ECO 3302 – Intermediate Macroeconomics

Lectures 2 & 3: Becoming a Macroeconomist

Luis Pérez
(luisperez@smu.edu)

January 24, 27 & 29, 2025

Table of Contents

The Field of Macroeconomics

The Field of Macroeconomics

- Long been thought to be the **study of economic aggregates**
  - Eg, output, employment, inflation, ...
- While that is still true today, macroeconomics is much more than that
- Macroeconomics today is **also concerned with distributional questions**
  - Eg, inequality in consumption, income, wealth, ...
- Since its inception, the field of macro has grown in ambition and scope
  - **Many diverse topics**: Growth, International Trade, Taxation, Macro Finance, Labor Economics, Sovereign Debt, Climate Change, Migration, ...

Curiosity (on the origins of the field). Many consider John Maynard Keynes the founder of the discipline, and Robert E. Lucas Jr. the founder of modern Macroeconomics

Understanding Macroeconomists

- Most economists engaging in macroeconomic research do so with the **objective of *informing* economic policies**. [Some may just do it for fun!]

- Desire of aiding in policy design typically obeys one of two reasons:

  1. **Market Failures**. Market produces inefficient allocation of resources and corrective policies can resolve this inefficiencies (eg, pollution externalities)

  2. **Distortionary policy proposals**. Policies that, if implemented, may alter efficient allocations or move us to more distorted equilibria

The Approach of Macroeconomists

- To help policymakers, macroeconomists need to have a solid understanding of the functioning of the economy
- Understanding how the economy works, requires:
  1. **Tracking economic activity**—that is, measurement of economic quantities
  2. **Analysis**—that is, a theoretical understanding of key transmission mechanisms
- Thus, macroeconomics is not only about the questions being asked, but also about the methods being used to tackle such questions

- Modern macroeconomic analysis uses empirical, theoretical, and quantitative analysis to shed light on key economic questions:
  - **Empirical analysis** helps us understand *what is going on in the real world*
  - **Theoretical analysis** helps us understand *the responses of economic agents to specific shocks and economic policies*
  - **Quantitative analysis** provides us with a laboratory where we can quantify *how economic agents respond to economic policies in the presence of realistic heterogeneity and competing theoretical mechanisms*

What Is Macroeconomics?

Definition of (Modern) Macroeconomics

- Macroeconomics is the field of economics which studies economic aggregates and their distributional aspects
- Modern macroeconomics uses empirical, theoretical, and quantitative analysis and often seeks to inform policy decisions
- Relevant fields include economic growth, business cycles, optimal taxation, sovereign debt, international trade, ...

Why Study Macroeconomics?

Why study Macroeconomics?

1. To better understand pressing issues and the world around you

THE WALL STREET JOURNAL.

THURSDAY, JANUARY 13, 2022 - VOL. CCLXXIX NO. 10 | WSJ.com | ★★★★ $5.00

What's News

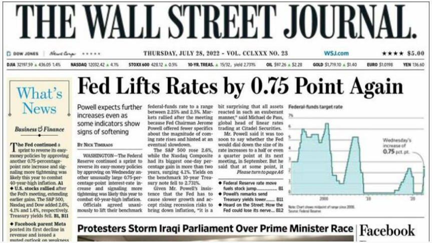
Business & Finance

Inflation Hits Fastest Clip Since '82

Consumer prices rise by 7% as pandemic disruptions, consumer demand stay strong

Consumer-price index, change from a year earlier

Consumer-price index for select categories, change from a year earlier



THE WALL STREET JOURNAL.

THURSDAY, JULY 28, 2022 - VOL. CCLXXX NO. 23 | WSJ.com | ★★★★ $5.00

What's News

Business & Finance

Fed Lifts Rates by 0.75 Point Again

Powell expects further increases even as some indicators show signs of softening

Federal-funds target rate

Protesters Storm Iraqi Parliament Over Prime Minister Race

Facebook

"All the News That's Fit to Print"

The New York Times

Late Edition

VOL. CLXVIII ... No. 58,324 | NEW YORK, SATURDAY, MAY 11, 2019 | $3.00

U.S. Renews Trade War Against China as Talks End Without Any Deal

Hard Line May Help as Election Nears

Trump Says He Is Set for a Long Fight

The Washington Post

Democracy Dies in Darkness

TUESDAY, MARCH 10, 2020

Amid outbreak, stocks dive and recession fears rise

From tweet eruptions to economic steps, Trump struggles for calm

Virus panic evaporates Dow Jones gains from 2019

STEEPEST DROP FOR OIL PRICES IN DECADES

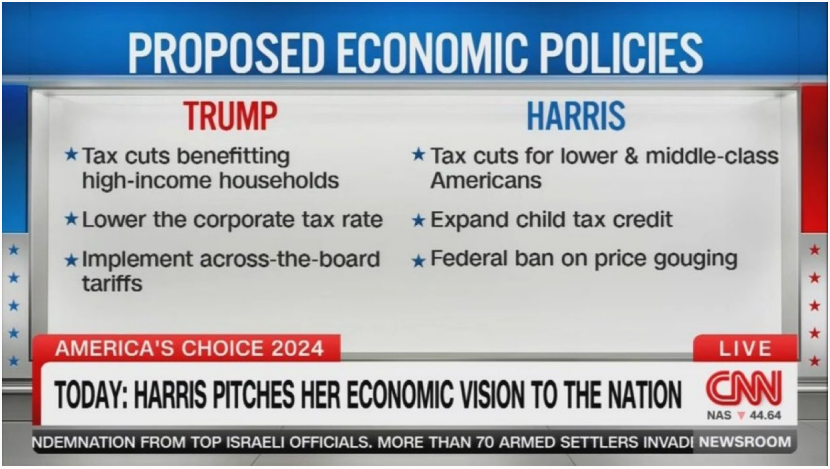
WHO director says pandemic threat is 'very real'

Outbreak shows lack

D.C.-area response

Why study Macroeconomics?

2. To evaluate different political programs and make informed voting decisions



Why study Macroeconomics?

3. **Because you are fascinated by macroeconomic questions**

   - Why are some countries much richer than others?
   - Why are some countries much more unequal than others?
   - What is the best way to lift (millions of) people out of poverty?
   - Why do some countries have well-functioning institutions while others do not?
   - Why do some countries have high inflation while others maintain stable prices?
   - Why do international markets tolerate higher levels of debt for some countries?
   - Why does the stock market react to the Fed policy announcements?

Why study Macroeconomics?

- **Let me share with you the fascination of one of my heroes, Bob Lucas, when thinking about economic growth**:

> "I do not see how one can look at figures like these without seeing them as representing *possibilities*. Is there some action a government of India could take that would lead the Indian economy to grow like Indonesia's or Egypt's? If so, *what*, exactly? If not, what is it about the 'nature of India' that makes it so? The consequences for human welfare involved in questions like these are simply staggering: Once one starts to think about them, it is hard to think about anything else"

Becoming A Macroeconomist

Becoming a Macroeconomist

- *John Maynard Keynes* on being a good economist:

"The master-economist must possess a rare combination of gifts...He must be mathematician, historian, statesman, philosopher—in some degree (...) as aloof and incorruptible as an artist, yet sometimes as near to earth as a politician"

- *N. Gregory Mankiw* on the job of a macroeconomist:

"The job of explaining the workings of the economy as a whole falls to macroeconomists. To this end, macroeconomists, collect data ...They then attempt to formulate theories to explain these data"

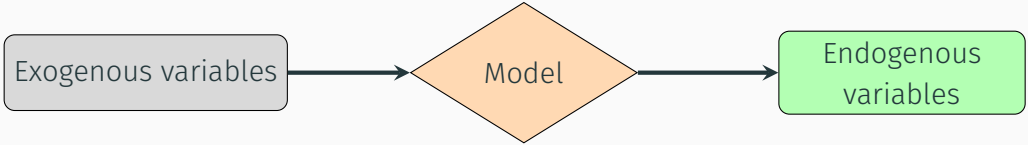
- *Paul Samuelson* on the most important task of a macroeconomist:

"The first duty of an economist is to describe correctly what is out there: a valid description without a deeper explanation is worth a thousand times more than a clever explanation of nonexistent facts"

Theory as model building

- Economist **use models to understand** (particular aspects of) **the world**
  - Eg, what is the effect of tariffs on trade, of taxes on labor supply, ...
- **Different questions call for different models**, so we have many models!
  - Occupational choice problem vs. effect of minimum wage on unemployment
- **Useful models**:
  - Simplifications of reality (ie, no irrelevant details)
  - Make sensible and suitable choices for problem at hand (ie, reasonable assumptions and parametrizations)
  - Capture key interactions (ie, mechanisms most people would deem relevant)
  - Consistent with empirical observations (qualitatively and/or quantitatively)

How models work



- **Models have two types of variables**:
  - **Exogenous variables**: variables whose values are taken as given
    - Determined "outside" model
  - **Endogenous variables**: variables explained by model
    - Determined "inside" model
    - **How?** Through decision rules (derived from optimization problems after imposing suitable equilibrium concept)
- **Model establishes relationship between exog and endog variables**
  (eg, growth rate is a function of economy's savings rate)

Example: Supply and demand of pizza

Economist theorizes that:

- **Quantity of pizza demanded** by consumers, Q^d, depends on its price P and on aggregate income Y. Formally,

$$Q^d = D(P, Y)$$

($D : \mathbb{R}^2_{++} \to \mathbb{R}_+$, *demand* function mapping price of pizza and income to quantity demanded)

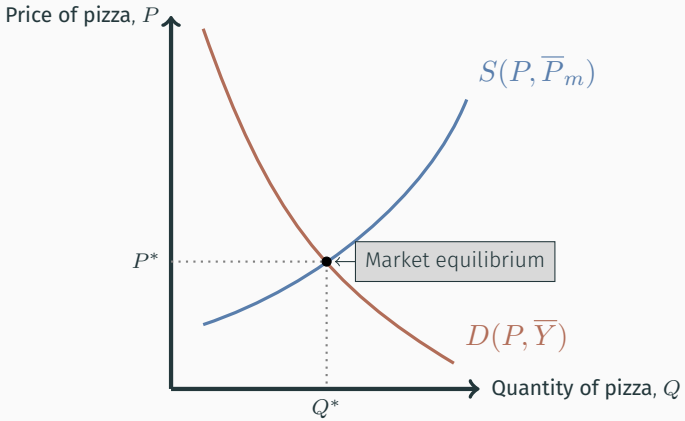
- **Quantity of pizza supplied** by pizzerias, Q^s, depends on its price P and on price of materials P_m (eg, flour, tomato, cheese, ...). That is,

$$Q^s = S(P, P_m)$$

- **Price of pizza adjusts so that markets clear**, $Q^s = Q^d$.

These 3 equations (demand function, supply function, mkt-clearing condition) **constitute a model of the market of pizza**

Model Illustration: Supply and demand of pizza I

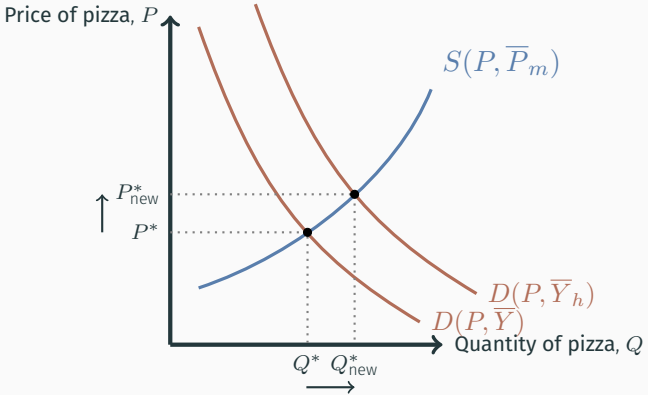


- **Exogenous variables**: income Y and price of materials P_m
- **Endogenous variables**: price of pizza P and quantity of pizza Q

Comparative statics in the market for pizza

- Model useful to understand how changes in exog variables affect endog variables
- Eg, Suppose aggregate income Y increases

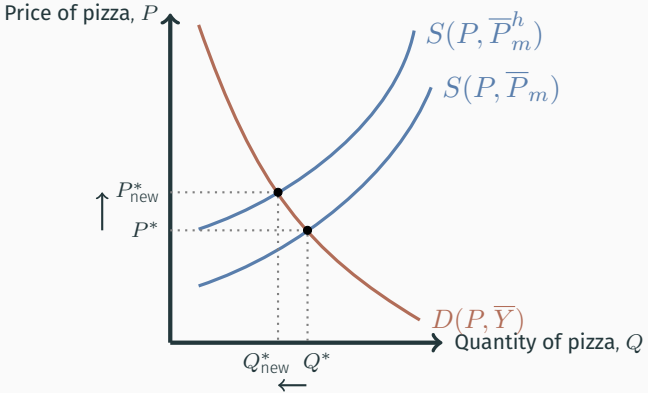
  $\Longrightarrow$ Quantity demanded increases at every price, so demand curve shifts to the right



Comparative statics in the market for pizza II

- Model useful to understand how changes in exog variables affect endog variables
- Eg, Suppose price of materials P_m increases

  $\Longrightarrow$ Quantity supplied decreases at every price, so supply curve shifts to the left



Discussing the model of the market for pizza

- **Model makes many simplifying assumptions**:
  - Single prize for pizza (regardless of proximity to clients)
  - Homogeneous pizzas (eg, not SauceBros vs. Domino's)
  - Demand depends only on price and income (eg, no role for taste or substitutes)
  - Supply depends only on price and cost of materials (eg, no consumers' taste)
  - Flexible price (ie, price adjusts instantly so market clears)
- **Is this lack of realism a problem?** *Depends on question of interest!*
  - NOT for understanding how income and costs affect price and quantity of pizza
  - YES for understanding price differentials across towns with different #pizzerias
- **Model building is an art**: assumptions to clarify our thinking, not mislead it!

"All models are wrong, but some are useful" ∼ George E.P. Box

Modern macroeconomic models

Modern macro models:

- Are **mathematically rigorous**
- Put more emphasis on **microfoundations**
- Put more emphasis on **consistent aggregation** (ie, micro-aggregated macro)
- Feature **rich heterogeneity** (in consumers' preferences, firms' technology, ...)
- Are **informed by data**

In this course, as the example of the market for pizza illustrates...

- Leave many of these complexities aside (eg, heterogeneity, aggregation, etc)
- Microeconomic decisions often assumed to happen in the background

Macroeconomics Data

- *Sherlock Holmes* on the importance of data [in line with *Samuelson*]:

  "*It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts*"

- Casual/anecdotal evidence vs. economic data:
  - Casual/anecdotal evidence: you grab a sense of how the economy is doing when you (or people you know) engage in economic activity
  - Data: systematic data (ie, many observations) that arise from surveying or collecting information on households and firms

- Economists use data to compute aggregate statistics that summarize the state of the economy (eg, GDP, inflation, unemployment rate)

Measuring Economic Activity: GDP

- **Gross domestic product (GDP)**: monetary value of final goods and services produced *within* an economy's borders in given time period
  - Considered the best measure to gauge how well economy is doing
  - Considered "invention of the 20th century" by the US Dept of Commerce

- GDP **computed every 3 months** by Bureau of Economic Analysis (BEA) using:
  - *Administrative data* on tax collection, education & defense spending, ...
  - *Statistical data* from manufacturing firms, retail establishments, farms, ...

Measuring Economic Activity: GDP, NIPA, and SNA

- GDP, the *marquee* measure of National Income and Product Accounts (NIPA)
  - NIPAs are part of integrated System of National Accounts (SNA) that also include industry accounts and flow of funds accounts
  - Industry accounts are input-output (IO) tables
  - Flow of funds accounts record value of tangible and financial assets, liabilities, and sources of funds used to acquire assets
- System of National Accounts (SNA): internationally accepted conceptual framework to construct NIPA and other accounts (used by +200 countries)
  - Released in 1953; major updates in 1968, 1993, 2008
  - Next update in 2025

Measuring Economic Activity: GDP

Table 1: Three ways to compute GDP

Production method	Income method	Expenditure method
Sum of value added $Y = \sum_i \text{VA}_i = \sum_i (y_i - x_i)$	labor income + capital income + profits $Y = WL + RK + \Pi$	Sum of final expenditures $Y = C + I + G + NX$
Value added: market value y_i minus cost of intermediates x_i Example: VA of coffee is \$ paid minus cost of coffee, milk, sugar,...	Wages and salaries WL, rents from capital RK, profits Π	Consumption C, investment I, gvt expenditures G, net exports NX

Remark

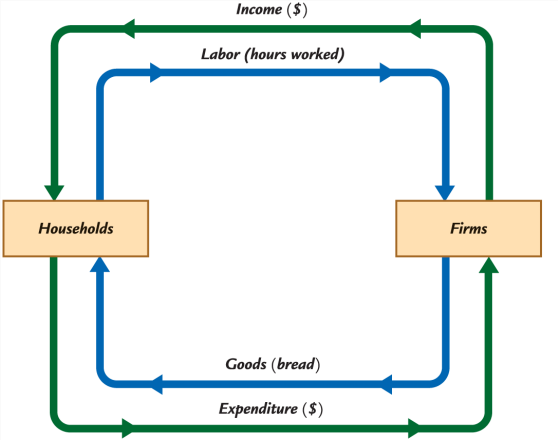
GDP is a production concept, so it doesn't matter who owns primary factors (eg, capital, labor), but rather *where* production occurs

GDP: Income, Expenditure, and the Circular Flow

- In closed and static economies, there are two ways to view GDP:
  1. National income: total income of economy's residents
  2. National spending: total expenditure on economy's goods and services
- Since economy is closed, earnings must be spent within economy's borders
  - The *Circular Flow* representation illustrates these ideas

GDP: Income, Expenditure, and the Circular Flow

Figure 1: Circular flow in an economy with one good (bread) and one factor (labor)



Rules for computing GDP

1. **Use market prices to add different goods**. Suppose economy only produces reggaeton and margaritas. Then,

$$\begin{aligned}\text{GDP} &= \underbrace{P_R \times Q_R}_{\text{monetary value of reggaeton}} + \underbrace{P_M \times Q_M}_{\text{monetary value of margaritas}} \\ &= \$50 \times 4 + \$15 \times 8 \\ &= \$320\end{aligned}$$

2. **Do not count transactions of second-hand goods**. GDP measures value of *currently* produced goods and services, so do not count transactions of used goods since these are asset exchanges (eg, car resale, collector goodies, ...)

Rules for computing GDP

3. **Count increases in inventory**. When firms produce goods that do not sell but keep as inventory, these count toward GDP since produced in *current* period
    - When inventories are sold at later date, they do not affect GDP (purchase is positive spending, sale is disinvestment)
    - Wasted goods, whether inventory or not, do not count toward GDP

4. **Do not count intermediate good transactions, only value of final goods**
    - If you buy *sweetgreen* salad for $20 and *sweetgreen* pays $10 on purchase of ingredients, you only count the cost of your salad, not *sweetgreen* cost.
    - Recall value added is value of good or service minus cost of intermediates

Rules for computing GDP

5. **Use imputed values for goods or services not sold in market place**. [extra]
   - Many examples of such goods/services: Owner-occupied housing, gvt services (eg, services by police officers, Dallas tennis courts, ...)
   - Need to assign value for these goods/services:
     - Public goods typically valued at cost
     - Value of housing services from ownership estimated based on rentals of houses with similar characteristics (neighborhood, amenities, etc.)
     - Some imputations are complex (eg, financial services offered without charge)
   - Some goods and services escape GDP calculations due to complexity:
     - Home production
     - Underground economy

Measuring Economic Activity: Real vs. Nominal GDP

- GDP is the value of all final goods and services produced in an economy
- Nominal GDP measures value of goods and services using *current* prices

$$\text{Nominal GDP}_t = \sum_i p_{it} q_{it} = \sum_i p_{it} \left(y_{it} - \sum_j x_{jit} \right)$$

q: value added y: gross output x_{ij}: demand of good i by producer j

- The problem of using current prices for time-series comparisons is that GDP may change for one of two reasons:
  1. Changes in prices
  2. Changes in quantities
- Nominal GDP is not a good measure to gauge how well the economy is doing
  - GDP today may be $\times 2$ GDP yesterday because prices doubled

Measuring Economic Activity: Real vs. Nominal GDP

- A better measure of how well economy is doing would not let price changes influence GDP (ie, changes in GDP would reflect only changes in real activity)
- Real GDP measures value of goods and services using *constant* prices so that changes in prices do not affect intertemporal comparisons. Example:
  - Let base-year prices be those of year t. Then, for $j \geq 1$

$$\text{Real GDP}_t = \sum_i p_{it} q_{it}$$

$$\text{Real GDP}_{t+j} = \sum_i p_{it} q_{it+j}$$

Remark

Real GDP is a better measure than nominal GDP for growth analysis because it captures a country's ability to increase real economic activity

The GDP Deflator

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

- **The GDP deflator tells us what's going on with overall level of prices**
- To see this, consider economy with only one good:
  - Nominal $\text{GDP}_t = P_t \times Q_t$
  - Real $\text{GDP}_t = P_{\text{base}} \times Q_t$
  - GDP $\text{deflator}_t = P_t / P_{\text{base}}$
- **GDP deflator measures the price of output relative to the base year**, and it earned its name because it can be use to "*deflate*" nominal GDP:

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}}$$

Chain-weighted GDP

- In 1996, the BEA introduced a chain-weighted measure of real GDP to avoid problems with calculations of real GDP based on *constant* prices
- Real GDP at constant prices gives the impression that prices never change
- However, as time goes on, prices become dated
  - Some prices go down (eg, computers), some others go up (eg, education)
- The problem of using constant prices when prices do change:
  - Goods whose prices go down get too much weight in later years' real GDP
  - Goods whose prices go up get too little weight in later years' real GDP
- Next example illustrates these problems

Example: Real GDP at constant prices

YEAR	PRICE		QUANTITY		EXPENDITURE	
	Computers	Education	Computers	Education	Computers	Education
1	\$100	\$20	100	200	\$10,000	\$4,000
2	\$90	\$25	120	218	\$10,800	\$5,450
3	\$80	\$30	140	220	\$11,200	\$6,600

YEAR	REAL GDP (at base prices, year 1)
1	**\$14,000** ($= \$100 \times 100 + \$20 \times 200$)
2	**\$16,360** ($= \$100 \times 120 + \$20 \times 218$)
3	**\$18,400** ($= \$100 \times 140 + \$20 \times 220$)

Weighting biases with real GDP at constant prices

- Real GDP at base-year prices overweighs goods whose prices go down
  - In year 3, computers represent 76% of real GDP while only 61% of expenditures
  - In other words, its relative weight is 0.83 (= 100/120) instead of 0.73 (80/110)

YEAR	REAL GDP (at base prices, year 1)
1	**$14,000** (= $100 × 100 + $20 × 200)
2	**$16,360** (= $100 × 120 + $20 × 218)
3	**$18,400** (= $100 × 140 + $20 × 220)

- Real GDP at base-year prices underweighs goods whose prices go up
  - In year 3, education accounts only for 24% of real GDP, and 36% of expenditures
  - In other words, its relative weight is 0.17 (= 20/120) instead of 0.27 (30/110)

Chain-weighted GDP

- To solve weighting problems, the BEA introduced chain-weighted real GDP
  - The idea behind chain-weighting is that relative prices change, so that the *base year* should be updated year by year to avoid weighting biases
  - Method uses prices of years t and $t+1$ to compute real growth from t to $t+1$, prices of $t+1$ and $t+2$ to compute real growth from $t+1$ to $t+2$, and so on
  - Year-to-year growth growth rates are put together to form a "chain" that is used to compute real GDP
  - Chain-weighted measure of real GDP ensures that prices used to compute real GDP are never outdated.

Calculating real chain-weighted GDP

- **Step 1**. Compute Laspeyres quantity index (using period $t-1$ prices as weights):

$$(1+g_t)_{t-1} = \frac{\sum_i p_{it-1} q_{it-1} \times \left(\frac{q_{it}}{q_{it-1}}\right)}{\sum_i p_{it-1} q_{it-1}} = \sum_i \omega_{it-1} \left(\frac{q_{it}}{q_{it-1}}\right)$$

- **Step 2**. Compute Paasche quantity index (using period t prices as weights):

$$(1+g_t)_{t} = \frac{\sum_i p_{it} q_{it-1} \times \left(\frac{q_{it}}{q_{it-1}}\right)}{\sum_i p_{it} q_{it-1}} = \sum_i \omega_{it} \left(\frac{q_{it}}{q_{it-1}}\right)$$

Calculating real chain-weighted GDP

- **Step 3**. Compute Fisher's "ideal" chain index:

$$1 + g_t = \sqrt{\underbrace{(1+g_t)_t}_{\text{Paasche index}} \times \underbrace{(1+g_t)_{t-1}}_{\text{Laspeyres index}}}$$

(An index is called "ideal" if it satisfies certain theoretical properties; click here to learn more)

- **Step 4**. Compute chain-weighted GDP:

$$\text{Real GDP} = \underbrace{(1+g_t)(1+g_{t-1})(1+g_{t-2})}_{\text{chained weight (of Fisher indexes)}} \times \text{GDP}_{t-3}$$

Real GDP measured in year $t-3$ dollars since GDP_{t-3} is nominal measure

GDP and percentage changes

- When studying GDP, we are often interested in percentage changes
- Arithmetic tells us that **the percentage change of a product of two variables is approximately the sum of the percentage changes in each variable**:
  - Nominal GDP is $P \times Y$.
  - Using product rule from calculus: $\mathrm{d}(PY) = \mathrm{d}P \cdot Y + P \cdot \mathrm{d}Y$
  - Dividing both sides by GDP: $\frac{\mathrm{d}(PY)}{PY} = \frac{\mathrm{d}P}{P} + \frac{\mathrm{d}Y}{Y}$
  - Converting this equation to discrete changes: $\frac{\Delta PY}{PY} \approx \frac{\Delta P}{P} + \frac{\Delta Y}{Y}$
- Arithmetic also tells us that **percentage change of ratio is approximately the percentage change in numerator minus percentage change in denominator**:

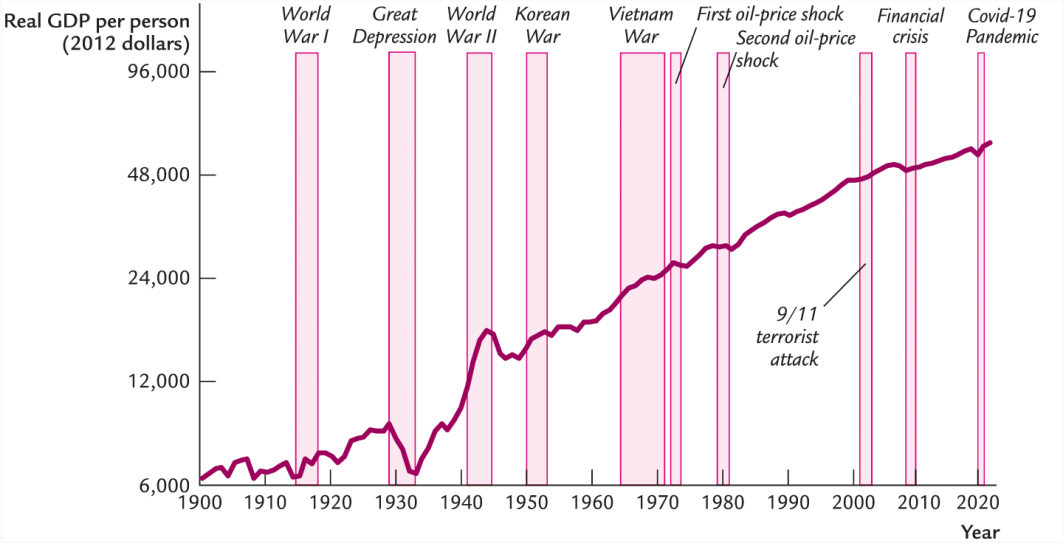
$$\frac{\Delta(Y/L)}{Y/L} \approx \frac{\Delta Y}{Y} - \frac{\Delta L}{L}$$

GDP and its components: GDP $= C + I + G + NX$

	US GDP per capita in 2022
	$76,324
Consumption	**52,047** (68%)
Durable goods (cars, TVs, fridges,...)	6,552
Nondurable goods (food, clothing, ...)	11,261
Services (haircut, college tuition, meals out)	34,234
Investment	**13,864** (18%)
Nonresidential (offices, equipment,...)	10,012
Residential (housing)	3,377
Change in firm inventories	475
Government spending	**13,328** (18%)
Federal	4,936
National defense (military equipment, ...)	2,773
Nondefense (highways, services by officers, ...)	2,163
State and local	8,392
Net exports	**−2,916** (−4%)
Exports	8,935
Imports	11,851

*US population in 2022 was 333.591 millions

A look at US GDP (per capita)



GDP adjustments

- GDP not only used to measure econ growth, also business-cycle fluctuations
- **Quarter-to-quarter variables** (or even higher frequency measures) **preferred for business-cycle analysis**
- Since economy features seasonal behavior, variables need to be adjusted
  - GDP typically peaks in 4th quarter (end-of-year bonuses, Xmas shopping, ...)
  - **Data series are *seaosanlly adjusted***: subtract changes that are predictable due to change of season from variable
- Examples of variables: GDP, employment, retail sales, air transport revenue, ...

Beyond GDP

- NIPA include other measures of income that slightly differ from GDP:
  - **Gross National Product (GNP)**: total income earned by *nation's residents*
    (includes foreign income of residents & excludes domestic income of foreigners)
  - **Net National Product (NNP)** = GNP − Depreciation
    (Depreciation—aka consumption of fixed capital—is the wear and tear of structures and machines; in the US, it is approximately 15% of GDP per year)
  - **Gross National Income (GNI)** = GNP + Statistical discrepancy
    (Statistical discrepancy arises from using different data)
  - **Personal Income (PI)**: income of households and noncorporate businesses
    (Excludes *retained earnings*, indirect business taxes, corporate income taxes, SS contributions, and includes SS transfers)
  - **Disposable Income (DI)** = PI − personal taxes − other nontax payments
    (Subtracts income and capital taxes, traffic fines, ...)

Measuring the cost of living: CPI

- We all know that $100 today will get us more than $100 in 10 years since the cost of most goods and services goes up over time
- To measure how the cost of living (or the level of prices) changes over time, we often use the **Consumer Price Index (CPI)**:
  - Computed by the Bureau of Labor Statistics (BLS)
  - Using representative basket of goods and services demanded by consumers
  - 8 major groups (food and beverages, housing, ...), more than 200 categories
  - CPI includes taxes *only* associated with goods and services (eg, sales tax)

The Consumer Price Index (CPI)

The CPI is a measure of change in the level of prices paid by consumers for a representative basket of goods and services

Computing the CPI

- The BLS weighs thousands of items in CPI calculations
- Weights determined by the importance of item in basket of goods and services purchased by typical consumer
- **Computing CPI involves complex procedures**:
  - New goods appear, old goods disappear
  - Quality improvements
- Basic idea is simple: CPI isolates changes in prices and different prices are weighted according to the importance of different goods and services

Computing the CPI: Simple Example

- Suppose there are only two goods in the economy: apples and oranges
- Assume typical consumer buys 5 apples and 2 oranges each year. Then,

$$\text{CPI}_t = \frac{5P_{\text{Apples, Current year}} + 2P_{\text{Oranges, Current year}}}{5P_{\text{Apples, Base year}} + 2P_{\text{Oranges, Base year}}}$$

- **CPI tells us how much it costs now to buy representative basket of goods for typical consumer relative to what it costed in a previous period**
- CPI possibilities:
  - Positive growth $\rightarrow$ Inflation
  - No growth $\rightarrow$ Price stability
  - Negative growth $\rightarrow$ Deflation

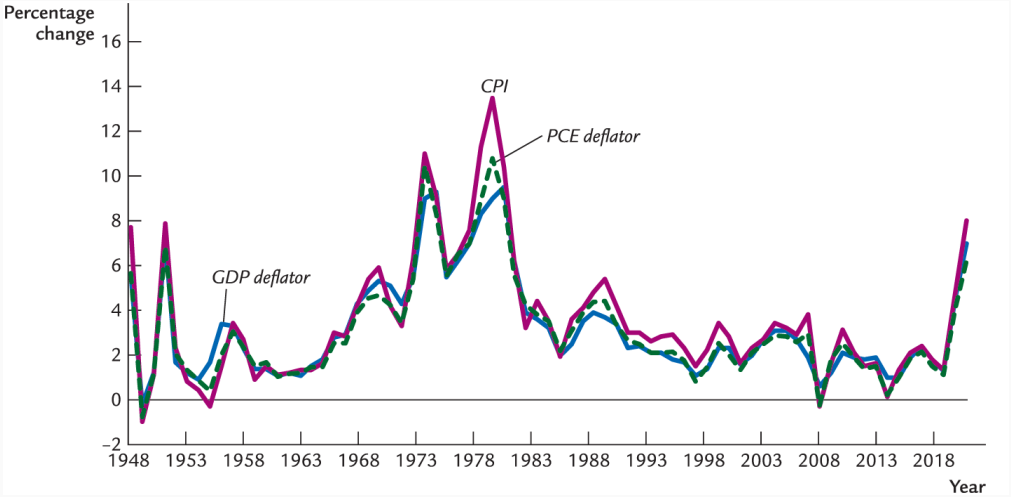
CPI and other price indices

- **CPI may be the most popular price index, but it is not the only one**
- Other popular price indices are:
  - **Producer Price Index (PPI)**: measures average change over time in selling prices received by domestic producers for their output
    (Prices used for PPI calculations come from first commercial transaction)
  - **Core inflation**: measures average change in prices paid by typical consumer, excluding food and energy.
    (Food and energy excluded because these prices can be too volatile)
  - **CPI of urban consumers, CPI of elderly, PCE price index, commodity price indices** (energy, housing, food, metals, raw materials, ...)

CPI vs GDP and CPE deflators

- **CPI and GDP deflator not the same object, although quantitatively similar**:
  - GDP deflator looks at all prices; CPI only at prices paid by consumers
  - GDP deflator includes domestic goods only; CPI includes imported goods
  - GDP deflator uses changing weights; CPI assigns fixed weights
- **CPI and PCE deflator not the same object, although quantitatively similar**:
  - PCE deflator computed as GDP deflator (= nominal exp. / real expenditures), but only looks at consumption component of GDP
  - Similar to GDP deflator, PCE deflator uses changing weights
  - Similar to CPI, PCE deflator factors in imported goods

Quantitative differences between CPI and GDP and PCE deflators



Does the CPI overstate inflation?

Reasons why economists believe CPI overstates inflation*:

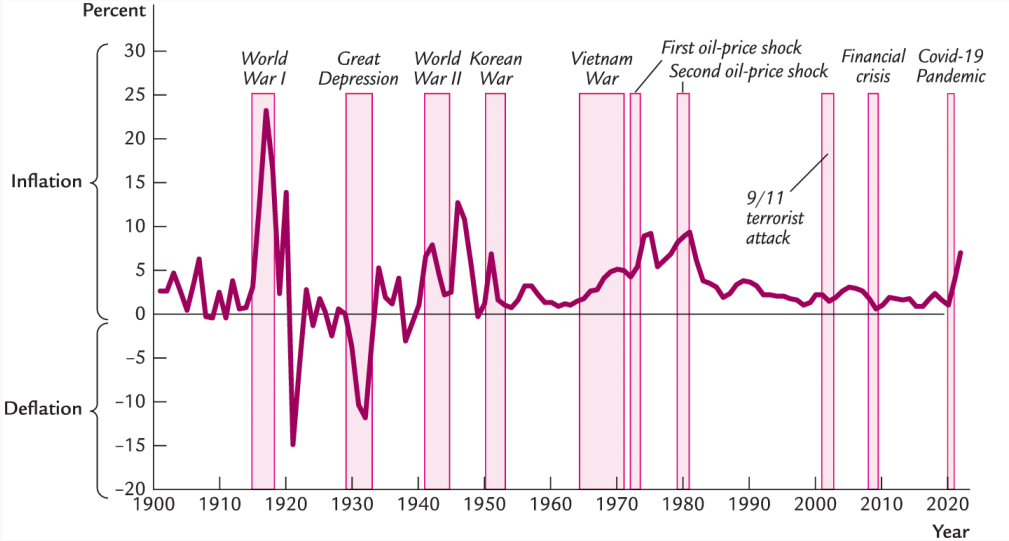
- **Substitution bias**. The CPI computed using fixed basket of goods, and consumers substitute toward goods with lower relative prices
- **Quality change bias**. CPI captures some quality improvements (those related to objective characteristics), but fails to capture others (those harder to measure)
- **New-product bias****. The CPI computed using fixed basket of goods, and consumers make different choices when new products introduced

Notes:

*You can learn more by reading the 1996 Boskin Commission Report

**New-product bias even if new products introduced in CPI calculations due to time lags

A look at the US inflation rate (using GDP deflator)



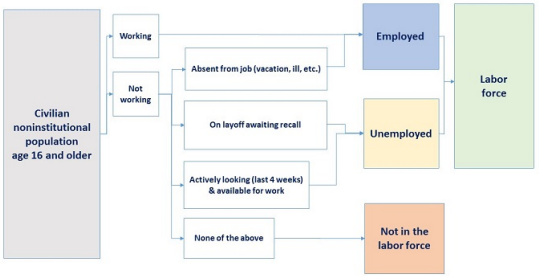
Measuring unemployment: Unemployment rate

Unemployment rate

The unemployment rate is the percentage of unemployed people in labor force

(civilian noninstitutional population age 16 and older who are working or actively looking for a job)

*Civilian noninstituional population excludes active members of US army and people in institutional facilities (eg, prison, nursing homes, ...)



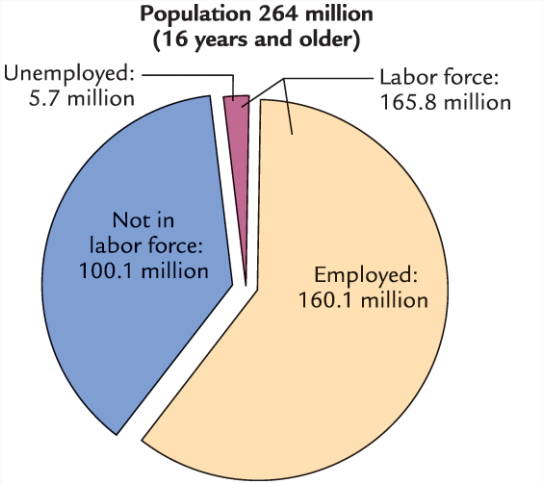
Computing the unemployment rate

- Bureau of Labor Statistics in charge of computing the unemployment rate

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{\text{Labor force } (= \text{unemployed} + \text{employed})} \times 100$$

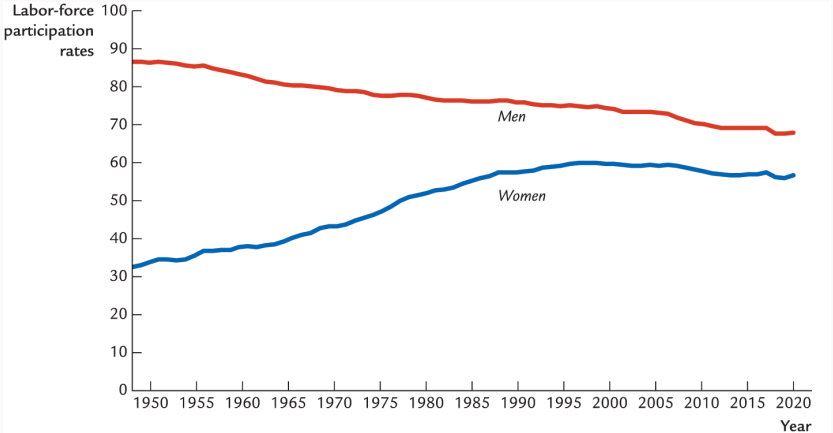
- Data used comes from the Current Population Survey (CPS):
  - Monthly survey
  - 60,000 households ($\approx$110,000 individuals)

US population 16 and older

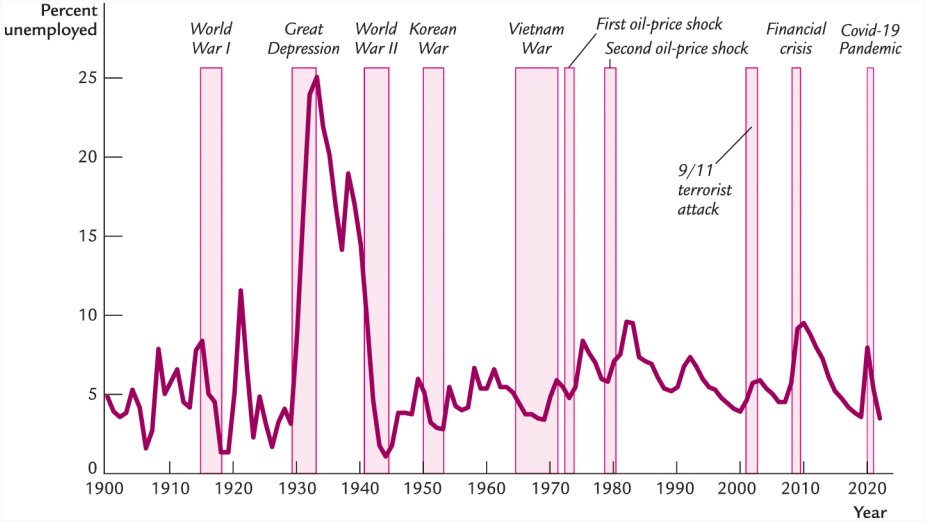


Trends in US labor force participation

$$\text{Labor-force participation rate} = \frac{\text{Labor force}}{\text{Adult population}} \times 100$$



US unemployment rate



Taking Stock

Taking stock

- **Macroeconomics**:
  - Field of economics studying economic aggregates and distributional aspects
  - Uses empirical, theoretical, and quantitative analysis
  - Often seeks to inform policy decisions

- We study macroeconomics to better understand the world around us, to make informed voting decisions, ...and because it is fascinating!

- **Macroeconomists**:
  - Use models to understand the world
  - Tailor models for questions at hand

Taking stock

- **Models have both exogenous and endogenous variables**:
  - Model establishes relationship between two types of variables
  - Eg, model for market of pizza has exog vars Y, P_m and endogenous vars P, Q
- **Models useful to understand how changes in exog vars affect eq. outcomes**
- **Macroeconomists use data to summarize state of economy & inform models**
- Discussed:
  - Rules and methods to compute GDP, the most important macro variable
  - Real vs. nominal GDP
  - GDP deflator
  - CPI and other price indices and deflators
  - Caveats with the CPI
  - Unemployment rate and labor force participation

Questions?

Thank You!

(Email: luisperez@smu.edu)

(Website: https://luisperezecon.com)