ECO 3302 – Intermediate Macroeconomics

Lecture 11: Unemployment and Labor Markets

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Introduction

Introduction

- **Unemployment is one of the most important problems in economics**
  (Recall that unemployed are those in the labor force who want but cannot find a job)
  - Everyone in economy subject to unemployment risk
  - Unemployment can have both economic and psychological consequences
    (Ie, it reduces living standards, causes distress, affects self-esteem, ...)

- Not surprisingly, politicians talk about job creation and low unemployment rates when running for president, mayor, senator, ...

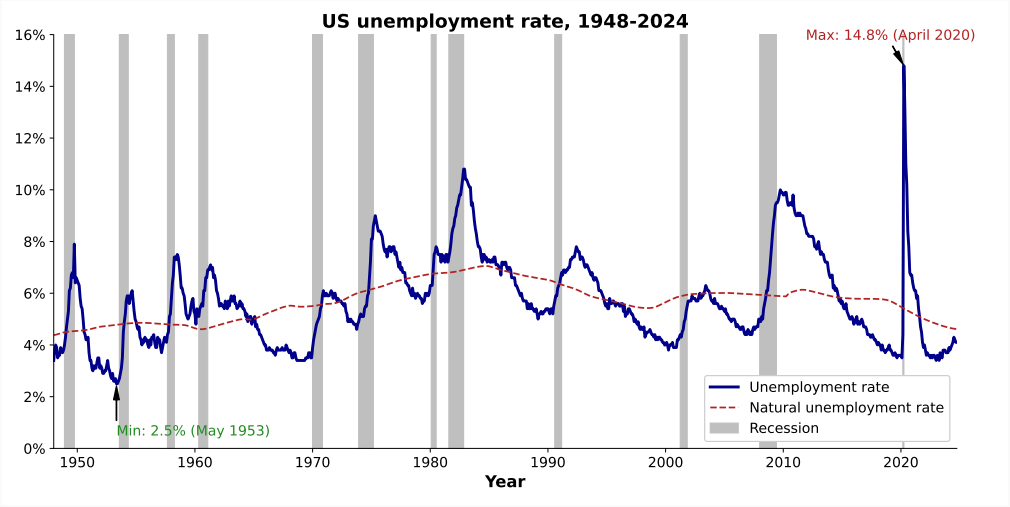
"We are setting record job numbers"
Donald Trump on July 21, 2020

"We now have historic low unemployment in America among all groups of people"
Kamala Harris on October 7, 2024

Introduction

- **Economists care about unemployment for many reasons**:
  - Measure it to gauge state of economy
  - Study it to identify causes and propose solutions
    (Eg, job-training programs, UI benefits, gvt spending, ...)
  - Try to design optimal UI programs
    (Ie, how generous should UI benefits be, and for how long should these last? Want to insure workers without giving them incentives to turn down jobs that are a good match)
- **So far, we studied models where unemployment had no role**
- **Today, we study unemployment in depth!** Let's start by looking at the data

Unemployment in the US over time



Notes. Data from FRED. Natural rate of unemployment estimated as a 20-year moving average of unemployment rates, using data from 10 years before and 10 years after current date (assuming unemployment rate of 4.5% pre-1948 and post-2024).

Natural rate of unemployment

- Unemployment rate, neither in US nor in other countries, never reaches 0%
  - Labor-market imperfections prevent workers from finding jobs instantly
- In US, natural rate of unemployment seems to be around 4–5%
- Today's focus is on understanding why there is always some unemployment and what determines its level
  - Not on cyclical fluctuations that cause changes in unemployment in short run
- **Natural rate of unemployment** is normal rate of unemployment around which economy fluctuates and toward which it gravitates in the long run

Different types of unemployment

1. **Structural unemployment**: Long-term unemployment resulting from mismatches between workers' skills or locations and job requirements or availability
2. **Frictional unemployment**: Short-term unemployment arising from time it takes to find and transition between jobs
3. **Cyclical unemployment**: Unemployment caused by economic downturns or recessions, when demand for goods and services declines
4. **Seasonal unemployment**: Unemployment occurring due to seasonal variations in demand for certain types of labor
5. **Technological unemployment**: Unemployment caused by automation and technological advances that reduce the need for human labor
6. **Institutional unemployment**: Unemployment resulting from institutional factors or policies that hinder the labor market's functioning

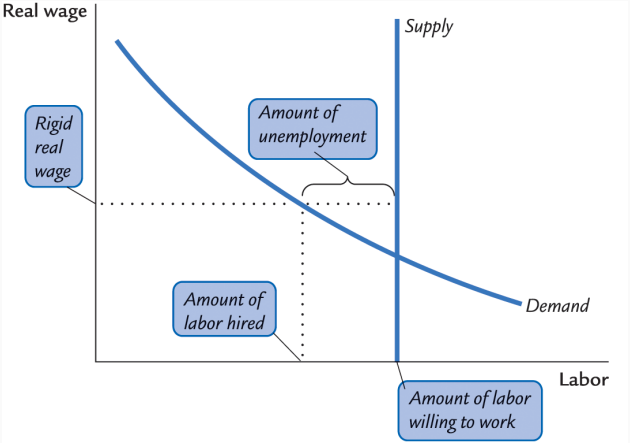
Real-Wage Rigidity & Structural Unemployment

Real wage rigity and structural unemployment

- In classic economic models, the real wage adjusts to bring quantity of labor supplied and demanded into balance
  - The result is **no unemployment**: #jobs = #people wanting to work
- **In the real world, wages not fully flexible**
  (ie, wage can be above market-clearing wage)
- Failure of wages to move to level that balances supply and demand of labor is referred to as **wage rigidity**
- Wage rigidity is one of many reasons for unemployment

Wage rigidity and unemployment

When real wage is above level that equilibrates supply and demand of labor, there is unemployment (ie, labor supply exceeds labor demand)



Wage rigidity and unemployment

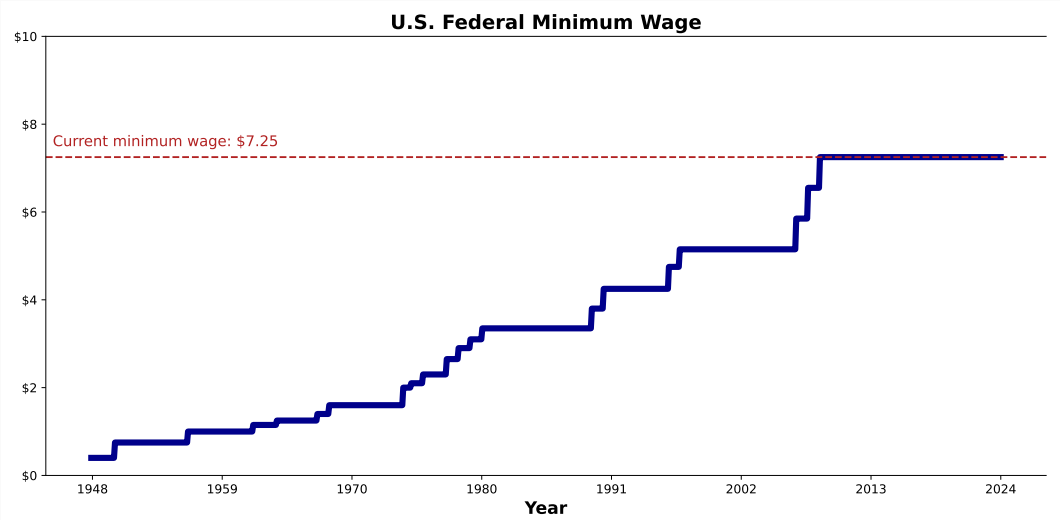
- Unemployment resulting from real wage rigidity is **structural unemployment**
  - Workers unemployed due to mismatch in number of people that want to work and number of jobs available

- Why does the labor market not clear? Ie, why don't firms lower the wages they pay so that they can hire more workers? **Potential reasons**:
  1. Minimum wage laws: gvt regulation prevents wage from falling to eq. level
  2. Unionization: market power of workers, manifested through collective bargaining, prevents wage from falling to equilibrium level
  3. Efficiency wages: wages above equilibrium level make workers more productive and thus firms prefer these wages over equilibrium level ones

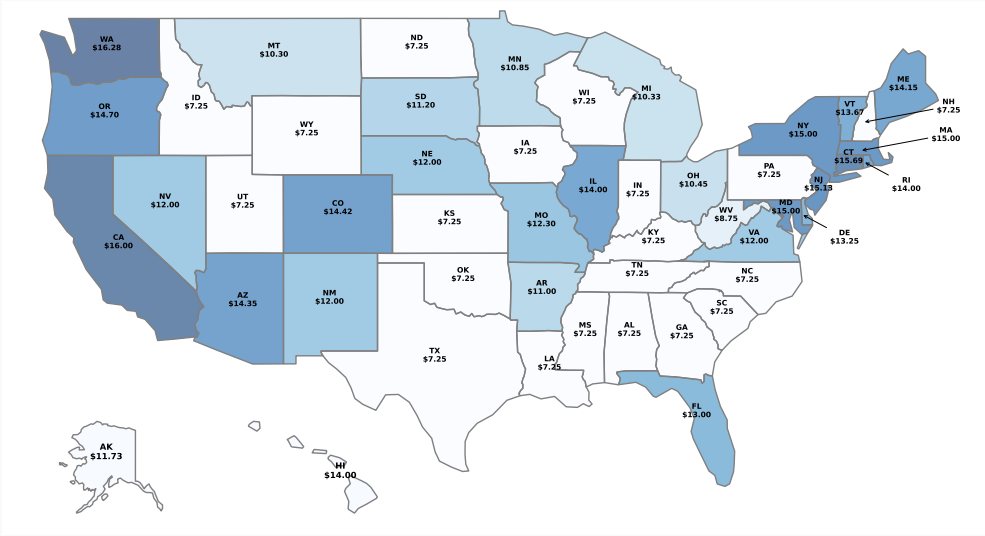
Minimum wage laws

- Minimum wage laws set legal minimum wage that firms must pay employees
- *Federal* minimum wage in US is established by Fair Labor Standards Act (FLSA)
  (This wage is typically 0.3-0.5× avg. hourly wage in manufacturing)
  - Since 2009, regular employees have federal minimum wage of $7.25 per hour
  - Federal minimum wage for tipped employees is $2.13 per hour
    (but if they don't make $7.25 including tips, employer must cover the difference)
- Many US states and municipalities have set their own minimum wages
  - These minimum wages are higher than the federal one
  - Employers must pay highest applicable minimum wage in territory they operate

U.S. Federal minimum wage



Minimum wage by U.S. state, 2024



Notes. Data from National Conference of State Legislatures.

Minimum wage laws

- **For most workers, minimum wage is not binding** (ie, they have higher wages)
- Minimum wage laws affect mostly unskilled & young/inexperienced workers
  - For these workers, minimum wage can be higher than eq. wage in free market
  - This means firms will want to hire less of *this type of labor*
- Minimum wage often featured in policy debates
  - This is because it is a way to raise living standards of the working poor
  - Advocates of min wage argue that benefits $>$ costs (ie, some unemployment)

Economic research on economic impact of minimum wage

- Economic research on effects of minimum wage has offered mixed evidence

  Some influential studies:

  - Card and Krueger (1994) analyzed effects of 1992 increase in New Jersey's min wage and **found no evidence of job losses and lower income inequality**:
    - They compared employment changes in fast-food restaurants in New Jersey with those of neighboring Pennsylvania, where min wage remained unchanged
  - Dube, Lester and Reich (2010) studies effects of min wages across US states between 1990 and 2016 and **find no negative employment effects**
    - **In previous work for restaurants in San Francisco and adjacent East Bay** (similar to Card and Krueger 1994), Dube and co-authors find **no negative employment effects**
  - Karabarbounis, Nath and Lise (2022) study effect of large minimum wage increases in the Twin Cities and **find large employment losses**
  - Neumark and Shirley (2022) document that 80% of 109 published studies find **zero to small short-run negative employment effects**

Economic research on economic impact of minimum wage

Of the studies reviewed by Neumark and Shirley (2022), 50% find raise in min wage has negative employment effects, 30% find no effect, and 20% find positive effects

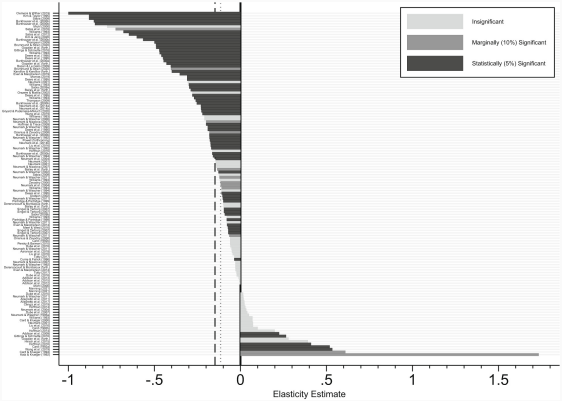


Figure 1: Employment effect of 1% increase in minimum wage

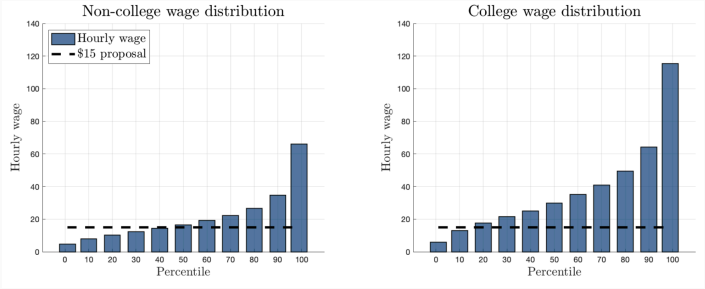
Economic research on economic impact of minimum wage

Consensus seems to be:

- Large, abrupt increases in min wage have more adverse effects than those of gradual, moderate increases, which are small or even zero
- Effects of min wage heterogeneous across industries and regions
- Min wage increases coupled with complementary policies (eg, tax credits) can mitigate potential downsides

Ongoing discussions about raising federal minimum wage

- **Recent proposal**: Increase federal minimum wage from $7.25 to $15 per hour
- Such minimum wage would affect a very large fraction of workers



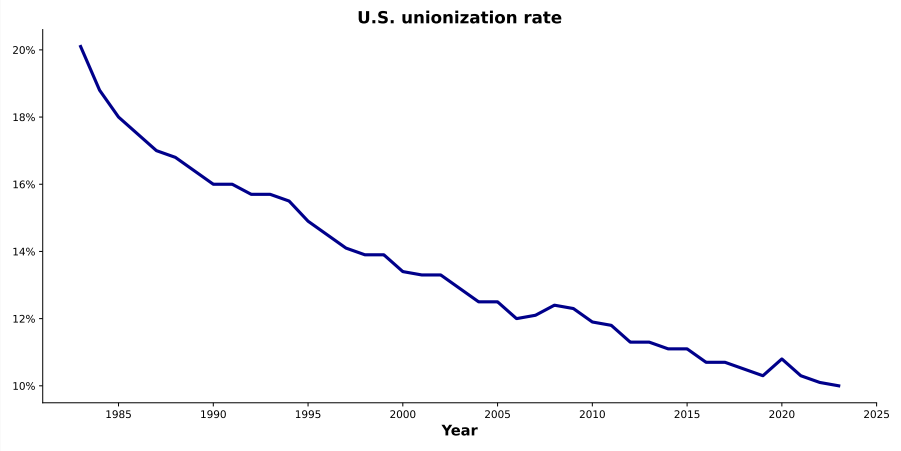
- Hurst, Kehoe, Pastorino, Winberry (2022) find that such min wage would have:
  - Small negative employment effects in short run; large negative ones in long run
  - Overall, such an increase in min wage detrimental for low-income workers

Unions and collective bargaining

- **Another reason why labor markets may not clear is collective bargaining**: workers exploit their market power to obtain wages above efficient eq. level
  - Only about 10% of US workers set their wages through collective bargaining
  - In Europe, this number can be much larger (eg, 98% in Austria)
- Threat of unionization can also push wages above efficient equilibrium level
- Unions (or threats of) may have different effects in similarly skilled workers, depending on their employment status:
  - **Insiders**: Unions can positively affect employed workers via higher wages
  - **Outsiders**: Unions can negatively affect unemployed workers by reducing their job-finding rate
- Wage bargaining takes place at different levels in different countries
  (Eg, bargaining at the firm level in the US, at the national level in Sweden, ...)

Unionization in the US

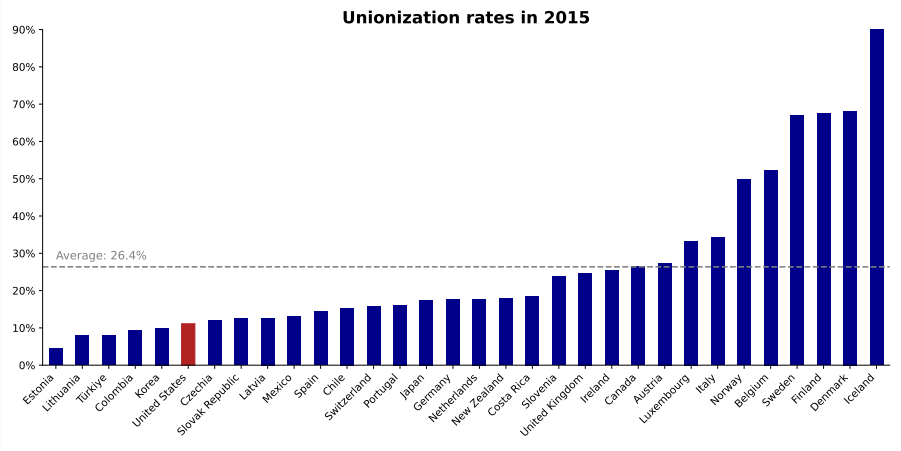
Union membership rate in the US sits at an historical low of 10%



Notes. Data from the BLS.

Unionization across the world

Unionization rate in the US is low in comparison to the rest of the world



Notes. Data from the OECD.

Efficiency wages

- **Efficiency wages**: Firms voluntarily pay wages above the efficient equilibrium level because at these wages workers are more productive
  - In poor countries, higher wages may allow workers to afford more nutritious diets and thus work harder
  - In rich countries, higher wages may reduce workers' turnover, so firms can reduce hiring & training costs
  - Higher wages make workers happier, and happier workers are more productive
- **All efficiency-wage theories have one thing in common**:
  - Firms operate more efficiently when they pay workers a wage higher than the market-clearing one, which generates unemployment

Job Search & Frictional Unemployment

Frictional unemployment

- **Unemployment may also result from labor-market frictions**
  (Ie, it takes time for firms and workers to find the right match)
- In reality, workers have different skills and firms demand different attributes
  - This heterogeneity in labor market complicates finding the right job
- In reality, workers have limited information on the jobs that are available
  - This lack of information prevents some workers from finding suitable jobs
- In reality, workers face mobility restrictions
  (Eg, cannot move to another city/state because of family reasons)
- **Search frictions** (ie, lack of information on employment opportunities, mobility restrictions, worker-firm mismatch, ...) **give rise to frictional unemployment**

A Model of Labor Market Dynamics

Model of labor market dynamics

- **Two reasons why there is always some unemployment:**
  1. Real wage rigidity $\rightarrow$ structural unemployment
  2. Search frictions $\rightarrow$ frictional unemployment
- Let's build a model that incorporates these two reasons
- **Labor force**. Exogenous number of workers L in labor force:

$$\underbrace{L}_{\substack{\text{workers in} \\ \text{labor force}}} = \underbrace{E}_{\substack{\text{employed} \\ \text{workers}}} + \underbrace{U}_{\substack{\text{unemployed} \\ \text{workers}}}$$

- **Jobs**. At any point in time, firms offer J jobs:

$$\underbrace{J}_{\text{number of jobs}} = \underbrace{F}_{\text{filled jobs}} + \underbrace{V}_{\text{vacant jobs}}$$

Model of labor market dynamics

- We assume that each employed worker can have at most one job. Hence:

$$\underbrace{E}_{\substack{\text{employed}\\\text{workers}}} = \underbrace{F}_{\text{filled jobs}}$$

- Two options for number of jobs available:
  - $J = L$: One job for each worker in labor force $\Rightarrow$ only frictional unemployment
  - $J < L$: No jobs for all workers in labor force $\Rightarrow$ also structural unemployment

- **Separation rate**. A (exogenous) fraction $s > 0$ of workers lose job each period:
  (In the US, monthly separation rate is $s \approx 0.04$)

$$\text{Job separations} = sE$$

Model of labor market dynamics

- **Matching technology**. Job hiring is explained with matching technology:

$$\text{New hires} = \mu M(U, V)$$

μ: efficiency parameter U: unemployed workers V: vacant jobs

New hires depend on number of unemployed and number of vacant jobs

Standard properties of M: CRS, increasing in both U and V

- **Labor market dynamics**:

$$\underbrace{\Delta U}_{\substack{\text{changes in} \\ \text{unemployment}}} = \underbrace{sE}_{\text{separations}} + \underbrace{\mu M(U, V)}_{\text{new hires}}$$

Solving the model (ie, write everything in terms of exogenous vars and solve for U):

1. Write separations: $sE = s(L - U)$
2. Write vacancies:

$$\begin{aligned} V &= J - F \\ &= J - E && \text{(using } E = F\text{)} \\ &= J - L + U && \text{(using } E = L - U\text{)} \end{aligned}$$

3. Write new hires: $\mu M(U, V) = \mu M(U, J - L + U)$

This leaves us with 2 equations (separations & new hires) and 2 unknowns (U, V)

Solving the model (ie, write everything in terms of exogenous vars and solve for U):

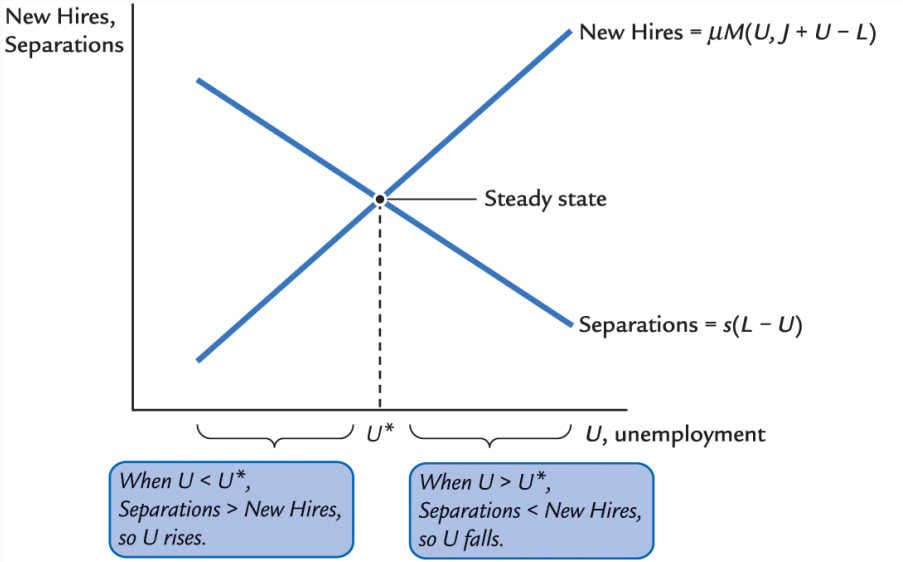
- Can solve the model using steady-state condition for unemployment:
  In steady state, (long-run) unemployment is constant

$$\Delta U = s(L-U) + \mu M(U, J-L+U) = 0 \quad \text{(steady-state condition)}$$

$$\implies \quad \underbrace{s(L-U)}_{\text{separations}} = -\underbrace{\mu M(U, J-L+U)}_{\text{new hires}}$$

- Solution to this equation yields steady-state unemployment level U^*

Graphical solution

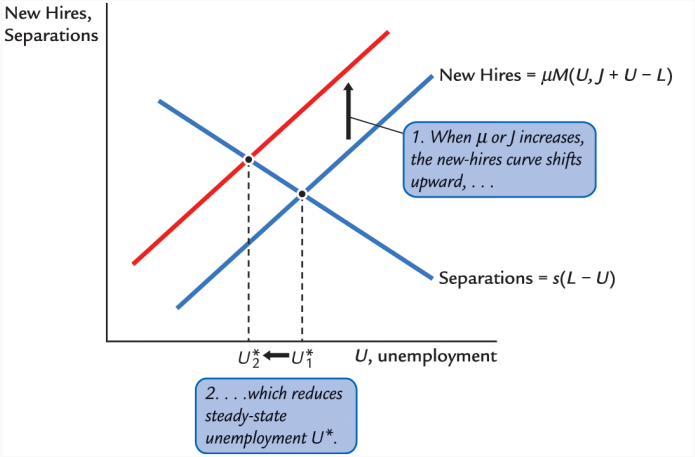


Comparative statics in model of labor market dynamics

- Can use model to understand what happens to steady-state unemployment:
  - When matching efficiency μ changes
  - When number of available jobs J increases
  - When job separation rate s changes

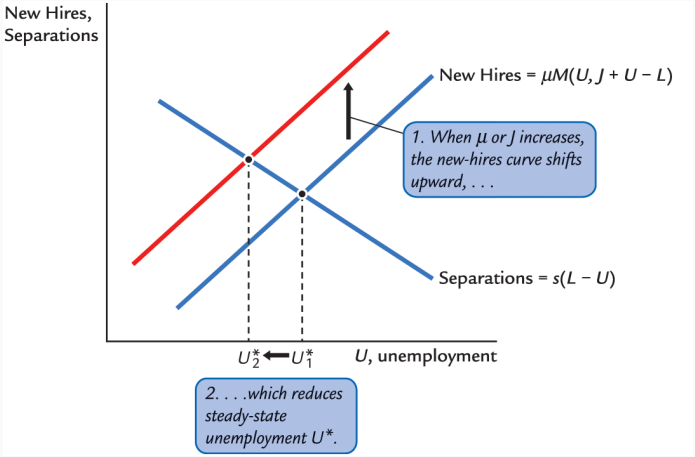
Comparative statics: Improved matching efficiency, $\uparrow \mu$, or more jobs, $\uparrow J$

When matching efficiency increases (eg, because UI benefits less generous or gvt provides more info to unemployed workers about available opportunities), s.s. unemployment falls



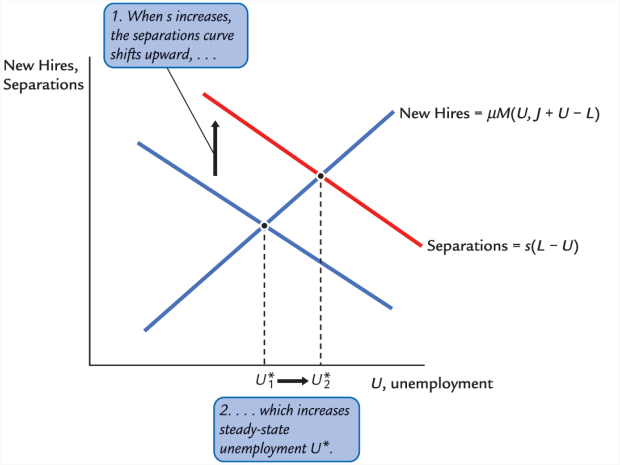
Comparative statics: Improved matching efficiency, $\uparrow \mu$, or more jobs, $\uparrow J$

When number of available jobs increases (eg, because minimum wage laws eliminated), steady-state unemployment falls



Comparative statics: Increase in separation rate, $\uparrow s$

When the job separation rate increases (eg, because workers are displaced by robots), steady-state unemployment increases



Summing up: Model of labor market dynamics

- **Model relates steady-state unemployment to job separations and new hires**
  - Workers in labor force are either employed or unemployed ($L = E + U$)
  - Number of jobs J is exogenous and capture available job opportunities
  - Jobs are either filled or vacant ($J = F + V$)
  - Employed workers lose their jobs at exogenous separation rate $s > 0$
  - New hires are determined by matching technology $\mu M(U, V)$
- Two possible types of unemployment:
  - Frictional: search frictions create unemployment even if jobs for all ($J = L$)
  - Structural: when wage rigidity pushes number of jobs below full empl. ($J < L$)
- **Steady-state unemployment is lower when: matching is more efficient ($\uparrow \mu$), more jobs are available ($\uparrow$ J), there are less separations ($\downarrow s$)**

Labor Markets Comparison: US vs Europe

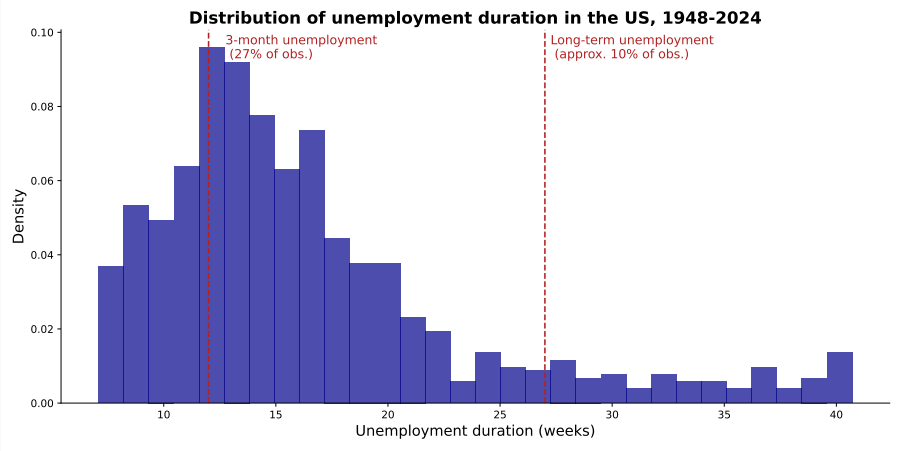
US labor markets

- **Once unemployed in the US, how long is the unemployment spell?**
  - Important for policy to know whether unemployment is short- or long-term:
    - Short-term unemployment points to frictional unemployment
      (Ie, it takes time to find a job suited to a worker's skills and taste)
    - Long-term unemployment points to structural unemployment
  - Eg, unemployment mostly frictional, increase reach and number of job portals
  - Eg, if unemployment mostly structural, reduce min wage
- **To gauge sources of unemployment, we look at unemployment spells**

US unemployment duration

Most of the unemployment in the US is frictional

(27% find employment in <3 months, 60% in <4 months, 80% in <5 months, ...)

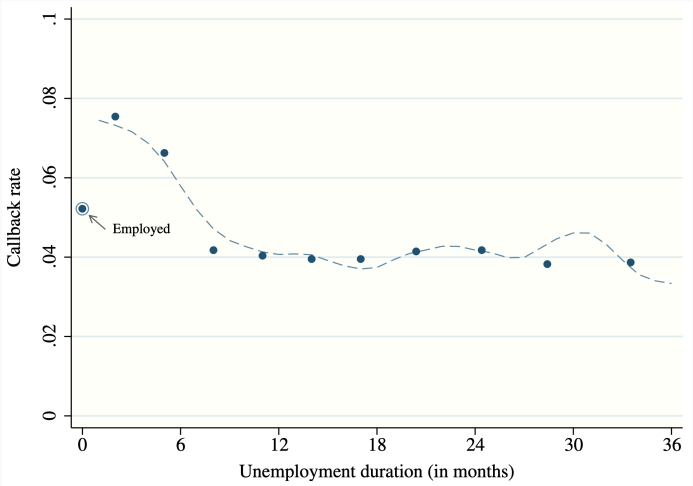


US unemployment duration

- **Negative consequences of long-term unemployment**:
  - Kroft, Lange, and Notowidigdo (2013) carried out a field experiment across 100 US cities by sending fictitious resumes to real job postings. Findings:
    - Employers are reluctant to interview long-term unemployed workers
    - Callback rates decline sharply with unemployment duration
      (Worker unemployed for 8 months is 45 percent less likely to receive a callback for an interview than an observationally equivalent newly unemployed worker)
  - Jarosch and Pilossoph (2019) note that not all interviews lost due to unemp. duration translate into lost jobs, and build model to gauge this number. Find:
    - Eliminating discrimination leads to: (i) 3% increase in job-finding rate for long-term unemployed; and (ii) decline in long-term unemployment of approx. 8%

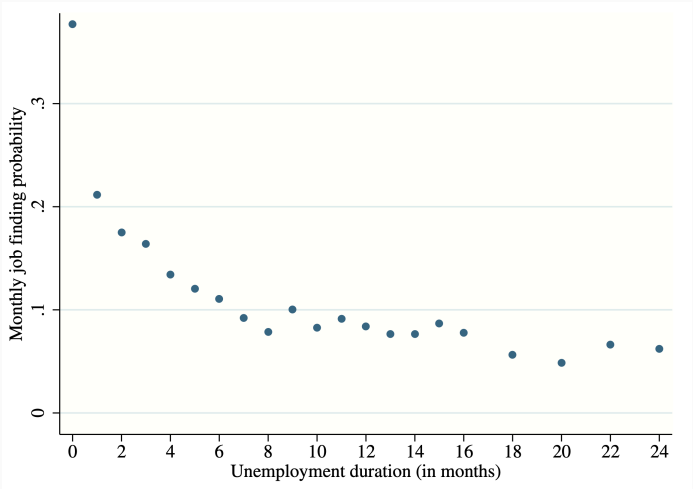
Unemployment duration and the callback rate

Interview callback rate in the US sharply declines with unemployment spell



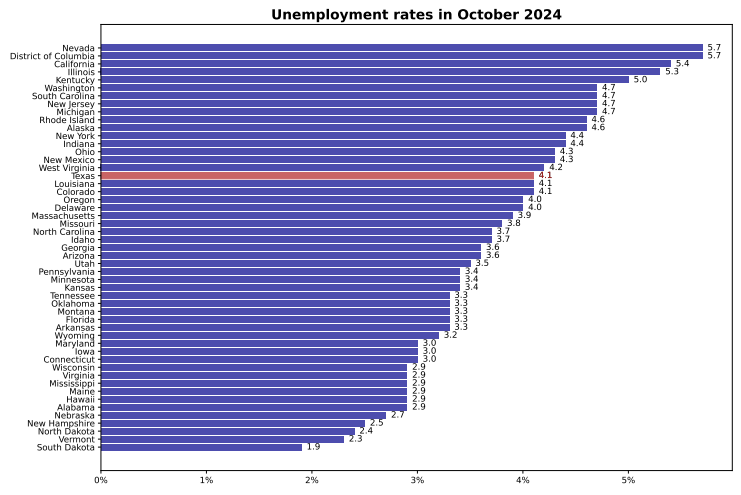
Unemployment duration and job-finding rate

Job-finding rate in the US sharply declines with unemployment spell



US unemployment rates by state

Large heterogeneity in unemployment rates across US states: from 1.9% to 5.7%



US unemployment by demographic characteristics

Table 1: US unemployment rates (%) in Q3 2024

	Total	White	Black	Asian	Hispanic
Age: >16 years	**4.3**	**3.8**	**6.2**	**4.1**	**5.3**
16–19 years	13.9	12.6	17.3	17.1	18.9
20–24 years	7.7	6.3	13.8	10.6	7.7
25–54 years	3.6	3.3	5.2	3.4	4.1
> 55 years	3.0	2.9	4.3	2.6	4.4
Men	4.1	3.7	6.3	4.2	4.8
Women	4.4	4.0	6.2	4.0	5.9

Larger unemployment rates for inexperienced workers, women, and minorities

US labor force participation

- So far, we have ignored labor force participation
  (Eg, in our model of labor-market dynamics, people in labor force L fixed)
- But movements in and out of labor force are important
- **Labor force participation is also connected to unemployment spells**
  - The longer the unemployment duration, the more likely a worker is to withdraw from the labor force
- We now look at labor force participation and other unemployment metrics

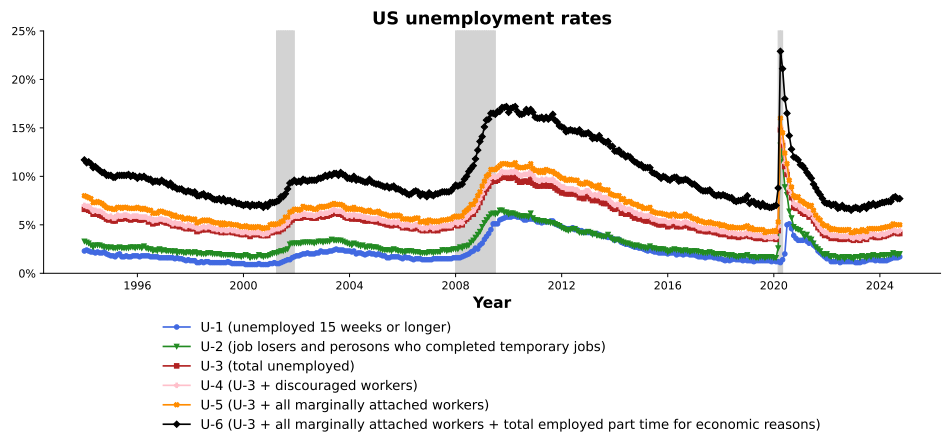
US labor force participation

Labor force participation sharply increased in the US during 1960–2000 and declined since 2000 (rise driven by women entering into LF & fall by males dropping out)

US unemployment measures

Approximately same number as total unemployed are employed part time

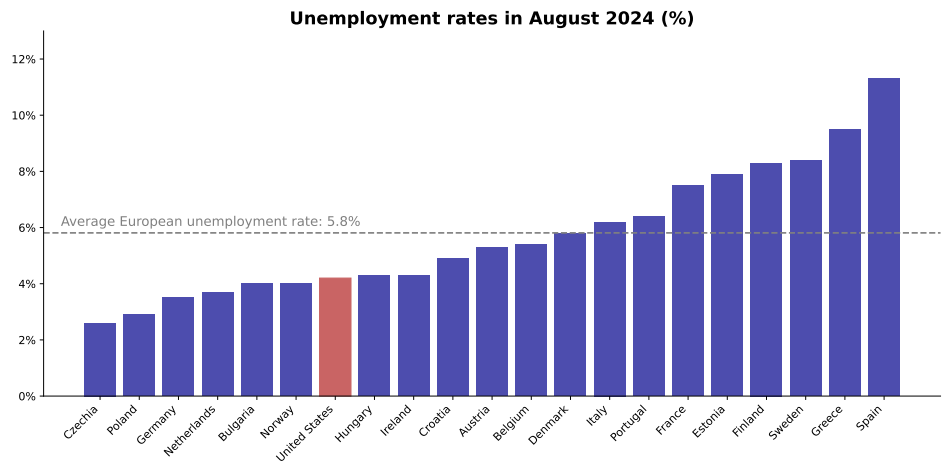
(Ie, there are not many marginally attached workers)



European labor markets

Average unemployment rates higher in European countries than in the US

(This 2.8 p.p. difference in unemployment rates holds true for 21st century)



European labor markets

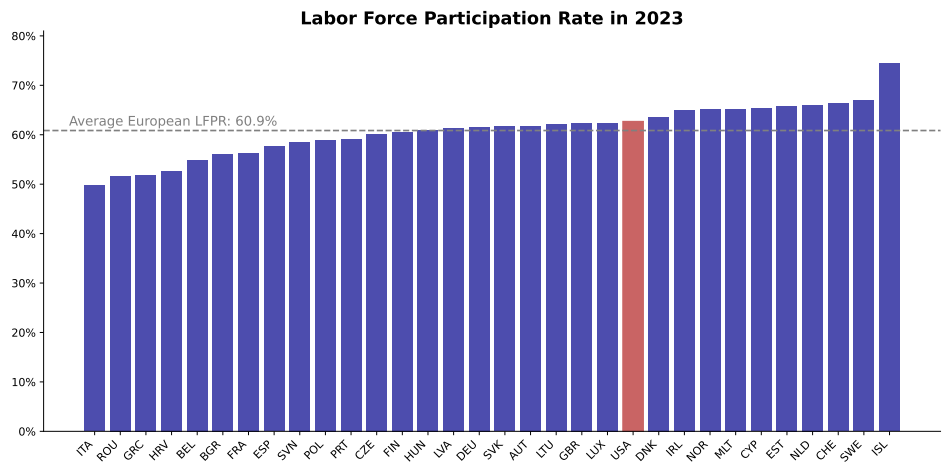
Why is unemployment higher in Europe than in the US?

1. Longer duration of unemployment benefits
   (In US, UI benefits typically available for up to 26 weeks; in Europe for 12 months or longer)
2. More generous unemployment benefits
   (In the US, UI benefits replace smaller percentage of previous income compared to Europe)
3. More regulated labor markets
   (In the US, laws make it easier for firms to hire and fire)
4. Higher unionization rates + higher minimum wages
   (In the US, workers engage less in collective bargaining and minimum wage is lower)
5. Higher labor income taxes
   (In the US, labor income taxes are generally lower than in European countries)
6. Higher taste for leisure
   (In the US, workers work more hours per week reflecting lower taste for leisure)

European labor markets

Average labor force participation rates lower in European countries than in the US

(About 2 p.p. difference in 2023)



Taking Stock

Taking stock

- **Unemployment is one of the most important problems in economics**
  - Everyone in the economy is subject to unemployment risk
  - Unemployment can have both economic and psychological consequences
- **Natural rate of unemployment**: rate of unemployment around which economy fluctuates and toward which it gravitates in the long run
  - Calculated using backward and forward information (ie, $\pm$10 years of data)
  - In the US, natural rate of unemployment is around 4–5%
- Many types of unemployment: structural, frictional, cyclical, seasonal, ...

Taking stock

- **Structural unemployment is caused by real wage rigidity**
  - In classic models, no unemployment because wage adjusts to clear market
  - In reality, wages don't fully adjust and are typically above market-clearing wage
  - Failure of wages to adjust to clear market is referred to as **wage rigidity**
- **Reasons why wages are rigid**:
  1. Minimum wage laws: gvt prevents wage from falling to clearing-market level
  2. Unionization/Collective bargaining: workers use their market power to set wages above clearing-market level
  3. Efficiency wages: firms set wages above clearing-market level because these make workers more productive
- Unionization rate in US is low in comparison to rest of world, it has been falling since 1970s, and currently sits at 10%

Taking stock

- Minimum wages typically set to improve living standards of working poor and to reduce income inequality
- Economic research suggests minimum wages have small short-run negative employment effects (ie, job losses)
- In US, federal min wage currently sits at $7.25/hour, but there is substantial variation across states because of state laws (Eg, $16.28 in WA vs. $7.25 in TX)
- Recent proposal of $15/hour min wage would affect large fraction of population, and economists estimated it'd have detrimental welfare effects

Taking stock

- **Frictional unemployment results from labor-market frictions**
  (Ie, workers and firms mismatched, lack of information on available jobs, mobility restrictions)
- Vast majority of unemployment in the US is frictional (ie, short-term duration)
- **Duration of unemployment negatively affects both interview-callback and job-finding rates, and also labor-force participation**
- Labor force participation sharply increase in the US from 1960 to 2000 due to entry of women in the labor force, but has been falling ever since
- **Unemployment rates are much higher in Europe than in the US**
  (Due to UI benefits being more generous and having longer duration, more regulated labor markets, higher unionization, higher min wages, higher income taxes, higher taste for leisure)

Questions?

Thank You!

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