ECON 206

Chapter 2
National Income Accounting

We study national income accounting for two reasons:

1. The national income accounts provide the formal structure for our macro theory models.

We divide output in two ways. On the ***production side***, output is paid out to labor in the form of wages and to capital in the form of interest and dividends. On ***the demand side***, output is consumed or invested for the future.

The division of output into **factor payments** (wages, etc.) on the production side provides a framework for our study of growth and aggregate supply.

The division of income into consumption, investment, and so on, on the demand side provides the framework for studying aggregate demand.

The input and output, or demand and production, accountings are necessarily equal in equilibrium. In addition to looking at real output, the national income accounts include measures of the overall price level. This provides a basis for our discussions of inflation.

2. The second reason for studying national income accounts is to learn a few estimated numbers that help characterize the economy. If we spread annual output equally across the population, would each person control $5,000, $50,000, or $500,000? Is income paid mostly to labor or mostly to capital? While memorizing exact statistics is a waste of time, knowing rough magnitudes is vital for linking theory to the real world. And macroeconomics is very much about the world we live in.

We begin our study with the basic measure of ***output***—***gross domestic product***, or GDP.

GDP is the value of all final goods and services produced in the country within a given period.

It includes the value of goods produced, such as houses and smartphones, and the value of services, such as airplane rides and economists' lectures. The output of each of these is valued at its market price, and the values are added together to get GDP.

- Why do we study the national income accounts?
  1. National income accounting provides formal structure for macrotheory models
  2. Introduces statistics that characterize the economy
- Output defined in two ways
  1. Production side: output = payments to workers (wages), capital (interest and dividends)
  2. Demand side: output = purchases by different sectors of the economy
- Output typically measured as GDP = value of all final goods and services produced within a country over a particular period of time

Production Side of the Economy

The production side of the economy transforms **inputs**, such as labor and capital, into **output, GDP**.

Inputs such as labor and capital are called factors of production, and the payments made to factors, such as wages and interest payments, are called factor payments.

Example: Imagine a student pie-baking economy with you as the entrepreneur. You hire several friends to roll dough, and you rent a kitchen from another friend. Your factor inputs are friends (labor) and kitchens (capital). Output is measured as the number of pies. With some experience, you could predict the number of pies that can be produced with a given number of friends and so many kitchens. You could express the relation as a mathematical formula called a **production function**, which is written in this case as

Pies = f (friends, kitchens)   **(1)**

We will, of course, be interested in a somewhat more general production function relating all the economy's production, GDP (Y) to inputs of labor (N) and capital (K), which we write as

$$Y = f(N, K).$$

More generally, we might write that labor payments equal the wage rate (w) times the amount of labor used and that capital payments (the rent for the kitchen) equal the rental rate (r) times the amount of capital rented and write

$$Y = (w \times N) + (r \times K) + \text{profit}.$$

* The production side of the economy transforms inputs (labor, capital) into output (GDP)

- Inputs = factors of production
- Payments to these factors = factor payments

* The relationship between inputs and outputs defined by the production function $\rightarrow$ $Y = f(N, K)$

where Y = output, N = labor, K = capital

- "Output is a function of labor and capital," where the functional form can be defined in various ways
- For example: corn = f (land, labor, seed, machines)

GDP, GNP, and GNI

GDP is the value of all currently produced goods and services produced within the borders of an economy sold on the market during a particular time interval but not resold.

Currently produced goods and services means that GDP excludes
- any used items such as houses and cars
- any transaction in which money is transferred without any accompanying good or service in return, e.g. government transfer payments, inheritances.

Produced within the borders of an economy means that GDP includes production that takes place in Turkey.

Sold on the market means that
•goods and services are valued at their market prices
•GDP excludes things not exchanged on the market like housework and volunteer work

Not resold means that
GDP only counts final products (those purchased by the ultimate user). Intermediate goods intended for resale or further processing are excluded lest we be guilty of double-counting.

We can also measure GDP by adding up total spending in the economy:

 personal consumption spending (C)
+ gross investment (I)
+ government purchases of goods and services (G)
+ exports
- imports

= GDP

Gross National Product (GNP) is the value of all currently produced goods and services produced with domestically owned factors of production sold on the market during a particular time interval but not resold.

 GDP
+ value of production outside domestic borders attributable to labor and property owned by domestic residents
- value of production within domestic borders attributable to labor and property owned by foreign residents
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= GNP

Depreciation

Gross investment includes all purchases of capital goods. Some investment, however, just replaces capital that wore out. Depreciation is an estimate of the amount of capital used up during the year. Subtracting depreciation from gross investment gives net investment. Net investment is a true measure of the increase in the size of the capital stock.

  GDP
- depreciation

= net domestic product

Net domestic product (NDP) is the amount of goods and services we could consume without reducing the size of our capital stock. We do enough investment to replace our depreciated capital.

National Income

 NDP
- sales taxes

= national income

National income is the income earned by the factors of production. It consists of wages and benefits, proprietor's income, rental income, corporate profits, and net interest.

Personal and Disposable Income

  national income

- social security taxes

- corporate income taxes

- undistributed profits (retained earnings)

+ government transfer payments

+ interest on the government debt

= personal income

Personal income measures income received whether earned or not.

  personal income

- personal income taxes

= personal disposable income

Gross national product (GNP): The market value of all the final goods and services produced anywhere in the world in a given time period by the factors of production supplied by the residents of the country. GNP = GDP + net factor income from abroad.

Net national product (NNP): NNP = GNP – depreciation.

National income (NI): NI = NNP + statistical discrepancy.

Personal income: National income – retained profits + transfer payments.

Disposable personal income = personal income received by households - personal income taxes.

Disposable income is the amount of income available for consumers to dispose of as they wish: consumption + savings.

Components of Demand

- Total demand for domestic output is made up of four components:

1. Consumption spending by households (C)
2. Investment spending by firms (I)
3. Government spending (G)
4. Foreign demand for our net exports (NX)

$\rightarrow$ The fundamental national income accounting identity is

$$Y = C + I + G + NX \qquad \text{(3)}$$

Consumption

Consumption refers to the purchases of goods and services by the household sector

- Includes spending on durable (ex. Cars), non-durable (ex. Food), and services (ex. Medical services)

- Consumption is the primary component of demand

Government

- Government purchases of goods and services include national defense expenditures and salaries of government employees

- Government also makes transfer payments = payments made to people without their providing a current service in exchange
  - Ex. Social security, unemployment benefits
  - Transfer payments are NOT included in GDP since not a part of current production
  - Government expenditure = transfers + purchases

Investment

- Investment = additions to the physical stock of capital (i.e. building machinery, construction of factories, additions to firms inventories)

- In the national income accounts, investment associated with *business sector's* adding to the physical stock of capital, including inventories
  - Household's building up of inventories is considered consumption, although new home constructions considered part of I, not C

- Gross investment included in GDP measure, which is net investment plus depreciation

Net Exports

- Accounts for domestic purchases of foreign goods (imports) and foreign purchases of domestic goods (exports) $\rightarrow$ NX = Exports – Imports

  – Subtract imports from GDP since accounting for total demand for domestic production

- NX can be >, <, or = 0

SOME IMPORTANT IDENTITIES

In this section we summarize the discussion of the preceding sections by presenting a set of national income relationships that we use extensively in the rest of the book.

For analytical work in the following chapters, we simplify our analysis by focusing on GDP. For the most part, we disregard depreciation and thus the difference between GDP and NDP, as well as the difference between gross investment and net investment.

We refer simply to investment spending. We also disregard indirect taxes and business transfer payments. With these conventions in mind, we refer to national income and GDP interchangeably as income or output. These simplifications have no serious consequences and are made only for convenience.

Finally, just in the next subsection, we omit both the government and foreign sector.

A Simple Economy

We denote the value of output in our simple economy, which has neither a government nor foreign trade, by Y. Consumption is denoted by C and investment spending by I.

The first key identity is that output produced equals output sold.

What happens to unsold output? We count the accumulation of inventories as part of investment (as if the firms sold the goods to themselves to add to their inventories), and therefore all output is either consumed or invested.

Output sold can be expressed (in terms of the components of demand) as the sum of consumption and investment spending. Accordingly, we can write

$$Y \equiv C + I \qquad (4)$$

The next step is to establish a relation among saving, consumption, and GDP. How will income be allocated? Part will be spent on consumption, and part will be saved. Thus we can write

$$Y \equiv C + S \qquad \text{(5)}$$

where S denotes private sector saving. Identity (5) tells us that the whole of income is allocated to either consumption or saving. Next, identities (4) and (5) can be combined to read

$$\underbrace{C + I}_{demand} \equiv Y \equiv \underbrace{C + S}_{income} \qquad \text{(6)}$$

The left-hand side of identity (6) shows the components of demand, and the right-hand side shows the allocation of income. The identity emphasizes that output produced is equal to output sold. The value of output produced is equal to income received, and income received, in turn, is spent on goods or saved. Identity (6) can be slightly reformulated to show the relation between saving and investment. Subtracting consumption from each part of identity (6), we have

$$I \equiv Y - C \equiv S \qquad \text{(7)}$$

Identity (7) shows that in this simple economy investment is identically equal to saving.

REINTRODUCING THE GOVERNMENT AND FOREIGN TRADE

When adding the government and the foreign sector, the fundamental identity becomes

$$Y \equiv C + I + G + NX \qquad (8)$$

Disposable income, YD, is what consumers split between C and S when have a public sector, or

$$YD = Y + TR - TA \qquad (9)$$

$$YD \equiv C + S \qquad (10)$$

where TR = transfer payments and TA = taxes. If rearrange (9) and substitute (8) for Y, then

$$C + S - TR + TA \equiv C + I + G + NX \qquad (11)$$

- Substituting (10) into (11):

$$YD - TR + TA \equiv C + I + G + NX \qquad (12)$$

$$Y \equiv C + I + G + NX$$

$$YD = Y + TR - TA$$

$$YD \equiv C + S$$

$$YD - TR + TA \equiv C + I + G + NX$$

$$C + S - TR + TA \equiv C + I + G + NX$$

$$S - I \equiv (G + TR - TA) + NX \qquad \text{(13)}$$

SAVING, INVESTMENT, THE GOVERNMENT BUDGET, AND TRADE

$$S - I \equiv \underbrace{(G + TR - TA)}_{\textit{Budget Deficit}} + \underbrace{NX}_{\textit{Trade Surplus}}$$

where G + TR is total government expenditures and TA is government income → difference between expenditures and income is the government budget deficit (The budget deficit is the negative of the budget surplus, BS = TA − (G + TR).)

The second term on the right-hand side is the excess of exports over imports, or the net exports of goods and services, or net exports for short. NX is also called the trade surplus. When net exports are negative, we have a trade deficit.

Thus, identity (13) states that the excess of saving over investment (S − I) in the private sector is equal to the government budget deficit plus the trade surplus.

The identity suggests, correctly, that there are important relations among the excess of private saving over investment (S − I), the government budget (BD), and the external sector (NX).

For instance, if, for the private sector, saving is equal to investment, then the government's budget deficit (surplus) is reflected in an equal external deficit (surplus).

TABLE 2-2 The Budget Deficit, Trade, Saving, and Investment
(Billions of Dollars)

SAVING (S)	INVESTMENT (I)	BUDGET DEFICIT (BD)	NET EXPORTS (NX)
1,000	1,000	0	0
1,000	850	150	0
1,000	900	0	100
1,000	950	150	−100

Table 2-2 shows the significance of identity (13). To fix ideas, suppose that private sector saving S is equal to $1,000 billion. In the first two rows we assume that exports are equal to imports, so the trade surplus is zero. In row 1, we assume the government budget is balanced. Investment accordingly has to equal $1,000 billion. In the next row we assume the government budget deficit is $150 billion. Given the level of saving of $1,000 billion and a zero trade balance, it has to be true that investment is now lower by $150 billion. Row 3 shows how this relationship is affected when there is a trade surplus.

Any sector that spends more than it receives in income has to borrow to pay for the excess spending. ***The private sector has three ways of disposing of its savings.***

1. It can make loans to the government, which thereby pays for the excess of government spending over the income it receives from taxes.

2. Or, the private sector can lend to foreigners if the latter buy more from us than we buy from them. In this situation, foreigners therefore earn less from us than they need in order to pay for the goods they buy from us, and we have to lend to cover the difference.

3. Finally, the private sector can lend to business firms, which use the funds for investment.

In all three cases, households will be paid back later, receiving interest or dividends in addition to the amount they lent.

- Private sector can dispose of savings in three ways:

  1. Make loans to the government

  2. Private sector can lend to foreigners

  3. Private sector can lend to firms who use the funds for I

Measuring Gross Domestic Product

FINAL GOODS AND VALUE ADDED

GDP is the value of **final goods and services produced**. The insistence on final goods and services is simply to make sure that we do not **double-count**.

For example, we would not want to include the full price of an automobile in GDP and then also include as part of GDP the value of the tires that were bought by the automobile producer for use on the car. The components of the car that are bought by the manufacturers are called *intermediate goods*, and their value is not included in GDP. Similarly, the wheat that goes into a pie is an intermediate good. We count only the value of the pie as part of GDP; we do not count the value of the wheat sold to the miller and the value of the flour sold to the baker.

In practice, double counting is avoided by working with the concept of *value added*.

At each stage of the manufacture of a good, only the value added to the good at that stage is counted as part of GDP.

The value of the wheat produced by the farmer is counted as part of GDP. Then the value of the flour sold by the miller minus the cost of the wheat is the miller's "value added." If we follow this process along, we will see that the sum of the value added at each stage of processing is equal to the final value of the bread sold.

Activity	Cost of Inputs	Price of Output
Growing Oranges	$0	$1
Making Orange Juice	$1	$1.50
Distributing Juice to Stores (Wholesale)	$1.50	$2.25
Selling Juice to Consumer (Retail)	$2.25	$3.50
TOTAL	$4.75	$8.25

The importance of counting only final goods and services in gross domestic product is illustrated by the value chain for orange juice shown above. When a producer is not fully vertically integrated, the output of multiple producers will come together to create the final product that goes to the end consumer. By the end of this production process, a carton of orange juice that has a market value of $3.50 is created. Therefore, that carton of orange juice should contribute $3.50 to gross domestic product. If the value of intermediate goods were counted in gross domestic product, however, the $3.50 carton of orange juice would contribute $8.25 to gross domestic product.

Activity	Cost of Inputs	Price of Output	Value Added
Growing Oranges	$0	$1	$1
Making Orange Juice	$1	$1.50	$0.50
Distributing Juice to Stores (Wholesale)	$1.50	$2.25	$0.75
Selling Juice to Consumer (Retail)	$2.25	$3.50	$1.25
TOTAL			$3.50

A more intuitive way to avoid double counting the value of intermediate goods in gross domestic product is to, rather than try to isolate only final goods and services, look at the value added for each good and service (intermediate or not) produced in an economy. Value added is simply the difference between the cost of inputs to production and the price of output at any particular stage in the overall production process.

The total value added at all stages of production is what is then counted in gross domestic product, assuming of course that all stages occurred within the economy's borders rather than in other economies. Note that the total value added is, in fact, equal to the market value of the final good produced, namely the $3.50 carton of orange juice.

CURRENT OUTPUT

GDP consists of the value of output currently produced. It thus excludes transactions in existing commodities, such as old masters or existing houses.

We count the construction of new houses as part of GDP, but we do not add trade in existing houses. We do, however, count the value of realtors' fees in the sale of existing houses as part of GDP. The realtor provides a current service in bringing buyer and seller together, and that is appropriately part of current output.

- GDP = value of <u>final</u> goods and services <u>currently</u> produced <u>within a country</u> over a period of time
  - **<u>Final</u> goods and services → NO DOUBLE COUNTING**
    - Ex. Would not include the full price of a car AND the tires bought by the manufacturer for the car → tires = *intermediate goods*
  - **Goods and services <u>currently</u> (in the time period being considered) produced & excludes transactions involving used goods**
    - Ex. Include the construction of new homes in current GDP, but not the sale of existing homes
  - **Goods and services produced <u>within a country</u>, regardless of the ownership/nationality of the producing firm**
    - Ex. Include the sale of a car produced by a Japanese car manufacturer located in Turkey in Turkey's GDP

The Factor Income Approach

- It consists of employee compensation (wage), rent, interest, and profits.

- When we add indirect taxes (less subsidies) and depreciation to nations income, we have GDP.

- **GDP = w + r + i + ∏ + indirect (business) taxes+ depreciation - subsidies**

Problems of GDP Measurement

GDP data are, in practice, used not only as a measure of how much is being produced but also as a measure of the welfare of the residents of a country. Economists and politicians talk as if an increase in GDP means that people are better off. But GDP data are far from perfect measures of either economic output or welfare. There are, specifically, three major problems:

1. Some outputs are poorly measured because they are not traded in the market. If you bake homemade pie, the value of your labor isn't counted in official GDP statistics. If you buy a pie, the baker's labor is counted. This means that the vastly increased participation of women in the labor force has increased official GDP numbers with no offsetting reduction for decreased production at home.

   Note, too, that government services aren't directly priced by the market. The official statistics assume that a dollar spent by the government is worth a dollar of value. GDP is mismeasured to the extent that a dollar spent by the government produces output valued by the public at more or less than a dollar.

2. Some activities measured as adding to GDP in fact represent the use of resources to avoid or contain "bads" such as crime or risks to national security. Similarly, the accounts do not subtract anything for environmental pollution and degradation. This issue is particularly important in developing countries. For instance, one study of Indonesia claims that properly accounting for environmental degradation would reduce the measured growth rate of the economy by 3 percent.

3. It is difficult to account correctly for improvements in the quality of goods. This has been the case particularly with computers, whose quality has improved dramatically while their price has fallen sharply. But it applies to almost all goods, such as cars, whose quality changes over time. The national income accountants attempt to adjust for improvements in quality, but the task is not easy, especially when new products and new models are being invented.

Problems of GDP Measurement

1. Omits non-market goods and services
   - Ex. Work of stay-at-home mothers and fathers not included in GDP
2. No accounting for "bads" such as crime and pollution
   - Ex. Crime is a detriment to society, but there is no subtraction from GDP to account for it
3. No correction for quality improvements
   - Ex. Technological improvements are beneficial to the economy, but nothing is added to GDP to account for them

Attempts have been made to construct an **adjusted GNP** series that takes account of some of these difficulties, moving closer to a measure of welfare.

The most comprehensive of these studies, by the late Robert Eisner of Northwestern University, estimates an adjusted GNP series in which the level of real GNP is about 50 percent higher than the official estimates.

Nominal vs. Real GDP

Nominal GDP measures the value of output in a given period in the prices of that period, or, as it is sometimes put, in current dollars.

NGDP in 2019 is the sum of the value of all outputs measured in 2019 dollars:

$$NGDP_{2019} = \sum_{i=1}^{N} P_i^{2019} * Q_i^{2019}$$

– Changes in NGDP could be purely due to changes in prices $\rightarrow$ if GDP is to be used as a measure of output, need to control for prices

Nominal vs. Real GDP

Real GDP measures changes in physical output in the economy between different time periods by valuing all goods produced in the two periods at the same prices, or in *constant dollars*

- If P^B is the price in the base year for good i, RGDP in 2019 is:

$$RGDP_{2019} = \sum_{i=1}^{N} P_i^B * Q_i^{2019}$$

vs.

$$NGDP_{2019} = \sum_{i=1}^{N} P_i^{2019} * Q_i^{2019}$$

Inflation and Prices

Inflation, Π, is the rate of change of prices:
$$\Pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

where P_t is today's price and P_{t-1} is last period's price

Today's price
$$P_t = P_{t-1} + (P_{t-1} * \Pi)$$

equals last year's price, adjusted for inflation

- If $\Pi > 0$, prices are increasing over time $\rightarrow$ inflation
- If $\Pi < 0$, prices are decreasing over time $\rightarrow$ deflation

How do we measure prices?

- For the macroeconomy, need a measure of overall prices (price index)
- Most common indexes are CPI, PPI, and the GDP deflator

Price Indexes: GDP Deflator

GDP deflator is the ratio of NGDP in a given year to RGDP of that year

- Since GDP deflator is based on a calculation involving all goods produced in the economy, it is a widely based price index that is frequently used to measure inflation.

- Measures the change in prices between the base year and the current year

- Ex. If NGDP in 2020 is \$6.25 and RGDP in 2020 is \$3.50, then the GDP deflator for 2020 is \$6.25/\$3.50 = 1.79 $\rightarrow$ prices have increased by 79% since the base year.

Price Indexes: CPI

- The consumer price index (CPI) measures the cost of buying a fixed basket of goods and services representative of the purchases of urban consumers. Measure of the cost of living for the average household

- Differs from GDP deflator in three ways:

  1. CPI measures prices of a more limited basket of goods and services (only household goods and services)

  2. The bundle of goods in the consumer basket is fixed, while that of the deflation is allowed to vary

  3. CPI includes prices of imports, while GDP deflator only considers those goods produced within the Turkey.

The GDP deflator and the CPI differ in behavior from time to time. For example, at times when the price of imported oil rises rapidly, the CPI is likely to rise faster than the deflator. However, over long periods the two produce quite similar measures of inflation.

Price Indexes: PCE

The personal consumption expenditure (PCE) deflator measures inflation in consumer purchases based on the consumption sector of the national income accounts. Because it is a chain-weighted index, the Federal Reserve often focuses on this indicator rather than the CPI.

Price Indexes: PPI

The producer price index (PPI) is the fourth price index that is widely used. Like the CPI, the PPI is a measure of the cost of a given basket of goods. However, it differs from the CPI in its coverage; the PPI includes, for example, raw materials and semifinished goods. It differs, too, in that it is designed to measure prices at an early stage of the distribution system.

Whereas the CPI measures prices where urban households actually do their spending—that is, at the retail level—the PPI is constructed from prices at the level of the first significant commercial transaction.

This makes the PPI a relatively flexible price index and one that frequently signals changes in the general price level, or the CPI, some time before they actually materialize.

For this reason the PPI, and more particularly, some of its subindexes, such as the index of "sensitive materials," serve as one of the business cycle indicators that are closely watched by policymakers.

Core Inflation

Policymakers are interested in measuring ongoing inflationary trends. The prices of some goods are very volatile, suggesting that price changes are often temporary. For this reason policymakers focus on core inflation, which excludes changes to food and energy prices. Core inflation measures are reported for both the CPI and the PCE deflator.

Unemployment

The unemployment rate measures the fraction of the workforce that is out of work and looking for a job or expecting a recall from a layoff.

The periods of high unemployment are generally associated with periods of recession, although the match isn't perfect.

BLS (Bureau of Labor Statistics) divides population into 3 groups:

Employed: paid employees, self-employed, and unpaid workers in a family business

Unemployed: people not working who have looked for work during previous 4 weeks

Not in the labor force: everyone else

The **labor force** is the total # of workers, including the employed and unemployed.

Unemployment rate ("u-rate"):
% of the labor force that is unemployed

$$\text{u-rate} = 100 \times \frac{\text{\# of unemployed}}{\text{labor force}}$$

Labor force participation rate:
% of the adult population that is in the labor force

$$\text{labor force participation rate} = 100 \times \frac{\text{labor force}}{\text{adult population}}$$

Compute the labor force, u-rate, adult population, and labor force participation rate using this data:

Adult population of the U.S. by group, September 2013	
# of employed	144.3 million
# of unemployed	11.3 million
not in labor force	90.6 million

Labor force = employed + unemployed

 = 144.3 + 11.3

 = 155.6 million

U-rate = 100 x (unemployed)/(labor force)

 = 100 x 11.3/155.6

 = 7.3%

Population = labor force + not in labor force

   = 155.6 + 90.6

   = 246.2

LF partic. rate = 100 x (labor force)/(population)

   = 100 x 155.6/246.2

   = 63.2%

Discouraged workers
- would like to work but have given up looking for jobs
- classified as "not in the labor force" rather than "unemployed" .

The natural rate of unemployment is the normal rate of unemployment around which the actual rate fluctuates.

Cyclical unemployment is the deviation of unemployment from its natural rate and is connected to short-term economic fluctuations.

The natural rate includes frictional unemployment and structural unemployment.

Frictional unemployment occurs when workers take time to search for the right jobs.

Structural unemployment occurs when above equilibrium wages result in a surplus of labor.

Cyclical unemployment is caused by the contraction phase of the business cycle. That's when the demand for goods and services falls dramatically. It forces businesses to lay off large numbers of workers to cut costs.

Cyclical unemployment creates more unemployment. The laid-off workers have less money to buy the goods and services they need. That further lowers demand.

Frictional unemployment occurs when workers leave their old jobs but haven't yet found new ones. Most of the time, workers leave voluntarily, either because they need to move or have saved enough money to allow them to look for a better job.

Frictional unemployment also occurs when students are looking for that first job or when mothers are returning to the workforce. It also happens when workers are fired or, in some cases, laid off due to business-specific reasons, such as a plant closure.

Frictional unemployment is short-term and a natural part of the job search process. In fact, frictional unemployment is good for the economy, as it allows workers to move to jobs where they can be more productive.

Structural unemployment exists when shifts occur in the economy that creates a mismatch between the skills workers have and the skills needed by employers.

An example of this is an industry's replacement of machinery workers with robots. Workers now need to learn how to manage the robots that replaced them. Those that don't learn need retraining for other jobs or face long-term structural unemployment.

A long recession often creates structural unemployment. If workers stay unemployed for too long, their skills have likely become outdated. Unless they are willing and able to take a lower-level, unskilled job, they may stay unemployed even when the economy recovers. If this happens, structural unemployment leads to a higher rate of natural unemployment.

Real Unemployment

Real unemployment is not one of the types of unemployment, but it's a term you need to understand. Many people argue that instead of the "official" unemployment rate, we should use an alternate rate. The Bureau of Labor Statistics calls it the "U-6" rate. Others call it the "real" unemployment rate because it uses a broader definition of unemployment.

It includes these two categories:
1. Marginally attached workers: They haven't looked for work in the past four weeks, but have looked within the past year. Some of them become discouraged workers who have given up looking for work.
2. Part-time workers: They would like a full-time job but can only find part-time employment.

Interest Rates and Real Interest Rates

The interest rate states the rate of payment on a loan or other investment, over and above principal repayment, in terms of an annual percentage.

If you have $1,000 in the bank and the bank pays you $50 in interest at the end of each year, then the annual interest rate is 5 percent.

One of the simplifications we make in studying macroeconomics is to speak of "the" interest rate, when there are, of course, many interest rates. These rates differ according to the creditworthiness of the borrower, the length of the loan, and many other aspects of agreement between borrower and lender. Short-term Treasury bills are among the most heavily traded assets in the world.

- Nominal interest rate = return on an investment in current dollars

- Real interest rate = return on an investment, adjusted for inflation

- If R is the nominal rate, and r is the real rate, then we can define the nominal rate as:

$$R = r + \Pi$$

Exchange Rate

- Each country has its own currency in which prices are quoted
  - In the U.S. prices are quoted in U.S. dollars, while in Canada prices are quoted in Canadian dollars and most of Europe uses the euro
- Exchange rate = the price of a foreign currency
- Floating exchange rate → price of a currency is determined by supply and demand
- Fixed exchange rate → price of a currency is fixed
  - Ex. A Bermuda dollar is always worth one U.S. dollar

In practice, many countries intervene to control their exchange rates at some times but not at others, so their exchange rates are neither purely fixed nor purely floating.

In later chapters we take a careful look at how exchange rates affect the economy and how the economy helps determine exchange rates.