Unemployment Facts

704 Macroeconomic Theory II
Topic 1

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2024 Spring

Course Logistics

- Lecture:
  - Tuesdays, Thursdays, 11-12:15, in CDS 463
- Instructor:
  - Masao Fukui (mfukui@bu.edu)
  - Office hours: Mon 2:45-5:45pm in Room 400
- TA:
  - Shraddha Mandi (mandis@bu.edu)
  - Office hours: 12:30-2:30 in room 413
- Sections: Tu 3:30-4:45 in CAS 116

Grades

- Grades:
  - 40% problem sets
  - 60% final exam
- There will be 4 problem sets
  - Strongly encouraged to work in a group
  - But each student must hand in their own write-up.
  - Strongly encouraged to write in LaTeX
  - Write as if you were writing a paper and submitting it to a journal. Don't paste the screenshot of Stata output window!
- The first problem set is already posted. Due March 29th.

Course Overview

- First half: labor market frictions
- Second half: financial market frictions

What is Unemployment?

Why Study Unemployment?

- Unemployment is often a central focus in business cycles
- Why care about unemployment?
  - Individual: lower income, consumption, and emotional well-being
    Ganong-Noel (2018) Krueger-Meuller (2012)
  - Aggregate: Potentially under-utilization of resources
- Questions:
  1. Why is there unemployment? Why does it fluctuate?
  2. Is unemployment inefficient?
  3. What policies should we implement?
- But before theorizing, we need to define and measure unemployment

Defining Unemployment

Total US population
330 million

Non-institutional civillian population
260 million

Less than 16 y/o
armies, prisons

Civillian labor force
160 million

Not in labor force
100 million

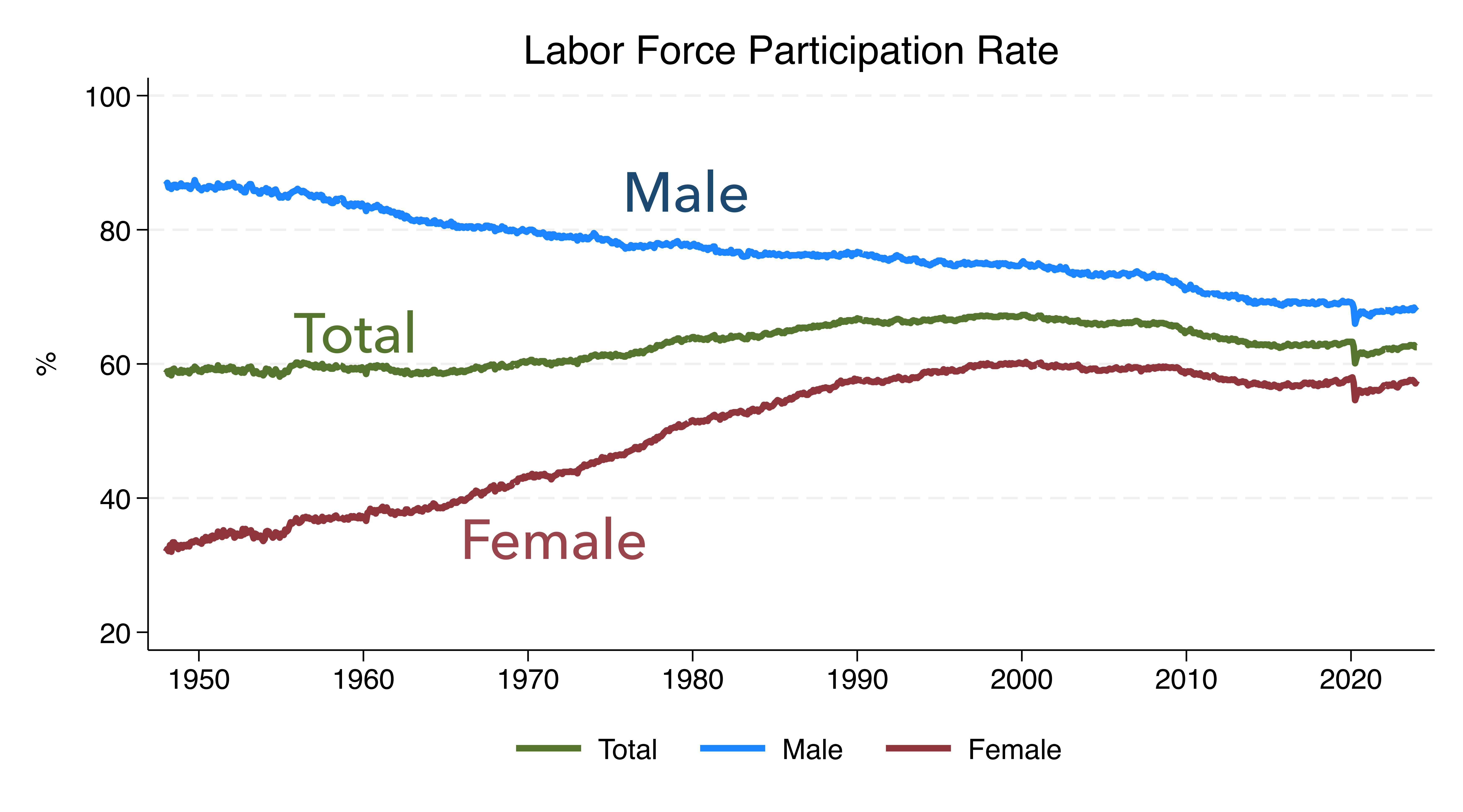
→ **Jobless but not looked for work in the past 4 weeks**

Employed
150 million

Unemployed
10 million

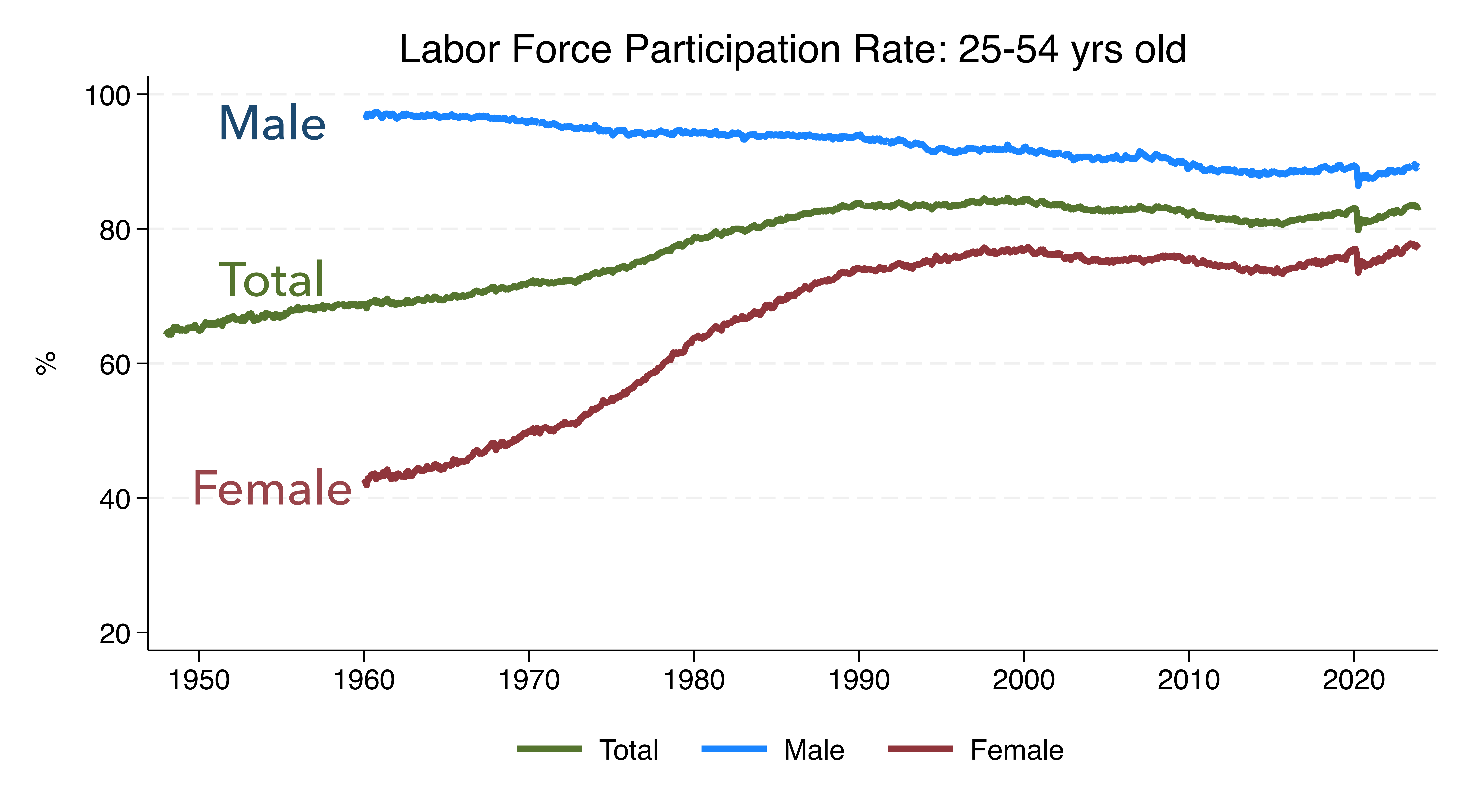
→ **Jobless and looked for work in the past 4 weeks**

Labor Force Participation Rate

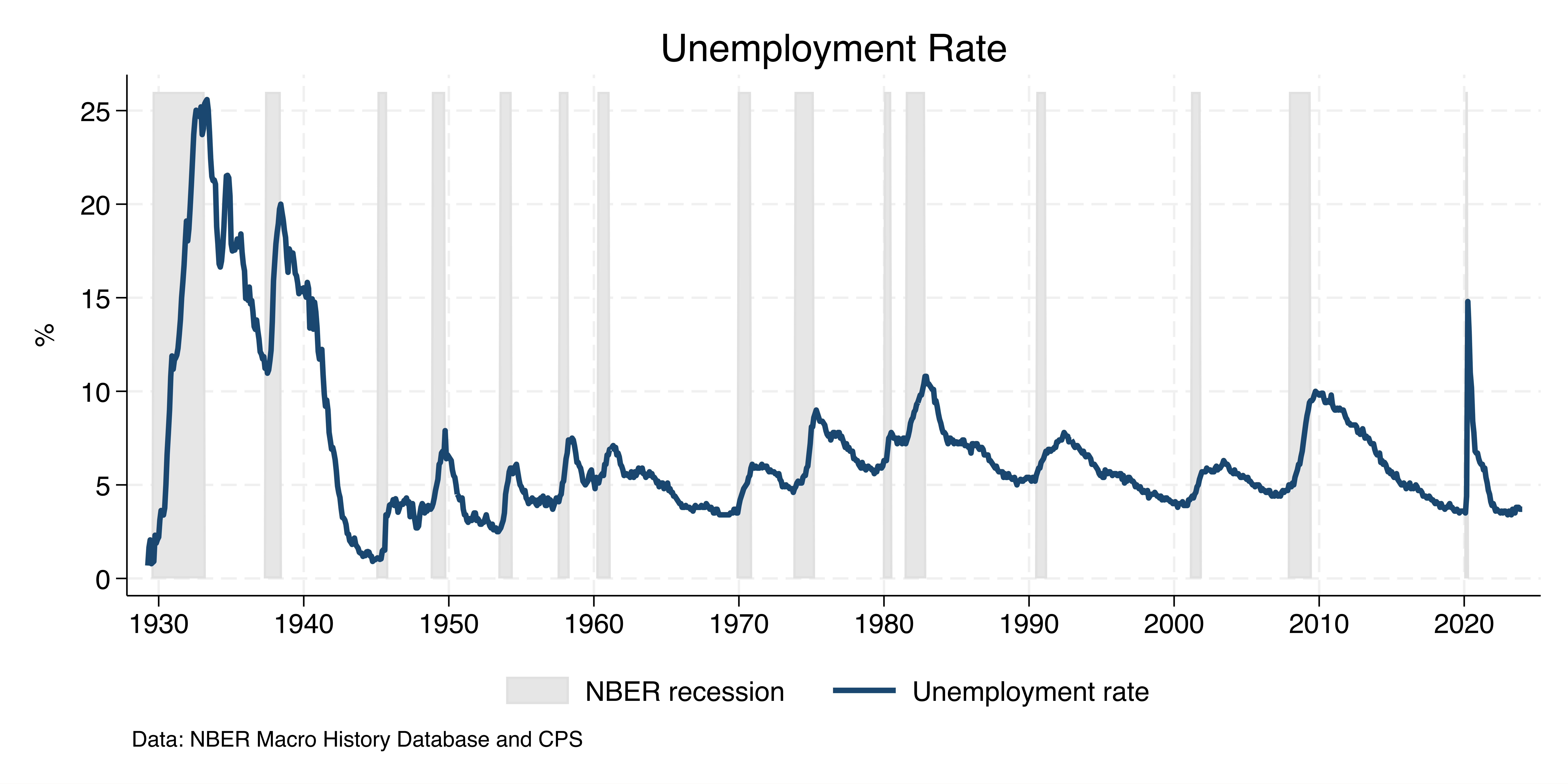


- Male: declining trend
  - aging
  - longer education
  - wealth effect
  - leisure tech
- Female: rising trend
  - social norm
  - home production technology
  - service sector

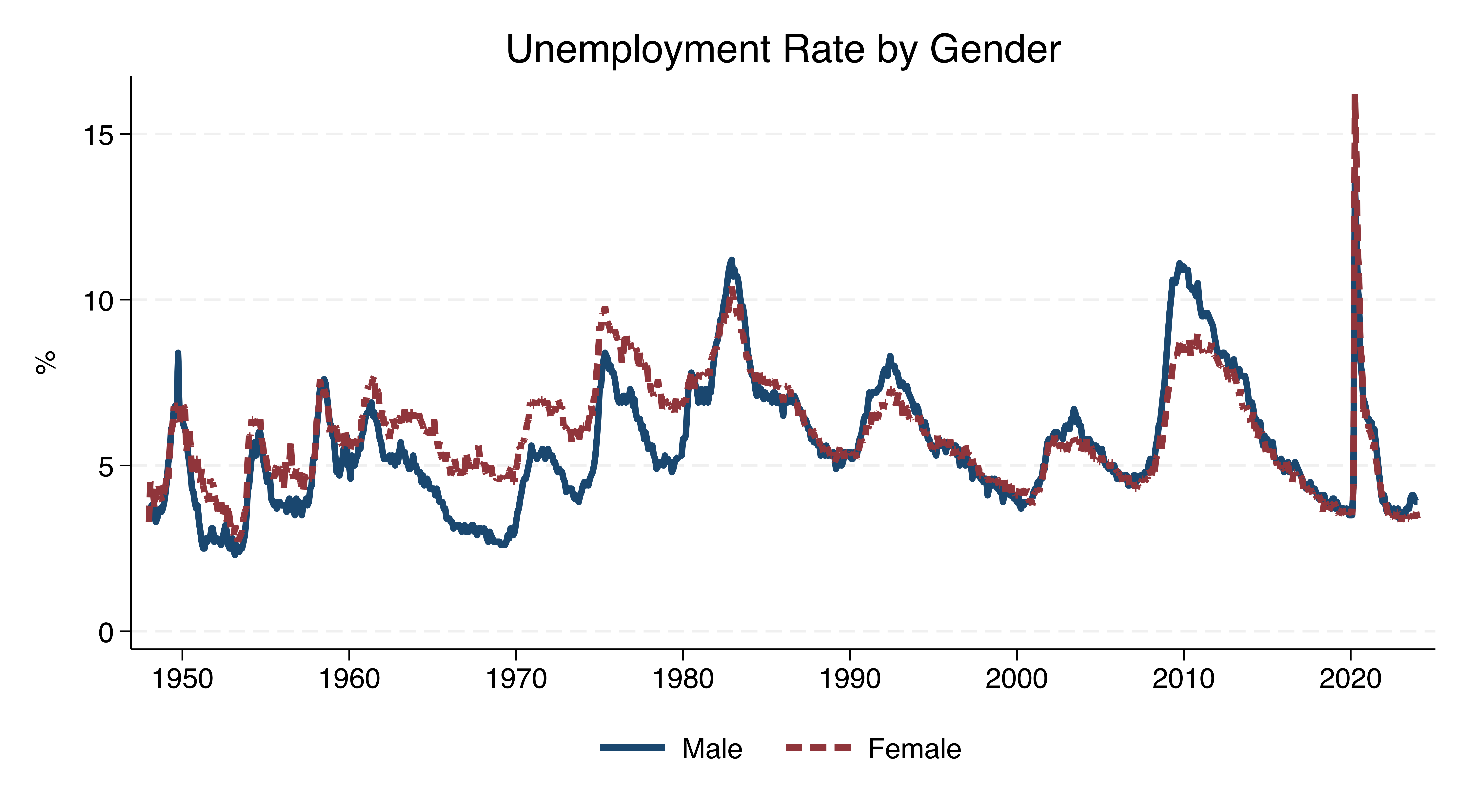
Prime Age Labor Force Participation Rate



Unemployment Rate



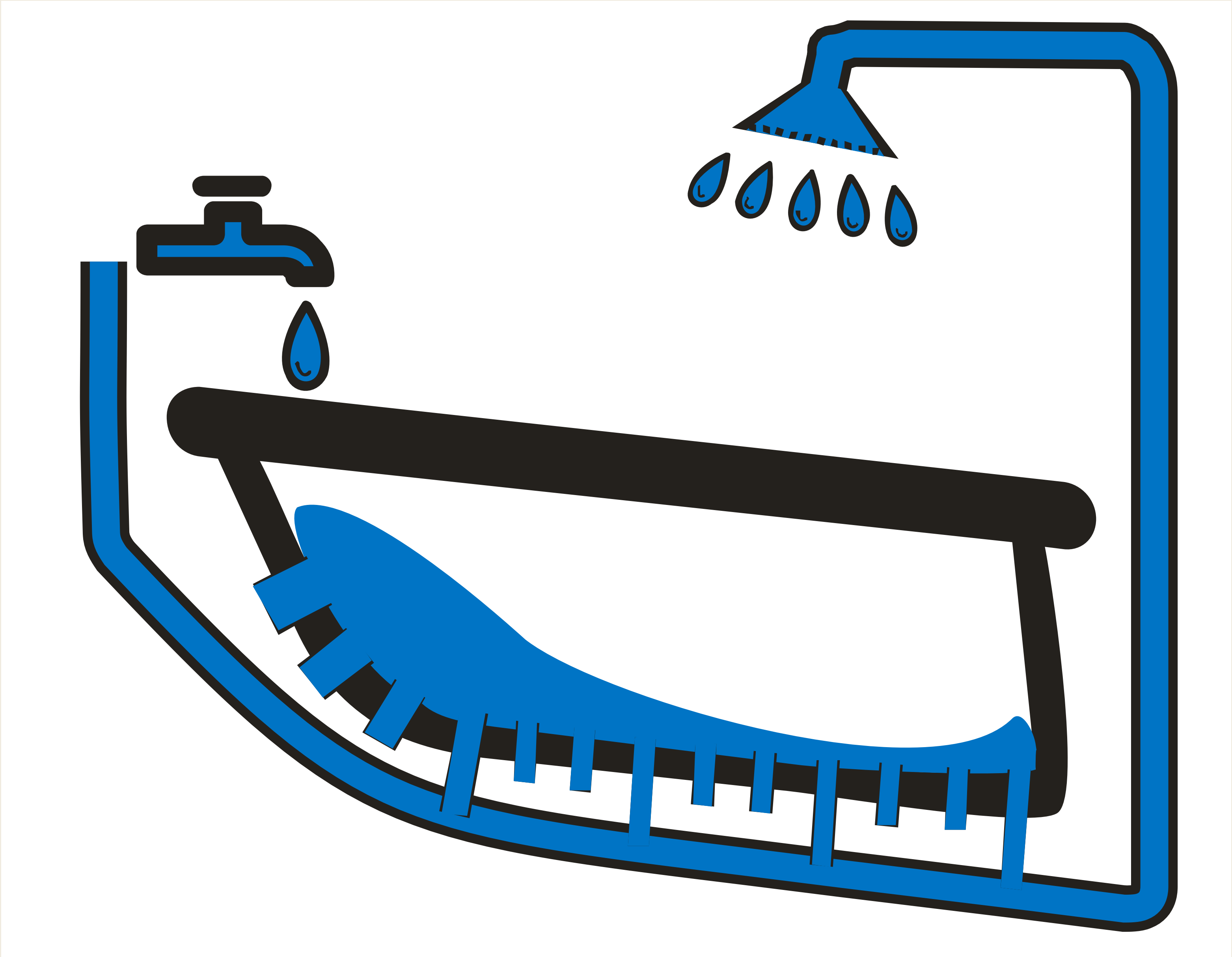
Unemployment Rate by Gender



- Female less cyclical before COVID

Flows Into and Out of Unemployment

Stock-Flow Accounting Model

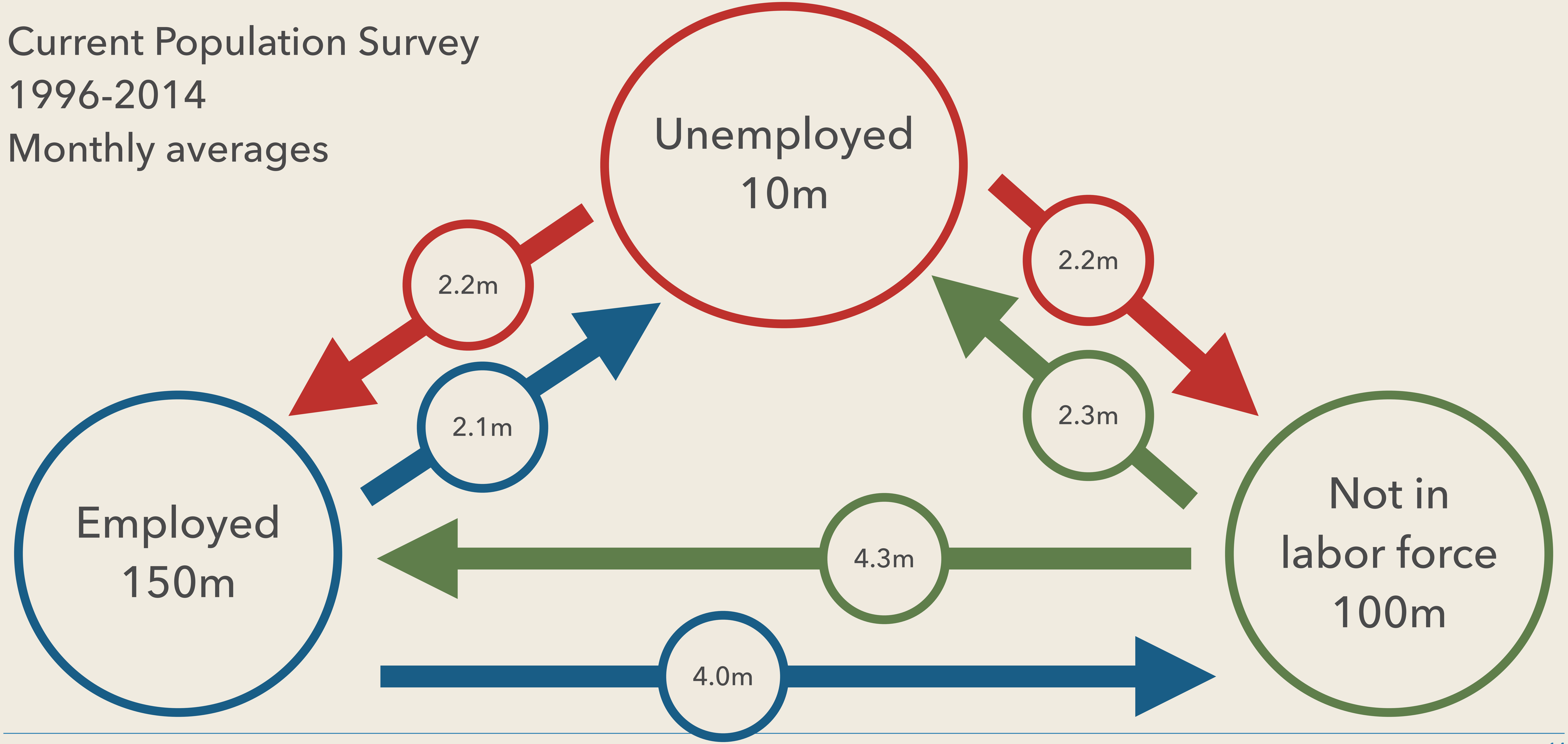


- Unemployment represents a stock of workers
  - Determined through a balance between inflows and outflows

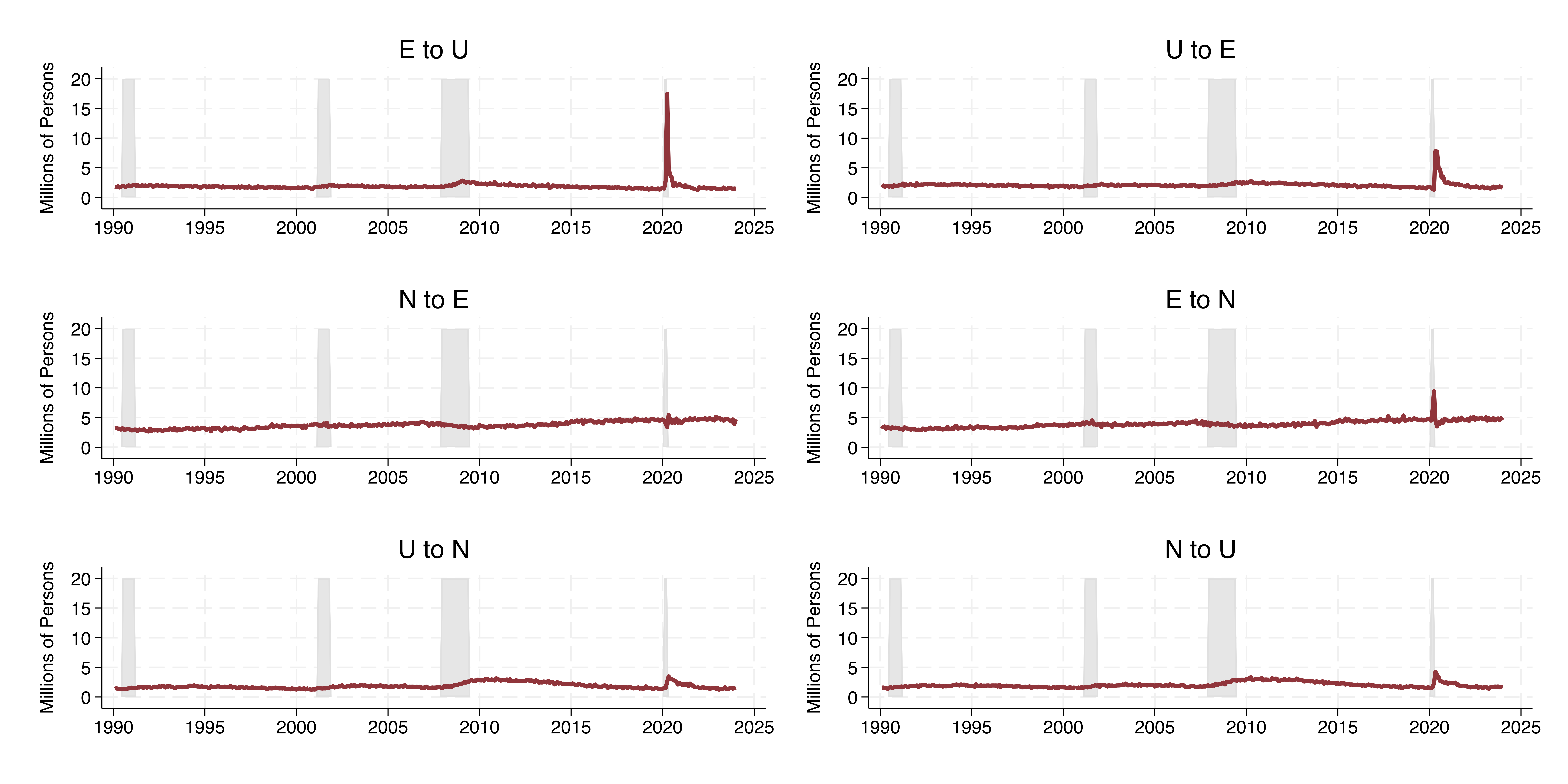
- Useful to break down the role of inflows vs. outflows
  - Disciplines the model we should be writing down

Flows are Large on Average

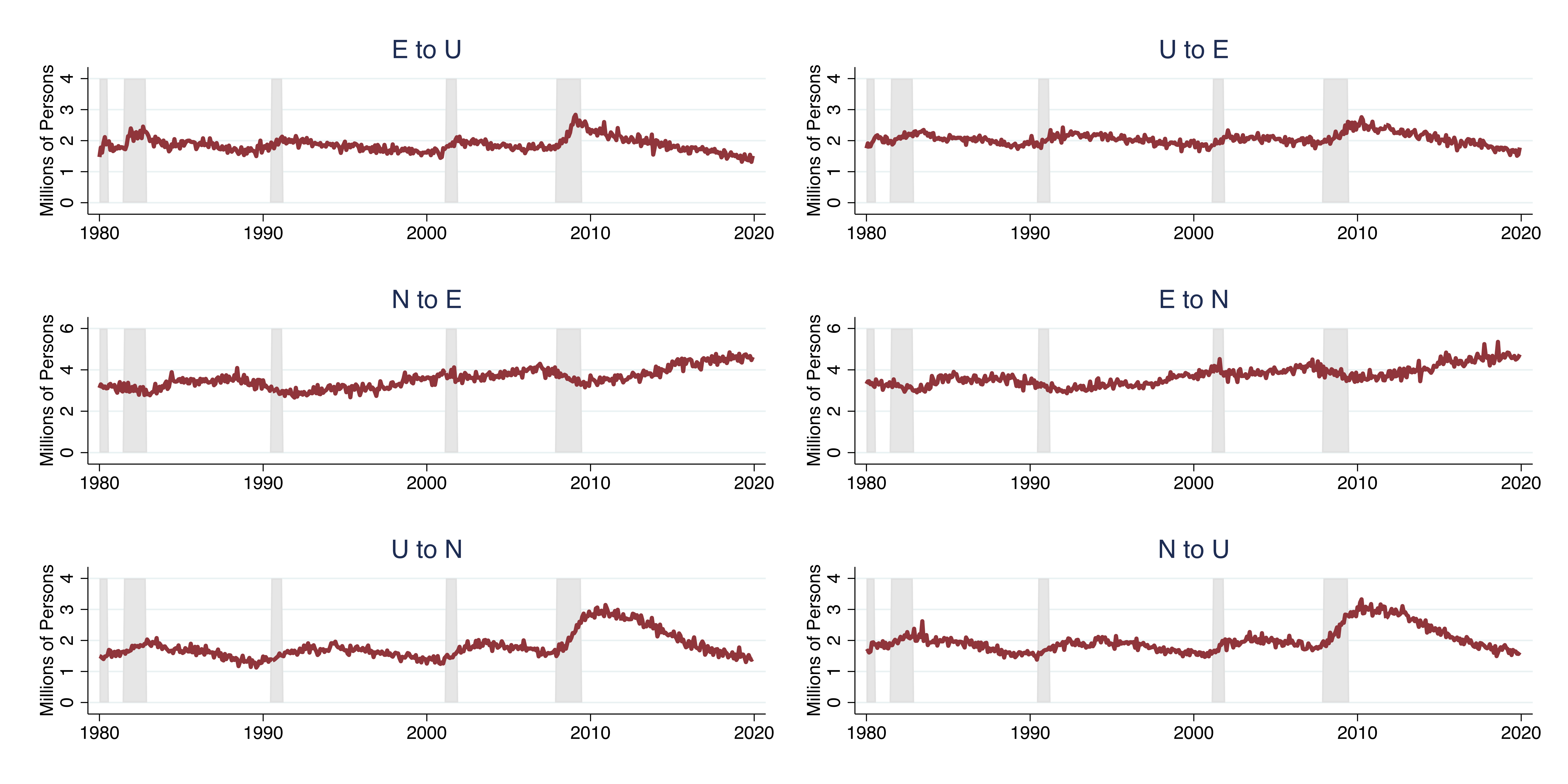
Current Population Survey
1996-2014
Monthly averages



Labor Market Flows over Time

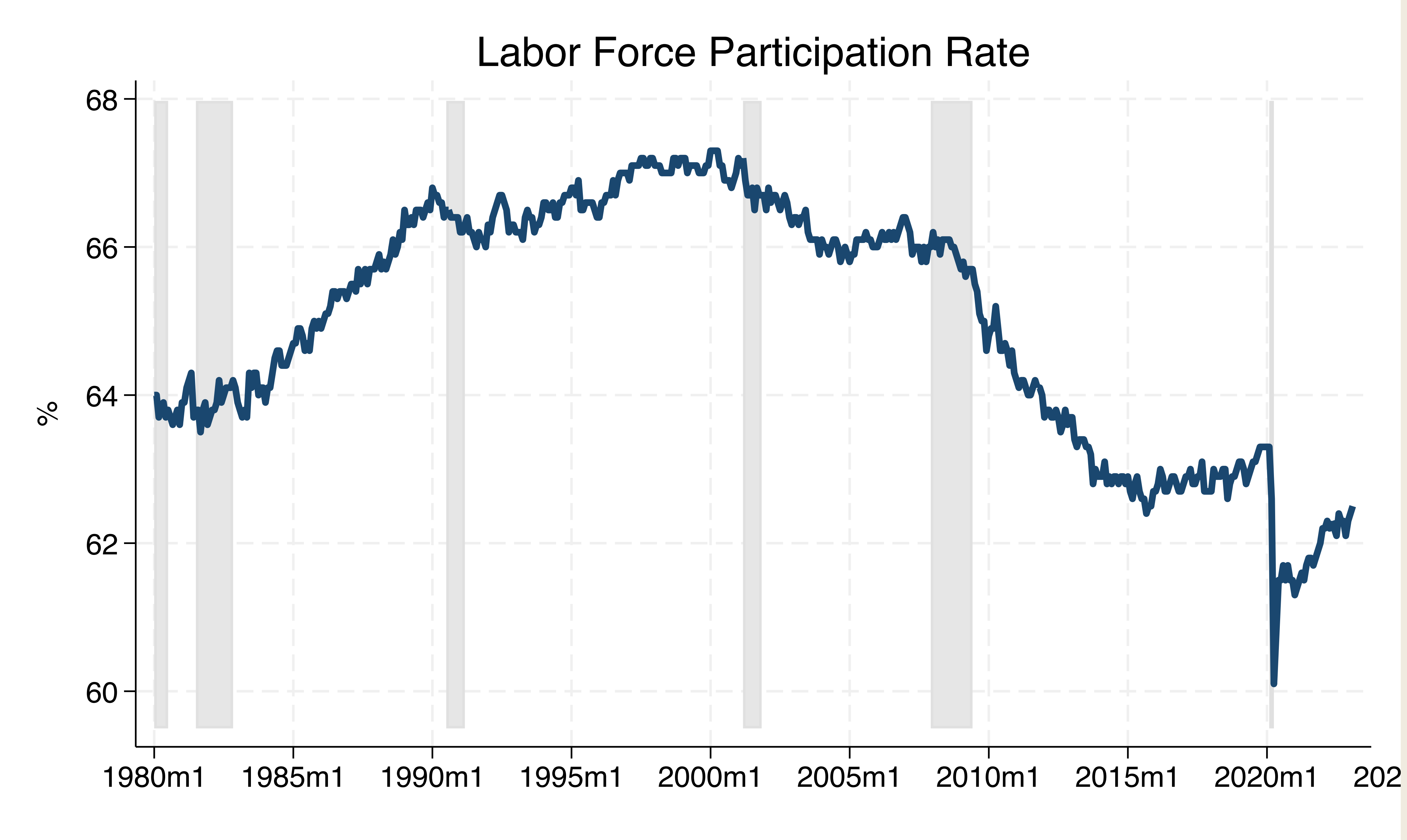


Labor Market Flows before COVID



Not in the Labor Force

- We will abstract from individuals not in the labor force
  - One justification is that the labor force participation is not very cyclical
  - Active research on how flows in to and out of N matters.

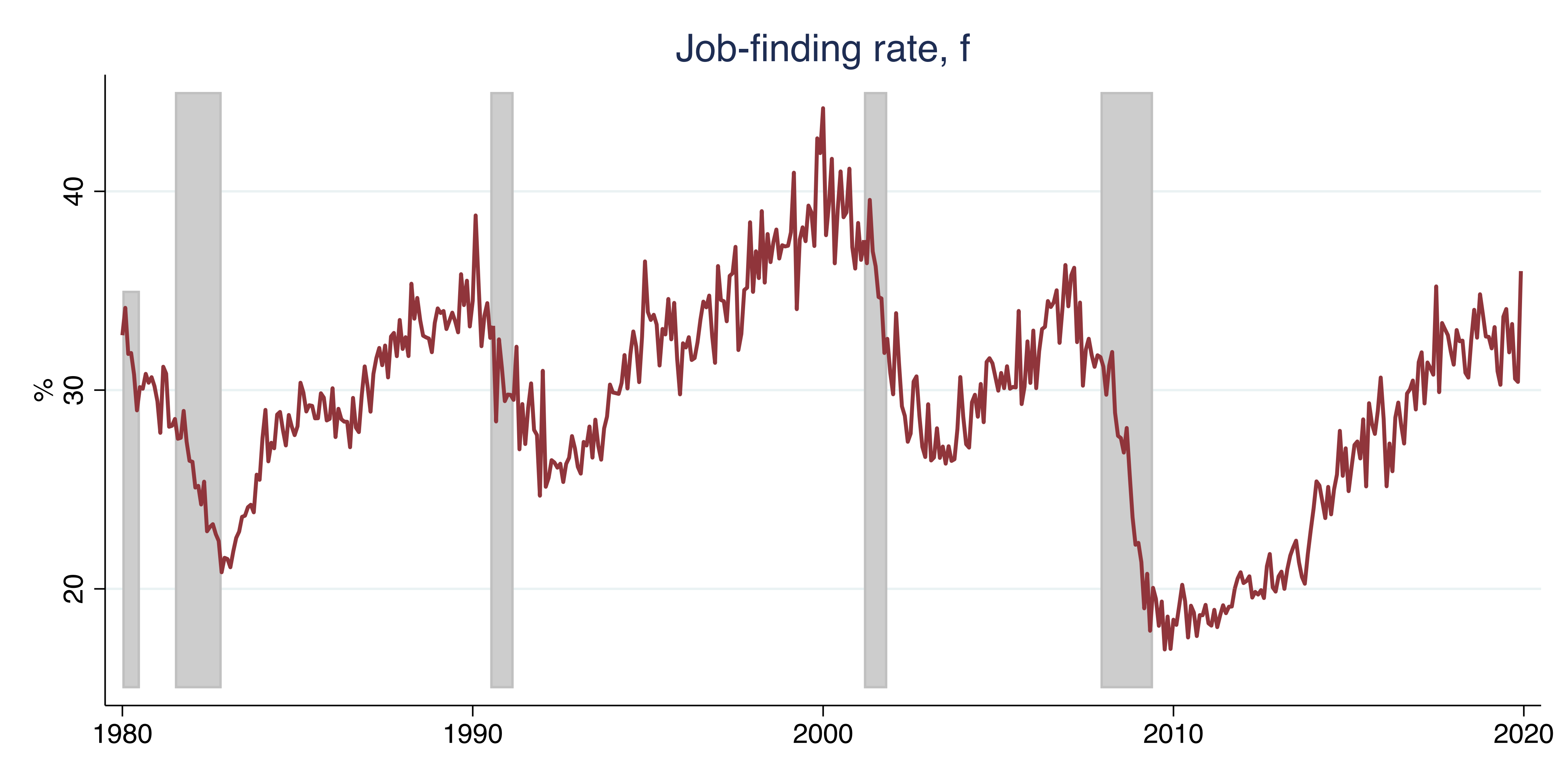


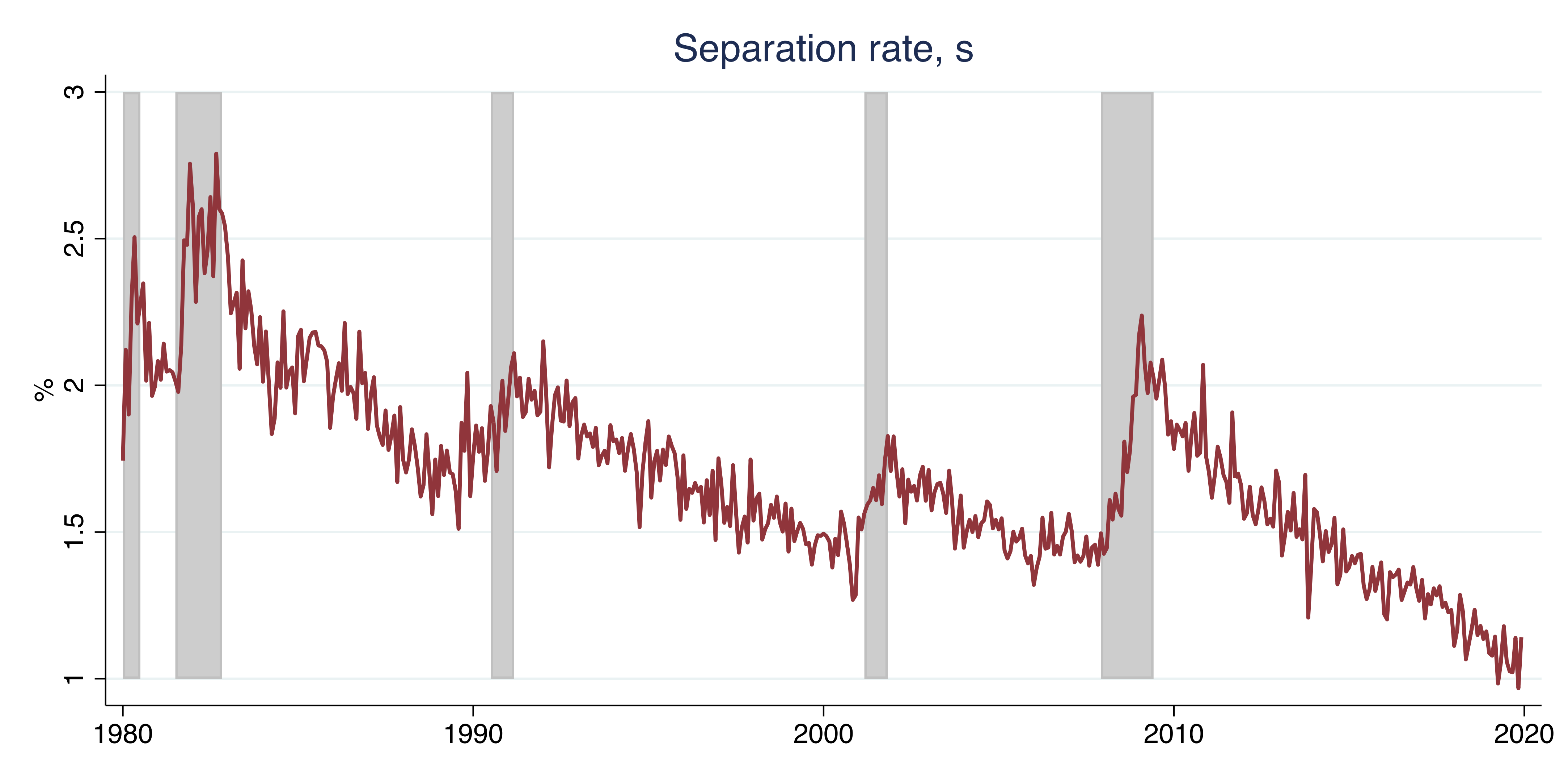
- Normalize: U + E = 1

Stock-Flow Model

- Basic stock-flow accounting equation:

$$\underbrace{u_{t+1} - u_t}_{\text{changes in unemployment}} = \underbrace{s_t(1 - u_t)}_{\text{separation (inflow into U)}} - \underbrace{f_t u_t}_{\text{job-finding (outflow from U)}}$$





- Is unemployment fluctuations due to fluctuations in f_t or s_t?

Approximate Unemployment Rate

- In the steady state,

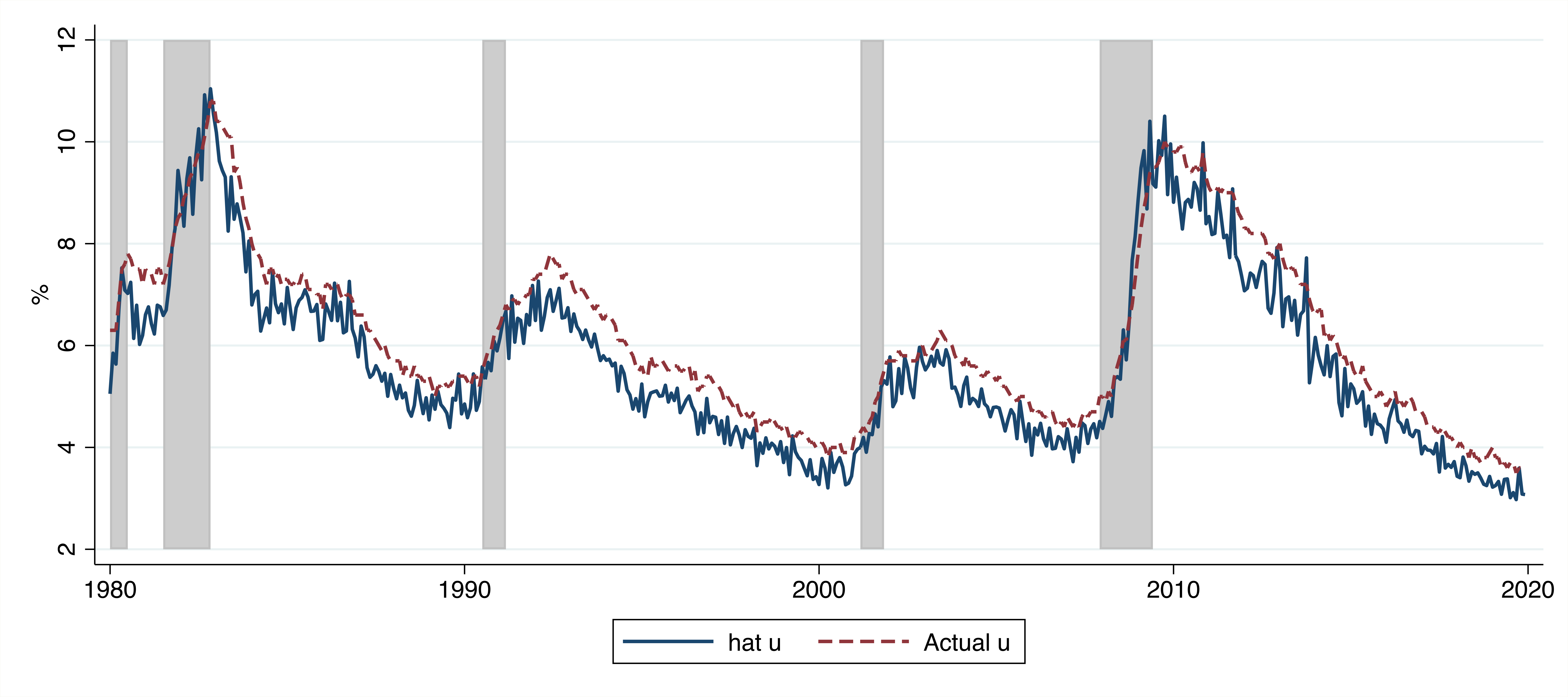
$$\bar{u} = \frac{\bar{s}}{\bar{s} + \bar{f}}$$

- Out of steady state, no such simple formula
- But if transitions are "fast enough", we can approximate

$$u_t \approx \frac{s_t}{s_t + f_t} \equiv \hat{u}_t$$

  - Unemployment is "as if" steady-state with contemporaneous flow
  - Can use this approximate formula to unpack the role of inflows vs. outflows

Approximation is Excellent



How Much Fluctuations in u due to s or f?

- Rewrite $\hat{u}_t = s_t/(s_t + f_t)$ as

$$\frac{\hat{u}_t}{1-\hat{u}_t} = \frac{s_t}{f_t}$$

- Taking log of both sides, the variance of $\log(\hat{u}_t/(1-\hat{u}_t))$ can be decomposed into

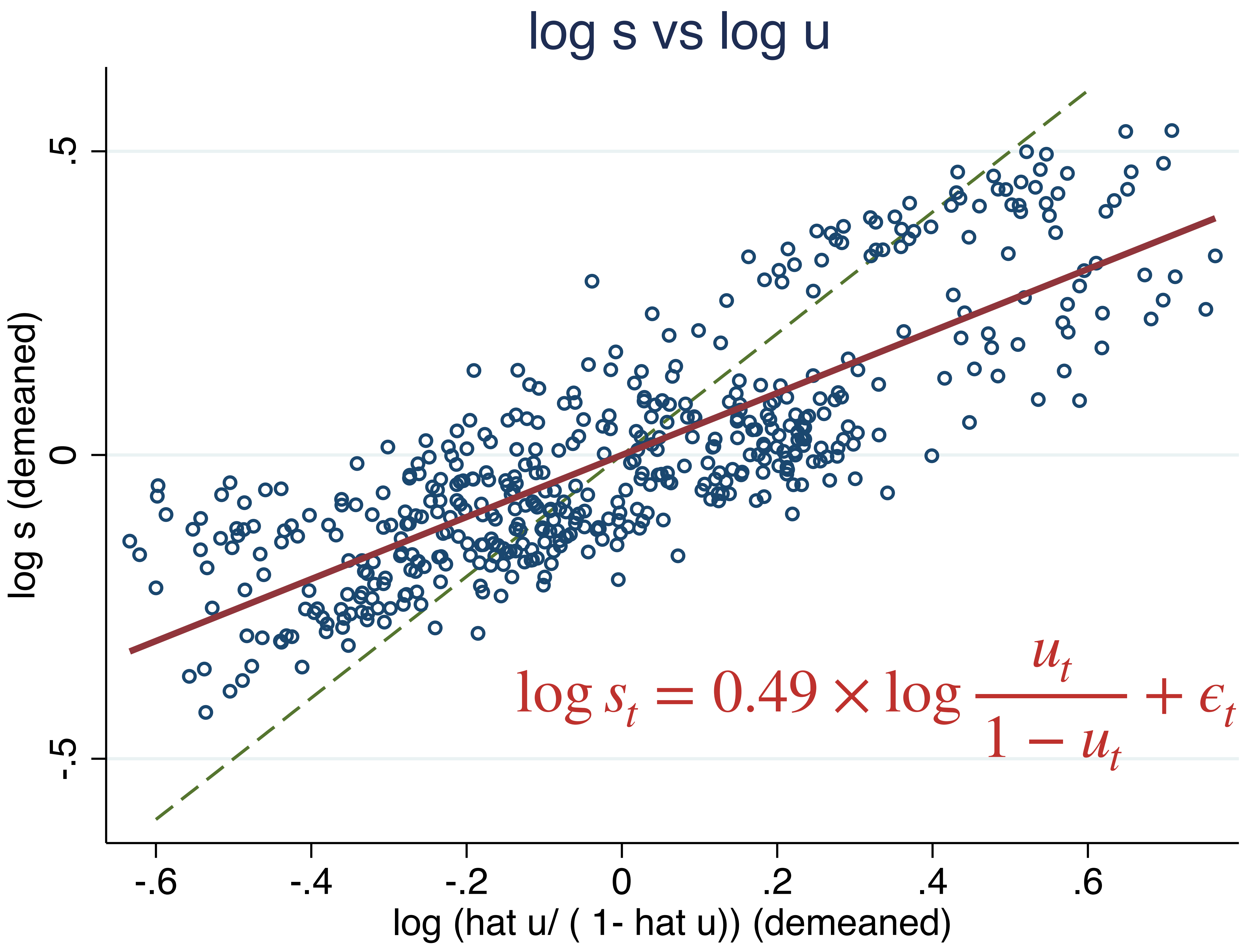
$$\text{Var}\left[\log\frac{\hat{u}_t}{1-\hat{u}_t}\right] = \underbrace{\text{Cov}\left[\log\frac{\hat{u}_t}{1-\hat{u}_t}, \log s_t\right]}_{\text{flutuations due to s}} + \underbrace{\text{Cov}\left[\log\frac{\hat{u}_t}{1-\hat{u}_t}, -\log f_t\right]}_{\text{flutuations due to f}}$$

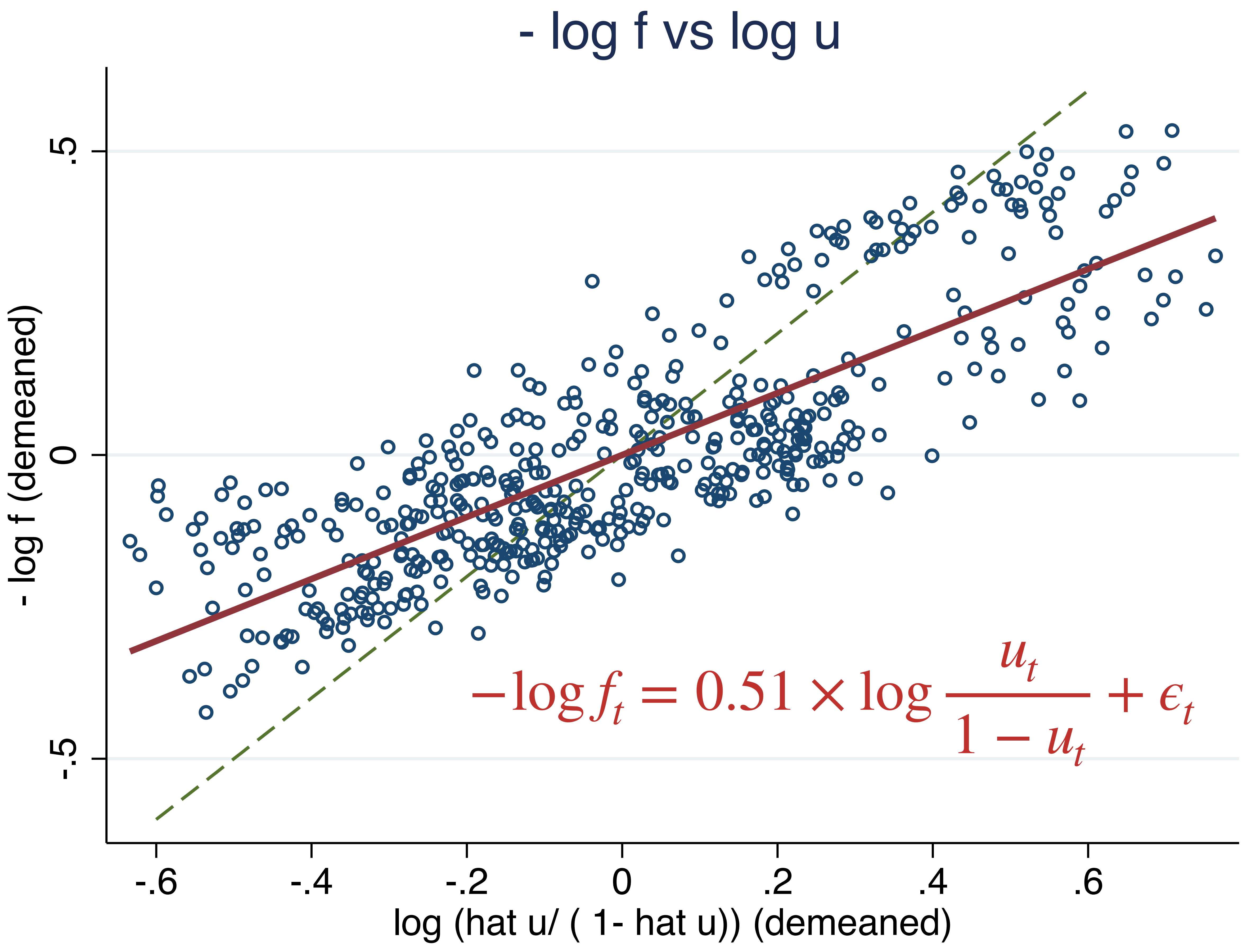
- Consider the following OLS regression

$$\log s_t = \alpha + \beta \log(\hat{u}_t/(1-\hat{u}_t)) + \epsilon_t$$

Then $\beta = \dfrac{\text{Cov}(\log s_t, \log \hat{u}_t/(1-\hat{u}_t))}{\text{Var}(\log \hat{u}_t/(1-\hat{u}_t))} \Rightarrow$ Variance share!

Variance Decomposition through Regression





Variance Decomposition

- Decomposition:
  - Job-finding: 51%
  - Job-separation: 49%
- This is in line with Fujita-Ramey (2009)
- In contrast, using different data/methodology, Shimer (2012) argued
  - Job-finding: 90%
  - Job-separation: 10%
- Consensus nowadays is 50:50
  - Literature has been mostly focusing on job-finding due to hysterisis from Shimer

Unpacking Job-finding Rate

Matching Friction

- Why can't workers find a job immediately? Why does job-finding rate fluctuate?
- Dominant views until 1970s:
  - wage rigidity $\Rightarrow$ labor supply > labor demand
- Diamond-Mortensen-Pissarides (DMP) paradigm:
  - Workers look for a job. Firms look for workers.
  - But it takes time to find a match
- Assume that the number of matches in each period is given by

$$m_t = M(u_t, v_t)$$

  - M: matching function, u_t: unemployment, v_t: vacancies
  - M is nonnegative, increasing, and concave in both arguments
  - Reduced form way to capture various frictions (e.g., physical and informational)

Deriving Beveridge Curve

- It is convinient to assume M is constant returns to scale (e.g., $M(u, v) = \bar{m}u^{1-\alpha}v^{\alpha}$)
  - Not empirically settled. Interesting area to explore.
- The job-finding probability can be written as

$$f_t = \frac{M(u_t, v_t)}{u_t} = M(1, v_t/u_t) \equiv \hat{f}(\theta_t)$$

  - $\theta_t \equiv v_t/u_t$ is labor market tightness
- Plug the above expression into the approx. unemp. rate formula ($s_t = f_t u_t/(1-u_t)$):

$$s_t = M\left(\frac{v_t}{n_t}, \frac{u_t}{1-u_t}\right), \quad n_t \equiv 1 - u_t$$

  - A relationship between vacancy rate, v_t/n_t, and unemp. rate, u_t (for given s_t)
  - Popularly referred to as "**Beveridge curve**"

Beveridge Curve

- Assuming s is a constant

$$s = M\left(\frac{v_t}{n_t}, \frac{u_t}{1-u_t}\right)$$

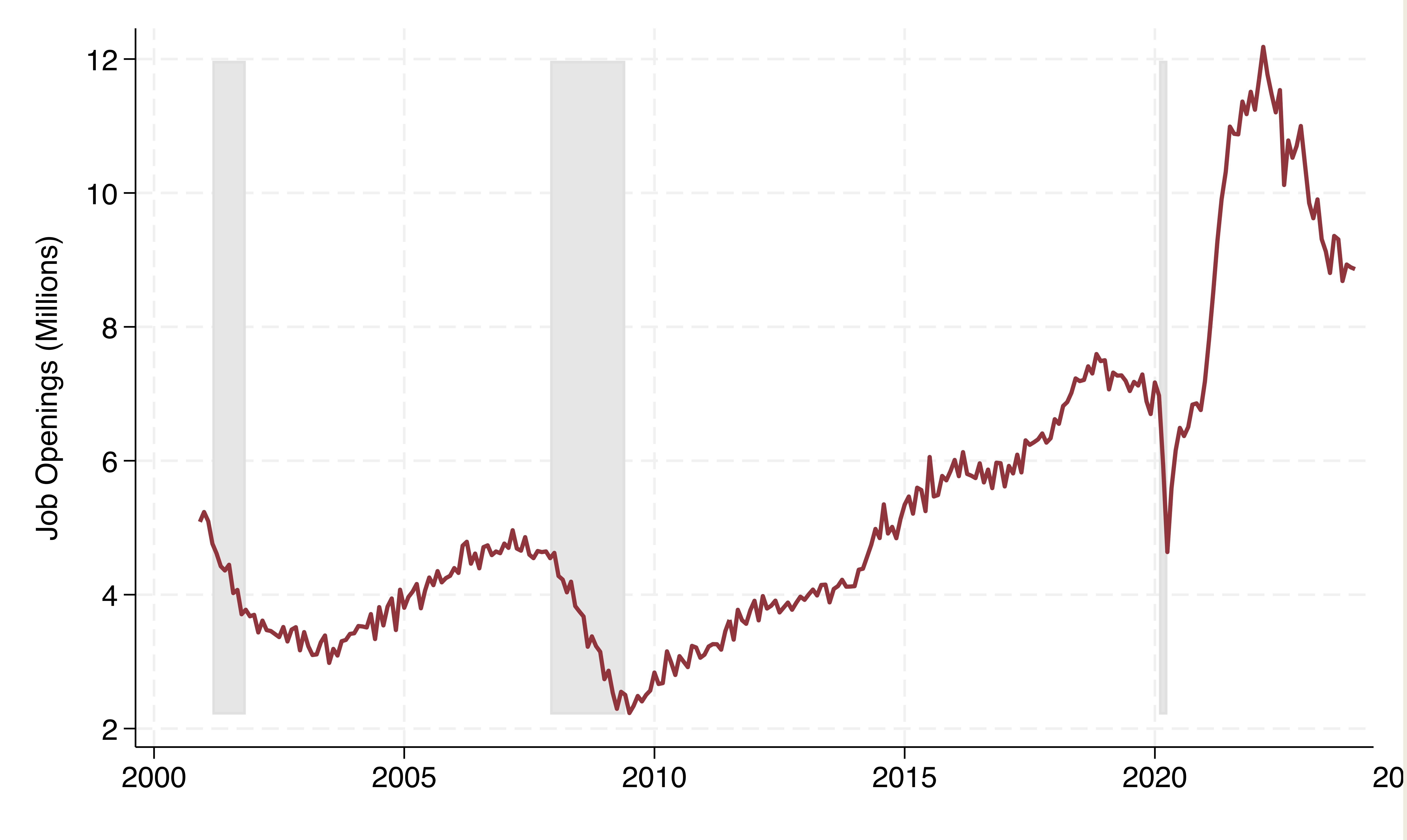
What is Vacancy?

- How does Beveridge curve look in the data?
  - Before that, what is “vacancy” in the data?

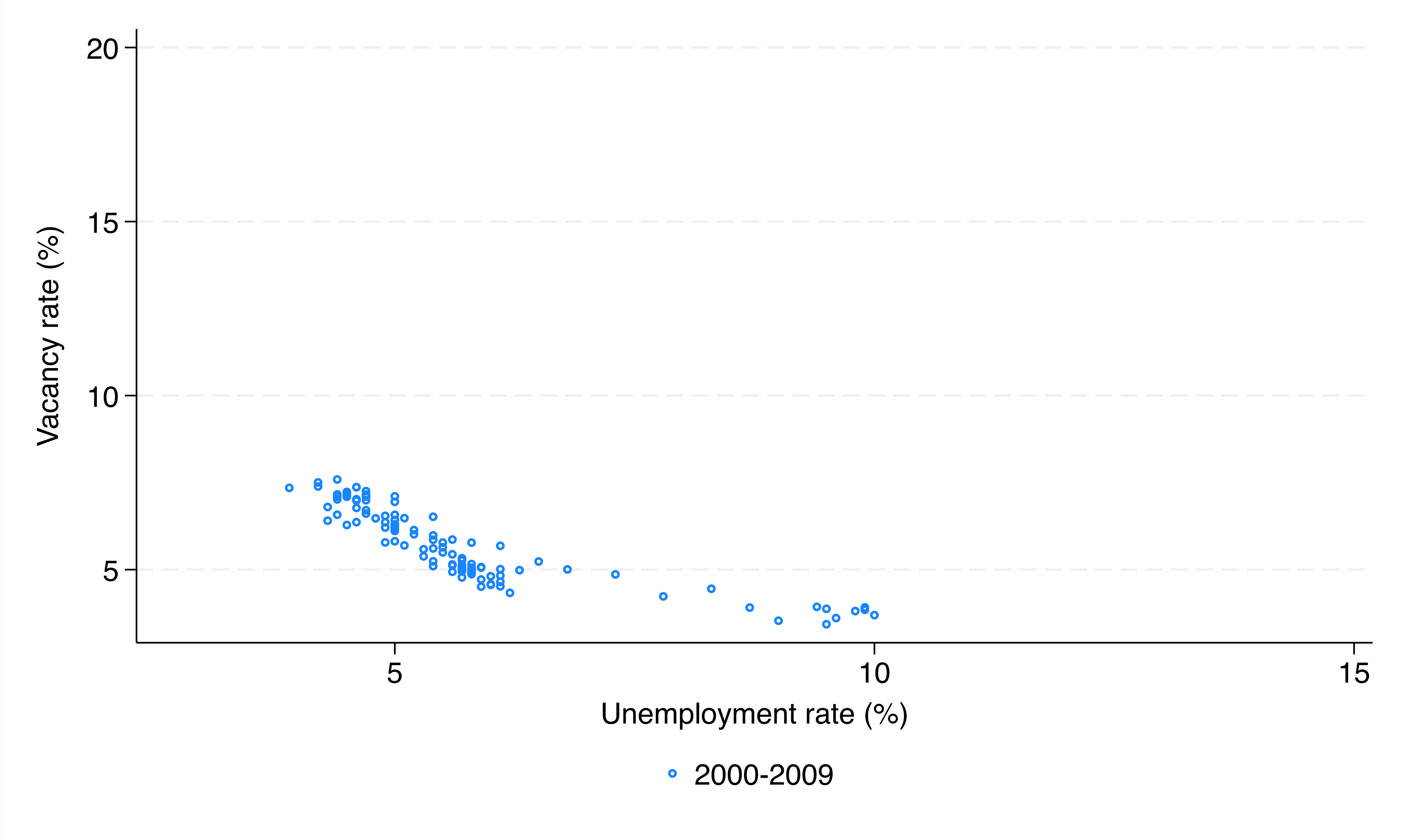
- BLS Job Openings and Labor Turnover Survey (JOLTS) definition:

1. A specific position exists and there is work available for that position
2. The job could start within 30 days
3. There is **active recruiting** for workers from outside the establishment location

Vacancy in the Data



Empirical Beveridge Curve



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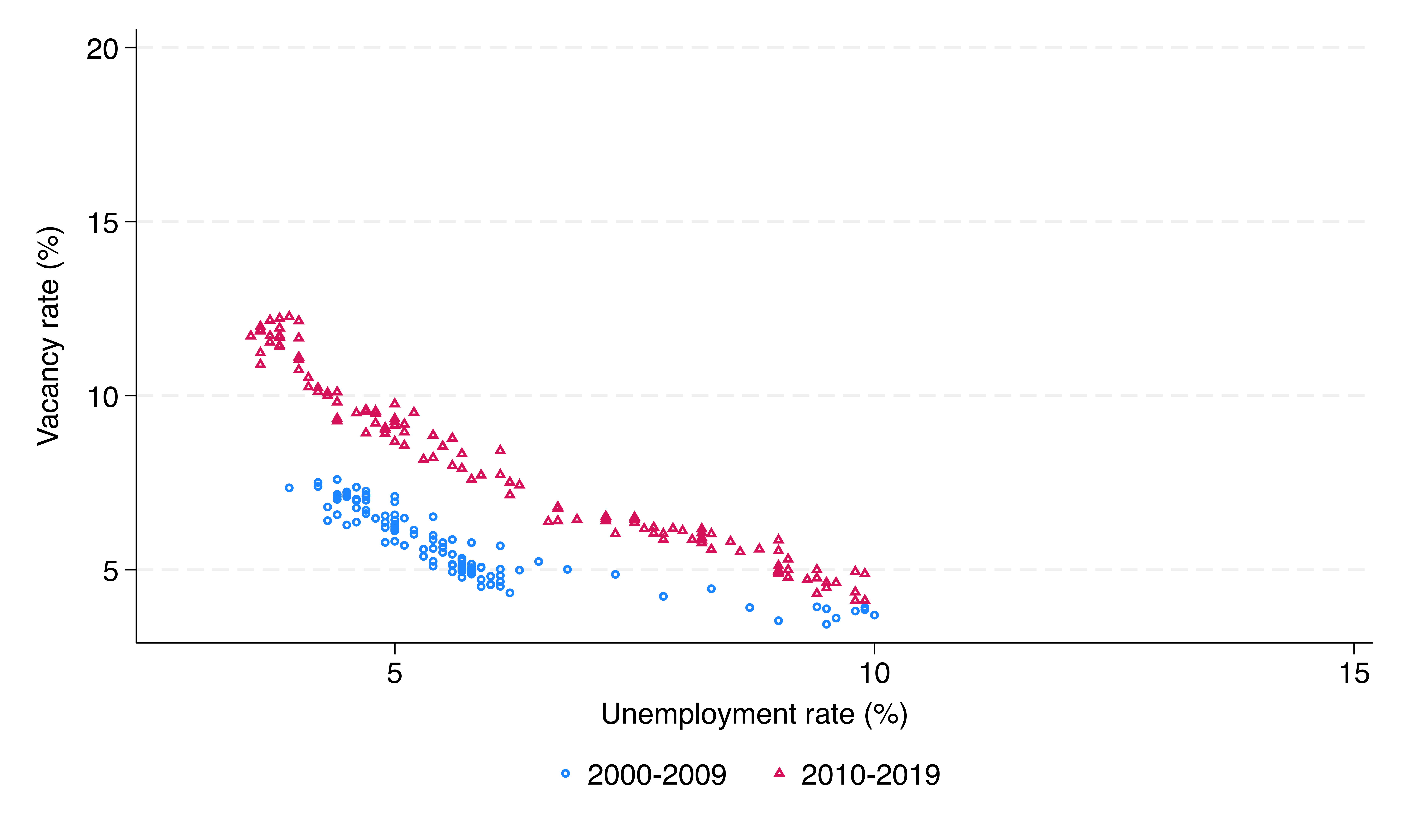
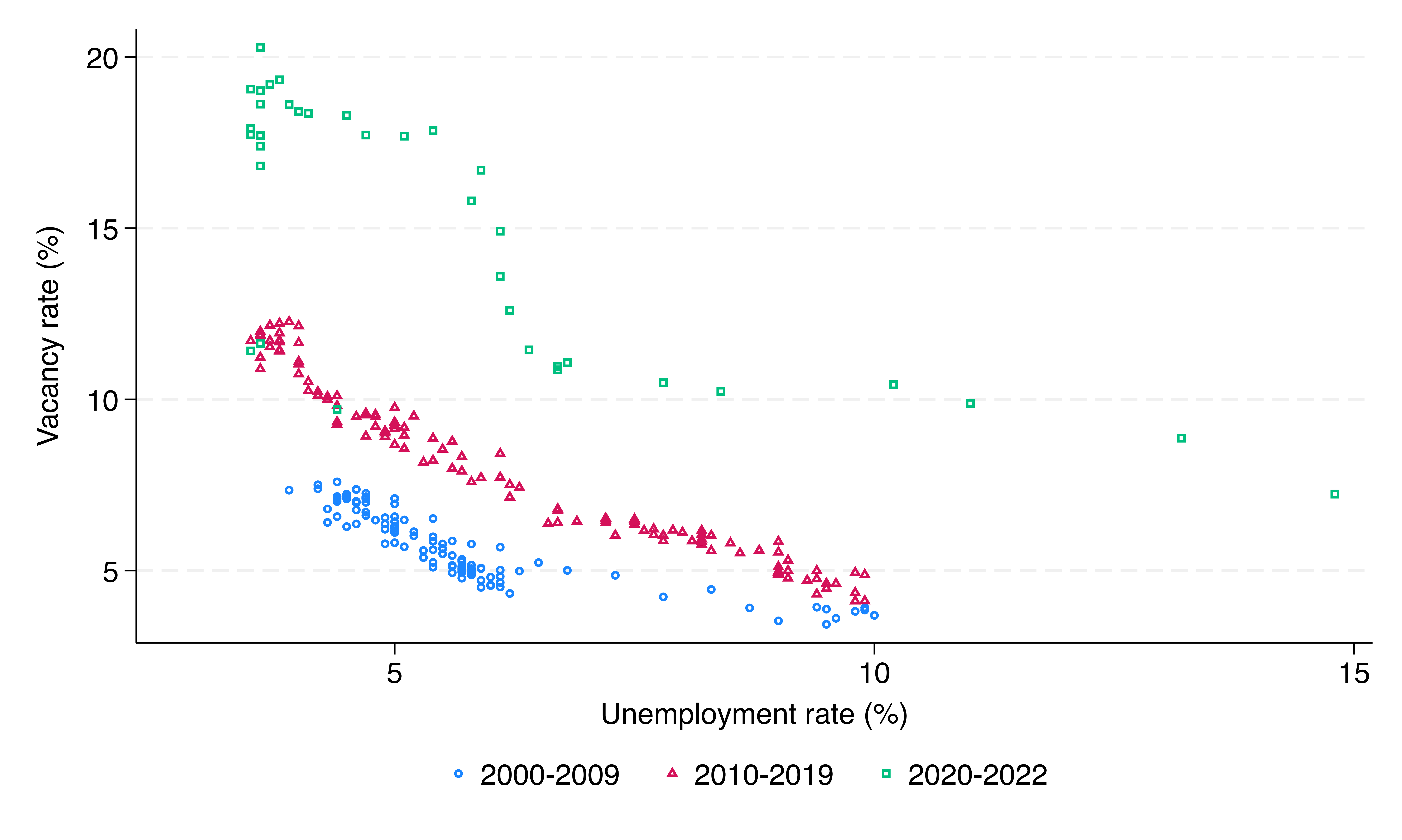
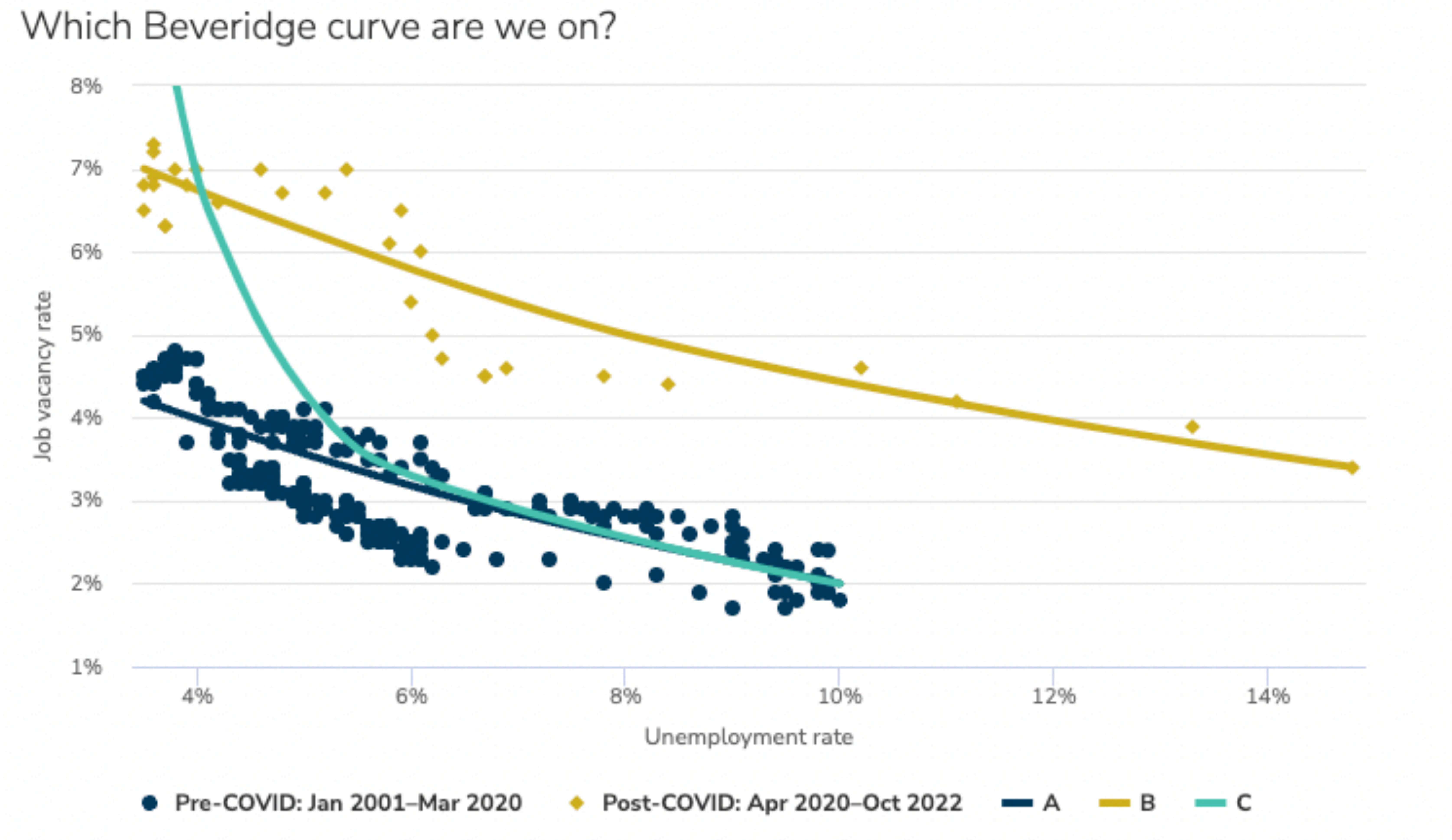


Empirical Beveridge Curve



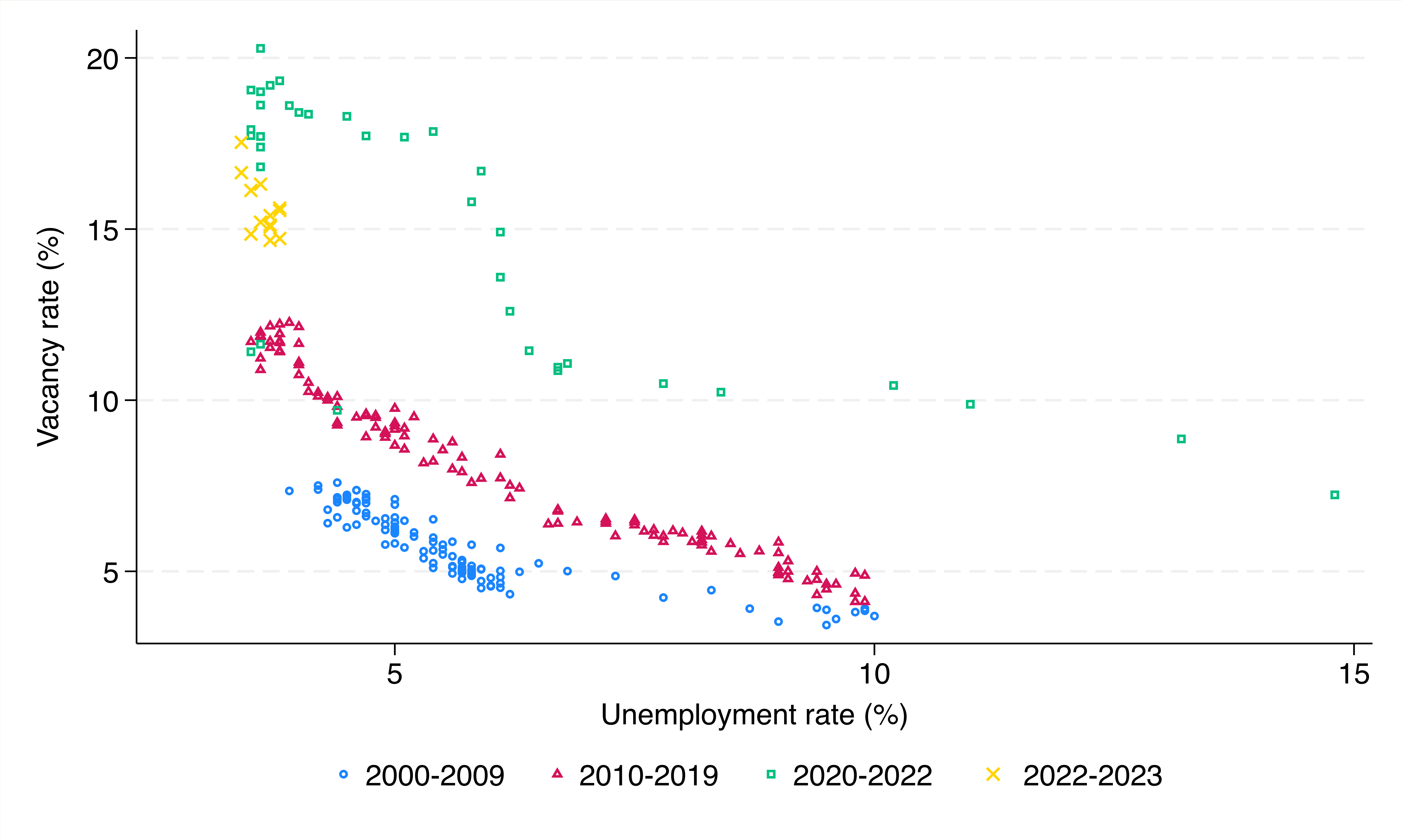
Soft-Landing or Hard-Landing?



- **Blanchard & Summers**: We are on B. If the Fed brings down v to pre-COVID level, we will see a massive increase in u.
  $\Rightarrow$ hard-landing
- **Mongey:** We are on C. Reducing v doesn't increase u much.
  $\Rightarrow$ soft-landing

https://www.minneapolisfed.org/article/2022/us-job-matching-holds-up-keeping-a-soft-landing-in-sight

Who was Right?



What Can Beveridge Curve Tell?

- As predicted by DMP paradigm, there appears to be a negative correltaion … with ongoing outward shifts in the relationship
  - For any given u_t, we have more vacancies now than before
- Suppose the matching function is time-varying and now given by

$$M_t(v_t, u_t) = \bar{m}_t(v_t)^{\alpha}(u_t)^{1-\alpha}$$

$\bar{m}_t$: match efficiency shock

Beveridge Curve

- Taking log, the Beverage curve (expressed in logs) is now

$$\log(v_t/n_t) = \tilde{m}_t - \frac{1-\alpha}{\alpha}\log\frac{u_t}{1-u_t}$$

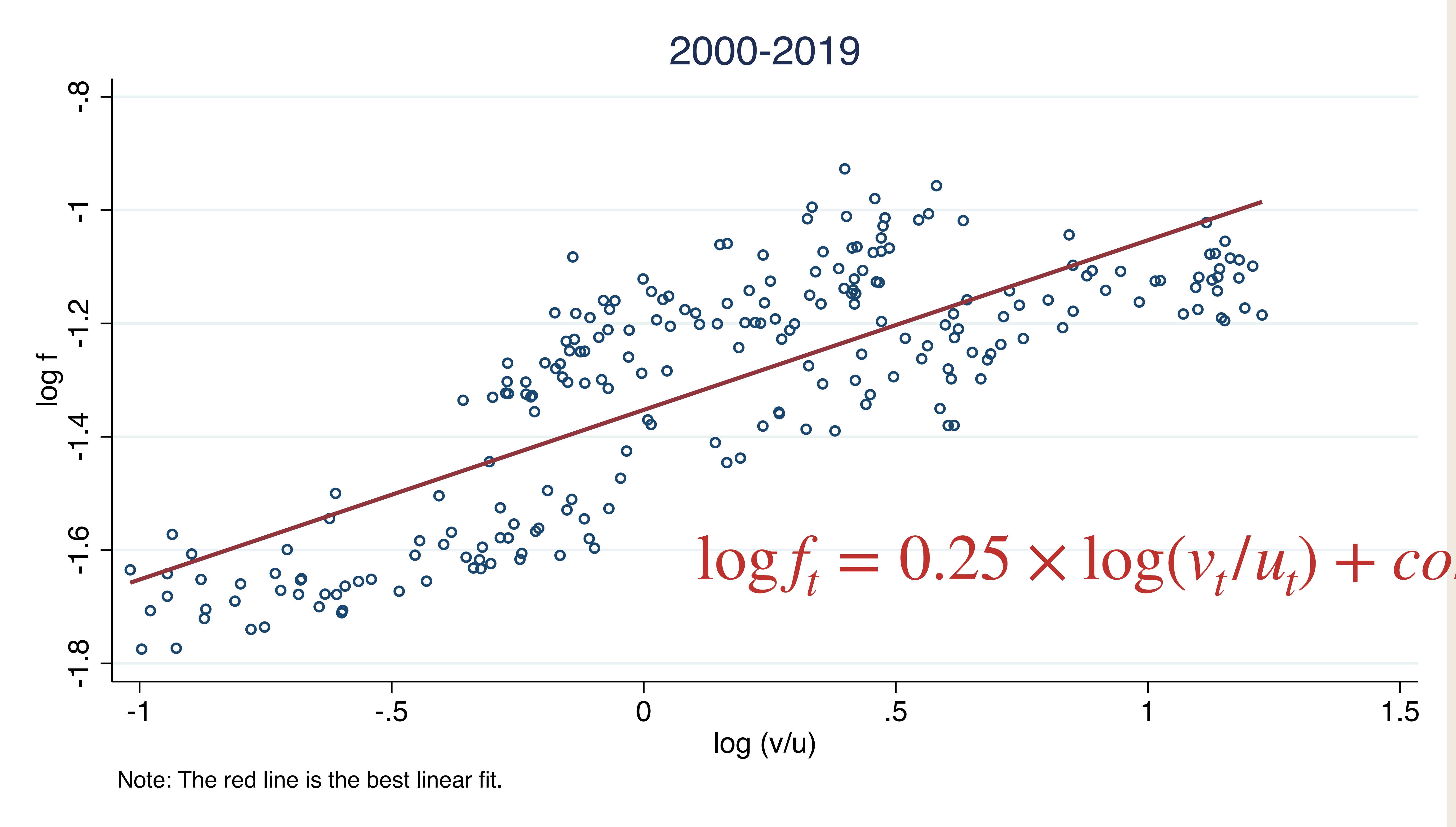
where $\tilde{m}_t \equiv (1/\alpha)\left[\log s_t - \log \bar{m}_t\right]$

- Any shock to s_t or $\bar{m}_t$ will show up as the shifts in the empirical Beveridge curve
- If $\tilde{m}_t$ is correlated with u_t, the empirical Beveridge curve lacks structural interpretation
  - Just as in corr(q, p) tells us neither supply nor demand curve
  - In my view, this is an important open question
- Still, corr(v, u)<0 is suggestive that v is an important determinant of u

Job-Finding and Market Tightness

- Another way to see the prediction of DMP paradigm is (under Cobb-Douglas)

$$\log f_t = \log \hat{f}(\theta_t) = \log \bar{m} + (1-\alpha)\log(v_t/u_t)$$



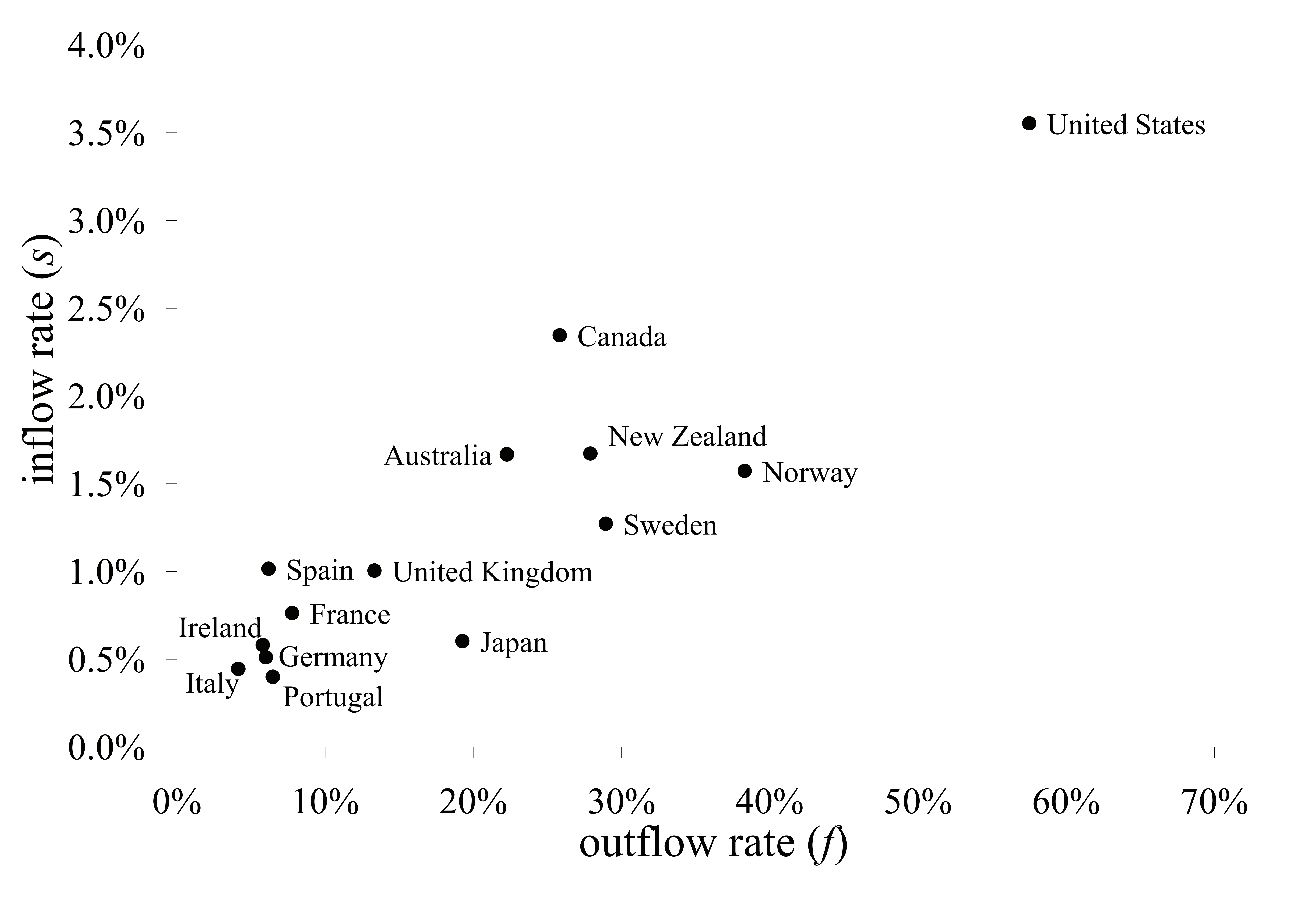
$$\log f_t = 0.25 \times \log(v_t/u_t) + const + \epsilon_t$$

Taking Stock

Taking Stock

- Unemployment rate fluctuates between 5-10p.p.
- On average, 30% of workers find a job every month; 2% of workers loose their job
- Job-finding and separation play roughly equally important role in fluctuations in u
- DMP paradigm views unemployment as the outcome of matching frictions
- Next lecture: understand the determinants of v_t

Appendix: Cross-Country Perspective



Source: Barnichon and Garda (2016)