Intermediate Macroeconomics

Measurement

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Outline

- Data and Measurement of Macroeconomics (Chapter – 2)
- National Income: demand side (Chapter – 3)
- Monetary System (Chapter – 4)
- Inflation (Chapter – 5)
- Labor Market (Chapter – 7)

Chapter 2 - The Data of Macroeconomics

outline

Chapter 2 introduces three most important macroeconomics measurement,

1. gross domestic product (GDP)
2. the consumer price index (CPI)
3. the unemployment rate

Gross domestic product: Expenditure and income

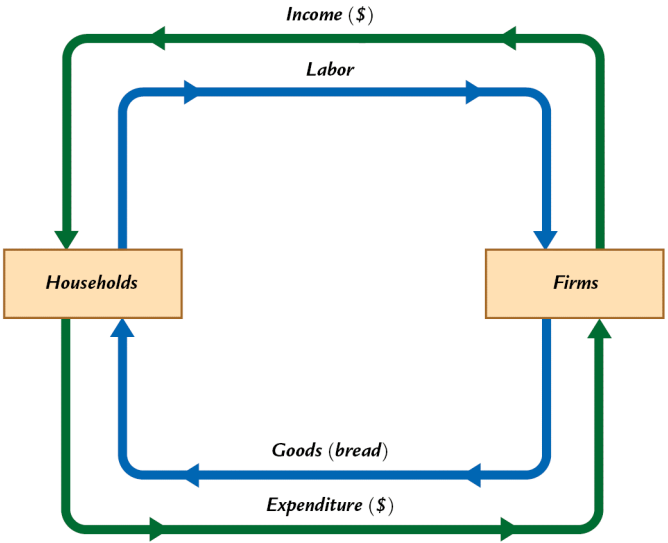
There are two main GDP measures,

- Total expenditure on domestically produced final goods and services
- Total income earned by domestically located factors of production

Equilibrium

Expenditure equals income because every dollar a buyer spends becomes income to the seller

The circular flow



Mankiw, *Macroeconomics*, 11e, © 2022 Worth Publishers

Value added

Value added is the value of output minus the value of the intermediate gods used to produce that output.

- A farmer grows a bushel of wheat and sells it to a miller for $1
- The miller turns the wheat into flour and sells it to a baker for $3
- The baker uses the flour to make a loaf of bread and sells it to an engineer for $6
- The engineer eats the bread

Final goods, value added, and GDP

$$\begin{aligned} \text{GDP} &= \text{value of final goods produced} \\ &= \text{sum of value added at all stages of production} \end{aligned}$$

The value of the final goods already includes the value of the intermediate goods, so including intermediate and final goods in GDP would be double counting.

- In previous example, bread is final product. Wheat and flour are intermediates

the expenditure components of GDP

$$\underbrace{Y}_{\text{total output}} = \underbrace{C + I + G + NX}_{\text{total expenditure}}$$

- C: consumption
- I: investment
- G: government spending
- NX: net exports

Consumption (C)

Definition: The value of all goods and services bought by households, including:

- Durable goods: last a long time (cars, home appliances).
- Nondurable goods: last a short time (food, clothing).
- Services: are intangible/non-physical items or activities (dry cleaning, air travel, concerts).

U.S. consumption 2019

	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	21,729	66,199
Consumption	14,795	45,074
Nondurable goods	3,011	9,173
Durable goods	1,548	4,715
Services	10,237	31,186

Investment (I)

Definition: spending on capital, a physical asset used in future production, including:

- Business fixed investment: spending on plant and equipment
- Residential fixed investment: spending by consumers and landlords on housing units
- Inventory investment: the change in the value of all firms' inventories

Notes: financial investment (bonds, stocks) is not counted as economic investment.

U.S. investment, 2019

	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	21,729	66,199
Investment	3,698	11,267
Nonresidential fixed investment	2,869	8,721
Residential fixed investment	818	2,491
Inventory investment	18	55

Government spending (G)

Definition: all government spending on goods and services

- Purchases of trains and installation of subway rail
- Services provided by a Park Ranger to visitors of national parks

G excludes transfer payments:

- Tax returns
- "Stimulus Checks"

U.S. government spending, 2019

	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	21,729	66,199
Government Purchases	3,814	11,619
Federal	1,450	4,417
Defense	862	2,626
Nondefense	588	1,790
State and local	2,364	1,790

Net exports (NX)

$$NX = \text{exports} - \text{imports}$$

- Exports: the value of g&s (goods and services) sold to other countries
- Imports: the value of g&s purchased from other countries
- Hence, NX equals net spending from abroad on our g&s

Notes: the trade deficit $NX < 0$ does not reduce GDP. Instead, imports are subtracted to removed them from domestic spending.

U.S net exports, 2019

	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	21,729	66,199
Net Exports	–578	–1,761
Exports	2,498	7,609
Imports	3,076	9,370

Real versus nominal GDP

GDP is the value of all final goods and services produced

- Nominal GDP measures these values using current prices
- Real GDP measures these values using the prices of a base year

Real versus nominal GDP example

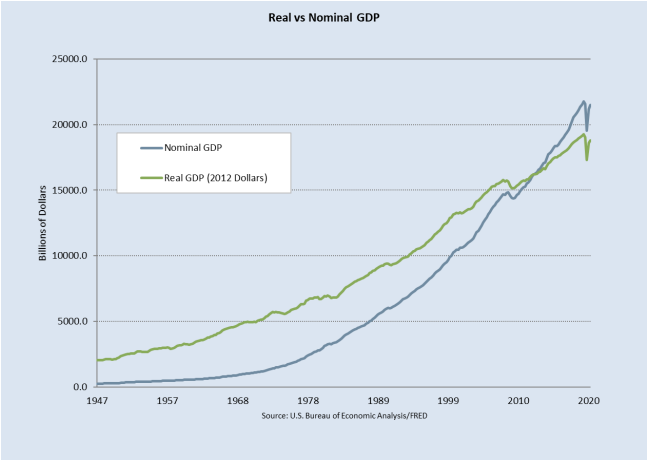
	2019: *P*	***2019:*** *Q*	***2020:*** *P*	***2020:*** *Q*	***2021:*** *P*	***2021:*** *Q*
Good A	$30	900	$31	1,000	$36	1,050
Good B	$100	192	$102	200	$100	205

- Compute nominal GDP in each year
- Compute real GDP in each year

Real GPD controls for inflation

- Changes in nominal GDP can be due to,
  - changes in prices
  - changes in quantities of output produced
- Changes in real GDP can be only be due to changes in quantities because real GDP is constructed using constant base year prices.

U.S. nominal and real GDP, 1947-2020



Inflation rate

- Inflation rate: the percentage increase in the overall level of prices
  - GDP deflator
  - Consumer Price Index (CPI)

GDP deflator,

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

Inflation rate: GDP deflator

	Nominal GDP	Real GDP	GDP Deflator	Inflation Rate
2019	$46,200	$46,200		n.a.
2020	51,400	50,000		
2021	58,300	52,000		

- Compute GDP deflator
- Compute inflation rate

Inflation rate: consumer price index (CPI)

- A measure of the overall level of prices
- Published by the Bureau of Labor Statistics (BLS)
  - It surveys consumers to determine the composition of the typical consumer's "basket" of goods
  - Every month, it collects data on the prices of all items in the basket and computes the cost of the basket,

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

CPI example

Basket: 20 pizzas, 10 records

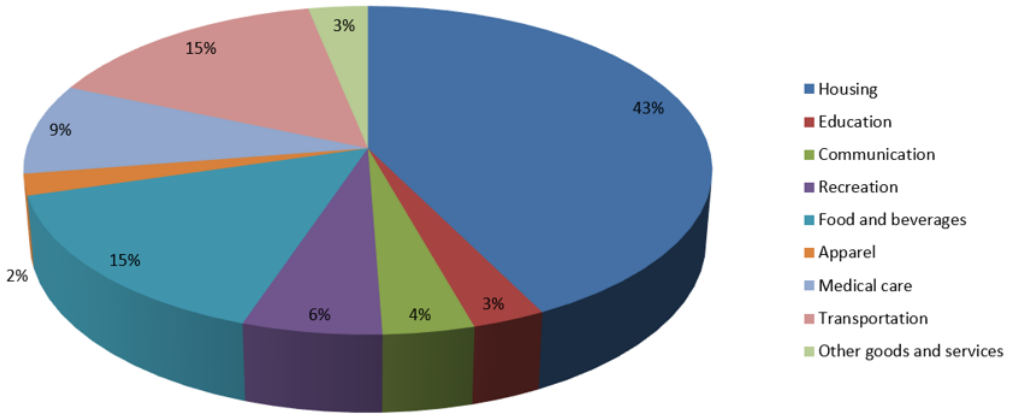
Prices:

	Pizza	Records
2018	10	15
2019	11	15
2020	12	16
2021	13	15

For each year, compute:

- the cost of the basket
- the CPI (using 2018 as the base year)
- the inflation rate from the preceding year

The composition of the CPI's "basket"



Caveats of CPI: over-estimation

- Substitution bias,
  - The CPI uses fixed weights, so it cannot reflect consumers' ability to substitute toward goods whose relative prices have fallen.
- Introduction of new goods,
  - The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI because the CPI uses fixed weights.
- Unmeasured changes in quality,
  - Quality improvements increase the value of the dollar but are often not fully measured.

CPI versus GDP deflator

Prices of capital goods,

- excluded from CPI
- included in GDP deflator

Prices of imported consumer goods,

- included in CPI
- excluded from GDP deflator

The basket of goods,

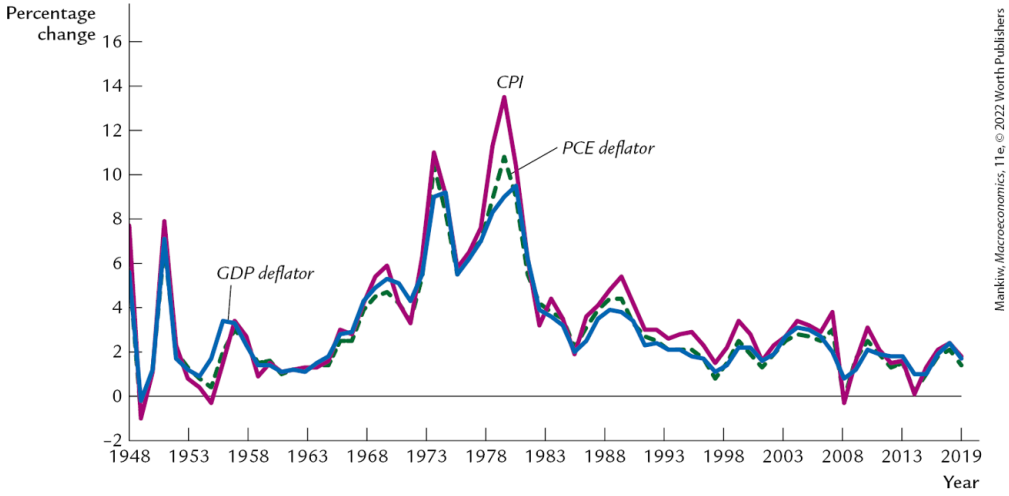
- CPI: fixed
- GDP deflator: changes every year

Inflation: PCE deflator

Another measure of the price level: personal consumption expenditures (PCE) deflator, the ratio of nominal to real consumer spending

- How the PCE is like the CPI,
  - only includes consumer spending
  - includes imported consumer goods
- How the PCE is like the GDP deflator
  - the "basket" changes over time
- Federal Reserve prefers PCE

The GDP deflator, CPI, and PCE deflator



Labor statistics

- Published by BLS every month
- The BLS uses a surveys;
  1. Household survey (main): The Current Population Survey (CPS)
     - contains the responses of about 60000 households on several questions including their demographics, jobs, and income (more)
  2. Establishment survey
     - second measure of employment by surveying businesses, asking how many workers are on their payrolls
     - about 160000 establishments, employing 40 million workers
- Neither measure is perfect, they occasionally diverge due,
  - treatment of self-employed persons
  - new firms not counted in establishment survey
  - technical issues involving population inferences from sample data

Labor statistics: categories of the population

- Employed: working at a paid job
- Unemployed: not employed but looking for a job
- Labor force: the amount of labor available for producing goods and services; all employed plus unemployed persons
- Not in the labor force: not employed, not looking for work
- unemployment rate: percentage of the labor force that is unemployed
- Labor force participation rate: fraction of the adult population that "participates" in the labor force – that is, is working or looking for work

Labor statistics: example

U.S. adult population by group, February 2021

Number employed = 150.24 million

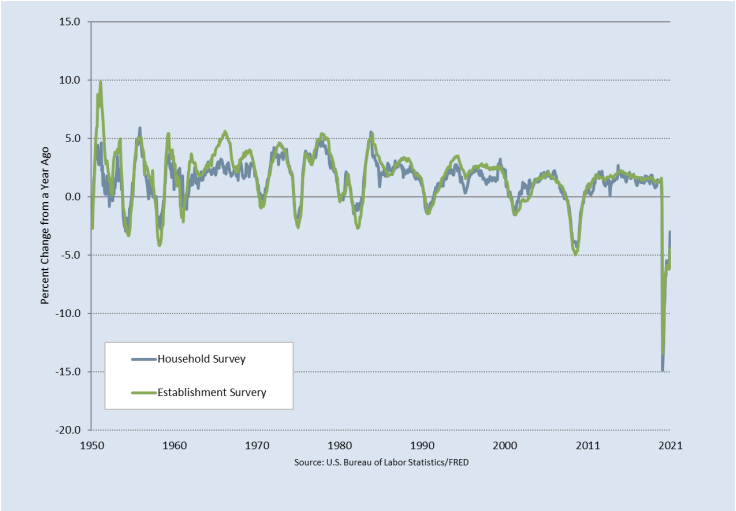
Number unemployed = 9.72 million

Adult population = 260.66 million

Calculate

- the labor force
- the unemployment rate
- the labor force participation rate

The measures of unemployment rate



Chapter 3 - National Income: Demand

Review

We have discussed national income from supply side. Recall production,

$$Y = AK^{\alpha}L^{1-\alpha}$$

- Due to the properties of Cobb – Douglas production
- α share of income is received by labor, and $1-\alpha$ share of income is received by capital owner

We will decompose the demand (or expenditure) side for the economy.

GDP identity

Balance of GDP identity for an closed economy

$$Y = C + I + G$$

- C: consumer demand for goods and services
- I: demand for investment goods
- G: government demand for goods and services
- Closed economy $\Rightarrow NX = 0$

Notes: LHS of above equation is income, and RHS is demand(expenditure). They must be balanced for economy !!!

Consumption: C

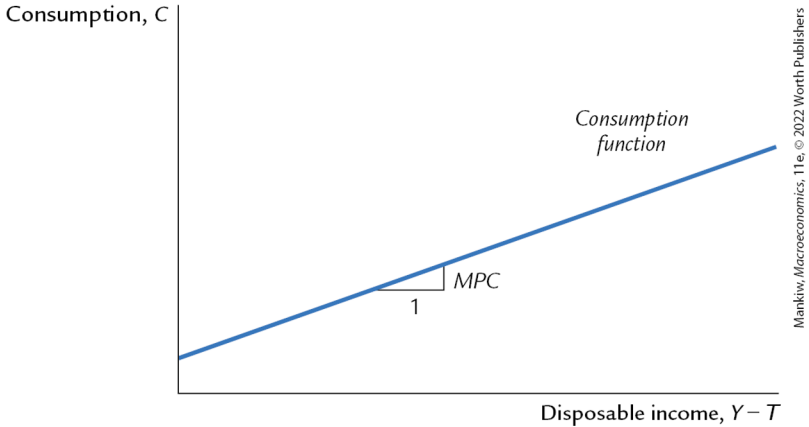
Disposable income: total income minus total taxes: $Y - T$

- Assume that household will spend a proportion of income in consumption. Thus,

$$C = \sigma(Y - T)$$

- σ: marginal propensity to consumer (MPC) is the change in C when disposable income increases by one \$.

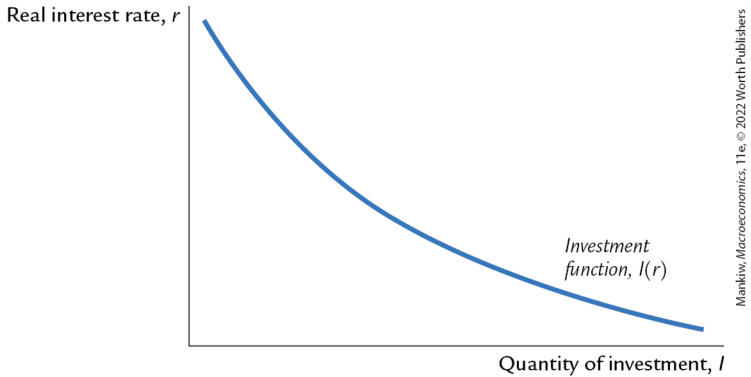
Consumption function



Investment I

- The investment function is $I = I(r)$
  - r is **real interest rate**
  - e.g. You borrow 10 pounds wheat and will re-pay 11 pounds wheat.
  - Remember, *real* measured by quantity instead of \$ value.
- Real interest rate r measures
  - cost of borrowing
  - opportunity cost of using one's own funds to finance investment spending
- Thus, I depends negatively on r
  - High interest rate, less demand for investment goods.

Investment function



Government spending G

G: government spending on goods and services

- excludes transfer payments (social security benefits, unemployment insurance benefits)
- assume that government spending and total taxes are exogenous. Thus,

$$G = \bar{G} \qquad T = \bar{T}$$

The market for goods and services

To simplify problem, assume $\bar{K}$ and $\bar{L}$ so we do not worry about supply side

- Aggregate demand,

$$C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$$

- Aggregate supply,

$$\bar{Y} = F(\bar{K}, \bar{L})$$

- Equilibrium,

$$\bar{Y} = C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$$

With assumptions, we need to pin down $I(r)$

The loanable funds market

- use a simple supply - demand model of the financial system to solve I^* and r^*
- one asset: "loanable fund"
  - demand for funds: investment
  - supply for funds: saving
  - "price" of funds: real interest rate

Demand and supply for loanable funds

- Demand of funds comes from investment
  - Firms borrow to finance spending on plant and equipment, new office buildings, etc. Consumers borrow to buy new houses.
  - Depends negatively on r
- Supply of funds comes from saving
  - Households use their saving to make bank deposits and purchase bonds and other assets. These funds become available to firms to borrow and finance investment spending.
  - The government may also contribute to saving if it does not spend all the tax revenue it receives.

Types of saving

- Private saving,

$$(Y - T) - C$$

- Public saving,

$$T - G$$

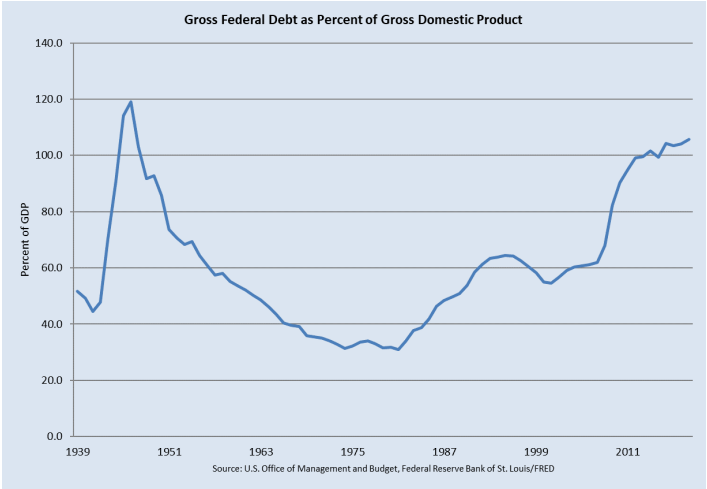
- National saving,

$$\begin{aligned} S &= \text{private saving} + \text{public saving} \\ &= Y - T - C + T - G \\ &= Y - C - G = I \end{aligned}$$

Budget surpluses and deficits

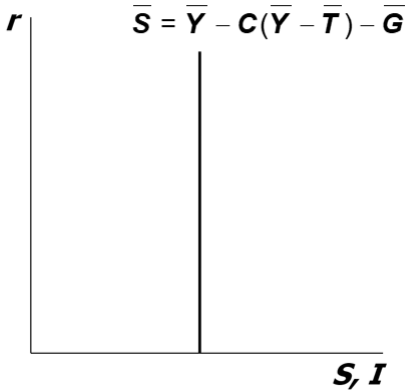
- If $T > G$, budget surplus $= T - G > 0 \Rightarrow$ public saving
- If $T < G$, budget deficit $= T - G < 0 \Rightarrow$ negative public saving
- if $T = G$, budget balances, no public saving
  - The U.S. government finances its deficit by issuing Treasury bonds – borrowing.

U.S federal government debt, 1940 - 2019

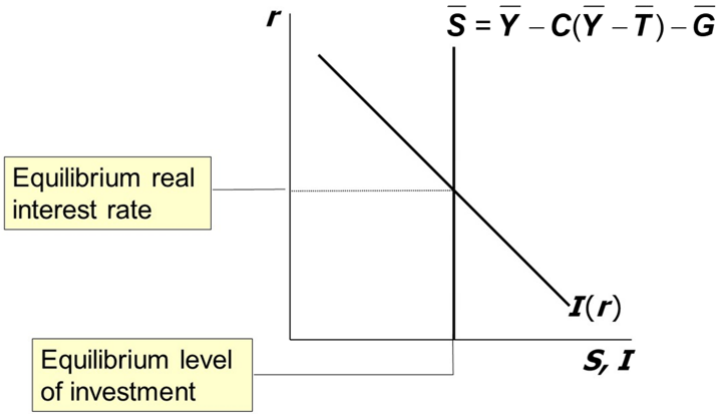


Loanable funds supply curve

National saving does not depend on r, so the supply curve is vertical.



Loanable funds market equilibrium

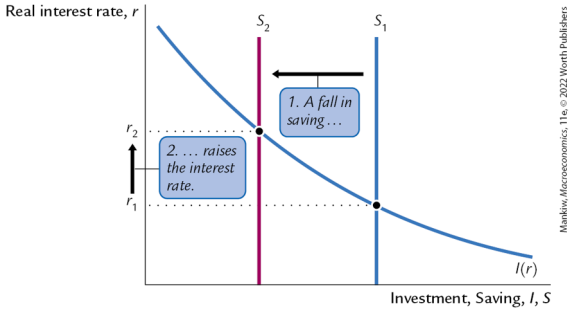


Example

Filled by in-class notes

Case study: The Reagan Deficit

- Reagan policies during early 1980s,
  - increases in defense spending: $\Delta G > 0$
  - big taxes cut $\Delta T < 0$



Are the data consistent?

	1970s	**1980s**
T–G	–2.2	–3.9
S	19.6	17.4
r	1.1	6.3
I	19.9	19.4

What might affect demand for loanable funds?

- Technological changes
- Taxes: investment credit

Chapter 4 – Monetary System

Outline

- The definition, functions, and types of money.
- How banks “create” money?
- What a central bank is and how it controls the money supply?

Money: definition

Money is the stock of assets that can be readily used to make transactions.

Bernard Schoenbaum/The New Yorker/Conde Nast/The Cartoon Bank

Money: functions and types

Functions

1. Medium of exchange: we use it buy goods and services
2. Store of value: transfer purchasing power from the present to the future
3. Unit of account: the common unit by which everyone measures prices and values

Types,

- Fiat money
  - no intrinsic value
  - e.g. U.S. dollar
- Commodity money
  - has intrinsic value
  - e.g. gold coins

Central bank and money supply

- Money supply is the quantity of money available in the economy
- Monetary policy is the control over money supply
  - Conducted by a country's central bank
  - In U.S., central bank is Federal Reserve. Fed uses open market operations, the purchases and sale of government bonds to control money supply

Money supply measures, January 2021

Symbol	Assets Included	Amount in January 2021 (billions of dollars)
C	Currency	$ 2,094.3
*M*1	Currency plus demand deposits, traveler's checks, and other checkable deposits	18,105.4
*M*2	*M*1 plus retail money market mutual fund balances, saving deposits (including money market deposit accounts), and small time deposits	19,394.6

Banks' role in the monetary system

The money supply equals currency plus demand deposits(checking account),

$$M = C + D$$

Since the money supply includes demand deposits, the banking system plays an important role.

- Reserves: the portion of deposits that banks have not lent
  - 100% reserve banking: a system in which banks hold all deposits as reserves
  - Fractional reserve banking: a system in which banks hold a fraction of their deposits as reserves

Banks' role in the monetary system

To understand the role of banks, we will consider three scenarios:

- No banks
- 100% reserve banking
- Fractional-reserve banking

In each scenario, we assume $C = \$1,000$

Scenario 1: No banks

With no banks

- $D = 0$, and $M = C = \$1,000$

Scenario 2: 100% reserve banking

- Initially ***C*** = \$1000, ***D*** = \$0, ***M*** = \$1,000
- Now suppose households deposit the \$1,000 at "Firstbank.

FIRSTBANK'S balance sheet

Assets	**Liabilities**
Reserves \$1,000	Deposits \$1,000

After the deposit:
C = \$0,
D = \$1,000,
M = \$1,000

LESSON:
100%-reserve banking has no impact on size of money supply.

Scenario 3: Fractional reserve banking

- Suppose banks hold 20% of deposits in reserve, making loans with the rest.
- Firstbank will make $800 in loans.

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $200 Loans $800	Deposits $1,000

The money supply now equals $1,800:

- Depositor has $1,000 in demand deposits.
- Borrower holds $800 in currency.

Fractional reserve banking

- Suppose banks hold 20% of deposits in reserve, making loans with the rest.
- Firstbank will make $800 in loans.

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $200 Loans $800	Deposits $1,000

The money supply now equals $1,800:

- Depositor has $1,000 in demand deposits.
- Borrower holds $800 in currency.

LESSON: In a fractional-reserve banking system, banks create money.

Fractional reserve banking

- Suppose the borrower deposits the $800 in Secondbank.
- Initially, Secondbank's balance sheet is:

SECONDBANK'S balance sheet

Assets	Liabilities
Reserves $160 Loans $640	Deposits $800

Secondbank will loan 80% of this deposit.

Fractional reserve banking

- If this $640 is eventually deposited in Thirdbank,
- Then Thirdbank will keep 20% of it in reserve and loan out the rest:

THIRDBANK'S balance sheet

Assets	**Liabilities**
Reserves $128 Loans $512	Deposits $640

Finding total amount of money

Original deposit = $1000

+ Firstbank lending = $ 800

+ Secondbank lending = $ 640

+ Thirdbank lending = $ 512

+ other lending…

Adding up all the lending yields the following formula:

Total money supply = $(1/rr) \times \$1{,}000$

where ***rr*** = ratio of reserves to deposits

In our example, ***rr*** = 0.2, so ***M*** = $5,000

Money creation in the banking system

A fractional reserve banking system creates money, but it doesn't create wealth. Bank loans give borrowers some new money and an equal amount of new debt

Bank capital, leverage, and capital requirements

Bank capital: the resources a bank's owners have put into the bank; difference between the value of a bank's assets and liabilities

Assets		**Liabilities and owners' equity**	
Reserves	$200	Deposits	$750
Loans	500	Debt	200
Securities	300	Capital (owners' equity)	50

Bank capital, leverage, and capital requirements

Leverage: the use of borrowed money to supplement existing funds for purpose of investment

$$\text{Leverage ratio} = \text{assets/capital} = (200 + 500 + 300)/50 = 20$$

Assets		**Liabilities and owners' equity**	
Reserves	$200	Deposits	$750
Loans	500	Debt	200
Securities	300	Capital (owners' equity)	50

Bank capital, leverage, and capital requirements

- Being highly leveraged makes banks vulnerable. Suppose a recession cause bank's loan and securities to fall by 5% to \$950
- Then, capital = assets - liabilities = 950 - 950 $\Rightarrow$ 0 capital

- 2008 - 2009 financial crisis
  - Losses on mortgage shrank bank capital, slowed lending, an exacerbated the recession
  - Regulatory changes imposed higher capital requirements with goal of reducing the likelihood of future crisis.

A model of money supply

Monetary base: $B = C + R$

- Controlled by central bank

Reserve – deposit ratio: $rr = R/D$

- depends on regulations and bank policies

Currency – deposit ratio: $cr = C/D$

- depends on household preferences

Money supply: $C + D$

Solving for the money

$$M = C + D = \frac{C + D}{B} \times B = m \times B$$

- where $m = \frac{C+D}{B}$

$$= \frac{C + D}{C + R} = \frac{(C/D) + (D/D)}{(C/D) + (R/D)} = \frac{cr + 1}{cr + rr}$$

Solving for the money

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

- if $rr < 1$, them $m > 1$
- if monetary bases changes by δB, then $\delta M = m \times \delta B$
- m is the money multiplier, the increase in the money supply, resulting from a one-dollar increase in the monetary base

The instruments of monetary policy

Fed can change the monetary base by

- open market operations: to increase the base, the Fed could buy government bonds, paying with new dollars.
- discount rate: the interest rate the Fed charges on loans to banks. To increase the base, the Fed could lower the discount rate, encouraging banks to borrow more reserves.

The Fed can change the reserve–deposit ratio by using:

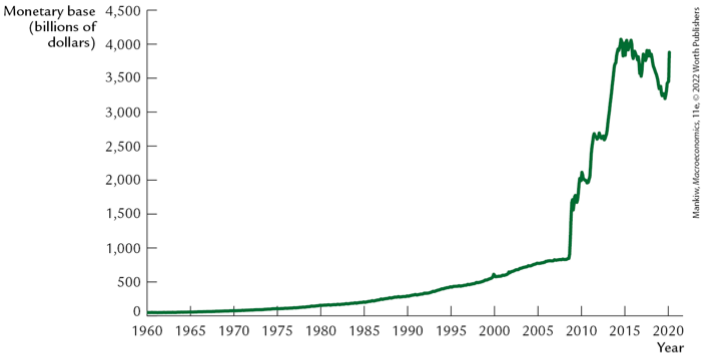
- reserve requirement: reduce the reserve–deposit ratio
- interest on reserves: pay a lower interest rate on reserves

Why the Fed can't precisely control M

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

- Household can change cr
- Banks always hold **excess reserves**(reserves that above requirement)

Quantitative easing



From 8/2008 to 8/2011,
the monetary base tripled,
but *M2* grew only about 22%.

From 1/2020 to 1/2021,
the monetary base increased by 52%, *M2* grew only about 25%.

Chapter 5 – Inflation

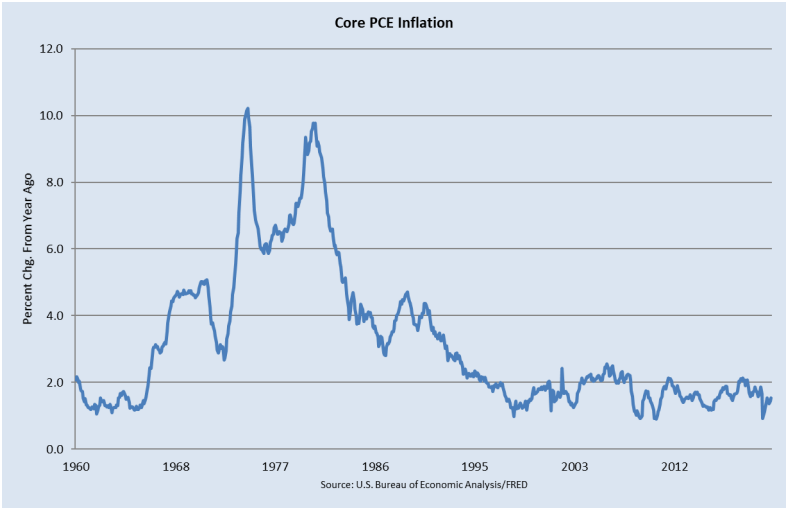
Preface

From last chapter: money is defined as a type of asset

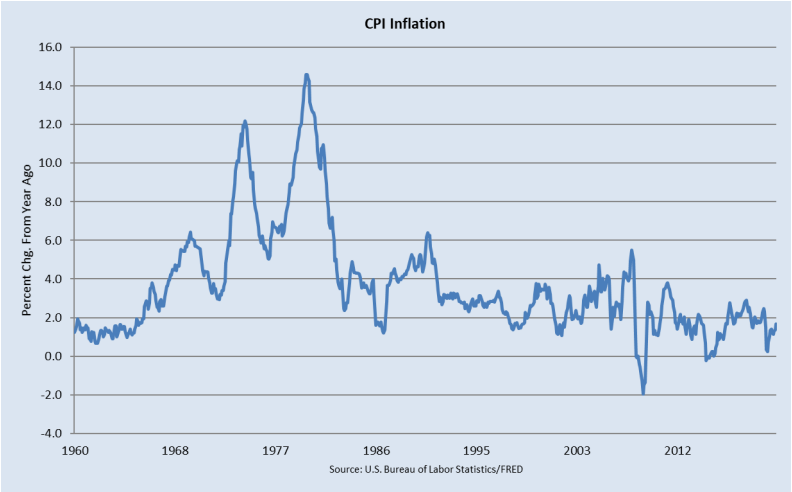
- just like other assets such as bonds, house etc, but money is most liquid
- nonetheless, money itself does not generate income
  - bonds pay you interests, house value may increase in future

There is a trade-off between liquidity and income

U.S. inflation and its trend, 1960 – 2020, core PCE



U.S. inflation and its trend, 1960 – 2020, core CPI



The quantity theory of money

- A simple theory linking inflation rate to the growth rate of money supply
- Begins with the concept **velocity**

Velocity

Basic concepts: the rate at which money circulates.

Definition: the number of times the average dollar bill changes hands in a given time period, e.g.

- \$500 billion in transactions
- money supply is \$100 billion
- so number of transactions is 5, or velocity is 5.
- This suggest,

$$V = \frac{T}{M}$$

- where T is total transaction, M is money supply

Velocity

Total transaction is same as total expenditure, and total expenditure equals to total nominal production. Thus,

$$V = \frac{P \times Y}{M}$$

- P: price
- Y: real output (GDP)

The quantity equation

Re-write previous equation,

$$M \times V = P \times Y$$

Equation above called **quantity equation**

Money demand

- M/P = **real money balances**, the purchasing power of the money supply
- a simple money demand function,

$$\left(\frac{M}{P}\right)^d = kY$$

  - k: how much money people wish to hold for each dollar of income (exogenous).
  - Another way to see that

$$M^d = kPY$$

Money demand

- Money demand: $(M/P)^d = kY$
- Quantity equation: $M \times V = P \times Y$
- The connection between them: $k = 1/V$
- When people hold lots of money relative to their incomes $\Rightarrow$ k is large, money changes hands infrequently $\Rightarrow$ V is small.

Quantity theory of money

- Assume V is constant and exogenous: $V = \bar{V}$

$$M \times \bar{V} = P \times Y$$

- With constant $\bar{V}$, the money supply determines nominal GDP ($P \times Y$)
- Recall that, real GDP Y is determined by supplies of K and L
- The quantity equation in growth rates,

$$\frac{\Delta M}{M} + \frac{\Delta V}{V} = \frac{\Delta P}{P} + \frac{\Delta Y}{Y}$$

  - By our assumption $\Rightarrow \frac{\Delta V}{V} = 0$

Quantity theory of money

- Denote $\pi = \frac{\Delta P}{P}$

$$\pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}$$

- Economic growth requires a certain amount of money supply growth to facilitate the growth in transactions
- Money growth in excess of this amount leads to inflation.
- $\frac{\Delta Y}{Y}$ depends on the factors of production and technological progress

Quantity theory predicts a one for one relationship between changes in the mony growth rate and changes in the inflation rate.

NOW YOU TRY
Applying the theory

Suppose ***V*** is constant, ***M*** is growing 5 percent per year, ***Y*** is growing 2 percent per year, and ***r*** = 4.

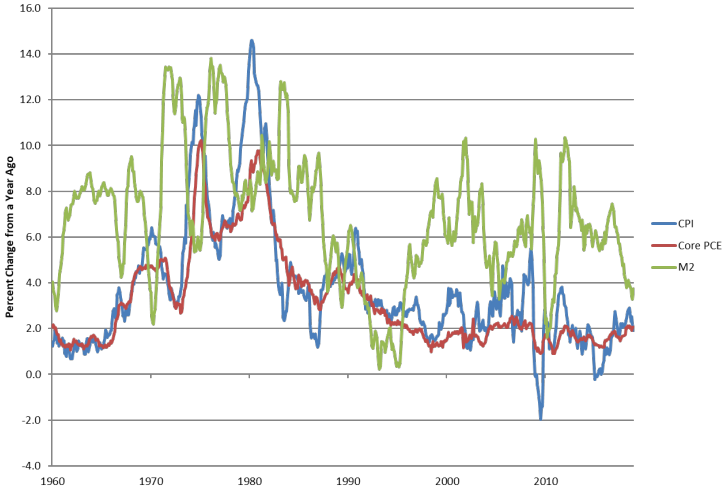
a. Solve for ***i***.

b. If the Fed increases the money growth rate by 2 percentage points per year, find Δi.

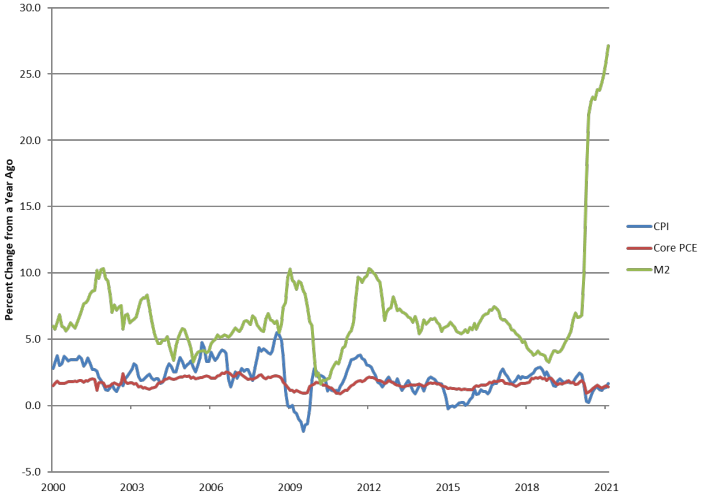
c. Suppose the growth rate of **Y** falls to 1% per year.

- What will happen to π?
- What must the Fed do if it wishes to keep π constant?

U.S. inflation and money growth, 1960 – 2019



U.S. inflation and money growth, 2000 – 2021

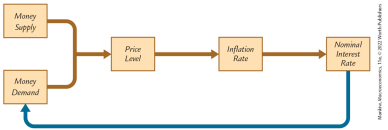


Fisher effect

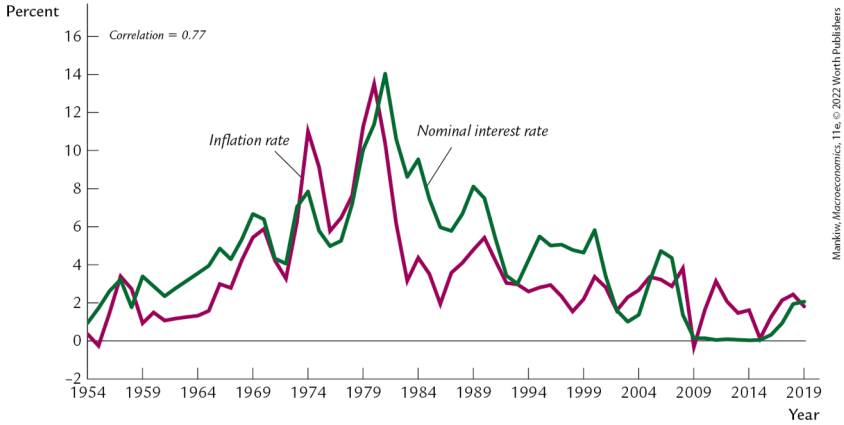
- Denote i as nominal interest rate
- Denote r as real interest rate
- Fisher equation,

$$r + \pi = i$$

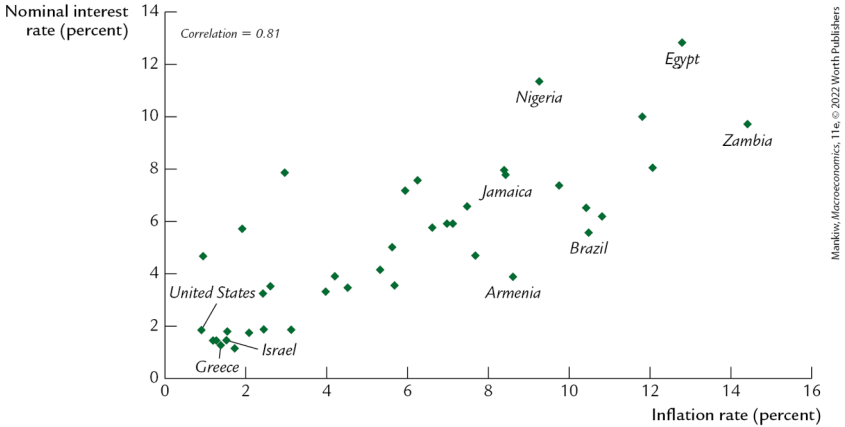
- Recall, saving (S) and investment (I) determine r. Thus, an increase in π increases i. This one for one relationship called **Fisher effect**



U.S. inflation and nominal interest rates, 1955 – 2020



Inflation and nominal interest rates in 48 countries



Two interests rate

Notation,

- π: actual inflation rate (not known until after it has occurred)
- $E\pi$: expected inflation rate

Two real interest rates;

- $i - E\pi$: **ex ante** real interest rate (rate people expect at the time buy a bond or take out a loan)
- $i - \pi$: **ex post** real interest rate (rate actually realized)

After 1980, Fed implement monetary policy based on $E\pi$, so adjusted Fisher equation

$$r + E\pi = i$$

Money demand function

- When nominal interest rate i goes up, people want to hole assets (e.g bonds) instead money, so money demand negatively correlated on i
- When income Y goes up, people want to hold more money because it is the most liquid assets

$$\left(\frac{M}{P}\right)^d = L(i, Y)$$

- Because the fisher effect $i = r + E\pi$

$$\left(\frac{M}{P}\right)^d = L(r + E\pi, Y)$$

Equilibrium

$$\frac{M}{P} = (\frac{M}{P})^d = L(r + E\pi, Y)$$

- LHS is real money supply, and RHS is real money demand
- What if Fed increases M ?
- What if Fed announce they will increase money supply in future?

How price responds to $E\pi$

$$\frac{M}{P} = L(r + E\pi, Y)$$

- if $E\pi \uparrow \Rightarrow i \uparrow$
- $i \uparrow$, demand less money $\Rightarrow (M/P)^d \downarrow$
- if M is constant $\Rightarrow P \uparrow$ to make (M/P) fall

An numeric example

A common misperception

Common misperception,

- inflation reduces real wages
  - only true in short run, when nominal wage are fixed by contracts.
  - again, real wage is determined by production factors, labor and capital supply

Benefits and costs of inflation

Benefits,

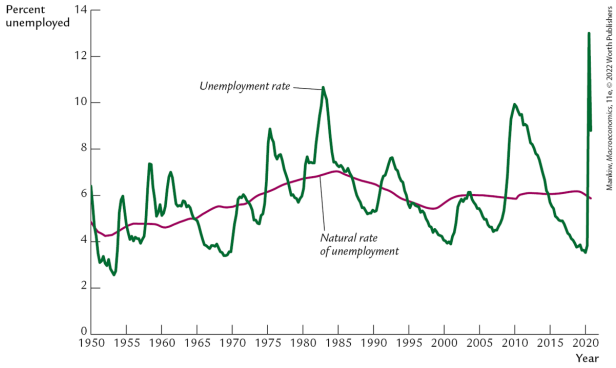
- nominal wage are rarely reduced (wage rigidity), even real wage falls, inflation allow real wages go reach equilibrium without nominal wage cuts

Costs,

- Expected,
  - Shoeleather costs: households have to withdraw case from bank frequently
  - Menu costs: cost of printing new menus and mailing out catalogs
  - Price distortion: distorted relative price if firm does not print new menu
  - Tax treaty: we pay fixed tax rate
- Unexpected
  - if π(actual) $>$ $E\pi$(expected) $\Rightarrow$ purchasing power transfers from lenders to borrowers, vice versa

Chapter 7 - Labor market

Natural rate of unemployment



Nature rate of unemployment: average rate of unemployment around which the economy fluctuates

A first model of the natural rate

- L: # of workers in labor force
- E: # of employed workers
- U: # of unemployed
- U/L: unemployment rate

Assume L is exogenously fixed. During any given month,

- s = rate of job separation: fraction of employed workers become separated from their jobs
- f = rate of job finding: fraction of unemployed workers find jobs
- both s and f are exogenous.

Steady state condition

Idea: we observe the unemployment rate is around 5% in the long run, with fluctuations in short run. Thus, we would expect 5% is our employment rate

- At steady state, the people who find jobs should equal to people who lose jobs (that's why it's called steady state, because no changes in unemployment rate)

$$s \times E = f \times U$$

Finding equilibrium (steady state) unemployment rate

Remember, we assume rate of job separation s and rate of job finding f are exogenous, so we can find an equilibrium (steady state) unemployment rate,

$$\begin{aligned} f \times U &= s \times E \\ &= s \times (L - U) \\ &= s \times L - s \times U \\ (f + s) \times U &= s \times L \\ \frac{U}{L} &= \frac{s}{s + f} \end{aligned}$$

Why there is unemployment

$$\frac{U}{L} = \frac{s}{s+f}$$

From data, the rate of separation s is much lower than rate of job finding f

- It does not matter if people can easily find a job, even with high separation rate.
- If $f = 1$, then $\frac{U}{L}$ should be very small.

The question is: why $f < 1$?

- Job search
- Wage rigidity

Job search: frictional unemployment

Frictional unemployment: take time to transit or search a job, even with flexible wages and enough jobs (short-term).

- e.g, you want to work as data analyst; you want a job in California
- e.g, there is a job in Houston, but it's too costly to move there
- e.g, there are no online job platform (Glassdoor, linkedin etc)
- all kind of frictions during job search.

Job search: structural unemployment

Structural unemployment: a long-term unemployment caused by shifts in the economy.

What might explain the job losses in manufacturing sector?

- Automation: a productivity change
- Trade shocks: import cheaper goods from foreign countries (e.g China, Mexico)

Government policy: unemployment insurance (UI)

Eligibility,

- Unemployed through no fault of your own (fires and quits are case-by-case basis)
- able, ready, and willing to work immediately (looking for a job)
- have enough earned wages in the base period to qualify

Claims,

- states run program but receive money from Federal government, vary in their documentation requirement
- research shows racial disparities in having claims approved and length of time for approval

Unemployment insurance

Benefits,

- replacement rate: benefits are a percentage of your previous wages (varies by states, 50% usually)
- states set up a cap on total weekly benefits
- standard benefits last 26 weeks, and benefits are considered as taxable income

Expanded Benefits Program: during bad economics times, the length of benefits can be extended by 13 or 20 weeks

Unemployment insurance during pandemics

- additional 13 weeks extension starting Mar 2020, with an extra 600 dollars a week
- additional 11 weeks extension starting Dec 2020, with a extra 300 or 400 dollars a week depend on state
- additional 25 weeks extension starting Mar 2021, with a extra 300 dollars a week

Benefits of UI

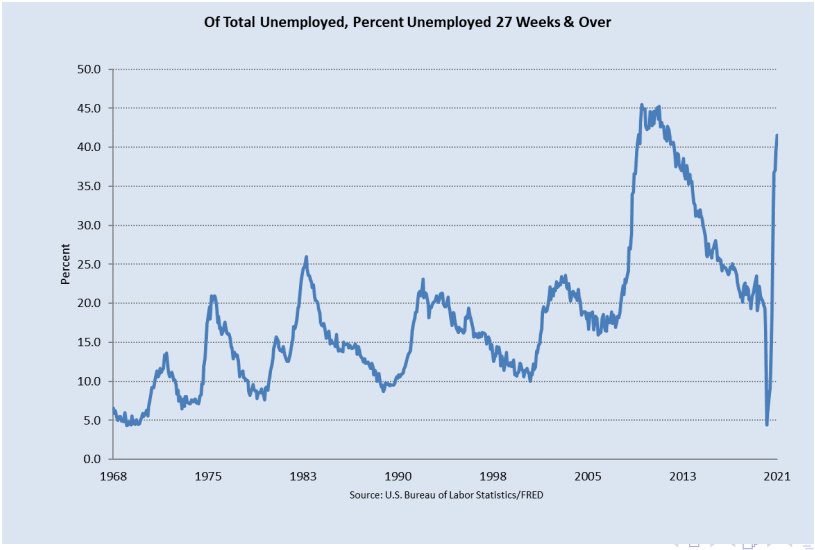
"Do Unemployment Insurance Benefits Improve Match Quality? Evidence from Recent U.S. Recessions"

- Longer UI benefit durations decrease the mismatch between workers' educational attainments and the educational requirements of jobs
- bigger effects of UI on match quality for those more likely to be liquidity constrained—women, non-whites and less-educated workers
- UI extensions improve the functioning of the labor market

Discussion

- based on what we learned, are UI expansions helpful or hurt to the economy?

Discourage incentives



Wage rigidity

Reasons,

- Minimum wage law
  - Evidence shows that minimum wages above 60 percent to 66 percent of the median local wage increase unemployment.
  - But, the minimum wage cannot explain the majority of the natural rate of unemployment, as most workers' wages are well above the minimum wage.
- Labor unions
  - Unions exercise monopoly power to secure higher wages for their members. When the union wage exceeds the equilibrium wage, unemployment results.
- Efficiency wages,
  - firm willing to pay above - equilibrium
    - attracting skilled worker
    - increase efforts, reduce turnover

Example