Macroeconomics (W3)

Learning objectives

In this chapter, you will learn about how we define and measure:

- Gross Domestic Product (GDP)
- the Consumer Price Index (CPI)

Gross Domestic Product

Two definitions:

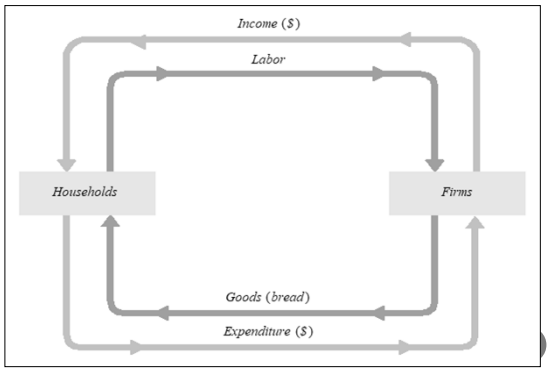
1. Total expenditure on domestically-produced final goods and services
2. Total income earned by domestically-located factors of production

Why expenditure = income

In every transaction, the buyer's expenditure becomes the seller's income.

Thus, the sum of all expenditure equals the sum of all income.

The Circular Flow



Consumption (C)

def: the value of all goods and services bought by households. Includes:

- ***durable goods***
  last a long time
  ex: cars, home appliances
- ***non-durable goods***
  last a short time
  ex: food, clothing
- ***services***
  work done for consumers
  ex: dry cleaning, air travel.

INVESTMENT (I)

def1: spending on [the factor of production] capital.

def2: spending on goods bought for future use.

Includes:

- ***business fixed investment***
  spending on plant and equipment that firms will use to produce other goods & services
- ***residential fixed investment***
  spending on housing units by consumers and landlords
- ***inventory investment***
  the change in the value of all firms' inventories

INVESTMENT VS. CAPITAL

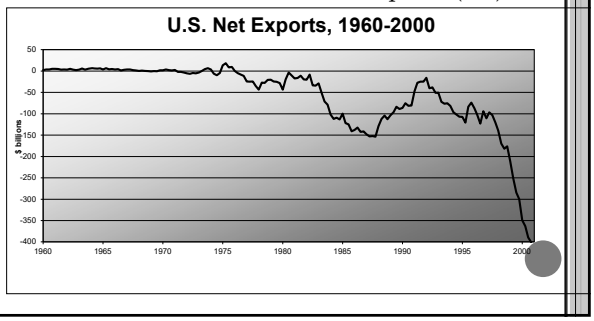
- Capital is one of the factors of production.
  At any given moment, the economy has a certain overall stock of capital.
- Investment is spending on new capital.

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 = EX - IM)

def: the value of total exports (**EX**)
minus the value of total imports (**IM**)



AN IMPORTANT IDENTITY

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

where
Y = GDP = the value of total output
C + **I** + **G** + **NX** = aggregate expenditure

WHY OUTPUT = EXPENDITURE

- Unsold output goes into inventory, and is counted as "inventory investment"…
  …whether the inventory buildup was intentional or not.
- 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) – (factor payments to abroad)

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** measure these values using the prices of a base year.

REAL GDP CONTROLS FOR INFLATION

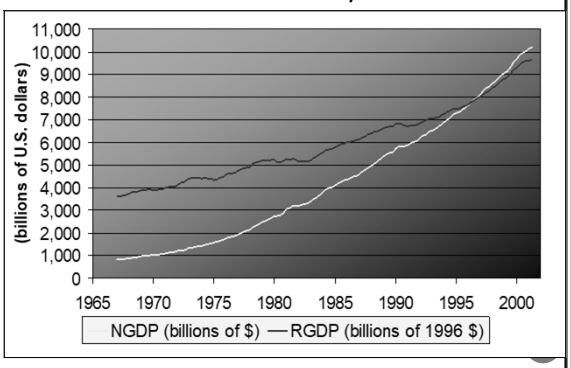
Changes in nominal GDP can be due to:

- 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.

U.S. REAL & NOMINAL GDP, 1967-2001



GDP DEFLATOR

- The **inflation rate** is the percentage increase in the overall level of prices.
- One measure of the price level is the **GDP Deflator**, defined as

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

Understanding the GDP deflator

Example with 3 goods

For good i = 1, 2, 3

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

Understanding the GDP deflator

$$\text{GDP deflator} = 100 \times \frac{NGDP_t}{RGDP_t} = 100 \times \frac{P_{1t}Q_{1t} + P_{2t}Q_{2t} + P_{3t}Q_{3t}}{RGDP_t}$$

$$= 100 \times \left[\left(\frac{Q_{1t}}{RGDP_t} \right) P_{1t} + \left(\frac{Q_{2t}}{RGDP_t} \right) P_{2t} + \left(\frac{Q_{3t}}{RGDP_t} \right) P_{3t} \right]$$

The GDP deflator is a weighted average of prices.

The weight on each price reflects that good's relative importance in GDP.

Note that the weights change over time.

Working with percentage changes

USEFUL TRICK #1 For any variables ***X*** and ***Y***,

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

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

Working with percentage changes

USEFUL TRICK #2

the percentage change in (X/Y)
≈ the percentage change in ***X***
– the 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%.

Consumer Price Index (CPI)

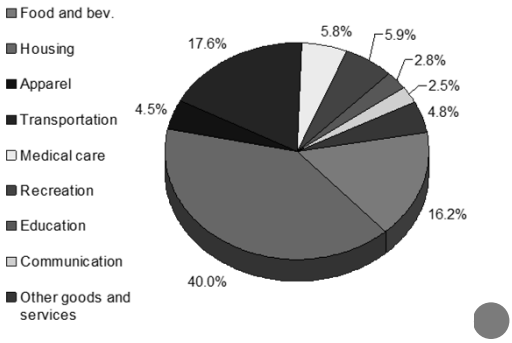
- A measure of the overall level of prices
- Published by the **Bureau of Labor Statistics** (**BLS**)
- Used to
  - track changes in the typical household's cost of living
  - adjust many contracts for inflation (*i.e.* "COLAs")
  - allow comparisons of dollar figures from different years

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

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

THE COMPOSITION OF THE CPI'S "BASKET"



UNDERSTANDING THE CPI

Example with 3 goods

For good i = 1, 2, 3

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

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

E_t = the cost of the CPI basket in month t

E_b = cost of the basket in the base period

UNDERSTANDING THE CPI

$$\text{CPI in month } t = 100 \times \frac{E_t}{E_b} = 100 \times \frac{P_{1t}C_1 + P_{2t}C_2 + P_{3t}C_3}{E_b}$$

$$= 100 \times \left[\left(\frac{C_1}{E_b} \right) P_{1t} + \left(\frac{C_2}{E_b} \right) P_{2t} + \left(\frac{C_3}{E_b} \right) P_{3t} \right]$$

The CPI is a weighted average of prices.

The weight on each price reflects that good's relative importance in the CPI's basket.

Note that the weights remain fixed over time.

REASONS WHY THE CPI MAY OVERSTATE INFLATION

- **Substitution bias**: The CPI uses fixed weights, so it cannot reflect consumers' ability to substitute toward goods whose relative prices have fallen.
- **Introduction of new goods**: The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI, because the CPI uses fixed weights.
- **Unmeasured changes in quality**: Quality improvements increase the value of the dollar, but are often not fully measured.

THE CPI'S BIAS

- The Boskin Panel's "best estimate": The CPI overstates the true increase in the cost of living by 1.1% per year.
- Result: the BLS has refined the way it calculates the CPI to reduce the bias.
- It is now believed that the CPI's bias is slightly less than 1% per year.

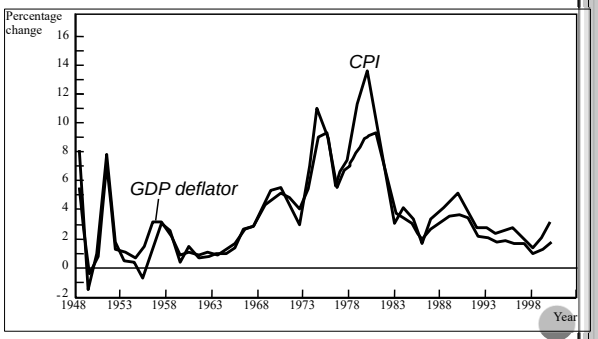
CPI VS. GDP DEFLATOR

prices of capital goods
- included in GDP deflator (if produced domestically)
- excluded from CPI

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

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

TWO MEASURES OF INFLATION



MEASURING UNEMPLOYMENT: 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

CHAPTER SUMMARY

1. Gross Domestic Product (GDP) measures both total income and total expenditure on the economy's output of goods & services.
2. 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.
3. GDP is the sum of consumption, investment, government purchases, and net exports.

CHAPTER SUMMARY

4. 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
   - the GDP deflator, the ratio of nominal to real GDP
5. The unemployment rate is the fraction of the labor force that is not employed. When unemployment rises, the growth rate of real GDP falls.