

Unit 4: Measuring GDP and Prices

ECO 120 Global Macroeconomics

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1.1 Reading

Reading

- Module 10 - pages 106-110
- Module 11

1.2 Goals

Goals

- Specific Goals:
 - Understand how to measure a country's output.
 - Learn a way to measure the overall level of prices in the economy.
 - Learn some problems with these measures.
- Learning Objectives:
 - LO3: Define, compute, and explain limitations to measures of the macroeconomy, including gross domestic product, inflation, and unemployment.

2 National income accounts

2.1 Types of Measures

National income accounting

- **National income accounting:** different measures of a country's overall economic performance.
- Why do we care?
 - Assess the health of the economy by comparing output / person across countries and across time periods.

- Track long run growth out the economy.
- Access the effectiveness of macroeconomic policies.
- Measures:
 - **Gross domestic product**
 - **Net domestic product**
 - **National income**
 - **Personal income**
 - **Disposable income**

2.2 Gross domestic product

Gross domestic product

- **Gross domestic product:** total market value of all *final* goods and services produced in a given year.
- To avoid double counting, intermediate goods are not counted.
- Necessary that it be a monetary measure.
- Excludes financial transactions.
- Excludes secondhand sales / sales of used goods.

Example: \$350 suit

- The birth of suit:
 1. Sheep rancher produces and sells \$120 wool to a wool processor.
 2. A firm processes the wool and sells the material to a suit manufacturer for \$180.
 3. The suit manufacturer makes a suit and sells it to a wholesaler for \$200.
 4. The wholesaler sells the suit to a retailer for \$250.
 5. The retailer sells the suit to you for \$350.
- If we counted all these transactions in GDP we get: $\$120 + \$180 + \$200 + \$250 + \$350 = \$1,100$.
- When actually, in the end we are only left with a suit worth \$350.

Value added approach

- Add to GDP only the value added at each step:
 1. Sheep rancher: \$120
 2. Wool processor: $\$180 - \$120 = \$60$
 3. Suit manufacturer: $\$200 - \$180 = \$20$
 4. Wholesaler: $\$250 - \$200 = \$50$
 5. Retailer: $\$350 - \$250 = \$100$
- Add up the value added at every stage of production: $\$120 + \$60 + \$20 + \$50 + \$100 = \350

What's not counted?

- Non-production transactions: transactions that do not involve production of a good.
- Financial transactions
 - Public transfer payments such as social security payments and veterans payments.
 - Private transfer payments such as gifts between family members.
 - Stock market transactions.
- Secondhand transactions: contribute nothing to production, just moving ownership of final goods between people.

2.2.1 Expenditure approach

Expenditure approach

- **Expenditure approach:** method of computing GDP by adding up all expenditures of final goods and services.
- Consumption: consumption expenditures of households.
- Investment: purchases of capital goods by firms.
- Government purchases.
- Net exports.

Investment

- **Gross private domestic investment**
 - *Most important:* Capital - final purchases of machinery, equipment, and tools.
 - All construction: includes construction of new offices, factories, *and* residential houses.
 - Changes in inventories: “unsold” output (not counted in consumption, because never purchased).
- **Net private domestic investment** = gross private domestic investment - depreciation.
 - Depreciation: every day some old investment goods need repair or replacement.

Net exports

- **Net exports** = exports - imports.
- Export goods are produced in the U.S. and consumed outside the U.S.
- Imports are subtracted
 - Some things in consumption, investment, and government spending may have been imported (not produced in U.S.).
 - Subtracting imports from exports results in a net quantity of goods produced in the U.S. that are sold outside the U.S.

Gross domestic product

Expenditure approach leads to the equation:

$$Y = C + I + G + X - M$$

- Y: Total Output \equiv GDP.
- C: Private Consumption
- I: investment
- G: Government Spending
- X: Exports
- M: Imports

2.2.2 Income approach

Income approach

- **Income approach:** another method of computing GDP, add up total income.
- **National income** is composed of:
 - Compensation of employees (income earned from labor)
 - Rent (income earned from owning land)
 - Interest (income earned from owning capital)
 - Proprietors' income (income earned from organizing production)
 - Corporate profits (income earned from organizing production)
- National income is *almost* equal to GDP.
 - Requires some statistical adjustments (corporate income taxes, undistributed corporate profits)

Disposable Income

- **Personal income** = National income
 1. *minus* social security payments
 2. *minus* corporate income taxes
 3. *minus* undistributed corporate profits
 4. *plus* transfer payments
- **Disposable income** = Personal income - personal taxes.
- Often, macroeconomist abstract from many of these adjustments and say:

$$\text{Disposable income} \approx \text{GDP} - \text{Personal Taxes}$$

3 Real GDP

3.1 Real vs. Nominal GDP

Nominal vs. Real GDP

- Problem with GDP calculation is that it measures *market value* of goods and services.
- Prices may increase, but production stay the same.
- **Nominal GDP:** (unadjusted) GDP calculation using prices that prevailed when output was produced.
- **Real GDP:** GDP calculation that is adjusted for changes in prices.
 - A single measure of the *quantity* of all final goods and services.

3.2 Computing GDP

Calculating Real GDP

- Don't use current year prices to compute real GDP.
- Use prices from a chosen **base year**.
- Example:
 - Suppose only two goods: Brats and Cheese
 - Let's use 2005 as a base year, compute real GDP for 2006

$$\text{Real GDP}_{2006} = P_{Brats,2005}Q_{Brats,2006} + P_{Cheese,2005}Q_{Cheese,2006}$$

Example: Nominal GDP

Year 2005		
Item	Quantity	Price
Brats	100	\$1.00
Cheese	20	\$5.00

Year 2006		
Item	Quantity	Price
Brats	150	\$2.00
Cheese	25	\$7.00

$$\begin{aligned}\text{Nominal GDP}_{2005} &= \\ 100(\$1) + 20(\$5) &= 200\end{aligned}$$

$$\begin{aligned}\text{Nominal GDP}_{2006} &= \\ 150(\$2) + 25(\$7) &= 475\end{aligned}$$

Example: Real GDP

Year 2005		
Item	Quantity	Price
Brats	100	\$1.00
Cheese	20	\$5.00

Year 2006		
Item	Quantity	Price
Brats	150	\$2.00
Cheese	25	\$7.00

- Real GDP using 2005 as a base year.

$$\begin{aligned}\text{Real GDP}_{2005} &= \\ 100(\$1) + 20(\$5) &= 200\end{aligned}$$

$$\begin{aligned}\text{Real GDP}_{2006} &= \\ 150(\$1) + 25(\$5) &= 275\end{aligned}$$

- What is real GDP growth?

$$\begin{aligned} \text{Real GDP Growth} &= \frac{275-200}{200} \\ &= 0.375 = 37.5\% \end{aligned}$$

Example: Real GDP

Year 2005		
Item	Quantity	Price
Brats	100	\$1.00
Cheese	20	\$5.00

Year 2006		
Item	Quantity	Price
Brats	150	\$2.00
Cheese	25	\$7.00

- Real GDP using 2006 as a base year.

$$\begin{aligned} \text{Real GDP}_{2005} &= \\ 100(2) + 20(7) &= 340 \end{aligned}$$

$$\begin{aligned} \text{Real GDP}_{2006} &= \\ 150(2) + 25(7) &= 475 \end{aligned}$$

- What is real GDP growth?

$$\begin{aligned} \text{Real GDP Growth} &= \frac{475-340}{340} \\ &= 0.397 = 39.7\% \end{aligned}$$

Chain weighted real GDP

- Different base years lead to different conclusions for output growth.
- **Chain weighted GDP:** Another measure of real GDP that averages out these differences.

3.3 Calculating the Price Level

Calculating the price level

- **Price level:** an overall measure of prices in the economy.
- **GDP deflator:** average of current year prices as a percentage of base year prices.

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

- Compute GDP deflator using 2005 as a base year.

4 Shortcomings of GDP

Shortcomings of GDP

- Does not account for non-market activities.
- Leisure: Average workweek in 1900 was 53 hours. Today it's 35 hours.
- Improved product quality (eg. computers).
- Underground economy.
- External costs. Clean up costs are actually *added* to GDP.
- Says nothing about distribution.

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5.1 Next up...

Next up...

- Measuring Unemployment: Modules 12 and 13
- Measuring Inflation - Modules 14 and 15