

$$u^* = \sqrt{uv}$$

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# US GOVERNMENT'S FULL-EMPLOYMENT MANDATE

- Employment Act of 1946
  - “policy and responsibility of the federal government...to promote **maximum employment**”
- Federal Reserve Reform Act of 1977
  - responsibility of the Federal Reserve “to promote effectively the goals of **maximum employment**, stable prices”
- Full Employment and Balanced Growth Act of 1978
  - “responsibility of the federal government...to foster and promote...**full employment**”
- goal: compute the full-employment rate of unemployment (FERU)

# HOW TO INTERPRET LEGAL CONCEPT OF FULL EMPLOYMENT?

- Employment Act of 1946:
  - full employment allows “to foster ...the **general welfare**”
- Full Employment and Balanced Growth Act of 1978:
  - away from full employment, the economy “is deprived of the full supply of goods and services, the full utilization of labor ...and the related increases in **economic well-being** that would occur under conditions of genuine full employment”
- ⇒ full employment = **social efficiency** = **maximum social output**
  - same efficiency concept as in Hosios (1990), Pissarides (2000)

## NAIRU $\neq$ FERU

- Joint Economic Committee (2019):
  - “Today, **full employment** is considered by many to be synonymous with the non-accelerating inflationary rate of unemployment (**NAIRU**)—the rate of unemployment that neither stokes nor slows inflation.”
- Council of Economic Advisors (2024):
  - “Modern economics has generally defined **full employment** by citing the theoretical concept of the lowest unemployment rate consistent with stable inflation, which is referred to as  $u^*$ , ... the non-accelerating inflationary rate of unemployment (**NAIRU**).”
- but the NAIRU does not mark labor-market efficiency (Rogerson 1997)

## NRU $\neq$ FERU

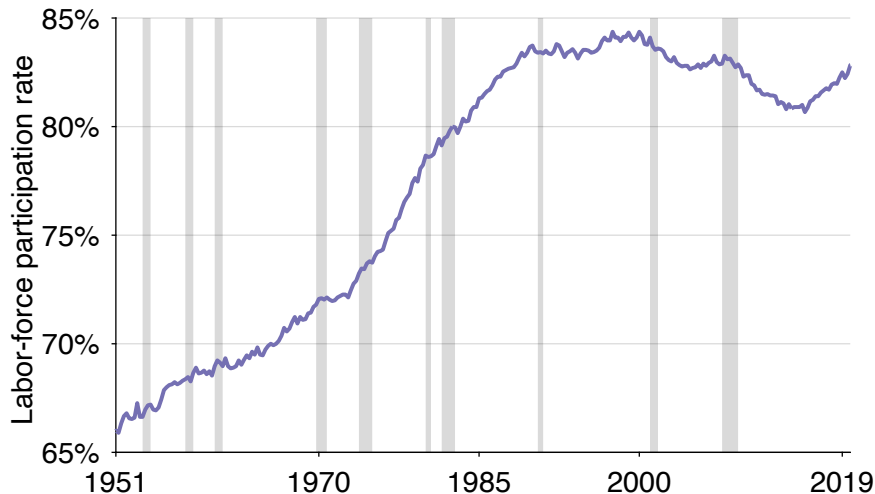
- Boston Fed President Rosengren (2014):
  - measures the departure of the Fed from its **full-employment mandate** by “the squared deviations of unemployment from an estimate of full employment utilizing the **Congressional Budget Office assessment of the natural rate** for each year.”
- but the CBO’s natural/noncyclical rate of unemployment (NRU) is a slow-moving average of unemployment  $\leadsto$  not socially efficient (Pissarides 2000)

## THEORY OF FULL EMPLOYMENT

## LABOR AVAILABLE FOR MARKET PRODUCTION = LABOR FORCE

- Employment Act of 1946:
  - “promote employment opportunities for those able, willing, and seeking to work”
- labor force: pool of workers that can be tapped for market production
  - people out of the labor force: in school or training, retired, looking after their family
- labor-force size is taken as fixed
  - labor-force participation rate is acyclical (Rees 1957; Shimer 2009; Rogerson, Shimer 2011)
  - impulse response of labor-force participation rate to productivity shock is 0 for 2 years (Cairo, Fujita, Morales-Jimenez 2022)

## US LABOR-FORCE PARTICIPATION RATE $\approx$ ACYCLICAL





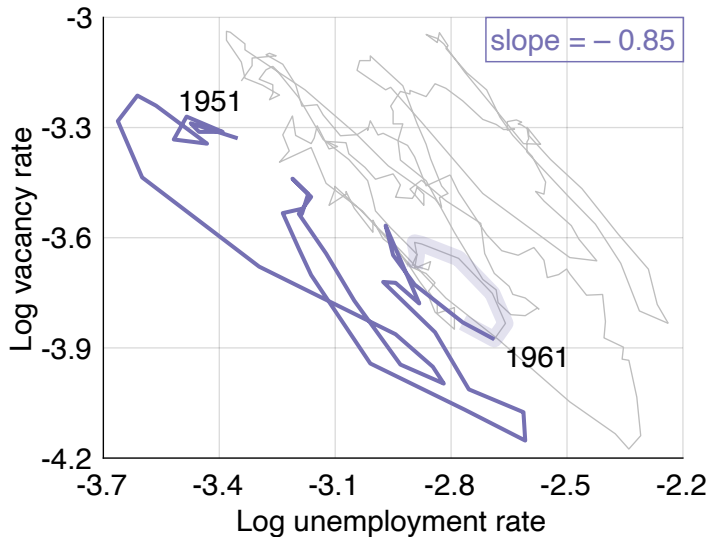
## SOCIAL PRODUCT OF UNEMPLOYED LABOR $\approx 0$

- share  $u$  of labor force is unemployed
- contributions to social output:
  - zero from jobseeking
  - positive from home production
  - negative from idleness: psychological cost from unemployment
- psychological cost offsets home production (Borgschulte, Martorell 2018)  $\leadsto$  social product of unemployed labor = 0
- mechanisms behind large psychological cost of unemployment:
  - Jahoda (1981): loss of daily routine, regular social interactions, pursuit of overarching goals, personal status & identity
  - Hussam et al (2022): work + cash preferred to cash alone

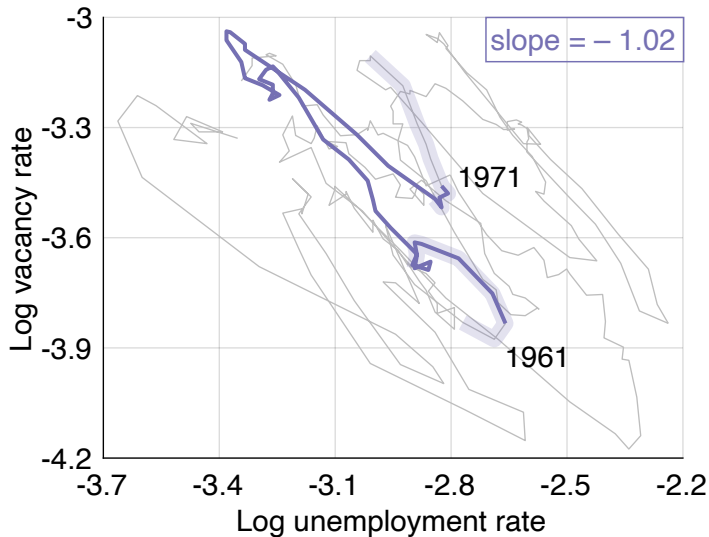
## SOCIAL PRODUCT OF EMPLOYED LABOR

- share  $v$  of labor force is employed and recruiting
  - ~> social product of recruiting = 0
- number of recruiters = number of vacancies
  - National Employer Survey (1997): large survey by Census Bureau
  - Gavazza, Mongey, Violante (2018): survey of 400 firms by Bergin & Associates
  - 1 vacancy requires  $\approx 1$  full-time recruiter
- share  $1 - (u + v)$  of labor force is employed and producing
  - ~> social product of producing  $> 0$

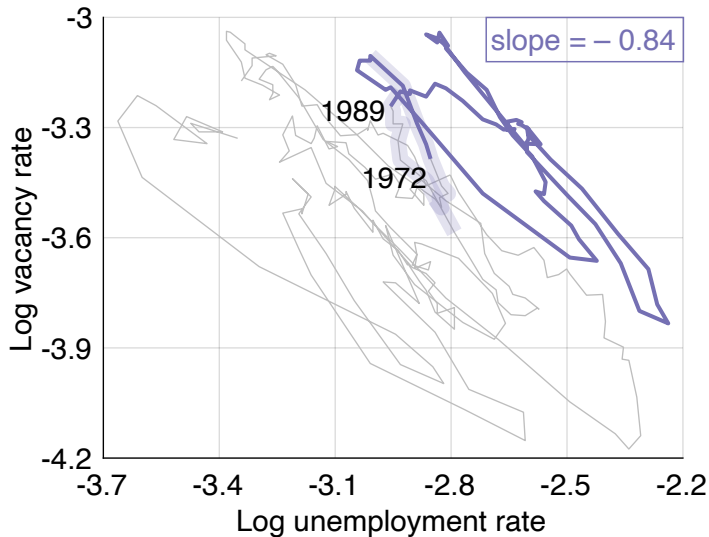
# US BEVERIDGE CURVE $\approx$ HYPERBOLA (MICHAILLAT, SAEZ 2021)



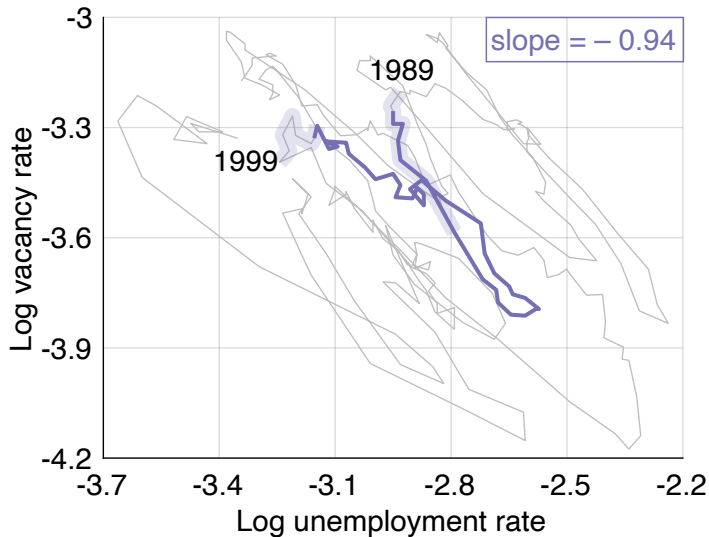
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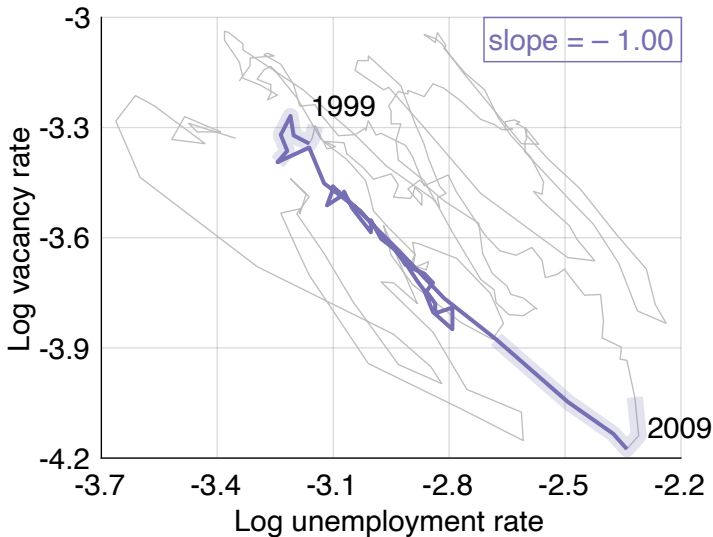
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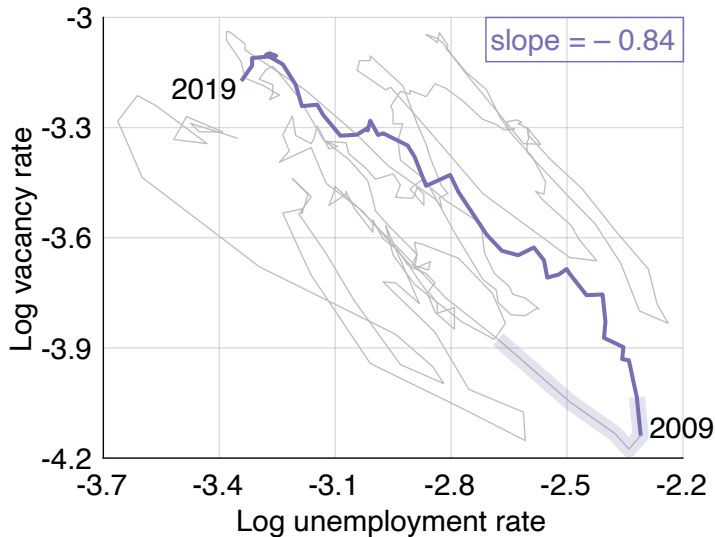
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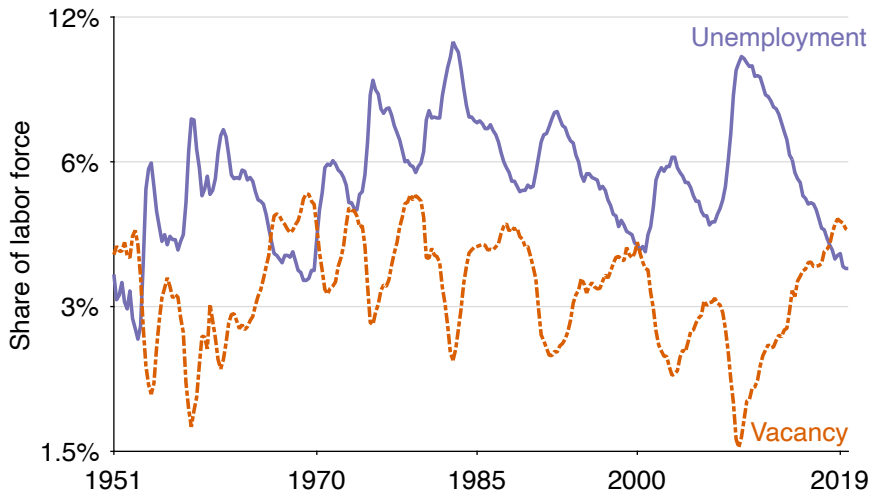


# US BEVERIDGE CURVE $\approx$ HYPERBOLA (MICHAILLAT, SAEZ 2021)





## US BEVERIDGE CURVE $\approx$ HYPERBOLA: LOG SCALE



## COMPUTING THE FERU

- minimize socially nonproductive use of labor  $u + v$
- subject to hyperbolic Beveridge curve  $uv = A$ , with  $A > 0$
- unconstrained minimization with convex objective:  $u + A/u$
- first-order condition gives minimum point:

$$\frac{d[u + A/u]}{du} = 0 \quad \Rightarrow \quad 1 - \frac{A}{u^2} = 0$$

- minimum point is FERU:

$$u^* = \sqrt{A} \quad \Rightarrow \quad v^* = \sqrt{uv}$$

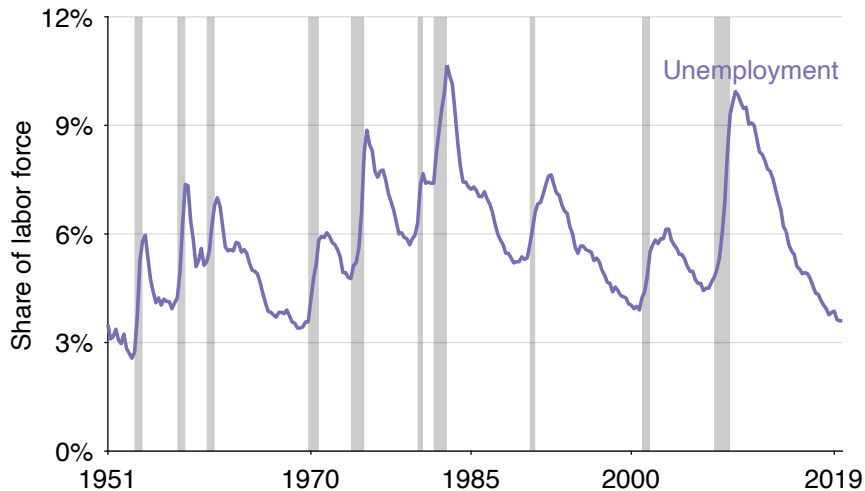
- FERU is  $> 0$ , determined by location of Beveridge curve

## CRITERION FOR FULL EMPLOYMENT

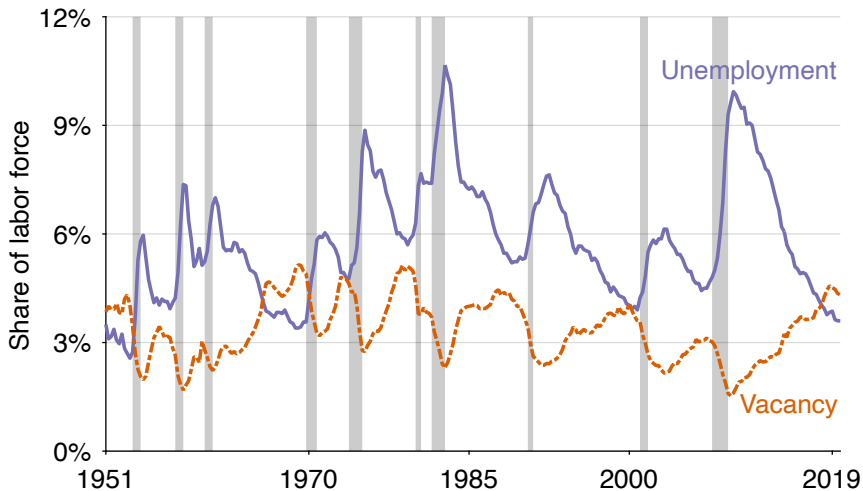
- $u^*$  is geometric average of  $u$  and  $v$
- economy is at full employment when  $u = u^*$ 
  - ~> at **full employment** when  $u = v$
- economy is above full employment, inefficiently tight when  $u < u^*$ 
  - ~> inefficiently **tight** when  $u < v$
- economy is below full employment, inefficiently slack when  $u > u^*$ 
  - ~> inefficiently **slack** when  $u > v$

## POSTWAR IN THE UNITED STATES

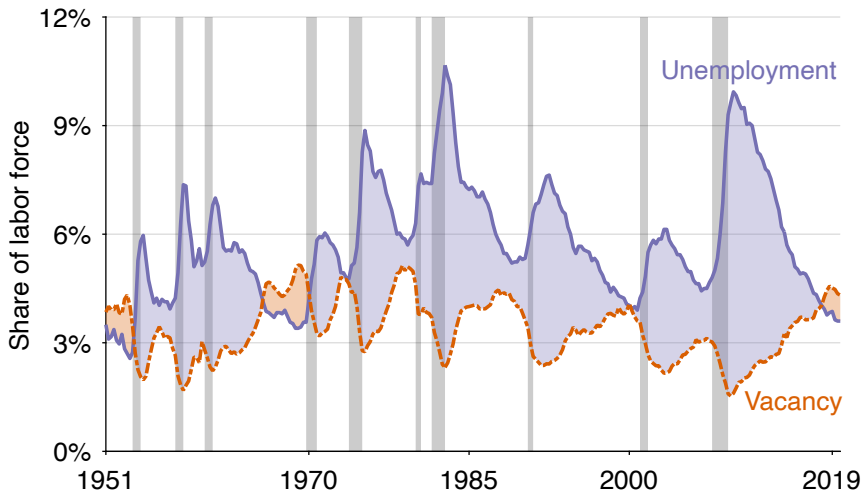
# UNEMPLOYMENT RATE (CPS)



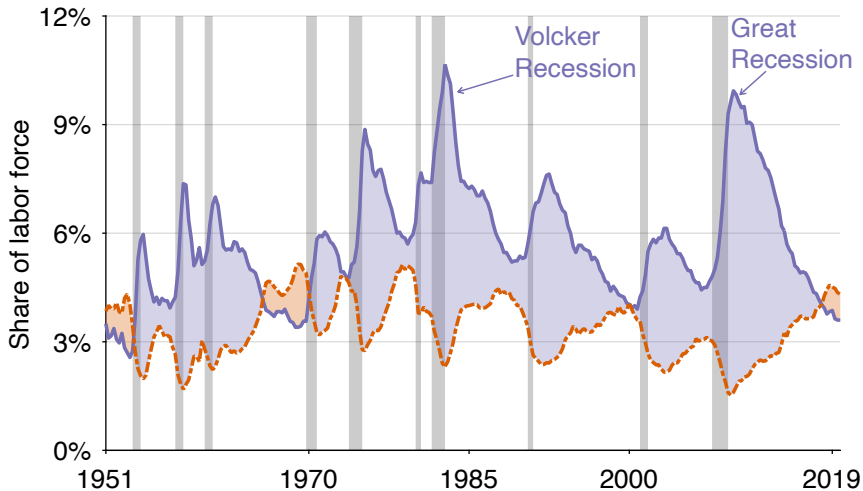
## VACANCY RATE (BARNICHON 2010, JOLTS)



## LABOR MARKET IS GENERALLY TOO SLACK...

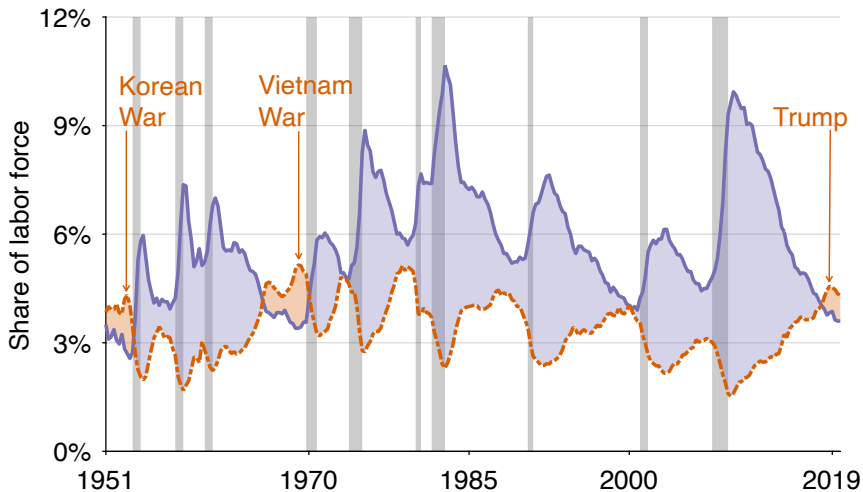


## ...AND IS ESPECIALLY SLACK IN SLUMPS

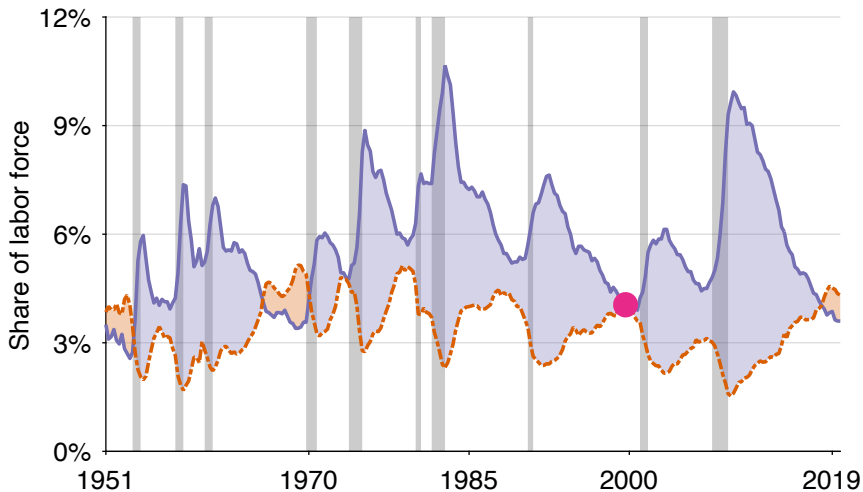




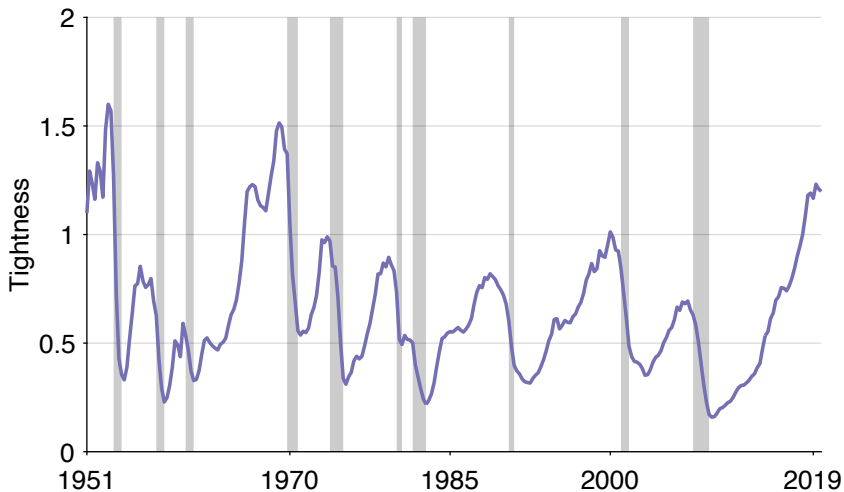
## LABOR MARKET IS TOO TIGHT DURING MAJOR WARS



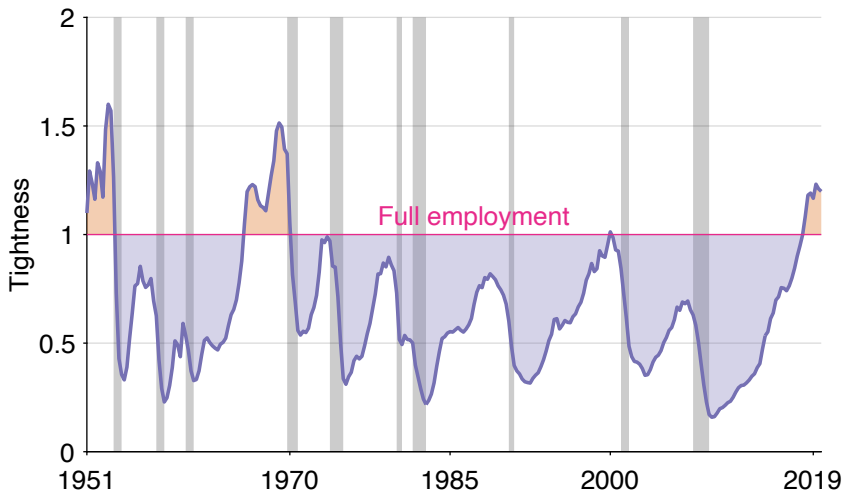
## FULL EMPLOYMENT IN THE LATE 1990S



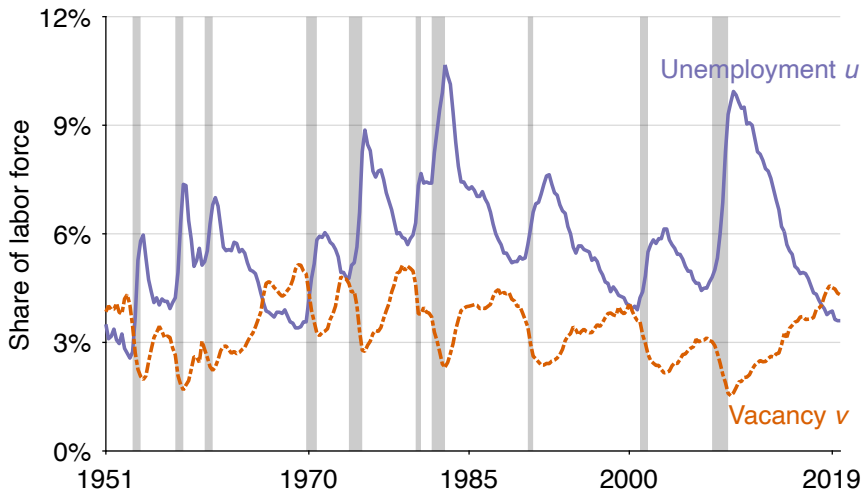
## TIGHTNESS $v/u$ SUMMARIZES STATE OF LABOR MARKET



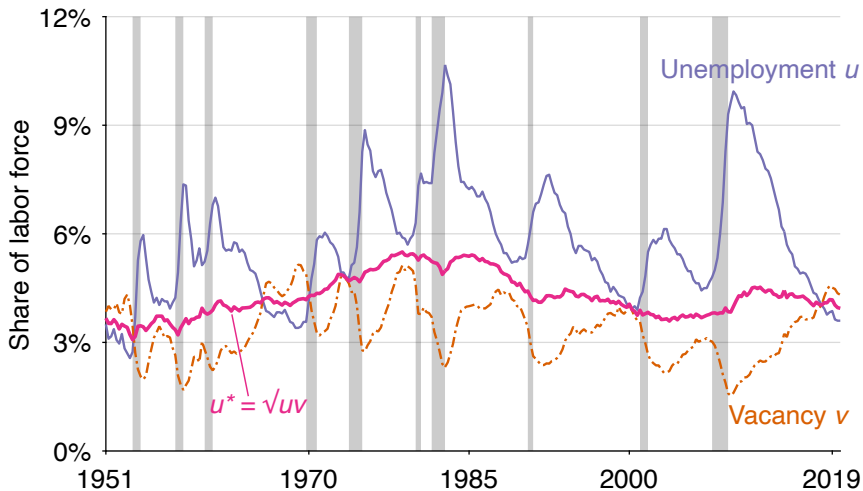
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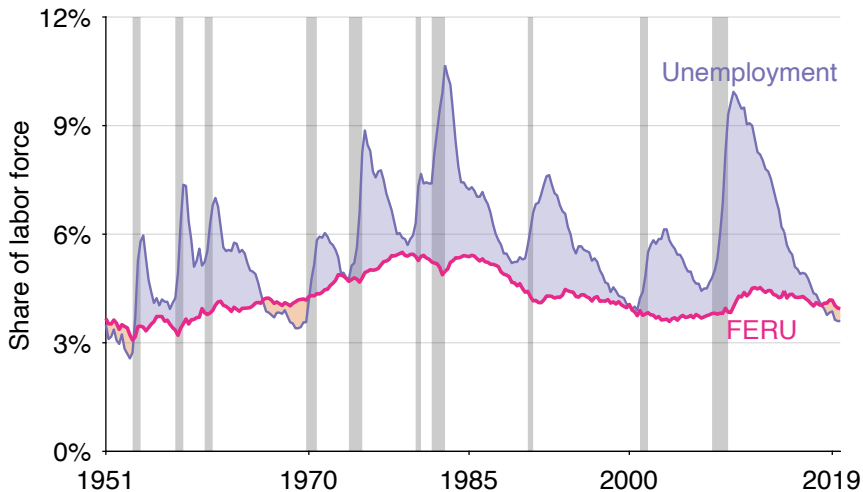
FERU REMAINS IN 3.0%–5.3%, AVERAGES 4.2%



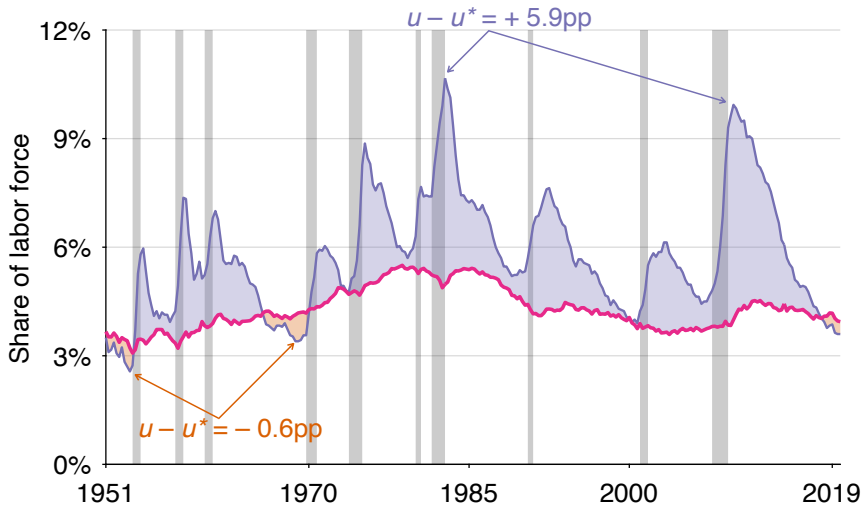
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## UNEMPLOYMENT GAP IS COUNTERCYCLICAL



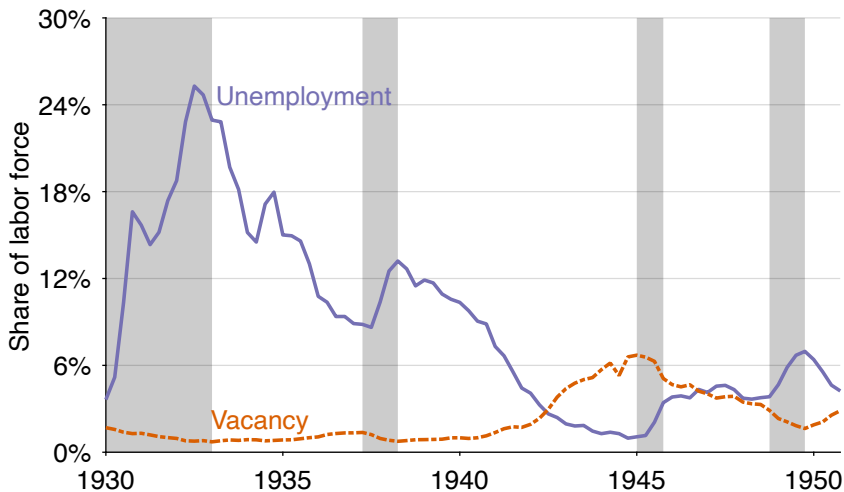
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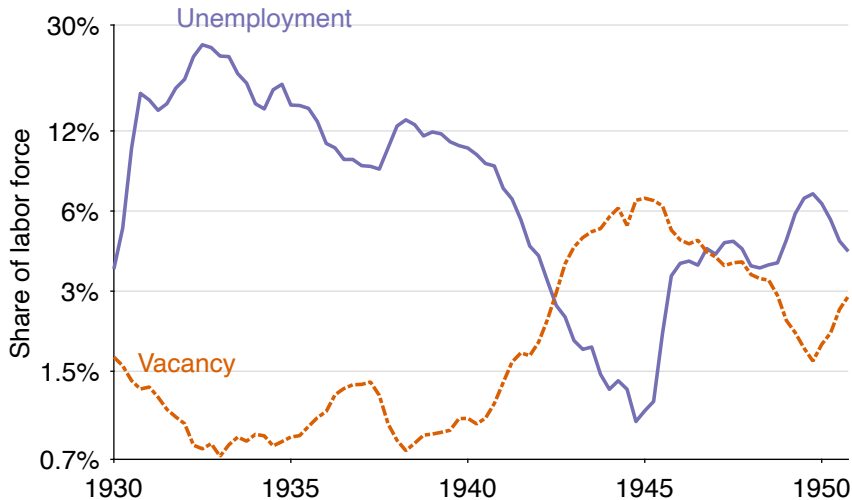


# GREAT DEPRESSION IN THE UNITED STATES

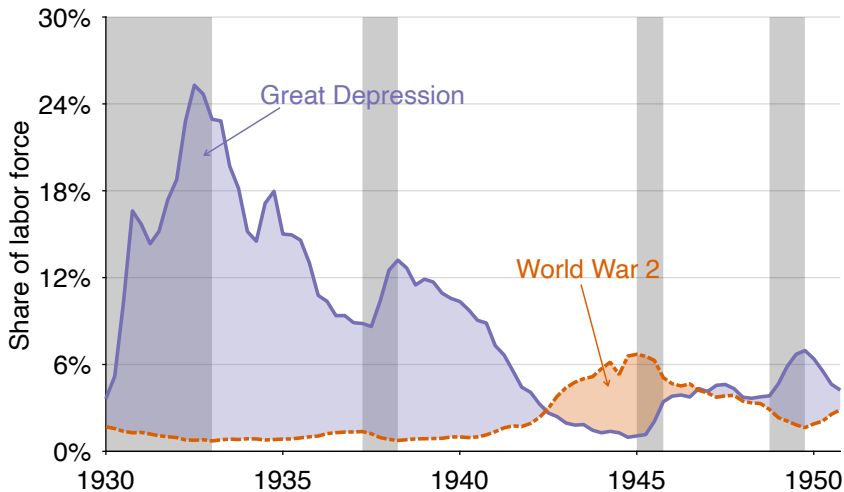
## UNEMPLOYMENT & VACANCY RATES (PETROSKY-NADEAU, ZHANG 2021)



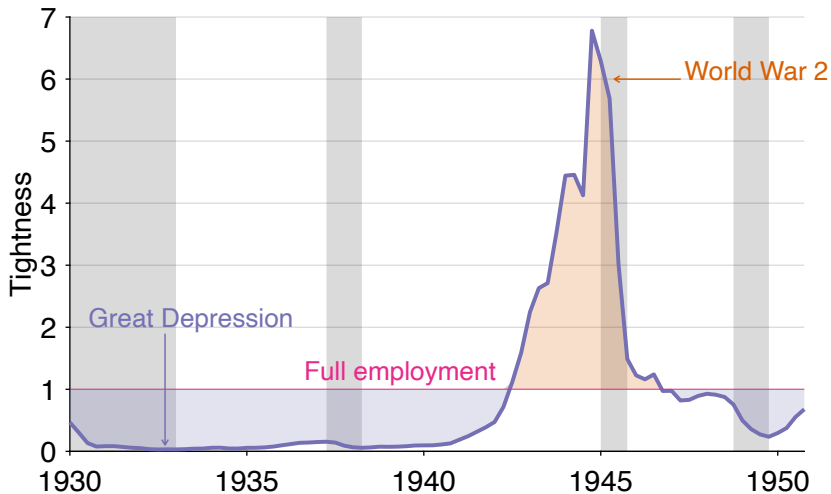
## BEVERIDGE CURVE $\approx$ HYPERBOLA: LOG SCALE



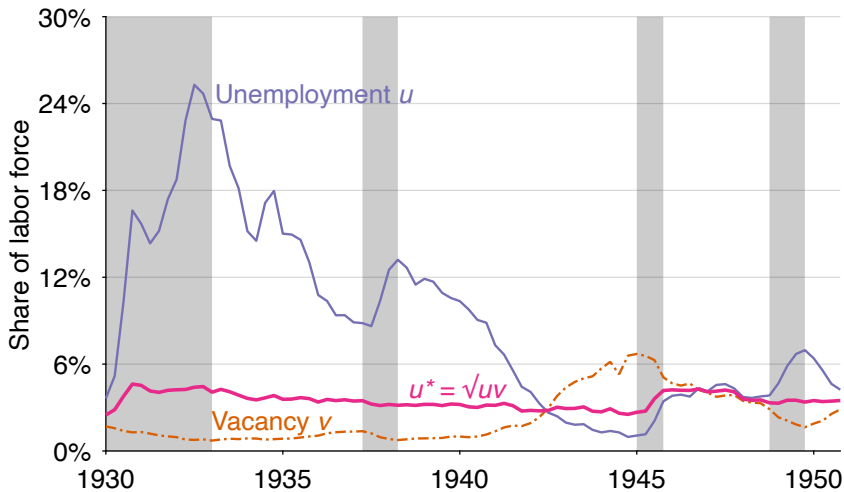
## LABOR MARKET WAS TOO SLACK UNTIL WW2



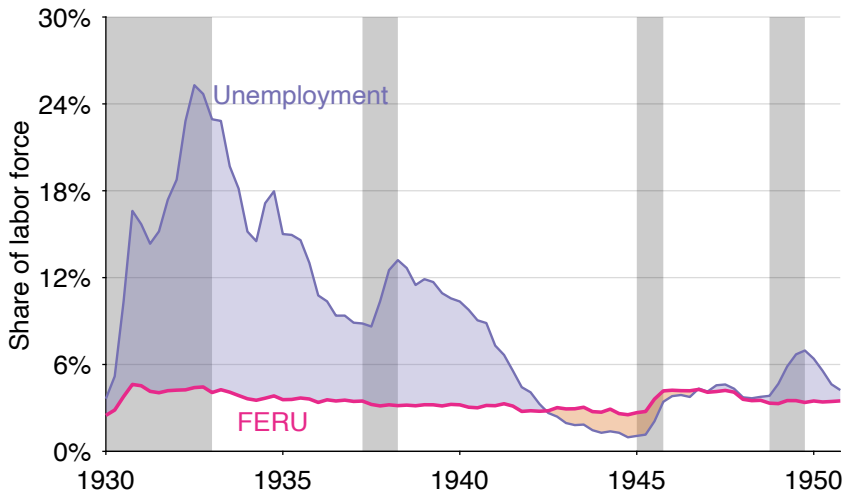
## LOWEST AND HIGHEST TIGHTNESS ON RECORD



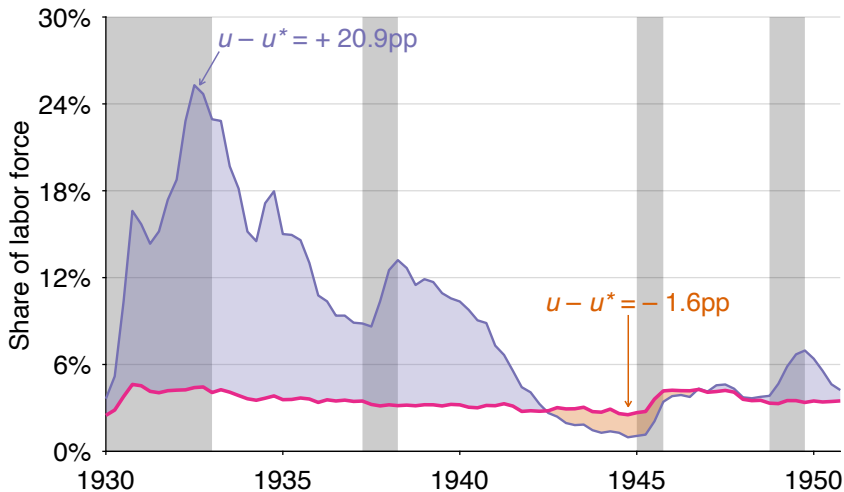
FERU REMAINS IN 2.5%–4.6%, AVERAGES 3.5%



## MOST EXTREME UNEMPLOYMENT GAPS ON RECORD



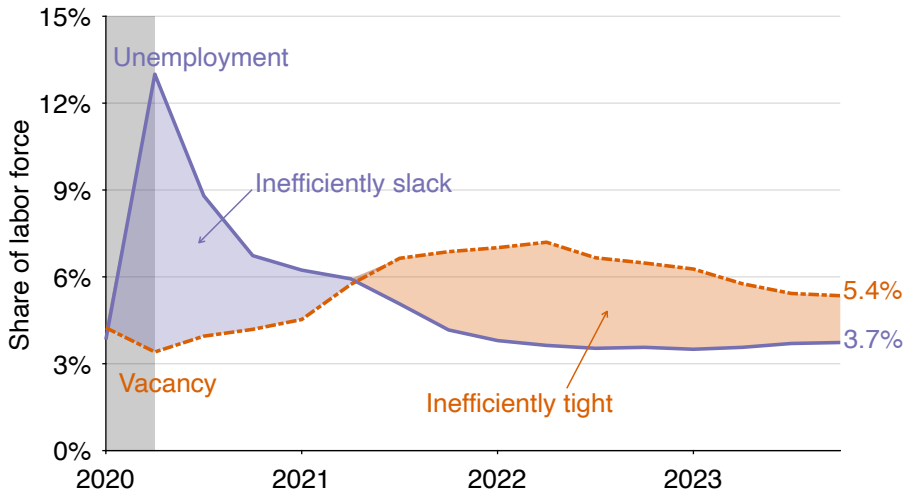
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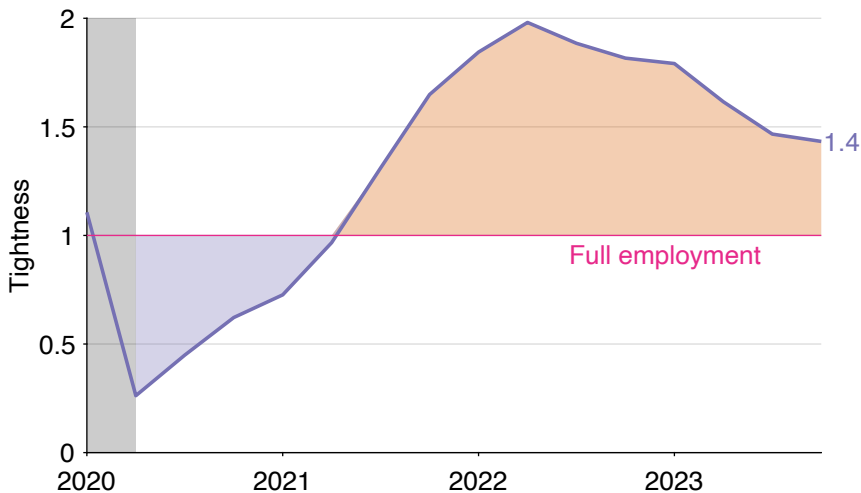


PANDEMIC IN THE UNITED STATES

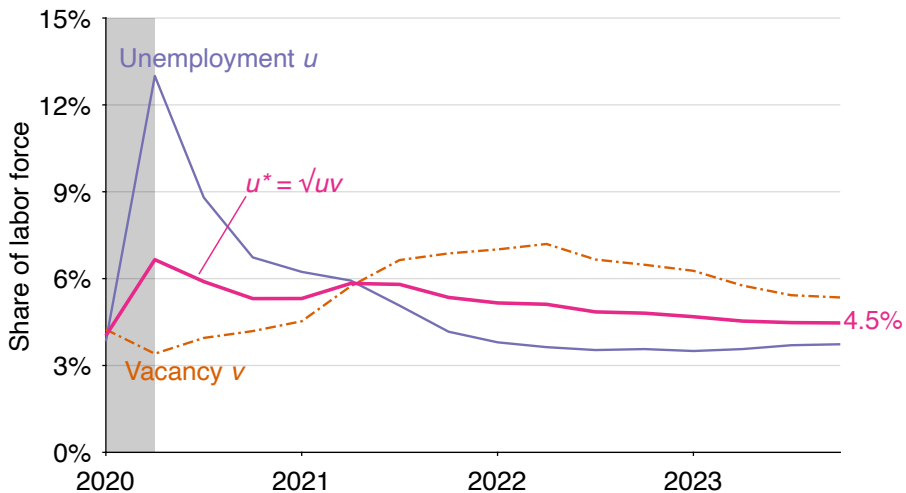
## LABOR MARKET HAS BEEN TOO TIGHT SINCE 2021Q3...



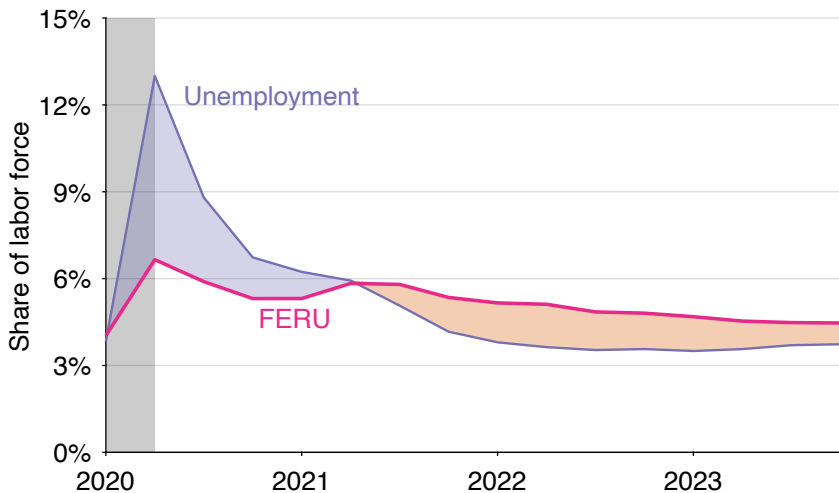
...BUT IT HAS BEEN COOLING SINCE 2022Q2



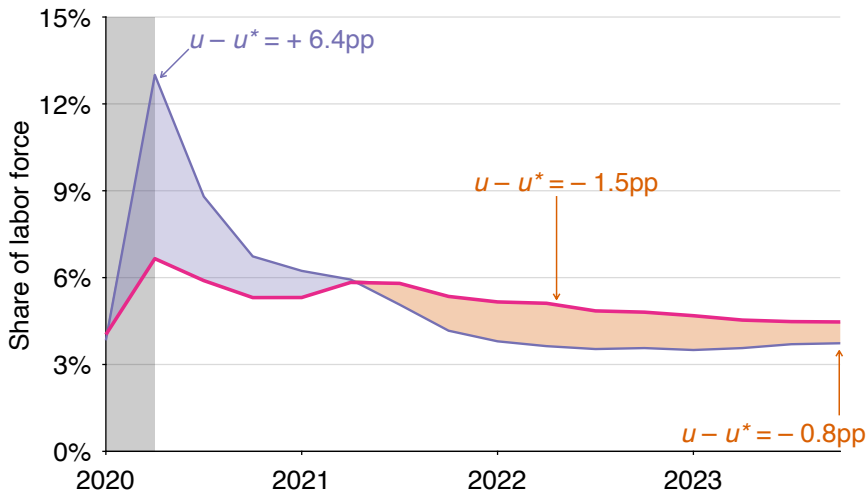
CURRENT TARGET FOR MONETARY POLICY:  $u^* = 4.5\%$



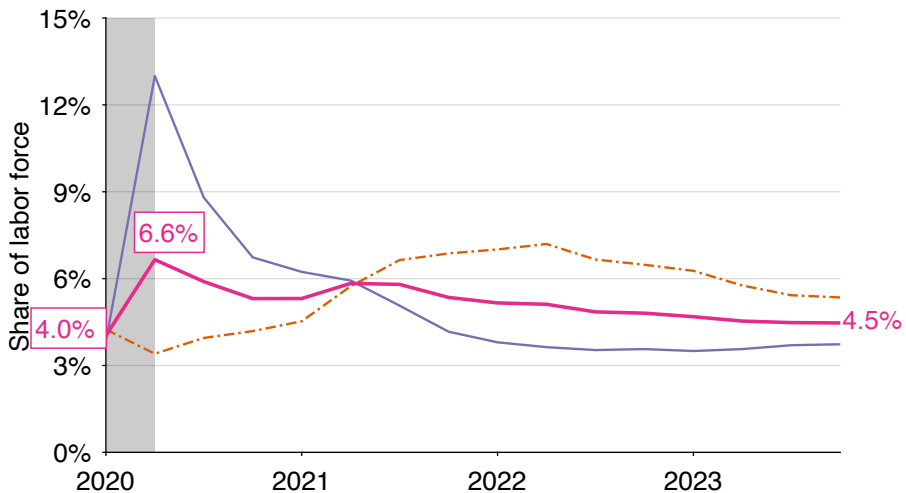
## MOST EXTREME UNEMPLOYMENT GAPS SINCE WW2



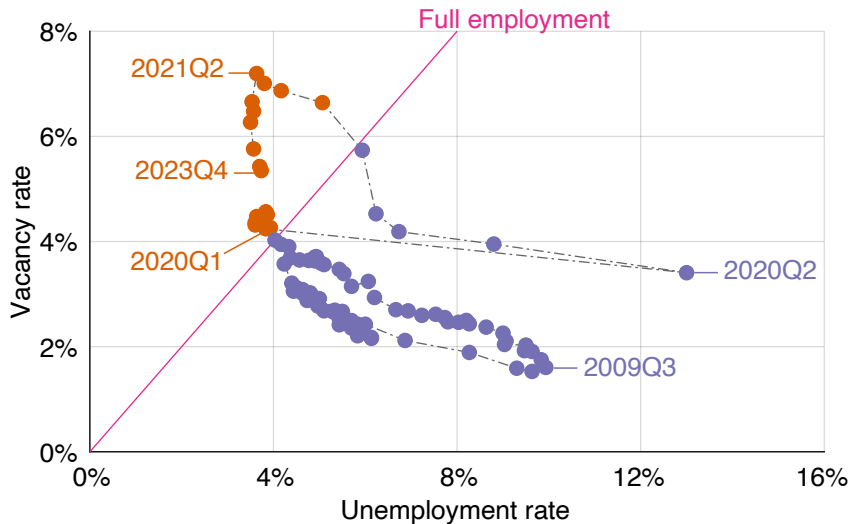
## MOST EXTREME UNEMPLOYMENT GAPS SINCE WW2



## WHY DID THE FERU INCREASE SO MUCH IN 2020?



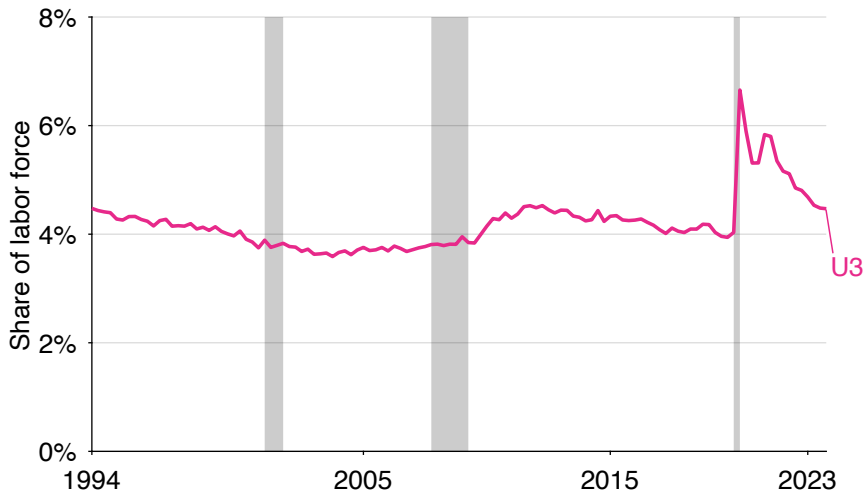
## BECAUSE THE BEVERIDGE CURVE SHIFTED IN 2020Q2



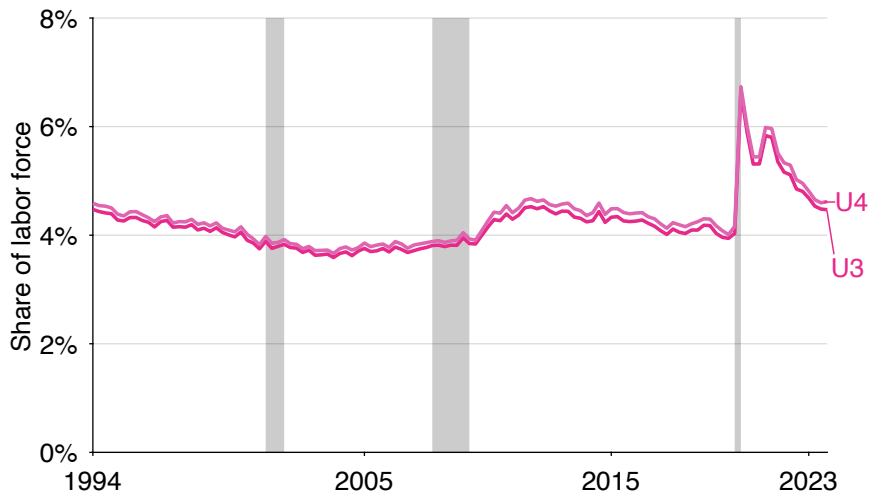


**ROBUSTNESS**

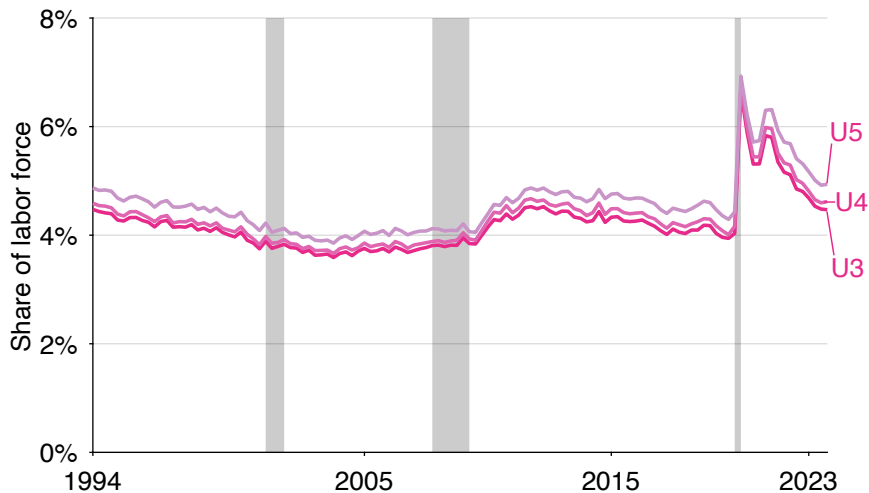
## FERU WITH DIFFERENT MEASURES OF UNEMPLOYMENT



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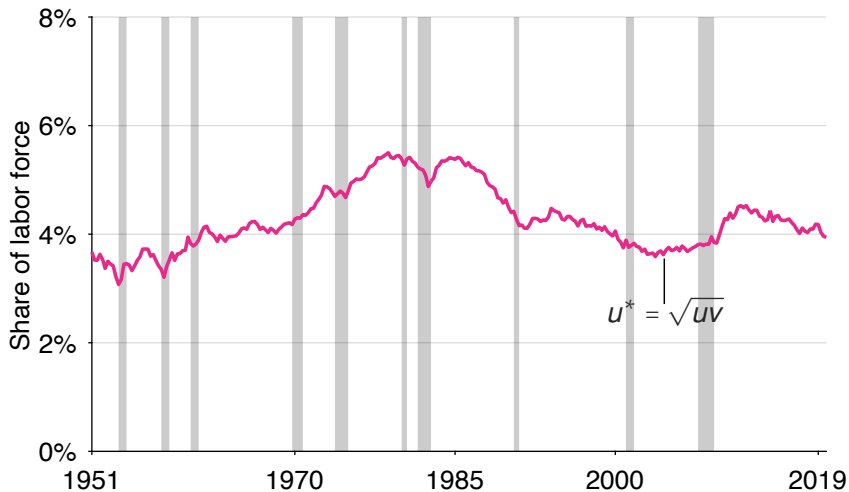
## GENERALIZED FERU FORMULA (MICHAILLAT, SAEZ 2021)

- home production net of psychological cost of idleness:  $0 \rightarrow \zeta$
- recruiters per vacancy:  $1 \rightarrow \kappa$
- elasticity of Beveridge curve:  $v = A/u \rightarrow v = A/u^\epsilon$
- generalized FERU formula:

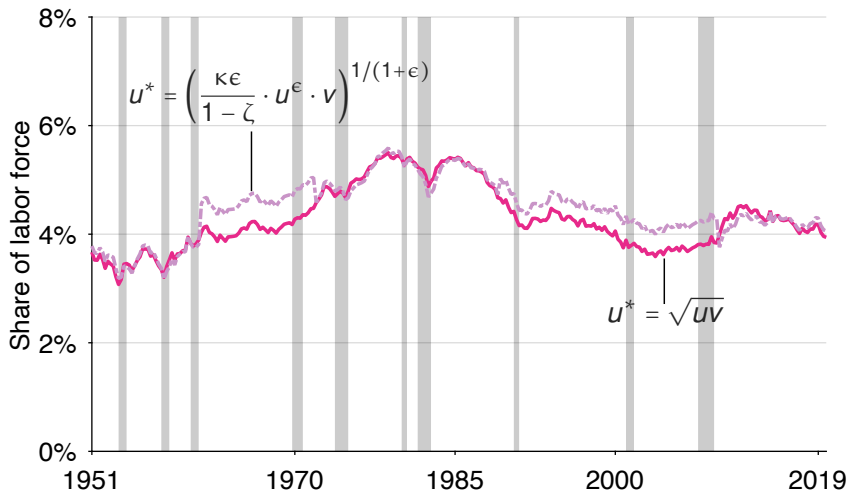
$$u^* = \sqrt{uv} \quad \rightarrow \quad u^* = \left( \frac{\kappa \cdot \epsilon}{1 - \zeta} \cdot u^\epsilon \cdot v \right)^{1/(1+\epsilon)}$$

- US calibration of generalized formula:
  - $\zeta = 0.26$
  - $\kappa = 0.92$
  - $\epsilon$  given by Bai, Perron (1998) algorithm

## SIMPLE VERSUS GENERALIZED FERU FORMULA



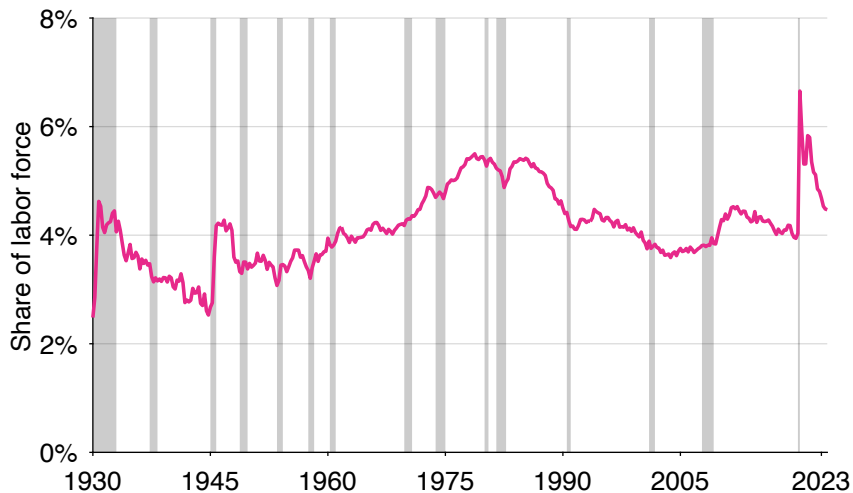
# SIMPLE VERSUS GENERALIZED FERU FORMULA



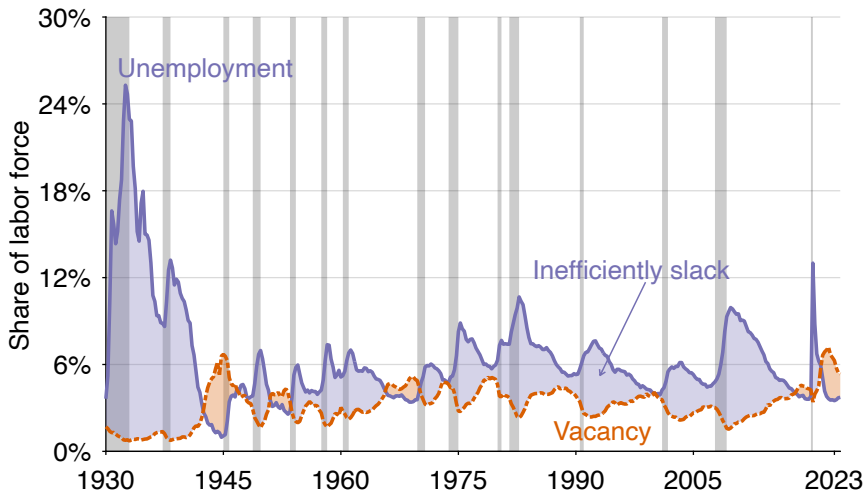
WHY HAS THE US LABOR MARKET BEEN SO SLACK IN  
THE PAST CENTURY?



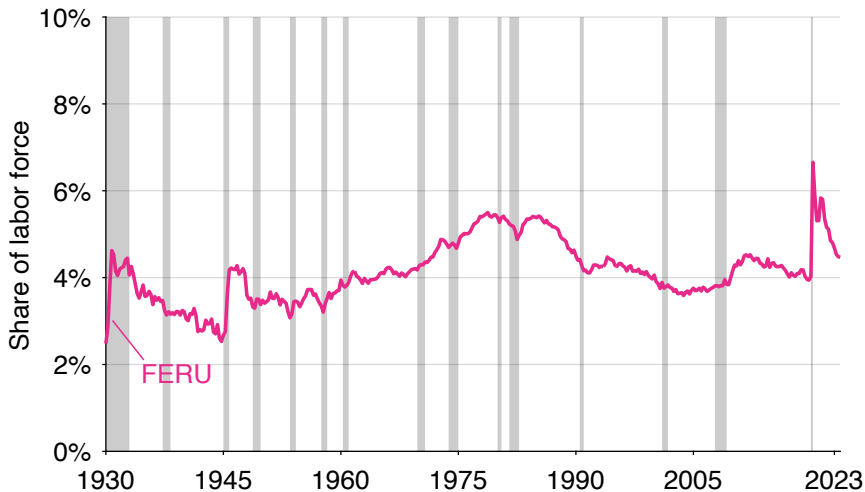
FERU AVERAGES 4.1% OVER 1930–2023



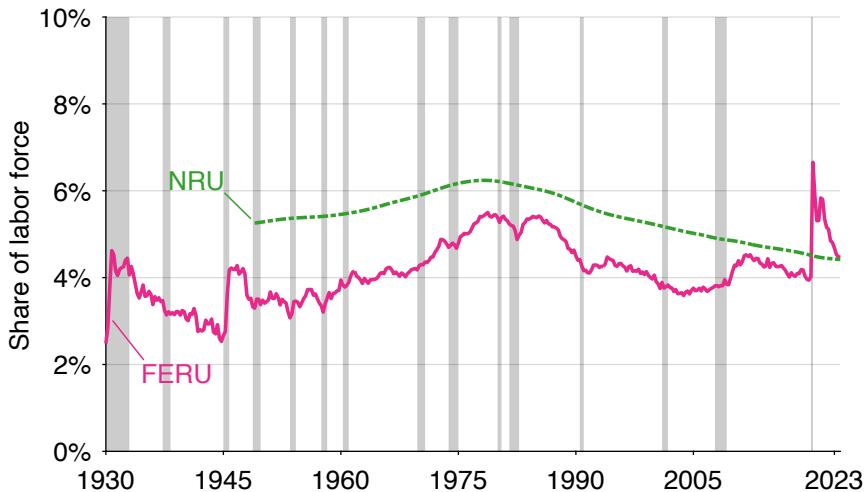
# LABOR MARKET IS GENERALLY INEFFICIENTLY SLACK



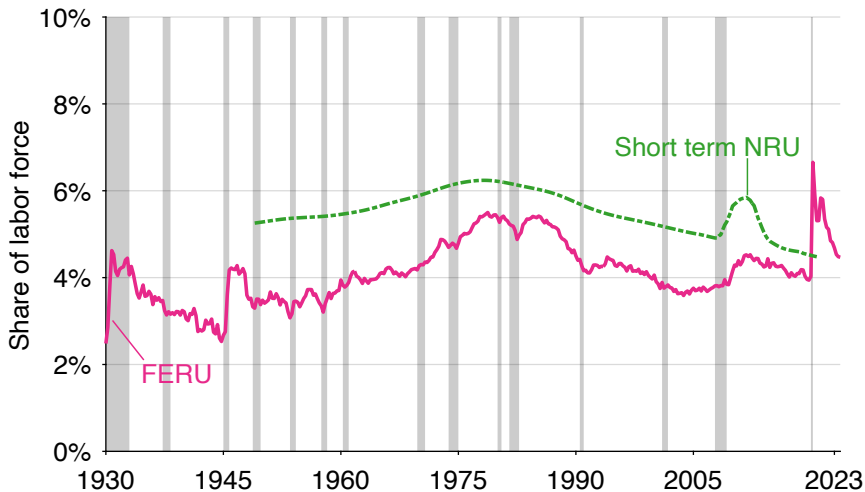
## FERU IS LOWER THAN EXISTING TARGETS



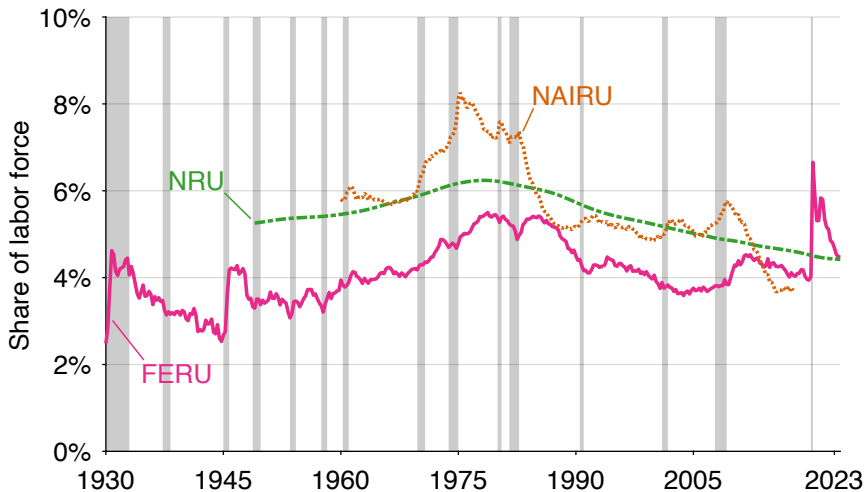
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## OTHER REASONS FOR DEPARTURES FROM FULL EMPLOYMENT

- Great Depression:
  - gold standard (Eichengreen, Temin 2000)
  - policy errors (Friedman, Schwartz 1963)
- Volcker–Greenspan era:
  - priority given to inflation (Thornton 2011; Kaya et al 2019)
  - maybe due to pressure from Congress (Hess, Shelton 2016)
- Great Recession, pandemic:
  - zero lower bound on nominal interest rate

# LABOR MARKET IS INEFFICIENTLY TIGHT IN MAJOR WARS (AND AROUND THE PANDEMIC)

