

The Data of Macroeconomics

GDP, CPI, and Unemployment

Gross Domestic Product (GDP) is the dollar value of all final goods and services produced within an economy in a given period of time.

The ***consumer price index (CPI)*** measures the level of prices.

The ***unemployment rate*** tells us the fraction of workers who are unemployed.

Gross Domestic Product

Gross Domestic Product is a measure of how well the economy is performing. The Central Statistical Organization (part of the Govt's Dept. of MOSPI) calculates GDP via **administrative data**, which are byproducts of government functions such as tax collection, education programs, defense, and regulation, and statistical data, which come from government surveys of, for example, NSSO, ASI, retail establishments manufacturing firms and farm activity.

NATIONAL INCOME

- **GROSS DOMESTIC PRODUCT (GDP)**

It is the value of all final goods and services produced for the marketplace during a given time period within a country's borders.

- Key concepts:
 - **Value**: market prices or factor cost
 - **Final** vs intermediate goods
 - **Value added**: Sales receipts less purchase of intermediate goods (avoid double counting)
 - Existing versus new (“produced”)
 - For the **marketplace**
 - “**given time period**” Usually annual or quarterly
 - “**Within a country's borders**” vs “by a country's nationals”

CALCULATING NI



- $GNP = GDP + \text{factor payments from abroad} - \text{factor payments to abroad}$
- $NNP = GNP - \text{Depreciation}$
- $NI = NNP - \text{Indirect Business Taxes (or, sales tax)}$
- $\text{Personal Income} = NI - \text{Social Insurance Contribution} - \text{Net Interest} + \text{Dividends} + \text{Govt Transfers to Individuals} + \text{Personal Interest Income}$
- $\text{Disposable Income} = \text{Personal Income} - \text{Personal Tax}$

Rules for Computing GDP

1) To compute the total value of different goods and services, the national income accounts use market prices.

Thus, if:



$$\begin{aligned}\text{GDP} &= (\text{Price of apples} \times \text{Quantity of apples}) \\ &\quad + (\text{Price of oranges} \times \text{Quantity of oranges}) \\ &= (\$0.50 \times 4) + (\$1.00 \times 3) \\ \text{GDP} &= \$5.00\end{aligned}$$

2) Used goods are **not** included in the calculation of GDP.

3) The treatment of inventories depends on if the goods are stored or if they spoil. If the goods are stored, their value is included in GDP. If they spoil, GDP remains unchanged. When the goods are finally sold out of inventory, they are not counted.

More Rules for Computing GDP

4) Intermediate goods are not counted in GDP— only the value of final goods. Reason: the value of intermediate goods is already included in the market price.

Value added of a firm = the value of the firm's output - the value of the intermediate goods the firm purchases.

5) Some goods are not sold in the marketplace and therefore don't have market prices. We must use their *imputed value* as an estimate of their value. For example, home ownership and government services.

Real Vs. Nominal GDP

The *value of final goods and services measured at current prices* is called *nominal GDP*.

$$\text{Nominal GDP } Y = P \times y$$

This distinction between real and nominal can also be applied to other monetary values, like wages.

This conversion from nominal to real units allows us to eliminate the problems created by having a measuring stick (dollar value) that essentially changes length over time, as the price level changes.

How real GDP is computed in our **apple** & **orange** economy?

If we want to compare output in **2009** and output in **2010**, we would need *base-year prices*, i.e. **2009** prices.

Real GDP in 2009 would be:

$(\text{2009 Price of Apples} \times \text{2009 Quantity of Apples}) +$
 $(\text{2009 Price of Oranges} \times \text{2009 Quantity of Oranges}).$

Real GDP in 2010 would be:

$(\text{2009 Price of Apples} \times \text{2010 Quantity of Apples}) +$
 $(\text{2009 Price of Oranges} \times \text{2010 Quantity of Oranges}).$

Real GDP in 2011 would be:

$(\text{2009 Price of Apples} \times \text{2011 Quantity of Apples}) +$
 $(\text{2009 Price of Oranges} \times \text{2011 Quantity of Oranges}).$

Note that **2009** prices are used to compute real GDP for all three years. Because prices are held constant from year to year, real GDP varies only when the quantities produced vary.

GDP Deflator

THE IMPLICIT PRICE DEFLATOR FOR GDP

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

Nominal GDP measures the current dollar value of the output of the economy.

Real GDP measures output valued at constant prices.

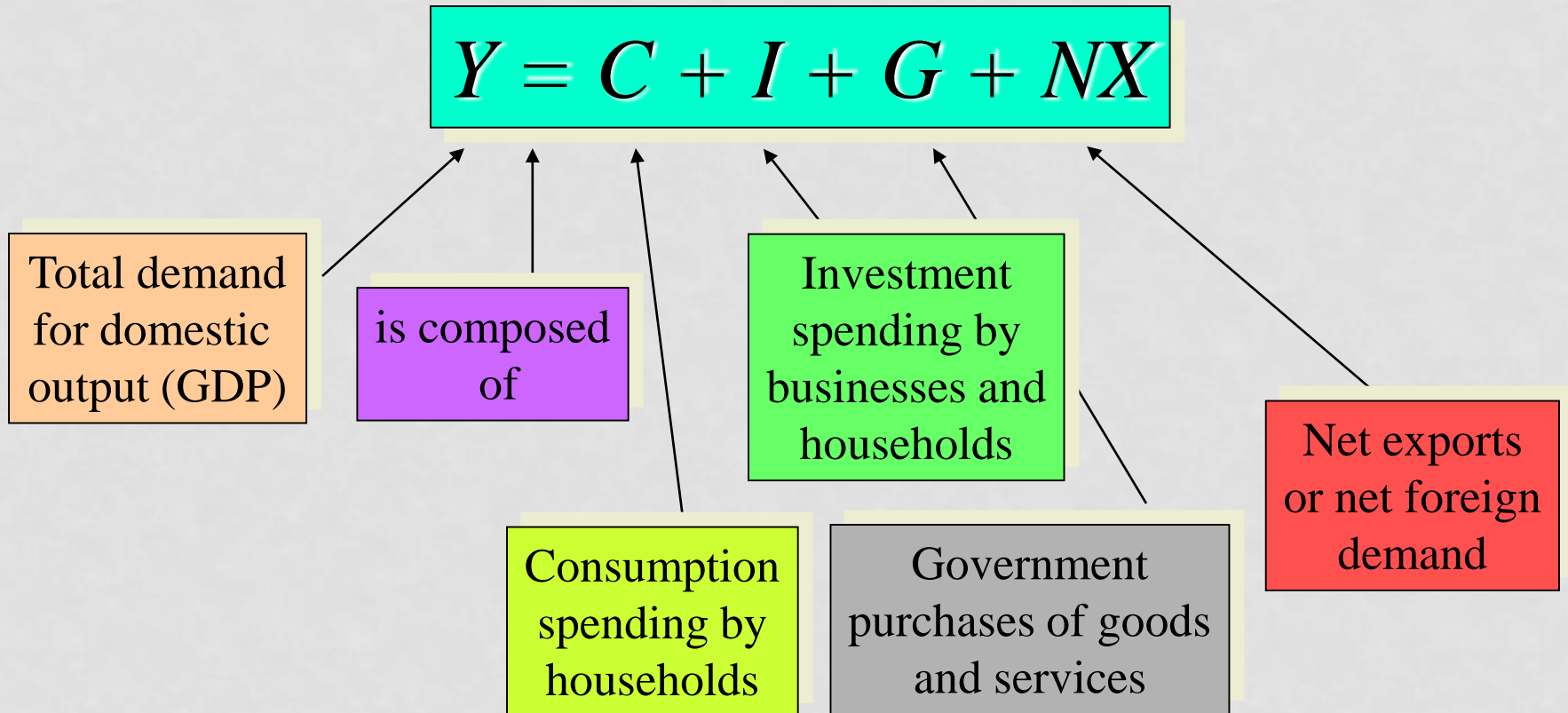
The *GDP deflator*, also called the *implicit price deflator for GDP*, measures the price of output relative to its price in the base year. It reflects what's happening to the overall level of prices in the economy.

Chain-Weighted Measures of GDP

In some cases, it is misleading to use base-year prices that prevailed 10 or 20 years ago.

In 1995, the Bureau of Economic Analysis decided to use *chain-weighted* measures of real GDP. The base year changes continuously over time. This new chain-weighted measure is better than the more traditional measure because it ensures that prices will not be too out of date.

Components of Expenditure

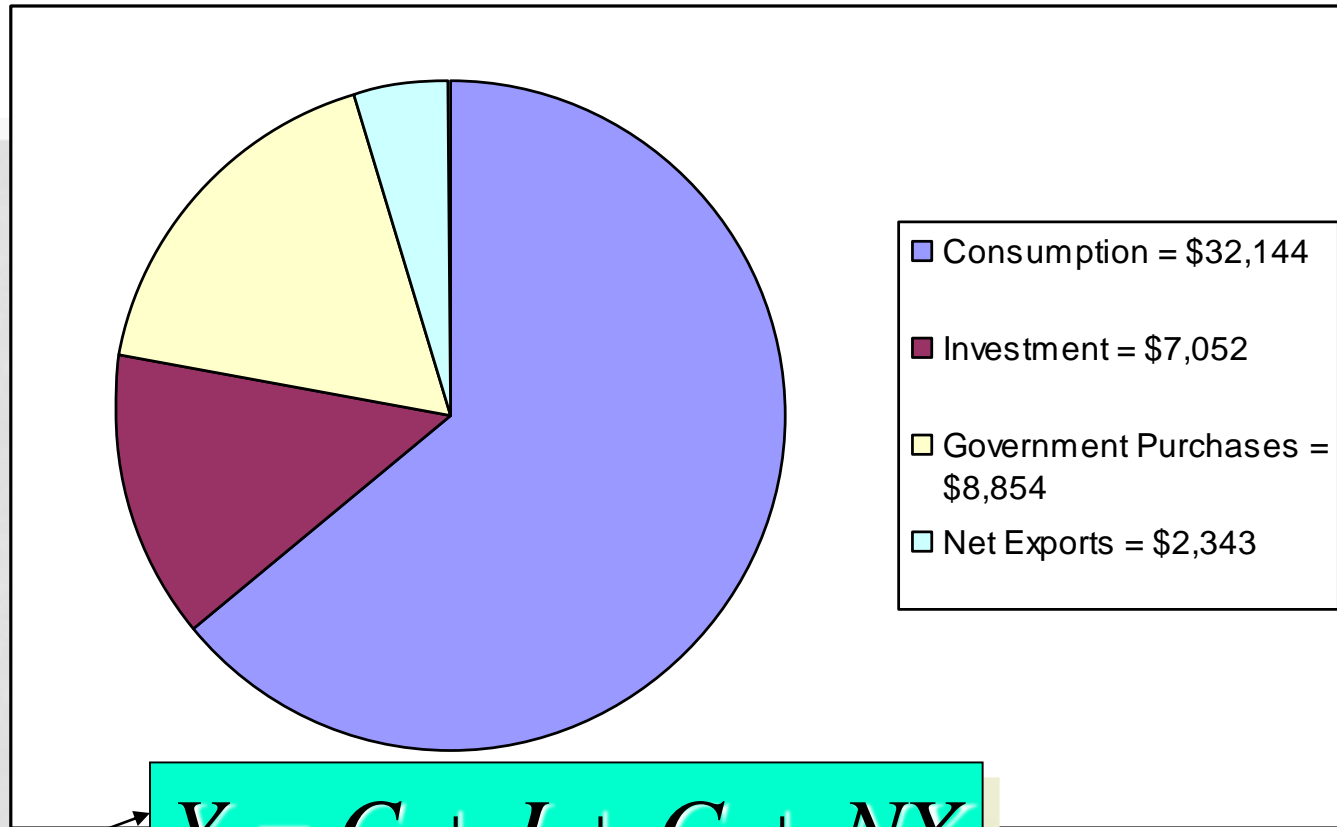


This is the called the *national income accounts identity*.

GDP AND ITS COMPONENTS

In 2007, U.S. GDP totaled about 13.8 trillion. This number is incomprehensible. So, if we divide this number by the total population of 302 million, we get GDP per person—the amount of expenditure for the average American— which equaled **\$45,707** in 2007. Let's break it down visually on the next slide.

GDP (Y) WAS \$45,707 PER PERSON



$$Y = C + I + G + NX$$

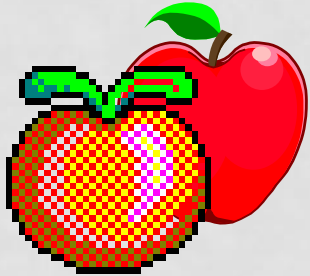
$$\$45,707 = \$32,144 + \$7,052 + \$8,854 + \$2,343$$

Note: The numbers above must be multiplied by the U.S. Population 302 million to obtain the totals for the above national income accounts identity $Y = C + I + G + NX$.

Computing the CPI

The *Consumer Price Index (CPI)* turns the prices of many goods and services into a single index measuring the overall level of prices.

The Bureau of Labor Statistics weighs different items by computing the price of a basket of goods and services produced by a typical customer. The CPI is the price of this basket of goods relative to the price of the same basket in some base year.



Let's see how the CPI would be computed in our apple and orange economy.

For example, suppose that the typical consumer buys 5 apples and 2 oranges every month. Then the basket of goods consists of 5 apples and 2 oranges, and the CPI is:

$$\text{CPI} = \frac{(5 \times \text{Current Price of Apples}) + (2 \times \text{Current Price of Oranges})}{(5 \times \text{2009 Price of Apples}) + (2 \times \text{2009 Price of Oranges})}$$

In this CPI calculation, 2009 is the base year. The index tells how much it costs to buy 5 apples and 2 oranges in the current year relative to how much it cost to buy the same basket of fruit in 2009.

Core Inflation

This statistic measures the increase in the price of a consumer basket that **excludes food and energy products**. Because food and energy prices exhibit substantial short-run volatility, core inflation is sometimes viewed as a better gauge of ongoing inflation trends.

CPI Versus the GDP Deflator

The GDP deflator measures the prices of all goods produced, whereas the CPI measures prices of only the goods and services bought by consumers. Thus, an increase in the price of goods bought only by firms or the government will show up in the GDP deflator, but not in the CPI.

Also, another difference is that the GDP deflator includes only those goods and services produced domestically. Imported goods are not a part of GDP and therefore don't show up in the GDP deflator.

The final difference is the way the two aggregate the prices in the economy. The CPI assigns fixed weights to the prices of different goods, whereas the GDP deflator assigns changing weights.

Measuring Unemployment

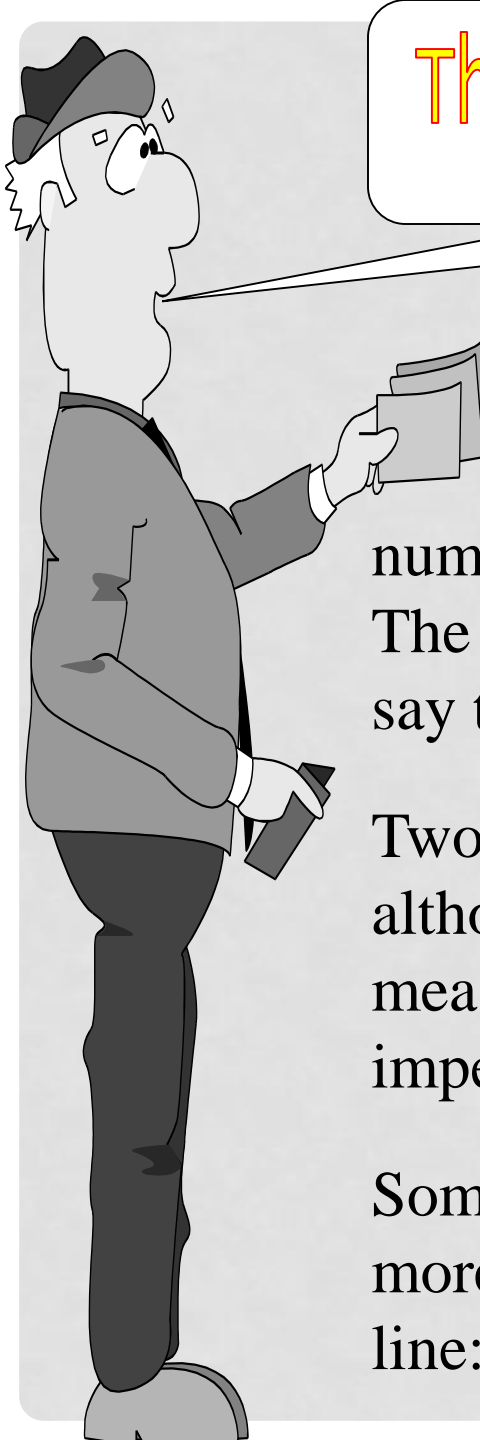
The *labor force* is defined as the sum of the employed and unemployed, and the *unemployment rate* is defined as the percentage of the labor force that is unemployed.

The *labor-force participation rate* is the percentage of the adult population who are in the labor force.

$$\text{Unemployment Rate} = \frac{\text{Number of Unemployed}}{\text{Labor Force}} \times 100$$

$$\text{Labor-Force Participation Rate} = \frac{\text{Labor Force}}{\text{Adult Population}} \times 100$$

The Establishment Survey & The Household Survey



The BLS conducts two surveys of labor market, and therefore produces two measures of total employment. The *establishment survey* estimates the number of workers firms have on their payrolls. The *household survey* estimates the number of people who say they are working.

Two measures of employment are not necessarily identical, although positively correlated. The reason? The surveys measure different things and the surveys in general, are imperfect.

Some economists believe that the establishment survey is more accurate because it has a larger sample size. Bottom line: all economic statistics are imperfect!