$u^* = \sqrt{uv}$

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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 ≠ 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 ≠ FERU

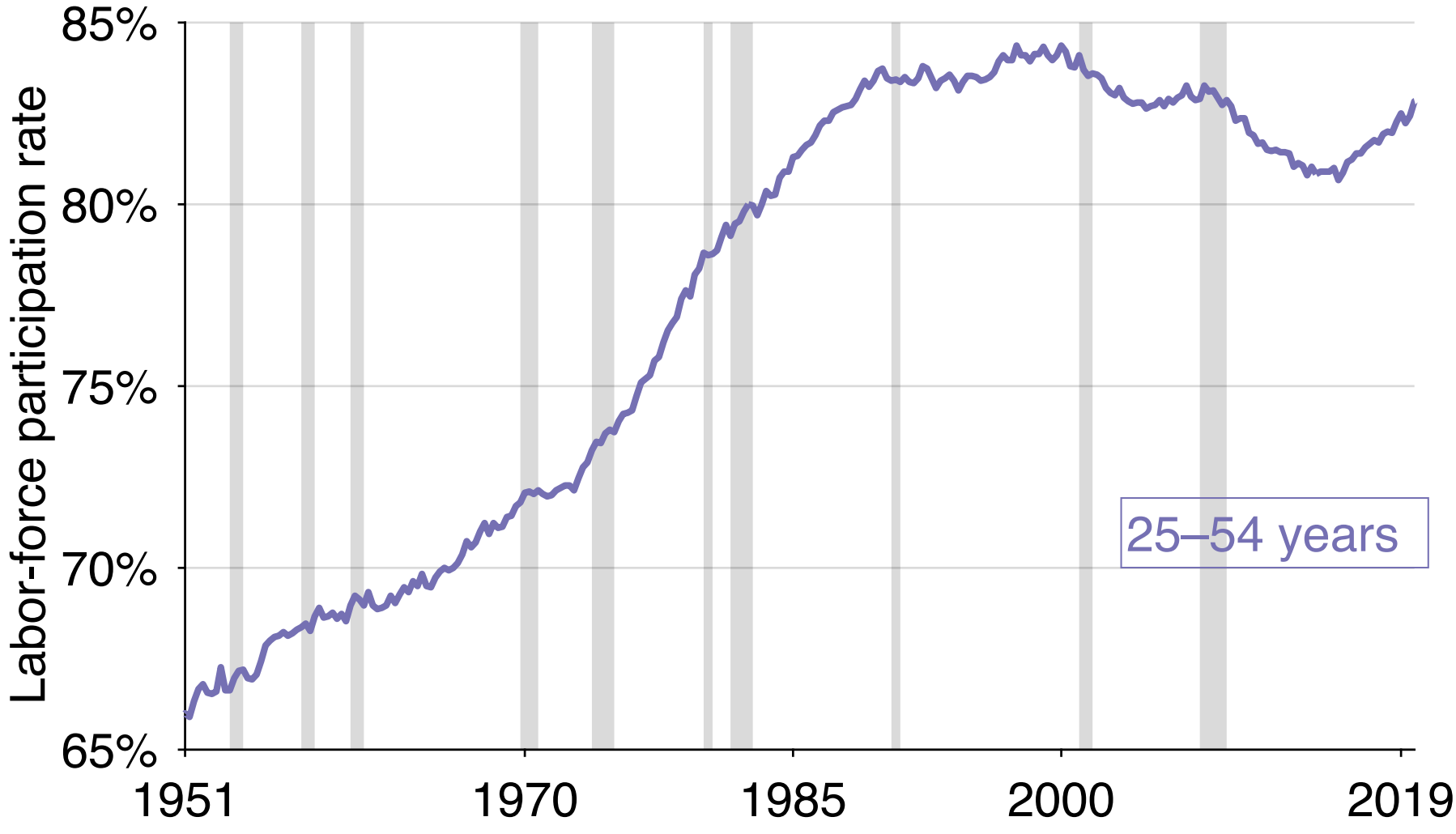
- Boston Fed President Rosengren (2014):
  - measures the departure of the Fed from its full-employment mandate by "the squared deviations of unemployment from an estimate of full employment utilizing the Congressional Budget Office assessment of the natural rate for each year."
- but the CBO's natural/noncyclical rate of unemployment (NRU) is a slow-moving average of unemployment, which is generally 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 given
  - 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 ≈ ACYCLICAL



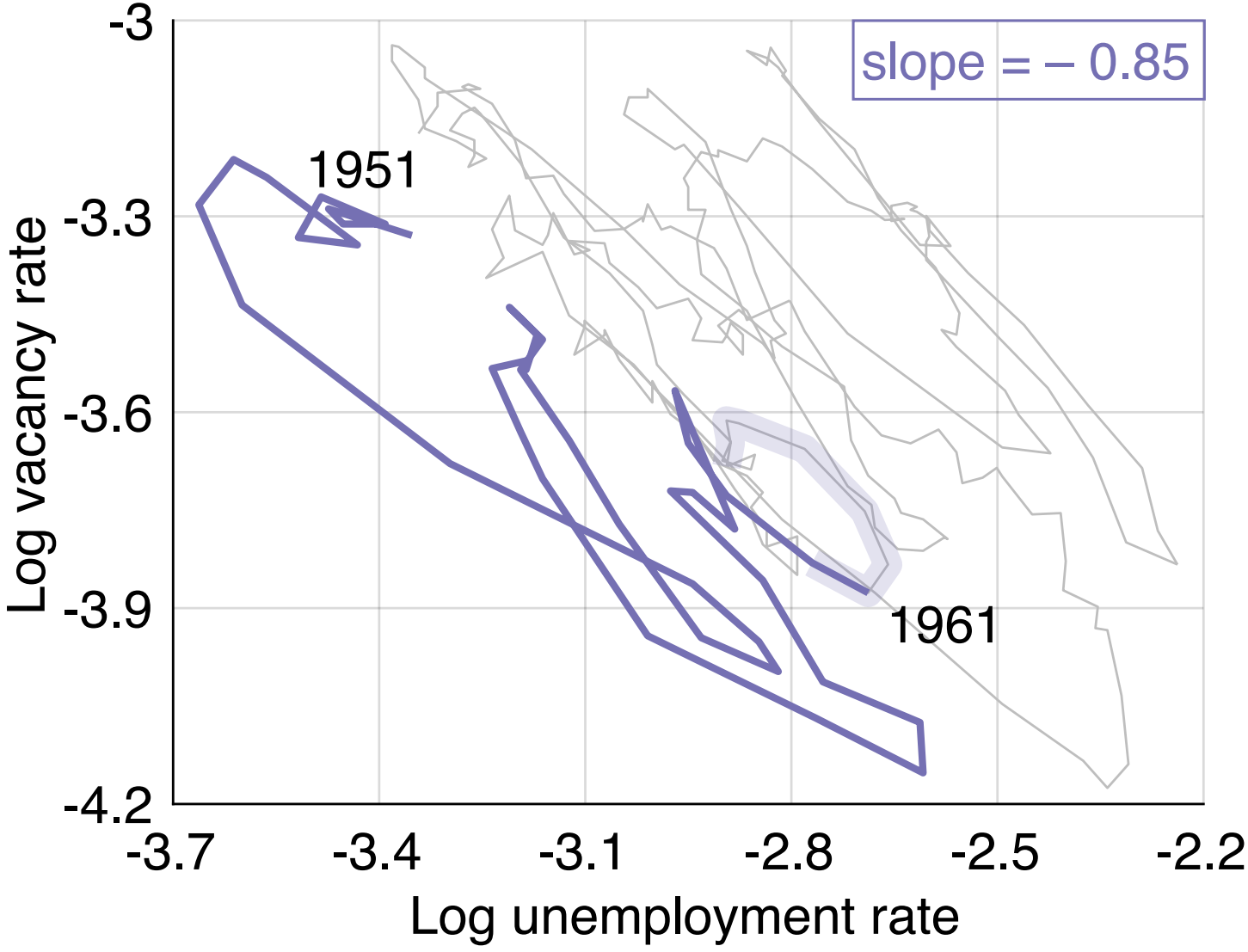
SOCIAL PRODUCT OF UNEMPLOYED LABOR ≈ 0

- 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) $\rightsquigarrow$ 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
  - $\rightsquigarrow$ 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
  - $\rightsquigarrow$ social product of producing > 0

US BEVERIDGE CURVE ≈ HYPERBOLA (MICHAILLAT, SAEZ 2021)



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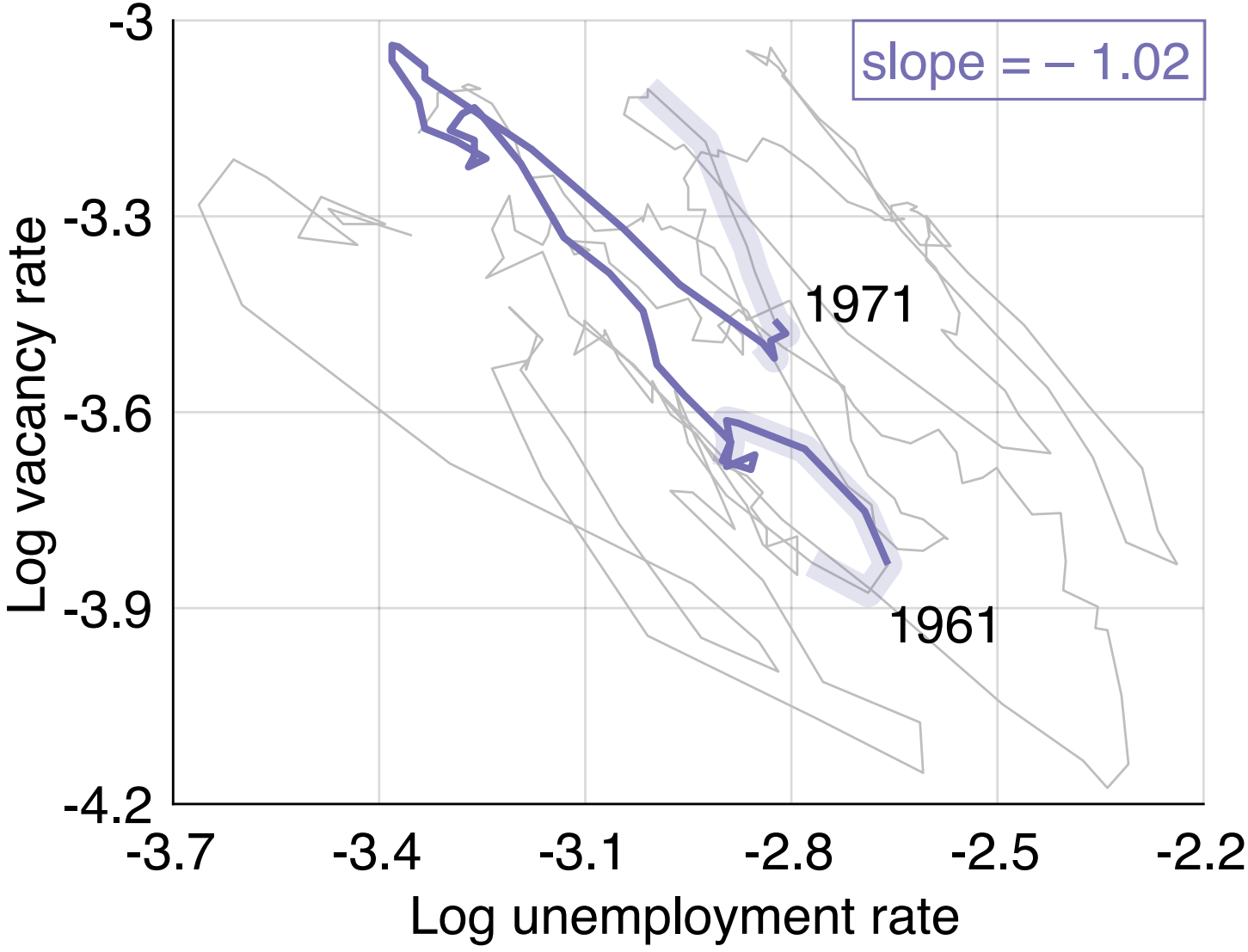

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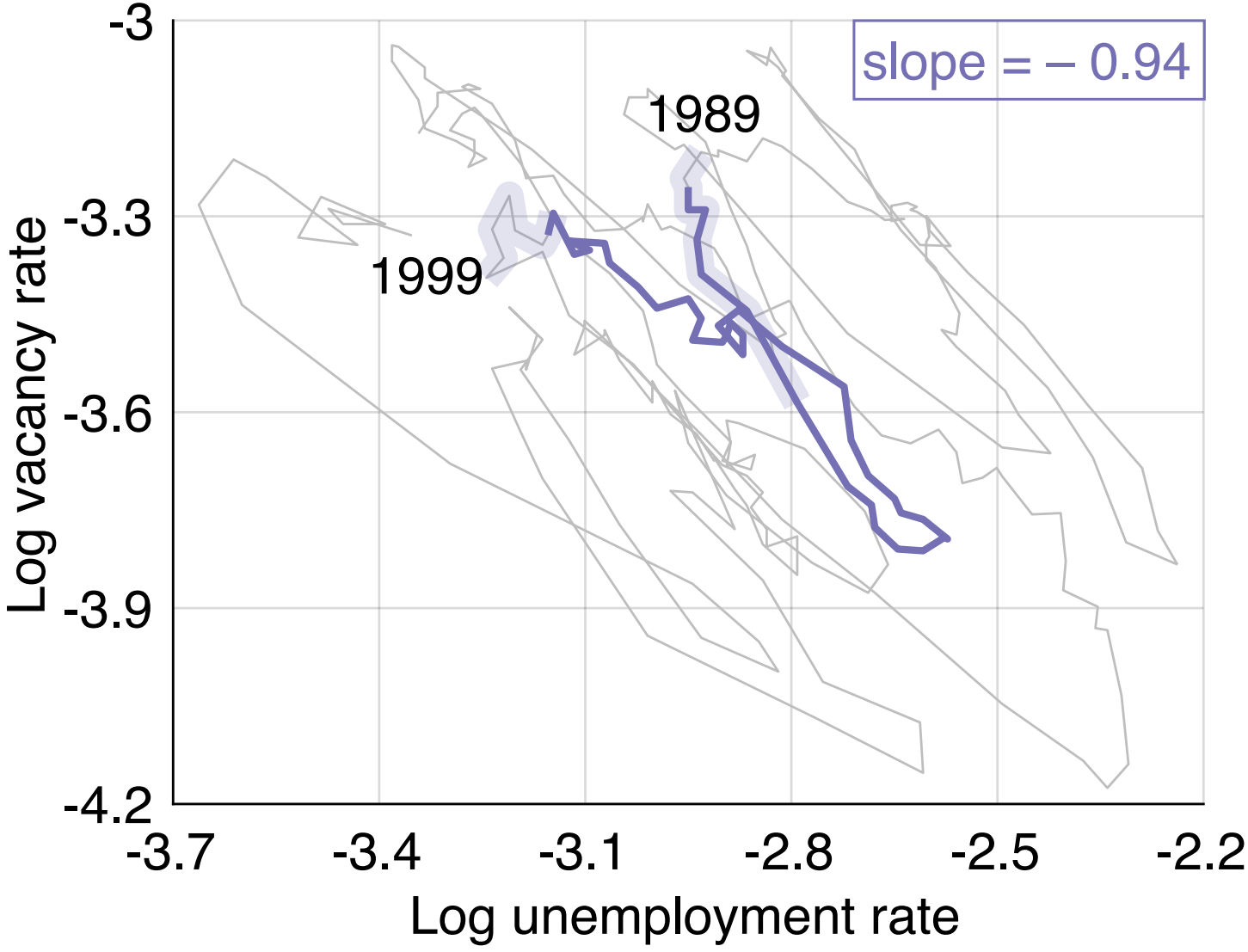

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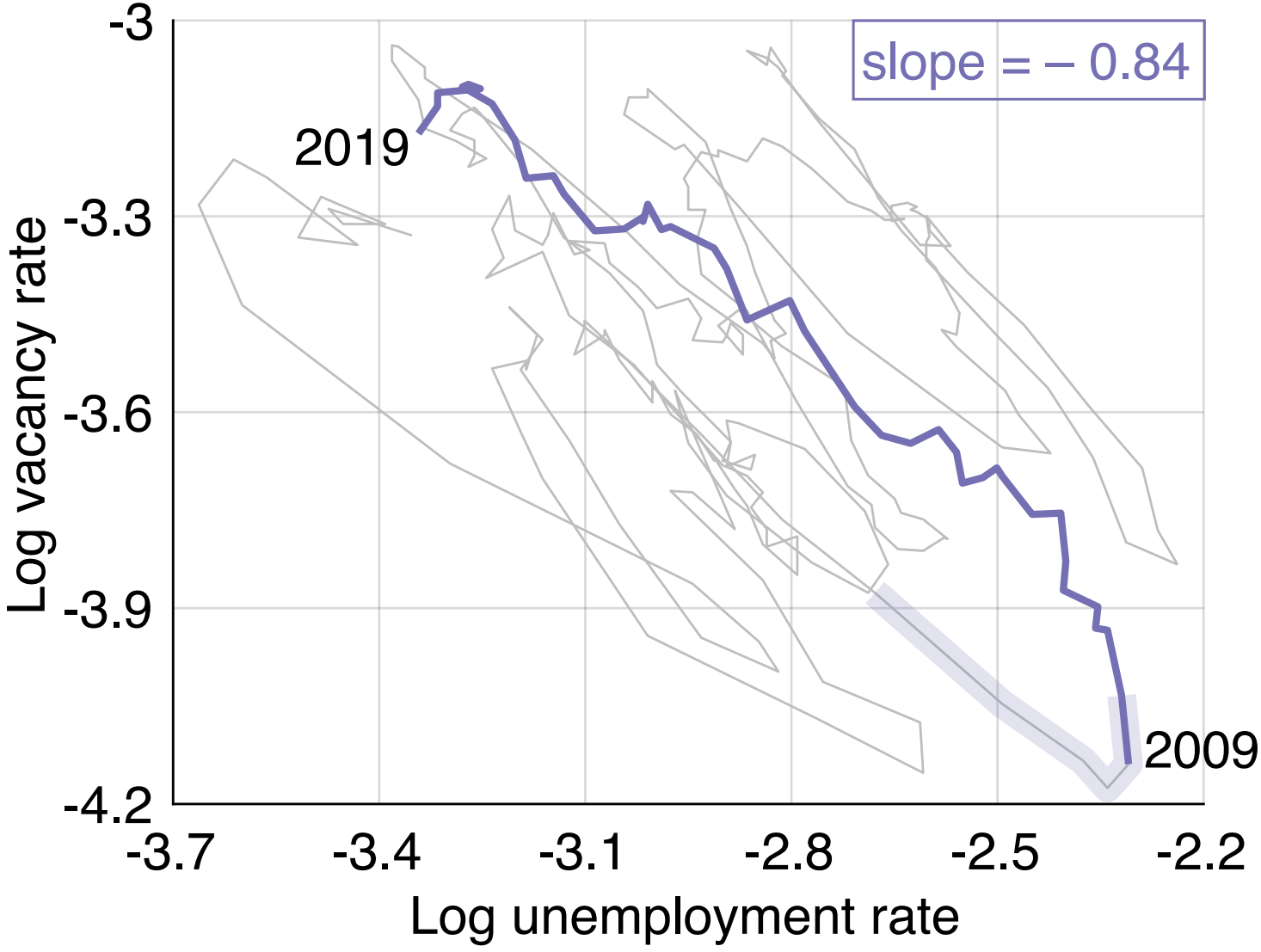
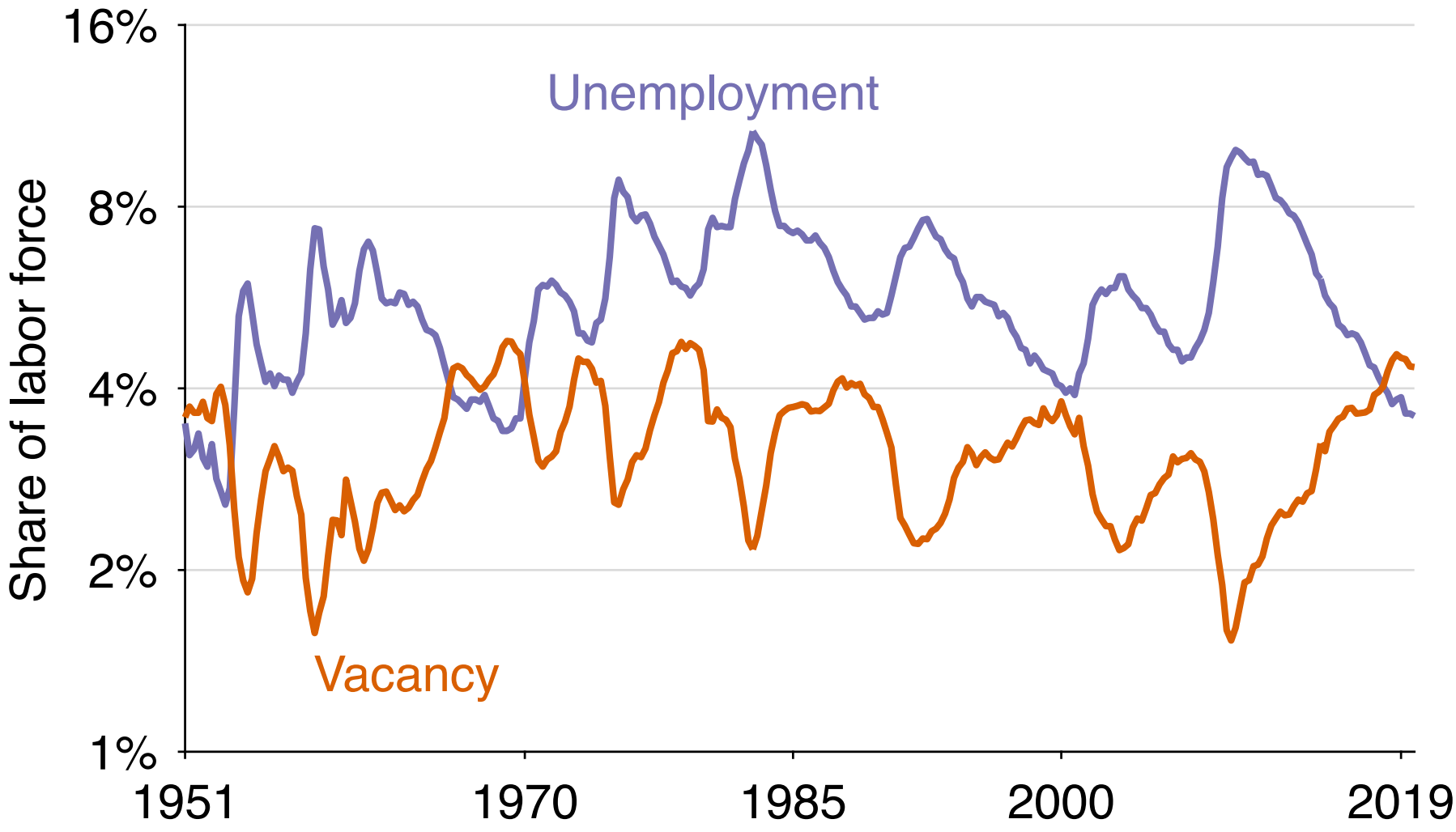


US BEVERIDGE CURVE ≈ HYPERBOLA: LOG SCALE



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:

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

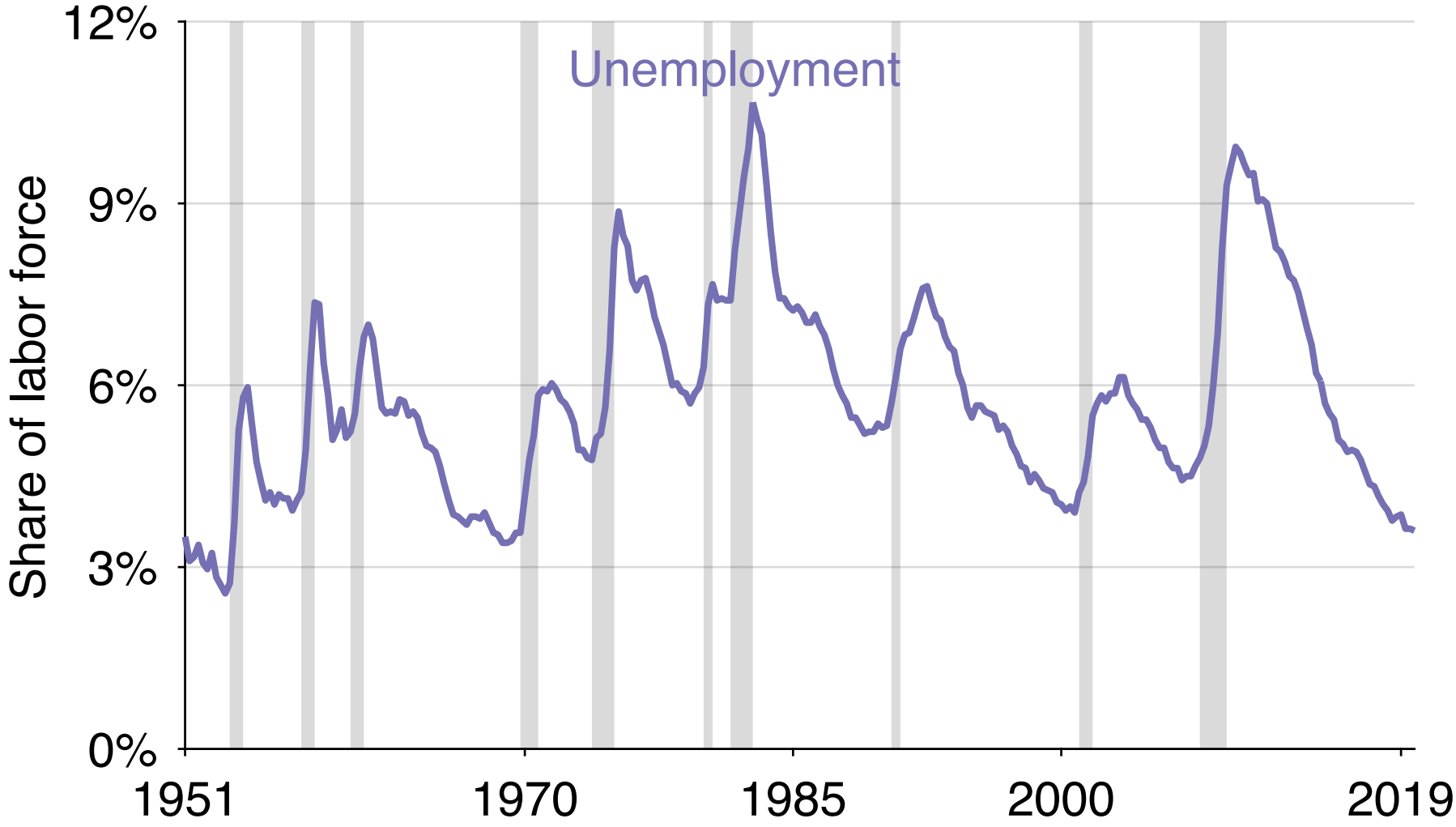
- FERU is > 0, determined by location of Beveridge curve

CRITERION FOR FULL EMPLOYMENT

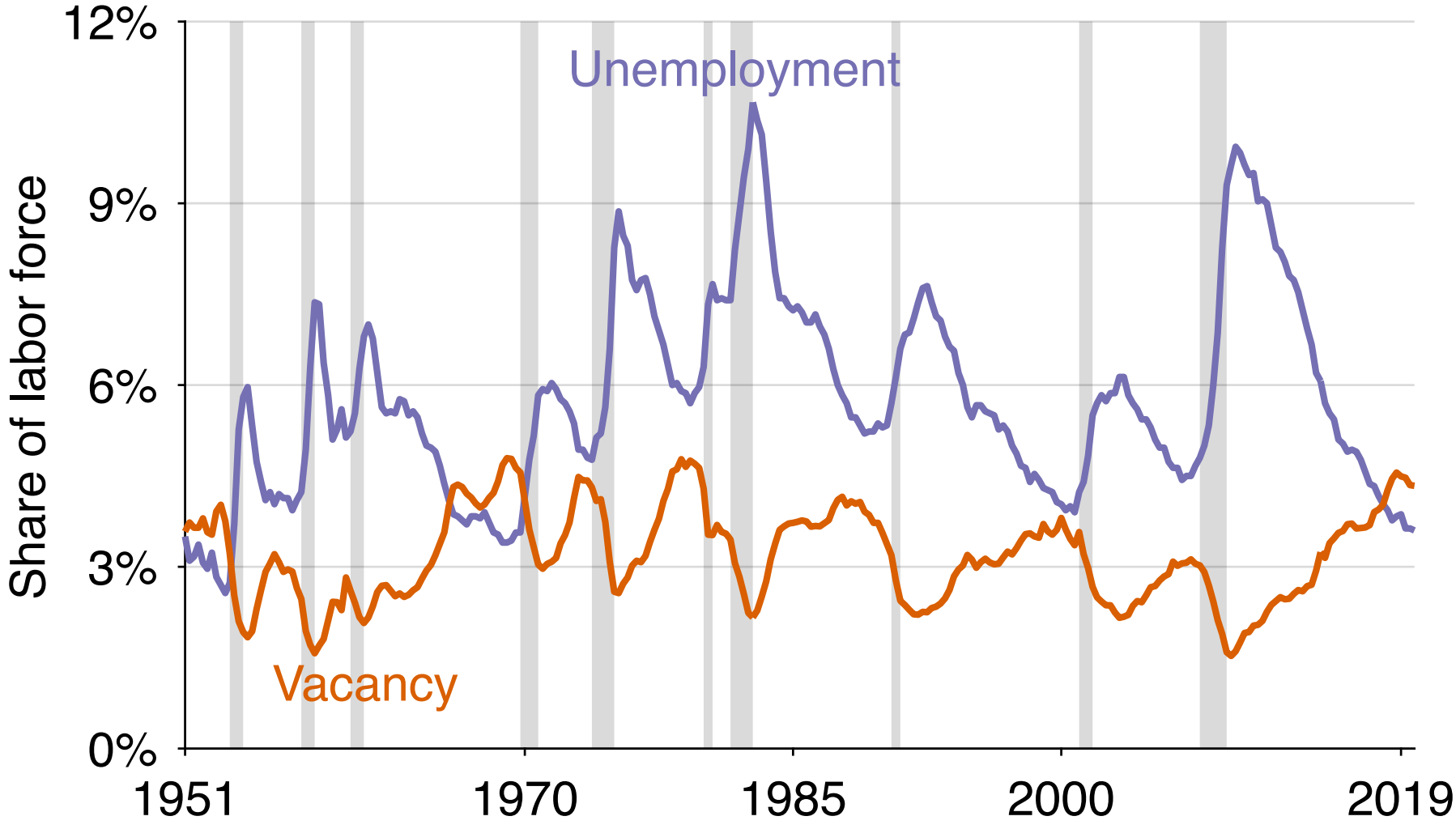
- u^* is geometric average of u and v
- economy is at full employment when $u = u^*$
  - ⇝ at full employment when $u = v$
- economy is above full employment, inefficiently tight when $u < u^*$
  - ⇝ inefficiently tight when $u < v$
- economy is below full employment, inefficiently slack when $u > u^*$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

POSTWAR IN THE UNITED STATES

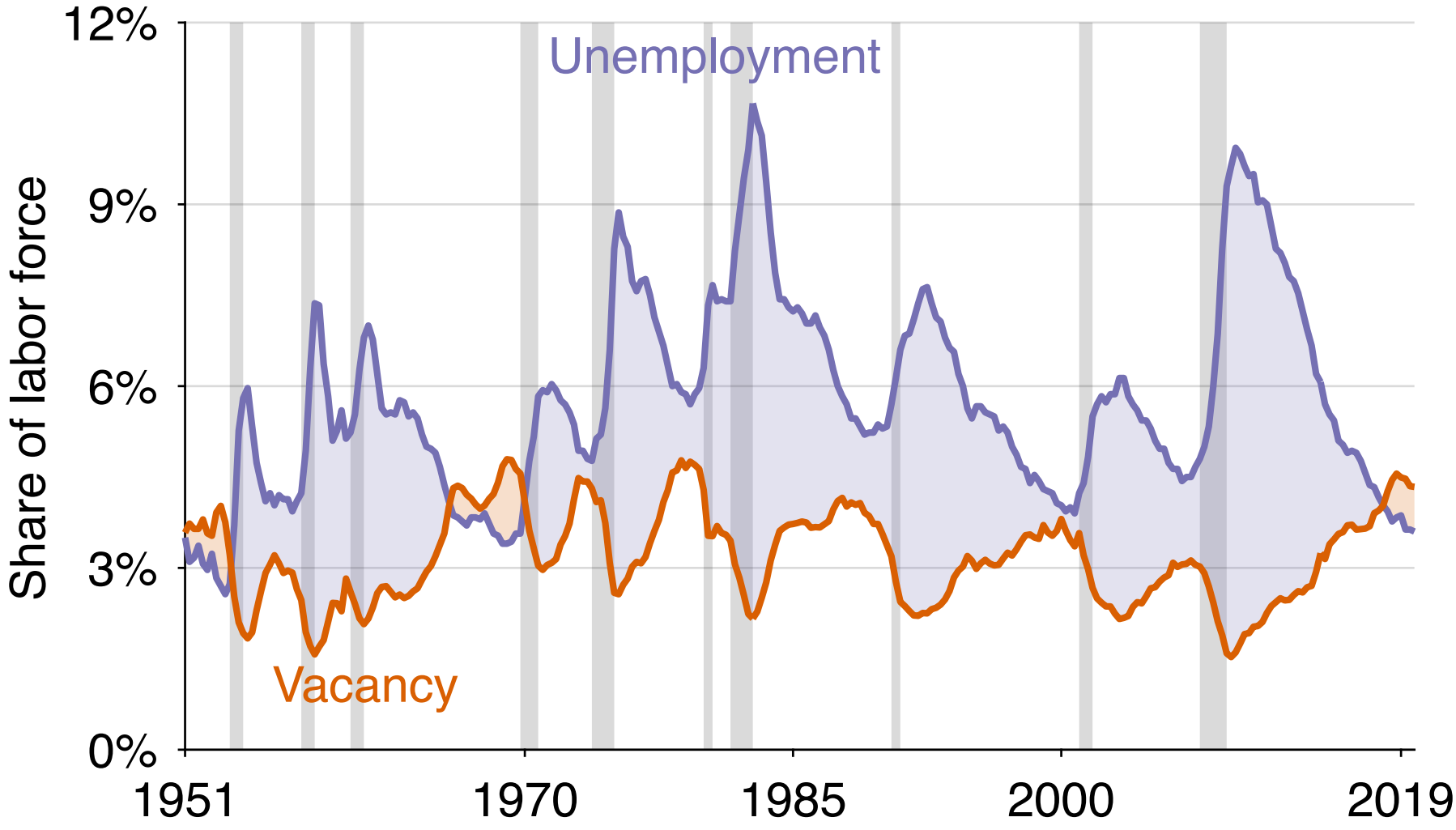
UNEMPLOYMENT RATE (CPS)



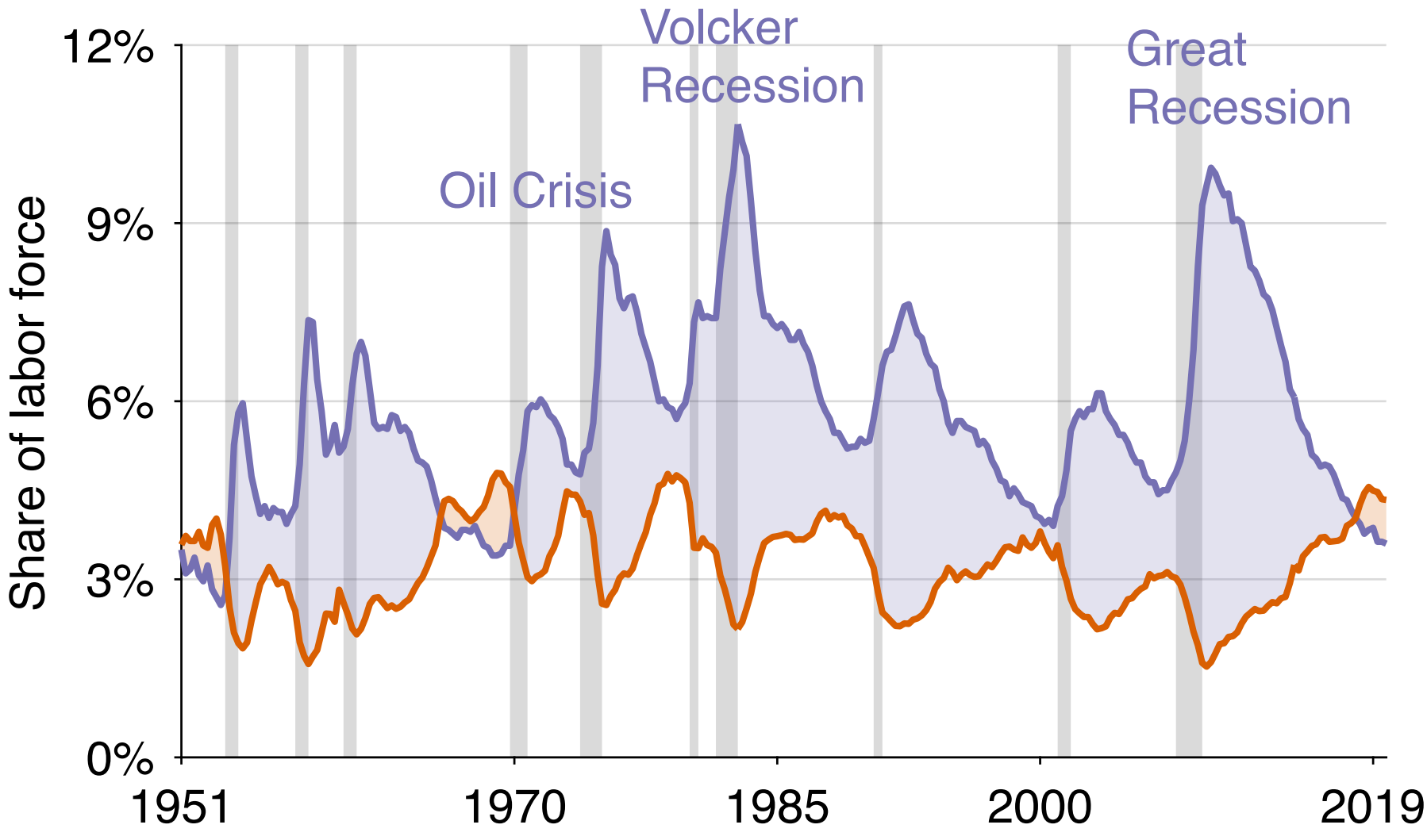
VACANCY RATE (BARNICHON 2010, JOLTS)



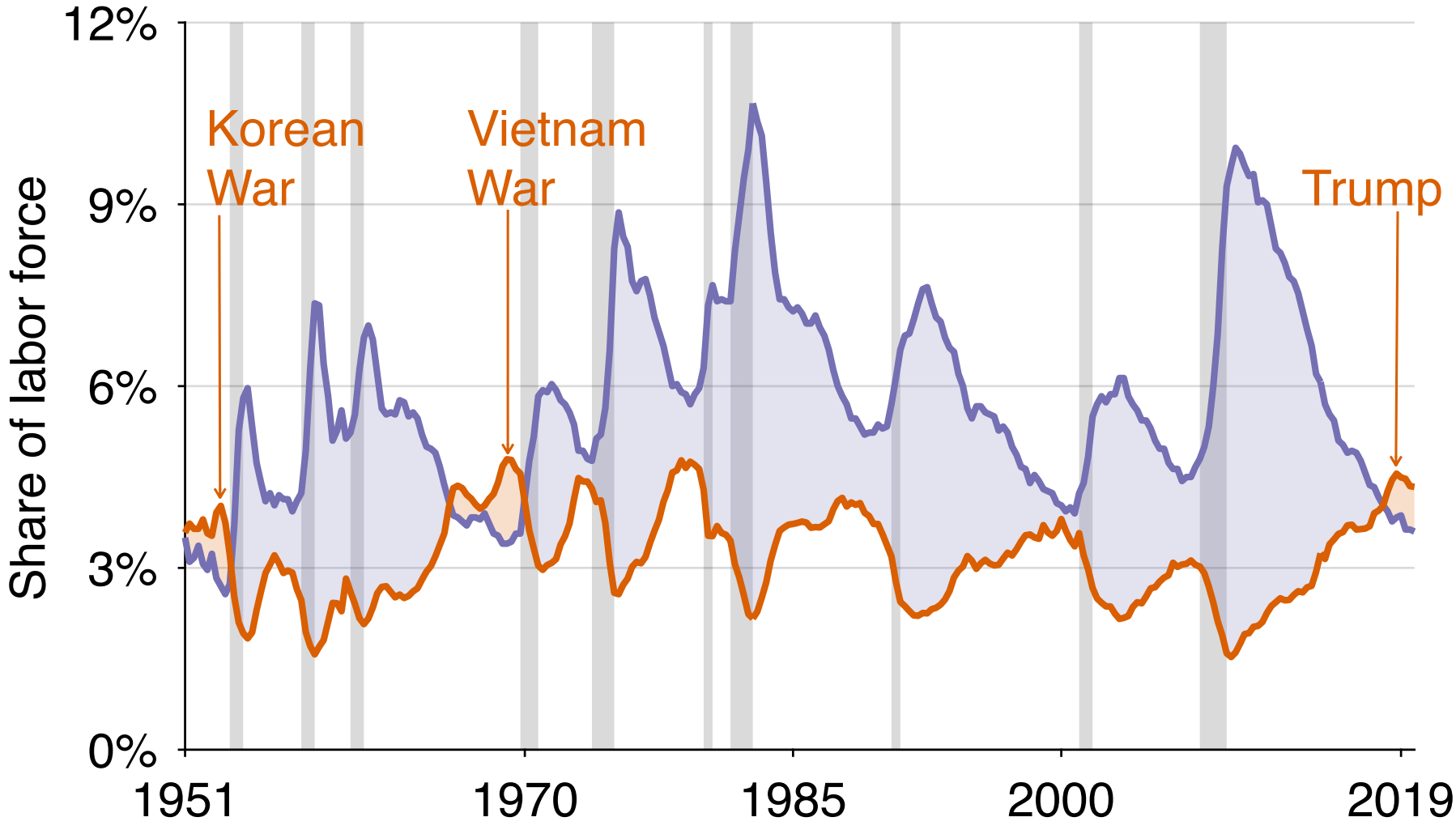
LABOR MARKET IS GENERALLY TOO SLACK. . .



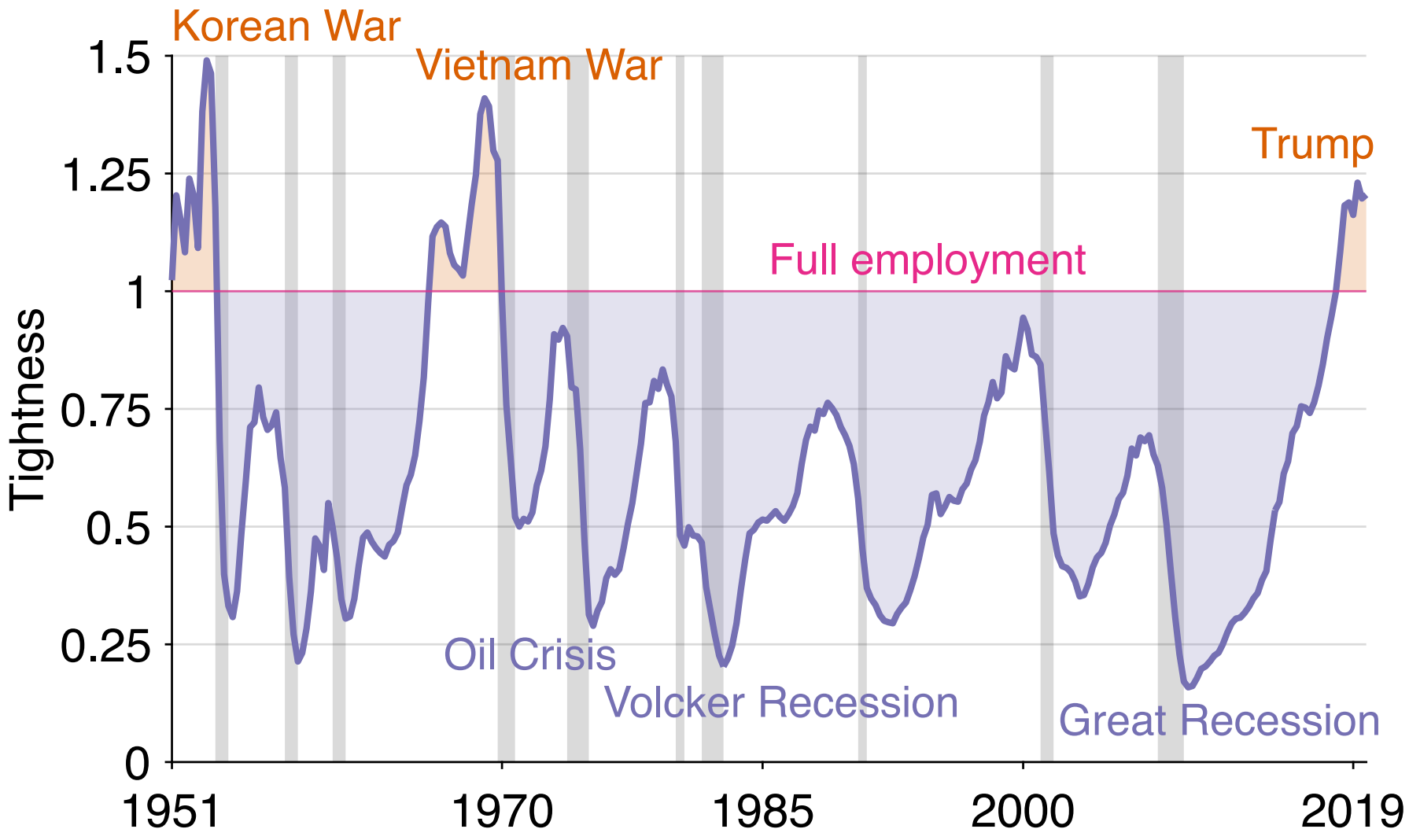
. . . AND IS ESPECIALLY SLACK IN SLUMPS



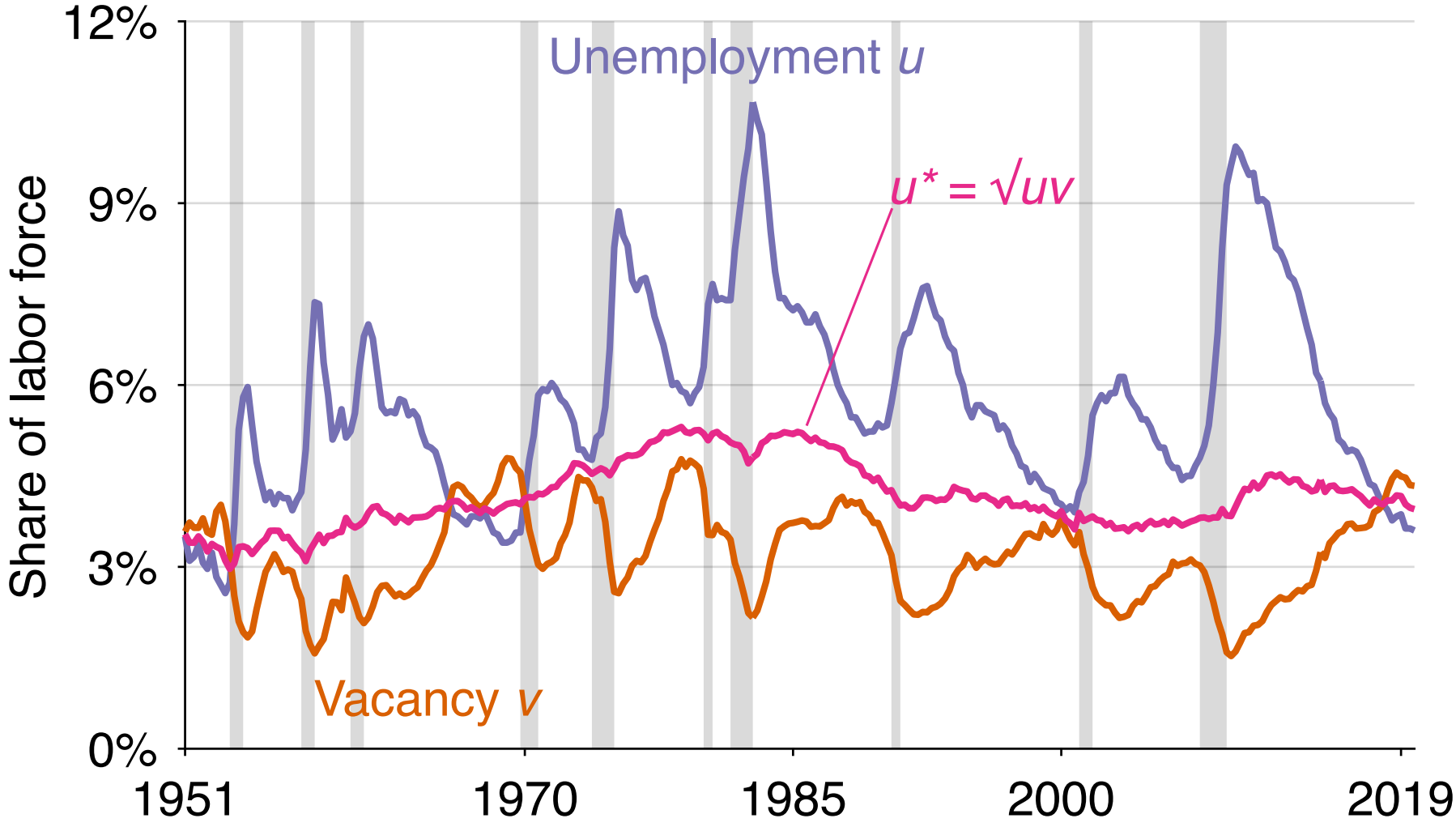
LABOR MARKET IS TOO TIGHT DURING WARS



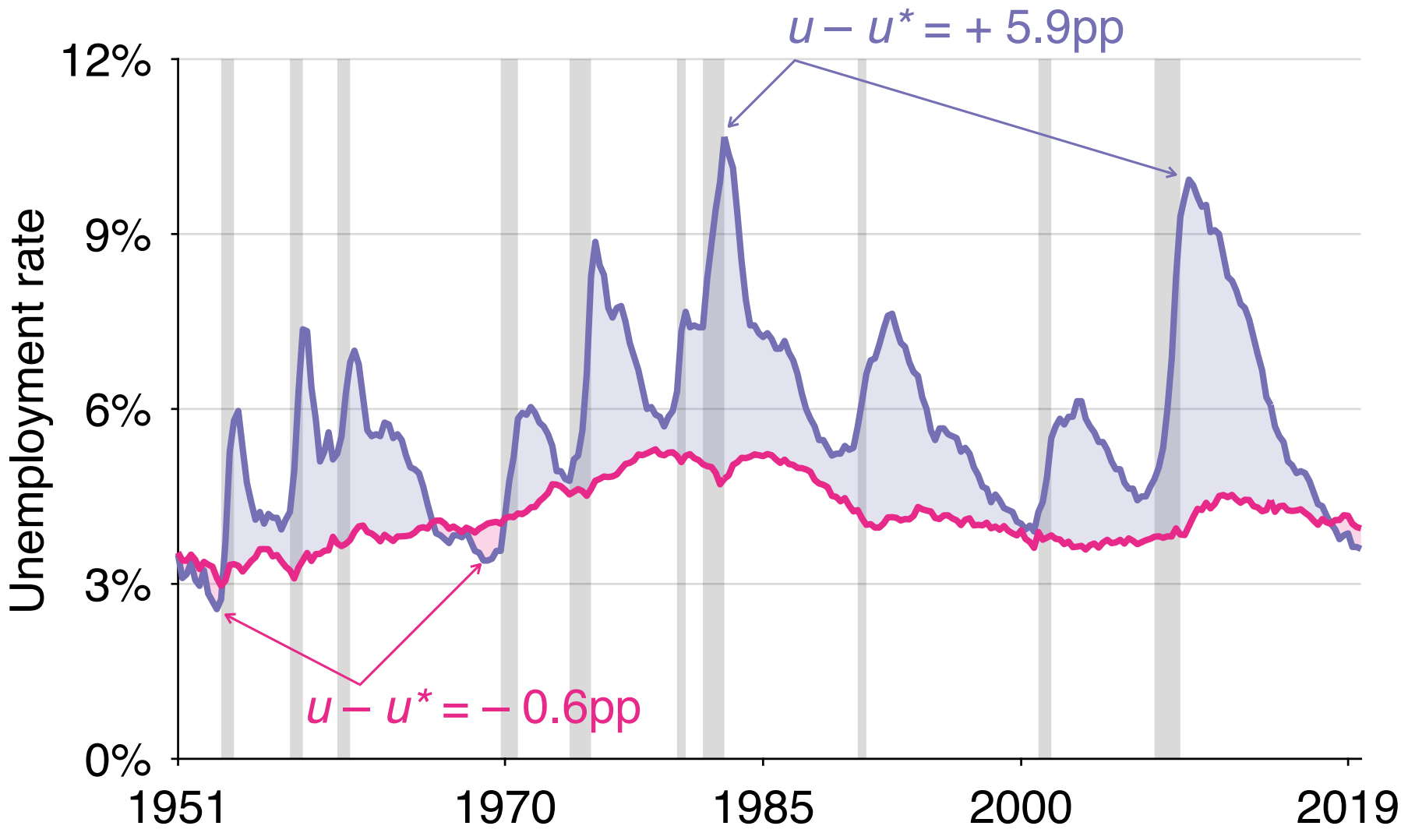
TIGHTNESS v/u SUMMARIZES STATE OF LABOR MARKET



u^* REMAINS IN 3.0%–5.3%, AVERAGES 4.2%

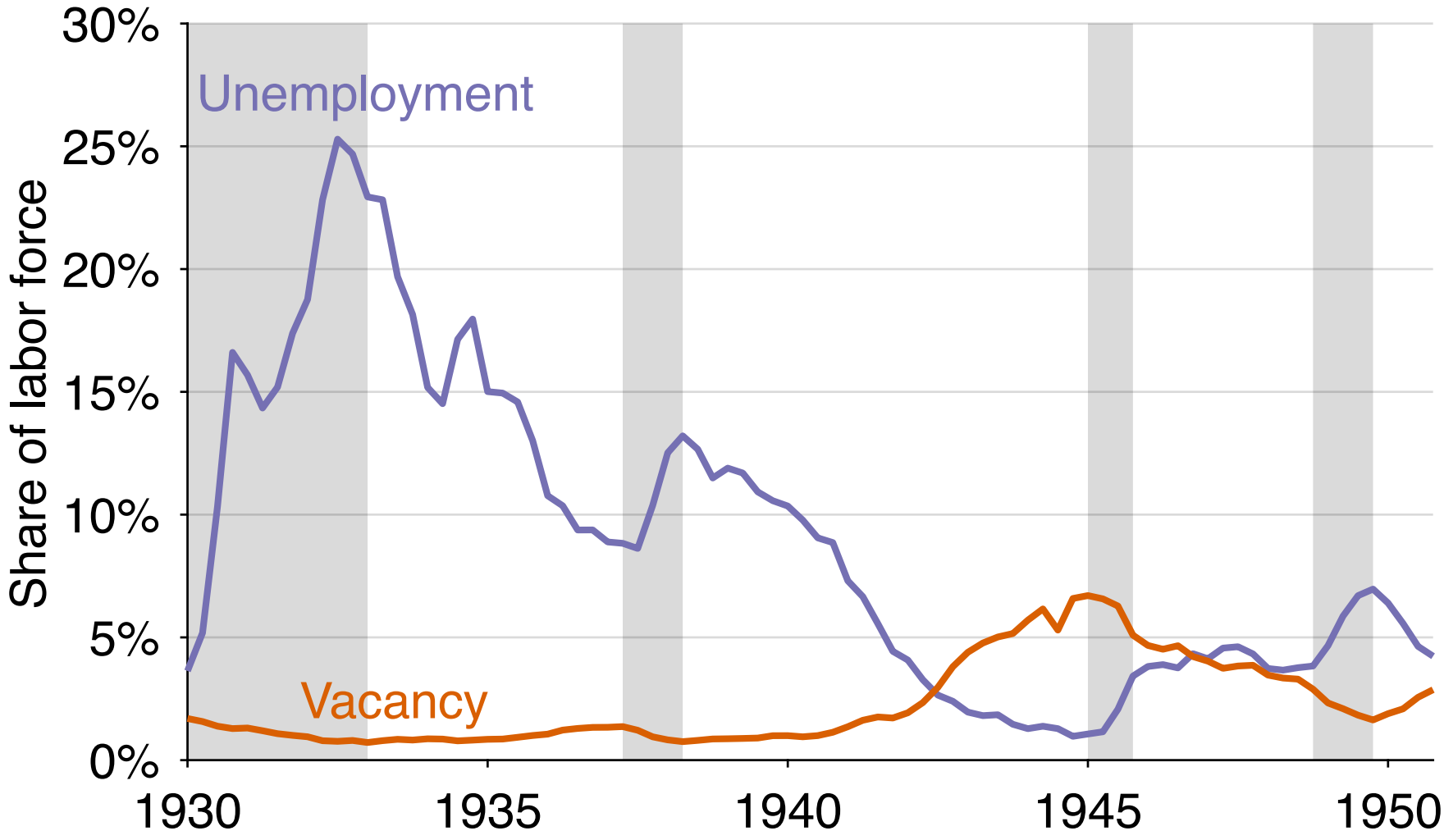


UNEMPLOYMENT GAP IS COUNTERCYCLICAL

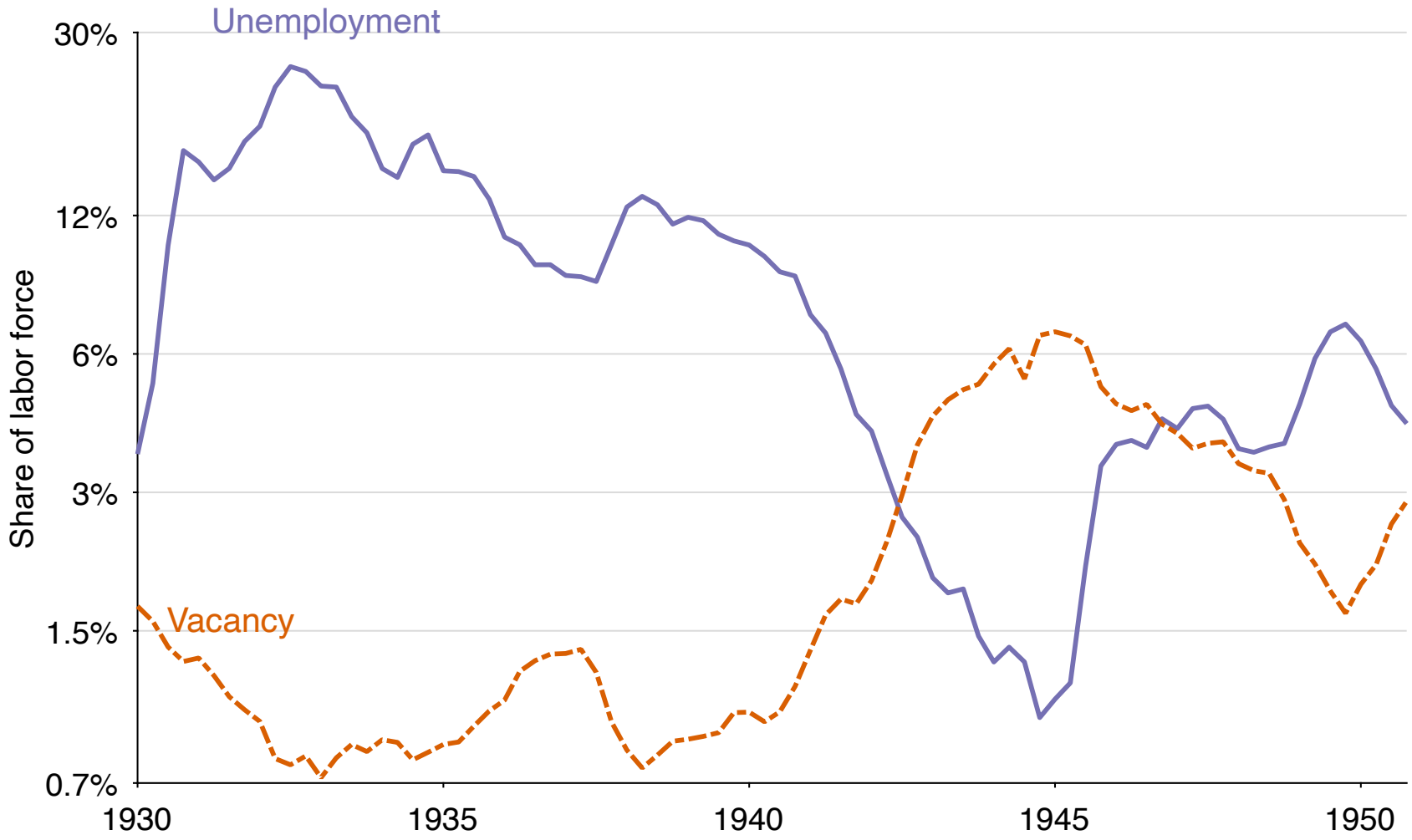


GREAT DEPRESSION IN THE UNITED STATES

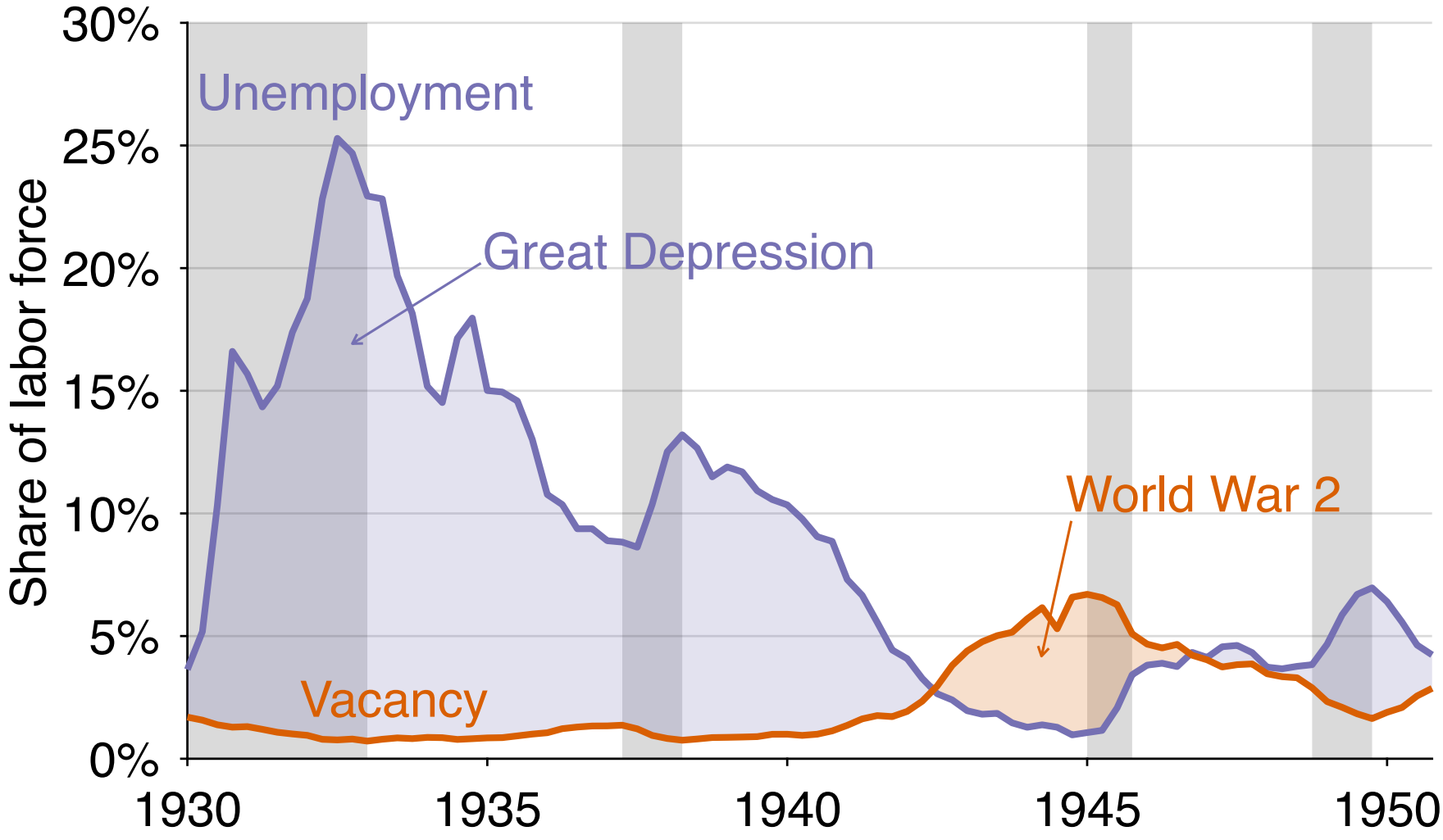
UNEMPLOYMENT & VACANCY RATES (PETROSKY-NADEAU, ZHANG 2021)



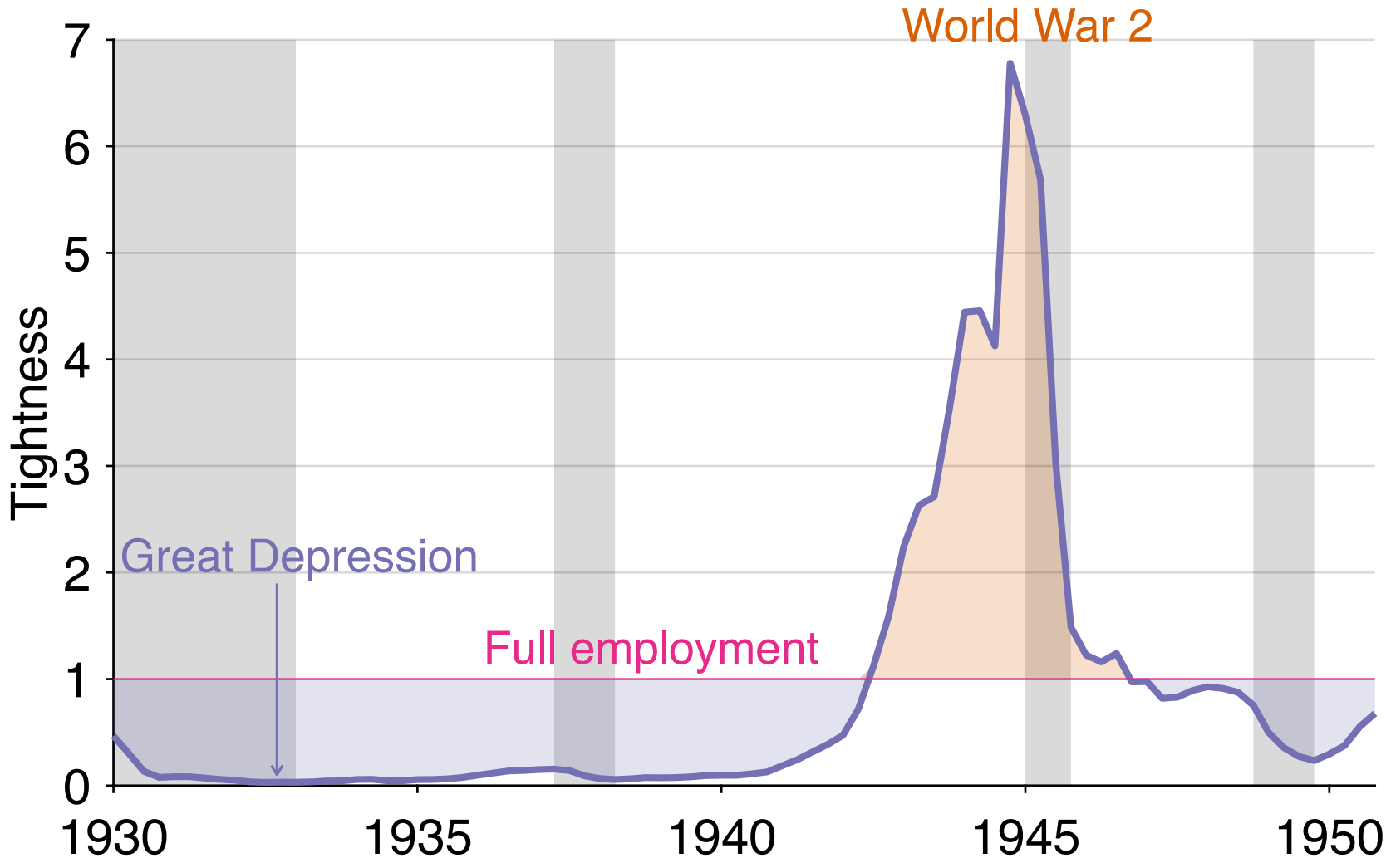
BEVERIDGE CURVE ≈ HYPERBOLA: LOG SCALE



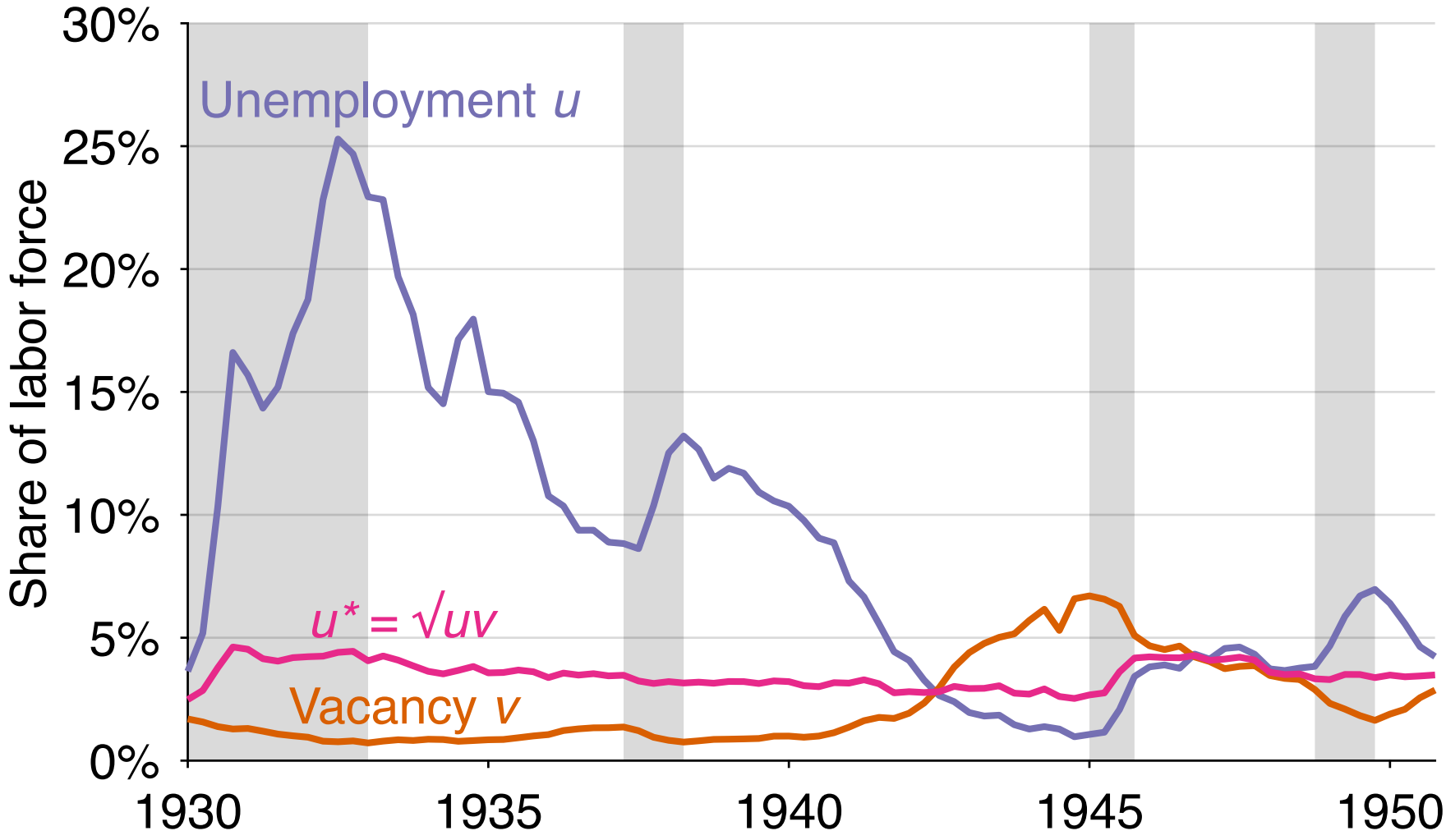
LABOR MARKET WAS TOO SLACK UNTIL WW2



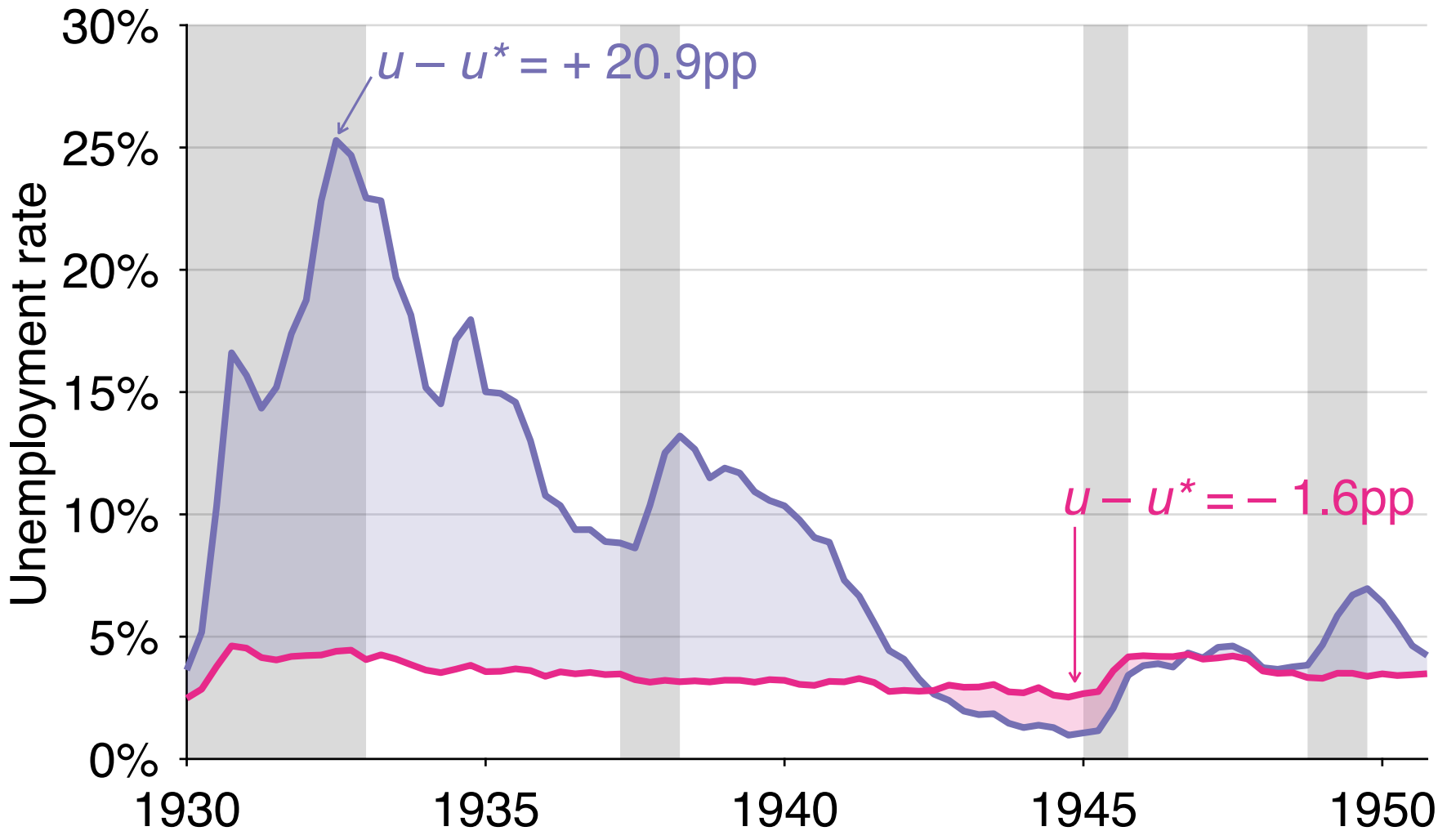
LOWEST AND HIGHEST TIGHTNESS ON RECORD



u^* REMAINS IN 2.5%–4.6%, AVERAGES 3.5%

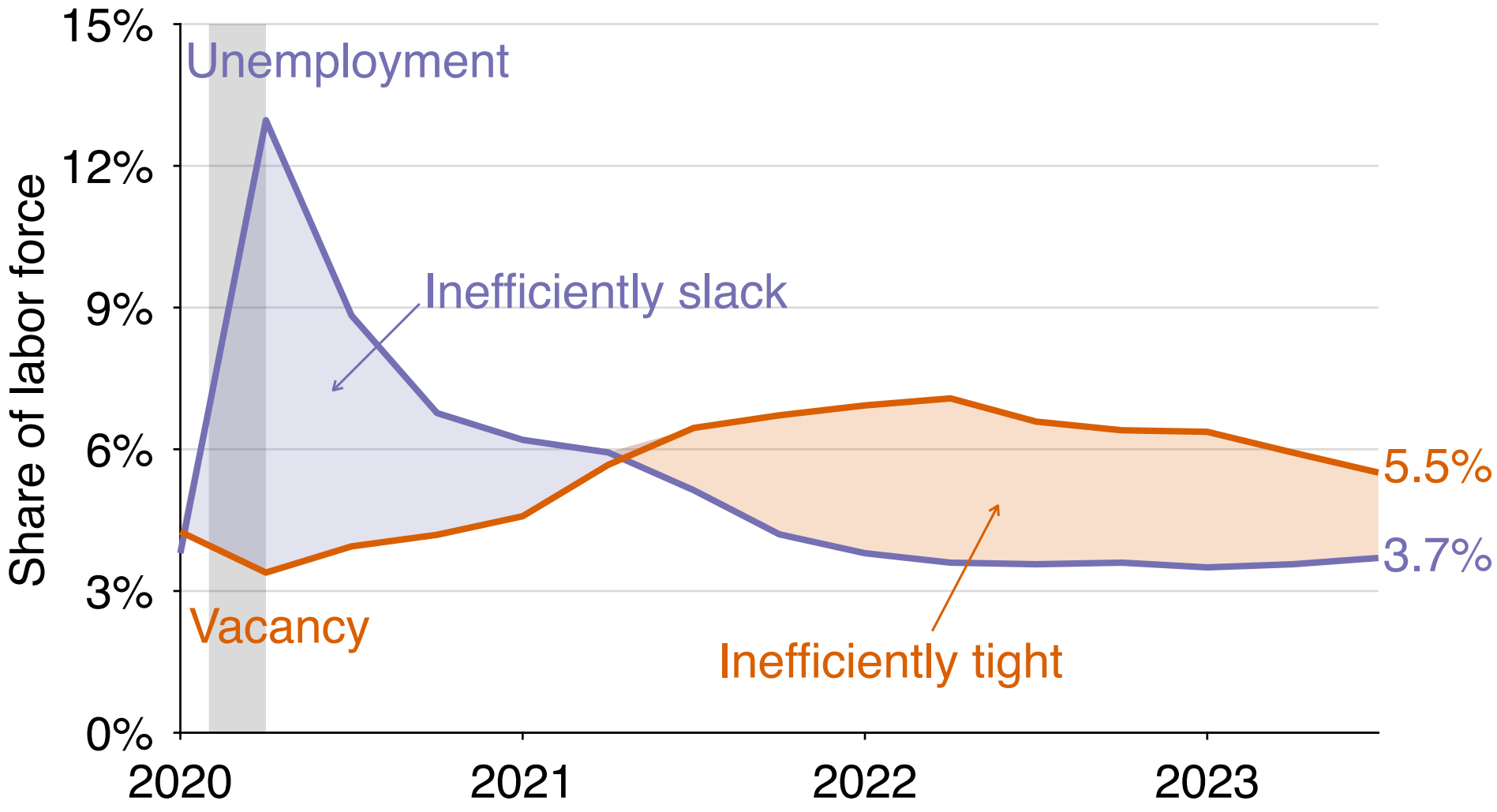


MOST EXTREME UNEMPLOYMENT GAPS ON RECORD

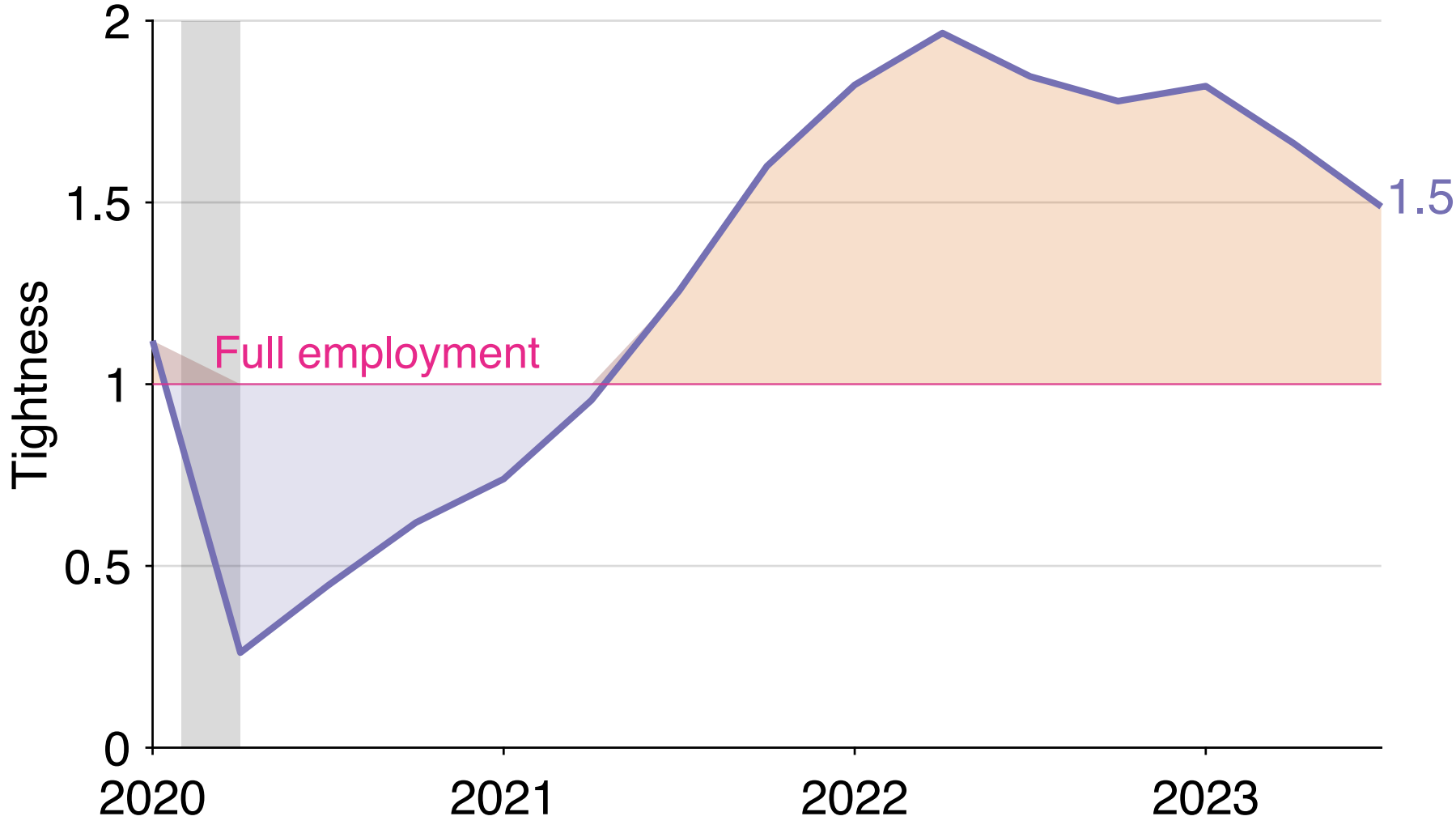


PANDEMIC IN THE UNITED STATES

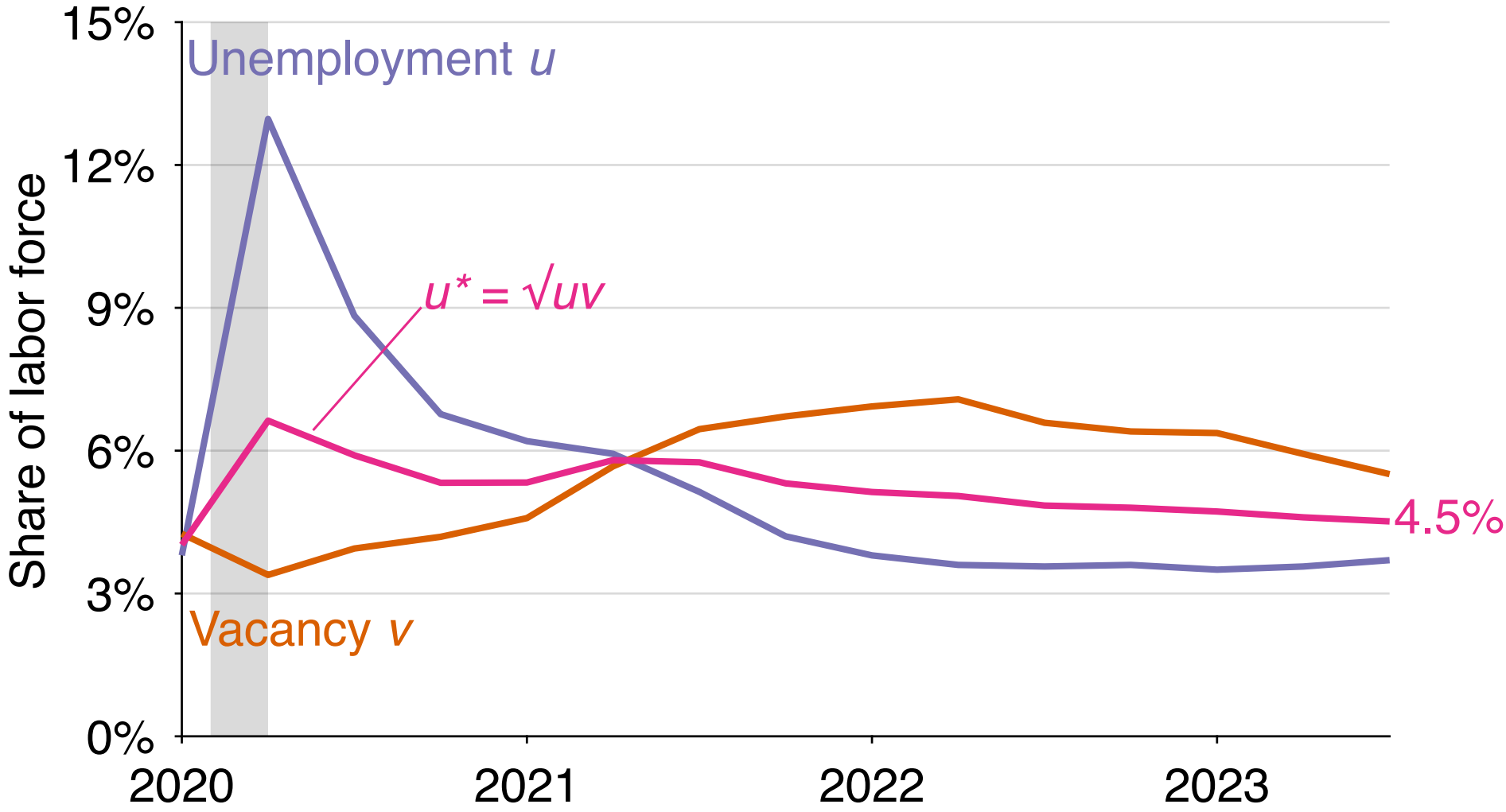
LABOR MARKET HAS BEEN TOO TIGHT SINCE 2021Q3...



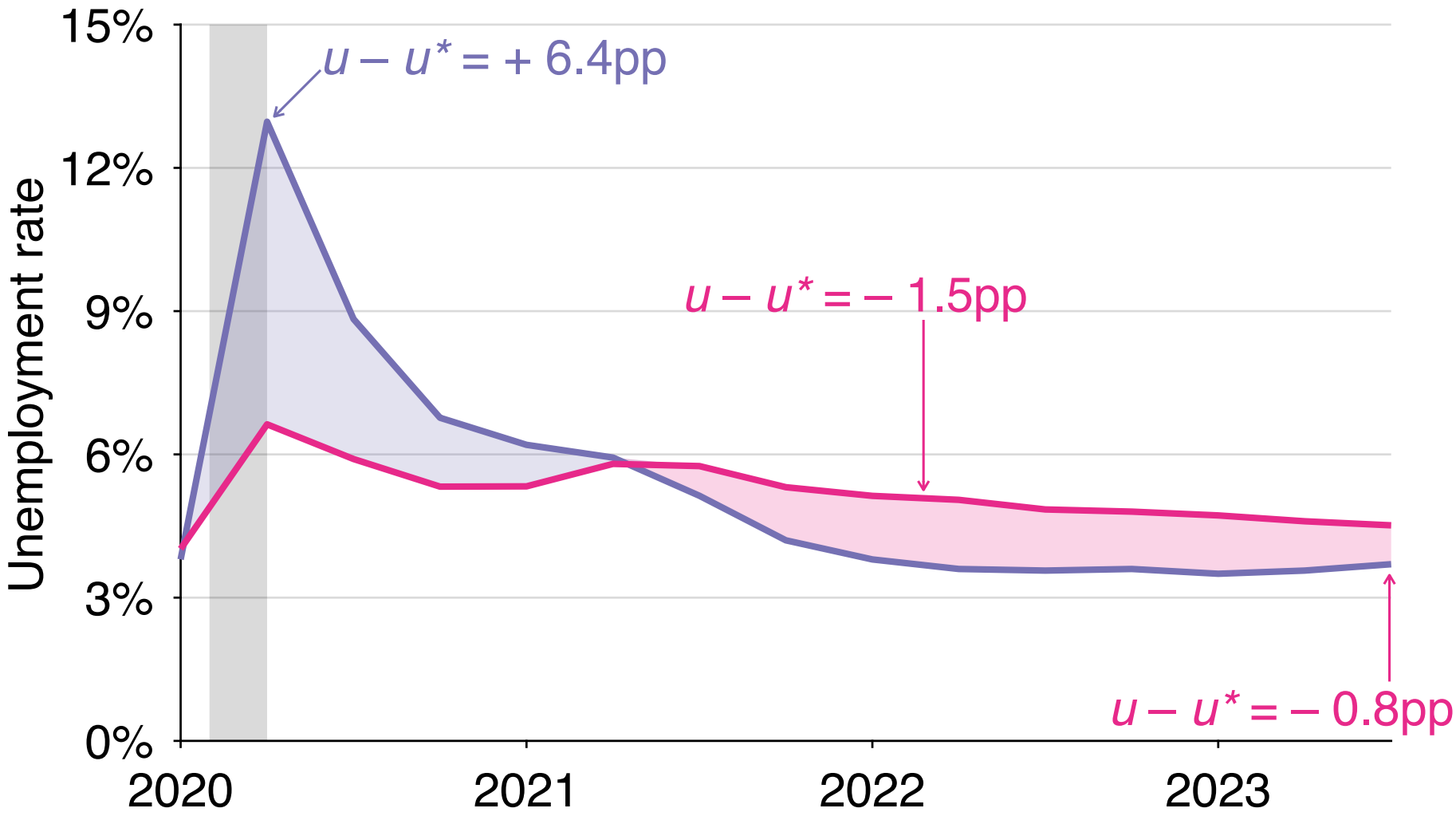
. . . BUT IT HAS BEEN COOLING SINCE 2022Q2



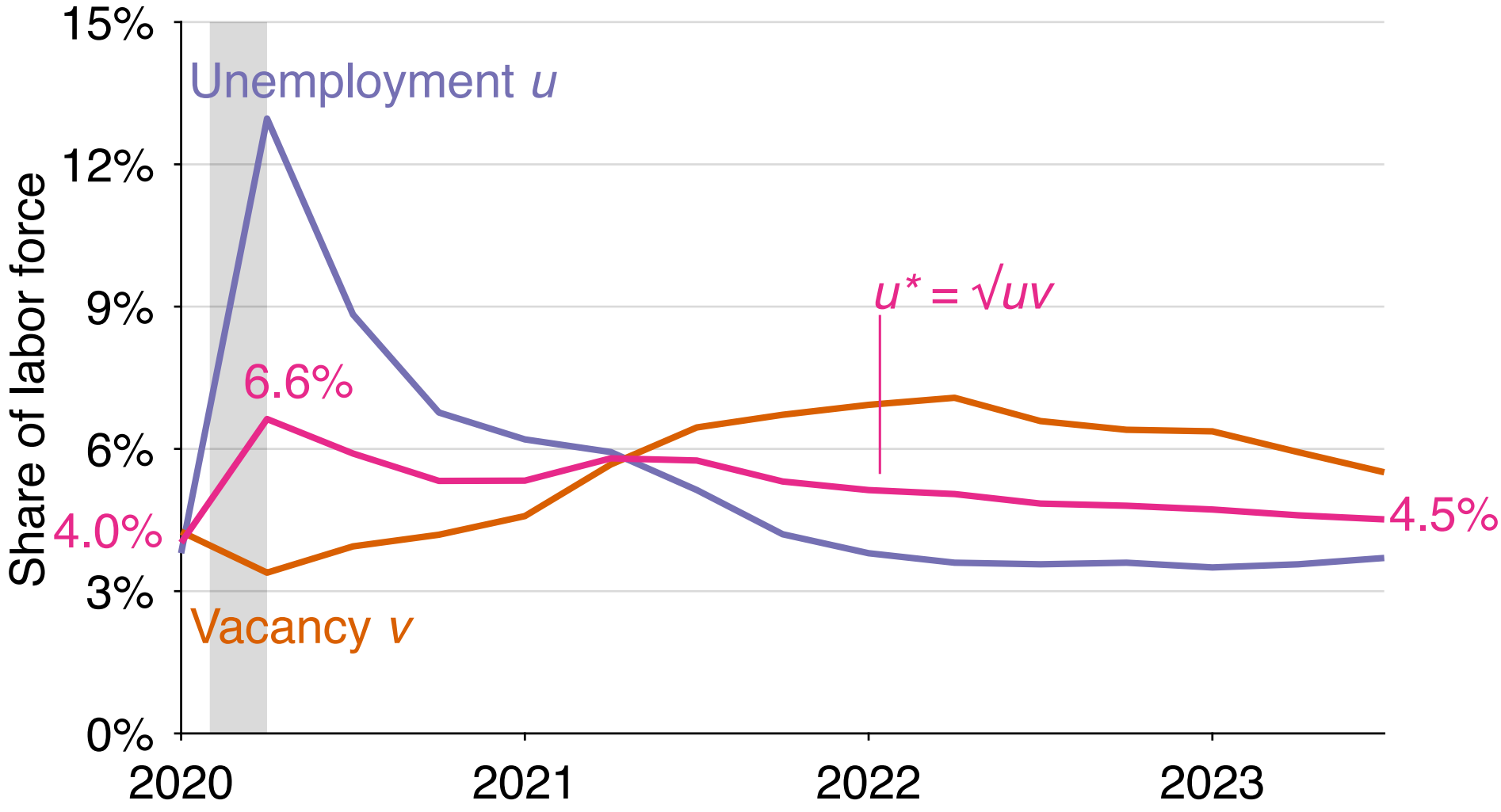
CURRENT TARGET FOR MONETARY POLICY: $u^* = 4.5\%$



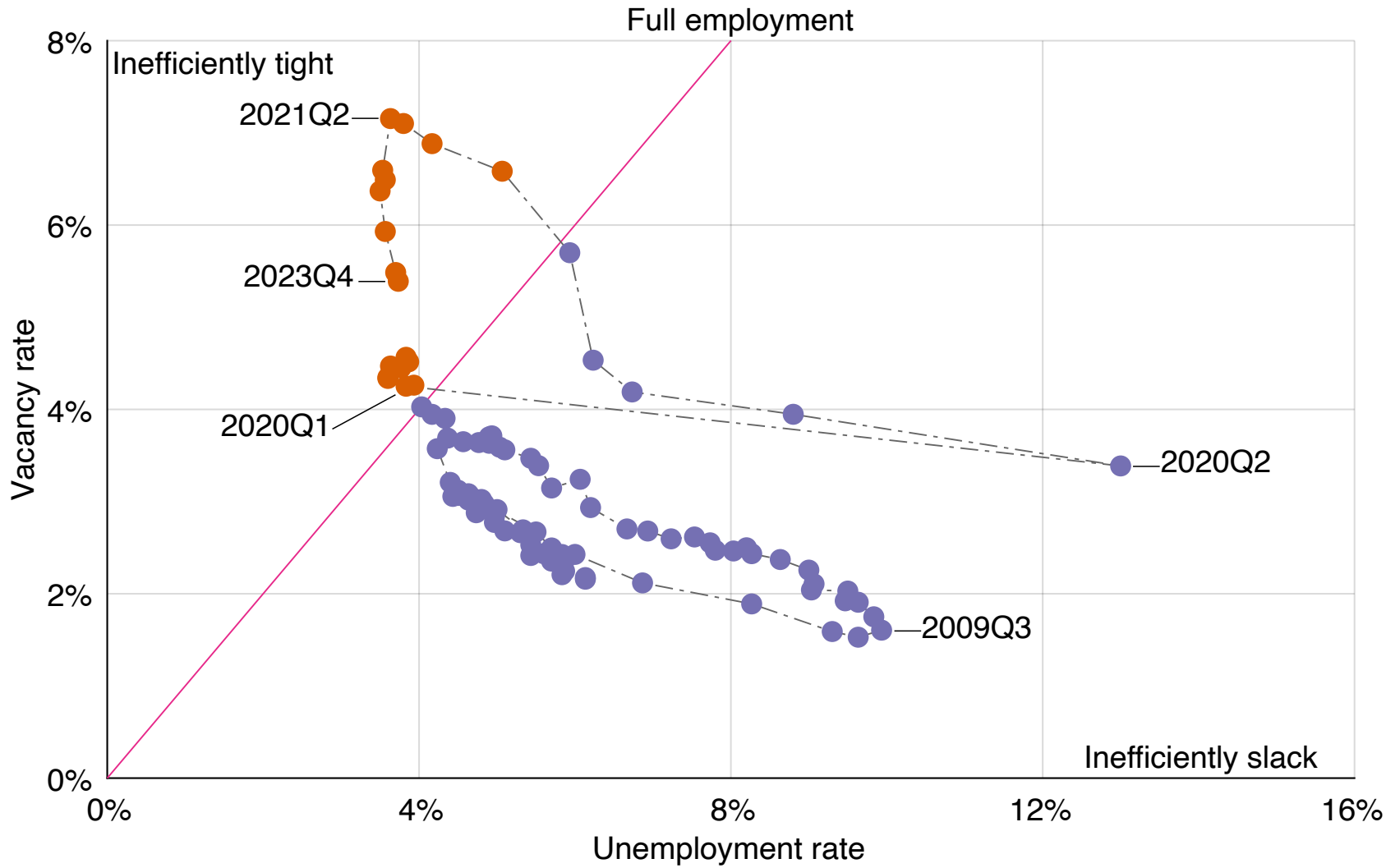
MOST EXTREME UNEMPLOYMENT GAPS SINCE WW2



WHY DID u^* INCREASE SO MUCH IN 2020?

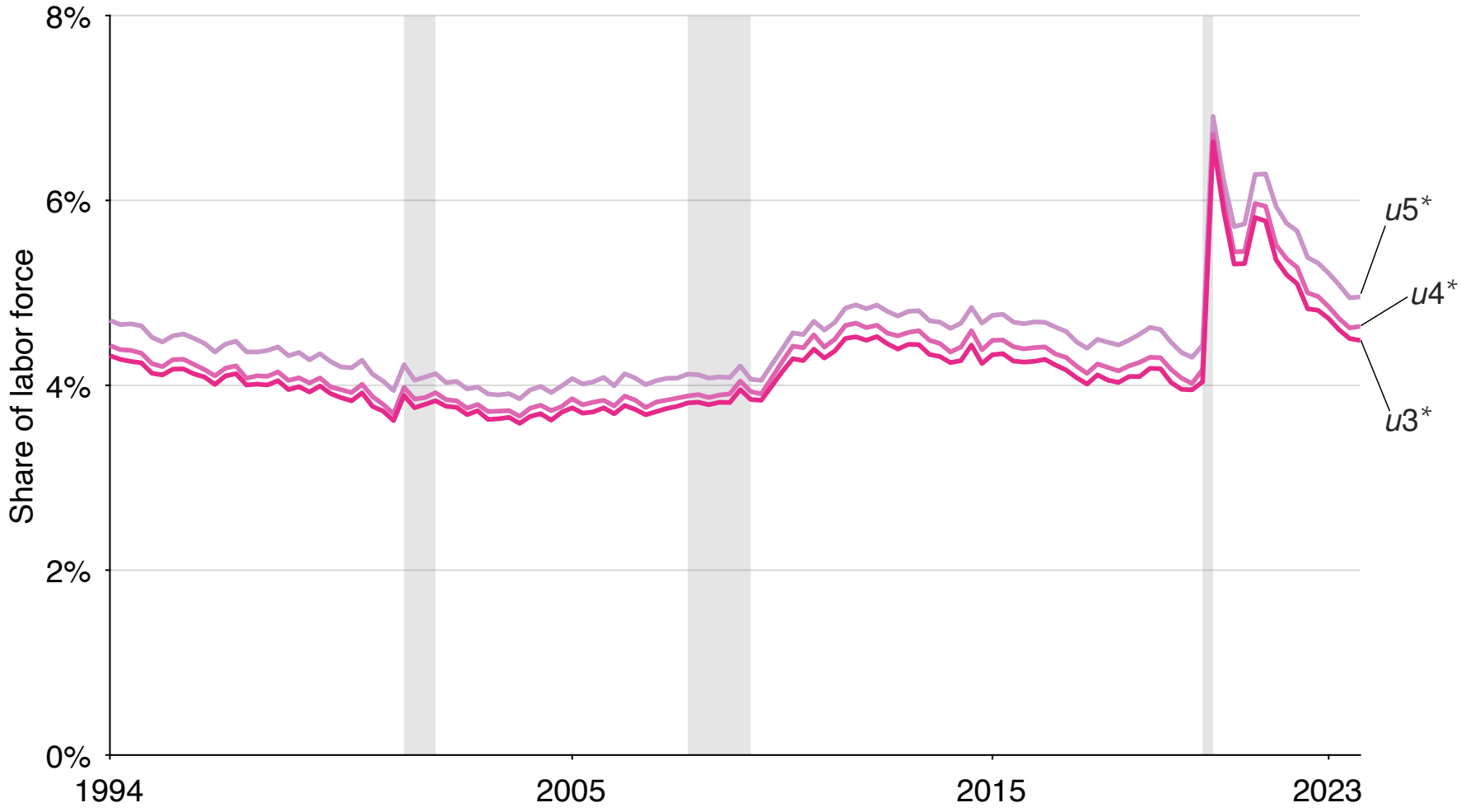


BECAUSE OF LARGE SHIFT OF BEVERIDGE CURVE IN 2020Q2

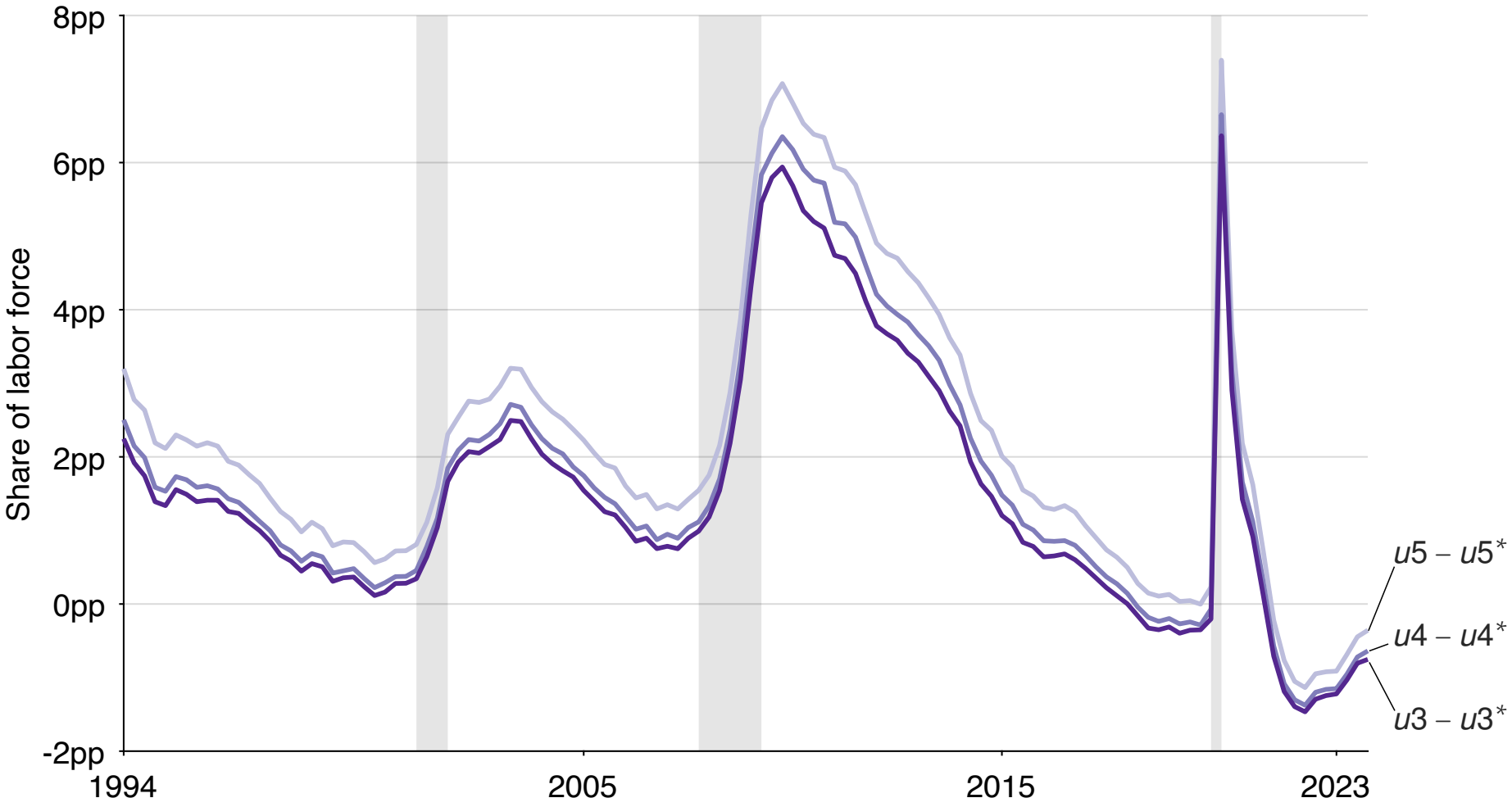


ROBUSTNESS

FERU WITH DIFFERENT MEASURES OF UNEMPLOYMENT



FERU WITH DIFFERENT MEASURES OF UNEMPLOYMENT



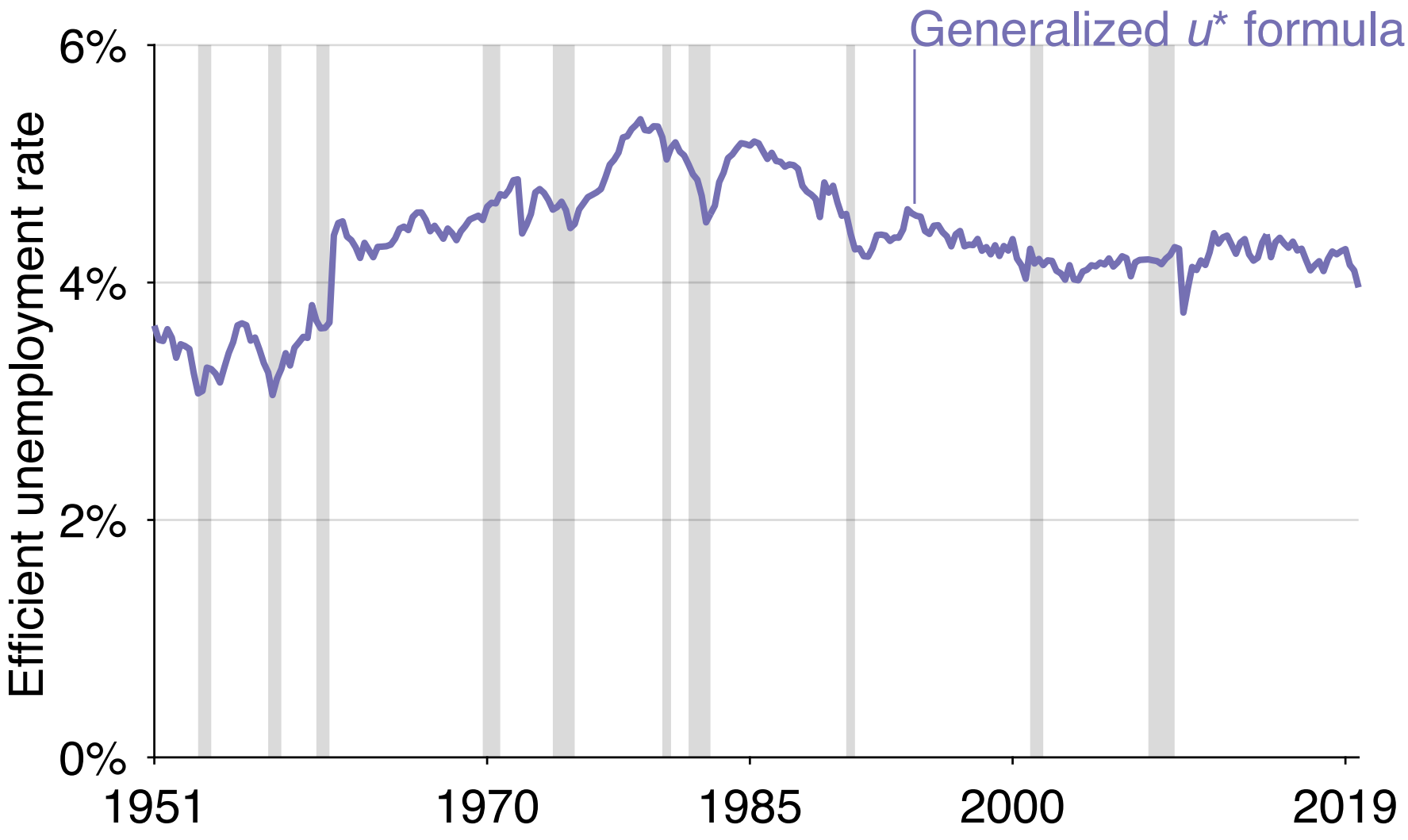
MORE GENERAL FERU FORMULA (MICHAILLAT, SAEZ 2021)

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

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

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

SIMPLE VERSUS GENERALIZED FERU FORMULA



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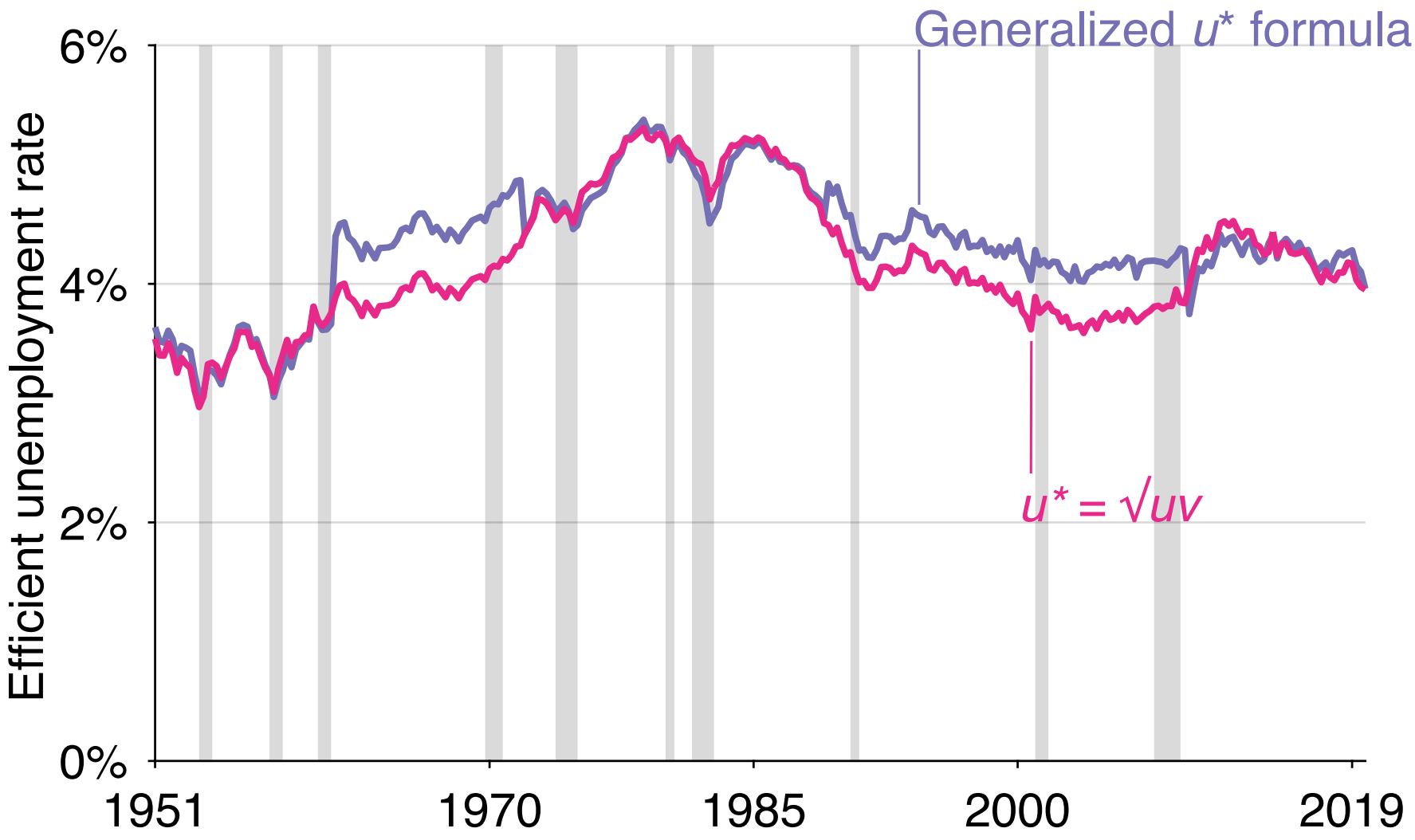
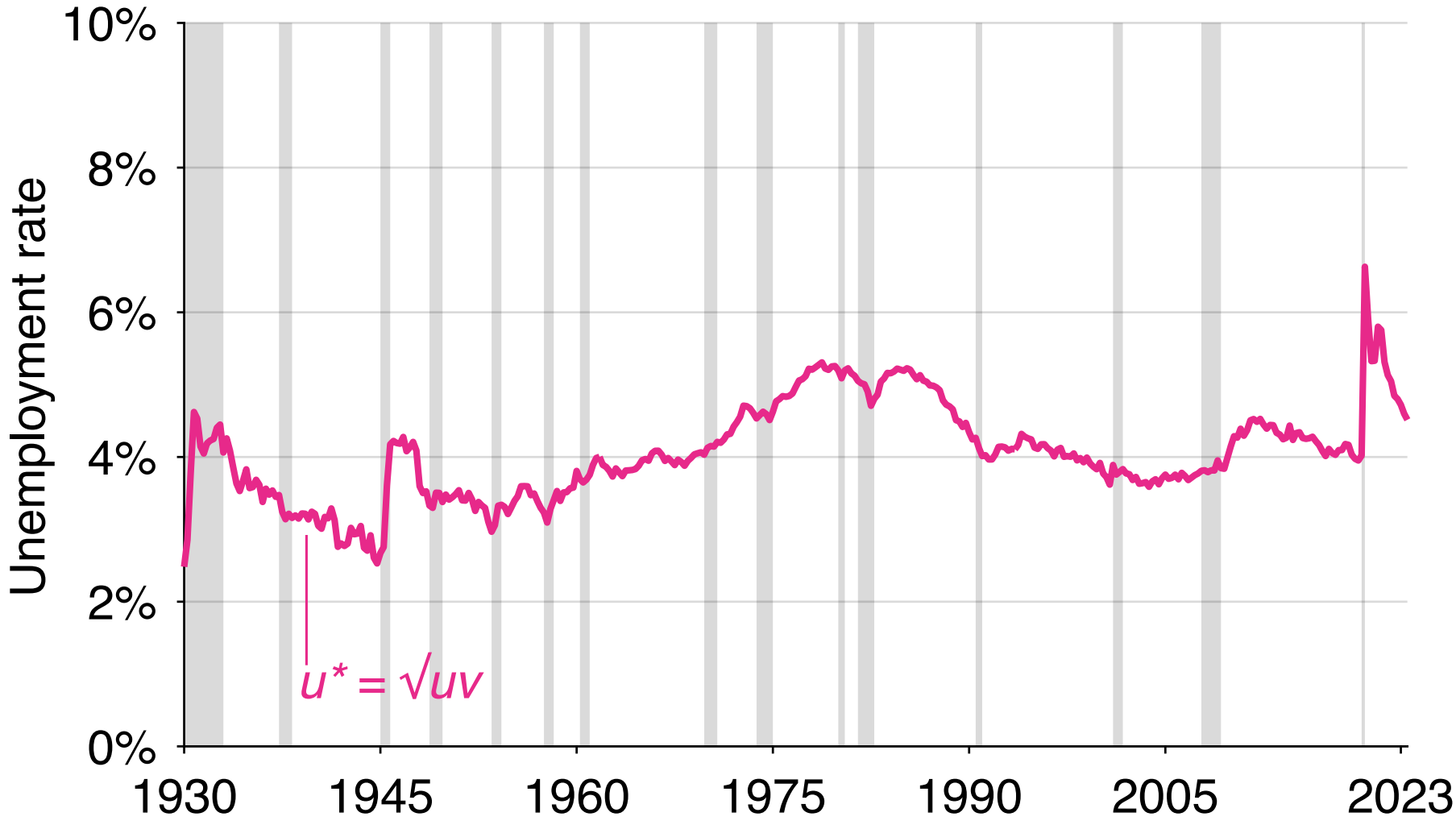
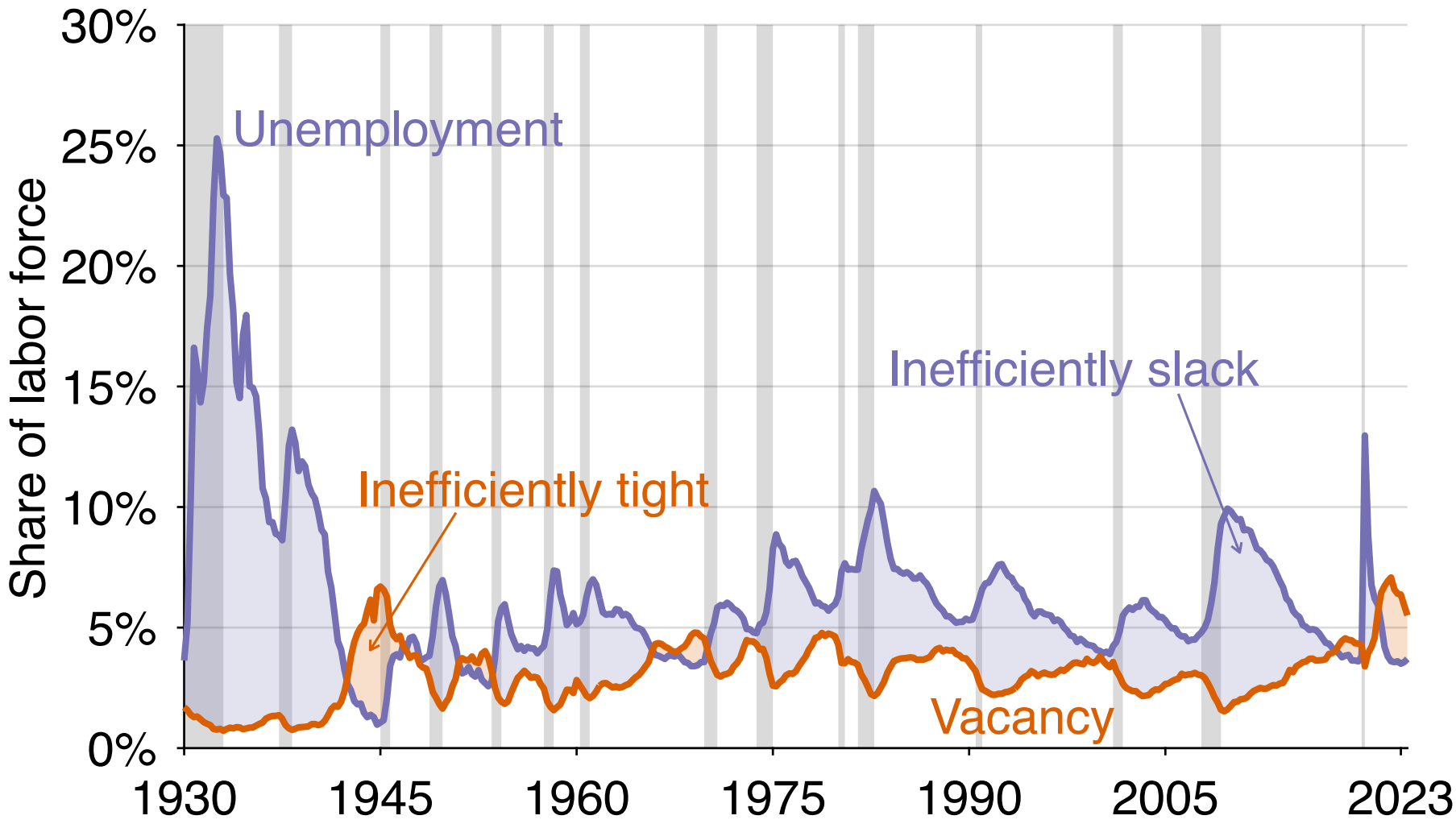


WHY HAS THE US LABOR MARKET BEEN SO SLACK IN THE PAST CENTURY?

$u^* = \sqrt{uv}$ AVERAGES 4.1% OVER 1930–2023



US LABOR MARKET IS GENERALLY INEFFICIENTLY SLACK



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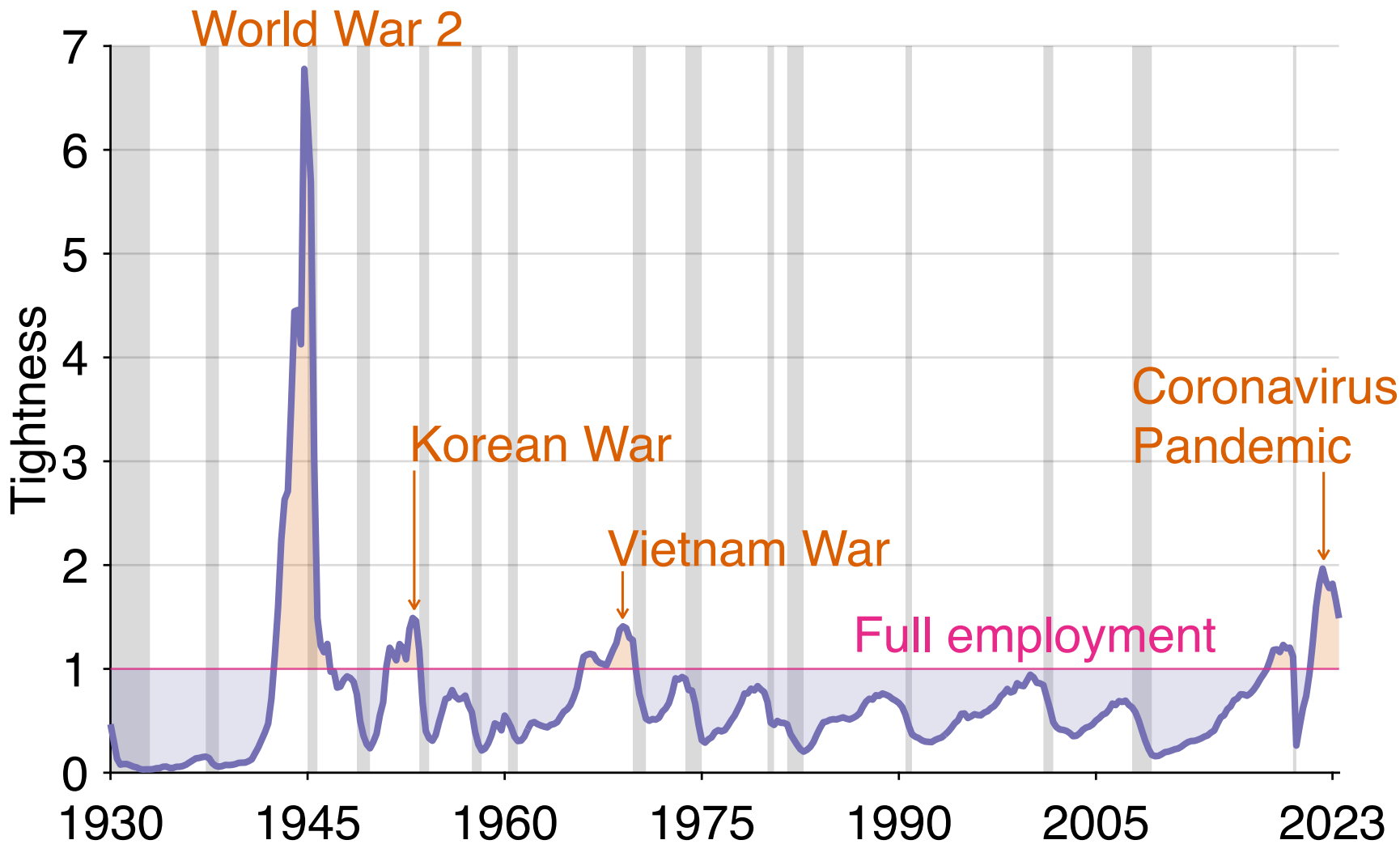
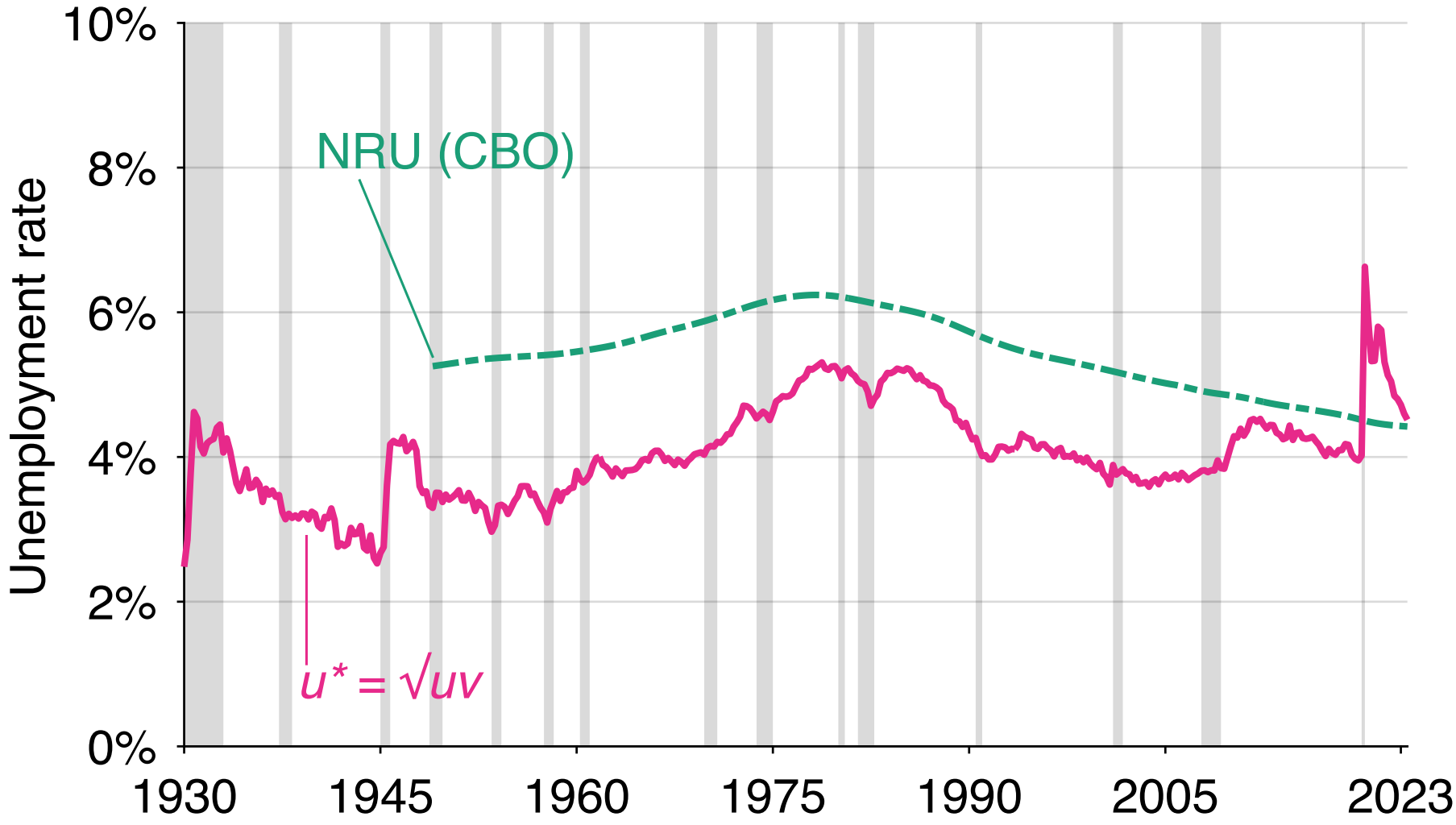


$u^* = \sqrt{uv}$ IS LOWER THAN EXISTING TARGETS



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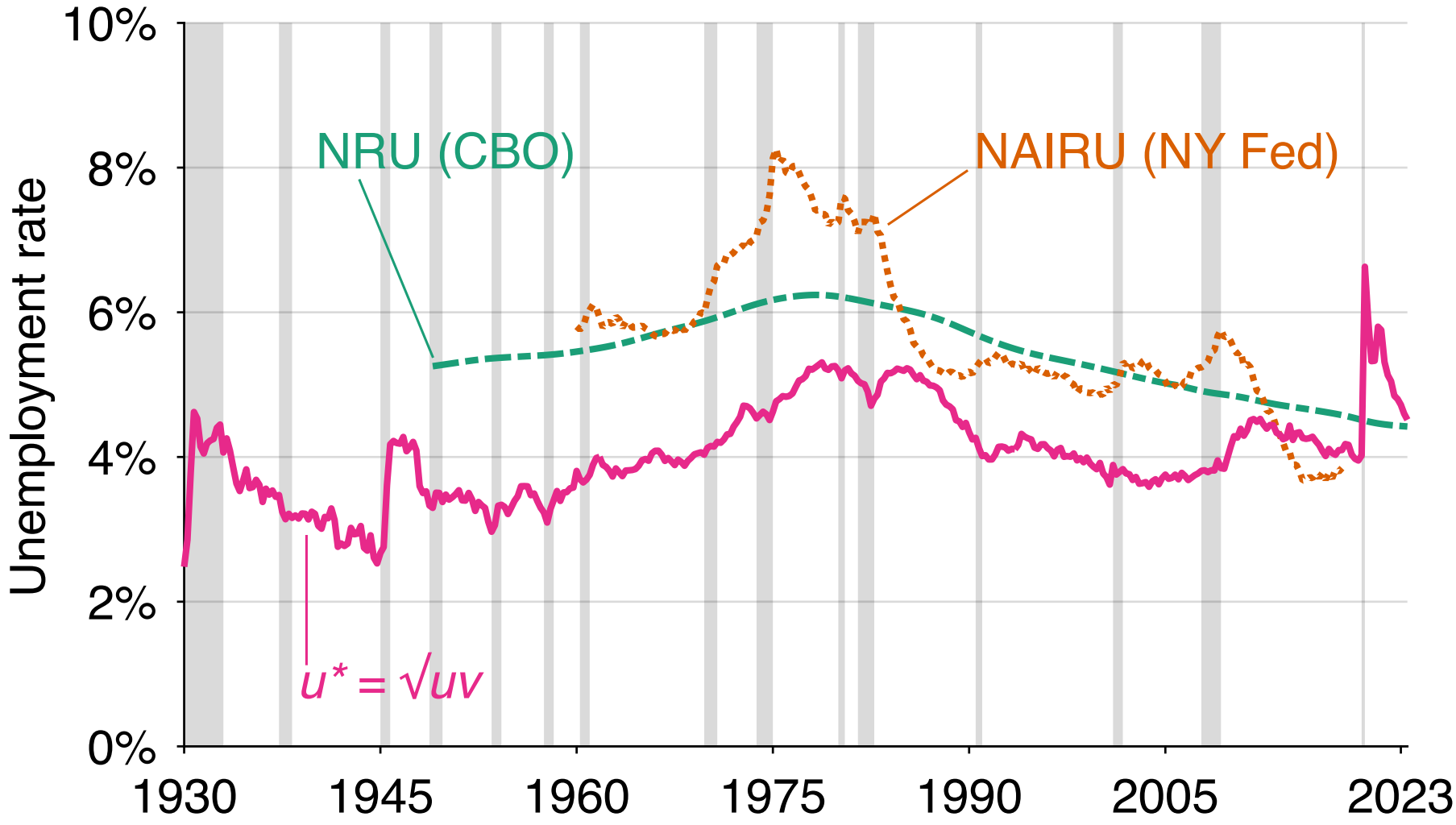

OTHER REASONS FOR DEPARTURES FROM FULL EMPLOYMENT

- Great Depression:
  - gold standard (Eichengreen, Temin 2000)
  - policy errors (Friedman, Schwartz 1963)
- World War 2, Korean War, Vietnam War:
  - pressure from White House to keep interest rates low to help finance war effort (Bernanke 2022)
- Volker–Greenspan era:
  - priority given to inflation at the expense of unemployment (Thornton 2011; Kaya et al 2019; Hess, Shelton 2016)
- Great Recession, pandemic:
  - zero lower bound on nominal interest rate