

Chapter 3

Macroeconomic Accounting

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Micro → Macro

- › HHs have preferences that translate to economic choices
- › What is the “macro” part of our analysis?
 - Determine how those choices move aggregate prices and quantities
 - Recall: aggregate = sum, or economy as a whole
- › Before we make the micro → macro jump, we need to understand what we’re aggregating to

National Income Accounting

› Three equal approaches

1. Product approach [*anything produced*] →
2. Expenditure approach [*is purchased by someone*] →
3. Income approach [*must be income for someone else*]

› National income identity:

Total Production =

Total Income =

Total Spending

Gross Domestic Product

- › **Gross Domestic Product (GDP, or Y)** total market value of all the new final goods and services produced within a specific time and set of borders
- › **Note: Economists use “ Y ” and “real GDP” interchangeably. We’ll talk about what real means at the end of the chapter.*
- › Let’s go through each term in our definition

Market Value

- › **Market value:** use prices to compare different goods
 - Assumption: prices come from market clearing (supply = demand)
 - This is a subjective, equilibrium value
 - Why subjective? What happens if **preferences** change?

New and Final Goods

- › New final goods and services:
 - New is simple: only things produced in the period we're studying, not earlier
- › Final goods and services are more complicated

Final Goods and Services:

- › Anything not used up in the production of other goods and services. Includes:
 - **Capital goods** - goods that produce other goods (they are not used up in production)
 - › Ex: assembly line equipment
 - **Inventory investment** - unsold final goods, goods in process
- › **Intermediate goods** are not final goods
 - Anything used up in production of final goods (or other intermediate goods)
 - › Ex: flour in a cake

Value-added Approach

- › To avoid counting intermediate goods twice, we use the **value-added approach**
 - Only adds the additional value of each step to GDP

Step	Receipt	Value Added
Farmer grows apples	1	1
Processor cleans apples	3	2
Vendor sells apples	4	1
Baker sells apple pie	7	3
Consumer buys apple pie	7	0

Time and Borders

- › Within a specific time and set of borders:
- › Time can mean anything; usually a year or quarter
- › Borders is more nuanced. Where do you include the profits of an Italian firm operating in the U.S.?

Gross National Product

- › Gross National Product (GNP) is production from nationals, regardless of borders
- › GDP = output produced within borders regardless of nationality
- › Net Factor Payments (*NFP*) = $GNP - GDP$
 - Usually around 1% for U.S.

GDP vs GNP

- › So where do profits from an Italian owned firm operating in the U.S. go?
 - Italian GNP (owned by Italian nationals)
 - U.S. GDP (operating within U.S. borders)

Expenditure Approach

- › Measured by total spending (demand for all goods)
 - GDP (Y) =
consumption (C) + investment (I) +
government purchases (G) + net exports (NX)
 - $NX = \text{Exports} - \text{Imports}$

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

Goods Market Equilibrium

- › The expenditure approach leads us to our first market clearing condition
 - Goods Market Equilibrium
- › **Market clearing:** price(s), demand function(s), and supply function(s) where quantity supplied = quantity demanded
- › In the classical setting, there is a price for output where:

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

Components of GDP

- › **Consumption:** durable/non-durable goods and services
 - ~68% of U.S. GDP
- › **Investment:** capital goods, inventory, residential/non-residential buildings, IP
 - ~18% of U.S. GDP
- › **Government purchases:** NOT including transfers (Social Security) and interest payments on debt
 - ~17% of U.S. GDP
- › **Net exports:** money received from exports minus imports
 - ~-3% of U.S. GDP (BEA, 2026)

Government and Private Income

- › We can break GDP into two categories:
 - Government income
 - Private income

- › Government income = $T - Tr - Int$
 - Taxes collected (T)
 - Transfers to households (e.g. Social Security) (Tr)
 - Interest payments on debt (Int)

Private Income

- › Private (household) income = $GDP + NFP + Tr + Int - T$
 - Income from home (Y , or GDP)
 - Income from abroad (NFP) – slide 10
 - Transfers from gov't (Tr)
 - Interest on gov't debt (Int)
 - Taxes paid (T)

- › Private + Gov't income = $GDP + NFP = GNP$
 - Income from citizens regardless of location

Issue with GDP?

- › GDP does not measure:
 - Happiness, education, opportunity, kindness, ethics
 - Though, ceteris paribus, most people prefer high GDP to low GDP
- › We can look at GDP per capita, or GDP per person, but that doesn't solve the issue if the distribution is skewed
- › Can compare with Gini Coefficient, which looks at income inequality
 - 0 = perfectly equal; 1 = total inequality

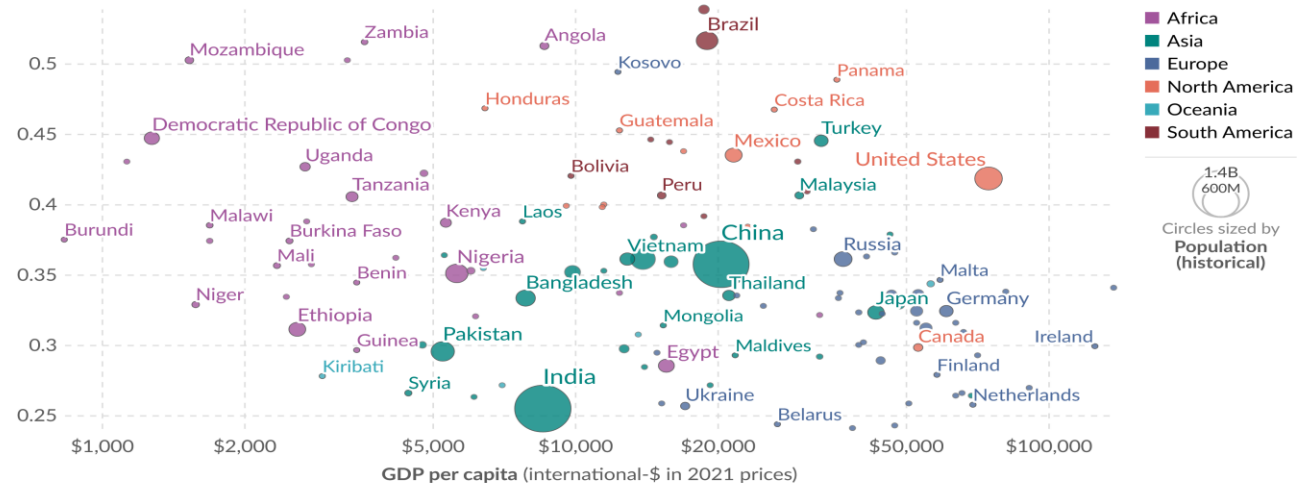
Gini Coefficient and GDP per Capita

Income inequality vs. GDP per capita, 2023

Our World
in Data

The Gini coefficient¹ measures inequality on a scale from 0 to 1. Higher values indicate higher inequality. GDP per capita is adjusted for inflation and for differences in living costs between countries.

Gini coefficient



Data source: World Bank Poverty and Inequality Platform (2025); Eurostat, OECD, and World Bank (2025)

Note: GDP per capita is expressed in international-\$² at 2021 prices. Depending on the country and year, inequality data relates to income (measured after taxes and benefits) or to consumption, per capita³.

OurWorldinData.org/economic-inequality | CC BY

- › No clear correlation. Maybe by global region?
 - Still doesn't get at the heart of the matter

Another Issue

- › Assume a two good economy: apples and oranges
- › 2010: 9 apples sold at \$2 each; 8 oranges sold at \$3 each
 - $\text{GDP} = \$18 + \$24 = \$42$
- › 2020: 9 apples sold at \$4 each; 10 oranges sold at \$5 each
 - $\text{GDP} = \$36 + \$50 = \$86$
- › How much did the economy *really* grow? How much was just inflation?

Nominal vs Real Values

› The \$42 and \$86 values of **nominal GDP**

- **Nominal:** in name only
- Does not represent purchasing power
- Influenced by **inflation:**
- Rate of change in *aggregate* price level

2010	2020
$P_{\text{apples}} = 2$ $P_{\text{oranges}} = 3$	$P_{\text{apples}} = 4$ $P_{\text{oranges}} = 5$
$Q_{\text{apples}} = 9$ $Q_{\text{oranges}} = 8$	$Q_{\text{apples}} = 9$ $Q_{\text{oranges}} = 10$

› **Real GDP** is found by picking a “base year”

- **Real:** adjusted for inflation; represents purchasing power
- Use prices from base year and quantities from current year
- If 2010 is the base, real GDP in 2020 is:
 - $\$18 + \$30 = \$48$

GDP Deflator

› **GDP deflator** measure of inflation:

- $\frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$

› GDP deflator in 2020 =

- $\frac{86}{48} \times 100 = 179$, or 79% inflation

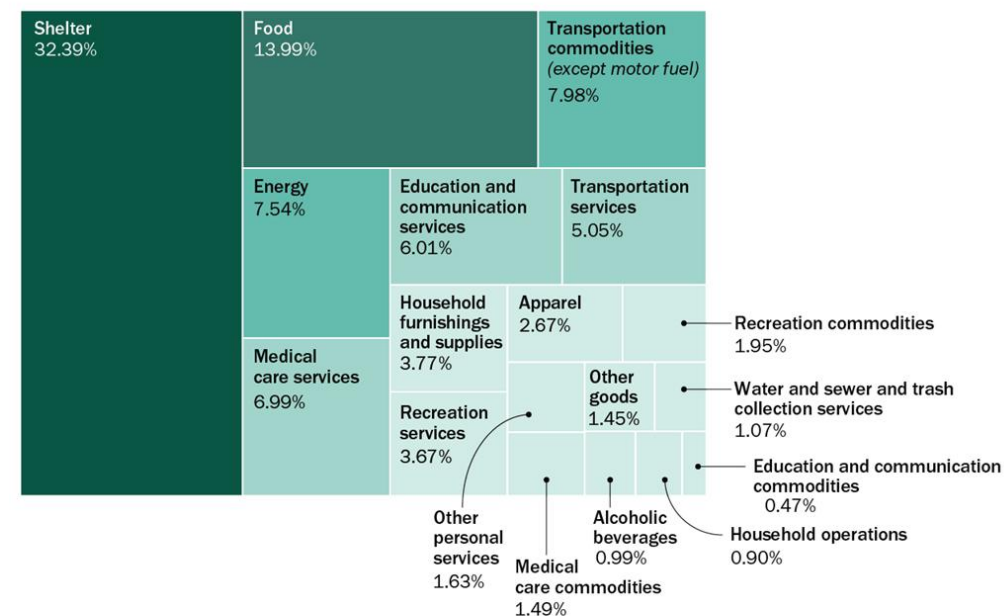
2010	2020
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Consumer Price Index

- › Can also use **Consumer Price Index (CPI)**
 - Instead of fixing base prices, we fix a “basket” of goods in base year
 - Common price index in media; fix quantities for average consumer

What goes into the consumer price index?

Relative importance of different expenditure categories, November 2021



Source: U.S. Bureau of Labor Statistics

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Calculating CPI

$$\text{CPI} = \frac{\text{Costs Current Year}}{\text{Costs Base Year}} \times 100$$

- › CPI for basket fixed in 2010 =
 - $\frac{76}{42} \times 100 = 181$, or 81% inflation

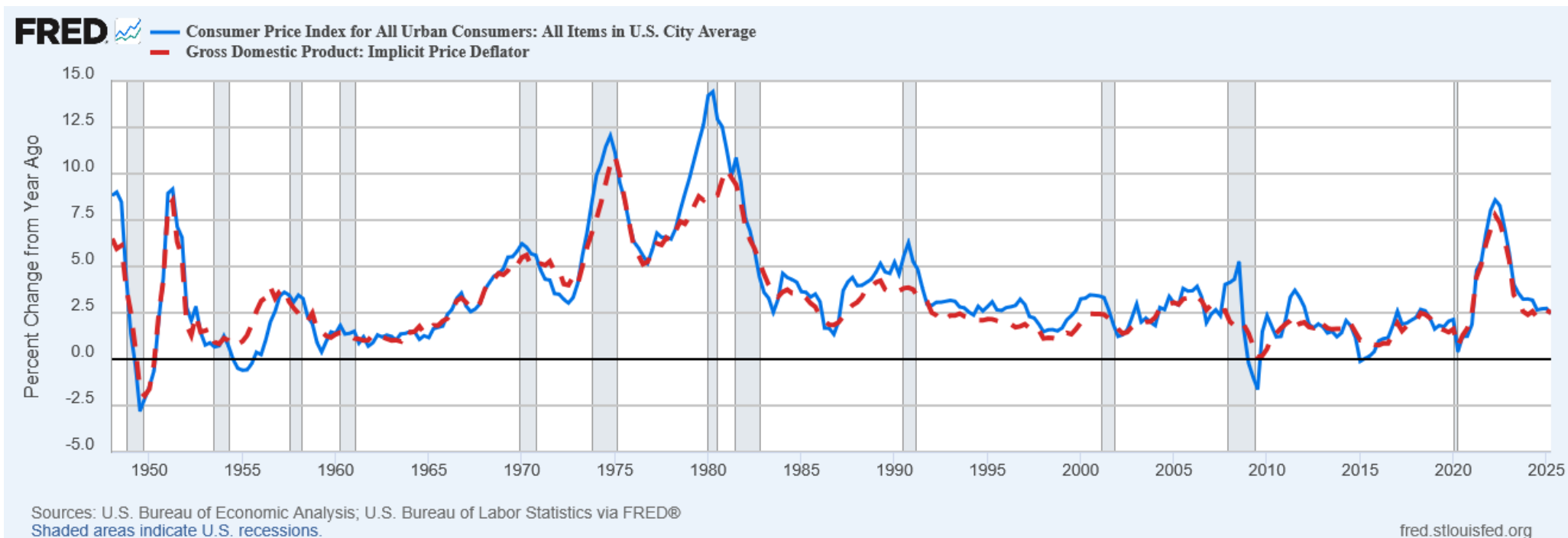
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Pros and Cons to CPI

- › Tries to focus on consumer, not whole economy
- › But cannot see substitution by consumers to better or cheaper goods
 - Known as **substitution bias**
- › Baskets can also become outdated
 - Imagine a basket before the iphone, using prices after the iphone
- › Can overstate inflation by 1%

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CPI vs GDP Deflator



Personal Consumption Expenditures

- › Personal Consumption Expenditures (PCE) preferred by **the Federal Reserve (Fed)**, the U.S. central bank, since 2000's
 - More goods and services covered
 - Purchases on behalf of households (Medicare)
 - Updated more frequently
 - CPI biased against rural economic activity

- › Fed uses **core PCE**, which excludes food and energy
 - Far more volatile markets that obscure the trend
 - HW will take a deeper dive into core PCE

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APPENDIX

Product Approach Example (1/5)

- › Let's look at an economy with two firms: Frank Co and Coop Inc
 - Coop produces cheese and Frank produces pizza
 - Coop sells cheese to consumers and to Frank
 - Frank sells pizza to consumers only

- › The following is an accounting breakdown of activity

Product Approach Example (2/5)

› Coop:

Total revenue from cheese	\$10,000
Selling cheese to public	\$8,000
Selling cheese to Frank	\$2,000
Wages paid to workers	\$4,000

› Frank:

Total revenue from pizza	\$15,000
Buying cheese from Coop	\$2,000
Wages paid to workers	\$5,000

Product Approach Example (3/5)

- › So just add up total revenue? Coop:
 - Not quite

Total revenue from cheese	\$10,000
Selling cheese to public	\$8,000
Selling cheese to Frank	\$2,000
Wages paid to workers	\$4,000

- › Total revenue double counts the value of the cheese Coop sold to Frank

- If it's included in Coop's total revenue, it adds no value to the total when adding Frank's revenue

Frank:

Total revenue from pizza	\$15,000
Buying cheese from Coop	\$2,000
Wages paid to workers	\$5,000

Product Approach Example (4/5)

- › We use the **value added** approach to deal with this
 - Value of output minus purchased value of inputs
- › Since cheese is an intermediate good for Frank, it is not counted

Product Approach Example (5/5)

- › GDP = \$23,000 =
 - 10,000 + 15,000 – 2,000

- › Total value of production
minus value of intermediate
goods

Coop:

Total revenue from cheese	\$10,000
Selling cheese to public	\$8,000
Selling cheese to Frank	\$2,000
Wages paid to workers	\$4,000

Frank:

Total revenue from pizza	\$15,000
Buying cheese from Coop	\$2,000
Wages paid to workers	\$5,000

Expenditure Approach Example

- › GDP = \$23,000 =
 - 8,000 + 15,000

- › Total value spending on final goods
 - Cheese the public buys
 - Pizza the public buys
 - No capital goods, inventory, government, exports, in this example

Coop:

Total revenue from cheese	\$10,000
Selling cheese to public	\$8,000
Selling cheese to Frank	\$2,000
Wages paid to workers	\$4,000

Frank:

Total revenue from pizza	\$15,000
Buying cheese from Coop	\$2,000
Wages paid to workers	\$5,000

Income Approach Example

› Add up all firm, household, government income

› GDP = \$23,000 =

- (10,000 – 4,000) +
- (15,000 – 2,000 – 5,000) +
- 4,000 +
- 5,000

- Coop's income +
- Frank's income +
- Coop employee income +
- Frank employee income

Coop:

Total revenue from cheese	\$10,000
Selling cheese to public	\$8,000
Selling cheese to Frank	\$2,000
Wages paid to workers	\$4,000

Frank:

Total revenue from pizza	\$15,000
Buying cheese from Coop	\$2,000
Wages paid to workers	\$5,000

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