoclassical theory on government's role in the economy, and that Keynes did not believe in continuous government intervention, but rather it should only step in during crisis periods.

Example: The Classicists versus the Keynesians

Keynesians	Classicists
Producers generate output to meet total demand.	Total demand meets production because production generates just enough income to purchase the goods produced.
There are no automatic forces generating equilibrium. Overproduction leads to unemployment and excess supply. Underproduction leads to inflation and excess demand.	The pricing system corrects any production imbalances so equilibrium exists.

Monetarist Theory

The monetarists disagree with Keynesian theory, but for different reasons than those of Neoclassical thought. Mainly, they feel that Keynes failed to consider the impact of money supply. Furthermore, they believe that the view of short-term government intervention fails to consider the long-term impact of such actions, and that it is very difficult to properly time such broad government policy. Monetarists therefore believe in a consistent, clear, and limited role from government, along with a steady growth of the money supply to control inflation. They also believe that business cycles are driven by government intervention and exogenous shocks.

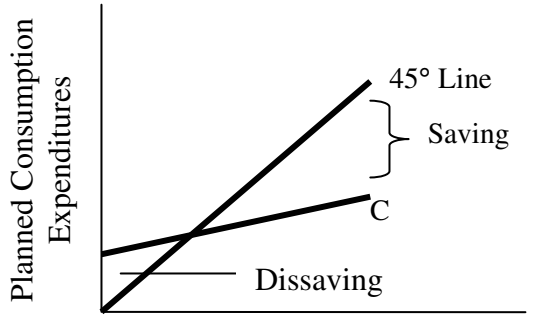
The Keynesian Model

The Four Components of Aggregate Demand

1. Consumption Function

The **consumption function** *describes the positive correlation between disposable income and consumption. As disposable income increases, consumption expenditures increase, but by a smaller fraction than the increase in income*. This is reflected in the slope of the consumption function, the MPC (marginal propensity to consume), which is less than one.

Aggregate Consumption Function



At low incomes, expenditure is greater than income. People borrow (or "dissave" which is to spend savings) to purchase consumption goods.

For example, Margaret's marginal propensity to consume is .8. This implies that when Margaret wins the lump-sum lottery of $250,000, she spends 80% of her winnings or .8 × $250,000 = $200,000.

2. Investment

Investment encompasses expenditures on fixed assets, and changes in inventories of raw materials and final products not yet sold. Keynes assumes these expenditures are autonomous (they do not vary with income) since they are determined by factors that are outside the basic model.

3. Government Expenditures

Like investment, these expenditures are assumed to be independent of income (or autonomous).

4. Planned Net Exports

Since exports are dependent on spending choices and income levels abroad, planned net exports are independent of changes in domestic income level.

For example, while the Keynesian model assumes exports are independent of the domestic income level, imports increase as aggregate income expands. As income expands, net exports will decline. Observe below:

2014	2015
Exports = $100	Exports = $100
Imports = $200	Imports = $250
Aggregate income = $1,000	Aggregate income = $1,200
Net exports = -$100	Net exports = -$150

Although exports and aggregate income are independent, as aggregate income rises in 2015, net exports falls. This is because as aggregate income increases, import consumption rises.

Aggregate expenditure (AE) is *the sum of spending on consumption (C), investment (I), government purchases (G), and net exports (X).*

In the Keynesian model, equilibrium exists when:

$$\text{Total output} = \text{Planned } C + I + G + X$$

or

Real GDP = Planned aggregate expenditures

Note: Planned expenditures need not equal actual expenditures.

If actual expenditures are less than planned expenditures, then businesses will accumulate inventories.

If planned expenditures are greater than output, then businesses sell more goods than anticipated, which leads to a drawing down of inventories.

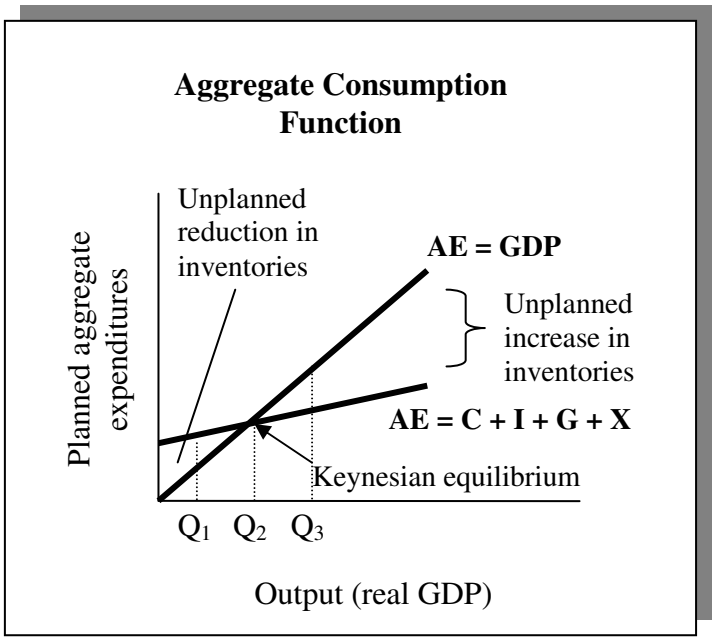
Example: Planned versus Actual Expenditures

Since business A anticipates that consumers will purchase four units of good G1 and 8 units of good G2, it decides to produce 6 units of G1 and 10 units of G2. Thus, planned investment in inventory is two units of G1 and two units of G2.

Unfortunately, consumers change their taste for both G1 and G2. Their actual demand is 6 units of G1 and 6 units of G2. Business A thus reduces its inventory of G1 by 2 units and increases its inventory of G2 by 2 units. Business A's actual investment differs from its planned investment due to changes in consumer demand.

Graphic Representation of Keynesian Equilibrium

Equilibrium occurs when planned aggregate expenditures equal the value of current output. In the diagram, the 45-degree line represents points where aggregate expenditure equals real GDP. Keynesian equilibrium (or AE = GDP) is only achieved on this line. The consumption function, AE = C + I + G + X, has a slope less than one and so is flatter than the 45 degree line. Graphically, total planned aggregate expenditures equal real GDP when AE intersects the 45-degree line.



Example

Consider the graphic representation of Keynesian equilibrium. Prior to the intersection of AE = C + I + G + X with the 45 degree line, total planned aggregate expenditures are greater than real GDP. In this area, inventories fall due to excess demand; equilibrium occurs by increasing output (i.e., move to the right on the horizontal axis). For points beyond the intersection of AE and the 45-degree line, total planned expenditures are less than real output. In

this region, equilibrium is achieved by moving left along the horizontal axis where real GDP is declining.

If the economy is operating below full employment (FE) capacity, increases in AE lead to expansions in both output and employment. Supply (real GDP) can accommodate the increased demand in the economy. (Graphically, a shift upward in AE implies a new equilibrium, i.e., a higher level of output.) Once FE capacity is reached, further expansion in AE results in inflation, without increasing real output.

Thus to achieve FE capacity output without any inflation, a sound macroeconomic policy by governments must regulate AE.

Monetarists belong to a school of economics that espouses:

- Monetary instability is the major cause of fluctuations in real GNP.
- Rapid growth of the money supply is the major cause of inflation. Quantity of money is determined by the Federal Reserve. If the money supply grows steadily, the economy will be at or close to full employment. If the Fed slows growth or decreases the money supply too fast, then the economy will face recession.
- Short-run aggregate supply is the same as the Keynesian view.
- Monetarist policy is the same as the classical view.

Newer Theories

Some newer theories have emerged that attempt to build on existing premises. For example, the real business cycle model (RBC) seeks to expand on neoclassical models. Like neoclassical theory, it asserts that money is not required in the economy. Therefore, monetary variables like inflation are assumed to have no impact, and the business cycle is instead driven by causes like technological advancement. They also believe, in agreement with neoclassical thought, that the market will quickly react to shifts in equilibrium and imbalances will not persist. New Keynesians, on the other hand, argue that inflation is a primary cause of business cycles, and they attempt to link monetary policy from central banks with changes in the business cycle. They also believe that even small economic shifts can cause extended breaks from equilibrium. One crucial difference between newer and older theories is that newer theories place much greater emphasis on aggregate supply.

An interesting recent development is that despite these varying schools of thought, there seems to be a gradual shift to consensus on what drives business cycles and what role should be played by governments and central banks.

Unemployment

Learning Objective: Discuss types of unemployment and describe the various measures of unemployment.

In general, unemployment refers to people who are not working but are *actively searching* for work. There are two general types of unemployed people:

1. long-term unemployed - have been out of work for an extended period (generally 3-4 months or longer) but are still looking
2. frictionally unemployed - have landed a job and are in the period between having left the old job but are not yet ready to begin the new one

The **unemployment rate** is simply *a ratio of the number of unemployed to the overall labor force*, where the **labor force** is defined as *all the people who either have a job or are actively looking for one*. These measures only account for people engaged in active job searches, and as such exclude groups like retirees, students, and stay-at-home parents. They also exclude the underemployed, the voluntarily unemployed, and discouraged workers.

The **underemployed** are those *people who are working but have the qualifications to work at a higher-paying job*; this typically occurs when a person is out of work and takes a different job to earn a paycheck. It can be difficult to estimate the number of underemployed people, so this measure is excluded from the official unemployment rate.

Discouraged workers are *unemployed people who have stopped searching for a job*. The unemployment rate often dips as people change from being unemployed to discouraged, so this can falsely signal an improvement in economic conditions. **Voluntarily unemployed** are *people who choose to stay out of the labor force*, usually by refusing to take work that does not pay enough. **Seasonal workers** may be technically unemployed and receiving unemployment benefits but may not be looking for a job during the months that their work is made impossible by the weather. Such workers overstate the unemployment rate. **Part-time workers** may wish to work full time but cannot find full time work. Such a worker is considered employed, thus understating the unemployment rate.

The **employment/population ratio** avoids some of these measurement problems:

$$\text{Employment/Population ratio} = \frac{\text{Number of persons 16 years of age and older employed as civilians}}{\text{Total civilian population 16 years of age and older}}$$

The components of the ratio are easily measured and well defined, and do not require a subjective judgment as to whether a person is available for work or actively seeking employment.

Different measures of the unemployment rate will come up with different estimates, as they rely on a variety of sources for their calculations. For example, the rate generally quoted by the government relies on surveys of households. Other groups will depend on the number of claims for unemployment assistance, or simplify the measurement of the labor force by using the number of people who are of working age, thereby ignoring their willingness to work or look for work. Still others elaborate by considering those who are discouraged, underemployed, etc. Finally, payroll/productivity measures are often used as a proxy for the unemployment rate, because they are viewed as more closely reacting to economic changes.

There are two main reasons why the unemployment rate is a lagging indicator of the business cycle (in other words, it tends to coincide with an economic condition in the past):

1. The labor force is constantly expanding or declining with the business cycle. As a result, many people change from being unemployed to discouraged in contractions, which *artificially reduces* the unemployment rate. Conversely, many discouraged workers switch back to actively seeking work during expansions, which *artificially increases* the unemployment rate (measuring labor force via just the total working population avoid this measurement bias).
2. Businesses tend to delay layoffs until they are absolutely necessary, so an artificially low unemployment rate may prevail as the economy begins to contract.

The labor market indicators discussed above are used to determine the health of the economy, but they don't explain the quantity of labor used to produce real GDP because individuals work varying number of hours. **Aggregate hours** are *total hours worked by everyone employed, including full and part time workers*. In general, over time aggregate hours in the U.S. have been increasing, but the number of hours worked per person has decreased. The main reason behind this is that the number of people in the workforce has increased, but more part time than full time jobs have been created.

The **real wage rate** describes *how much goods and services an hour's work can buy*.

$$\text{Real wage rate} = \frac{\text{Money wage rate (\$ per hour)}}{\text{Price level}}$$

If the GDP deflator was 100 in 2000, and if wages are measured using the GDP deflator, then they are expressed in terms of 2000 dollars. Real wage rates are measured in several ways. The Department of Labor calculates average hourly earnings of private manufacturing non-supervisory workers. With this measure, wages rose through the 1970s, stayed steady until the mid-1990s, and then began increasing again.

Real wages can also be measured as:

$$\frac{\text{Total wages and salaries(from National Income and Product Accounts)}}{\text{Aggregate hours}}$$

This is a broader measure than the Department of Labor measure since it includes more employees. By this measure, wages have been climbing steadily with a brief dip in the early 1990s. A third measure is total labor compensation, which includes wages, salaries, and supplemental pay such as fringe benefits. With this measure, wages increased steadily until about 2000.

With all of these measures, the growth rate of wages was slower in the 1970s, a decrease which occurred at the same time with slower productivity growth.

Key Employment Terms

Civilian labor force (working age population): *The total number of people 16 years of age or older who are either employed or seeking employment*.

Unemployed: *Describes a member of the civilian labor force who is currently not working, but is either currently seeking employment or waiting to start or return to a job*.

Labor force participation rate (LFPR): *The number of people in the civilian labor force over 16 years of age who are either employed or actively looking for employment, as a percentage of the total population 16 years and over*.

$$\text{Rate of unemployment} = \frac{\text{Number of persons unemployed}}{\text{Number in the labor force}} \times 100$$

For example, assume the following data for a hypothetical economy:

Civilian labor force	100
Persons employed	93
Total population 16 years and older	120

There are 7 unemployed workers in this data.

Unemployment rate = 7/100 = Number unemployed / Civilian labor force = 7%

LFPR = Civilian labor force / Total population 16 years and older = 100/120 = 83.33%

Why Unemployment?

1. *Temporary unemployment* - Labor mobility may create temporary unemployment as workers move from contracting to expanding industries and move in and out of the labor force. Young workers also create temporary unemployment as they often switch jobs.
2. *Imperfect information* - The lag between losing a job and finding a job due to lack of information creates unemployment.

Note: The rate of unemployment will always be a positive number.

Kinds of Unemployment

Frictional unemployment *occurs due to incomplete information*. Available workers are unaware of job openings, and employers are not fully aware of qualified, available workers. As an example: A worker is looking for a job. In his or her search, there are costs and benefits. The benefits of extending a job search are that he or she is more likely to find a "better" job (more pay, better environment, etc.). The cost of an extended search is defined as an opportunity cost. Each job the worker refuses in pursuit of a "better" job represents lost income and benefits that could have been earned. The length of a job search involves comparing the marginal benefit to the marginal cost of further searching. As soon as the costs exceed the benefits, the worker stops searching and accepts a job offer.

Structural unemployment *occurs due to changes in the basic structure of the economy that eliminate some jobs while generating new job openings for which unemployed workers are not well suited*. The retraining of workers for new sector jobs takes time and resources.

Cyclical unemployment *occurs because the recessionary phase of business cycles creates inadequate aggregate demand for labor, leading to layoffs and cutbacks in production*.

Full Employment

Full employment is *the level of employment stemming from the efficient use of the labor force after subtracting the natural rate of unemployment, which is the level of unemployment that exists permanently due to information costs, dynamic changes, and the structural conditions of the economy*. Full employment implies the natural, not zero, rate of unemployment.

Natural rate of unemployment is *the result of structural and frictional conditions on long-run average unemployment rates*. This is a sustainable rate in the long run. Full employment implies this level of unemployment.

The natural rate of unemployment is affected by the following factors:

1. *Demographics* - As the number of young workers increases, the natural rate of unemployment increases because younger workers change jobs and move in and out of the labor force (possibly due to education) more frequently than older workers.
2. *Minimum wage* - Increases in the minimum wage increase the natural unemployment rate because employers hire fewer workers.
3. *Unemployment benefits* - An increase in benefits reduces the opportunity cost of worker job search thus increasing the natural rate of unemployment.

Potential GDP is *output achieved and sustained into the future, considering the labor force size, expected productivity by labor, and the natural rate of unemployment*. Actual output may differ from the economy's potential.

Real GDP varies around potential GDP while the unemployment rate varies around the natural rate of unemployment. If the unemployment rate is lower than the natural rate of unemployment, then real GDP is more than potential GDP. If unemployment is greater than the natural rate, then real GDP is less than potential GDP.

Inflation

Learning Objective: Discuss inflation, disinflation, deflation, and hyperinflation.

Inflation is *a sustained increase in the price of goods and services*. Investors track inflation closely as it allows them to gauge the current state of the economy. The inflation rate is the percent change in a price index and gauges how quickly prices are increasing. *If the inflation rate is negative*, this is referred to as **deflation**. This means price levels are decreasing. Deflation is particularly damaging because while the value of money increases in this situation, it also means that liabilities (carrying debt) becomes more expensive. In addition, businesses tend to see lower revenues in a deflationary environment, which - coupled with higher real debt - will force them to cut expenses and investments. This in turn worsens unemployment and leads to even further economic decline (deflationary spiral).

Disinflation, which is different than deflation, is simply *a decline in the inflation rate and means that the rate of inflation is slowing but is still positive*. **Hyperinflation** is a state where the *inflation rate is extremely high*, causing the purchasing power of money to quickly erode. It is most often caused by poor government policies, where spending far exceeds tax revenues and monetary policy increases the money supply to accommodate spending. Countries tend to use policies that maintain inflation at a low rate (mostly monetary policy), so as to reduce the risk of slipping into deflation or hyperinflation. Finally, **core inflation** refers to *an inflation rate that excludes the impact of food and energy prices*, and **headline inflation** refers to *inflation that captures all available goods and services*.

Measuring and Explaining Inflation

Learning Objective: Discuss the construction of indices for measuring inflation.

Learning Objective: Compare inflation measures, including uses and limitations.

Measurement of the inflation rate relies on the construction of a price index. A **price index** is simply the *weighted average price of a basket of goods and services*. Below is a brief example of the calculation of a price index and inflation rate.

Inflation is measured by using the Consumer Price Index (CPI):

$$\text{Inflation}(i) = \frac{\text{This year's } CPI - \text{Last year's } CPI}{\text{Last year's } CPI} \times 100$$

Consider the data for a hypothetical economy below:

Year	Price Level	Rate of Inflation
1995	100	-------
2005	120	20 percent
2015	140	40 percent

The inflation rate for 2005 and 2015 is calculated as follows:

$$i(2005) = (120 - 100)/100 \times 100 = 20\%$$

$$i(2015) = (140 - 100)/100 \times 100 = 40\%$$

Each of these rates of inflation is relative to the base year, 1995.

Example

Assume an index is built using only two goods, X and Y. Prices of these goods were \$1/lb for X and \$2/lb for Y at the beginning of the year, and \$1.10/lb for X and \$2.50/lb for Y at the end of the year. Quantities for the basket of goods were 50 lbs and 80 lbs respectively at the start of the year, and 60 lbs and 80 lbs at the end of the year.

Total value of the basket of goods at the start of the year is $(1 \times 50) + (2 \times 80)$, or \$210. Total value at the end of the year is $(1.10 \times 60) + (2.50 \times 80)$, or \$266.

The price index is typically set to 100 at the start (the base period), so the price index measure at the end of the year equals $266/210 \times 100$, or 126.67.

The inflation rate for the year is $126.67/100 - 1$, which equals 26.67%.

Most indices hold the components of the consumption basket constant - these are called Laspeyres indices. Such indices experience three major biases:

1. *Substitution bias* - As the price of goods increases, people will tend to seek out substitutes with lower prices. As a result, keeping the basket of goods constant fails to capture this effect and the inflation measure will be upwardly biased.
2. *Quality bias* - If the quality of a good improves, people will be more satisfied with that good. The price of that good may increase, but the price index will not consider the fact that the reason the price has risen is due to a real improvement in that good. This also results in an upward bias in the inflation measure.
3. *New product bias* - Keeping a basket of goods constant means excluding products that are new to the market. This also creates an upward bias in measured inflation.

The easiest way to correct quality bias is to introduce adjustments for the quality of products in a basket of goods. This is called **hedonic pricing**. New product bias is easily remedied by regularly introducing new products to the basket of goods. Finally, substitution bias can be overcome by the use of **chained price index formulas**, which rely on calculating the geometric mean of multiple indices.

The scope of price indices can widely vary. In the U.S., for example, surveys used to measure price index changes are only collected from urban areas, where other countries rely on rural areas as well. Some countries also place greater emphasis on food and energy weights when composing indices. Also in the U.S., the personal consumption expenditures price index covers all personal consumption, while the producer price index (or wholesale price index in some countries) measures price increases that are passed from producers to consumers in a country.

There are two general forms of inflation:

1. cost-push
2. demand-pull

Each emphasizes different factors that impact price levels.

Learning Objective: Discuss cost-push versus demand-pull inflation.

Cost-push Inflation

Cost-push refers to price levels rising due to increasing business costs (usually wages), which are then passed on to consumers. This explains why inflation increases during expansionary phases of the economy: as the economy grows, unemployment drops and productivity is up, which in turn drives up wages. However, there are situations where sectors of the economy will face labor shortages while the official unemployment rate is still high. For example, the very high growth of the technology sector means that companies are almost always trying to find workers. The non-accelerating inflation rate of unemployment (NAIRU), also known as the natural rate of unemployment (NARU), measures the effective rate of unemployment of such situations. For example, tech firms continually face a shortage of labor supply compared to consumer demand for their products, therefore this sector may frequently show NAIRU/NARU values that are higher than the prevailing unemployment rate. Productivity must also be considered when gauging inflation, because output per worker will determine over how many units a business can spread labor costs: greater productivity means a lower price per unit a company can charge to meet costs of labor. The unit labor cost is calculated as:

$$ULC = W/O$$

Where O = hourly output per worker and W = hourly pay per worker.

If productivity growth cannot keep up with worker pay, unit costs will rise, and businesses are more likely to pass those increases on to customers.

Demand-pull Inflation

Demand-pull refers to market demand increasing prices, which then compels workers to seek higher wages to keep up with the cost of living. This measure accounts for the relationship between GDP and capacity utilization. Specifically, the higher the rate of capacity utilization, the closer actual and potential GDP are to each other, and the more likely the economy will experience higher prices as a result of shortages/bottlenecks in production. The inverse also holds: the farther an economy operates from peak utilization, the lower the actual GDP, and the less pressure will exist on the supply side, which makes it less likely that the economy will experience shortages and subsequent price increases.

Related to the demand-pull perspective is the view of monetarists, who believe that inflation is due to the supply of money. An excess supply of money will essentially bring down its value, thus harming purchasing power and creating inflation.

In addition to the mechanisms of inflation above, an analysis of the business cycle must also consider the impact of inflation expectations. Once business and consumers begin to believe inflation will increase, they begin to apply that belief to all business decisions, and the expectation may quickly materialize in the broader economy as a result. Furthermore, in such cases, inflation can persist even in economic conditions where it should not. This can be very difficult to predict and measure. Often, people will rely on prior inflation trends to attempt to predict such inflation movements. Surveys can also be somewhat effective in gauging future inflation expectations. Finally, people will compare the rates of inflation-linked securities (such as TIPS, or Treasury Inflation-Protected Securities) to the rates of bonds without an inflation component, in an attempt to estimate the market expectation of inflation movements.

Economic Indicators

Learning Objective: Discuss the uses and limitations of economic indicators..

An **economic indicator** is *a variable that can provide information on the state of the economy*. There are various types:

- Leading indicators have turning points that consistently tend to precede movements in the economy, and as such have predictive value in the near-term.
- Coincident indicators have turning points that consistently tend to match current movements in the economy, so they are valued for providing perspective to prevailing economic conditions.
- Lagging indicators have turning points that consistently tend to happen after movements in the economy, and can be used to help gauge past conditions.

It should be noted that while the record of various indicators is fairly consistent, there have been instances where the correlation between the indicator and economic activity breaks down. In addition, people are not only interested in how an indicator is behaving, but by *how much* it is changing. For this purpose, a diffusion index is used to compile several leading, lagging, and

coincident indicators, and this details the proportion of the index components that are moving in a manner that is consistent with the overall index. The purpose is to gauge how many component indicators are moving in the same direction. More components moving in concert gives greater confidence that the indicators agree on what is currently happening (or expected to happen) in the economy.

Finally, various groups will also provide aggregate measures of economic activity, usually in the form of survey results. For example, the Federal Reserve releases the "Beige Book," which is a compilation of polls the bank issues to its major branches. The ISM also polls members and compiles results into a series of indices on manufacturing measures. Market participants tend to use these as a way to verify the validity of more broadly used indicators.

Identifying Business Cycle Phases

Some indicators are closely monitored to help identify business cycle phases. Several are viewed as being highly reliable in this aspect. For example, the spread between 10-year Treasuries and the overnight borrowing rate is often used as a leading indicator to determine if the economy is heading towards expansion or contraction. In this case, widening spreads tend to indicate upcoming economic improvement. However, typically market participants will rely on watching several indicators at a given point in time, or monitoring one or more indicators over a time period. Sometimes, indicators may disagree, which make it more difficult to draw conclusions.

For example, the change in unit labor costs is a lagging indicator. Assume this variable is currently rising, which can mean that wages have been increasing as typically seen in an economic recovery. At the same time, the S&P 500 - a leading indicator - is showing an increase for the period. Taken together, they can be used to infer that a recovery has already started (as specified by the lagging indicator) and may be expected to continue for some time (as expected from the leading indicator).

this page intentionally left blank

8. Key Formulas

Aggregate production function: Y(quantity of GDP supplied) = F(L,K,T)

Budget constraint (two versions of the same equation):

$$P_A \times \text{Quantity}_A + P_B \times \text{Quantity}_B = I$$

or

$$\text{Quantity}_A = \frac{I}{P_A} - \frac{P_B}{P_A} \times \text{Quantity}_B$$

$$\text{Cross elasticity of demand} = \frac{\text{Percent change in quantity demanded}}{\text{Percent change in price for a substitute or complement}}$$

$$\text{Elasticity of supply} = \frac{\text{Percent change in quantity supplied}}{\text{Percent change in price}}$$

$$\text{Employment/Population ratio} = \frac{\text{Number of persons 16 years of age and older employed as civilians}}{\text{Total civilian population 16 years of age and older}}$$

GDP = National income + Capital consumption allowance + Statistical discrepancy

GDP = Consumer spending + Business investment + Government spending + Government fixed investment + Change in inventories + (Exports – Imports) + Statistical discrepancy

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

$$\text{Income elasticity of demand} = \frac{\text{Percent change in quantity demanded}}{\text{Percent change in income}}$$

$$\text{Inflation}(i) = \frac{\text{This year's } CPI - \text{Last year's } CPI}{\text{Last year's } CPI} \times 100$$

$$\text{Marginal Product (MP)} = \frac{\Delta\text{Total Product}}{\Delta\text{Labor Quantity}}$$

Marginal revenue = Change in total revenue / Change in output

Marginal Revenue Product (MRP) = Marginal Revenue (MR) × Marginal Product (MP), *or*

$$\text{Marginal Revenue Product (MRP)} = \frac{\Delta\text{Total Revenue}}{\Delta\text{Labor Quantity}}$$

$\text{Nominal GDP}_t = P_t \times Q_t$

Per capita potential GDP growth = TFP growth + W_C(Growth in capital-to-labor ratio)

Percent Δ Nominal GDP = (1 + %Δ real GDP)(1 + %Δ inflation) – 1

% Δ Nominal GDP ≈ %Δ real GDP + %Δ inflation

$$\text{Percent change in price} = \frac{P_0 - P_1}{(P_0 + P_1)/2} \times 100$$

$$\text{Percent change in quantity demanded} = \frac{Q_0 - Q_1}{(Q_0 + Q_1)/2} \times 100$$

Personal income = National income – Indirect business tax – Corporate income tax – Undistributed business profit + Transfer payments

Potential GDP growth = TFP growth + W_L(Labor growth) + W_C(Capital growth)

Potential growth rate = Growth rate of labor force + Growth rate of labor productivity

$$\text{Price elasticity of demand} = \frac{\text{Percent change in quantity demanded}}{\text{Percent change in price}}$$

$$\text{Rate of unemployment} = \frac{\text{Number of persons unemployed}}{\text{Number in the labor force}} \times 100$$

Real GDP = Planned aggregate expenditures

$$\text{Real GDP}_t = P_b \times Q_t$$

$$\text{Real wage rate} = \frac{\text{Money wage rate (\$ per hour)}}{\text{Price level}}$$

$$S - I = (G - T) + (X - M)$$

$$S = I + (G - T) + (X - M)$$

Total output = Planned C + I + G + X

Total Revenue (TR) = Price (P) × Total Product (TP)

$$\text{Real wages} = \frac{\text{Total wages and salaries(from National Income and Product Accounts)}}{\text{Aggregate hours}}$$

Unit labor cost: ULC = W/O

$Y = A \times F(L,K)$

$Y = C + I + G + X - M$

$Y/L = A \times F(1,K/L)$