Chapter 24

Measuring the Wealth of Nations

What will you learn in this chapter?

- How to calculate gross domestic product (GDP).
- Why each component of GDP is important.
- What different approaches are used to calculate GDP.
- What the difference is between real and nominal GDP.
- How to calculate the GDP deflator, GDP per capita, and the real GDP annual growth rate.
- What limitations of GDP exist.

Valuing an economy

- *Macroeconomics* is

- *Gross domestic product (GDP)* is

  – GDP is the most common metric for measuring the value of a national economy.

Valuing an economy

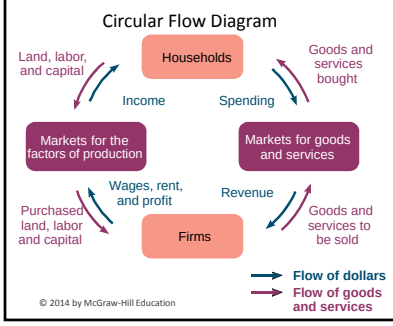
- When constructing a measure of how much a nation can produce in a given year, there are two hurdles that must be overcome:
  - How to add up into one measure of productivity.
  - Not intermediate goods and services that go into final goods and services.
- Simon Kuznets and Richard Stone came up with the national income accounting that resolves both of these issues.

Unpacking the definition of GDP

- Gross domestic product (GDP) is the sum of the market value of all final goods and services produced within a country in a given period of time.
  - Market value:
  - Final goods and services:
  - Produced within a country:
  - Given period of time:

Production = expenditure = income

The size of an economy is referred to as either



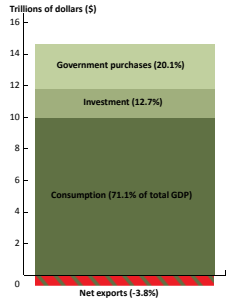
- Total output can be measured as
- However, every transaction has a buyer *and* seller. Therefore, total output can also be measured as
- Value of Production = Expenditure = Income

Measuring GDP: The expenditure approach

- The expenditure approach breaks expenditures down into four categories:
  - *Consumption* is spending on
  - *Investment* is spending on
    - *Inventory* is the stock of goods that
  - *Government purchases* is spending on
  - *Net exports* is

The expenditure approach

The U.S. GDP for 2011 is broken down as follows.



- The four categories in the expenditure approach:
- Expenditure = C + I + G + NX = Production.

The expenditure approach

The following table categorizes each situation in GDP according to the expenditure approach.

Situation	GDP Category	Why?
Buying a new digital camera	Consumption	Purchasing a new good or service always counts toward GDP.
Buying a used camera in eBay	Not counted	As a used good, the camera does not count toward GDP, as it was already counted when new. The fees paid to eBay for selling the camera count as consumption, though.
Buying a new house	Investment	Since the house can increase or fall in value, it makes sense to think of it as an investment.
Renting an apartment	Consumption	You are paying the owner of the house for a service, so it is counted as consumption.
Apple makes a new batch of iPads but doesn't sell them until next year	Investment	Counted as part of investment, as Apple is holding these tablets as part of its inventory.
Buying shares of General Motors stock	Not counted	Shares of stock are a transfer of money from one owner of the stock to another. Including stocks would cause a double-counting problem.
TSA buys plastic bins for airport security	Government spending	Any consumption or investment purchases made by the government are counted in GDP as government spending.
Babysitting for your neighbor	Not counted	In principle, it should be included in GDP, but such income is often not reported to the IRS so it can't be included in official statistics.

Active Learning: Expenditure Approach

For each of the following scenarios, categorize each GDP spending item using the expenditure approach.

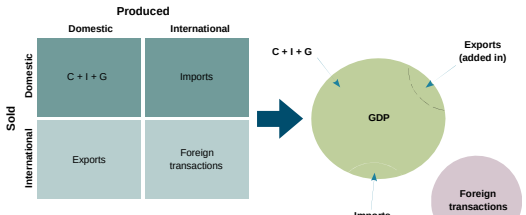
1. Delta purchases an airplane built in Canada.
2. DELL builds a new computer. At the end of the year, the computer is not sold and is placed in storage.
3. The government pays a U.S. company for a new naval missile carrier.
4. Joe purchases Pearl Jam tickets in Denver, CO.
5. Sarah purchases a new VW car manufactured in Germany.
6. The government pays $100 million to war veterans.

Measuring GDP: The income approach

- The income approach adds up
  - This includes wages earned by workers, interest earned on capital investments, rents earned on land, and profits earned by firms.
  - Income = Wages + Interest + Rental income + Profits.

Expenditure vs. income approaches

- The income approach yields the same results as the expenditure approach in an economy without any imports or exports.
  - Add to equate the expenditure and income approaches.



Measuring GDP: The "value-added" approach

- The value-added approach calculates
- This allows us to determine how much of the total amount paid was created at each step in the production process.
- This approach is helpful in avoiding and calculating how the resale of existing goods contributes to GDP.
- The value-added, expenditure, and income approaches all yield

Active Learning: The "value-added" approach

- Suppose that a pair of pants has the following production process. Provide the value added at each process and the value of a pair of pants in GDP.

Situation	Value of Output
Cotton	$2
Denim Fabric	$6
Jean Producer	$9
Jena Distributor	$10
Jean Retailer	$23

- Value-added:
  - Cotton:_____
  - Denim Fabric: _____
  - Jean Producer: _____
  - Jean Distributor: _____
  - Jena Retailer: _____
- What is the sum of the values added from all production processes to make the shirt?

Using GDP to compare economies

- U.S. GDP increased from $12.5 trillion in 2005 to $14 trillion in 2009. Does this mean that people in the U.S. produced more goods and services in 2009 as compared to 2005?
- GDP is a function of
- Often an increase in GDP is the result of growth in both

Using GDP to compare economies

- In order to use GDP to compare economic growth over time or different economies to one another, we need to know how much of the growth is attributable to each factor.
  - *Nominal GDP*: Goods and services are valued at prices.
  - *Real GDP*: Goods and services are valued at prices.

Nominal vs. real GDP

- To calculate nominal GDP:
  - Multiply the quantity of each good in a given year by
- To calculate real GDP:
  - Select a to fix prices.
  - Multiply the quantity of each good in a given year by

Year	Pizza (millions)	Price of Pizza ($)	Spaghetti (millions)	Price of Spaghetti ($)	Nominal GDP (millions of $)	Real GDP in 2010 prices (millions of $)	What's happening
2010 (base year)	5	10	20	8	(5 x $10)+ (20 x $8) = **$210**	(5 x $10)+ (20 x $8) = **$210**	In the base year, nominal GDP and real GDP are equal by definition.
2011	6	10	22	8	(6 x $10)+ (22 x $8) = **$236**	(6 x $10)+ (22 x $8) = **$236**	When output rises and prices stay constant, nominal and real GDP rise at the same rate.
2012	6	12	22	10	(6 x $12)+ (22 x $10)= **$292**	(6 x $10)+ (22 x $8)= **$236**	When prices rise and output stays constant, nominal GDP rises but real GDP does not.
2013	7	12	25	11	(7 x $13)+ (25 x $11)= **$366**	(7 x $10)+ (25 x $8)= **$270**	When both output and prices rise, nominal and real GDP rise at different rates.

Active Learning: Calculating nominal and real GDP

Calculate nominal and real GDP given a base year of 2013.

Year	Quantity of Apples	Quantity of Oranges	Price of Apples ($)	Price of Oranges ($)
2012	2	5	1	1
2013	3	5	2	1
2014	5	5	3	2

Year	NGDP	RGDP
2012		
2013		
2014		

The GDP deflator

- The *GDP deflator* is a

GDP deflator =

- Provides the ratio between the base-year value of current output and the current-year value of current output.
- Helps summarize how prices have changed over the entire economy.

The GDP deflator

- Inflation describes

- Inflation can be calculated by looking at the percentage change in the between any two years.

Year	Nominal GDP (millions of $)	Real GDP (millions of $)	Deflator	Inflation
2010	210	210	$\frac{\$210}{\$210} \times 100 = \mathbf{100}$	____
2011	236	236	$\frac{\$236}{\$236} \times 100 = \mathbf{100}$	(100 - 100)/100= **0%**
2012	292	236	$\frac{\$292}{\$236} \times 100 = \mathbf{123}$	(123 - 100)/100= **23%**
2013	366	270	$\frac{\$366}{\$270} \times 100 = \mathbf{136}$	(136 - 123)/123= **10.6%**

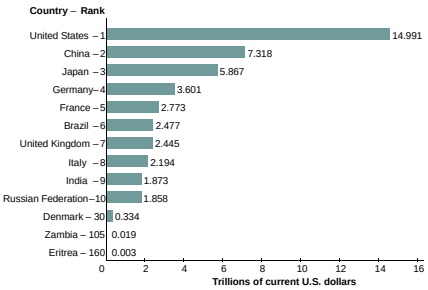
Active Learning: Calculating the GDP deflator

Calculate the GDP deflator for 2012-2014 below.

Year	NGDP	RGDP	GDP Deflator
2012	$7	$9	
2013	$11	$11	
2014	$25	$15	

Using GDP to assess economic health

In 2011, GDPs around the world varied substantially.



has the largest economy, followed by

- Does not consider population.

GDP per capita

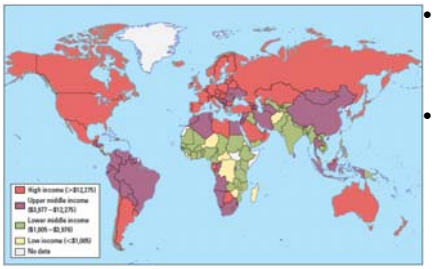
- *GDP per capita* is calculated as:

  GDP per capita =

- Knowing the GDP per capita for different countries suggests a lot about differences in life and well-being between countries.
- GDP per capita does not provide information about the of income or the within a country.

GDP per capita

GDP per capita around the world varies as well.



- Does not consider
- Does not consider

in each country.

Active Learning: GDP deflator and GDP per capita

Use the following information to calculate real GDP per capita.

Year	Nominal GDP (millions of $)	Real GDP (millions of $)	Population (millions of people)	Real GDP per capita
2012	500	400	2	
2013	600	450	2.25	

GDP growth rates

- The change in the economy can be estimated over time.

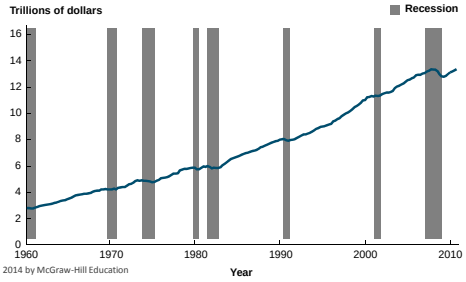
$$\text{GDP growth rate} =$$

where *t* is the current year and *t-1* is last year.

- Growth rates can track the business cycle.
  - A *recession* is
  - A *depression*

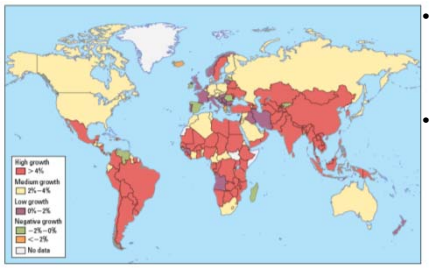
GDP growth rates

Since 1960, the U.S. has had eight periods of recession, even though real GDP grew significantly and steadily over the same period.



Global GDP per capita

GDP growth around the world.



- Growth is in lesser developing nations.
- High growth rates are not necessarily associated with high total GDP or GDP per capita.

Limitations of GDP measures

- GDP calculations leave out some important types of economic activity.
- *Green GDP* is an alternative measure of GDP that

GDP vs. well-being

GDP tells much about living standards and can be compared with other measures of well-being.

Country	GDP per capita (Current U.S. $)	Literacy rate (% of population over 15)	Life expectancy at birth (Years)	Child mortality (Deaths per 1,000 under age 5)	Life satisfaction index (0 to 10)
Norway	79,089 (4)	——	80.5 (13)	4 (8)	8.1 (6)
United States	45,989 (12)	——	78 (36)	8 (37)	7.8 (10)
Equatorial Guinea	15,397 (44)	93 (49)	50.1 (172)	167 (189)	——
Brazil	8,230 (61)	90.0 (63)	72.2 (102)	29 (109)	7.6 (24)
Bulgaria	6,423 (69)	98.3 (28)	72.7 (94)	12 (61)	4.4 (111)
China	3,744 (103)	93.7 (43)	72.7 (95)	26 (102)	5.2 (94)
Mali	691 (160)	26.2 (130)	50 (184)	193 (195)	3.7 (120)

Value (country rank)

Summary

- GDP is one of the most commonly used tools in macroeconomics and gives a measure of the size of an economy.
- GDP is the sum of the market values of all final goods and services produced within a country in a given period of time.
- There are three approaches used to calculate GDP:
  - The expenditure approach classifies and adds up spending on all goods and services produced in an economy and subtracts spending on imports.
  - The income approach adds up income earned by everyone in a country.
  - The value-added approach accounts for the value that is added to the economy at each production stage.

Summary

- GDP per capita allows comparisons over time and across countries.
- However, it does not provide the full picture of an economy's health and quality of life.
- Additionally, the overall price level can be calculated using nominal GDP and real GDP, called the GDP deflator.