

LECTURE 14

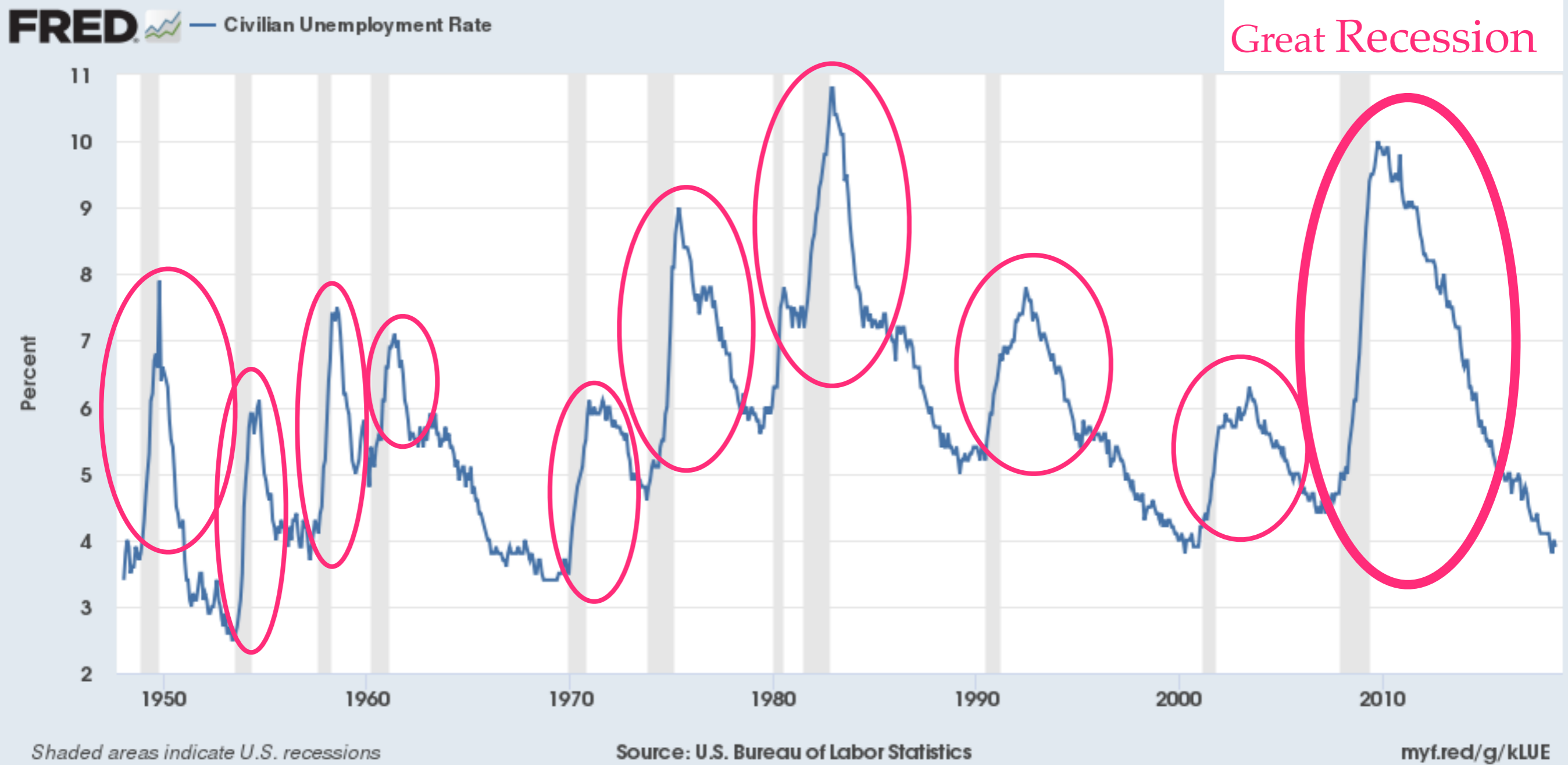
MATCHING | MATCHING FUNCTION

Pascal Michailat

Brown University

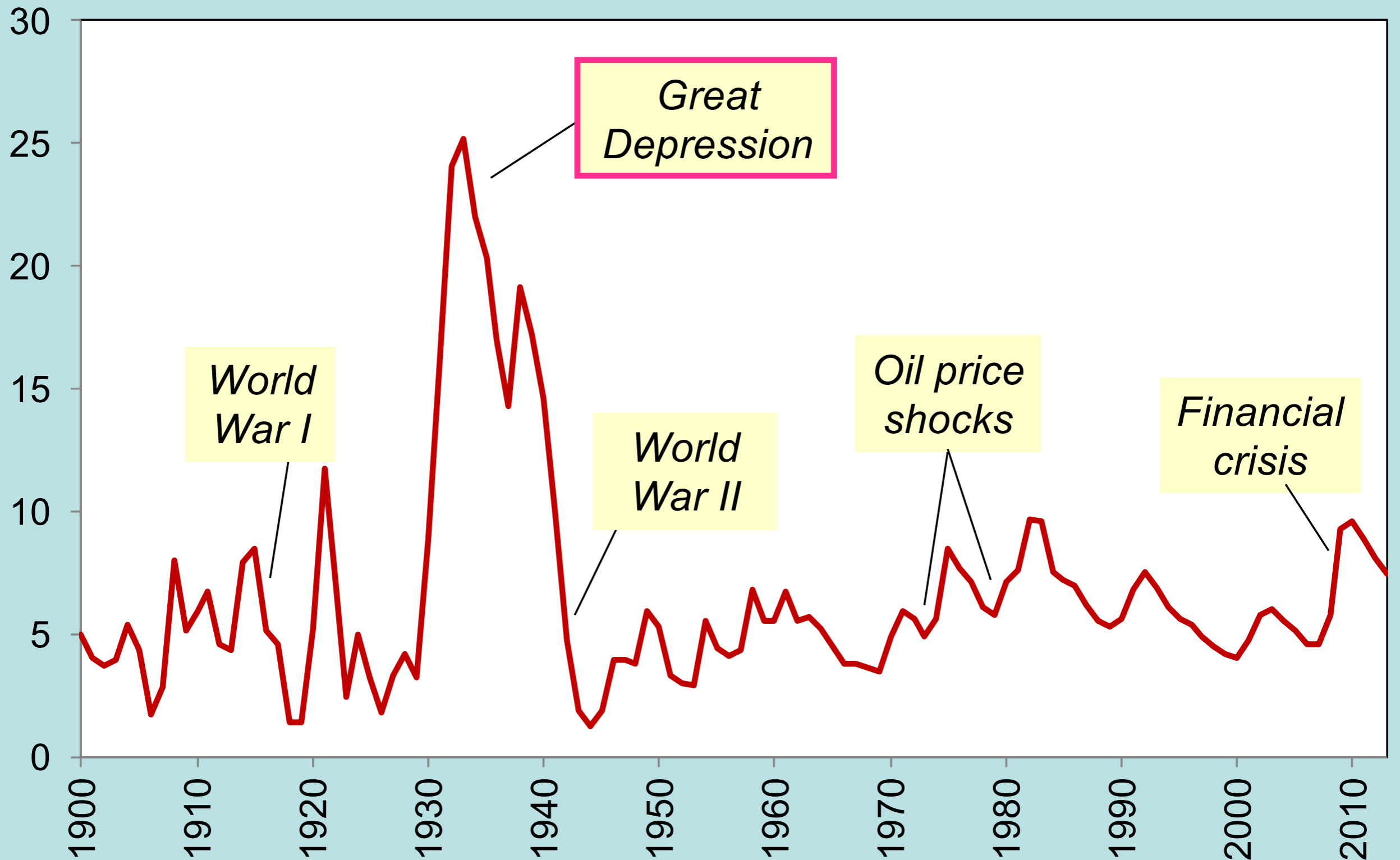
<https://www.pascalnichailat.org>

US UNEMPLOYMENT RATE



- unemployment goes up in recessions
- unemployment varied between 2.5% and 10% since 1948
- average unemployment rate: 5.8%

U.S. Unemployment Rate (% of labor force)



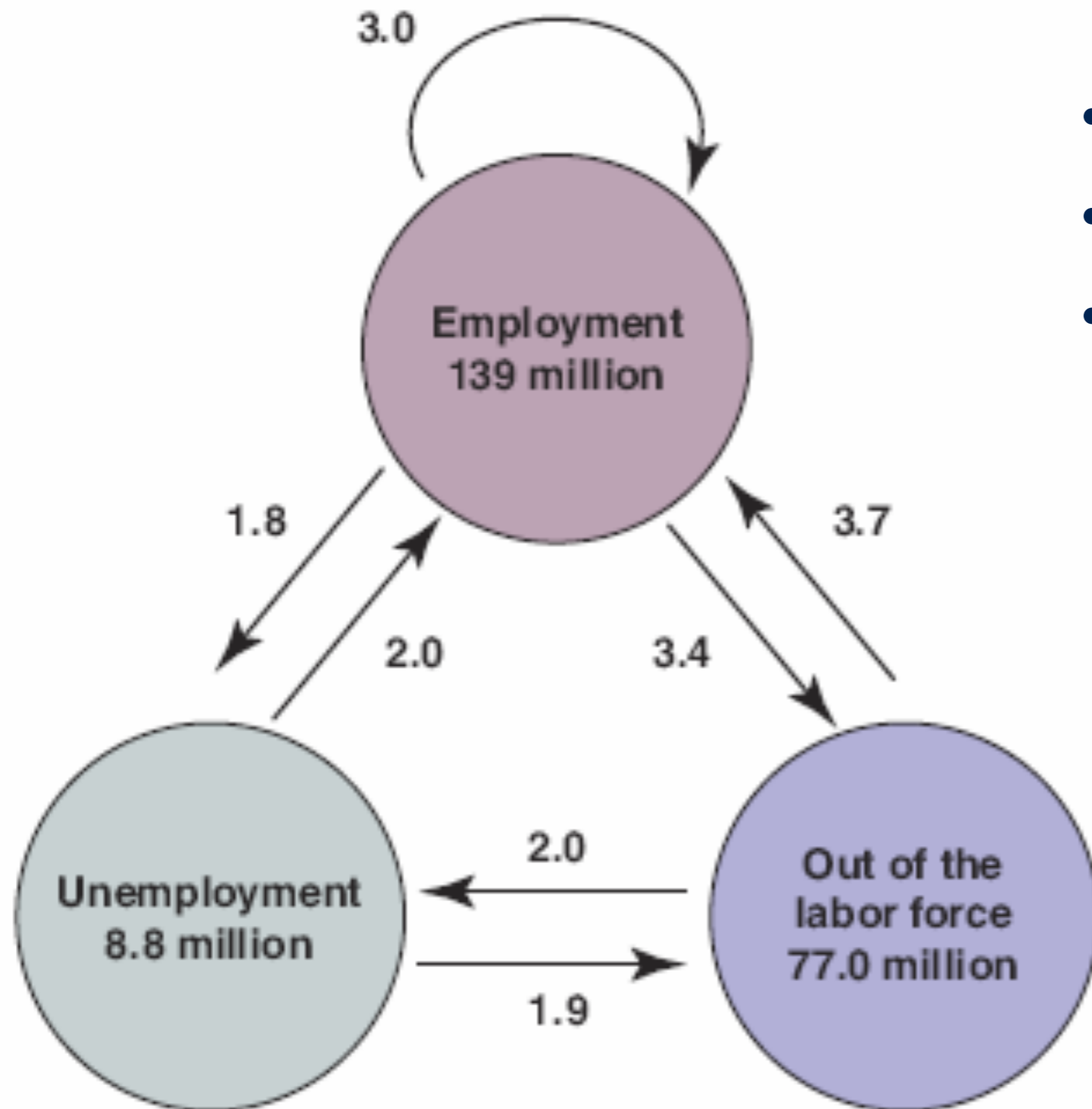
JOB'S LAST A LONG TIME

- typical job lasts 8 years in the US
- 25% of jobs last more than 20 years in the US
- in the US before WWI, labor was sold on a “spot market”
 - people would come every morning to the factory to be hired
- the personnel management movement changed that after WWI
- the goal was to offer job security to make workers more productive
 - workers gain knowledge specific to the firm
 - workers are more dedicated to the firm

UNEMPLOYMENT AND VACANCIES COEXIST

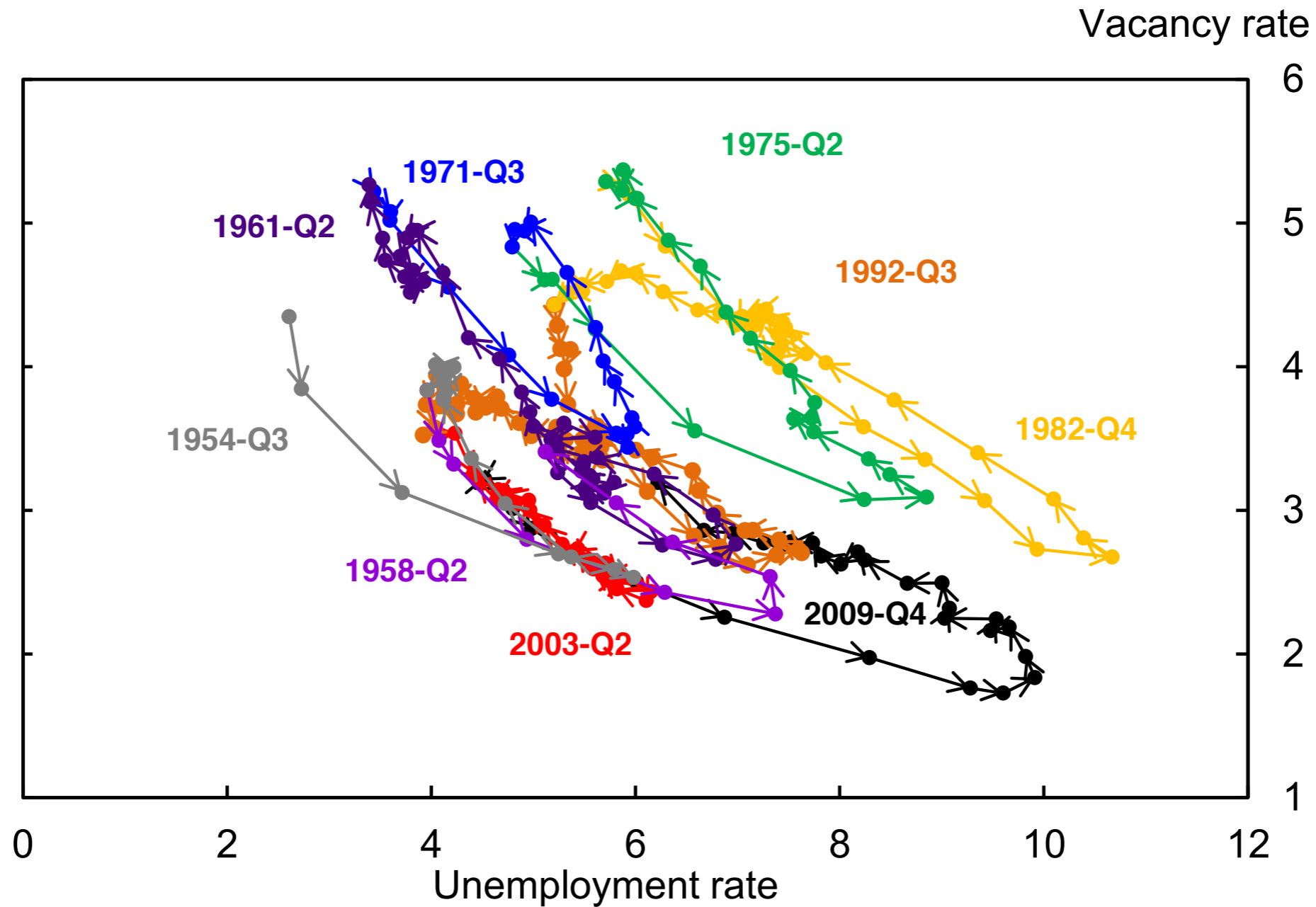
- it takes time to find a job in the US
 - average unemployment duration: 2 to 3 months
 - unemployment duration goes up in slumps: **countercyclical**
- it takes time for firms to fill their vacancies in the US
 - average duration to fill a vacancy: 2 weeks to 1 month
 - vacancy-filling duration goes down in slumps: **procyclical**
- coexistence of vacant jobs and unemployed is described by a **Beveridge curve**

US LABOR MARKET FLOWS



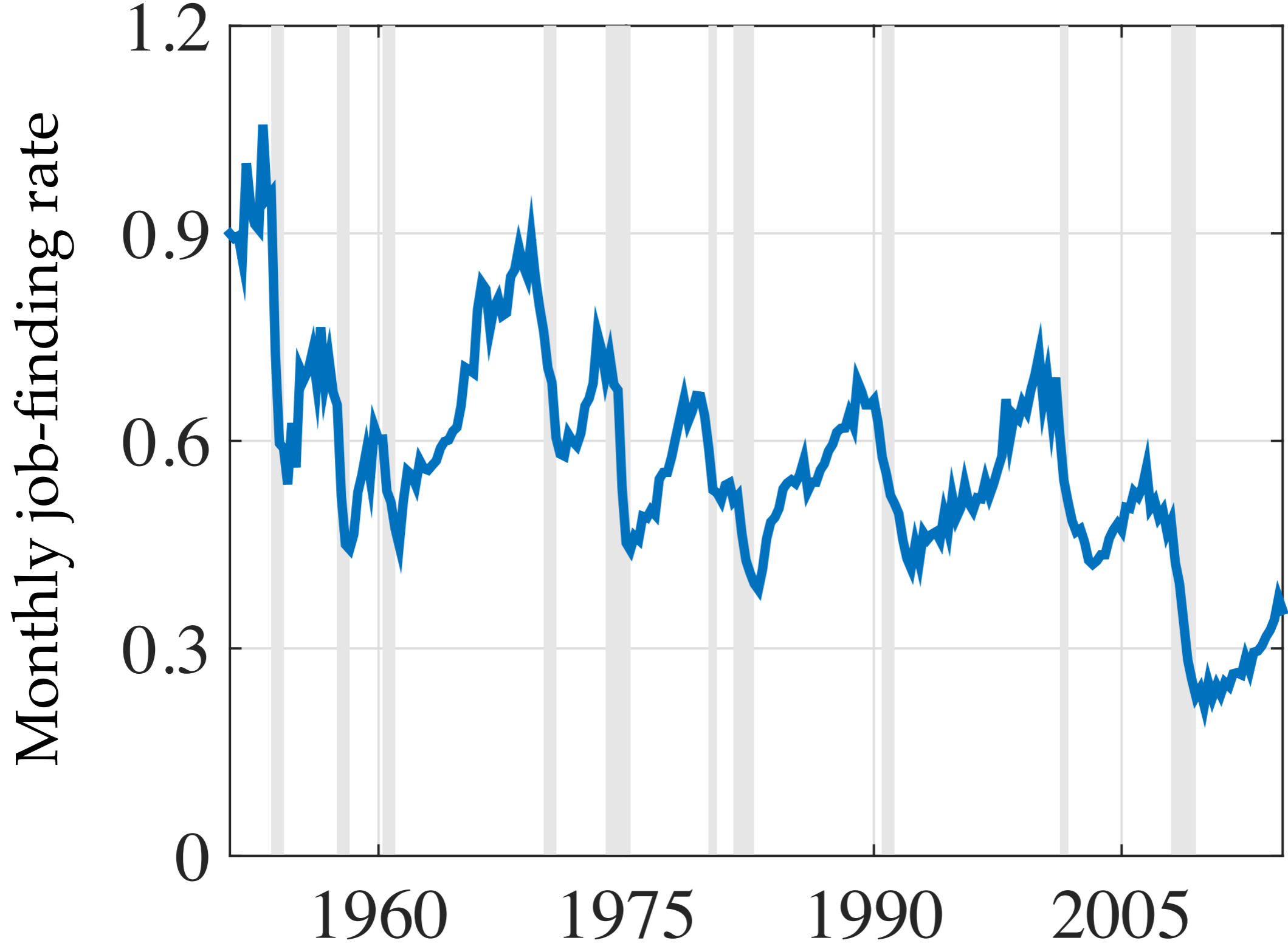
- monthly data for 1996—2014
- flows are in millions
- job separations = quits + layoffs
- quit: decided by worker
- layoff: decided by firm

US VACANCIES AND BEVERIDGE CURVE

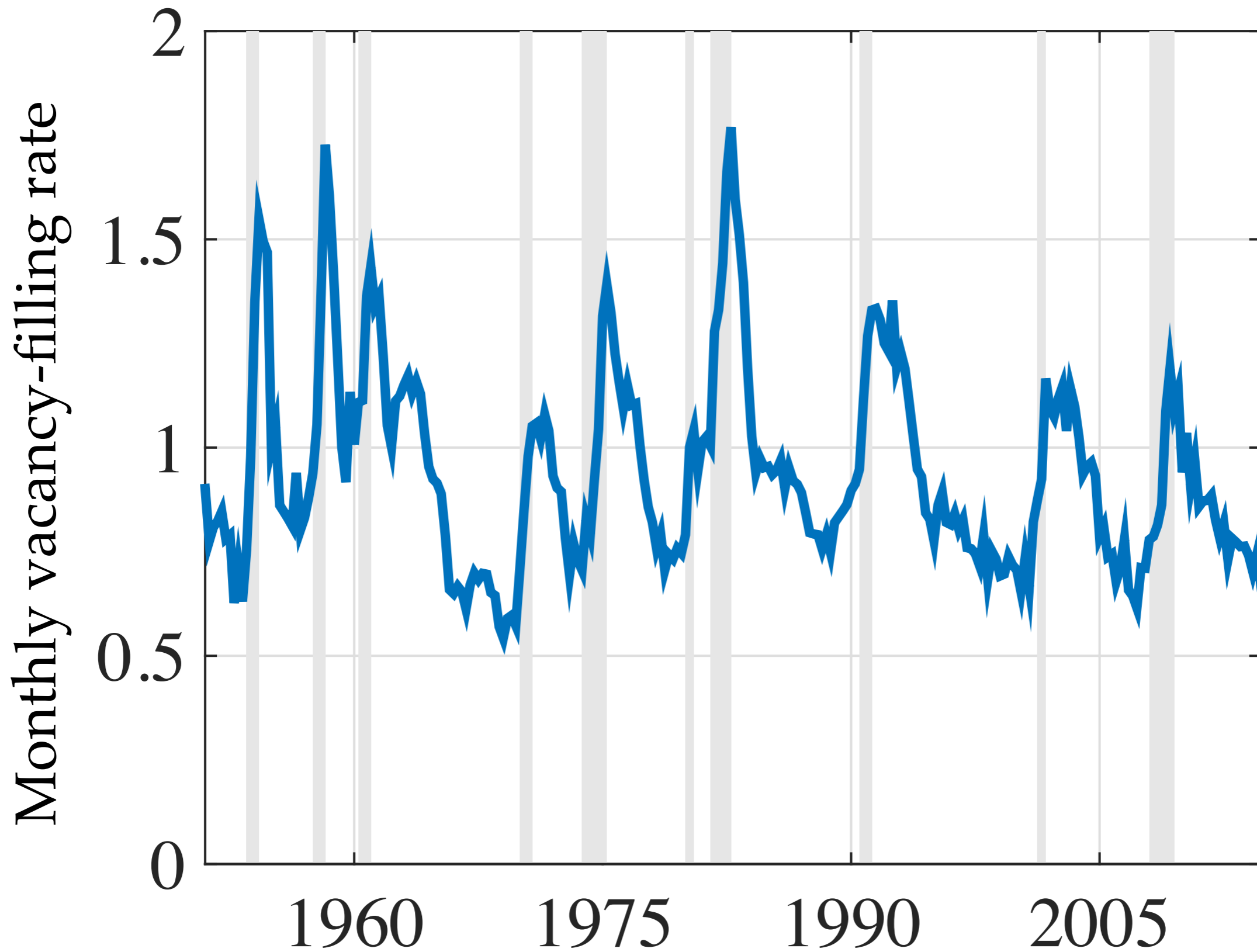


- each color indicates a different business cycle
- vacancies always coexist with unemployed workers
- when the vacancy rate is high, unemployment is low

US JOB-FINDING RATE IS PROCYCLICAL



US VACANCY-FILLING RATE IS COUNTERCYCLICAL



MATCHING PROCESS

- firms need to find a worker that they like
 - skills, education, experience, motivation, fit
- workers need to find a job that they like
 - location, pay, colleagues, industry, benefits, responsibilities
- each worker and job are unique, so it takes time for the right worker and right job to match: the market is described by a **matching function**
 - the matching function describes the complicated process of matching jobseekers and firms together
 - firms post vacancies to recruit workers
 - unemployed workers search for jobs

WORKERS & FIRMS

- H : number of workers in the labor force
 - $H > 0$ is parameter: fixed number of people in labor force
 - we do not model people out of the labor force
- L : number of employed workers
- U : number of unemployed workers
 - $u = U / H$: unemployment rate
- V : vacancies posted by firms

MATCHING FUNCTION

- number of matches in one month = $m(U, V)$
- $m(U, V)$ is increasing in U
- $m(U, V)$ is increasing in V
- $m(U, V)$ has constant returns to scale
 - $m(\text{constant} \times U, \text{constant} \times V) = \text{constant} \times m(U, V)$
- Cobb-Douglas example: $m(U, V) = \omega \times U^\eta \times V^{1-\eta}$,
where $\omega > 0$ and $0 < \eta < 1$

LABOR MARKET TIGHTNESS

- new tool: matching function
- new variable: labor market tightness $\theta = V / U$
- labor market tightness determines the probabilities to find a job and fill vacancy
- labor supply and labor demand will depend on wage & labor market tightness
- generalization of the market model from microeconomics

JOB-FINDING RATE

- fraction of unemployed workers finding a job in a month: $f(\theta)$
- $f(\theta) = m(U, V) / U = m(U / U, V / U) = m(1, \theta)$
- $f(\theta)$ is increasing in θ
 - when labor market tightness is lower, it takes longer to find a job
 - because there are a lot of jobseekers relative to vacancies, competition for jobs among workers is strong

VACANCY-FILLING RATE

- fraction of vacancies filled in a month: $q(\theta)$
- $q(\theta) = m(U, V) / V = m(U / V, V / V) = m(1 / \theta, 1)$
- $q(\theta)$ is decreasing in θ
 - when labor market tightness is higher, it takes longer to fill a vacancy
 - because there are a lot of vacancies posted relative to jobseekers, so competition for workers among firms is strong