Unit 4: Measuring GDP and Prices

ECO 120 Global Macroeconomics

National income accounts
Real GDP
Shortcomings of GDP

Reading
Goals

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- Gross Domestic Product (GDP): Module 11
- Real vs Nominal GDP: Module 12

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Reading
Goals

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- 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:
    - LO4: Define macroeconomic measures of production, prices, inflation, and employment. Students will be able to explain how each is measured and evaluate usefulness and limitations for each measure.

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Types of Measures
Gross domestic product

National income accounting   3/ 22

- **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

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Gross domestic product   4/ 22

- **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.

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Example: $350 suit   5/ 22

- 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.

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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
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- Add up the value added at every stage of production:
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- 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.

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- **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.

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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.

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- Export goods are produced in the U.S. and consumed outside the U.S.

- Imports are subtracted

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    - Subtracting imports from exports results in a net quantity of goods produced in the U.S. that are sold outside the U.S.

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Gross domestic product   11/ 22

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

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)

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    - 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)

National income accounts
Real GDP
Shortcomings of GDP

Types of Measures
Gross domestic product

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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, macroeconomists abstract from many of these adjustments and say:

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National income accounts
Real GDP
Shortcomings of GDP

Real vs. Nominal GDP
Computing GDP
Calculating the Price Level

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.

National income accounts   **Real vs. Nominal GDP**
Real GDP   Computing GDP
Shortcomings of GDP   Calculating the Price Level

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National income accounts   Real vs. Nominal GDP
Real GDP   Computing GDP
Shortcomings of GDP   Calculating the Price Level

Calculating Real GDP   15/ 22

- 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

National income accounts   Real vs. Nominal GDP
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National income accounts   Real vs. Nominal GDP
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National income accounts
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National income accounts   Real vs. Nominal GDP
Real GDP   Computing GDP
Shortcomings of GDP   Calculating the Price Level

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

Nominal GDP$_{2005}$ =
$100(\$1) + 20(\$5) = 200$

Nominal GDP$_{2006}$ =
$150(\$2) + 25(\$7) = 475$

National income accounts
Real GDP
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- Real GDP using 2005 as a base year.

  Real GDP$_{2005}$ =
  $100(\$1) + 20(\$5) = 200$

  Real GDP$_{2006}$ =
  $150(\$1) + 25(\$5) = 275$

- What is real GDP growth?

  Real GDP Growth $= \frac{275-200}{200}$
  $= 0.375 = 37.5\%$

National income accounts   Real vs. Nominal GDP
Real GDP   Computing GDP
Shortcomings of GDP   Calculating the Price Level

Example: Real GDP   17/ 22

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- Real GDP using 2006 as a base year.

  Real GDP$_{2005}$ =
  $100(2) + 20(7) = 340$

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- What is real GDP growth?

  Real GDP Growth = $\frac{475-340}{340}$
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National income accounts
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Real vs. Nominal GDP
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National income accounts   Real vs. Nominal GDP
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Chain weighted real GDP   19/ 22

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

National income accounts   Real vs. Nominal GDP
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Chain weighted real GDP   19/ 22

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National income accounts
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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.

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Calculating the price level   20/ 22

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Calculating the price level   20/ 22

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- 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 and electronic devices).

- Underground economy, significant for lesser developed countries.

- External costs. Clean up costs are actually *added* to GDP.

- Says nothing about distribution.

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- Measuring Unemployment: Modules 13 and 14
- Measuring Inflation - Module 16