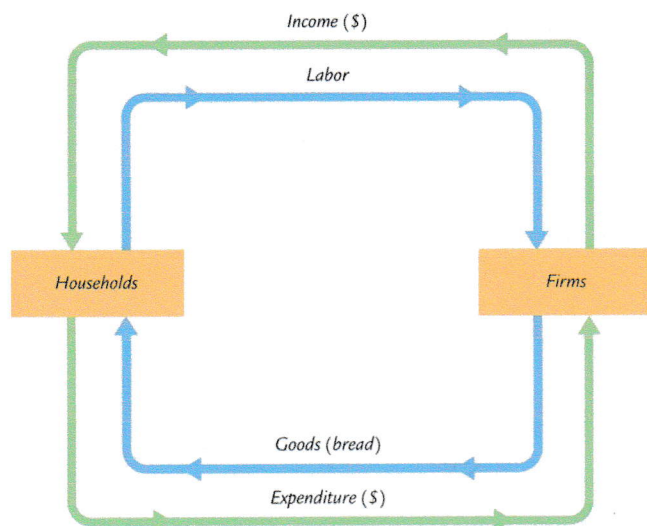# Ch 2   The Data of Macroeconomics

Gross Domestic Product: Expenditure and Income

Two definitions:

- Total expenditure on domestically produced final goods and services.
- Total income earned by domestically located factors of production.

Expenditure equals income because every dollar a buyer spends becomes income to the seller.

The Circular Flow

Value added: The value of output minus the value of the intermediate goods used to produce that output

Final goods, value added, and GDP

- GDP = value of final goods produced

  = sum of value added at all stages of production.
- The value of the final goods already includes the value of the intermediate goods, so including intermediate *and* final goods in GDP would be double counting.

  Gross Domestic Product: The total income earned domestically, including the income earned by foreign-owned factors of production; the total expenditure on domestically

produced goods and services.

How to calculate GDP?

(1) During a certain period of time (a quarter or a year) flow concept
(2) In one country or region (territorial concept)
(3) Newly Produced, excluding transfer payments and used goods
(4) Final Products, excluding intermediate goods
(5) Goods and services
(6) Valued at Market Prices
(7) Sum of all
(8) Excluding house works, used goods transactions, transfer payments, illegal transactions
(9) Including farmers' self-consumed agricultural products, imputed homeownership, public works by government

The expenditure components of GDP

- consumption, C
- investment, I
- government spending, G
- net exports, $NX = (X - M)$

An important identity:

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

Value of Total Output = Aggregate Expenditure

Consumption (C)

Definition: The value of all goods and services bought by households. Includes:

- *Durable goods* last a long time. *Eg.*, cars, home appliances
- *Nondurable goods* last a short time. *Eg.*, food, clothing
- *Services* are intangible items purchased by consumers.
  Eg., dry cleaning, air travel, education, medical or legal services, etc.

Investment (I)

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- Spending on capital, a physical asset used in future production
- Includes:
    - *Business fixed investment*   Spending on property, plant, and equipment
    - *Residential fixed investment*   Spending by consumers and landlords on housing units
    - *Inventory investment*   The change in the value of all firms' inventories

Investment vs. Capital

Note: Investment is spending on new capital.

Example *(assumes no depreciation)*:
- 1/1/2016:   Economy has $10 trillion worth of capital
- During 2016:   Investment = $2 trillion
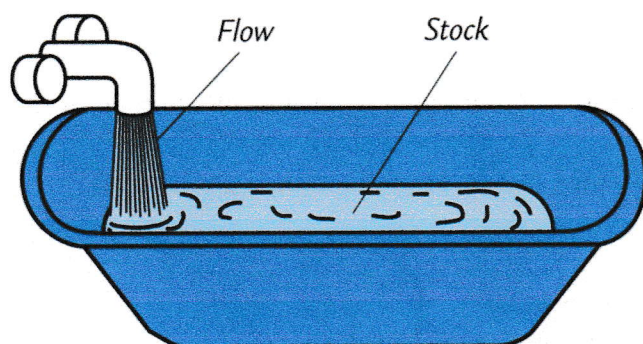- 1/1/2017:   Economy will have $12 trillion worth of capital

Stocks vs. Flows

A **stock** is a quantity measured at a point in time, like a snapshot.

E.g., "The U.S. capital stock was $10 trillion on January 1, 2016."

A **flow** is a quantity measured per unit of time.

E.g., "U.S. investment was $2 trillion during 2016."

Government spending (G)

- G includes all government spending on goods and services.
- G excludes transfer payments (e.g., unemployment insurance payments) because they do not represent spending on goods and services.

Net exports (NX)

- **NX** = exports – imports = X - M
  - **Exports:** the value of g&s sold to other countries
  - **Imports:** the value of g&s purchased from other countries
- Hence, NX equals net spending from abroad on our g&s

Why output = expenditure?

- Unsold output goes into inventory, and is counted as "inventory investment" . . . whether or not the inventory buildup was intentional.
- In effect, we are assuming that firms purchase their unsold output.

GDP: An important and versatile concept

We have now seen that GDP measures:

- total income
- total output
- total expenditure
- the sum of value added at all stages in the production of final goods

GNP vs. GDP

- Gross **National** Product (GNP):
  Total income earned by the nation's factors of production, regardless of where located.
- Gross **Domestic** Product (GDP):
  Total income earned by domestically-located factors of production, regardless of nationality.

  GNP – GDP = factor payments from abroad
  minus factor payments to abroad

- Examples of factor payments: wages, profits, rent, interest & dividends on assets

Other Measure of Income

Net National Product (NNP) = GNP - Depreciation

National Income (NI) = Compensation of employees + Proprietors' Income + Rental Income +

Corporate Profits + Net Interest + Indirect Business Taxes

NI is approximately equal to NNP.

Personal Income (PI) = National Income − Indirect Business Taxes − Corporate Profits − Social Insurance Contributions − Net Interest + Dividends + Government Transfers to Individuals +Personal Interest Income

Disposable Personal Income (DPI) = Personal Income − Personal Tax & Nontax Payments

Real   vs.   Nominal GDP

- GDP is the *value* of all final goods and services produced.
- **Nominal GDP** measures these values using current prices.
- **Real GDP** measures these values using the prices of a base year.

Real GDP controls for inflation

- Changes in nominal GDP can be due to:
    - changes in prices
    - changes in quantities of output produced
- Changes in real GDP can only be due to changes in quantities because real GDP is constructed using constant base-year prices.

GDP deflator

Inflation: chronic increase in the overall level of prices.

- **Inflation rate**: the percentage increase in the overall level of prices.
- One measure of the price level: **GDP deflator**

Definition:

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

Understanding the GDP deflator

Example with 3 goods

For good i = 1, 2, 3

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P_{it} = the market price of good i in month t

Q_{it} = the quantity of good i produced in month t

$NGDP_t$ = Nominal GDP in month t

$RGDP_t$ = Real GDP in month t

$$\text{GDP deflator}_t = \frac{NGDP_t}{RGDP_t} = \frac{P_{1t}Q_{1t} + P_{2t}Q_{2t} + P_{3t}Q_{3t}}{RGDP_t}$$

$$= \left(\frac{Q_{1t}}{RGDP_t}\right)P_{1t} + \left(\frac{Q_{2t}}{RGDP_t}\right)P_{2t} + \left(\frac{Q_{3t}}{RGDP_t}\right)P_{3t}$$

The GDP deflator is a weighted average of prices of goods produced domestically, excluding imported goods every quarter published by Bureau of Economic Analysis (BEA), Department of Commerce. The weight on each price reflects that good's relative importance in GDP. Note that the weights change over time.

Two Arithmetic Tricks for Working with Percentage Changes

1. For any variables X and Y,

> percentage change in $(X \times Y)$ ≈ percentage change in X + percentage change in Y

Ex.: If your hourly wage rises 5% and you work 7% more hours, then your wage income rises approximately 12%.

2. Percentage change in (X/Y) ≈ percentage change in X − percentage change in Y

Ex.: GDP deflator = 100 × NGDP/RGDP.

If NGDP rises 9% and RGDP rises 4%, then the inflation rate is approximately 5%.

Chain-weighted real GDP

- Over time, relative prices change, so the base year should be updated periodically.
- In essence, **chain-weighted real GDP** updates the base year every year, so it is more accurate than constant-price GDP.

- Your textbook usually uses constant-price real GDP because:
  - the two measures are highly correlated
  - constant-price real GDP is easier to compute

Consumer price index (CPI)

- A measure of the overall level of prices of approximated 500 items for consumers
- Published by the Bureau of Labor Statistics (BLS), Department of Commerce every month
- Uses:
  - tracks changes in the typical household's cost of living
  - adjusts many contracts for inflation ("COLAs") or pension or social security benefits, labor union's wage settlement, etc.
  - allows comparisons of dollar amounts over time
- Producer Price Index (PPI): A measure of the overall level of prices of approximated 900 items for producers

How the BLS constructs the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods

2. Every month, collect data on prices of all items in the basket; compute cost of basket

3. CPI in any month equals

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

Understanding the CPI

Example with 3 goods

For good i = 1, 2, 3

C_i = amount of good i in the CPI's basket

P_{it} = price of good i in month t

E_t = cost of the CPI basket in month t

Prices of imported consumer goods:
- included in CPI
- excluded from GDP deflator

The basket of goods:
- CPI: fixed
- GDP deflator: changes every year

Paasche price index: A measure of the level of prices based on a changing basket of goods.

The PCE deflator

- Another measure of the price level: Personal Consumption Deflator, the ratio of nominal to real consumer spending
- How the PCE is like the CPI:
  - only includes consumer spending
  - includes imported consumer goods
- How the PCE is like the GDP deflator:
  - the "basket" changes over time
- The Federal Reserve prefers PCE.

Measure of Joblessness: Unemployment Rate

One aspect of economic performance is how well as economy uses its resources. Because an economy's workers are its chief resource, keeping workers employed is a paramount concern of economic policymakers. The unemployment rate is the statistic that measures the percentage of those people wanting to work who do not have jobs. Every month, the U.S Bureau of Labor Statistics computes the unemployment rate and many other statistics that economists and policymakers use to monitor development in the labor marker.

The Household Survey: Based on about **600,000** household surveys

Categories of the population

- **Employed :** working at a paid job
- **Unemployed :** not employed but looking for a job
- **Labor force :** the amount of labor available for producing goods and services; all employed plus unemployed persons

  Not in the labor force : not employed, not looking for work

Two important labor force concepts

- **Unemployment rate :** percentage of the labor force that is unemployed
  - **Labor force participation rate :** the fraction of the adult population that "participates" in the labor force, *i.e.* is working or looking for work

- Unemployment Rate = (# of Unemployed / Labor Force) x 100

  Labor force Participation Rate = (Labor force / Adult Population) x 100

The establishment survey

- The BLS obtains a second measure of employment by surveying businesses, asking how many workers are on their payrolls.
- Neither measure is perfect, and they occasionally diverge due to:
    - treatment of self-employed persons
    - new firms not counted in establishment survey
    - technical issues involving population inferences from sample data

Chapter Summary

- Gross domestic product (GDP) measures both total income and total expenditure on the economy's output of goods & services.
- Nominal GDP values output at current prices; real GDP values output at constant prices. Changes in output affect both measures, but changes in prices only affect nominal GDP.
- GDP is the sum of consumption, investment, government purchases, and net exports.
- The overall level of prices can be measured by either:

    - the consumer price index (CPI), the price of a fixed basket of goods purchased by the typical consumer, or

    - the GDP deflator, the ratio of nominal to real GDP.

- The unemployment rate is the fraction of the labor force that is not employed.