Phillips and Beveridge Curves are Baaack

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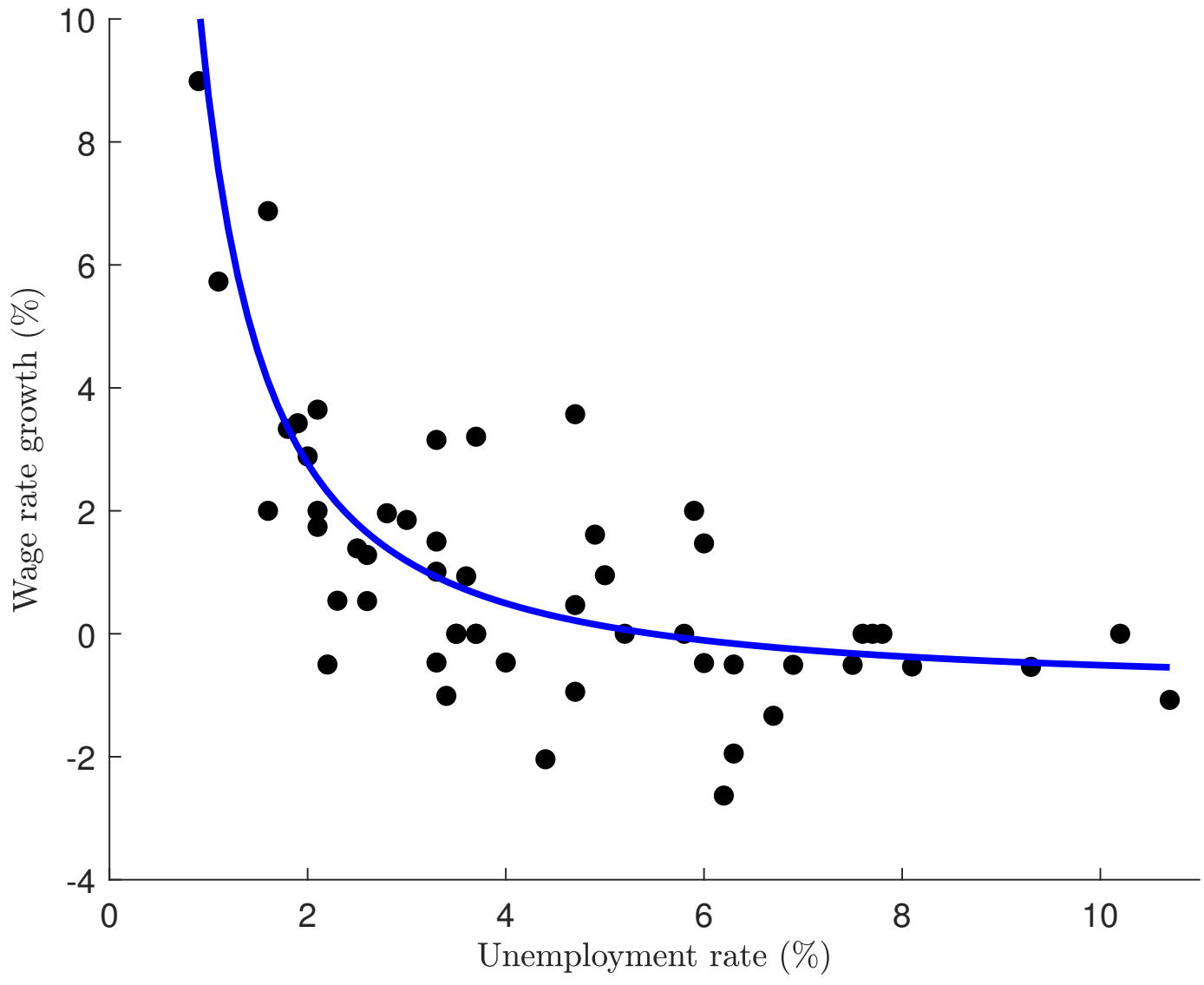
Phillips Curve

Phillips Curve



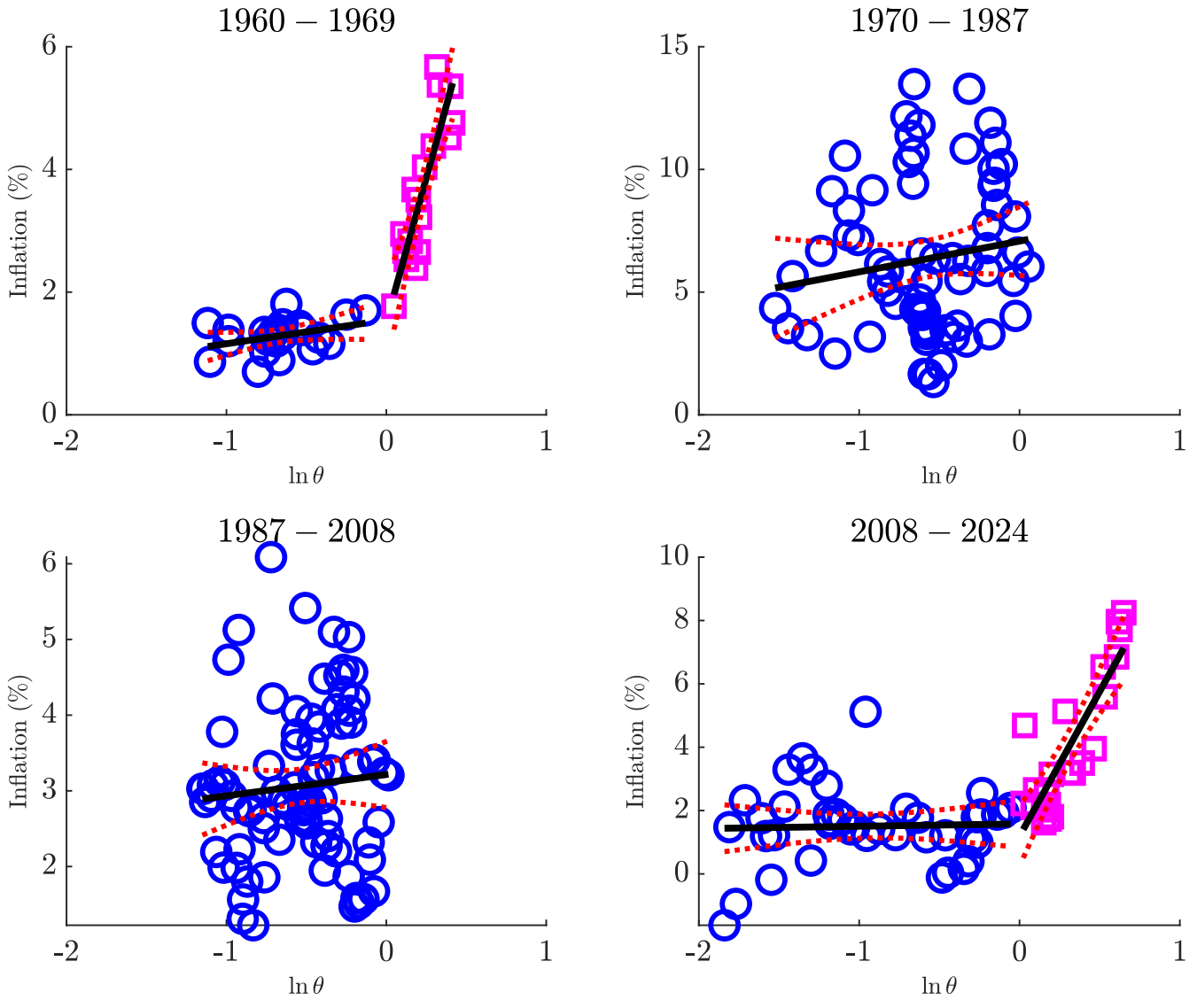
New Keynesian Phillips Curve

$$\pi_t = \kappa_x x_t + \kappa_\nu \nu_t + k_\pi E_t \pi_{t+1}$$

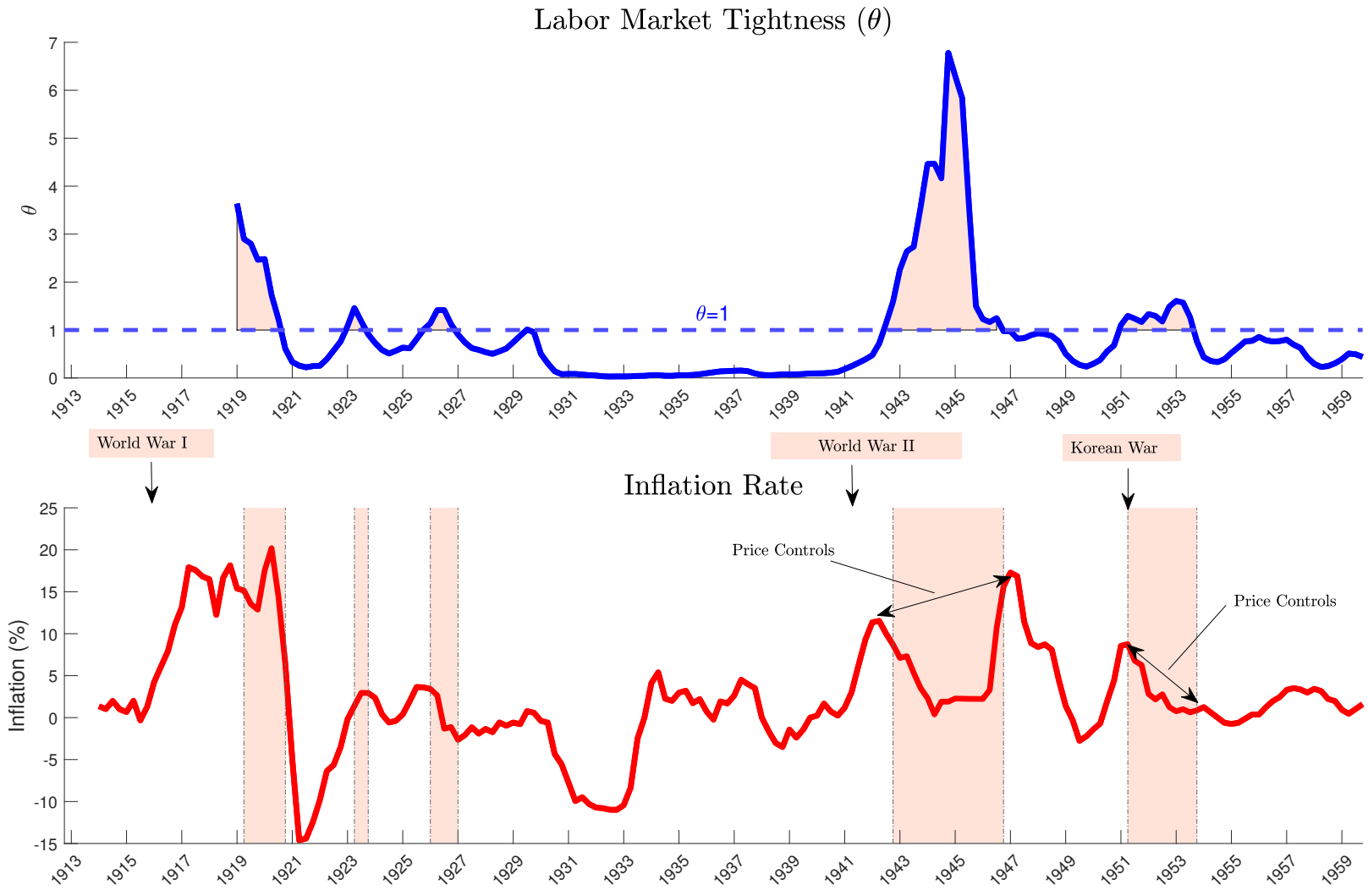
where:

- π_t = inflation
- x_t = measure of economic activity
- ν_t = supply shocks
- $E_t \pi_{t+1}$ = inflation expectations
- $\kappa_{x,\nu,\pi}$ = coefficients.

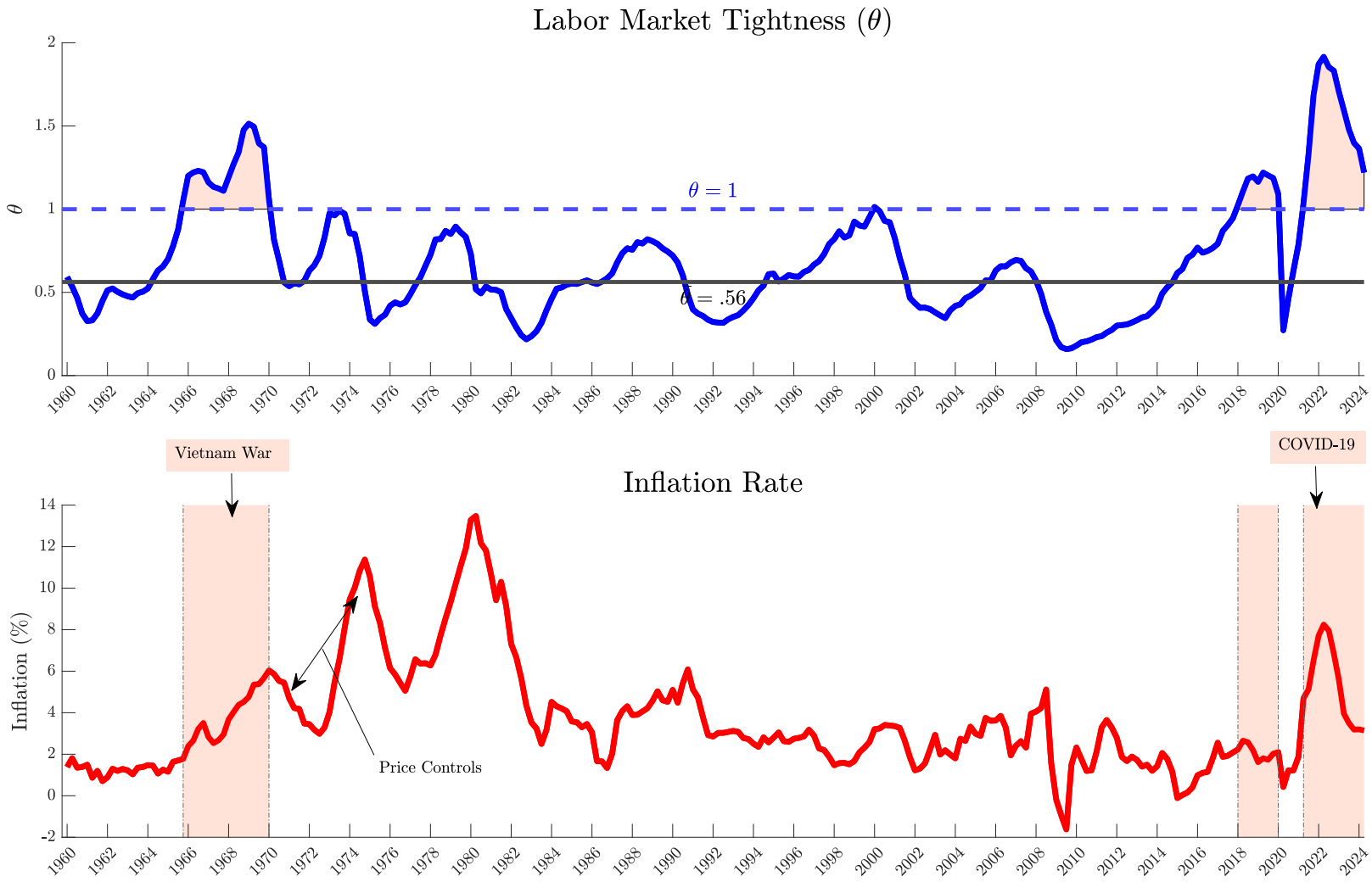
Phillips Curve Evidence: U.S. 1960-2024



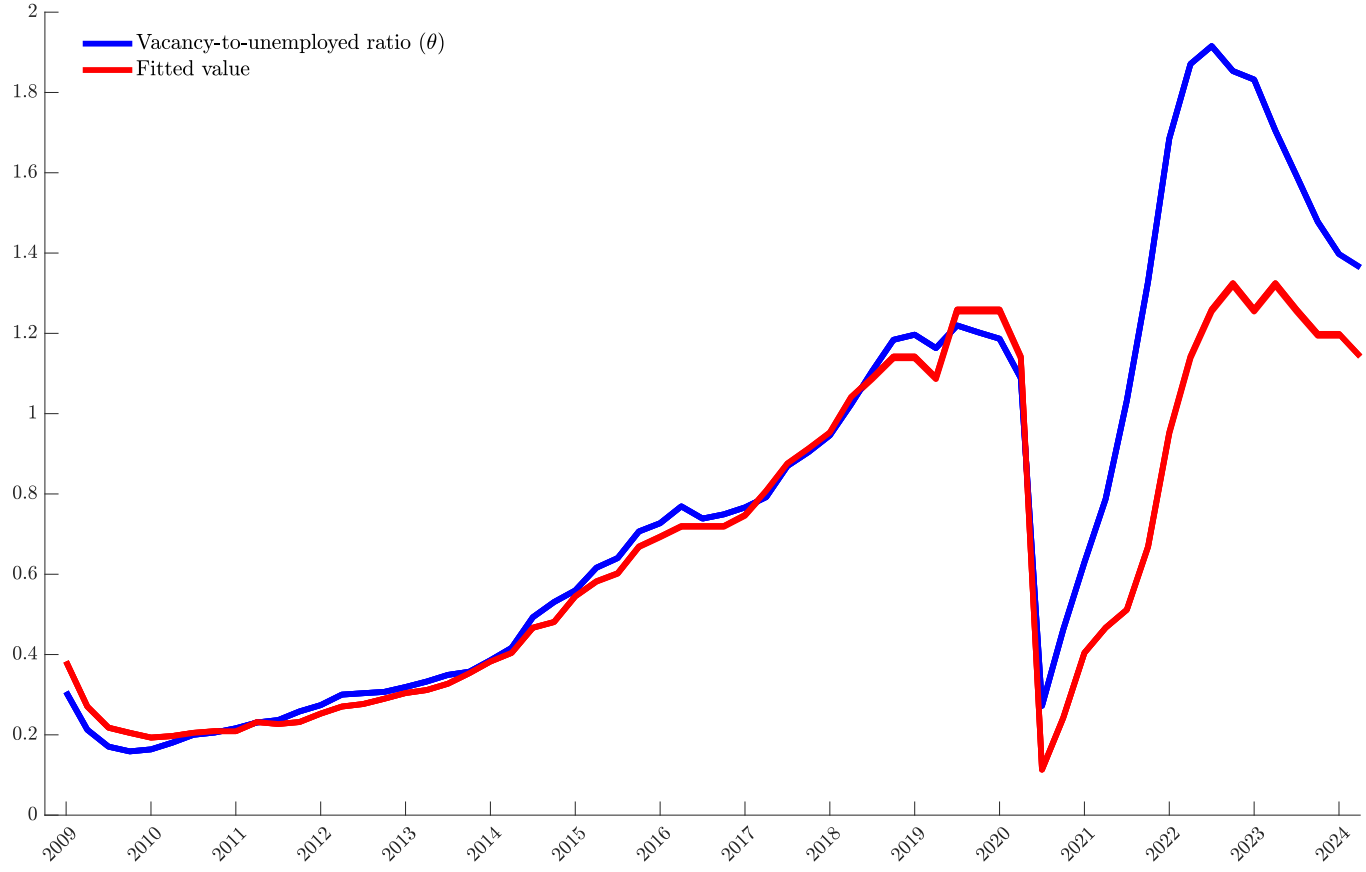
Episodes of Labor Market Tightness in 111 Years of U.S. History



Episodes of Labor Market Tightness in 111 Years of U.S. History



Why $\theta = \frac{v}{u}$ rather than u as a measure of economic slack?



Estimating Phillips Curve

$$\pi_t = \beta_c + \beta_\pi \pi_{t-1} + (\beta_\theta + \beta_{\theta_d} D_t) \ln \theta_t + (\beta_\nu + \beta_{\nu_d} D_t)\nu_t + \beta_{\pi^e} \pi_t^e + \varepsilon_t,$$

where:

- $\beta_c, \beta_\pi, \beta_\theta, \beta_{\theta_d}, \beta_\upsilon, \beta_{\upsilon_d}, \beta_{\pi^e}$ are parameters
- ε_t is a zero-mean normally distributed error term
- D_t is a dummy variable equal to 1 if $\theta_t \geq 1$
- $\pi_t = \ln P_t - \ln P_{t-1}$ (inflation), π_{t-1} is the lagged inflation
- $\ln \theta_t$ is the logarithm of the vacancy-to-unemployment ratio
- ν_t is a supply shock, π_t^e is inflation expectations

Phillips Curve Estimates

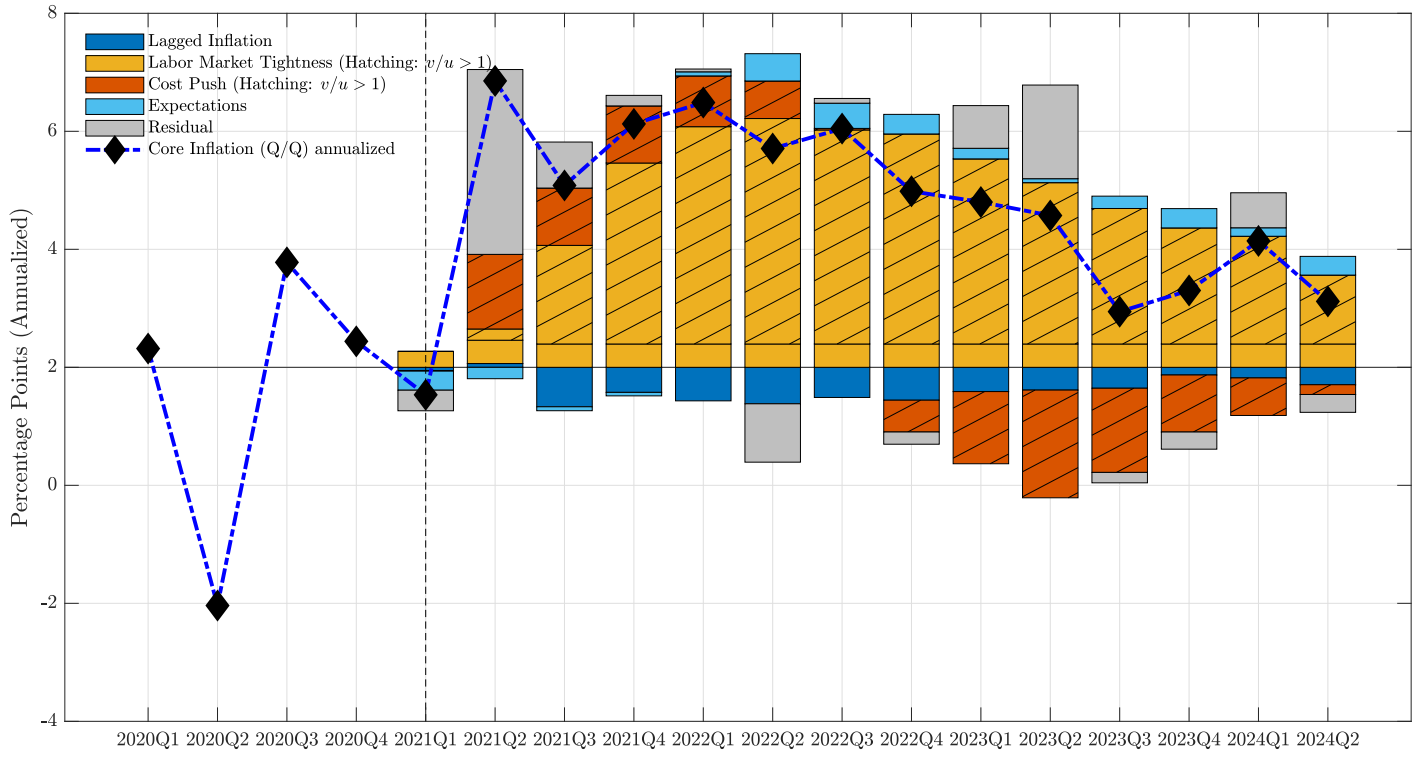
Phillips Curve Estimates

	(1) 1960-2024	(2) 2008-2024	(3) 1960-2024	(4) 2008-2024
Inflation lag	0.3707^{***} (0.0949)	0.2668 (0.2503)	0.2572^{***} (0.0933)	−0.1377 (0.1951)
$\ln \theta$	0.6748^{***} (0.1779)	0.7267^{*} (0.3708)	0.2367 (0.1993)	0.5227 (0.3188)
$\theta \geq 1$			3.7165^{***} (0.8248)	5.3565^{***} (0.8936)
Supply shock ν	0.0377^{**} (0.0192)	0.0177 (0.0393)	0.0446^{**} (0.0204)	−0.0093 (0.023)
$\theta \geq 1$			0.1015 (0.0993)	0.275^{**} (0.1212)
Inflation expectations	0.6596^{***} (0.1064)	0.8263 (0.6225)	0.8072^{***} (0.1016)	0.5091 (0.5048)
Constant	0.5559^{***} (0.1538)	0.9406^{**} (0.4176)	0.1977 (0.1662)	0.3954 (0.3822)
R^2 adjusted	0.8139	0.5137	0.8264	0.6603
Observations	258	64	258	64

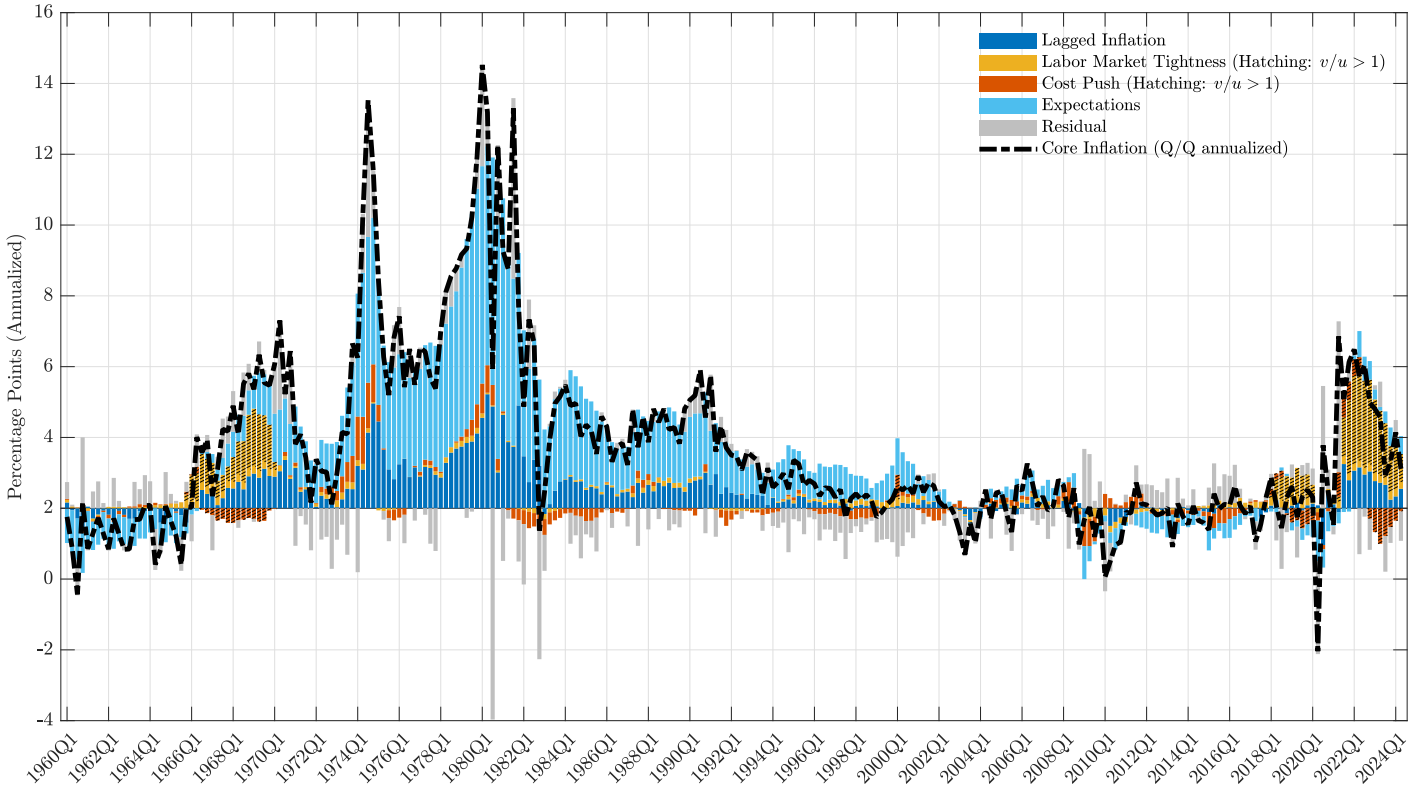
· *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

· Newey-West standard errors

Inflation Decomposition: 2020s Inflationary Surge



Inflation Decomposition:since 1960

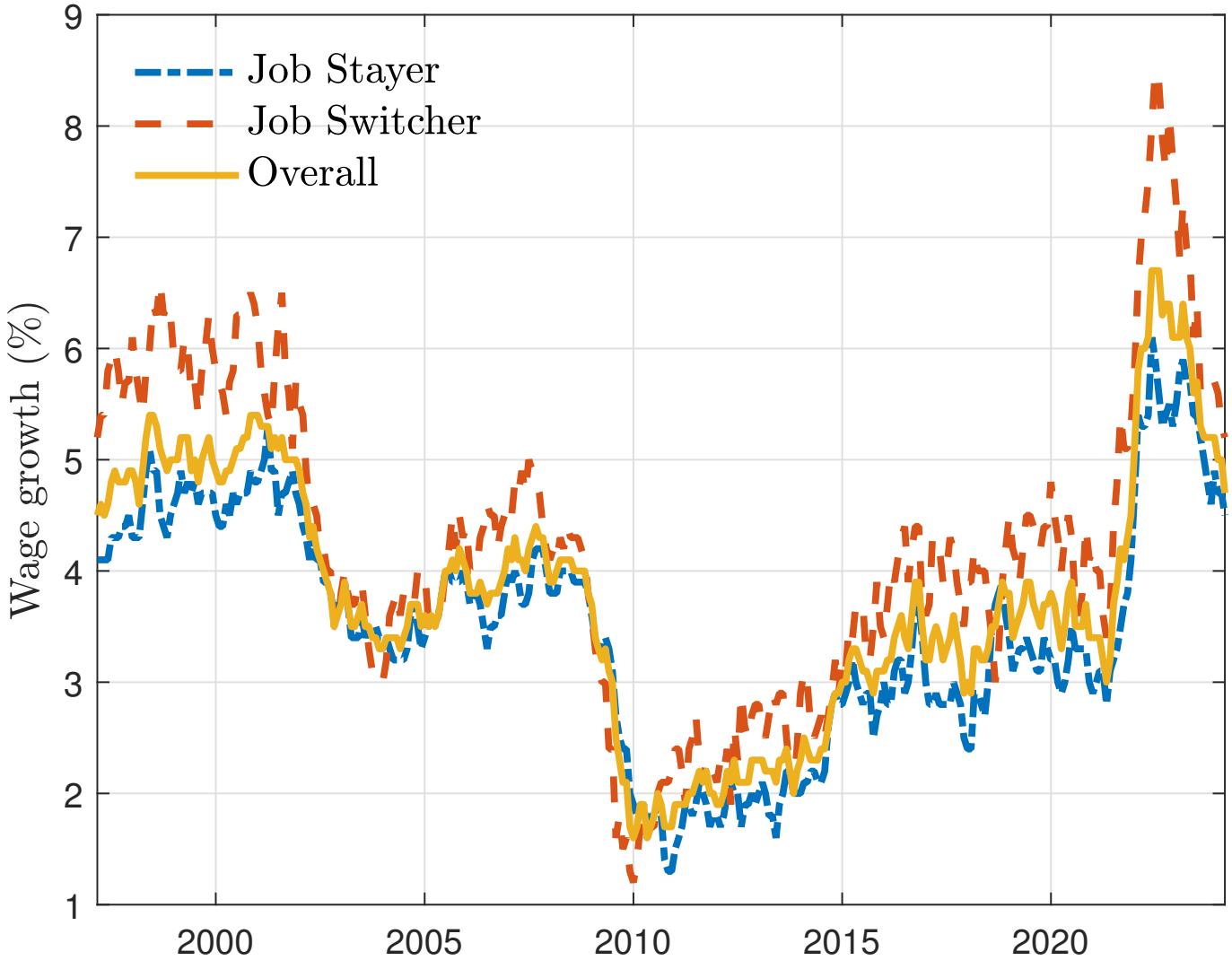


Inv-L New Keynesian Phillips Curve

- Standard sticky price model of costly price adjustment, but where existing and new workers are perfect substitutable as labor input.
- Wages of new hires is not lower than wages of existing workers.
- Key novelty: marginal costs of firms depend on wages of new workers.

$$\pi_t = \kappa_w \underbrace{\hat{w}_t^{new}}_{\text{Marginal Cost of Labor}} + \kappa_\nu \underbrace{\hat{\nu}_t}_{\text{Cost Push Shocks}} + \beta E_t \pi_{t+1}.$$

Wage Dynamic



Wage Behavior

- Wage indeterminacy is addressed by having employment agencies post vacancies and hire workers on behalf of firms.
- Posting vacancies is costly, while hiring workers provides benefits (a fraction of the wage bill).
- Profits are:

$$\gamma_b w_t M_t - \gamma_c V_t = \gamma_b w_t m_t \theta_t^{-\eta} V_t - \gamma_c V_t;$$

- Equilibrium implies that flexible wages are:

$$w_t^{\text{flex}} = \frac{\gamma_c}{\gamma_b} \frac{\theta_t^{\eta}}{m_t}.$$

Wage Behavior

- Wages for new hires:

$$w_t^{\text{new}} = \max\{w_t^{\text{ex}}, w_t^{\text{flex}}\}.$$

- Wages for existing workers:

$$w_t^{\text{ex}} = \left(w_{t-1}^{\text{ex}} \frac{(\Pi_{t+1}^{e})^{\delta}}{\Pi_t} \right)^{\lambda} (w_t^{\text{flex}})^{1-\lambda} \phi_t.$$

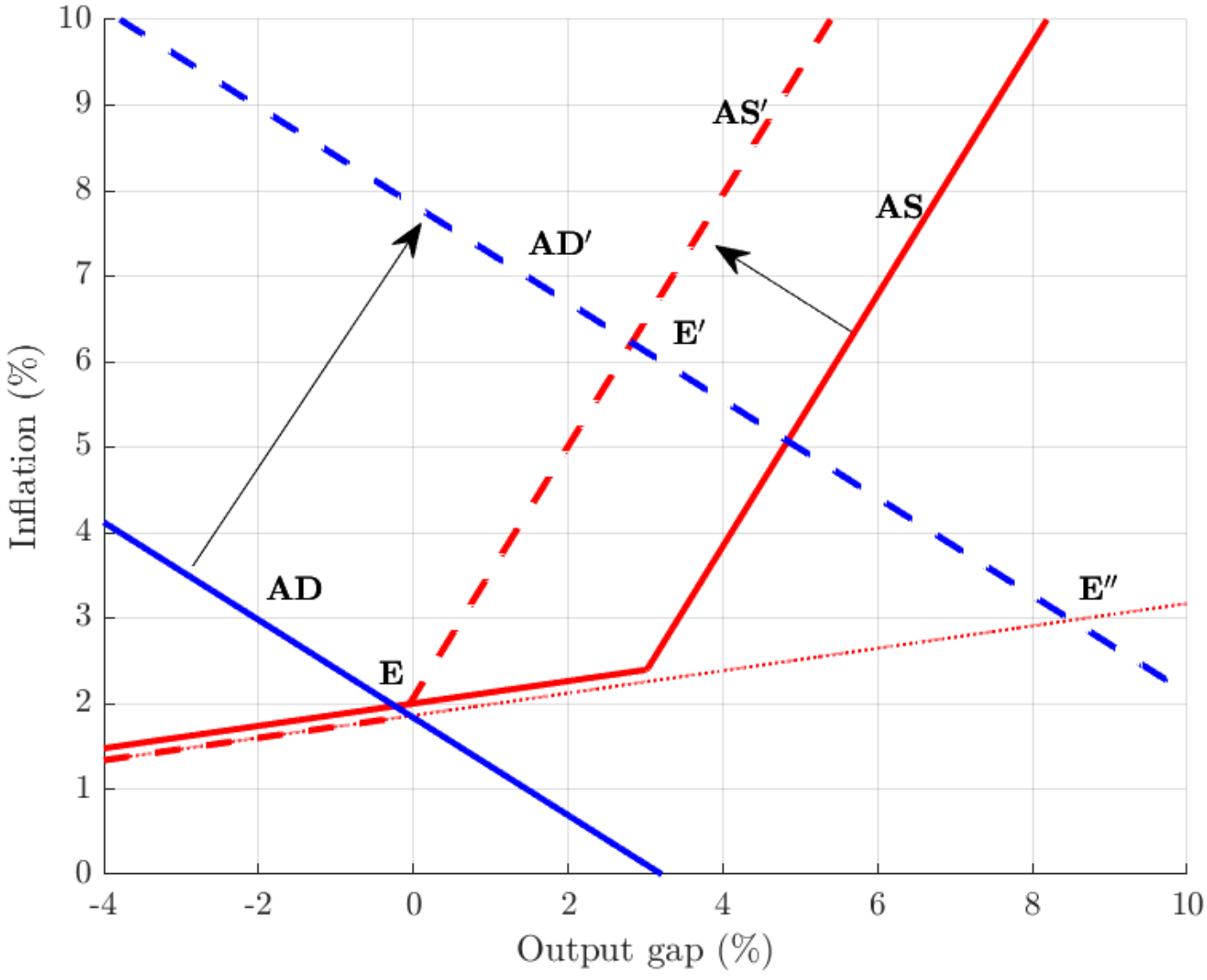
Inv-L New Keynesian Phillips Curve

$$\pi_t = \begin{cases} c + \kappa^{tight}\hat{\theta}_t + \kappa_\nu^{tight}\hat{\nu}_t + \beta E_t \pi_{t+1}, & \text{if } \hat{\theta}_t > \hat{\theta}_t^* \\ \kappa_w \hat{w}_{t-1} + \kappa\hat{\theta}_t + \kappa_\nu \hat{\nu}_t + \kappa_\beta E_t \pi_{t+1}, & \text{if } \hat{\theta}_t \leq \hat{\theta}_t^* \end{cases}$$

where:

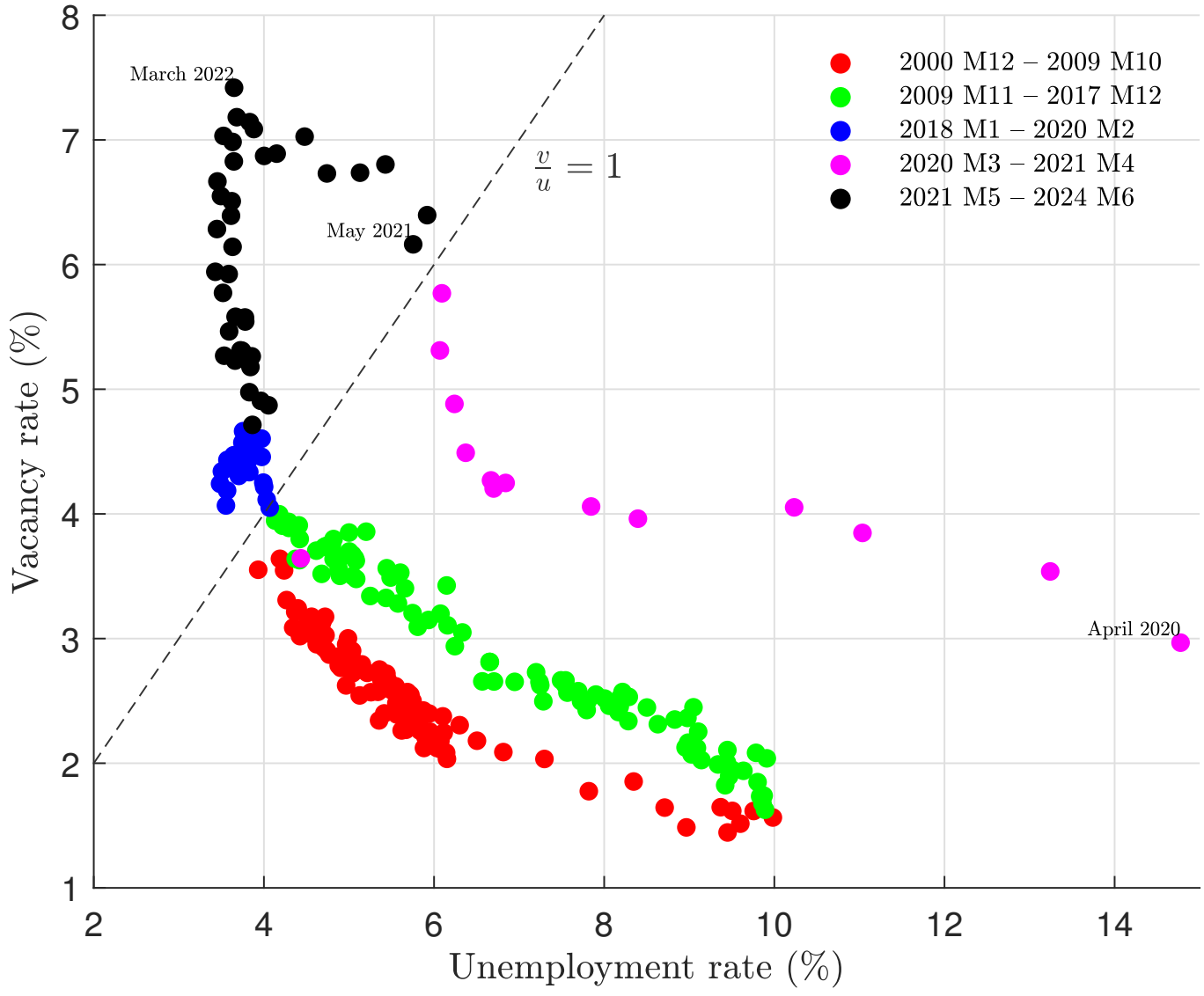
- $\kappa^{tight} > \kappa > 0$
- $\kappa_\nu^{tight} > \kappa_\nu > 0$
- $\kappa_\beta \gtrless \beta$:
- $\hat{\theta}_t^*$: threshold value of the vacancy-to-unemployment ratio

The 2020s Inflationary Surge



Beveridge Curve

The post-2000 U.S. Beveridge Curve



The BE Beveridge Curve

- Novel labor-market search model in which each period an exogenous fraction $(1 - s_t)$ of the labor force (F_t) is attached to firms, leading to:

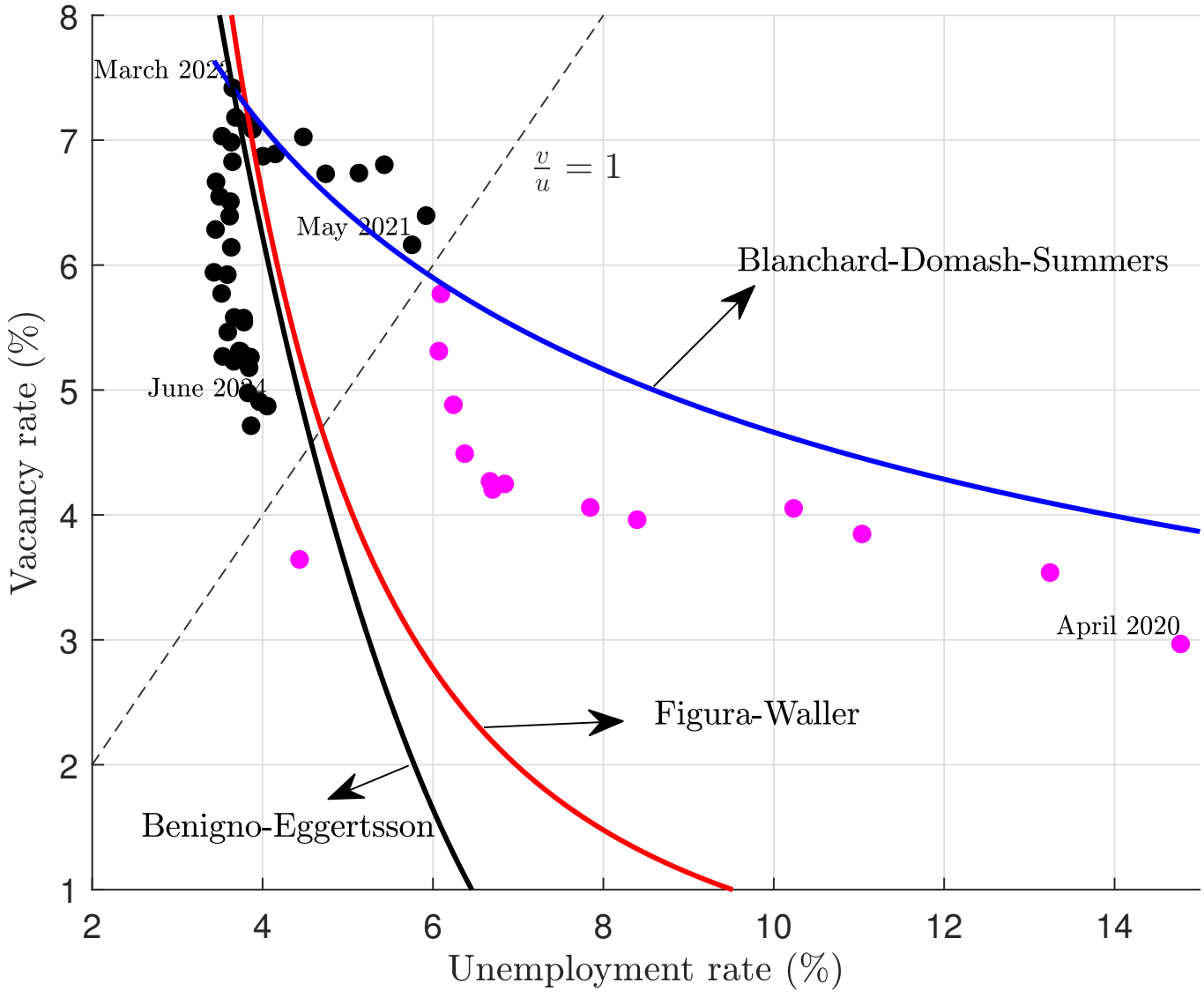
$$s_t F_t = U_t + H_t \Rightarrow s_t = u_t + h_t = u_t + m_t \theta_t^{1-\eta}$$

- The Beveridge Curve follows noting that $\theta_t = v_t / u_t$:

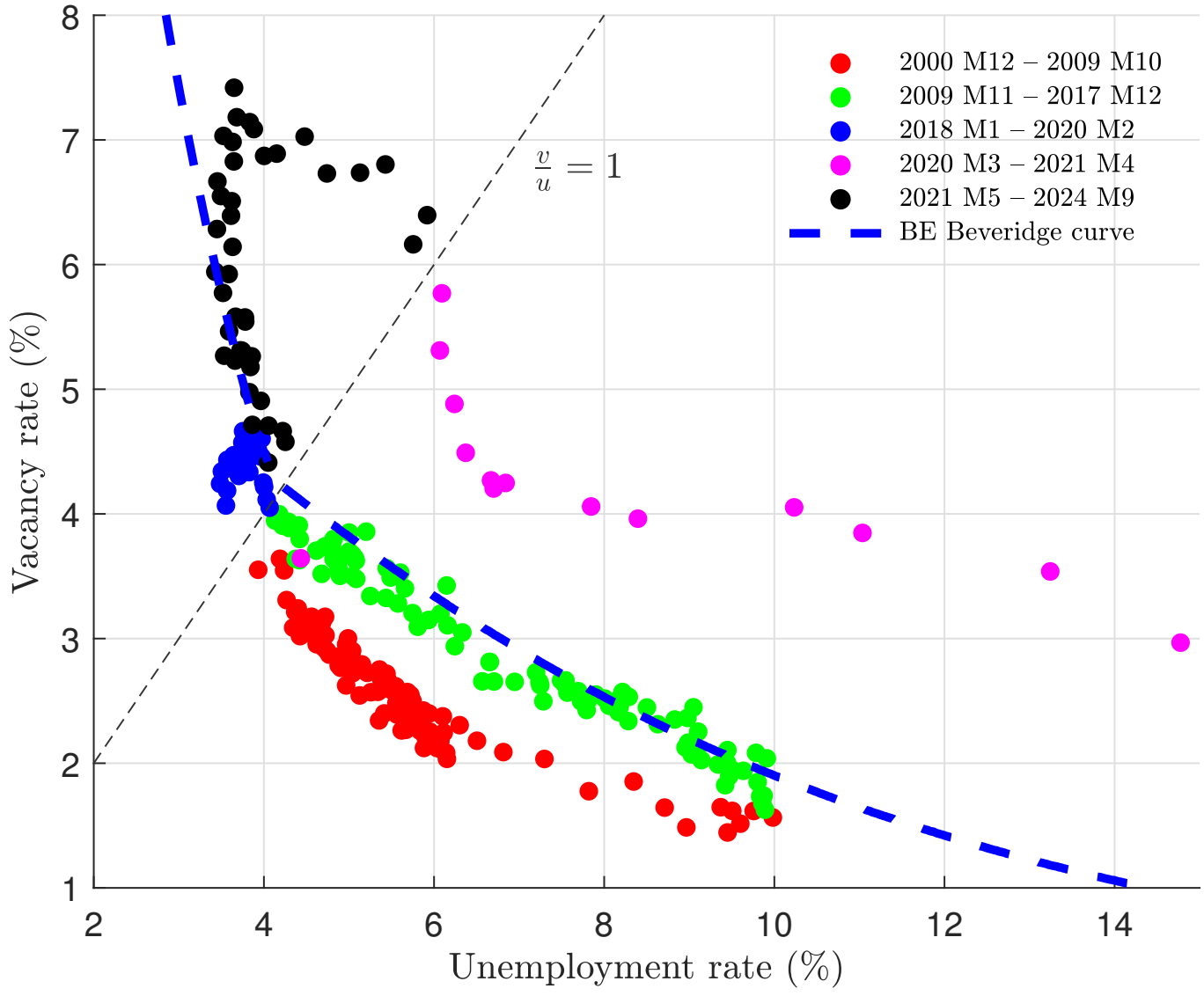
$$v_t = \left(\frac{s_t - u_t}{m_t u_t^{\eta}} \right)^{\frac{1}{1-\eta}}$$

- Parameters s_t and m_t can be inferred from data.

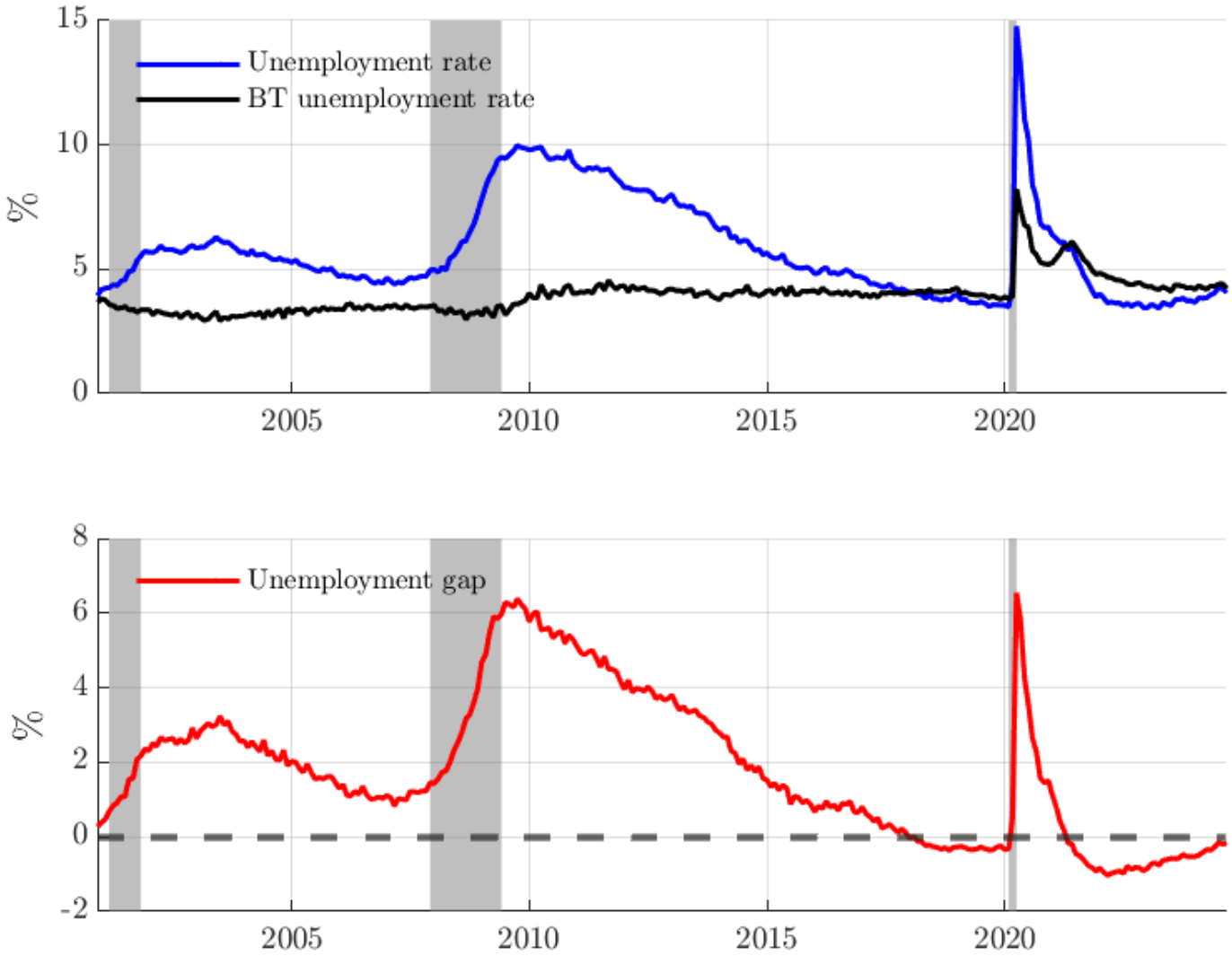
Beveridge Curve: Comparison



The Generalized BE Beveridge Curve

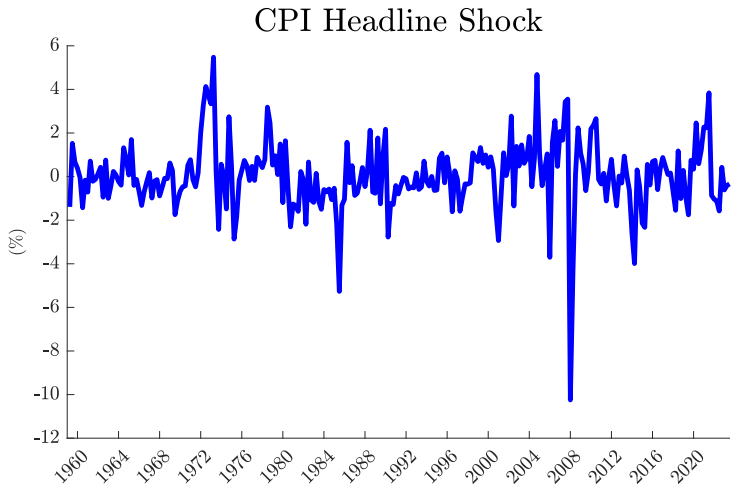


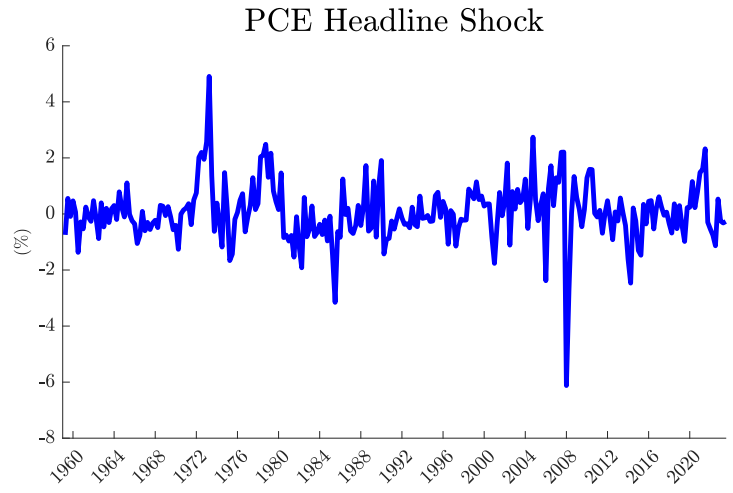
The Beveridge-Threshold Unemployment Rate

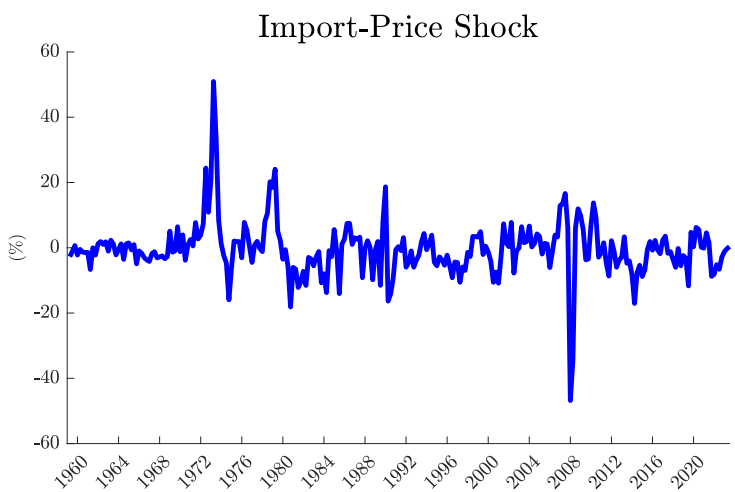


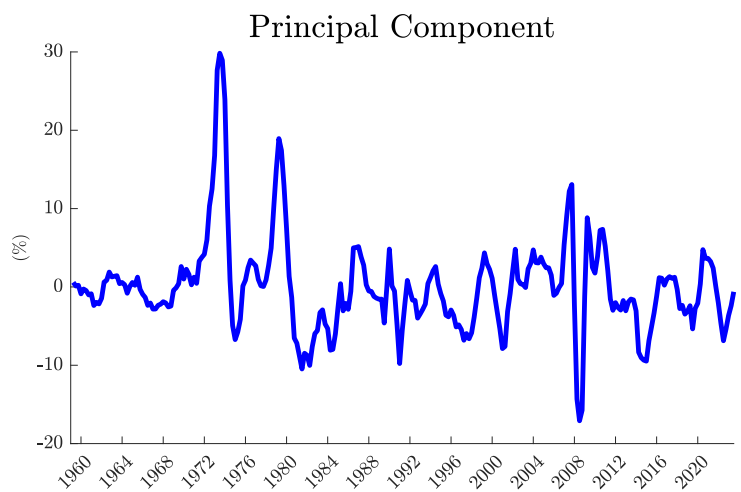
Thank You!

Supply Shocks

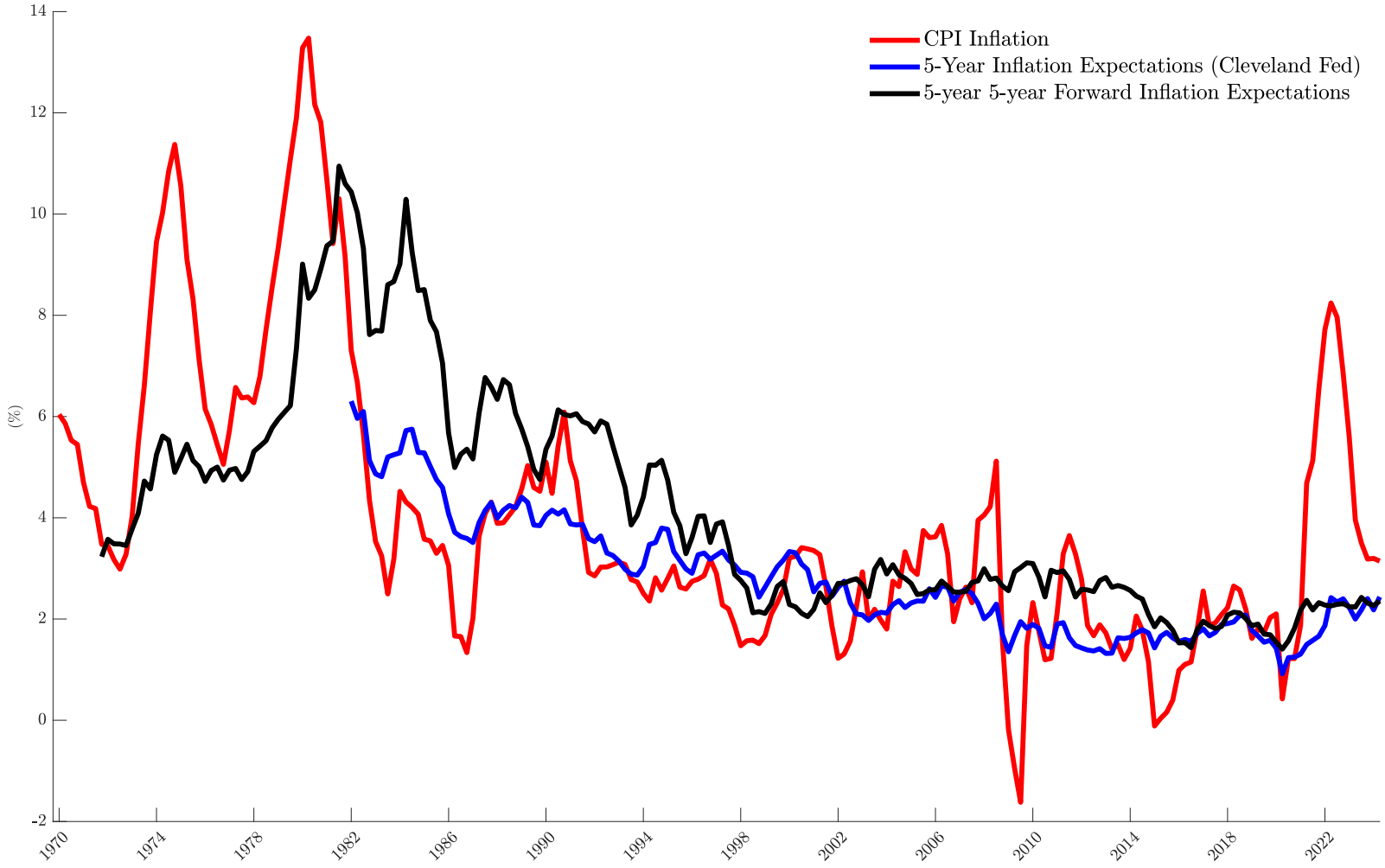




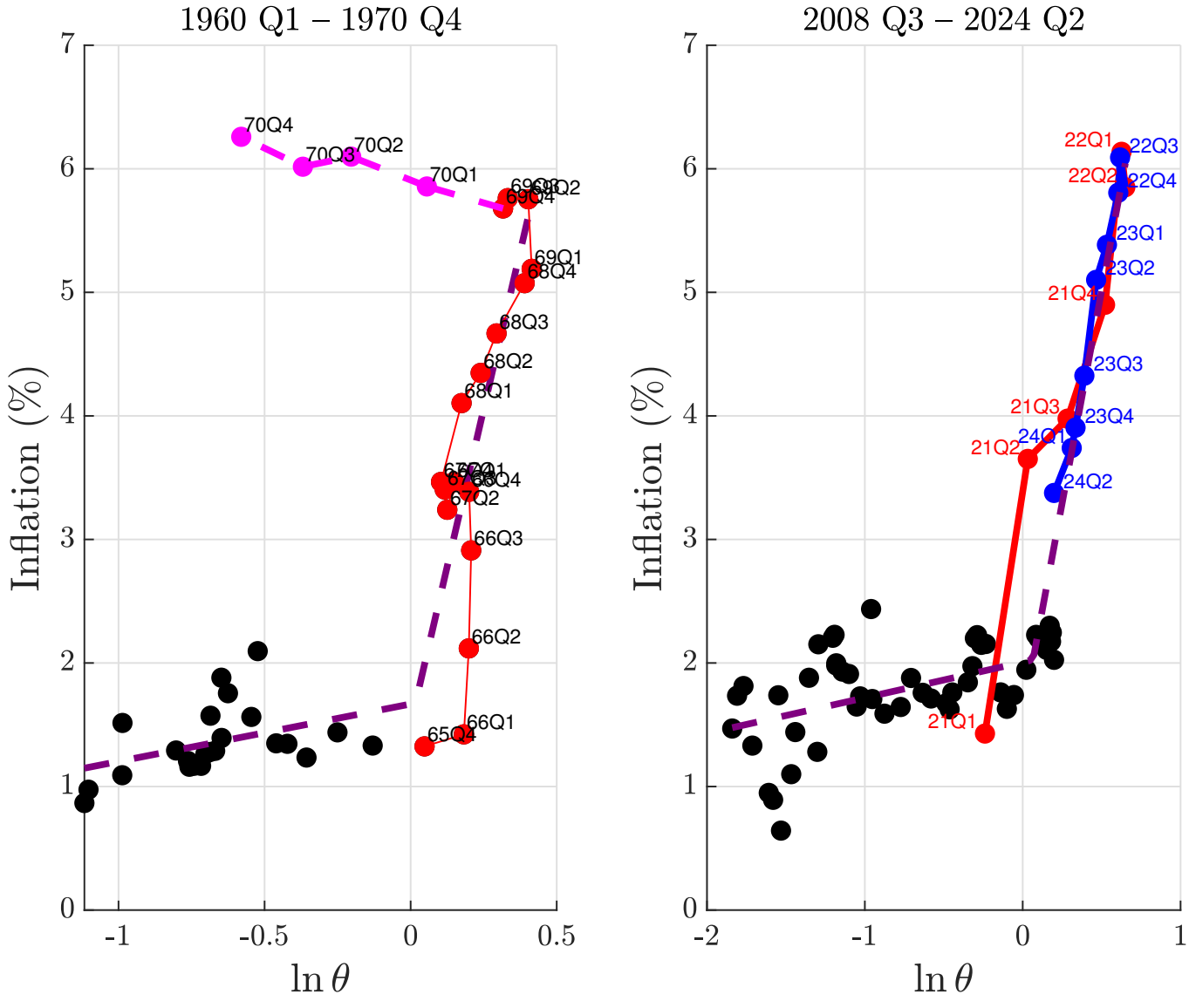




Inflation Expectations



1960s versus 2020s Comparison



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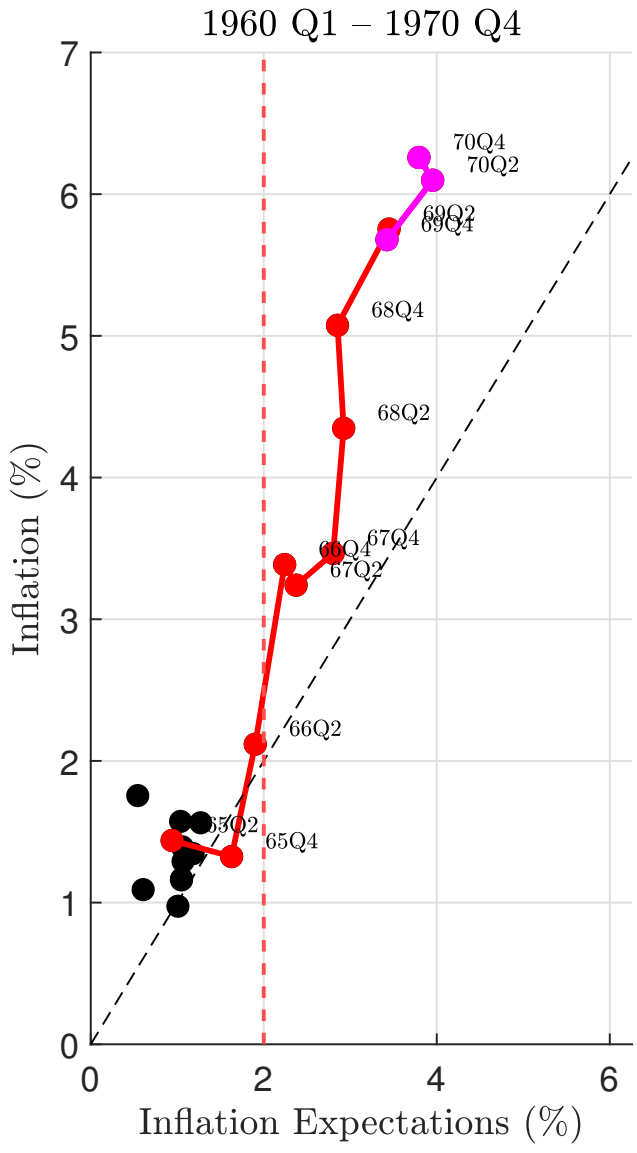
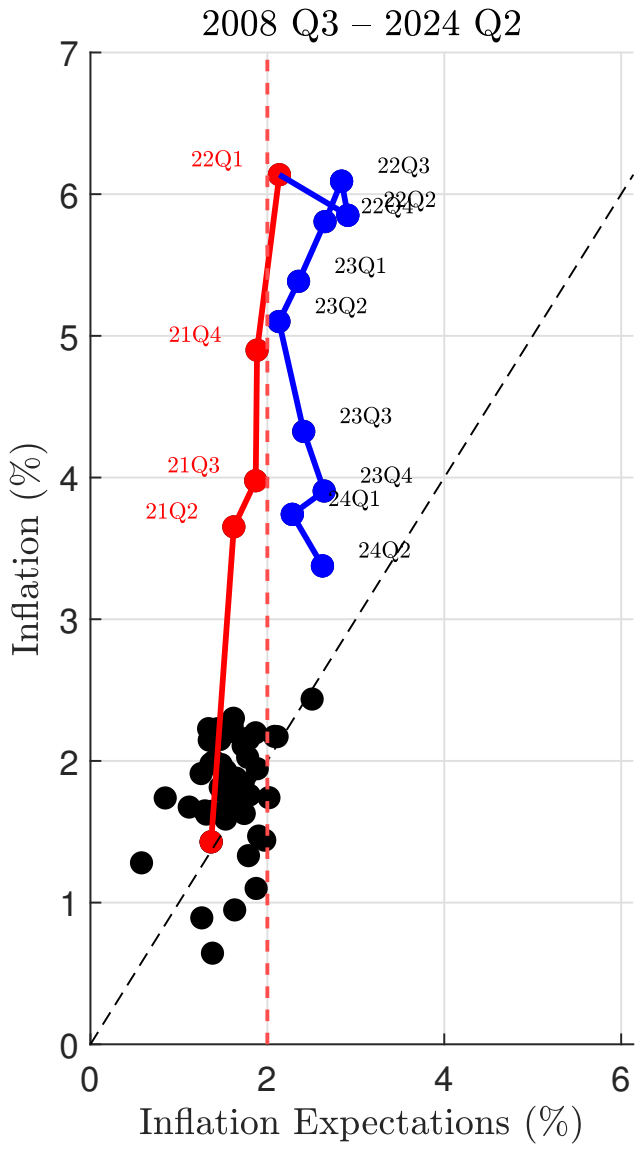
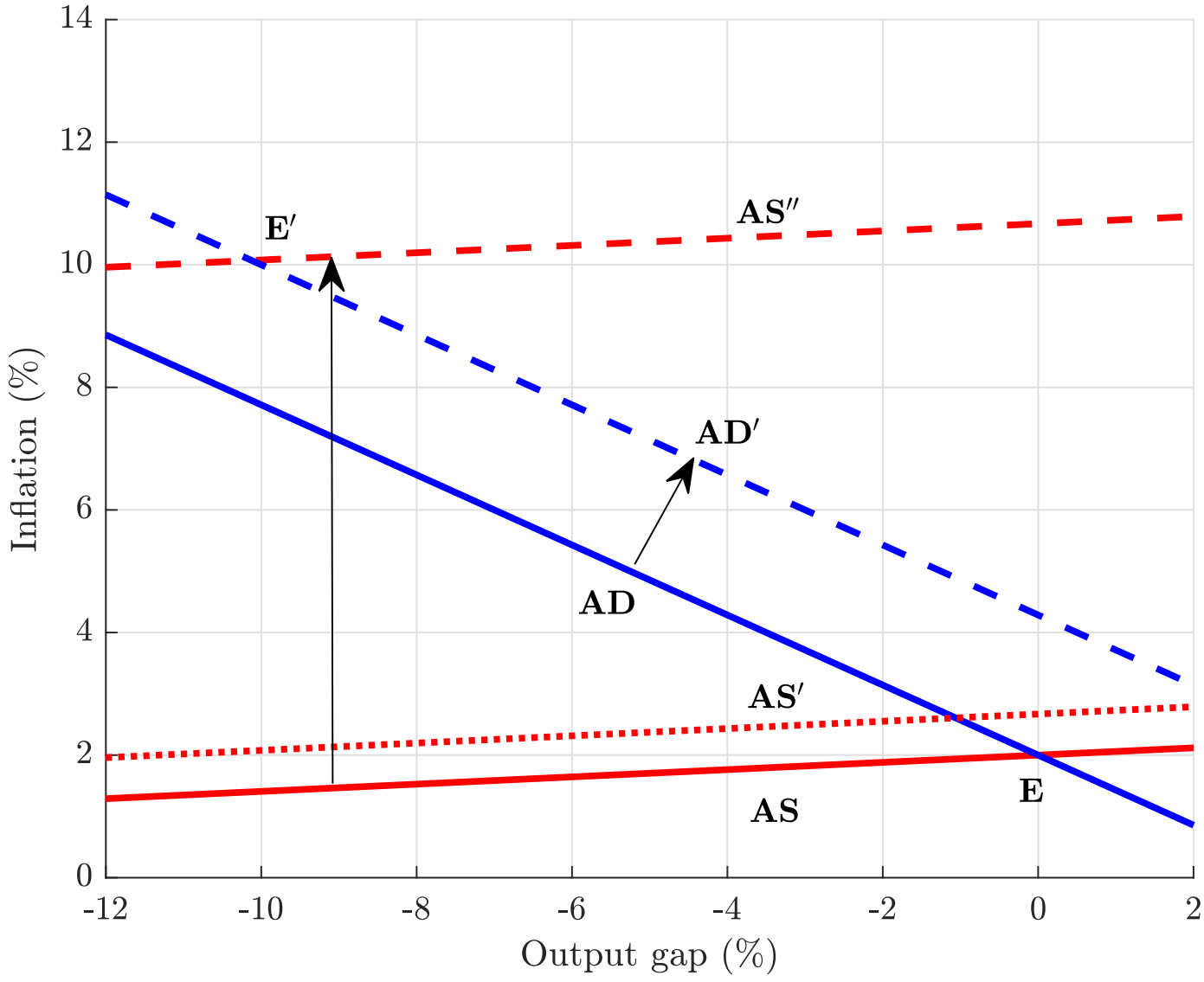
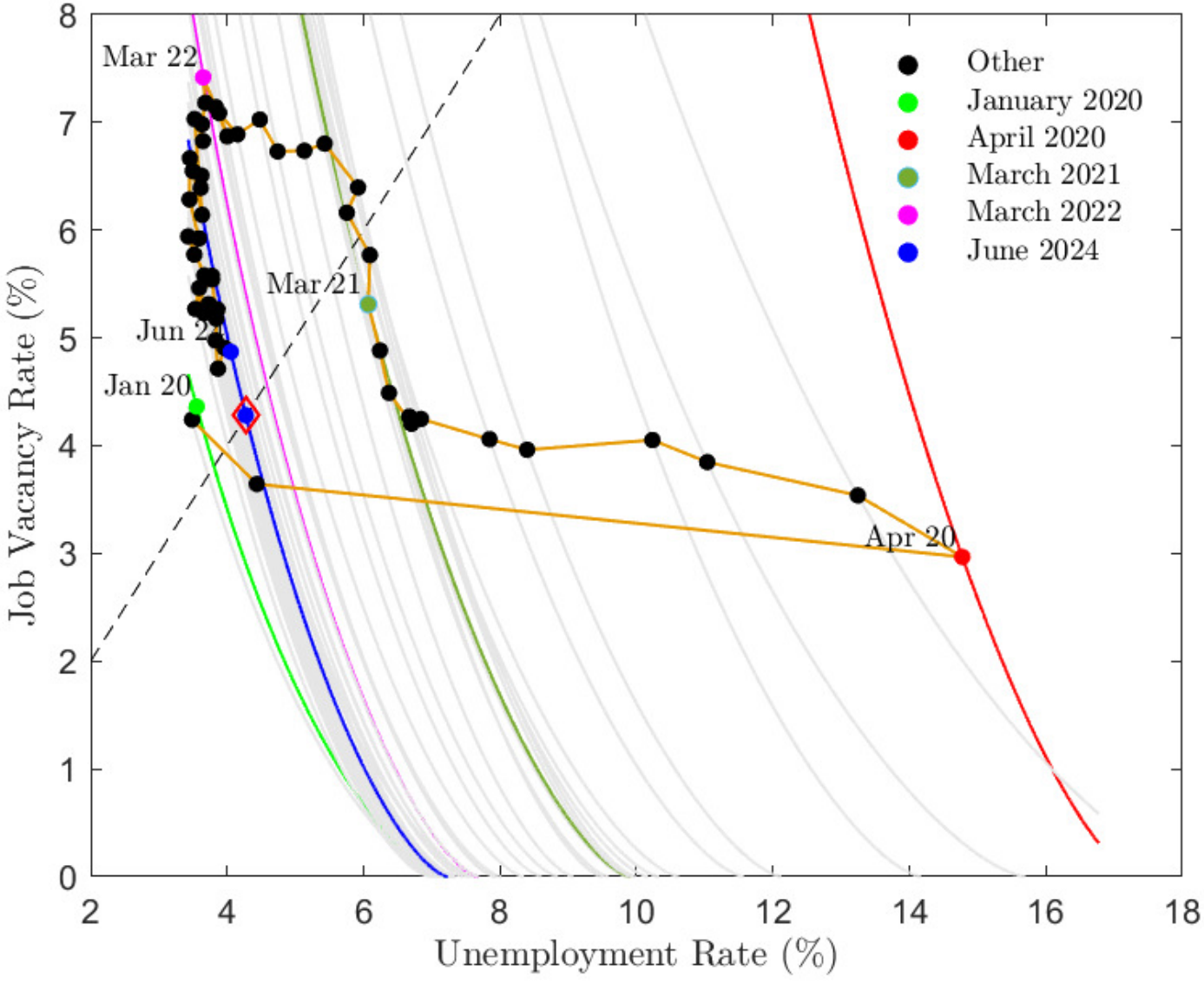




The 1970s Great Inflation



The BE Beveridge Curve



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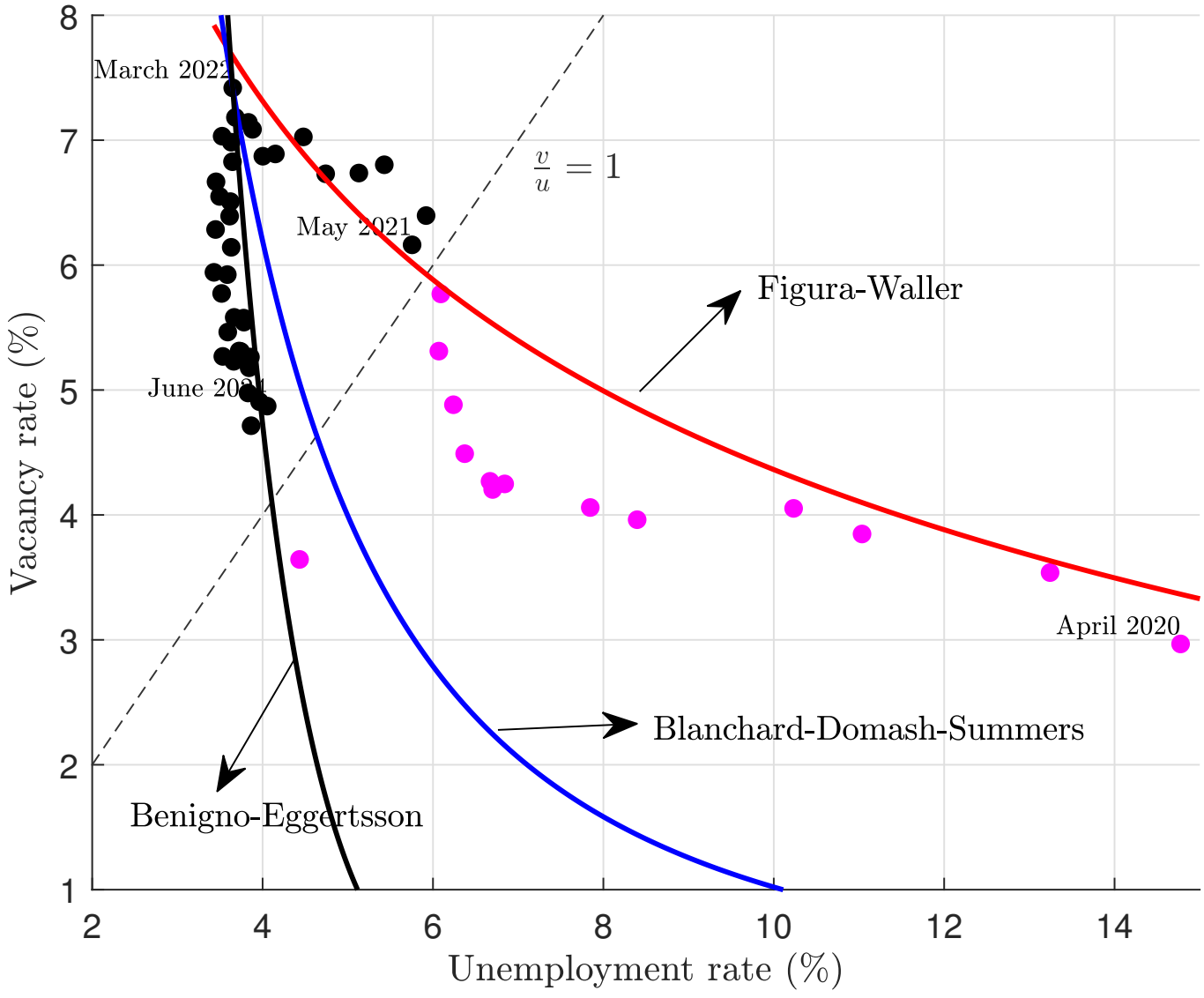

Generalized BE Beveridge Curve

- The fraction of unattached workers s_t was considered as exogenous.
- We hypothesize a relationship of the form

$$s(\theta_t) = \begin{cases} (\bar{s}_t - a_h) + a_h \theta_t^{-b_h} & \theta_t \geq 1 \\ \\ (\bar{s}_t - a_l) + a_l \theta_t^{-b_l} & \theta_t < 1 \end{cases}$$

- We then obtain a generalized Beveridge Curve:

$$0 = \begin{cases} m_t u_t^{\eta} v_t^{1-\eta} - \bar{s}_t - a_h (u_t^{b_h} v_t^{-b_h} - 1) + u_t & \theta_t \geq 1 \\ \\ m_t u_t^{\eta} v_t^{1-\eta} - \bar{s}_t - a_l (u_t^{b_l} v_t^{-b_l} - 1) + u_t & \theta_t < 1 \end{cases} .$$