Week 4: Measuring the Macroeconomy

ECO 120: Global Macroeconomics

Goals

Describe measures of macroeconomic activity including the following:

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

Reading and Exercises

- Module 14: Measuring total production using Gross Domestic Product (GDP)
- Module 15: Measuring real versus nominal GDP
- Module 16: Measuring unemployment
- Module 17: Categories of unemployment
- Module 18: Measuring Price Level using the Consumer Price Index
- **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

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

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

Gross Domestic Product

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

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  4. *plus* transfer payments
- **Disposable income** = Personal income - personal taxes.
- Close approximation:

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

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- **Disposable income** = Personal income - personal taxes.
- Close approximation:

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

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.
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- 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

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

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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

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

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

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- Real GDP using 2005 as a base year.

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

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

- What is real GDP growth?

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

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

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

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- **Chain-weighted GDP:** Another measure of real GDP that averages out these differences.

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Shortcomings of GDP

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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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.

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

- **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.

$$\text{CPI}_t = \frac{\text{Price of basket at time } t}{\text{Price of same basket in base year}}(100)$$

- CPI inflation rate: percentage change in CPI.

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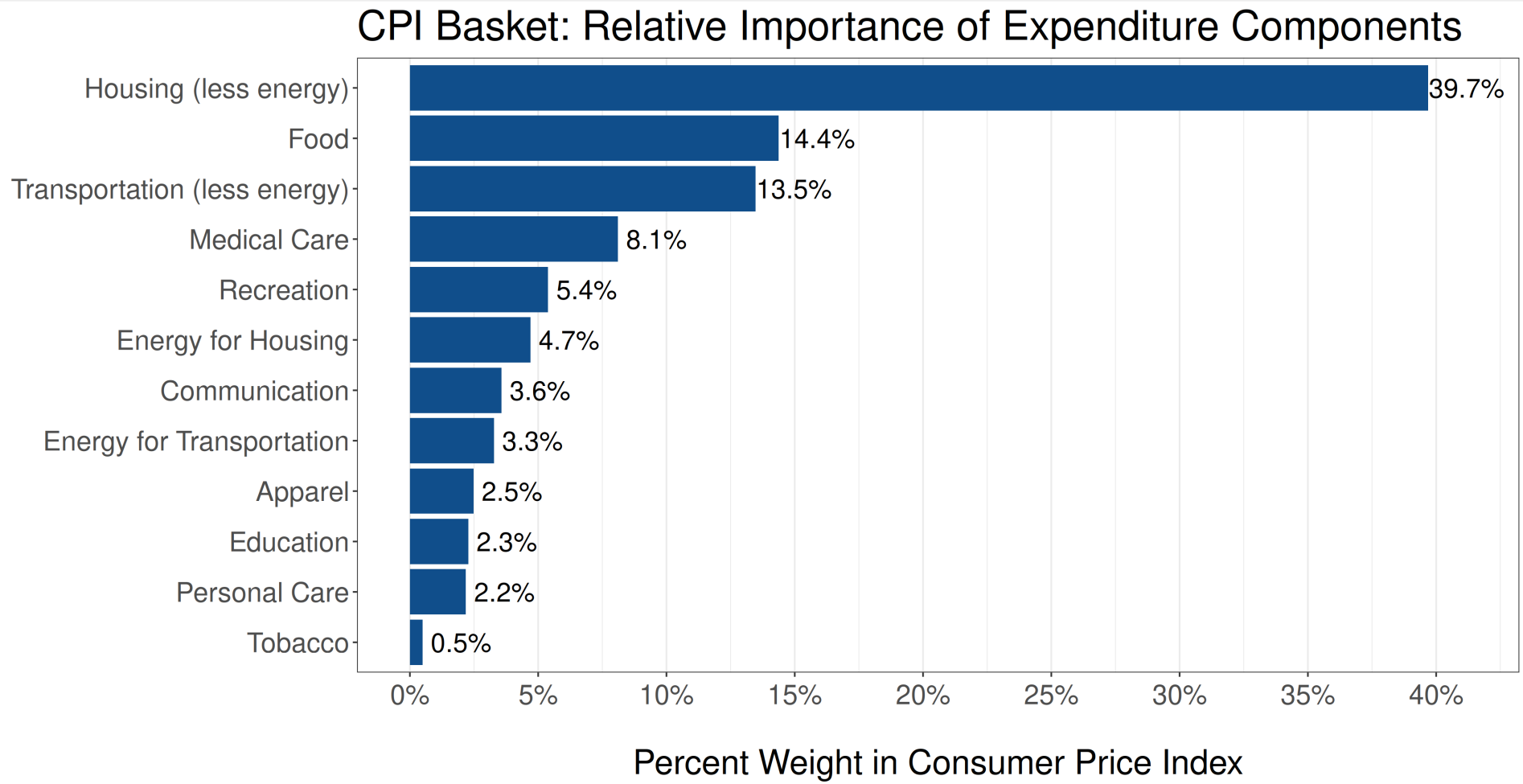
CPI Basket



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

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.

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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 $= 188 \ / \ 250 \ * \ 100\% = 75.2\%$
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- 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 $= 15 \ / \ 188 \ * \ 100\% = 8.0\%$

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

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Scholar Spotlight: Hie Joo Ahn

Measuring labor-force participation and the incidence and duration of unemployment, *Review of Economic Dynamics*, April 2022 (with James D. Hamilton)

Mis-measures of the labor market

- Labor market participation and unemployment are measured by the BLS
- Identify and fix inconsistencies in how these measures are aggregated
- Unemployment rate is about 2% higher
- Labor market participation is 2% higher
- Unemployment duration 11 weeks shorter

Dr. Hie Joo Ahn
Senior Economist
Federal Reserve Board of Governors

Types of Unemployment

- **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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- **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

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

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Computing the Real Wage

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) = \$19 / 127.183 * 100 = \$14.94
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- Module 16: Measuring unemployment
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