$u^* = \sqrt{uv}$

Pascal Michaillat, Emmanuel Saez

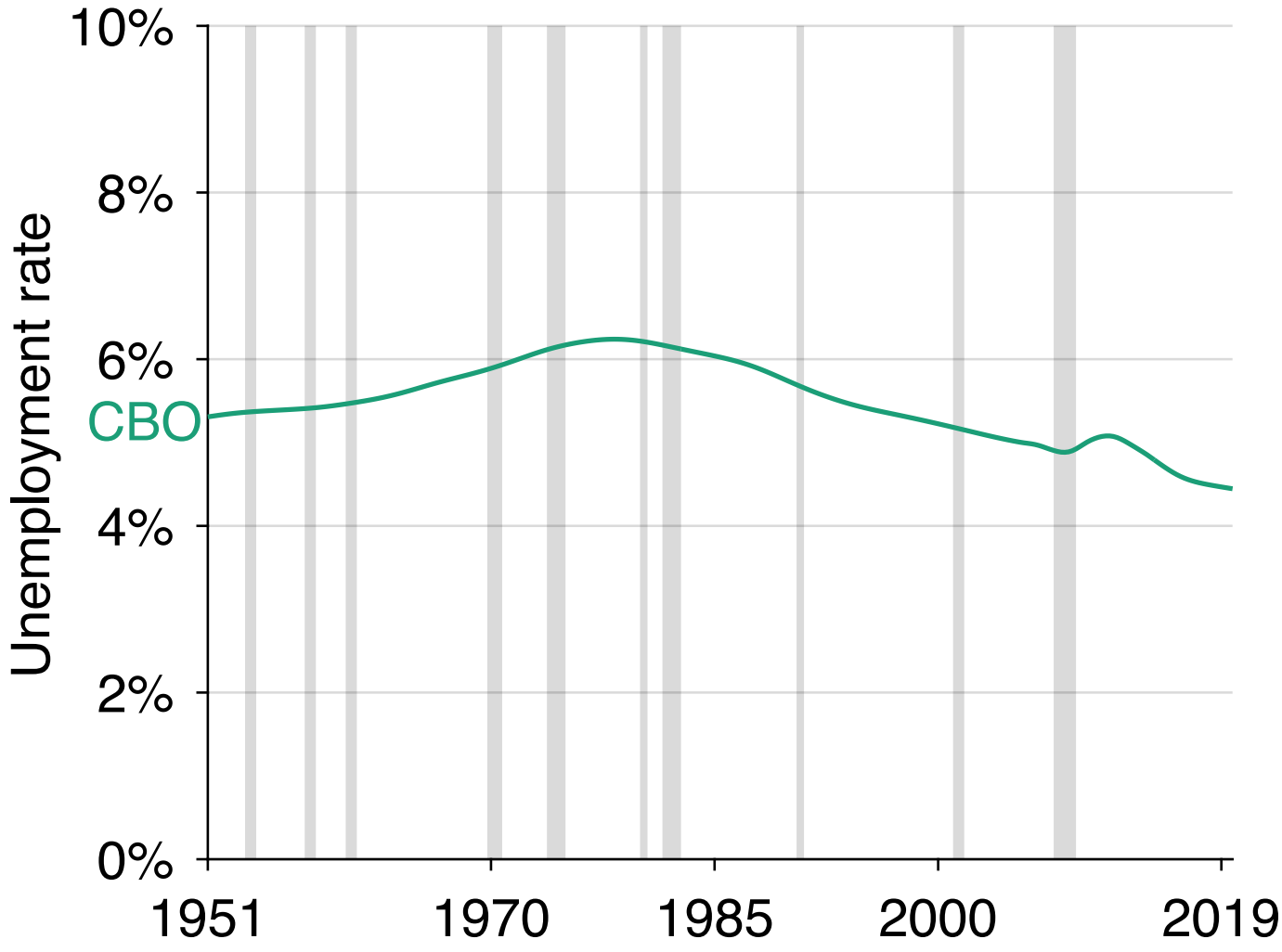
April 2022

Paper available at https://www.pascalmichaillat.org/13.html

A FORMULA FOR EFFICIENT UNEMPLOYMENT, u^*

- ⇝ sufficient statistic for optimal stabilization policies
  - monetary policy
  - fiscal policy
  - unemployment insurance
- ⇝ welfare-based measure of “full employment”
  - statutory target for US policymakers
  - Full Employment and Balanced Growth Act of 1978

EXISTING MEASURES OF "FULL EMPLOYMENT"



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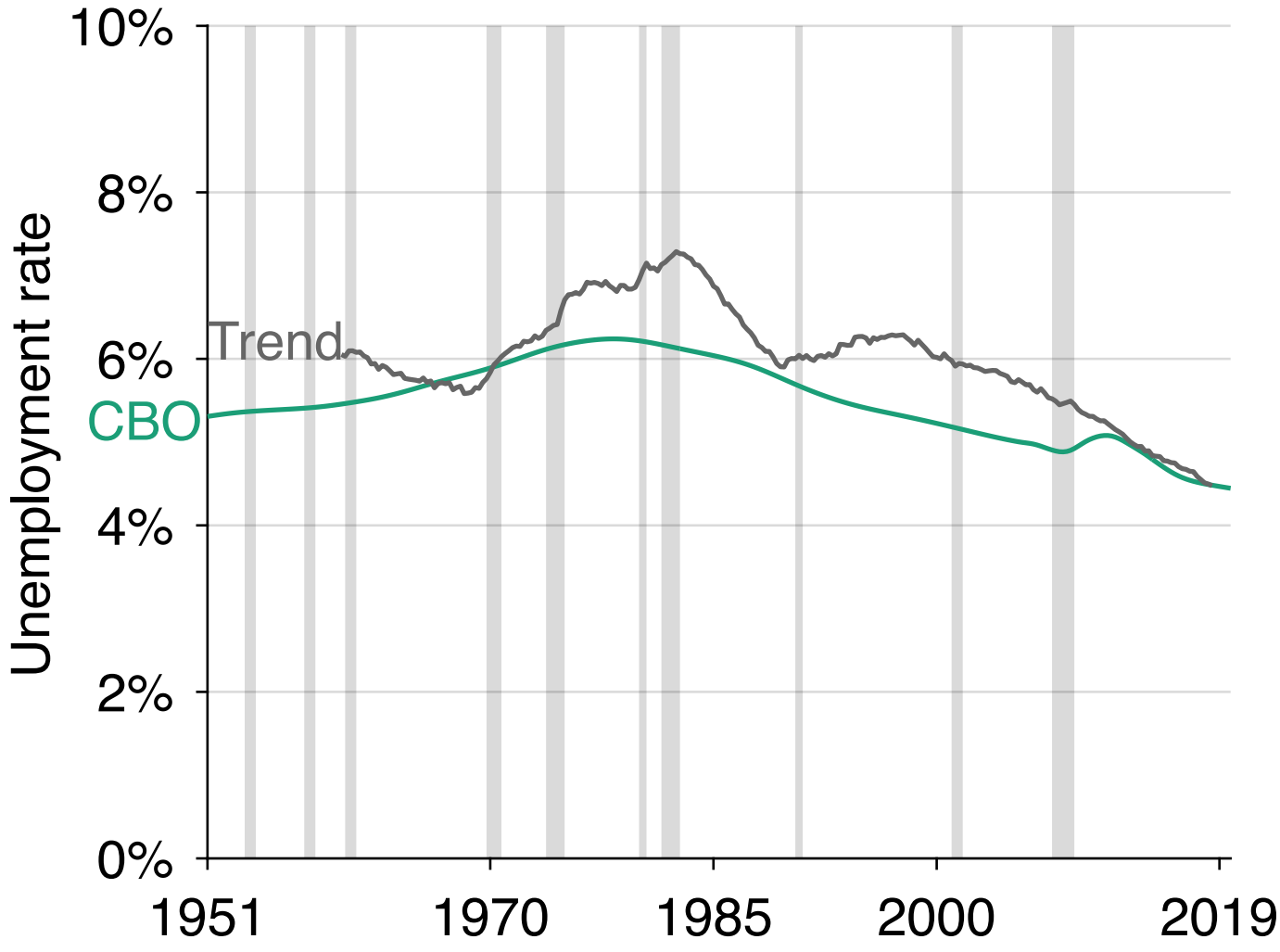

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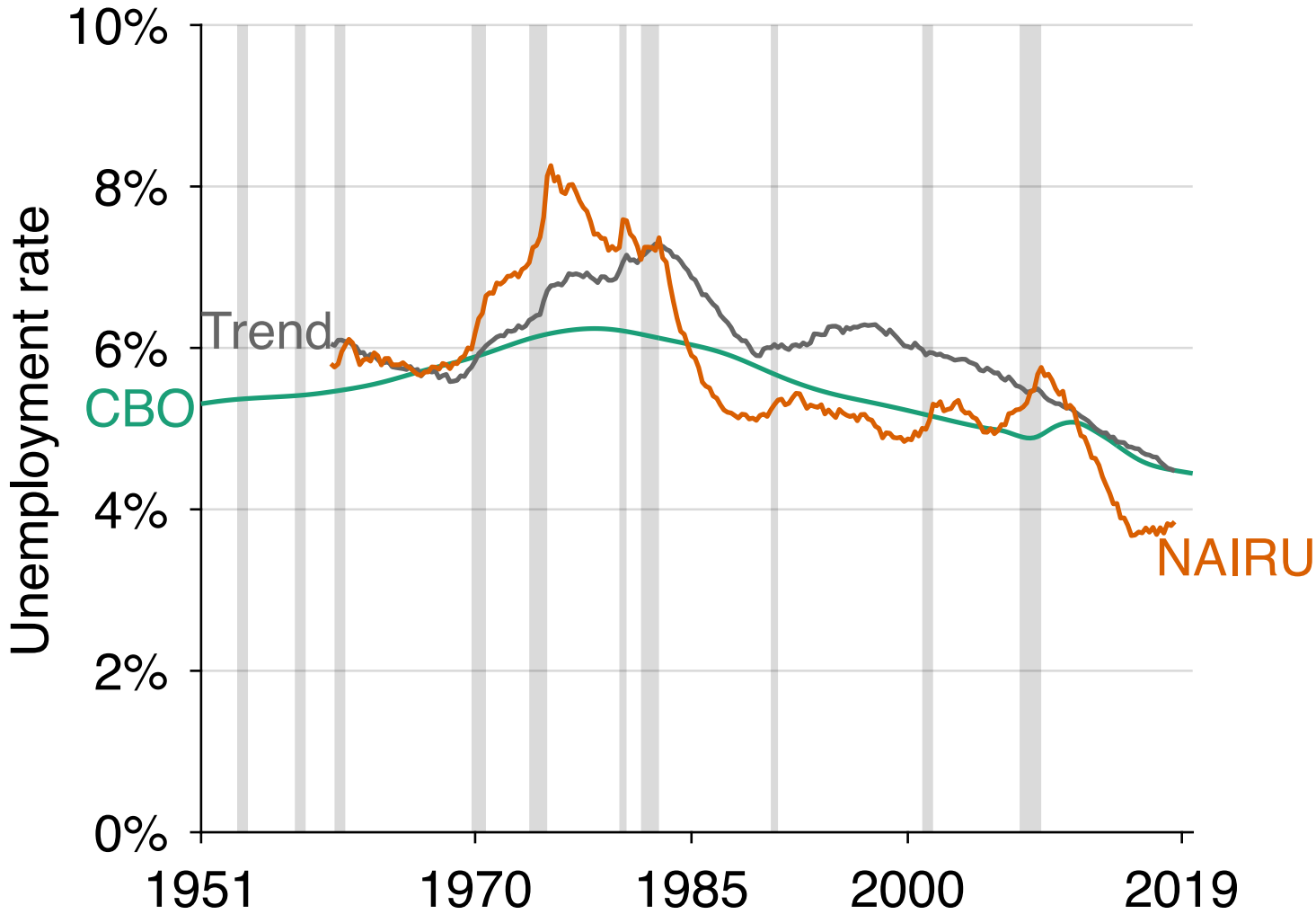

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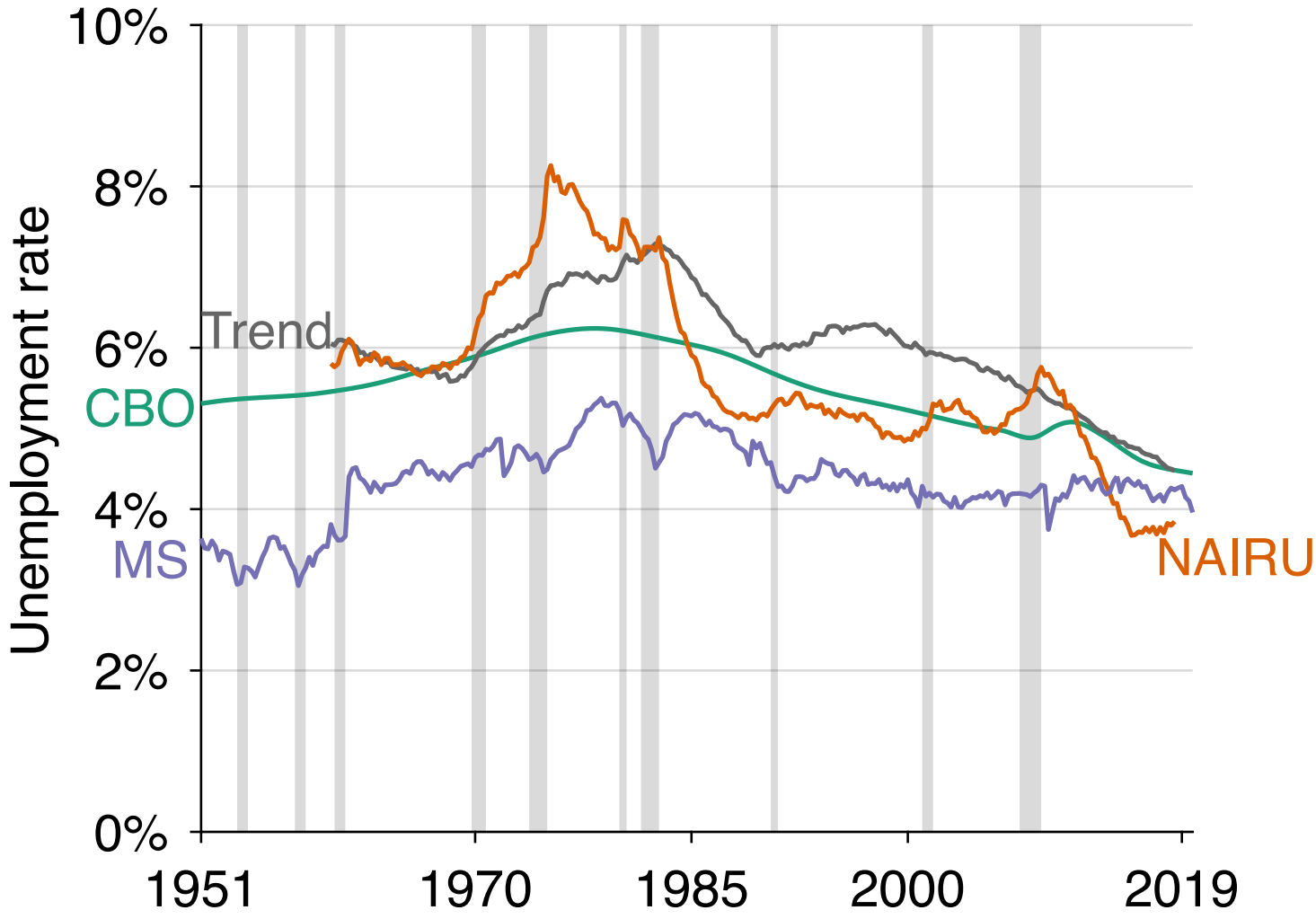
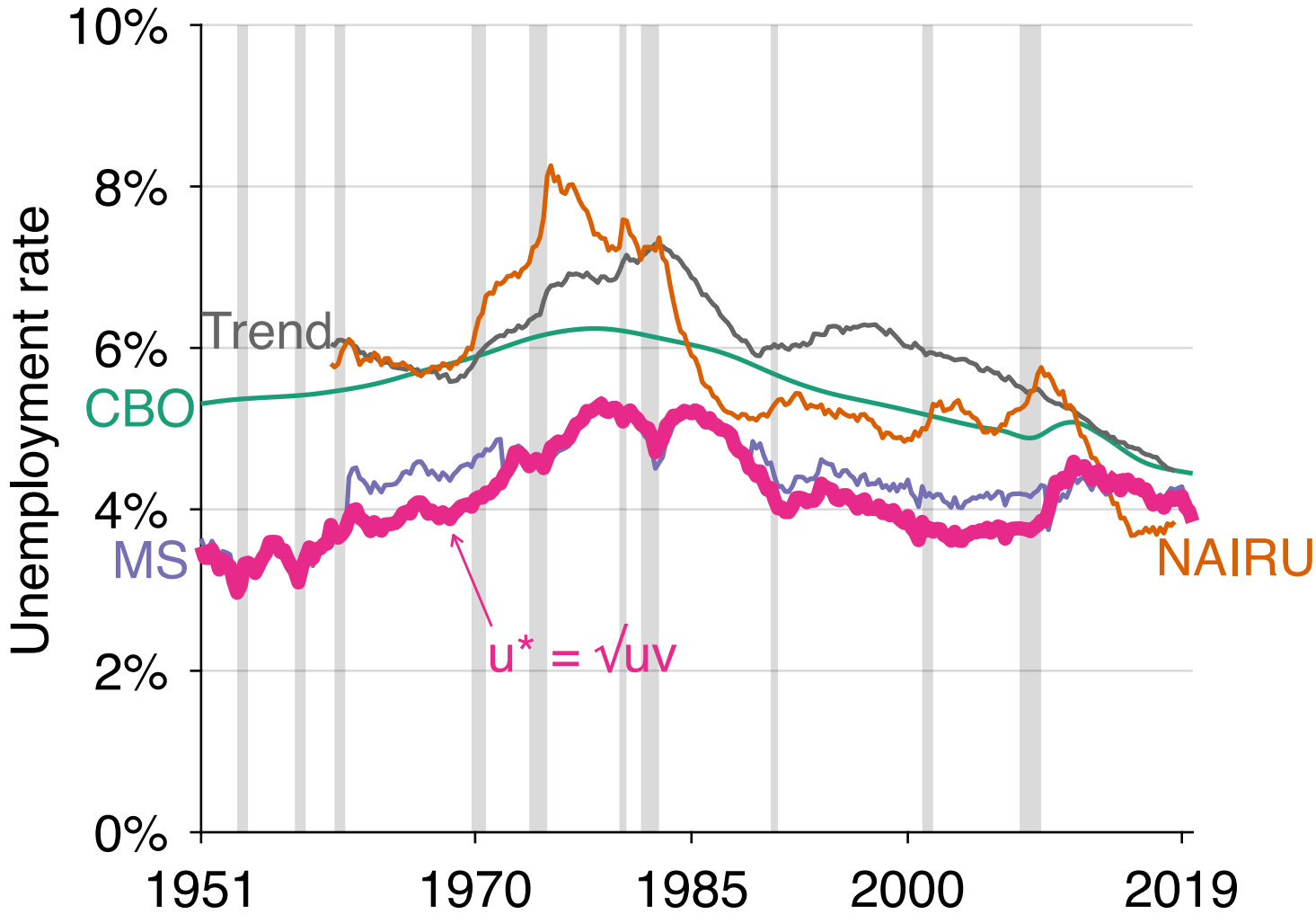


THIS PAPER: A SIMPLE WELFARE-BASED MEASURE

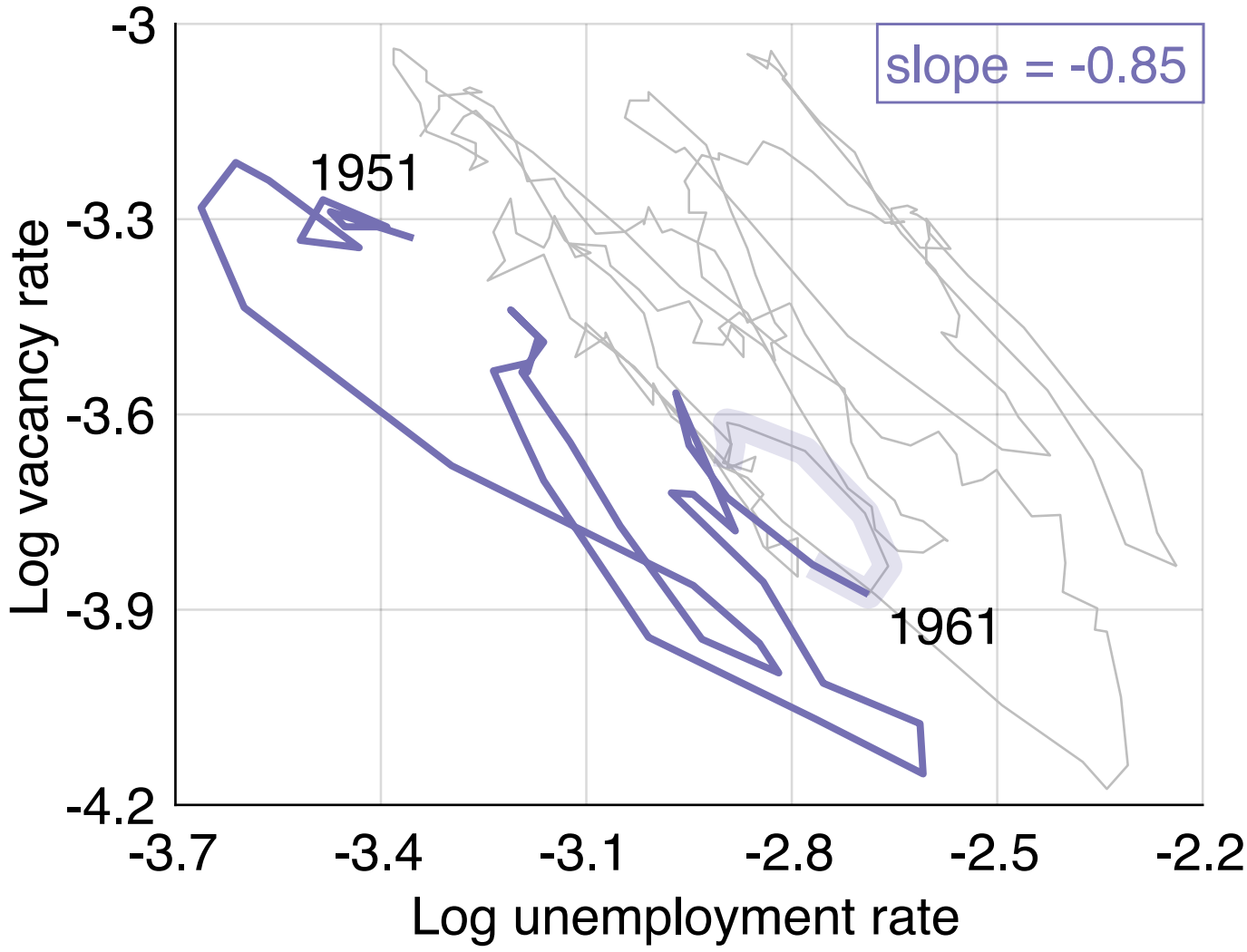


THEORY

WORKERS

1. share u of labor force is unemployed
    - no contribution to social welfare
2. share v of labor force is recruiting
    - one worker per vacancy
    - # vacancies determined by Beveridge curve $v(u)$
3. share $1 - (u + v)$ of labor force is producing
    - production determines social welfare

US BEVERIDGE CURVE ≈ HYPERBOLA



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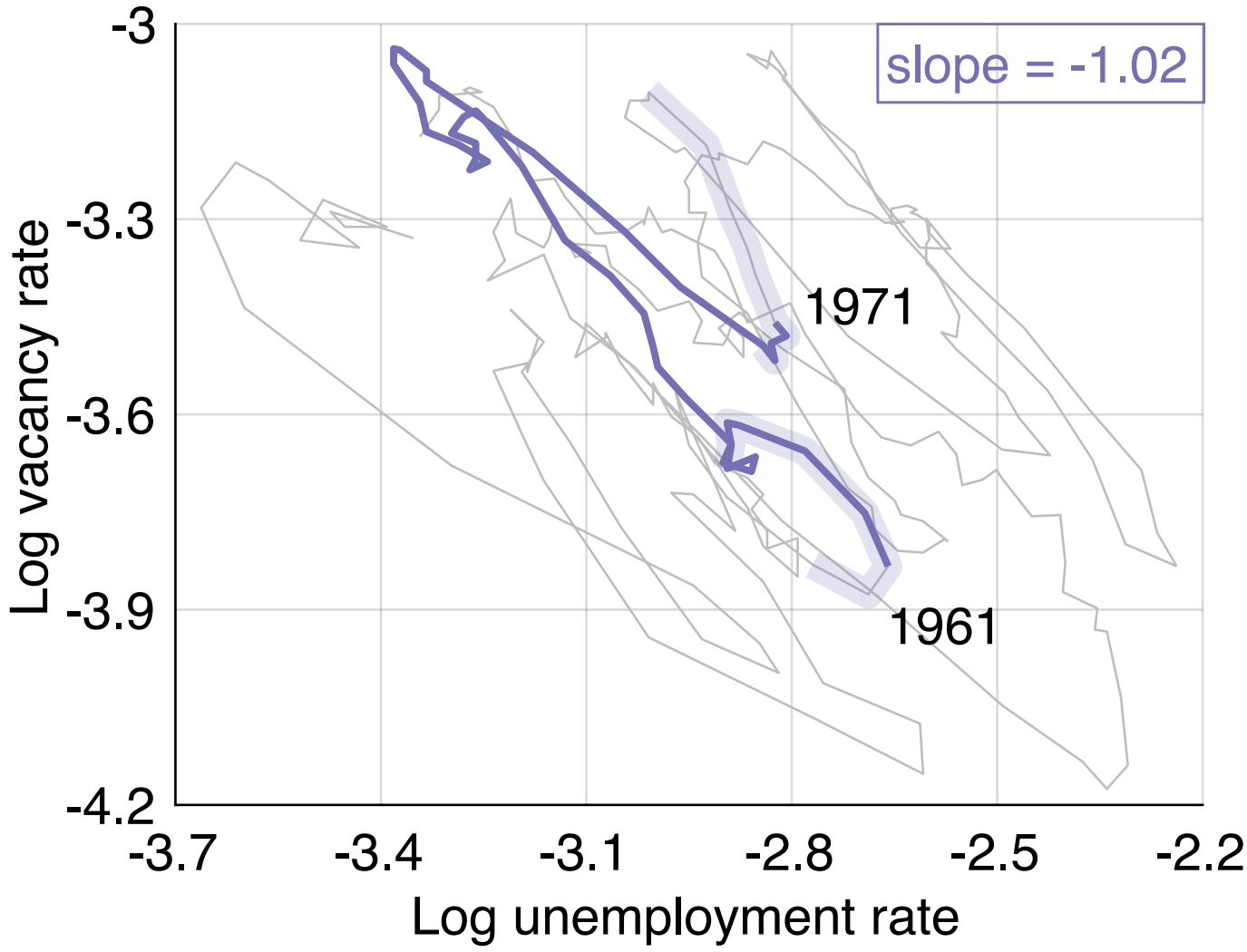

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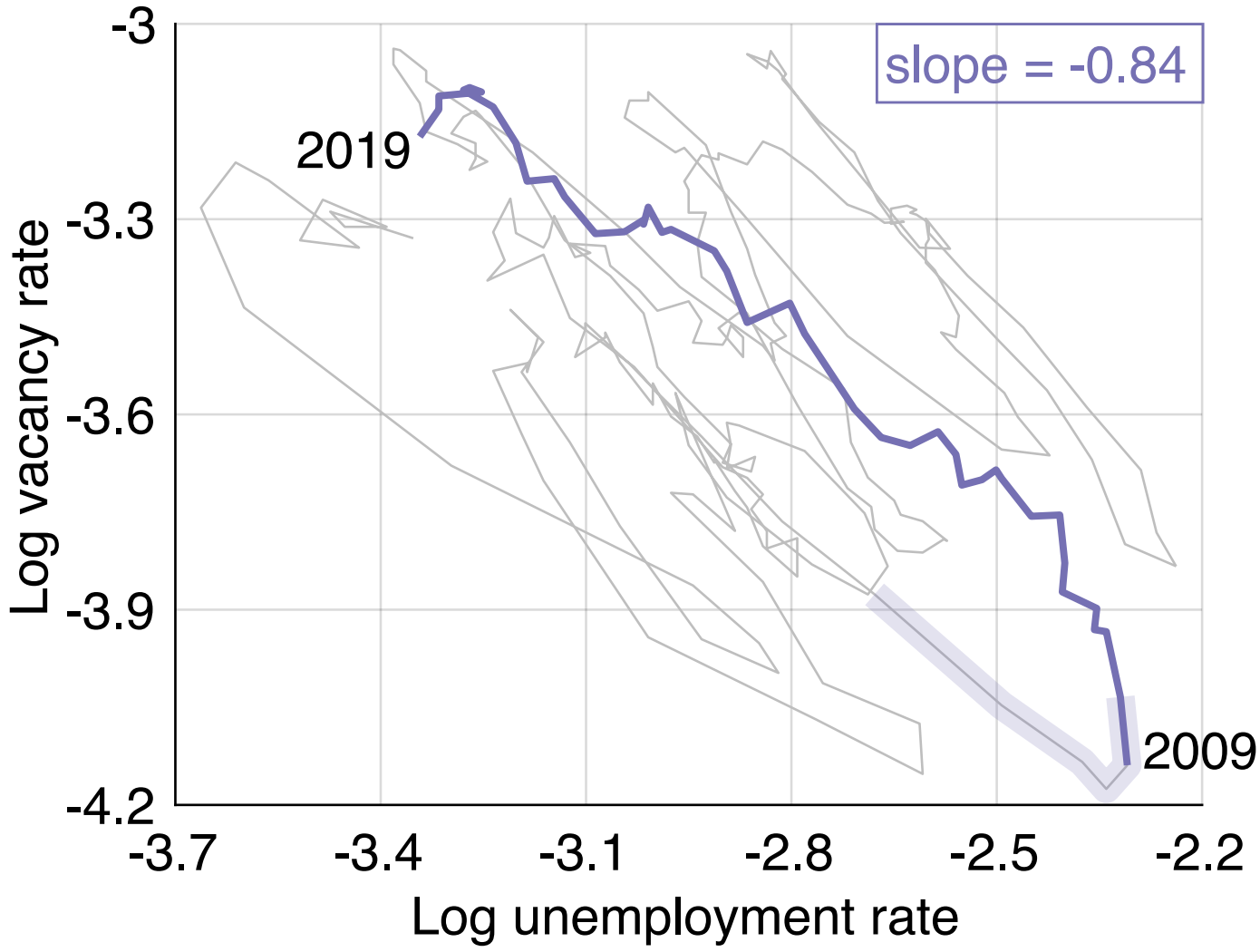


SOCIAL PLANNER'S PROBLEM

- minimize nonproduction $u + v$
- subject to Beveridge curve $v = A/u$, or $uv = A$
- solution by symmetry: $u^* = v^* = \sqrt{A} = \sqrt{uv}$
- solution by first-order condition:
  - minimize $u + A/u$, which is convex
  - first-order condition is necessary & sufficient

$$1 - A/u^2 = 0 \implies u = \sqrt{A}$$

EFFICIENT UNEMPLOYMENT RATE

- efficient unemployment rate:

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

- economy is inefficiently tight when $u < u^*$ or

$$u < v$$

- economy is inefficiently slack when $u > u^*$ or

$$u > v$$

GENERALIZATION [MICHAILLAT & SAEZ 2021]

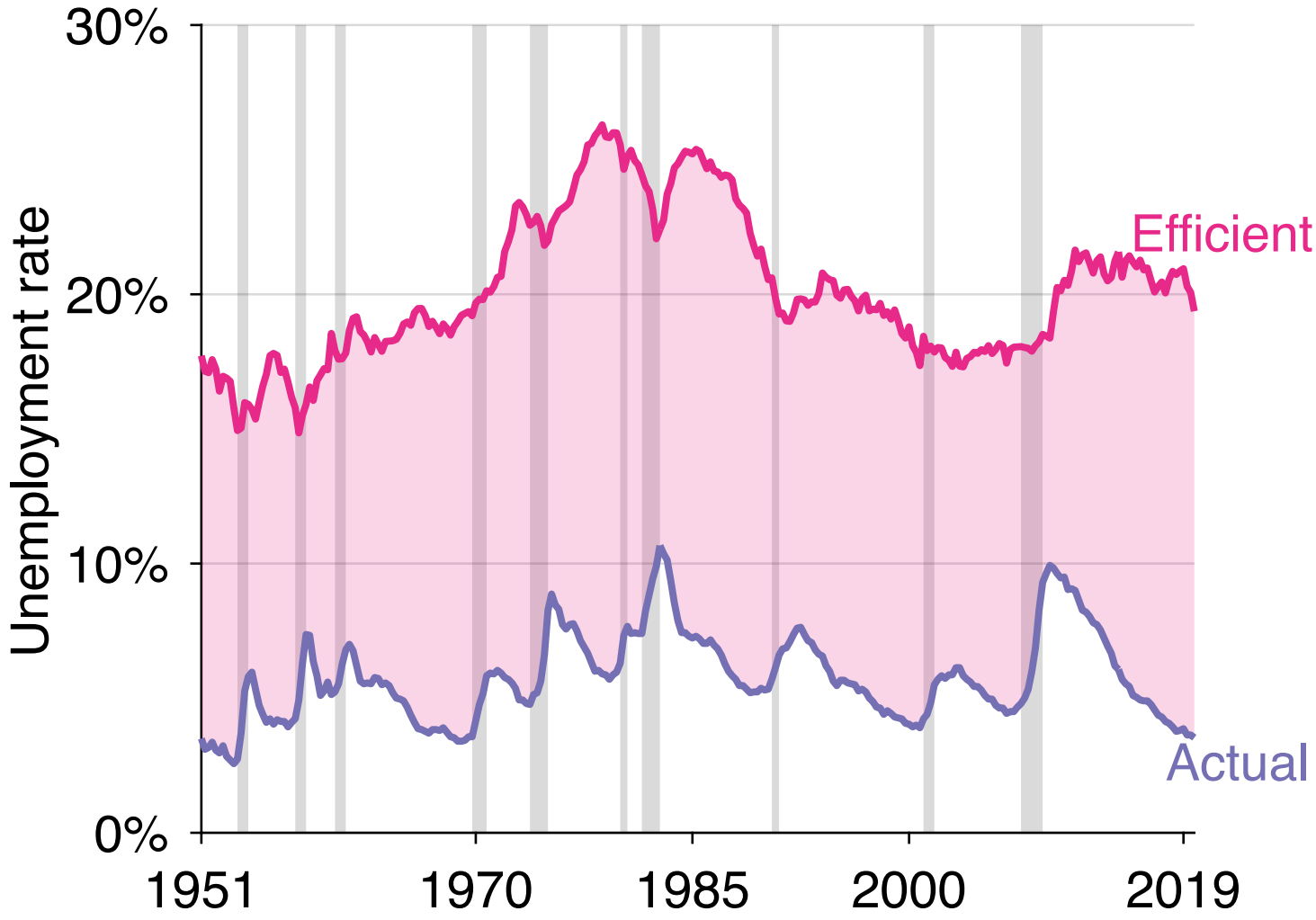
- home production per unemployed worker: $0 \to \zeta$
- # recruiters per vacancy: $1 \to \kappa$
- Beveridge curve: $v = A/u \to v = A/u^{\epsilon}$
- efficient tightness:

$$\theta^* = 1 \quad \to \quad \theta^* = \frac{1-\zeta}{\kappa\epsilon}$$

- efficient unemployment rate:

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

HAGEDORN & MANOVSKII [2008]: $\zeta = 0.96$



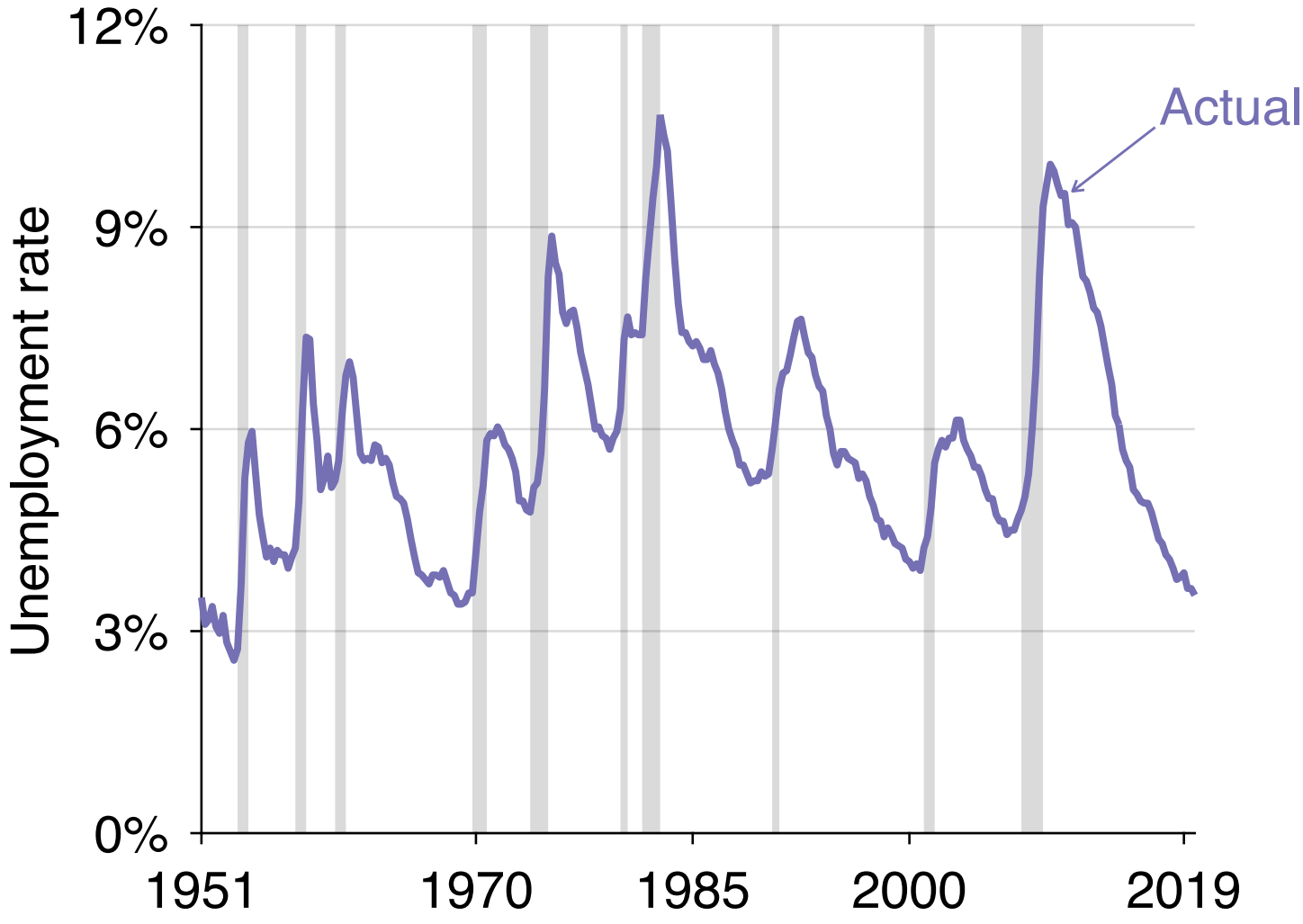
LIMITED INFLUENCE OF MATCHING DYNAMICS

1. unemployment is almost always on Beveridge curve
   - $\dot{u}(t) = \lambda \cdot [1 - u(t)] - f \cdot u(t)$
   - Beveridge curve: $\dot{u} = 0 \implies u^b = \lambda/(\lambda + f)$
   - unemployment dynamics: $u(t) - u^b = [u(0) - u^b]e^{-(\lambda+f)t}$
   - half life of $u(t) - u^b$: $\ln(2)/(\lambda + f) = \ln(2)/0.59 = 1.17$ month
2. efficient tightness θ^* is almost equal to Hosios tightness θ^h
   - with interest rate r and matching elasticity η:

$$\frac{\theta^* - \theta^h}{\theta^*} = \frac{r}{\eta(\lambda + f)}$$

   - under Shimer [2005] calibration: $(\theta^* - \theta^h)/\theta^* = 1.1\%$

UNEMPLOYMENT ≈ ON BEVERIDGE CURVE



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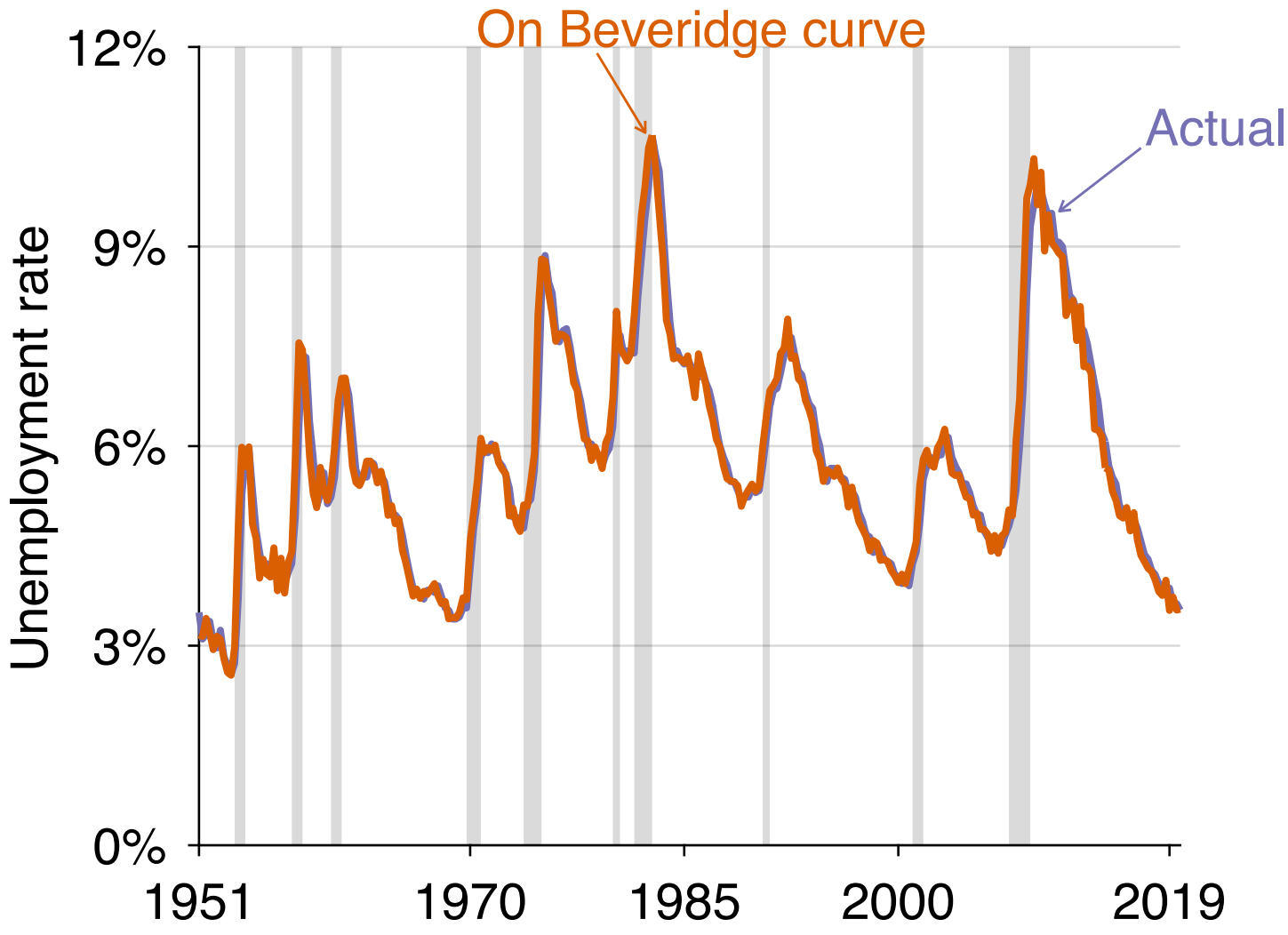
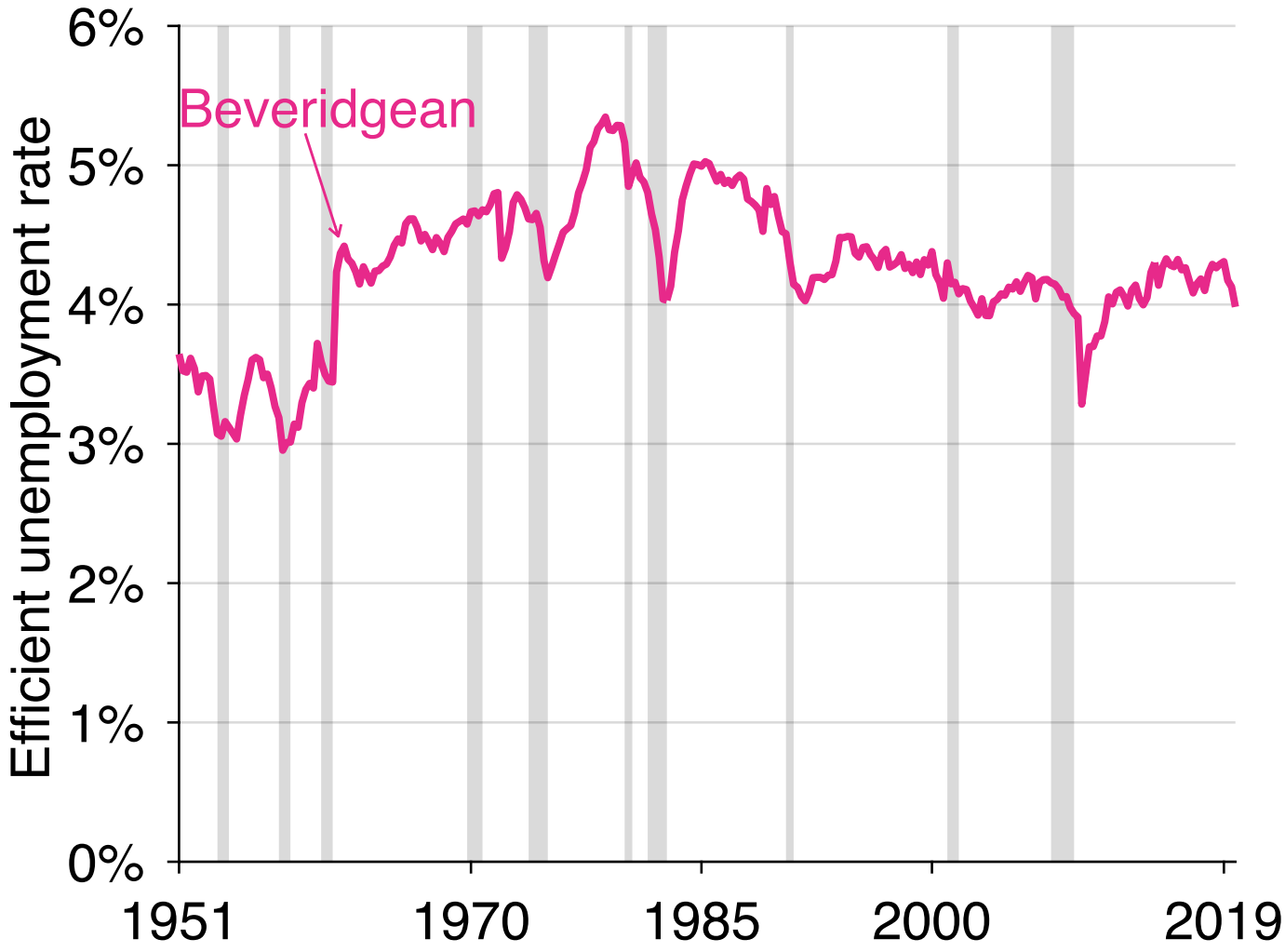


EFFICIENT UNEMPLOYMENT ≈ HOSIOS



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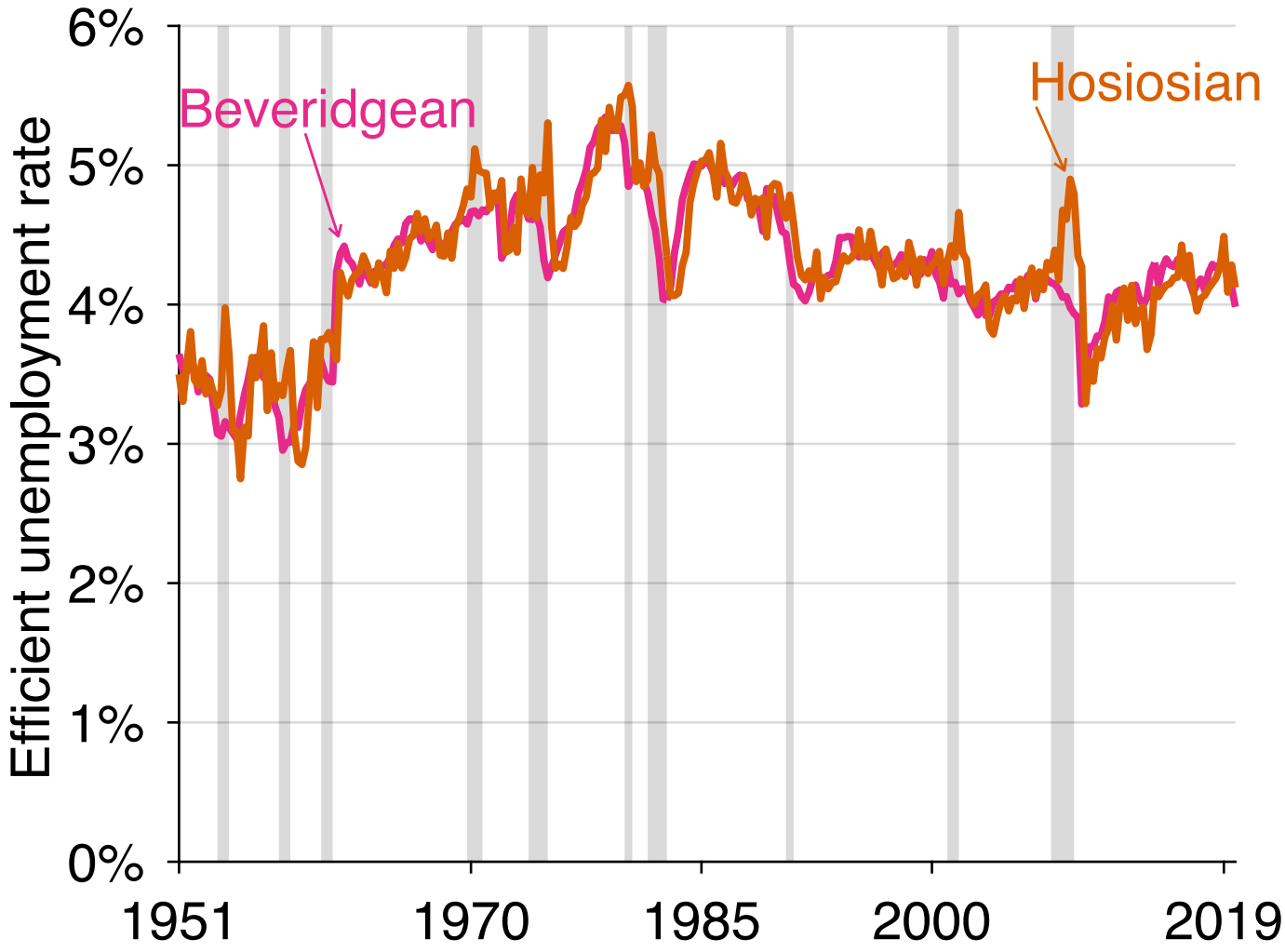
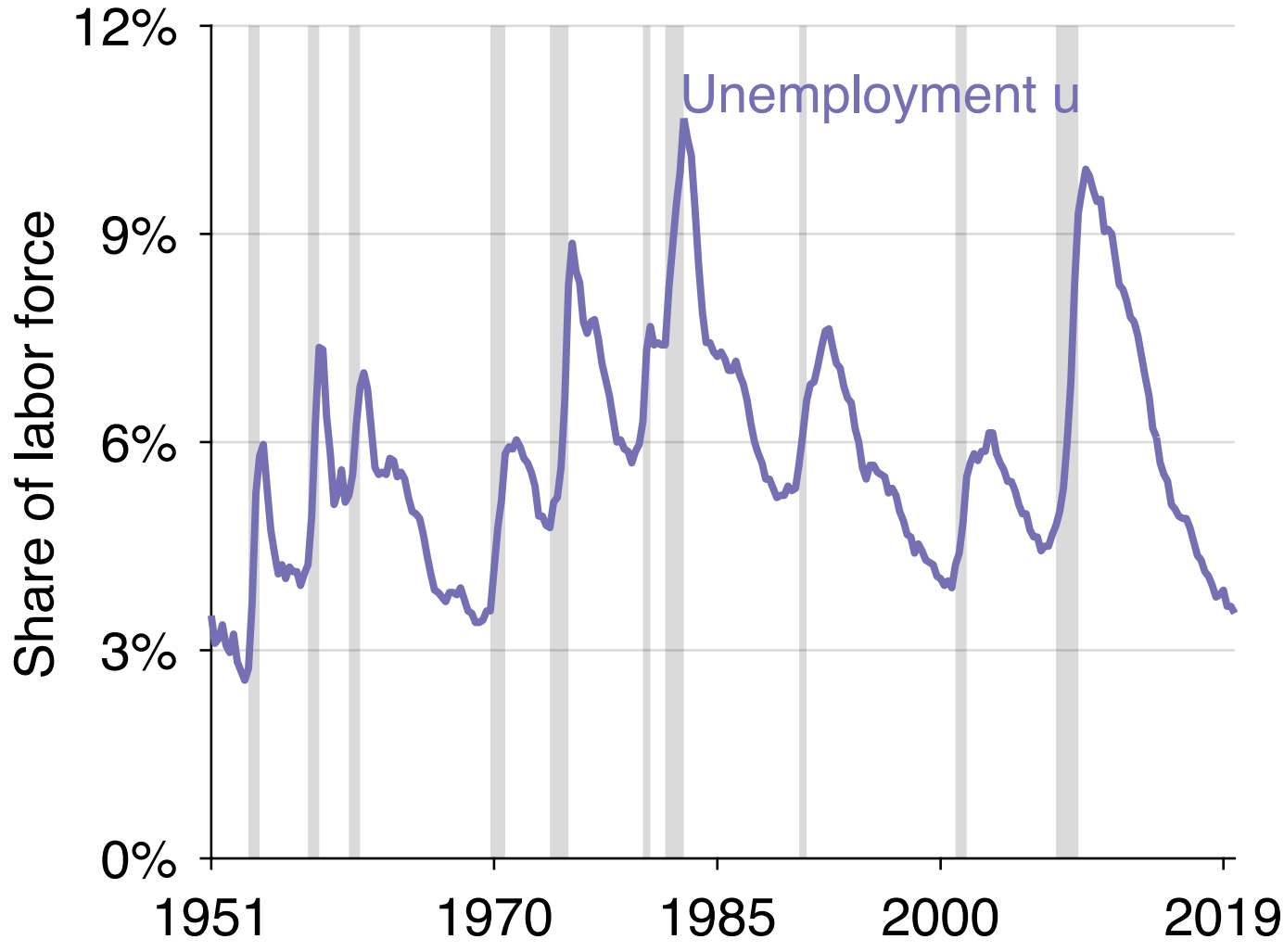
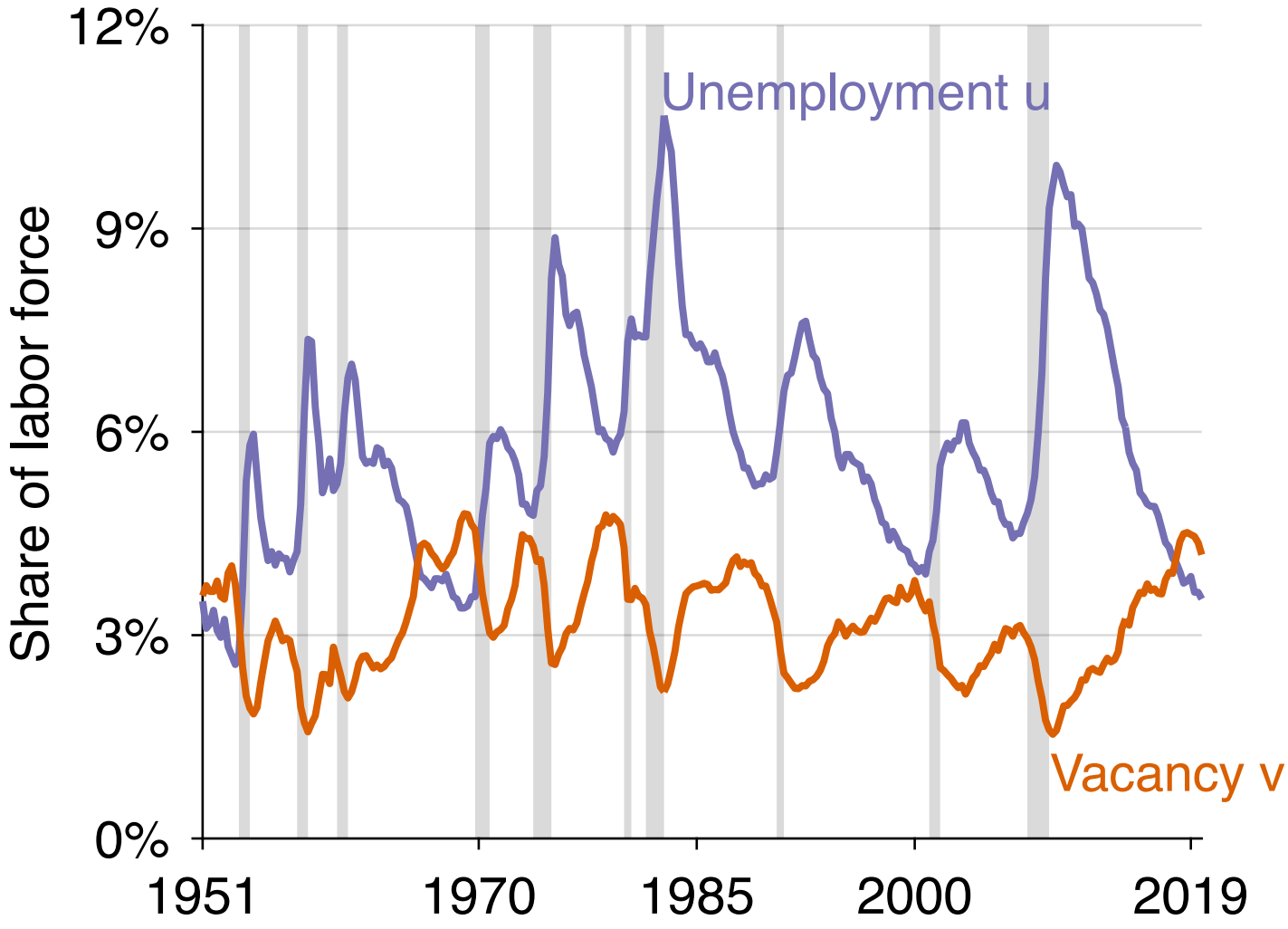


UNITED STATES, 1951–2019

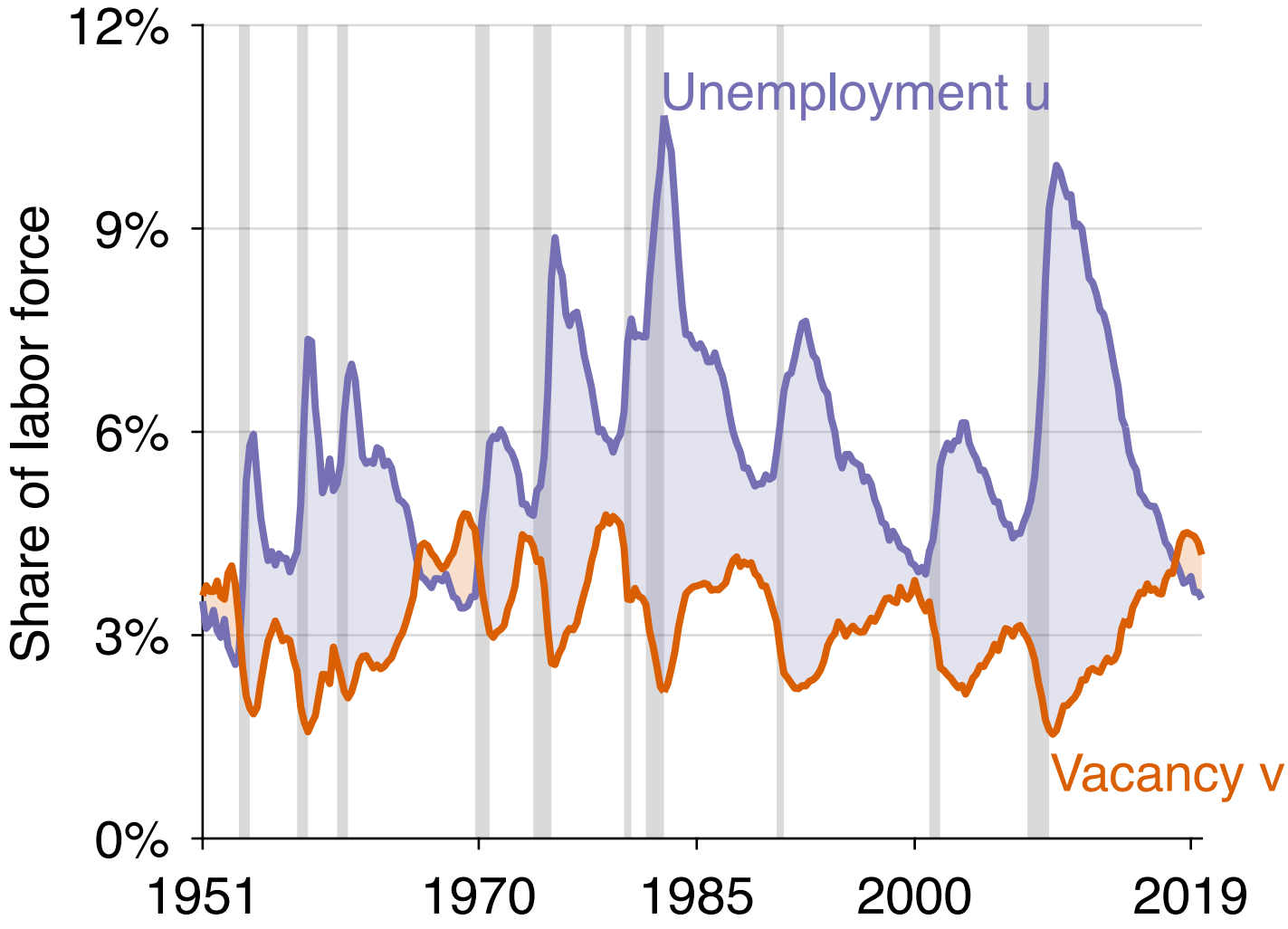
UNEMPLOYMENT RATE (CPS)



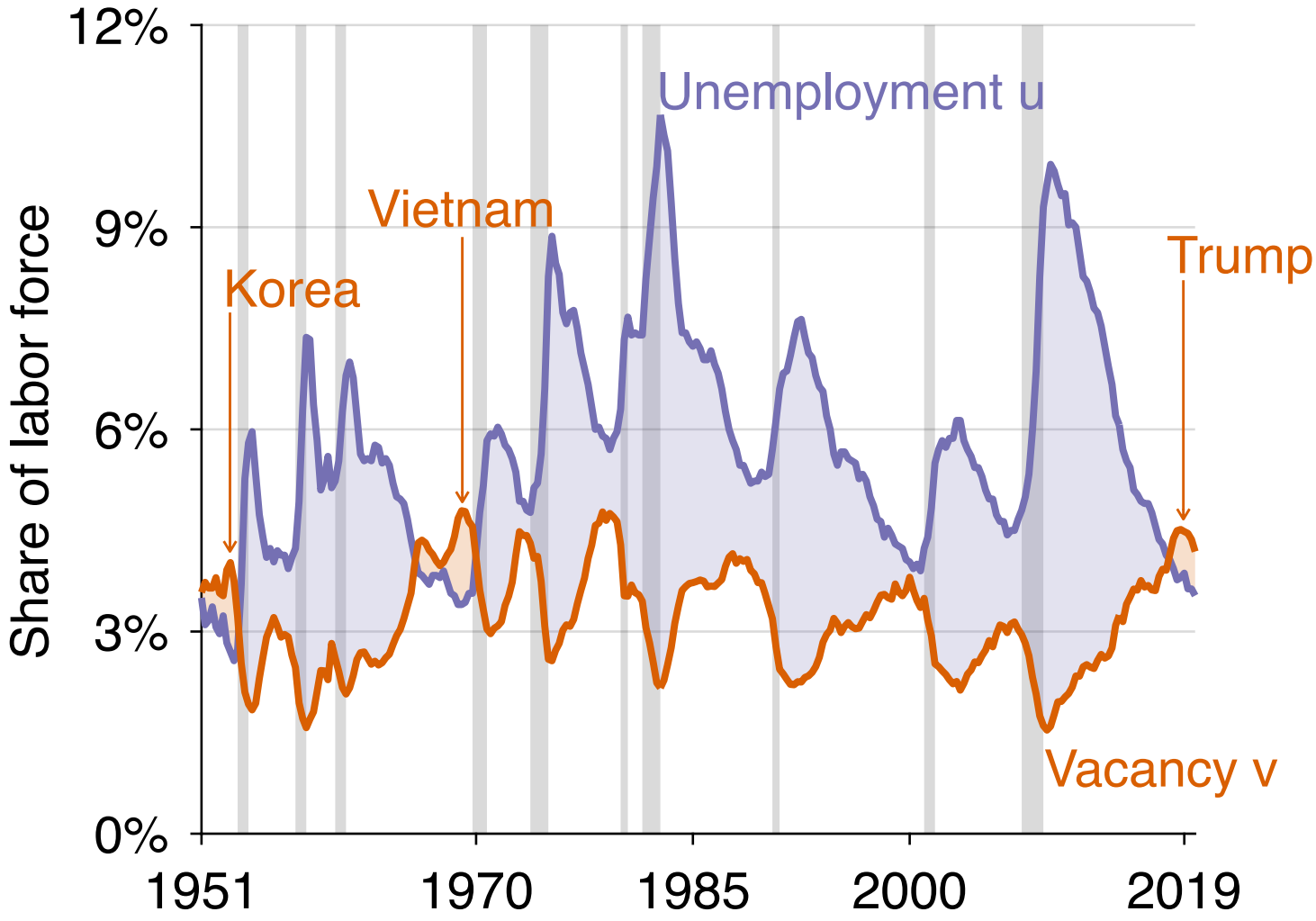
VACANCY RATE (BARNICHON 2010 & JOLTS)



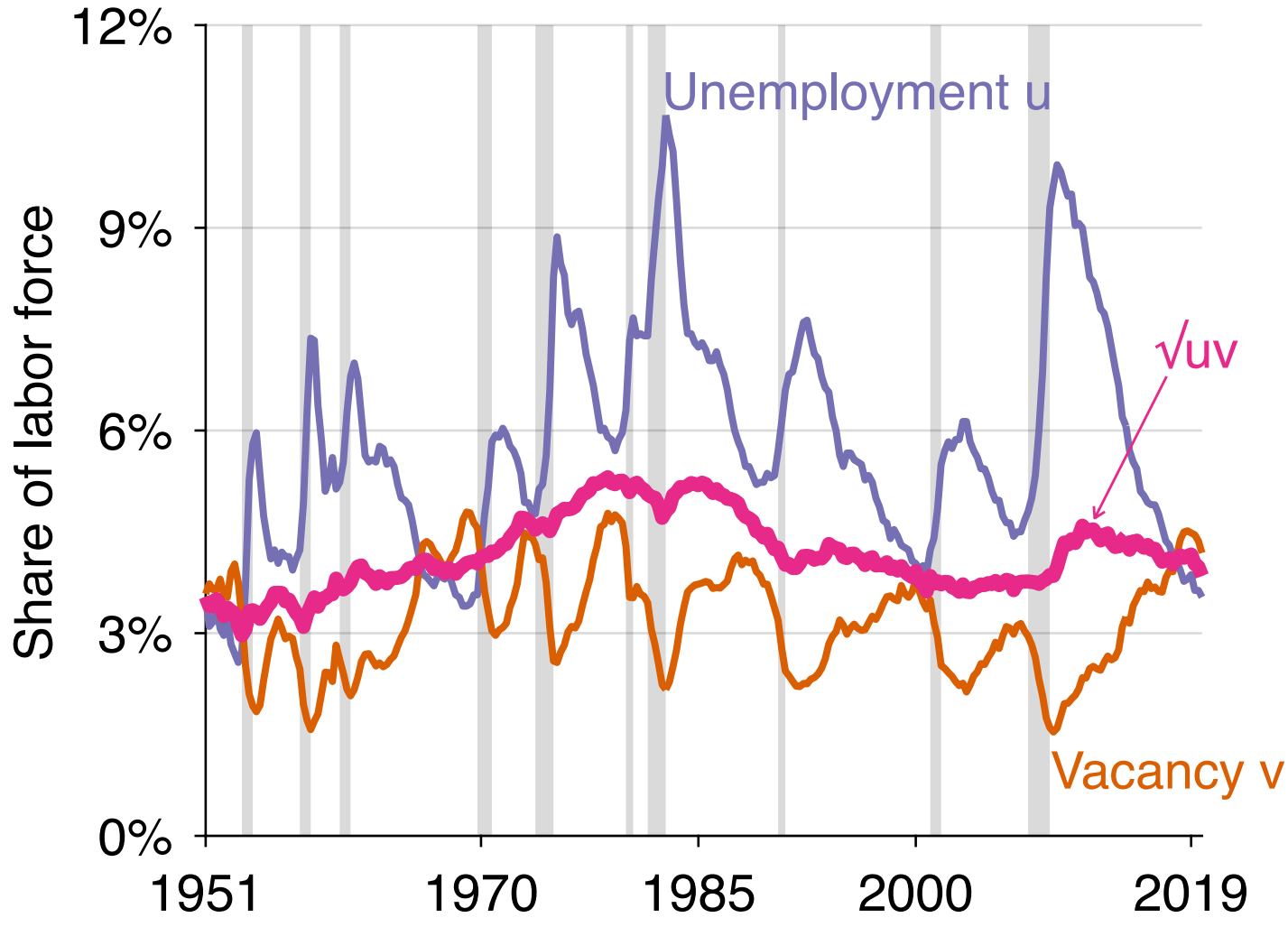
ECONOMY IS TOO SLACK WHEN $u > v$



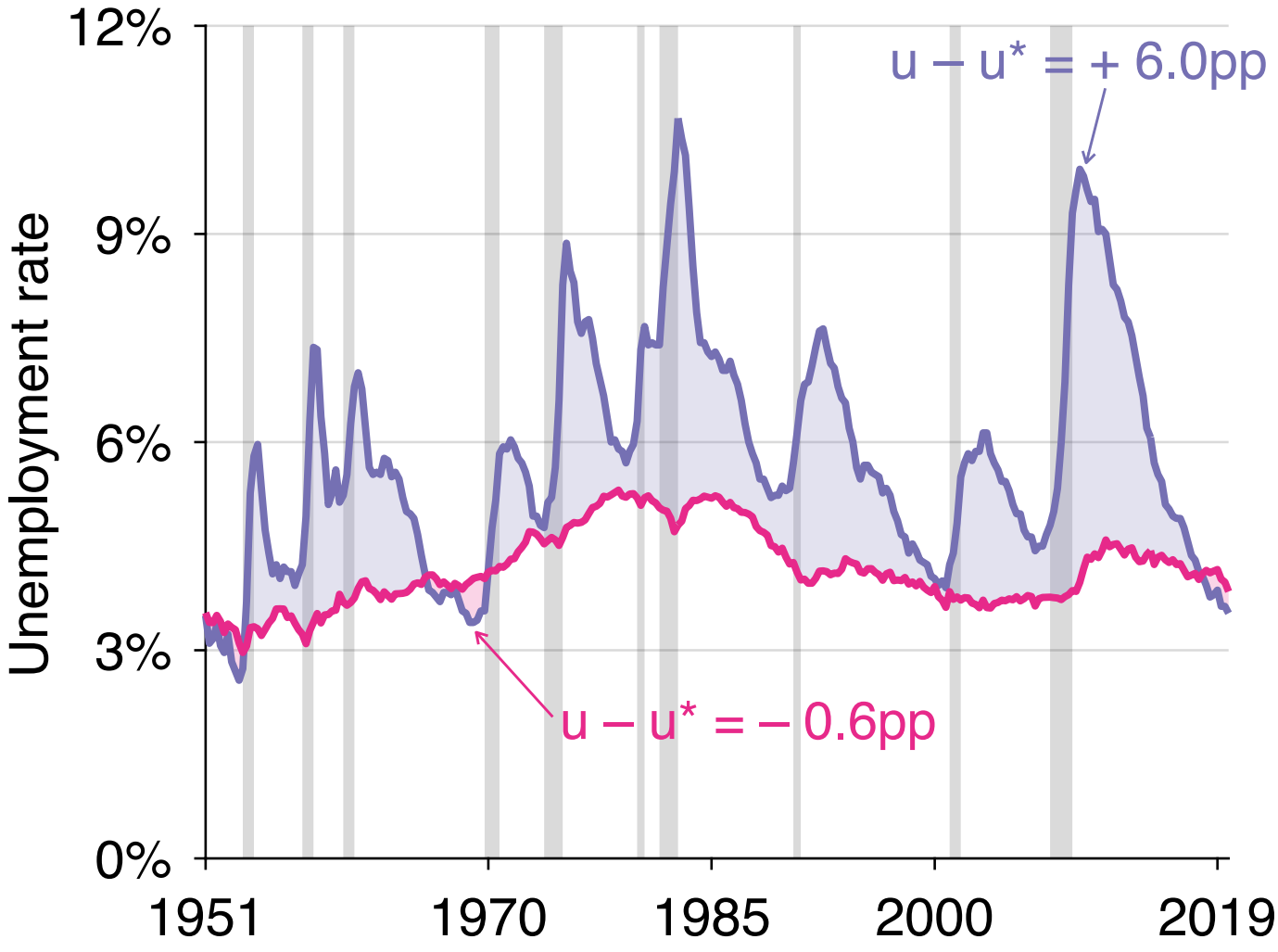
ECONOMY IS TOO TIGHT WHEN $u < v$



EFFICIENT UNEMPLOYMENT RATE IS $\sqrt{uv}$

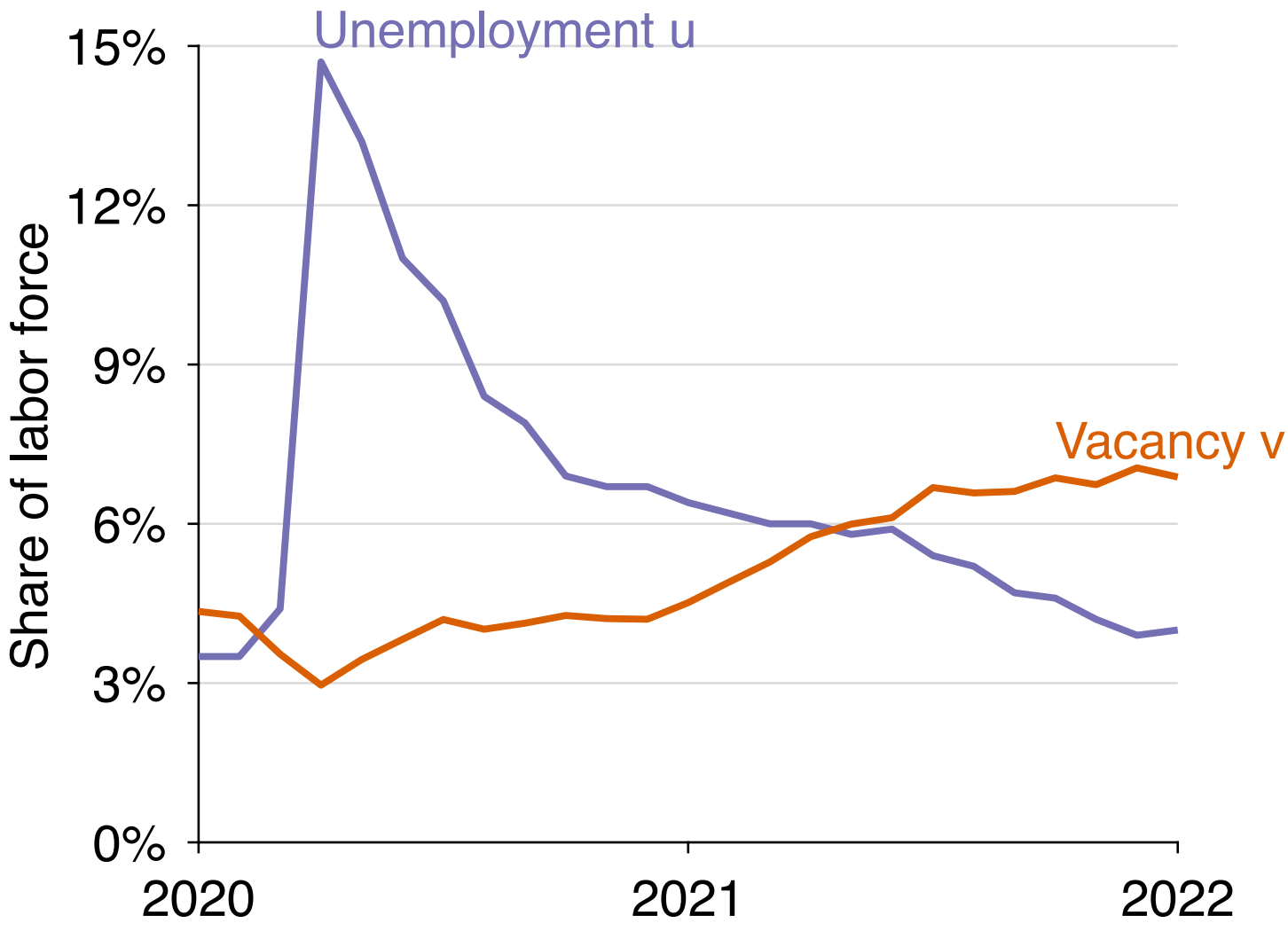


UNEMPLOYMENT GAP IS COUNTERCYCLICAL

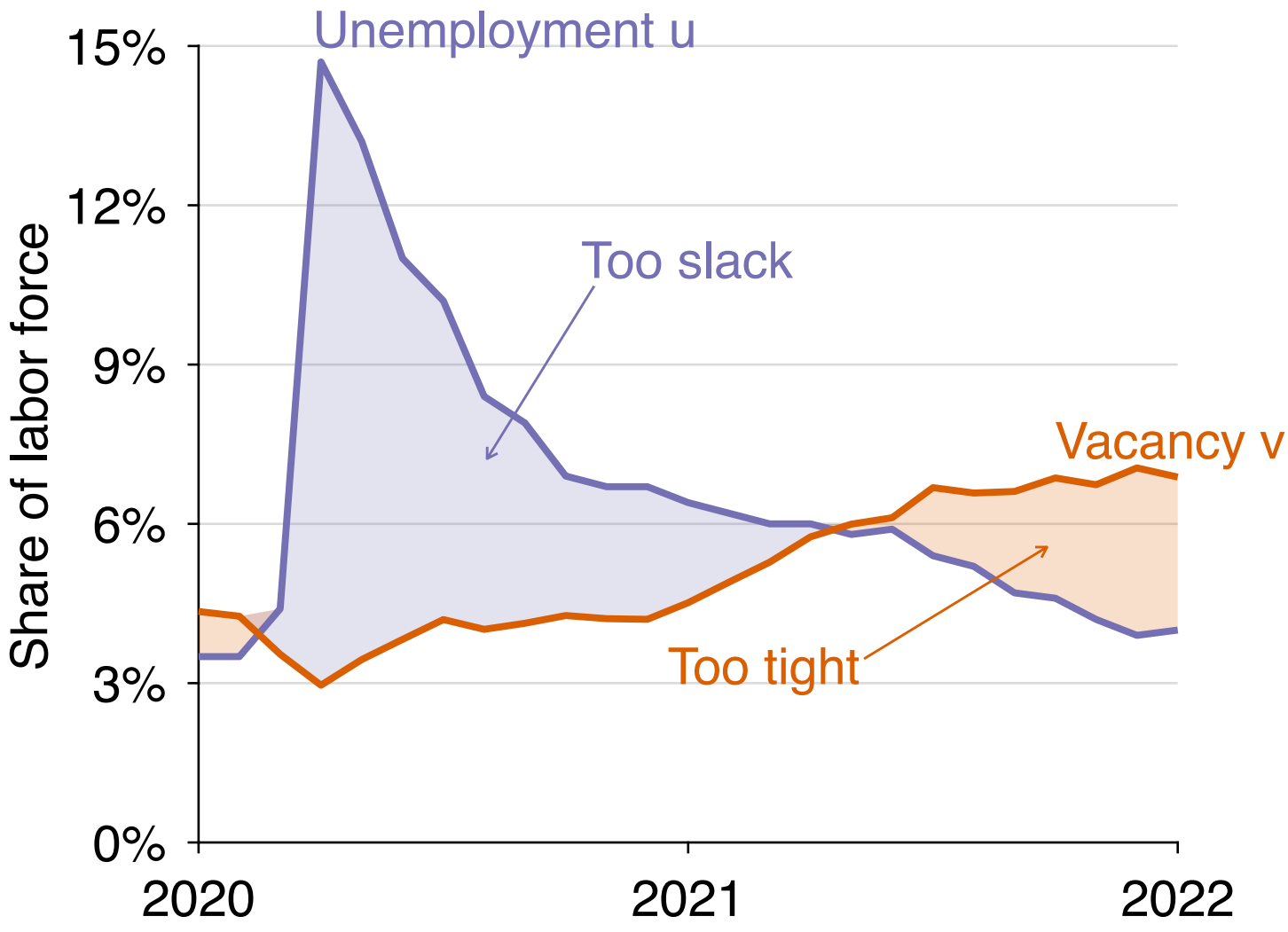


UNITED STATES, 2020–2022

UNEMPLOYMENT & VACANCY RATES



ECONOMY IS TOO TIGHT SINCE MAY 2021



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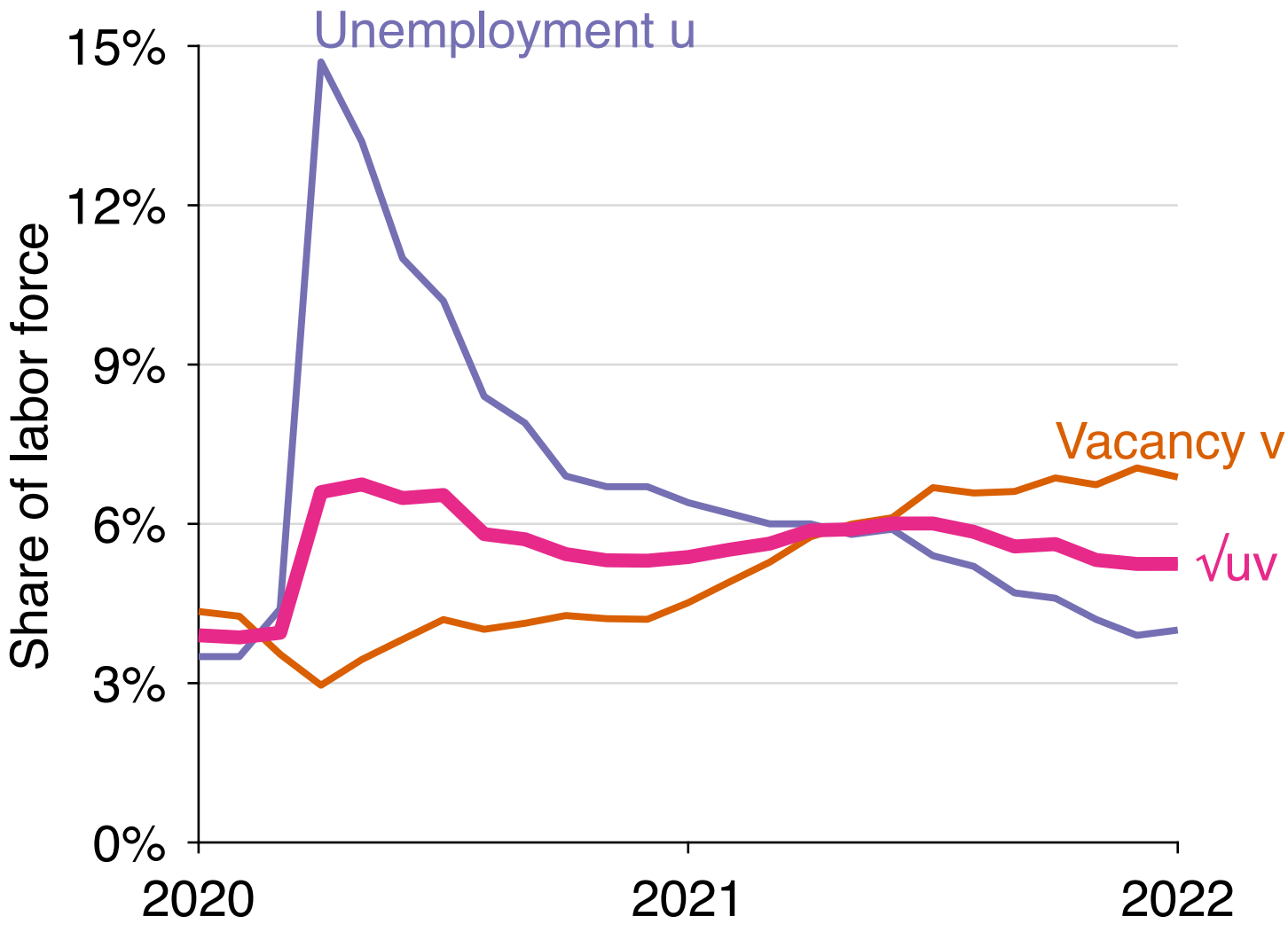
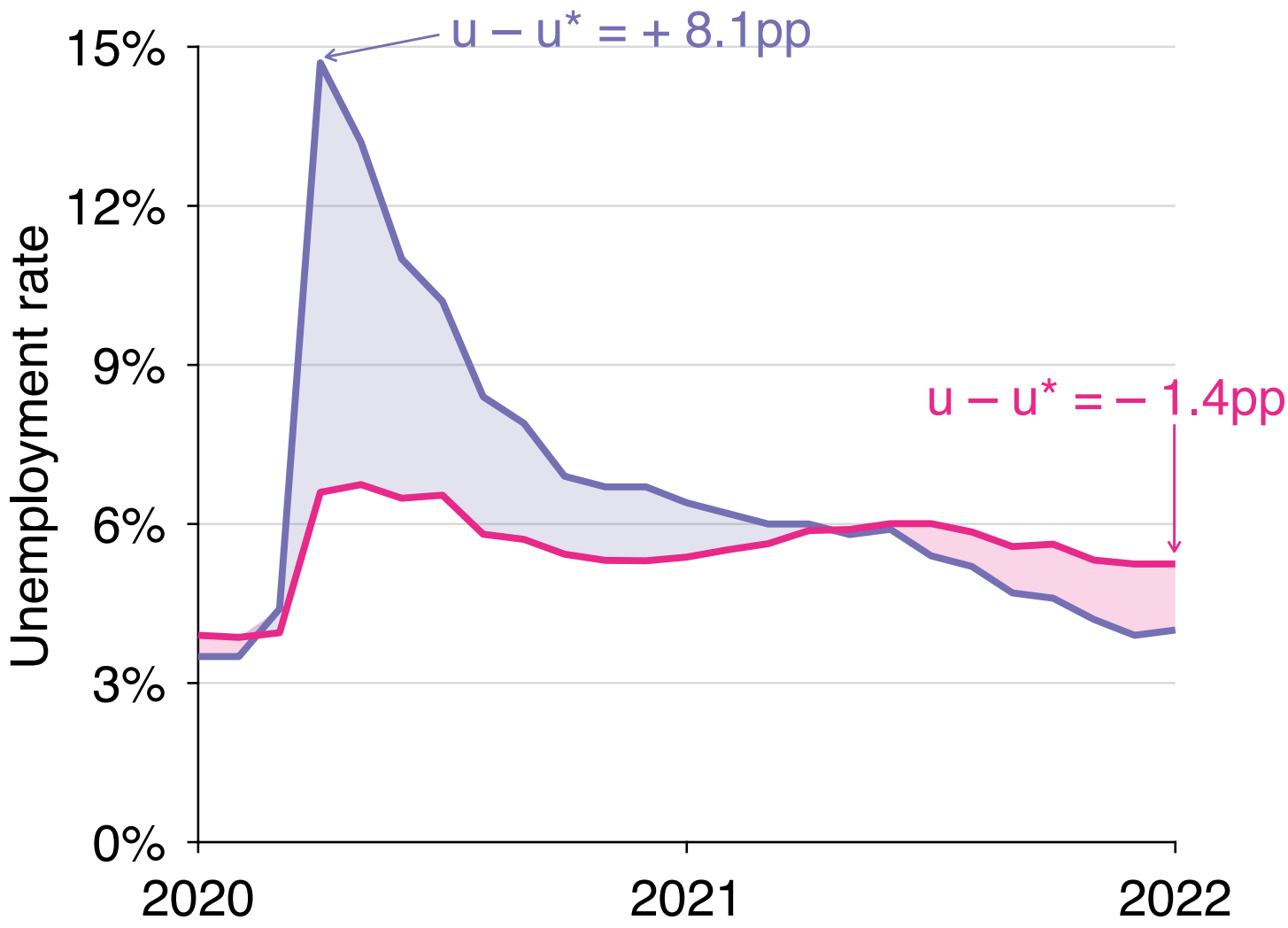


MOST EXTREME UNEMPLOYMENT GAPS ON RECORD



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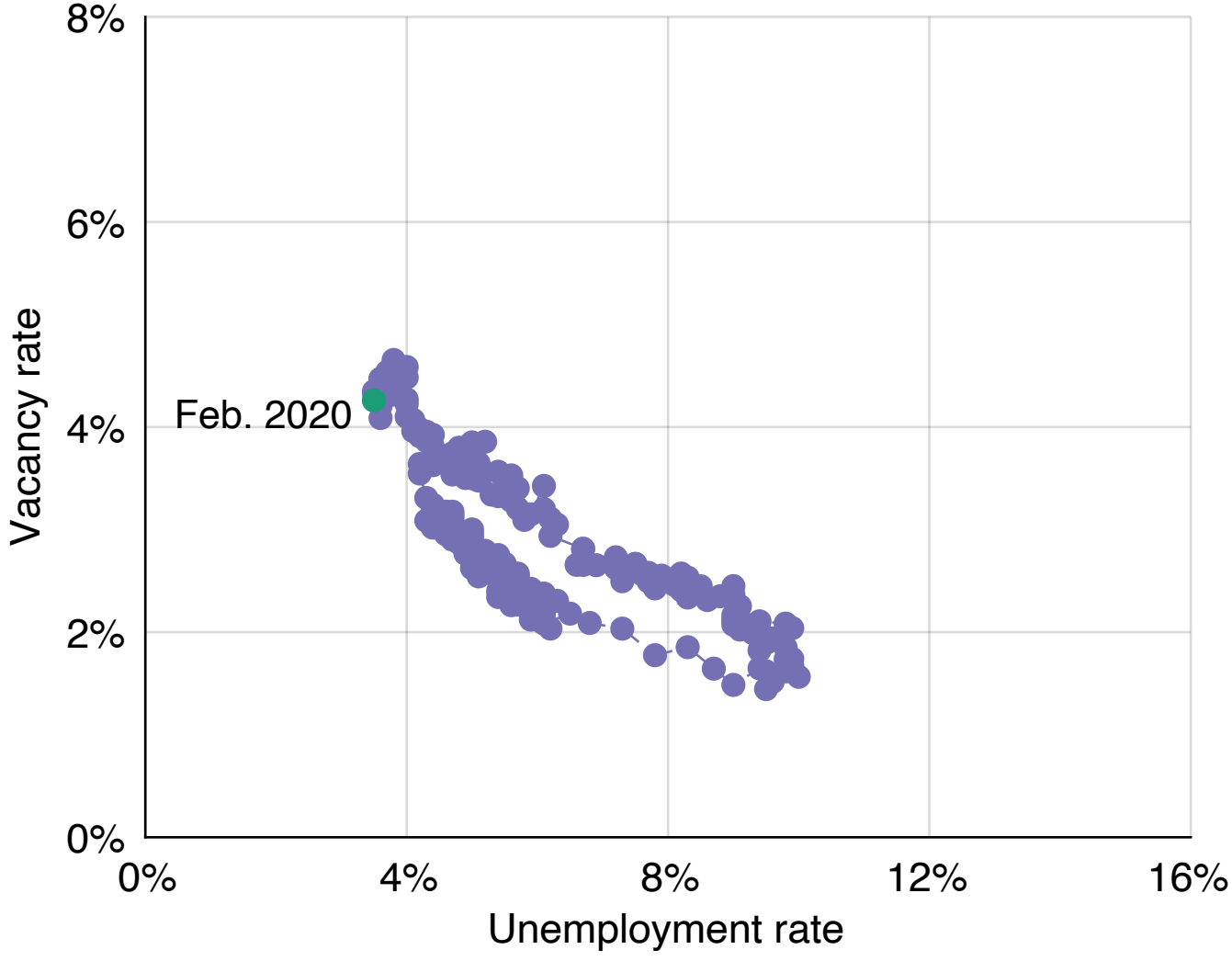

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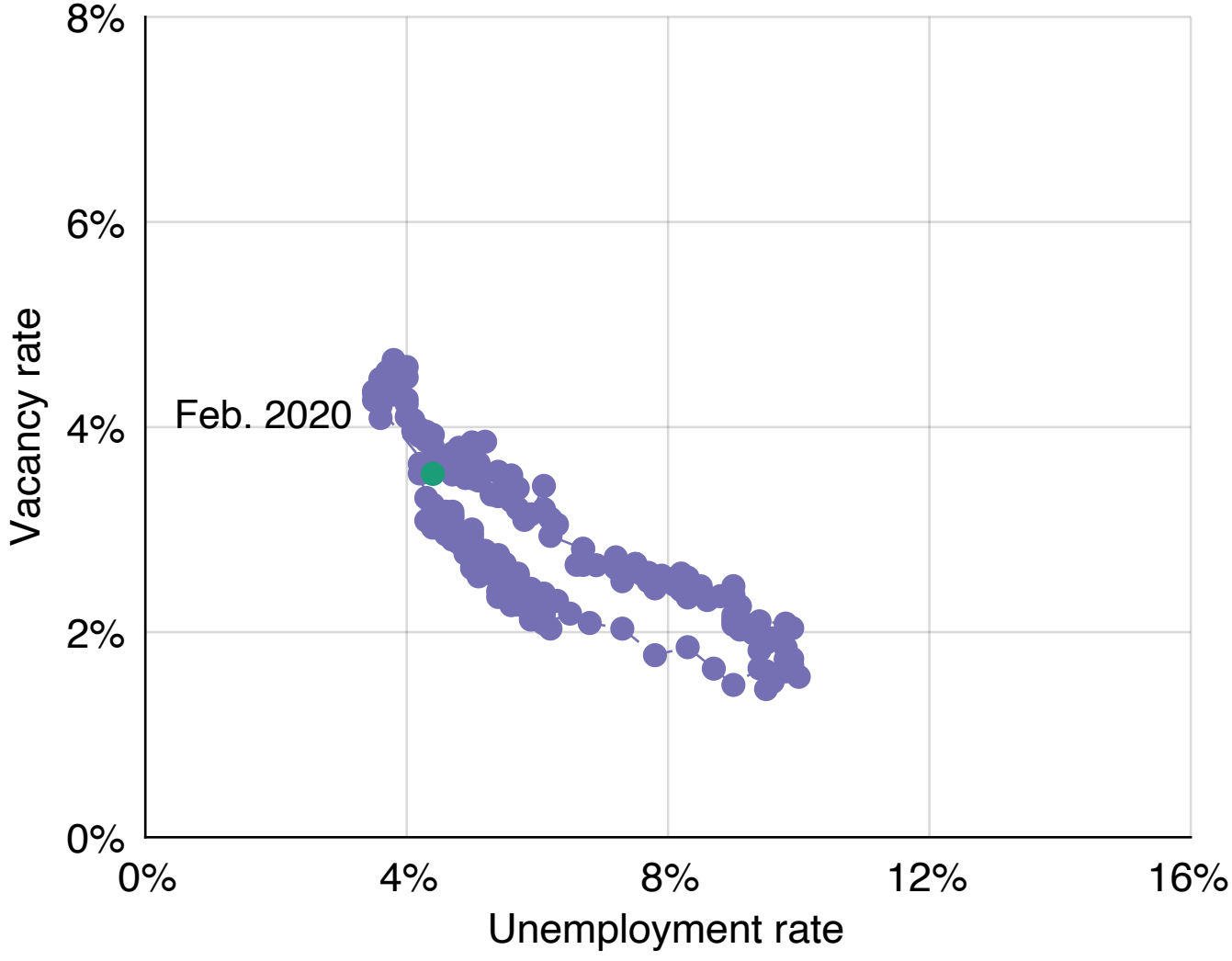

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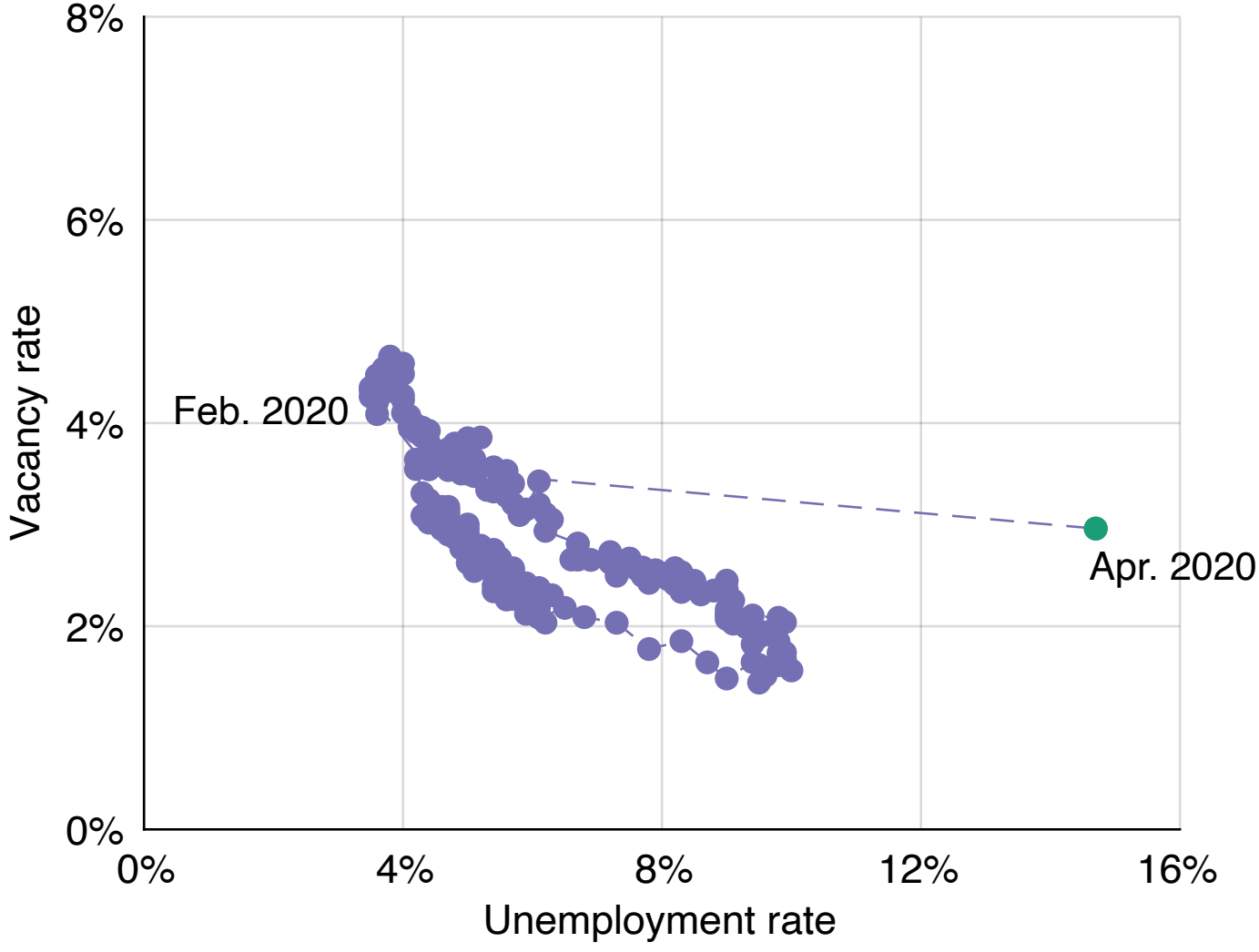

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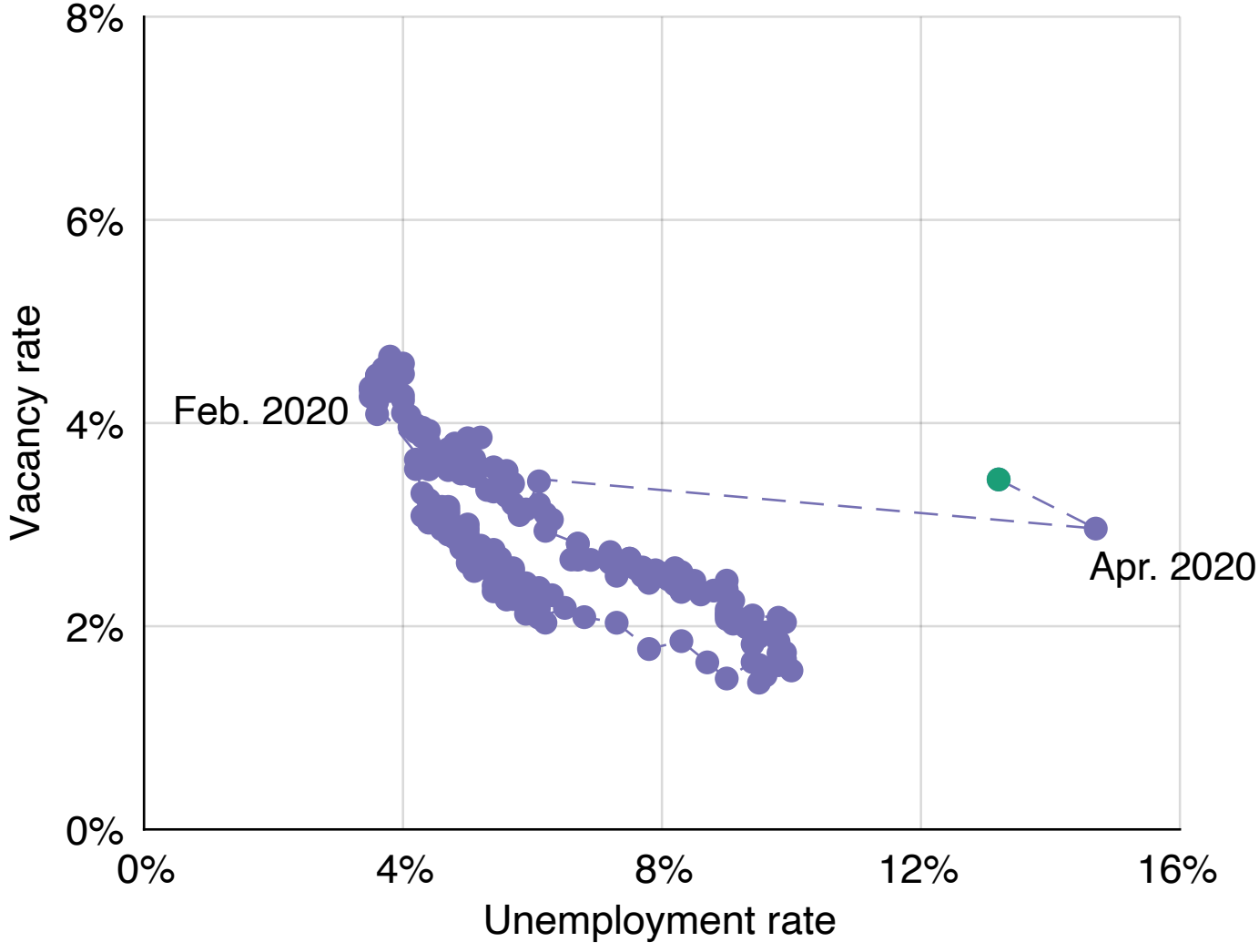

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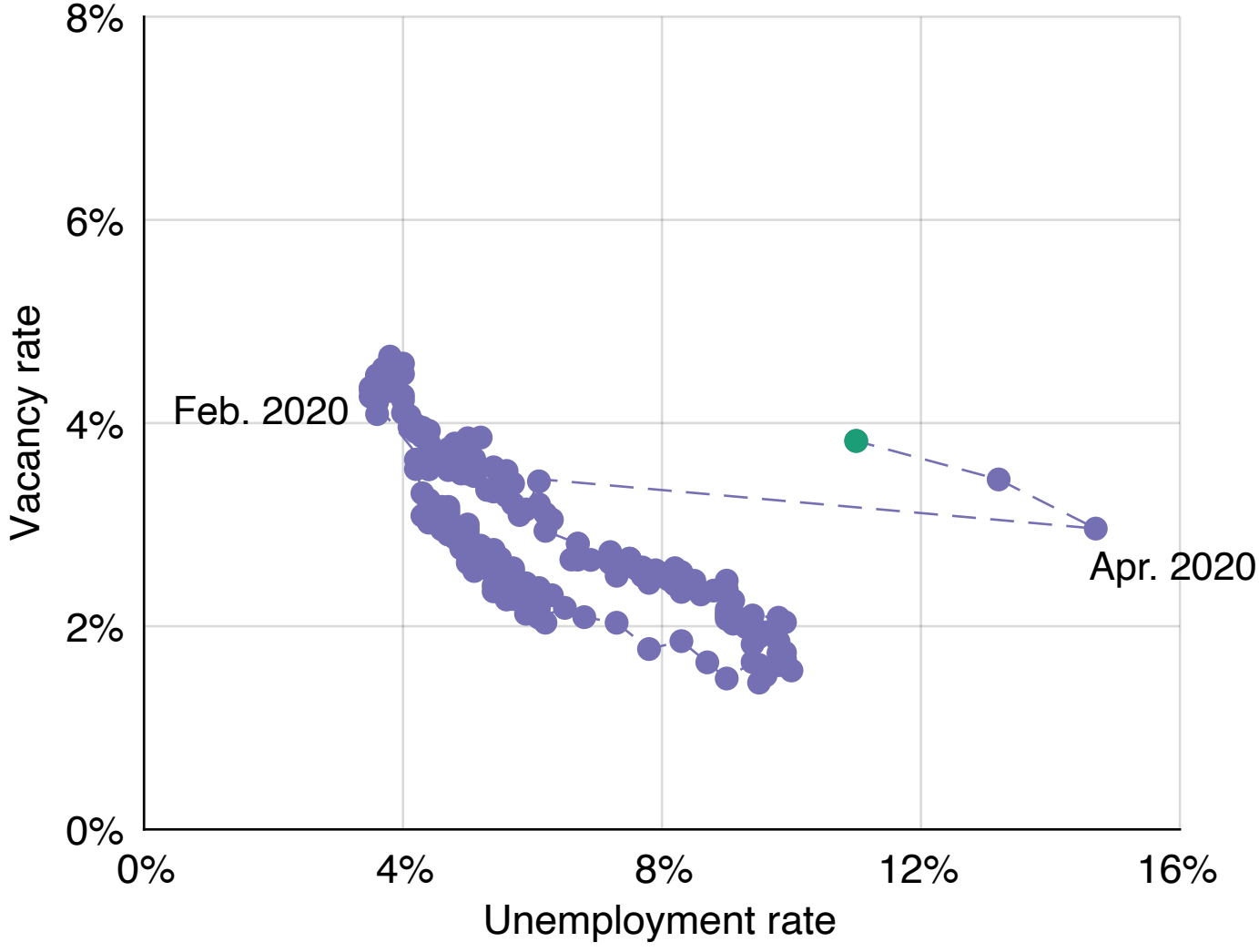

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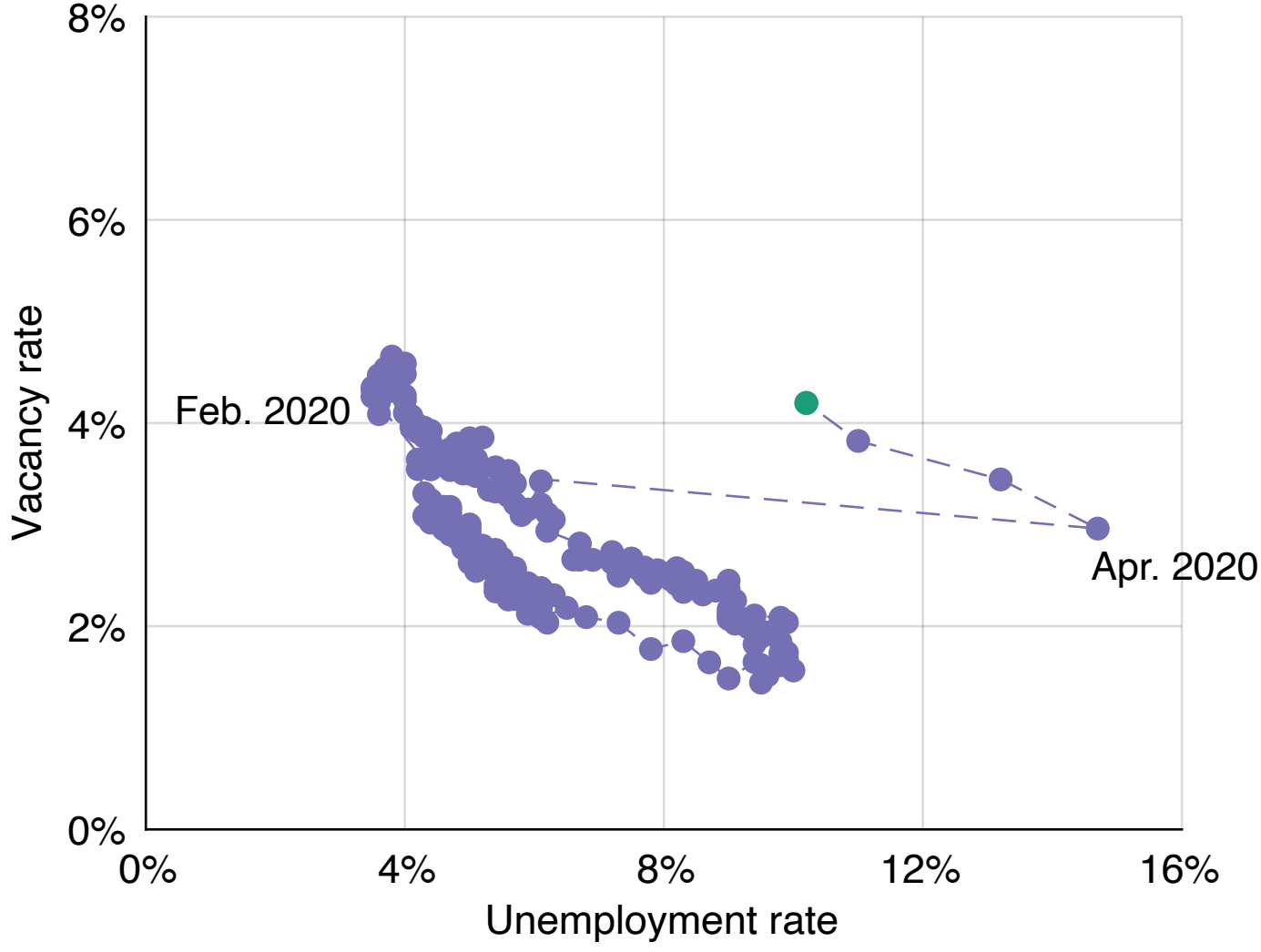

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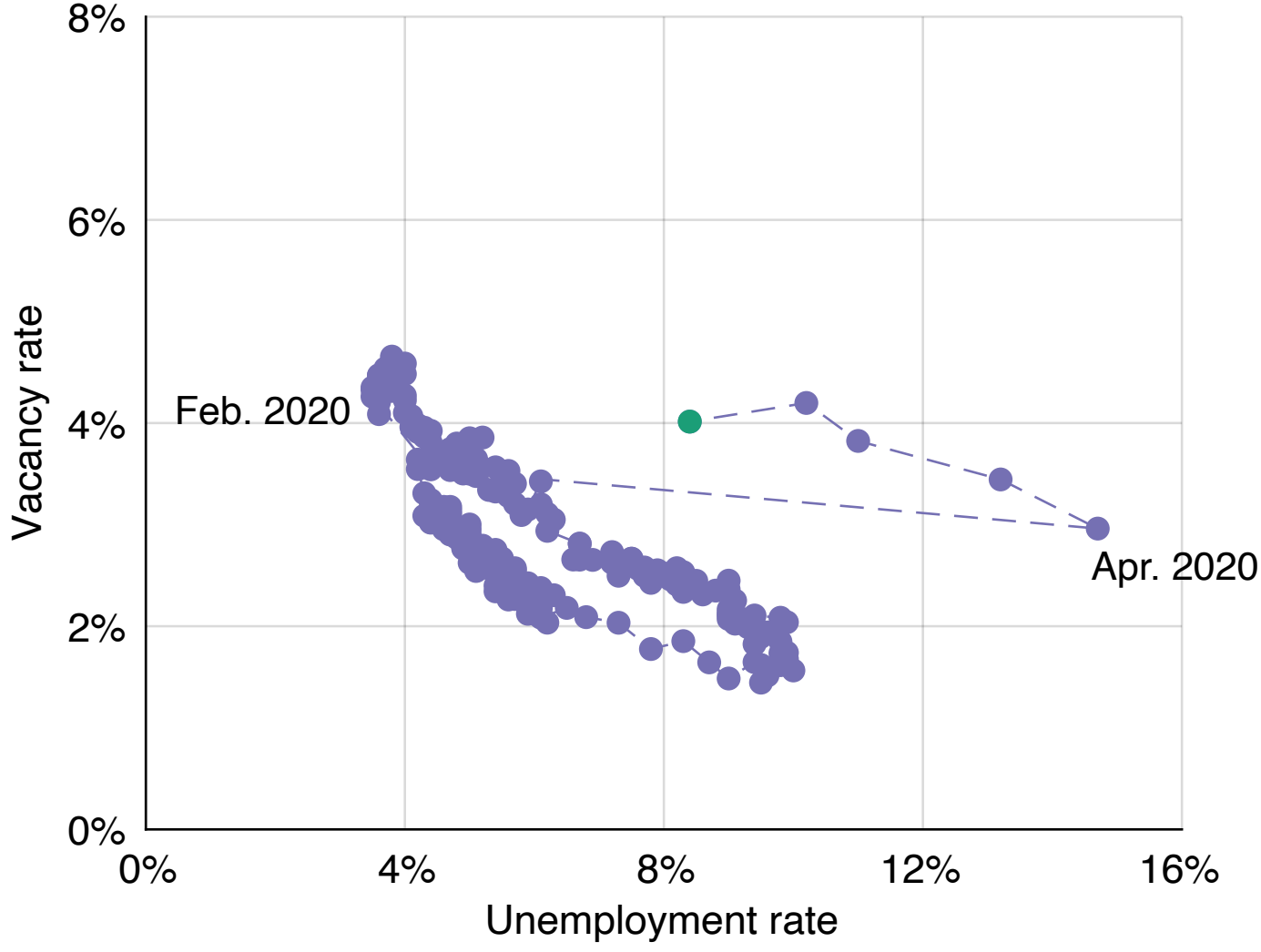

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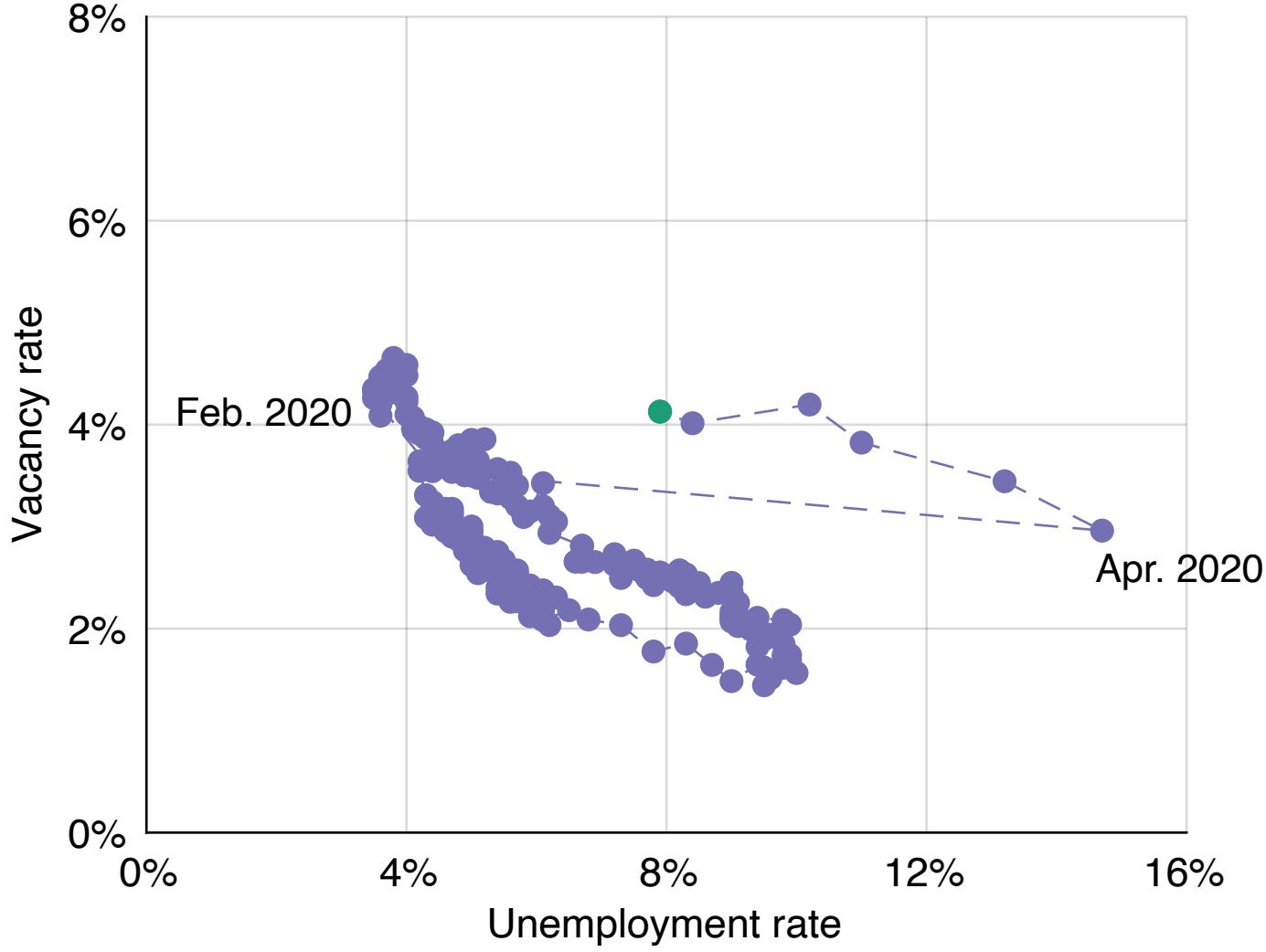

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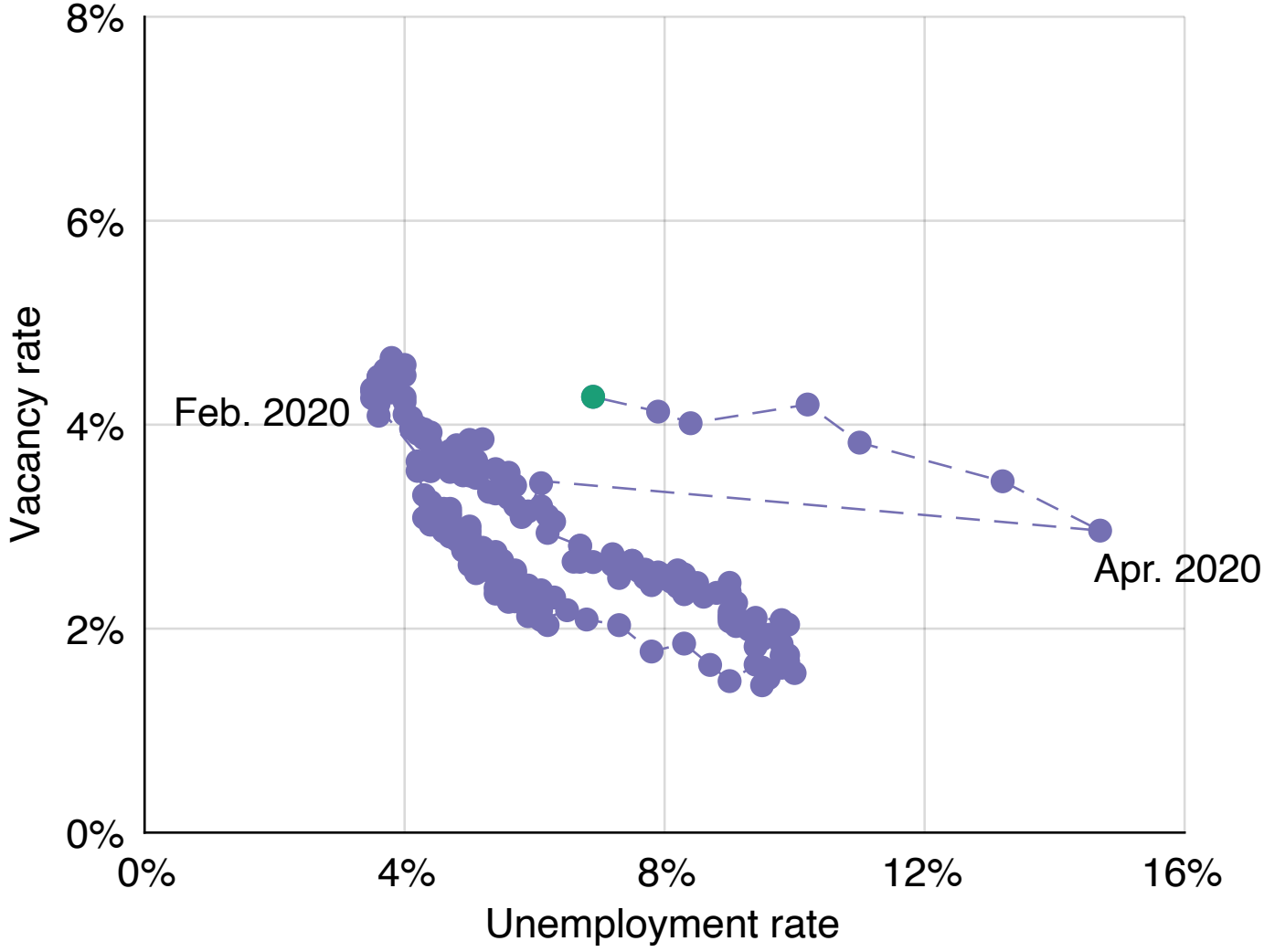

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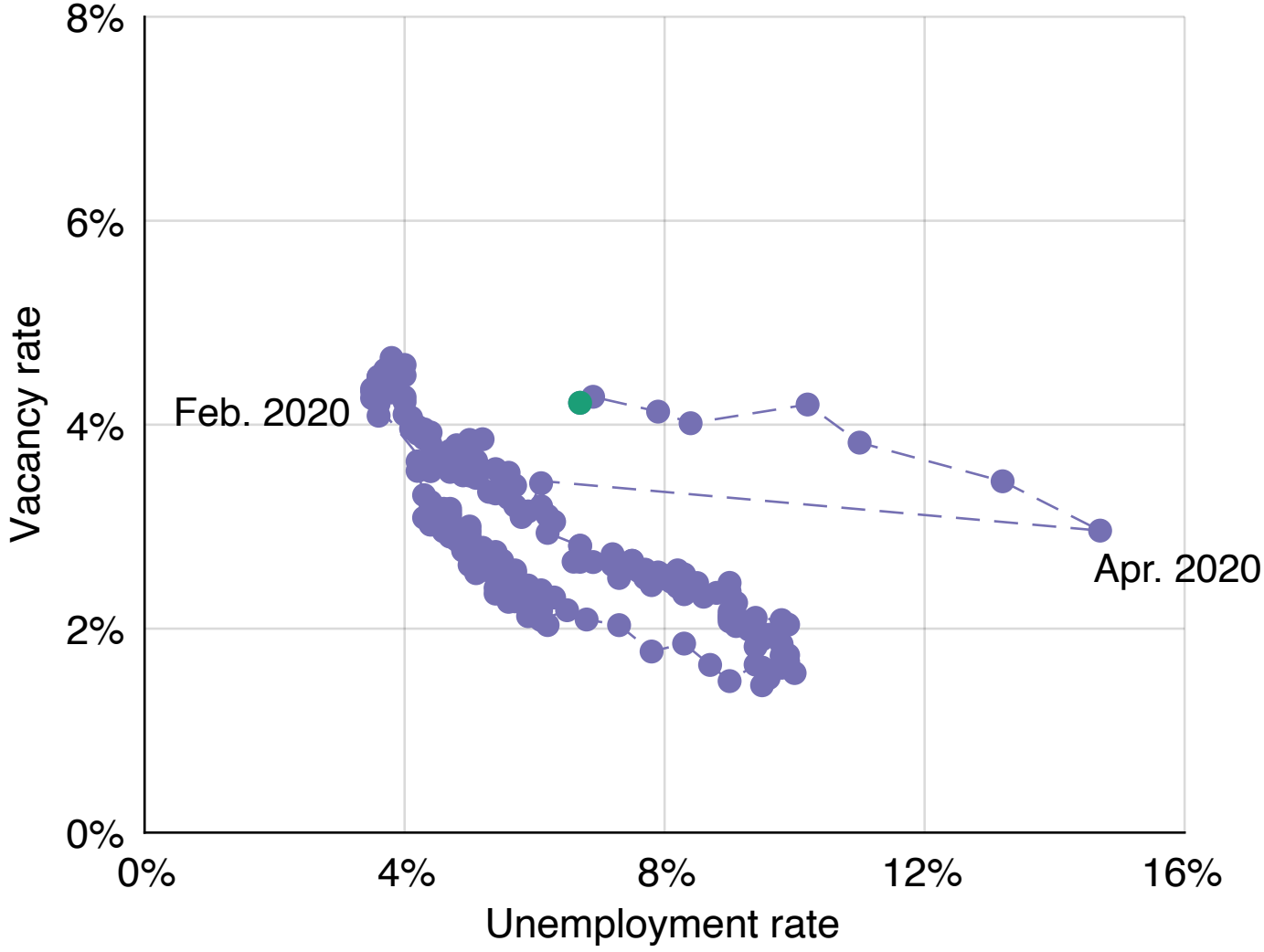

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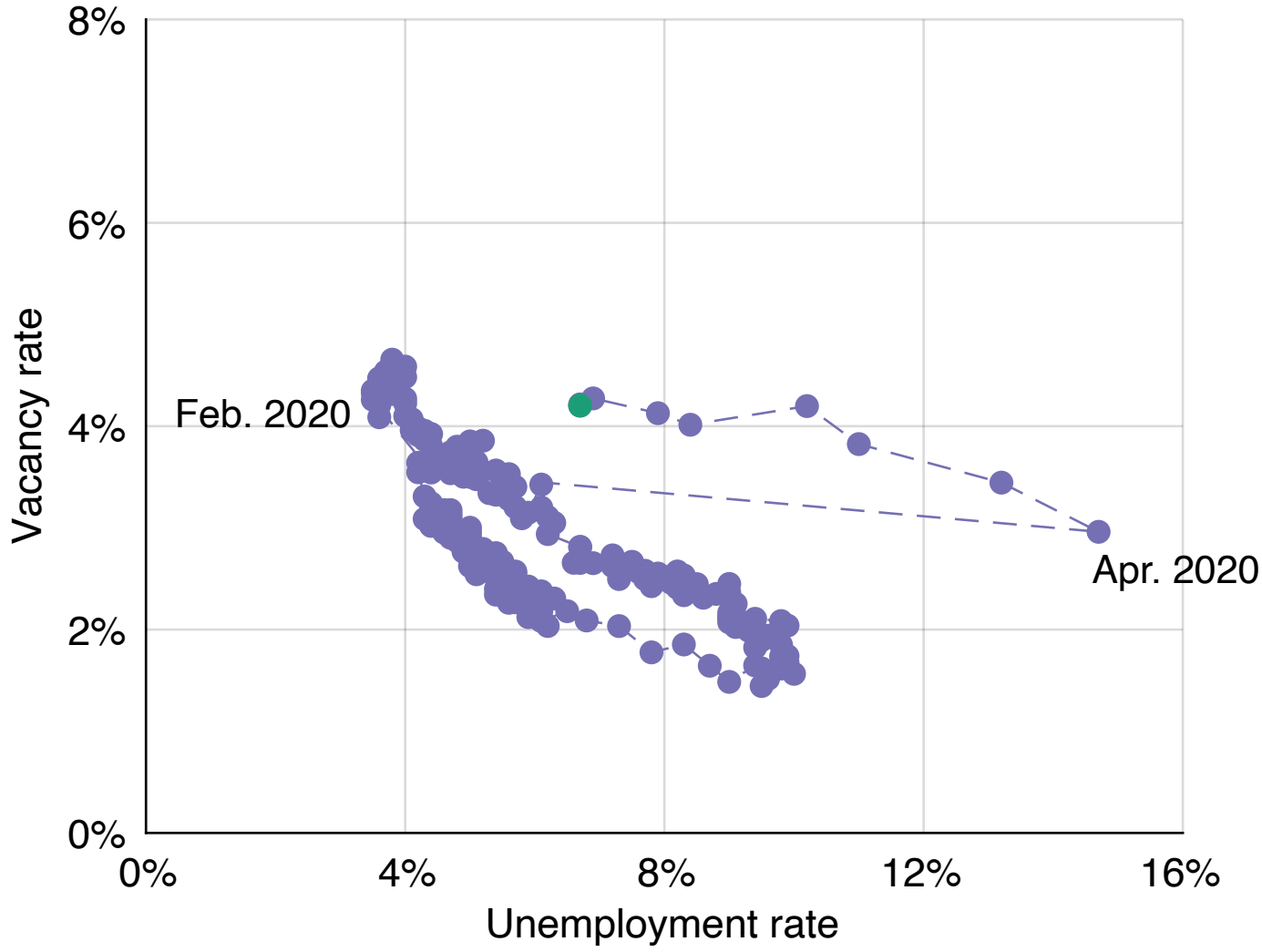

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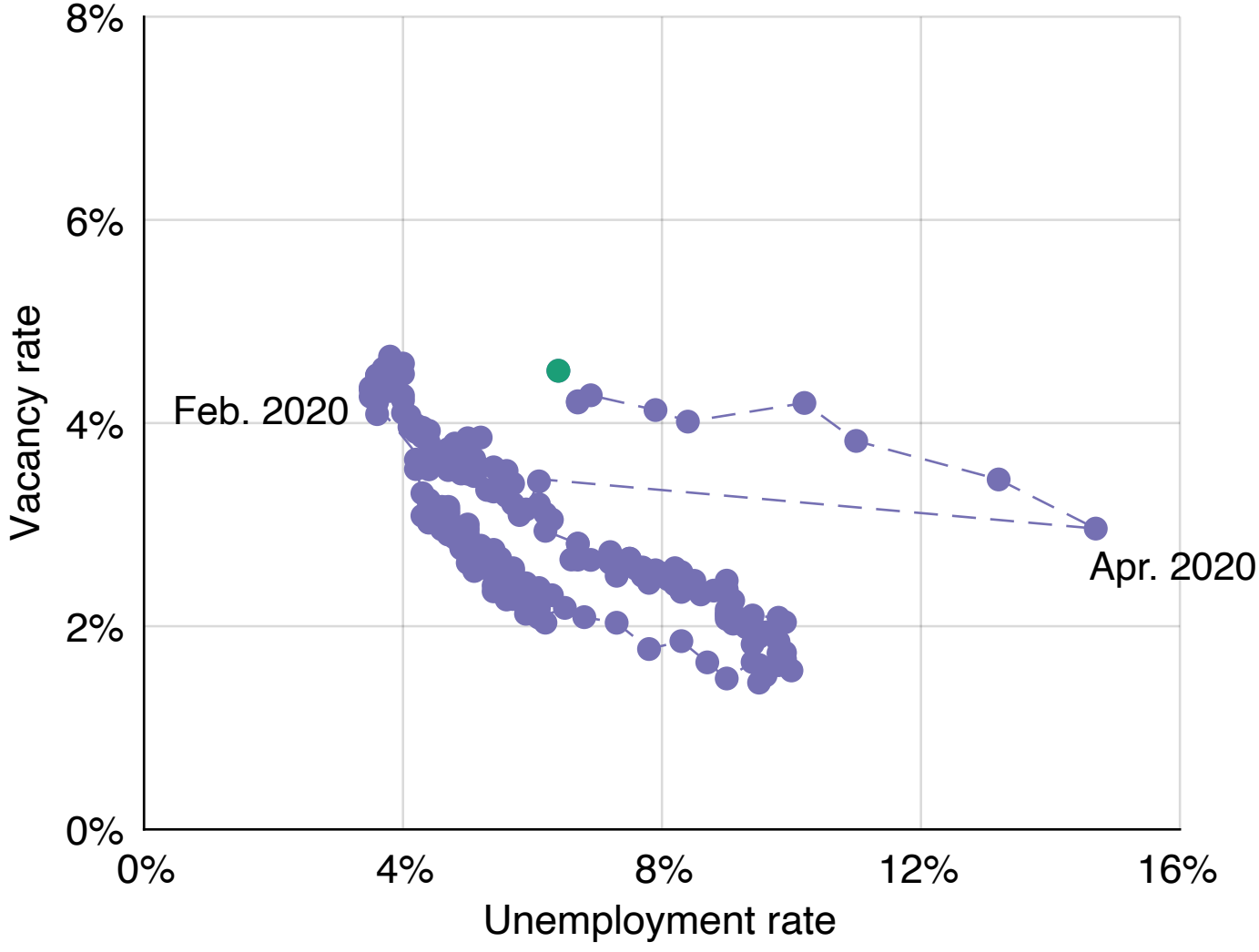

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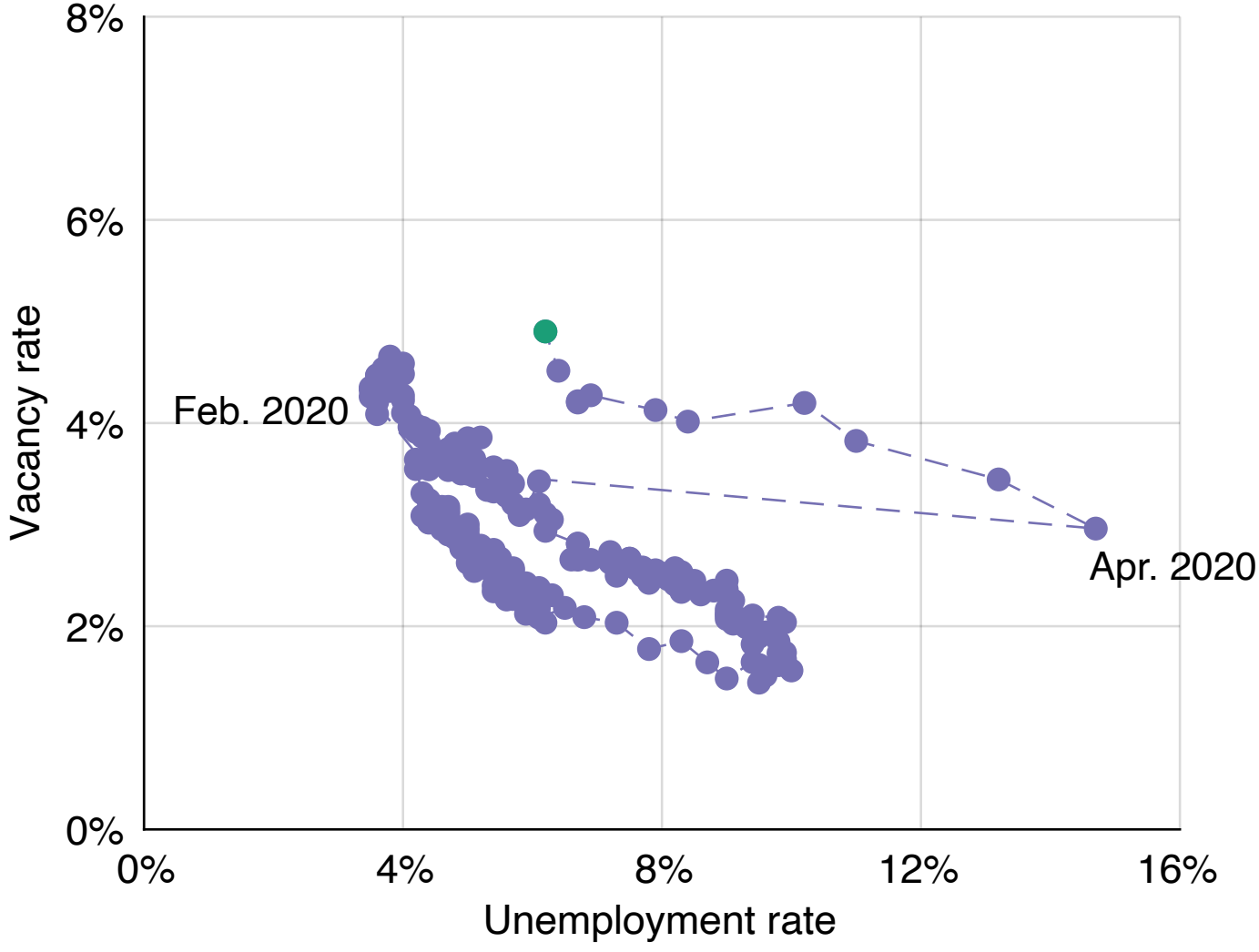

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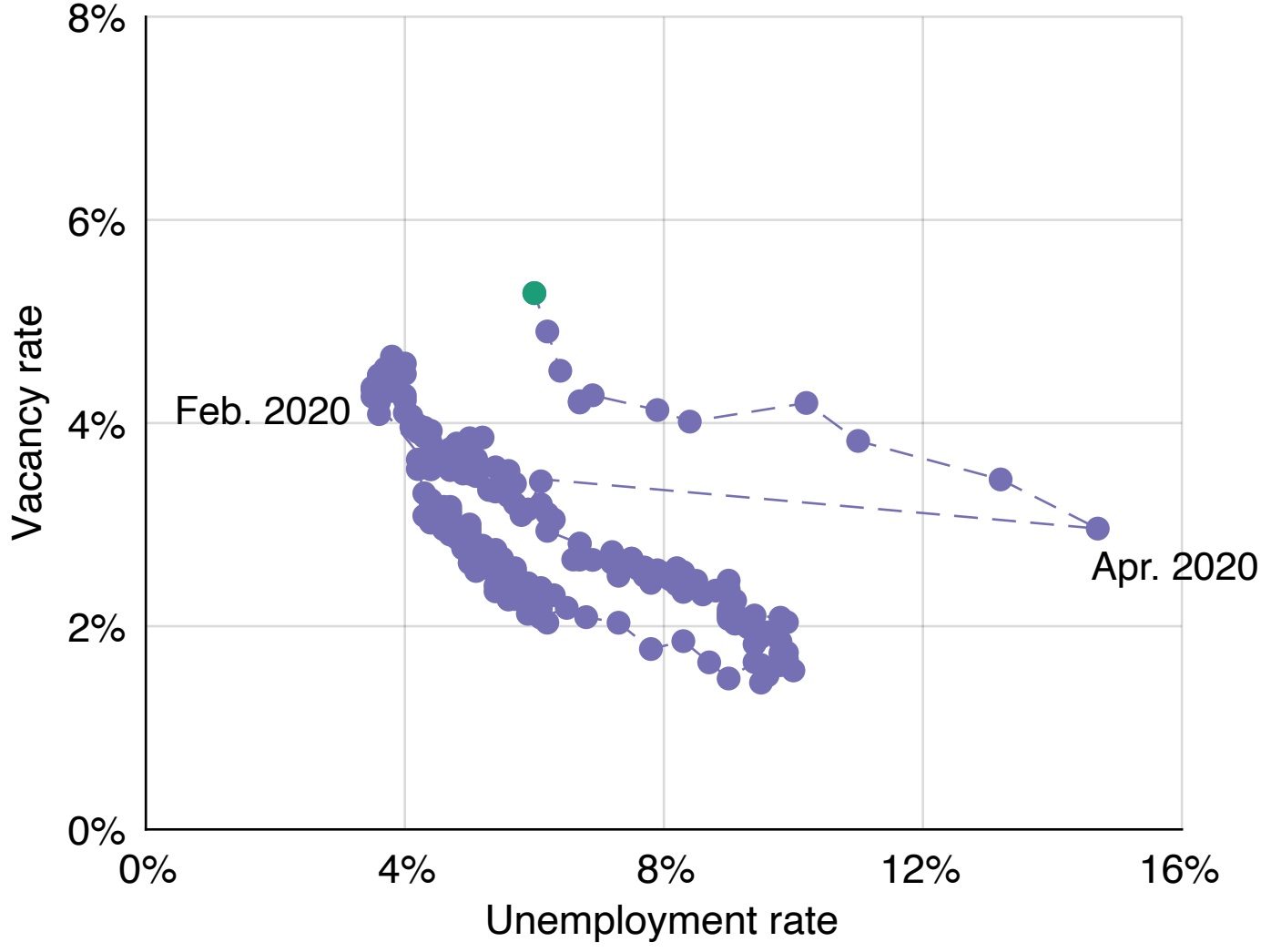

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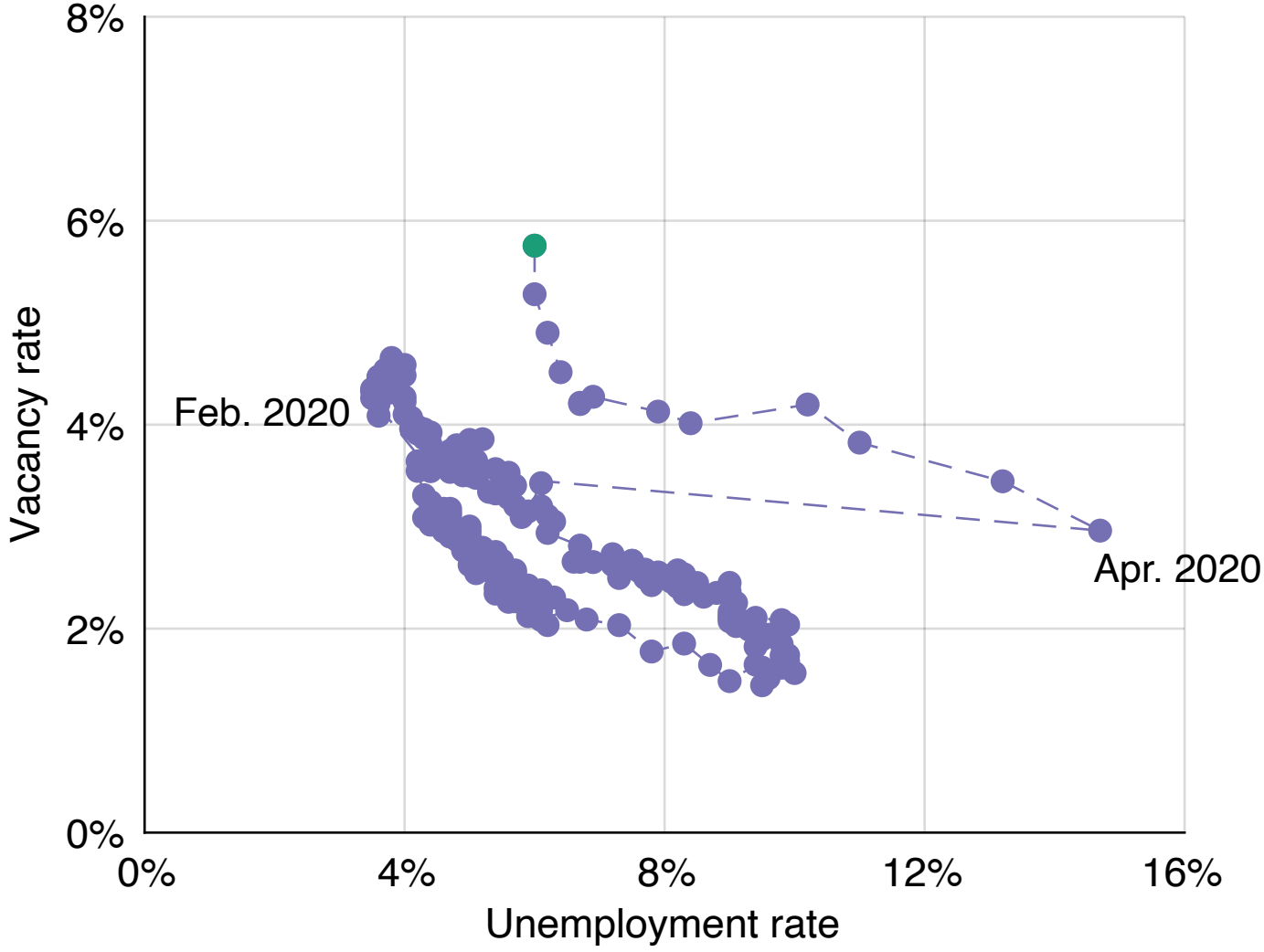

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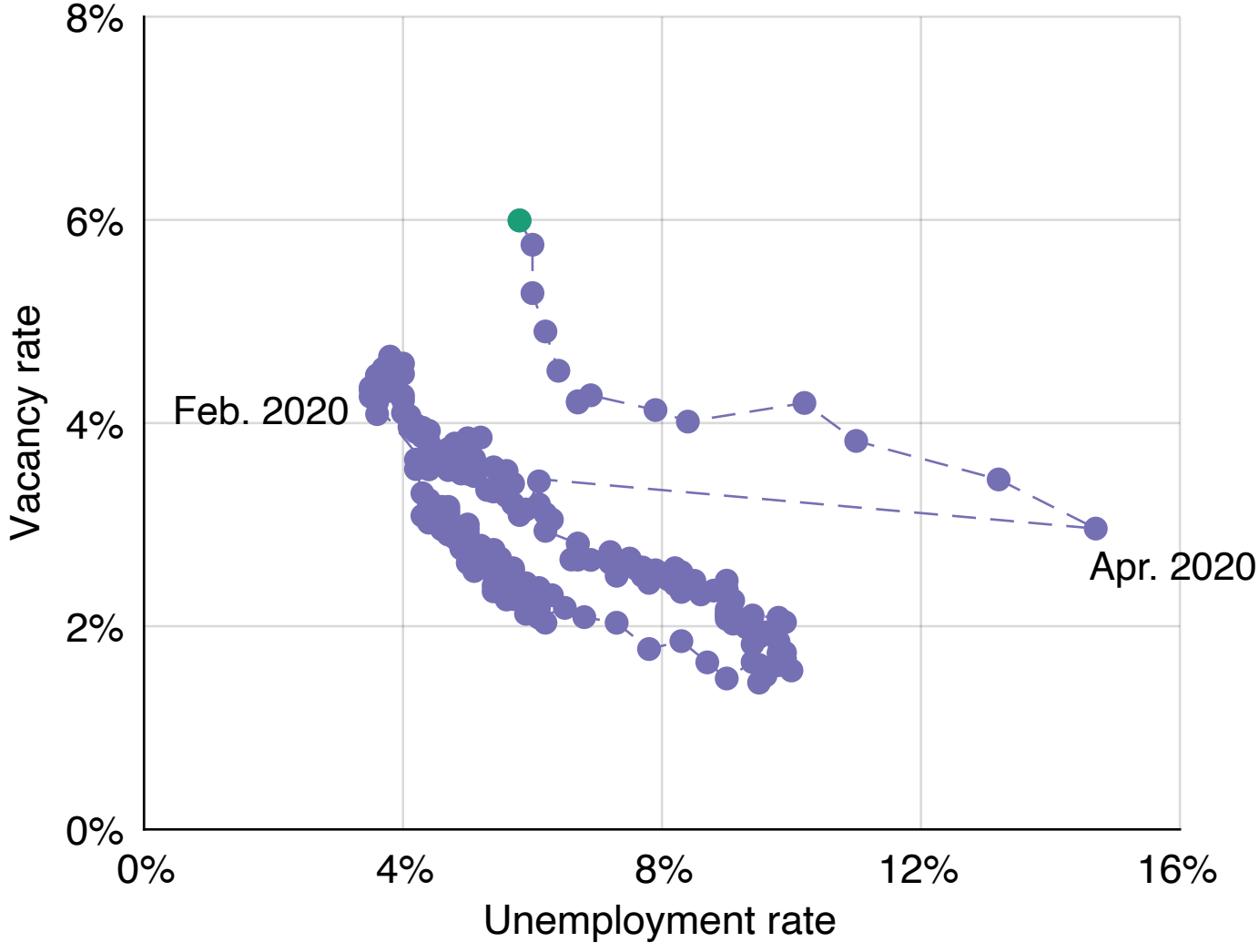

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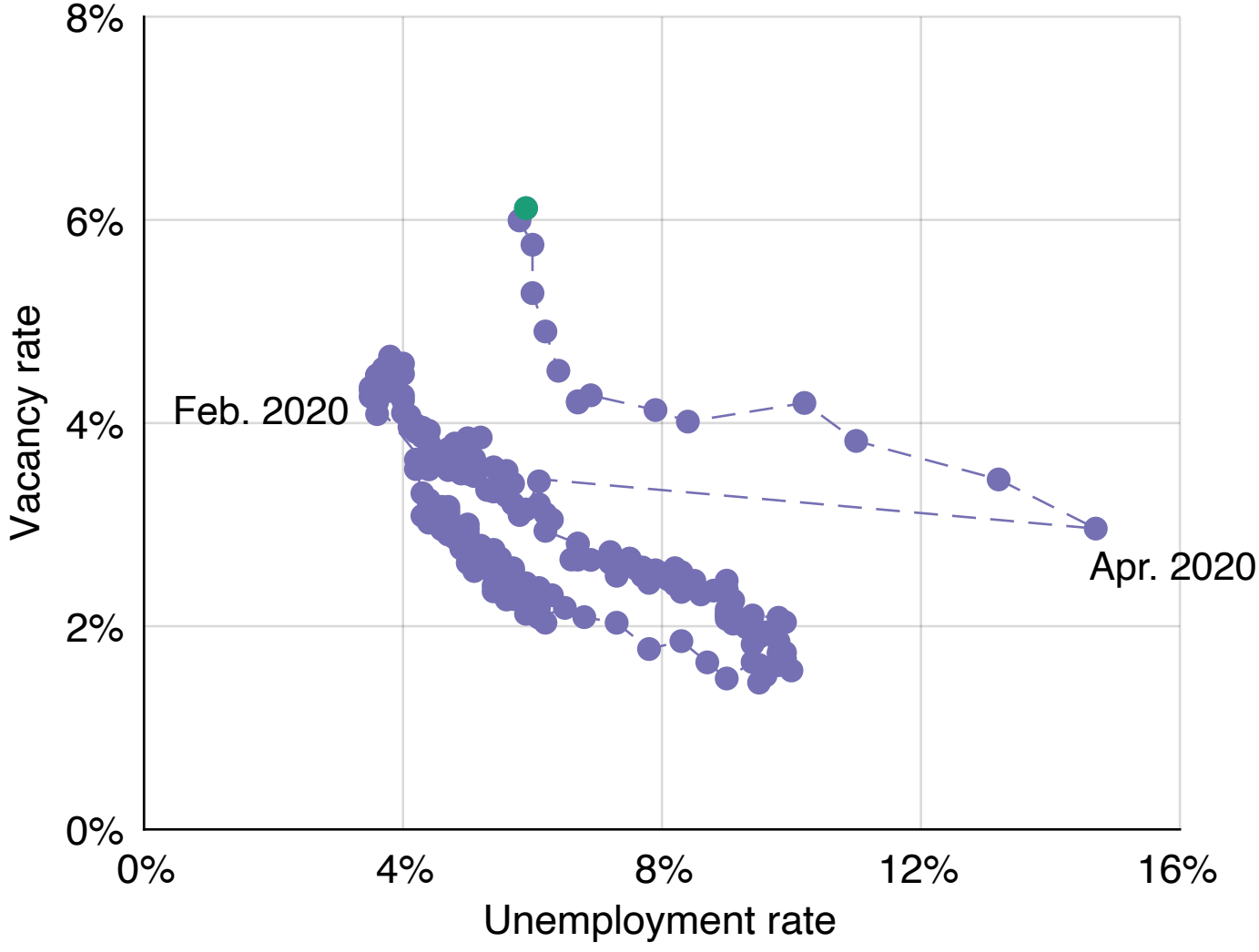

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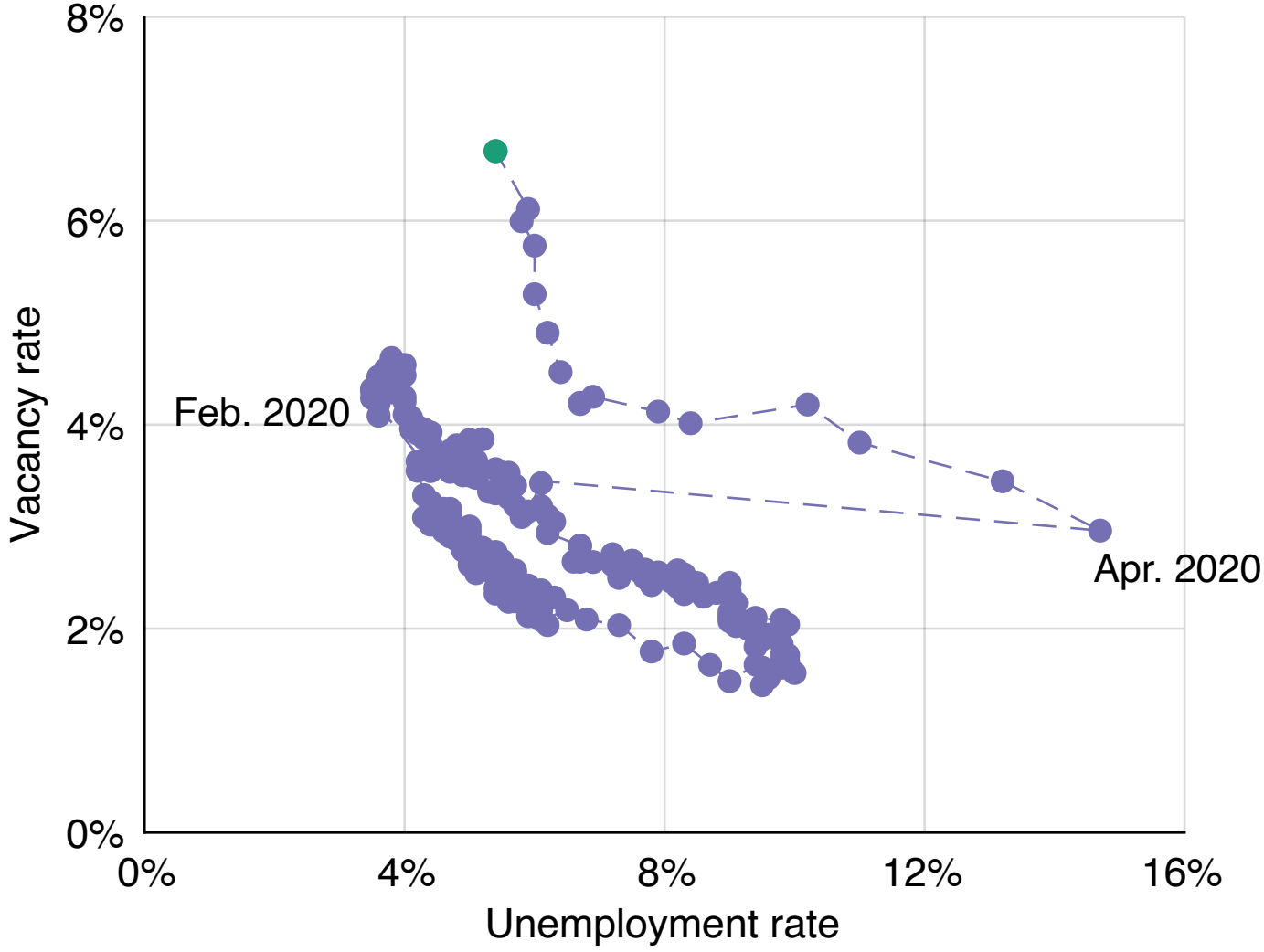

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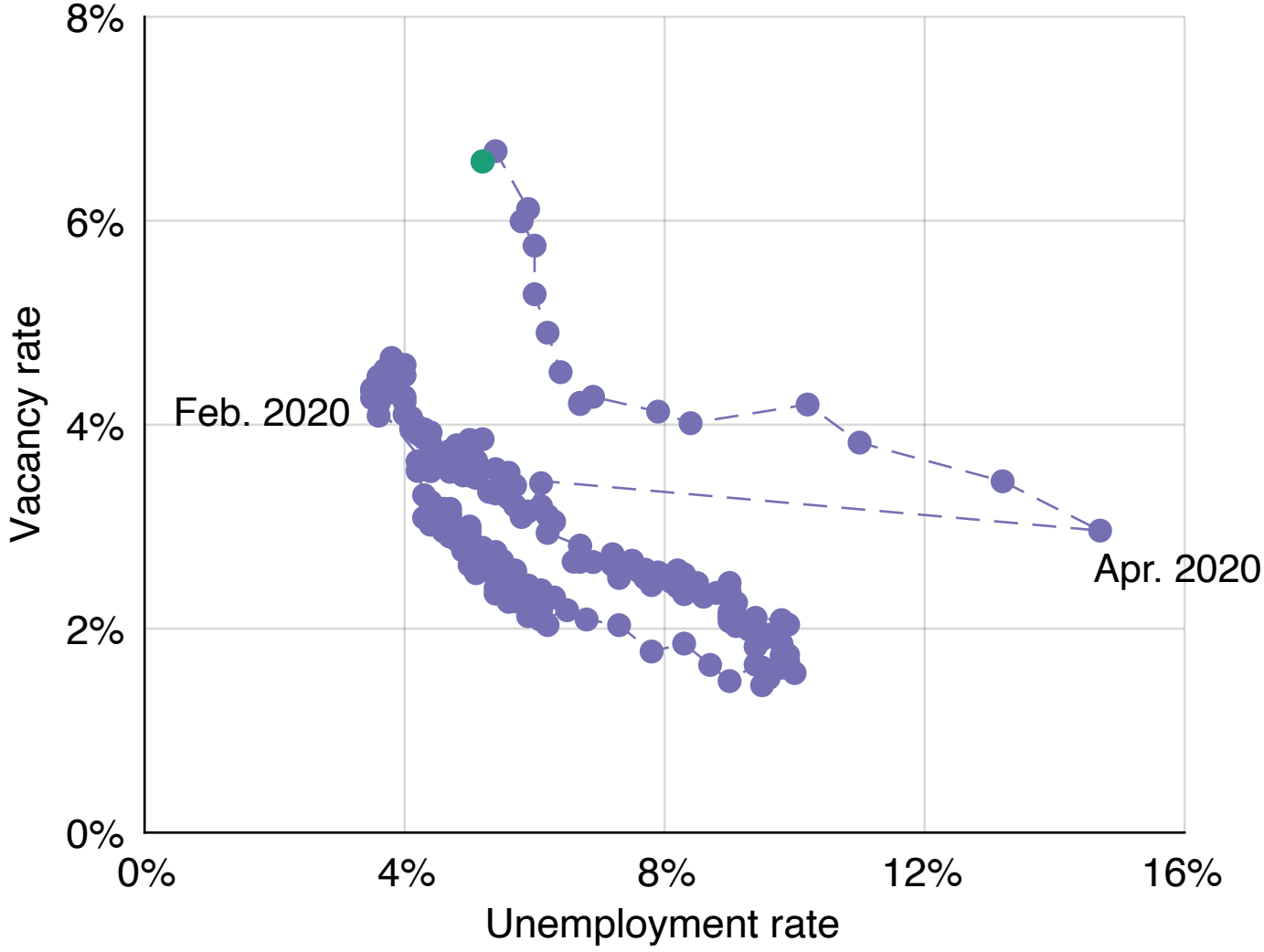

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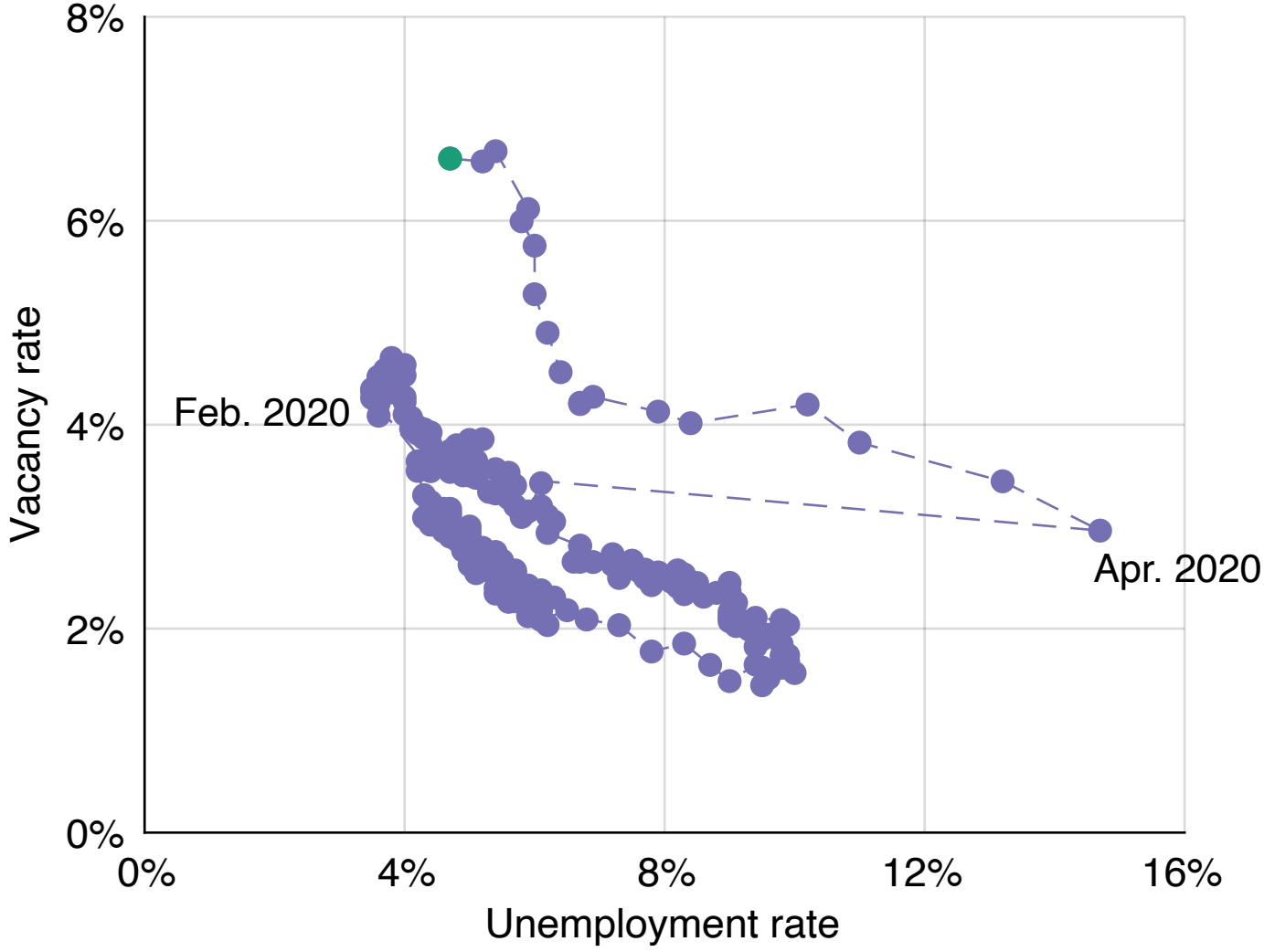

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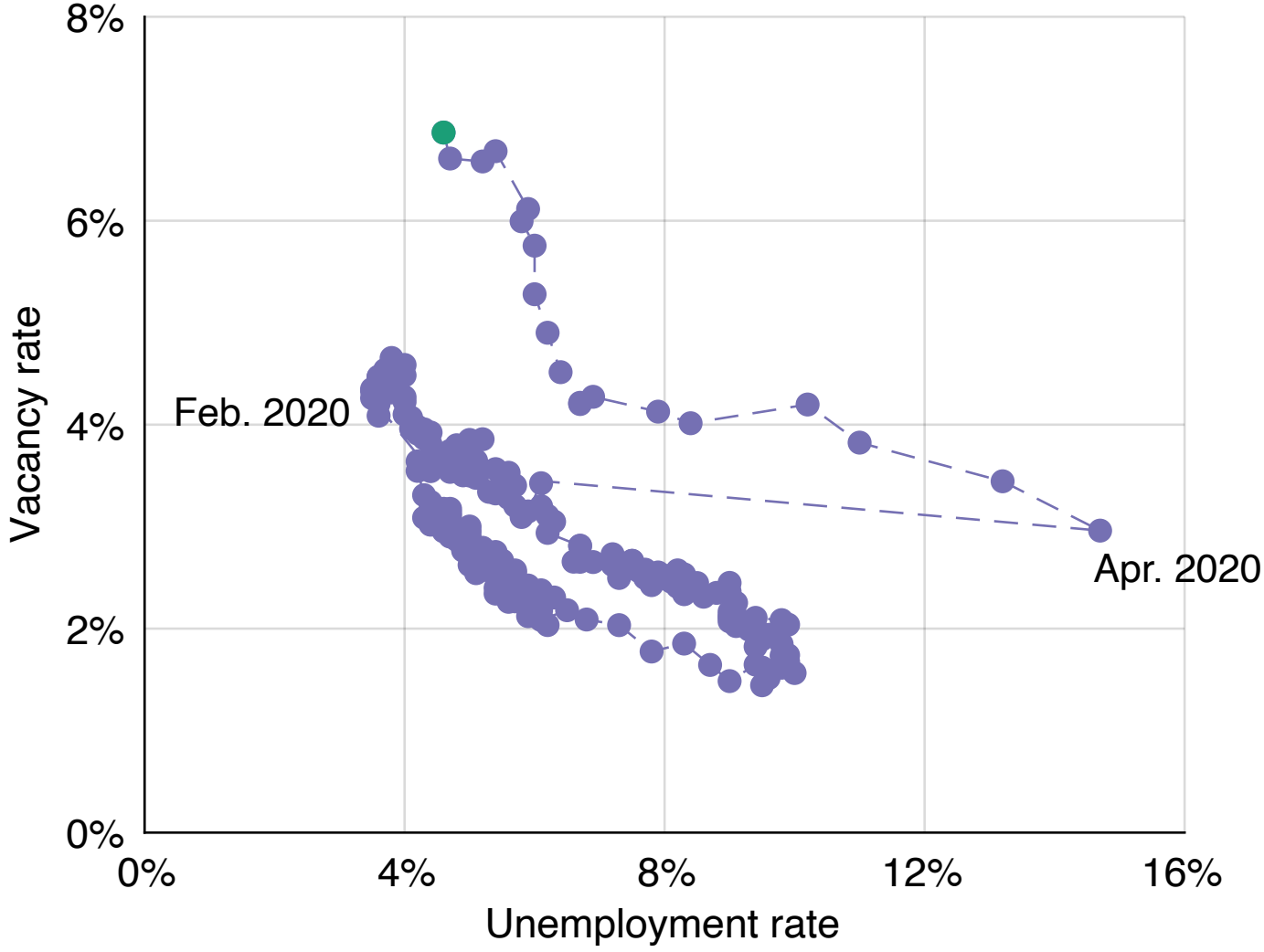

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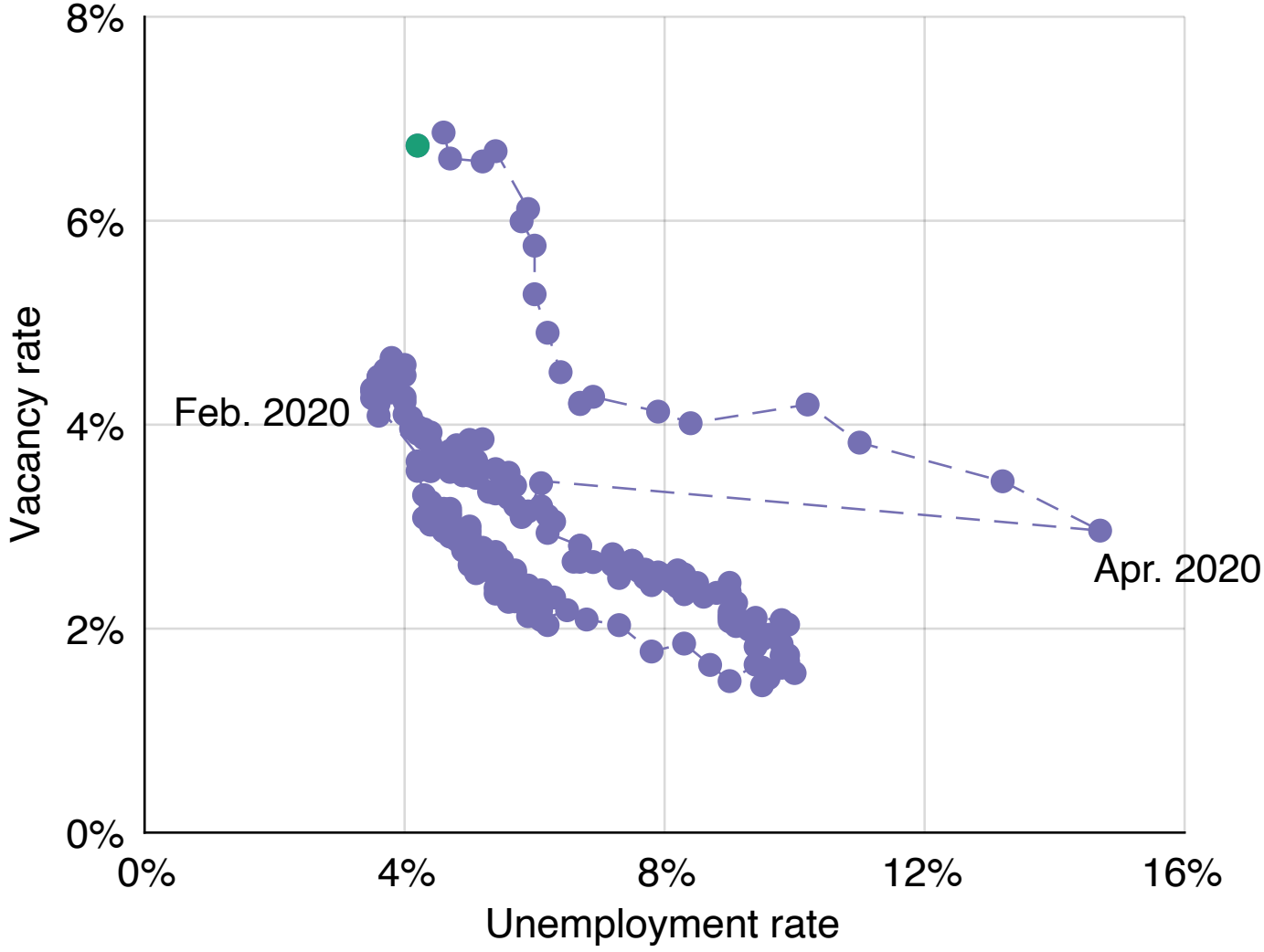

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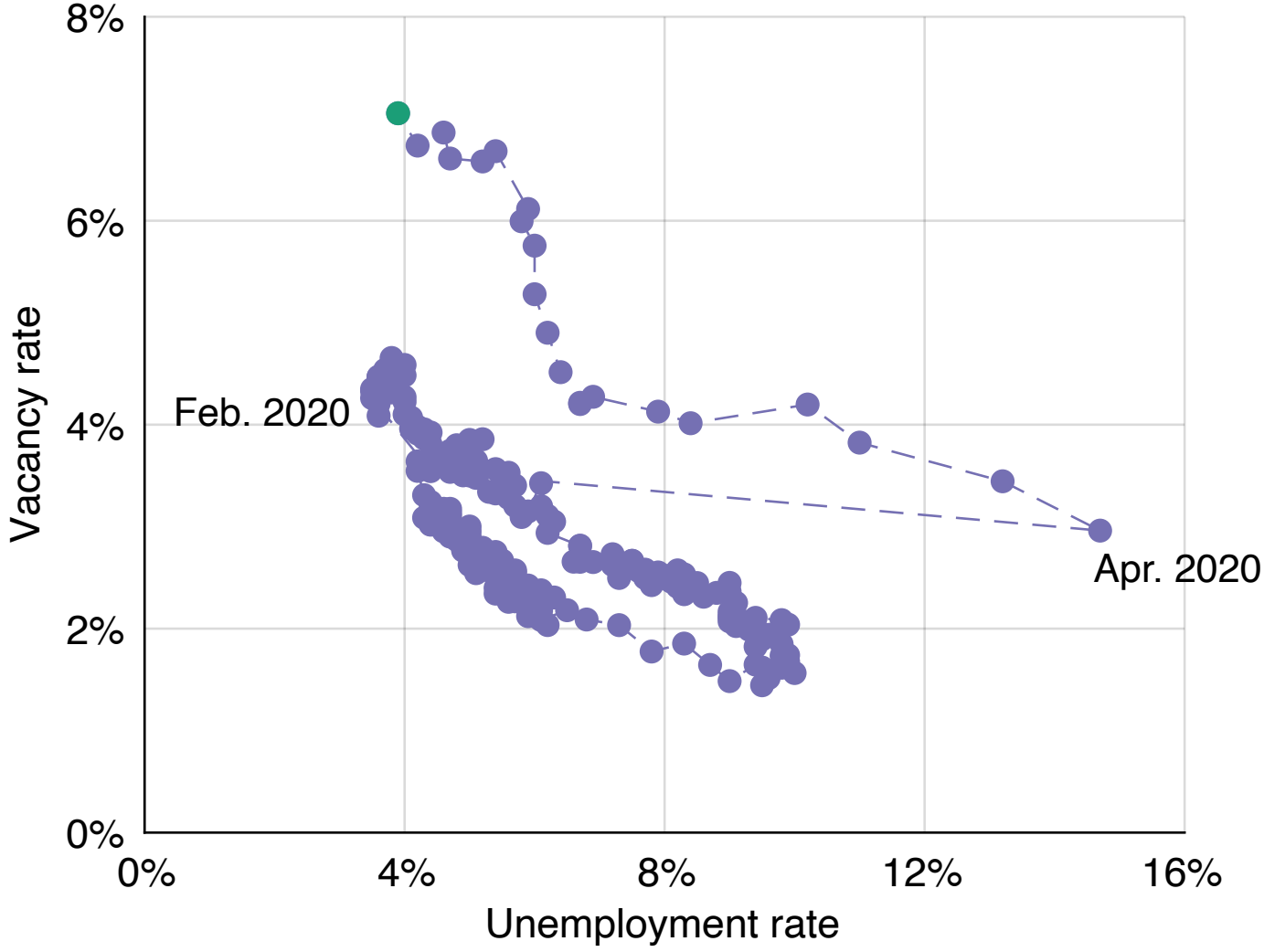

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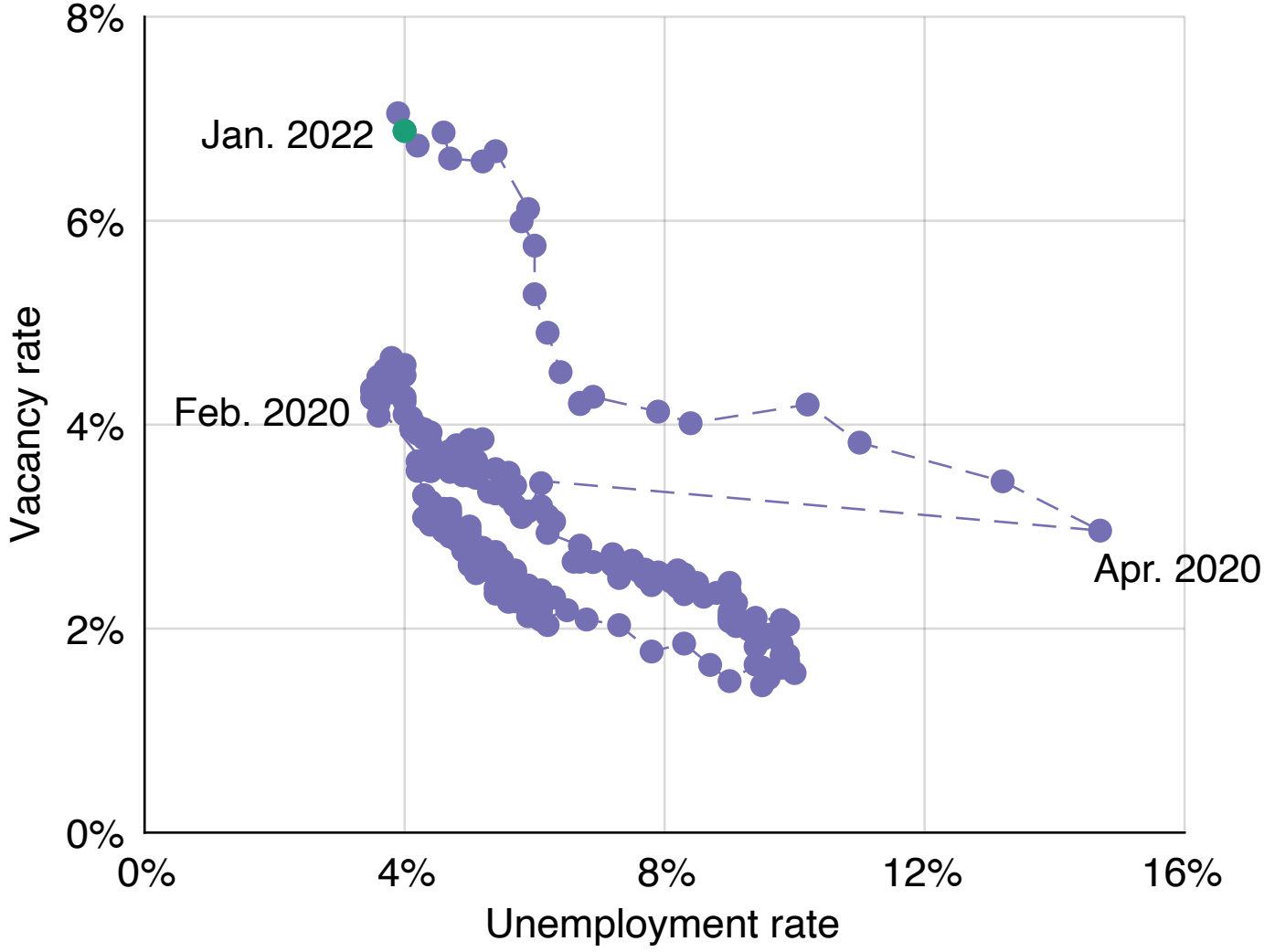

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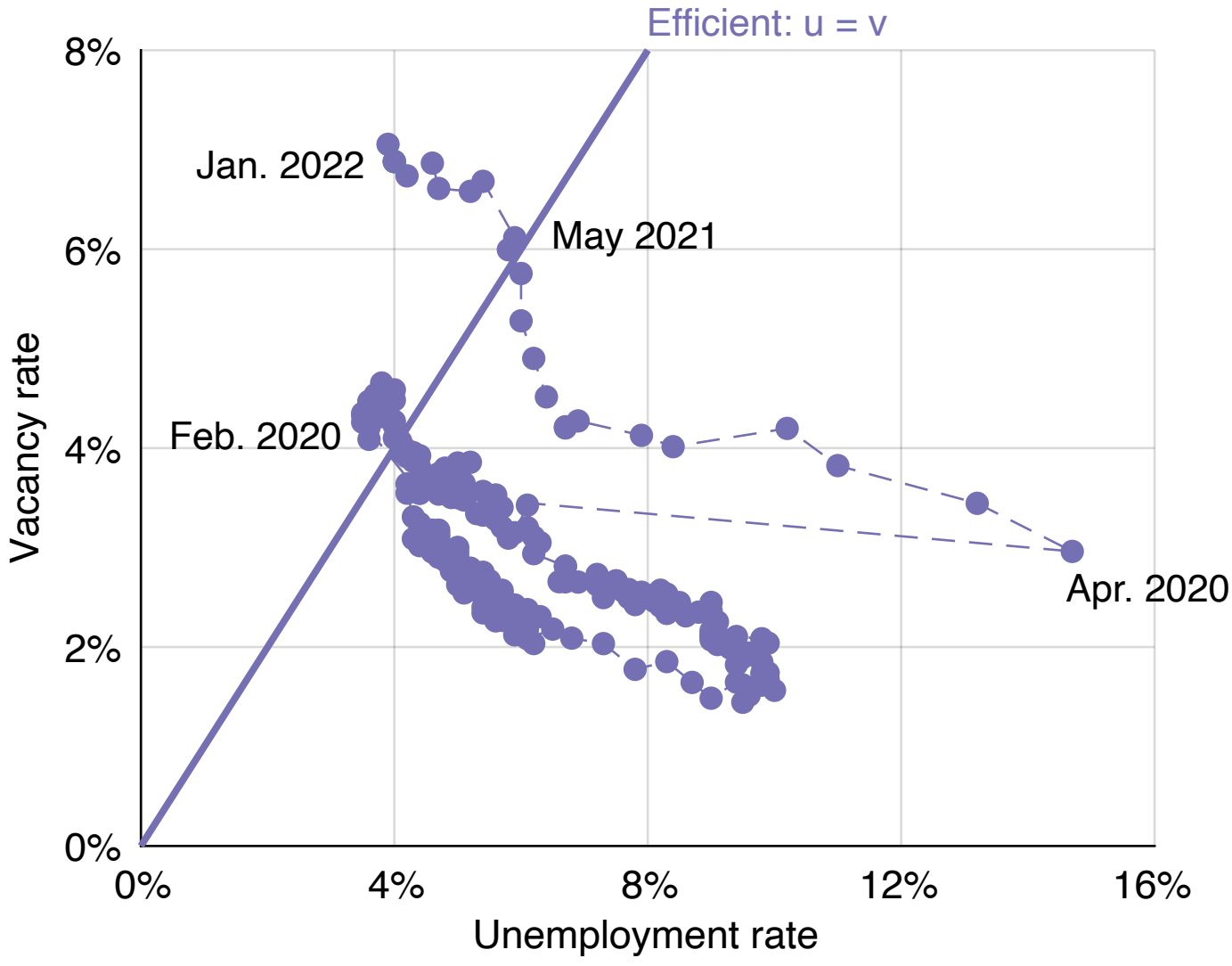

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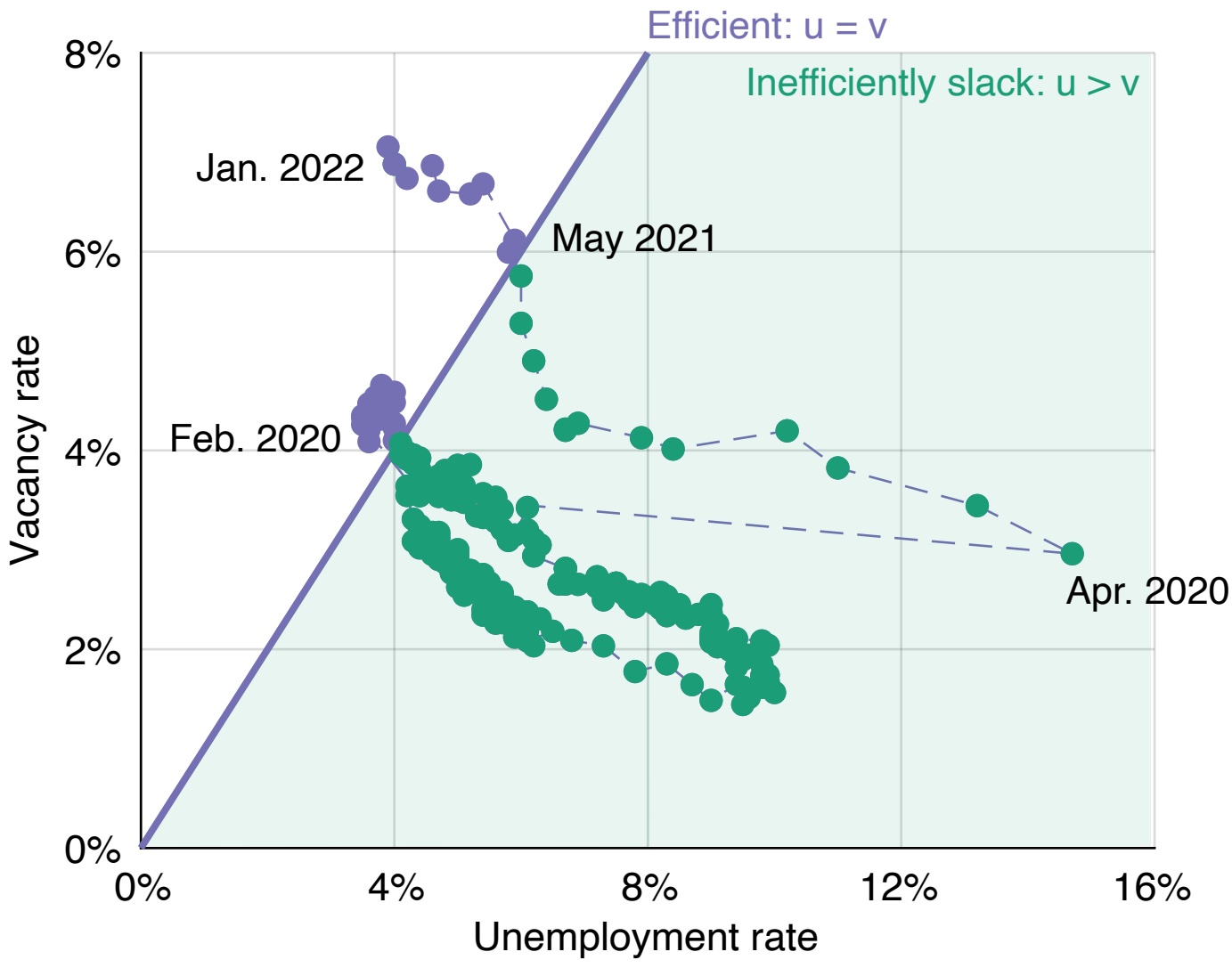

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