Week 1: Measuring the Macroeconomy

ECO 301: intermediate Macroeconomics

Production and Income
Price Level and Inflation
Employment

Goals
Reading and Exercises

Goals   1/ 32

Describe measures of macroeconomic activity including the
following:

- Total production
- Total income
- Aggregate price level
- Inflation
- Employment
- Worker compensation
- Unemployment

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Goals
Reading and Exercises

Reading and Exercises   2/ 32

- Textbook reading: Chapter 2
- **Canvas Quiz due Wednesday 11:59 PM**.
  Multiple-choice, 10 questions, unlimited attempts allowed,
  only best score counts
- **Homework due Friday 11:59 PM**. We will work together in
  class on Thursday.

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National Income Accounting

National Income Accounting

Different measures of a country's overall economic activity in a given time period.

Why Do We Care?

- Assess the health of the economy by comparing income per person across countries and across time periods.
- Track long run growth of the economy.
- Assess the effectiveness of government policies to fix economic problems.

Measures

- Gross domestic product
- Net domestic product
- National income
- Personal income
- Disposable income

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- **Disposable income**

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Gross Domestic Product   4/ 32

- **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.

- Monetary measure: A common unit allows us to add apples and oranges and pickup trucks and everything else together

- Does not include purely financial transactions

- Does not include secondhand sales / sales of used goods

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Example: $350 suit

The birth of suit

1. Sheep rancher sells $120 wool to a wool processor.

2. Wool processor makes material and sells it 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.

Value?

- 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
    5. Retailer: $350 - $250 = $100

- Add up the value added at every stage of production:
  $120 + $60 + $20 + $50 + $100 = $350

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What Is Not Counted in GDP?

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

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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 expenditures

- 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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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.

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Gross Domestic Product   11/ 32

Expenditure approach leads to the equation:

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

- Y: Total Output $\equiv$ GDP.
- C: Private Consumption
- I: Investment
- G: Government Expenditures
- X: Exports
- M: Imports

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Income Approach   13/ 32

- **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 = income paid to all the factors of production
- National income is *almost* equal to GDP.

    - Requires some statistical adjustments (corporate income taxes, undistributed corporate profits)

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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 = income paid to all the factors of production
- National income is *almost* equal to GDP.
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Disposable Income   14/ 32

- **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.

- Close approximation:

  Disposable income ≈ GDP − Personal Taxes

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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.

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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

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

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Example: Real GDP   18/ 32

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

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- Real GDP using 2006 as a base year.

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

  Real GDP$_{2006}$ =
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- What is real GDP growth?

  Real GDP Growth = $\frac{475-340}{340}$
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Chain-Weighted Real GDP   20/ 32

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

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Non-Market Activities Not Counted

- Leisure: Average workweek in 1900 in U.S. was 53 hours. Today it's 35 hours.

- Improved product quality (eg. computers and electronic devices).

- Informal or "underground" economy not counted.
    - United States: 8.3% of total production
    - Georgia: 64.9% of total production

Other Shortcomings

- Externalities: Production that leads to costs or negative consequences to others (eg. pollution)

- Says nothing about income or wealth inequality.

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

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

- **Inflation:** Growth rate of the price level

$$\text{inflation}_t = \frac{\text{GDP Deflator}_t - \text{GDP Deflator}_{t-1}}{\text{GDP Deflator}_{t-1}}(100\%)$$

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GDP Deflator
Consumer Price Index

Calculating the Price Level   22/ 32

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Calculating the Price Level   22/ 32

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- **GDP deflator**: average of current year prices as a percentage of base year prices.

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

- **Inflation:** Growth rate of the price level

$$\text{inflation}_t = \frac{\text{GDP Deflator}_t - \text{GDP Deflator}_{t-1}}{\text{GDP Deflator}_{t-1}}(100\%)$$

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Consumer Price Index

- **Consumer price index (CPI)**: another measure of the aggregate price level.
- Bureau of Labor Statistics (BLS) chooses a basket of goods: specific goods with specific weights.
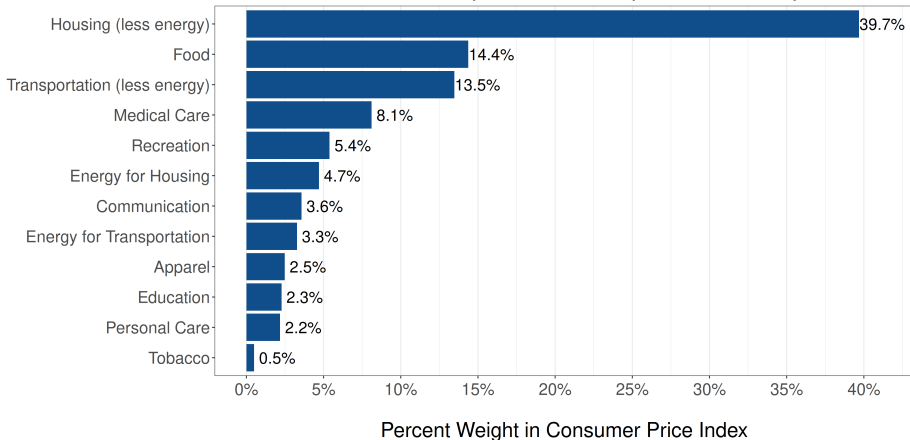
$$CPI_t = \frac{\text{Price of basket at time } t}{\text{Price of same basket in base year}} (100)$$

- CPI inflation rate: percentage change in CPI.

$$\text{inflation}_t = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} (100\%)$$

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CPI Basket

CPI Basket: Relative Importance of Expenditure Components

Housing (less energy) — 39.7%
Food — 14.4%
Transportation (less energy) — 13.5%
Medical Care — 8.1%
Recreation — 5.4%
Energy for Housing — 4.7%
Communication — 3.6%
Energy for Transportation — 3.3%
Apparel — 2.5%
Education — 2.3%
Personal Care — 2.2%
Tobacco — 0.5%

Percent Weight in Consumer Price Index

Average relative importance for all U.S. urban households, November 2022.
Source: https://www.bls.gov/cpi/tables/relative-importance/home.htm

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Labor force

Labor force: people in the population who are *willing* and *able* to work. The labor force does *not* include:

- Children

- People who are institutionalized

- Active-duty military personnel

- People legally not allowed to work

- People not employed who are not looking to be employed (eg. some students, retired people).

- **Discouraged workers**: people who are not employed and gave up looking for work because they don't think any jobs are available

- **Marginally attached workers:** people who would take a job if offered one, but are not looking

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Employment Statistics

Unemployment Rate

Unemployed people: people *in the labor force* not employed.

$$\text{Unemployment Rate} = \frac{\text{Number of unemployed people}}{\text{Labor force}} \times 100\%$$

Labor force participation rate

Labor force participation rate: percentage of adult civilian working-age population who are in the labor force.

$$\text{Labor Force Participation Rate} =$$

$$\frac{\text{Labor Force}}{\text{Adult Civilian Working-Age Population}} \times 100\%$$

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Computing Employment Statistics

Population

Suppose a working-age population has the following characteristics:

- 115 people work full time
- 33 people work part time
- 25 people work part time, but want full time jobs
- 15 people do not work, but want to and are looking for work
- 10 people want to work, but they got frustrated, and gave up looking for work
- 40 people are in school, not currently working nor looking for work
- 12 people are retired

Employment Statistics

- Working-age population (everyone)
  $= 115 + 33 + 25 + 15 + 10 + 40 + 12 = 250$
- Labor force
  $= 115 + 33 + 25 + 15 = 188$
  (includes working and unemployed)
- Unemployed $= 15$
  (must be in labor force)
- Labor force participation rate
  $= 188 / 250 * 100\% = 75.2\%$
- Unemployment rate
  $= 15 / 188 * 100\% = 8.0\%$

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Types of Unemployment   28/ 32

- **Frictional unemployment**: unemployment caused by delays in job search, job candidate search.
- **Structural unemployment**: caused by changes in demand for types of work.
    - Changes in technology makes some types of jobs obsolete.
    - Changes in international trade shrink some industries.
    - Changes in tastes and preferences.
- **Cyclical unemployment**: caused by declines in total spending in the economy.
    - Unemployment that increases during recessions, decreases during expansions.

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Full employment   29/ 32

- **Natural rate of unemployment**: whatever unemployment rate that is associated with zero cyclical unemployment.
- **Full employment**: When there is zero *cyclical unemployment*; the other types may be positive
- **Potential GDP or Full-Employment GDP**: Level of GDP that would occur with full employment

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Real Wage   30/ 32

- **Nominal wage:** Unadjusted, before tax, hourly earnings for labor
- **Real wage:** Inflation-adjusted wage, reflects the real purchasing power of the wage

$$\text{real wage} = \left(\frac{\text{nominal wage}}{\text{Price Level}} \right) 100$$

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Computing the Real Wage

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Nominal Wages and Price Levels

Suppose you earned the following
nominal wages

- Nominal wage(2021) = $18 / hour
- Nominal wage(2022) = $19 / hour

Actual GDP Deflators (base year 2012):

- GDP Deflator(2021) = 118.866
- GDP Deflator(2022) = 127.183

Real Wages

- Real wage(2021)
  = $18 / 118.866 * 100 = $15.14
- Real wage(2022)
  = $15 / 127.183 * 100 = $14.94
- Nominal raise, but *real pay cut.*
- Purchasing power of wages is lower
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