
Measuring National Output and National Income

CHAPTER OUTLINE

Gross Domestic Product

Describe GDP fundamentals and differentiate between GDP and GNP.

Calculating GDP

Explain two methods for calculating GDP.

Nominal versus Real GDP

Discuss the difference between real GDP and nominal GDP.

Limitations of the GDP Concept

Discuss the limitations of using GDP to measure well-being.

DETAILED CHAPTER OUTLINE

I. Introduction

A. Macroeconomics relies on data.

1. Much of this data is collected by the government and/or central bank.
2. Before we can understand how the economy works we must know what it looks like. Data collected on GDP, national income, consumption expenditure, prices, interest rates, and a host of other variables give us a picture of the economy.

B. National Income and Product Accounts

1. The *national income and product accounts* include all data collected and published by the government describing the various components of national income and output in the economy.
2. Most countries collect NIPA data.
 - a. In the United States the NIPA are collected and summarized by the U.S. Department of Commerce's Bureau of Economic Analysis (BEA).
 - b. These accounts tell us how the economy is performing and give us a framework that we can use to help understand how the parts of the macroeconomic engine work together. They can be compared to blueprints of an engine.
3. The NIPA do not explain how the economy works, but they do show the key parts and how they are connected.

Web Resources

The volume of macroeconomic data available online is staggering. Have your students spend some time browsing the data available at these sites:

Bureau of Economic Analysis: <http://www.bea.gov>

Bureau of Labor Statistics: <http://www.bls.gov>

Federal Reserve system: <http://www.federalreserve.gov>

For data on Europe, visit <http://europa.eu/> (European Union home page) and <http://www.ecb.int/home/html/index.en.html> (the European Central Bank home page).

International sources include the International Monetary Fund (<http://www.imf.org>) and the World Bank (<http://www.worldbank.org>). For developed economies, the OECD is a good source (<http://www.oecd.org>).

II. Gross Domestic Product

A. What Is GDP?

1. Gross Domestic Product (GDP) is the most basic measure of how an economy is performing.
2. *Gross domestic product (GDP)* is the total market value of all final goods and services produced within a given period by factors of production located within a country.

B. *Final Goods and Services* are goods and services produced for final use.

1. *Intermediate goods* are goods that are produced by one firm for use in further processing or for resale by another firm.

- a. For example, a dairy farmer's cows produce milk. However, that is not the final good because the raw milk will be sold to a dairy. The dairy will pasteurize it, package it, and sell the milk to a grocery store. Once the milk is owned by the retailer, it has reached its final stage of production and can be added to GDP.
 - b. Intermediate goods are not added separately in order to avoid double counting. Double counting can also be avoided by adding up national income using the value added approach.
 - 2. *Value added* is the difference between the value of goods as they leave a stage of production and the cost of the goods as they entered that stage.
 - a. In calculating GDP, we can sum up the value added at each stage of production or we can take the value of final sales.
 - b. We do not use the value of total sales in an economy to measure how much output has been produced.
- C. Exclusion of Used Goods and Paper Transactions
 - 1. NIPA exclude purchases and sales of previously owned goods and paper asset transactions because GDP includes only newly produced goods and services.
 - 2. Previously owned goods were counted when they were first produced.
 - 3. Asset transactions are not counted because they are not new goods or services.
 - 4. GDP does not count transactions in which money or goods changes hands and in which no new goods and services are produced.
- D. Exclusion of Output Produced Abroad by Domestically Owned Factors of Production
 - 1. Output produced by U.S. citizens living in other countries is not counted in the United States. GDP because the output is not produced within the United States.
 - a. The output produced by foreigners working in the United States is counted because the production occurs here. Domestic production creates domestic income which is why GDP is a better measure of national well-being than GNP.
 - b. GDP is the value of output produced by factors of production *located within* a country.
 - 2. *Gross national product (GNP)* is the total market value of all final goods and services produced within a given period by factors of production owned by a country's citizens, regardless of where the output is produced.
 - 3. For most countries, including the United States, the difference between GDP and GNP is small. In 2017 GNP was \$19,729.1, while GDP was \$19,485.4.

III. Calculating GDP

A. Introduction

- 1. We can add up GDP in two equivalent ways. We can sum the amount spent on all final goods and services during a year, then convert the total spending into production. Or we can add up all the income received by all factors of production in producing final goods. Either way, we should end up with the same total.

2. The *expenditure approach* is a method of computing GDP that measures the total amount spent on all final goods and services during a given period.
3. The *income approach* is a method of computing GDP that measures the income – wages, rents, interest, and profits—received by all factors of production in producing final goods and services.

Economics in Practice: Where Does eBay Get Counted?

eBay runs an online marketplace with over 220 million registered users who buy and sell 2.4 billion items a year, ranging from children's toys to oil paintings. In December 2007, one eBay user auctioned off a 1933 Chicago World's Fair pennant. The winning bid was just over \$20.

Most items sold on eBay are previously owned. Their market value was added to GDP in the year in which they were produced. eBay's business is to provide a marketplace for exchange. In doing so, it uses labor and capital and creates value. In return for creating this value, eBay charges fees to the sellers that use its site. The value of these fees do enter into GDP. So while the old knickknacks that people sell on eBay do not contribute to current GDP, the cost of finding an interested buyer for those old goods does indeed get counted.

Note, however, that some eBay merchants sell new goods. Since those goods are newly-produced, their full market value plus eBay's fees will be added to GDP during the year in which they were produced and sold.

B. The Expenditure Approach

1. $GDP = C + I^a + G + (EX - IM)$
2. *Personal Consumption Expenditures (C)* are expenditures by consumers on goods and services. There are three main categories of consumer expenditures: durable goods, nondurable goods, and services.
 - a. *Durable goods* are goods that last a relatively long time, such as cars and household appliances.
 - b. *Nondurable goods* are goods that are used up fairly quickly, such as food and clothing.
 - c. *Services* are the things we buy that do not involve the production of physical things, such as legal and medical services and education.
3. *Gross private domestic investment (I^a)* is total investment in capital—that is, the purchase of new housing, plants, equipment, and inventory by the private (or nongovernment) sector. *Investment* is the purchase of new capital—housing, plants, equipment, and inventory.
 - a. *Nonresidential investment* includes expenditures by firms for machines, tools, plants, and so on.
 - b. *Residential investment* includes expenditures by households and firms on new houses and apartment buildings.

- c. The *change in business inventories* is the amount by which firms' inventories change during a period. Inventories are the goods that firms produce now but intend to sell later.
- d. Inventories are counted as the first step in converting spending into production. Inventories are also included because of the services they provide firms.

$$\text{GDP} = \text{Final sales} + \text{Change in business inventories}.$$
- e. *Gross Investment versus Net Investment.*
 - i. Capital equipment wears out or becomes economically obsolete. GDP overstates production because it does not subtract the decrease in the capital stock.
 - ii. *Depreciation* is the amount by which an asset's value falls in a given period.
 - iii. *Gross investment* is the total value of all newly produced capital goods (plant, equipment, housing, and inventory) produced in a given period.
 - iv. *Net investment* equals gross investment minus depreciation.

$$\text{capital}_{\text{end of period}} = \text{capital}_{\text{beginning of period}} + \text{net investment}$$
- 4. *Government Consumption and Gross Investment (G)* includes expenditures by federal, state, and local governments for final goods and services. It does not include government transfer payments or interest payments on the national debt because neither is a payment for any final goods or services.
- 5. *Net Exports (EX-IM)* is the difference between exports (sales to foreigners of U.S.-produced goods and services) and imports (U.S.-purchases of goods and services from abroad). The figure can be positive or negative.

B. The Income Approach

- 1. *National Income* is the total income earned by factors of production owned by a country's citizens. It is the sum of compensation of employees, proprietor's income, rental income, corporate profits, net interest, indirect taxes minus subsidies, net business transfer payments, and the surplus of government enterprises.
 - a. *Compensation of employees* includes wages, salaries, and various supplements—employer contributions to social insurance and pension funds, for example—paid to households by firms and by the government.
 - b. *Proprietors' income* is the income of unincorporated businesses.
 - c. *Rental income* is the income received by property owners in the form of rent.
 - d. *Corporate profits* is the income of corporations.
 - e. *Net interest* is the interest paid by business. Since the interest is net, it must equal interest paid minus interest received by business. Household and government interest payments are excluded because they are not caused by the production of any good or service.

- f. *Indirect taxes minus subsidies* include taxes such as sales taxes, customs duties, and license fees less subsidies that the government pays for which it receives no goods or services in return. These items are added because indirect taxes are included in calculating final sales. Subsidies are treated as negative indirect taxes.
 - g. *Net business transfer payments* are net transfer payments by businesses to others, thus becoming income to the recipients.
 - h. *Surplus of government enterprises* is the income of government enterprises. In 2017 this item was negative, indicating that, on balance, government enterprises operated at a loss.
2. GDP is not exactly the same as national income. GDP measures total production within a country. National income measures income received by the citizens of the country (regardless of where in the world they live). To transform GDP into national income we must add net factor payments received from the rest of the world and subtract depreciation.
 - a. Net factor payments received from the rest of the world equal the receipts of factor income from the rest of the world minus the payment of factor income to the rest of the world. Since national income includes total income of all domestic citizens (not residents) net factor payments must be added. This transforms GDP into gross national product (GNP).
 - b. *Gross National Product (GNP)* is total output produced by domestically owned factors of production regardless of where in the world they are physically located.
3. Depreciation is the measure of the decrease in the value of capital assets as they wear out over time. *Net national product (NNP)* is gross national product minus depreciation; a nation's total product minus what is required to maintain the value of its capital stock.
4. Net national product plus the statistical discrepancy equals national income. The *statistical discrepancy* is the data measurement error.
5. *Personal income (PI)* is the total income of households. PI is calculated by starting with NI. Subtract undistributed corporate profits (profits minus dividends) and social insurance payments. Then add personal interest income from the government and consumers. Finally add transfer payments made to persons.
6. *Disposable Personal Income (DPI)* or *after-tax income* is PI minus personal income taxes. This is the amount that households have to spend or save.
 - a. Households spend part of DPI. They save the rest.
 - b. Total consumer spending includes personal consumption expenditures, interest paid by consumers to business, and personal transfer payments to foreigners.
 - c. *Personal saving* is the amount of disposable income that is left after total personal spending in a given period.
 - d. The *personal saving rate* is the percentage of disposable personal income that is saved. If the personal saving rate is low, households are spending

a large amount relative to their incomes; if it is high, households are spending cautiously.

IV. Nominal versus Real GDP

- A. *Nominal GDP* is gross domestic product measured in *current dollars*, the current prices we pay for goods and services.
1. This is not a desirable measure of production. Nominal GDP can increase because the price level has increased with no change in output.
 2. The BEA creates an index of the average price level (the GDP deflator mentioned in Chapter 5 [20]) to adjust nominal GDP for inflation.
 3. Inflation is an increase in the average price level.
 4. The *weight* is the importance attached to an item within a group of items.
- B. Calculating Real GDP
1. Real GDP is nominal GDP adjusted for changes in the price level.
 2. Before 1996 the BEA calculated real GDP and the GDP deflator by selecting a base year and using the prices in that year to calculate the two. This is called a fixed-weight procedure. The *base year* is the year chosen for the weights in a fixed-weight procedure. A *fixed-weight procedure* is a procedure that uses weights from a given base year.
 3. However, calculated growth rates could be very sensitive to the choice of a base year, which led the BEA to change its procedure. It now uses a procedure that calculates a geometric average over two consecutive years comparing each year to the previous year. This procedure is done in a way that guarantees that real GDP times the GDP deflator still equals nominal GDP.
- C. Calculating the GDP Deflator
1. The GDP deflator is one way of measuring the overall price level.
 2. Like real GDP, the BEA once used a fixed-weight procedure. However, since a price index is being calculated, the weights used are the quantities of the products. And, like real GDP the choice of base year can have a significant impact on the results.
 3. The BEA now calculates the geometric average of the quantity-weighted price indexes. Many of the problems caused by arbitrary choice of a base year are eliminated.
- D. The Problem of Fixed Weights: The BEA switched to the new procedure after decades of complaints by economists about the inaccuracy of the old fixed weight system. There were serious problems with the fixed weight method of calculating real GDP. Three of these problems were:
1. Structural changes that have occurred in the U.S. economy make it seem unlikely that prices for 1987 (the last year for which BEA gathered fixed weights) are good weights to use for the 1950s—or the twenty-first century for that matter.
 2. The use of fixed weights does not account for supply shifts, and therefore substitution responses are not considered.

3. Similar problems arise when using fixed weights to compute price indexes. Substitution responses are ignored resulting in an overstatement of the increase in the overall price level.
4. There is no “right” way to calculate real GDP or the GDP deflator. However, the BEA’s new procedure avoids some of the problems inherent in the old fixed-weight procedure.

V. Limitations of the GDP Concept

A. GDP and Social Welfare

1. Serious problems arise when we try to use GDP as a measure of happiness or well-being.
2. Some changes in social welfare are not measured by GDP. Some increases in social welfare are associated with decreases in GDP.
3. Most nonmarket and domestic activities are not counted in GDP even though they often involve production of a good or service. House cleaning and preparing your taxes are two examples.
4. GDP seldom reflects losses or social ills and has nothing to say about the distribution of output among individuals in a society.
5. GDP is neutral about the kinds of goods an economy produces.
6. However, GDP remains a highly useful measure of economic activity and well-being.

B. The *Informal Economy* is the part of the economy in which transactions take place and in which income is generated that is unreported and therefore not counted in GDP. These transactions may be missed because they are illegal activities or tax evasions. This causes two problems.

1. The size of GDP will be underreported. Europe’s informal economy is estimated at 20 percent of GDP. The best estimate for the United States is about 10 percent of GDP. In some developing countries as much as one-third of the economy may be production in the informal sector.
2. Since countries differ in the relative sizes of their underground economies, inter-country comparisons based on GDP or any GDP-related measurement are suspect. Unemployment may be overstated as people working in the informal economy have incentives to claim they are unemployed.

C. Gross National Income per Capita

1. *Gross national income (GNI)* converts GNP into dollars using an average of currency exchange rates over several years adjusted for rates of inflation.
2. GNI per capita is a better measure of well-being for the average person than is total GDP. GNI per capita is also extremely useful when trying to compare the economies of two different countries.