

Understanding U.S. Inflation During the COVID Era

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Headline Inflation = Core Inflation + Headline Shocks

Core: Underlying inflation that depends on expectations, labor market tightness.

- Measure: Cleveland Fed weighted median CPI. Strips out relative price shocks in any industry (not only food and energy). Also consider other measures.

Headline shocks: High-frequency, relative price shocks. COVID examples.

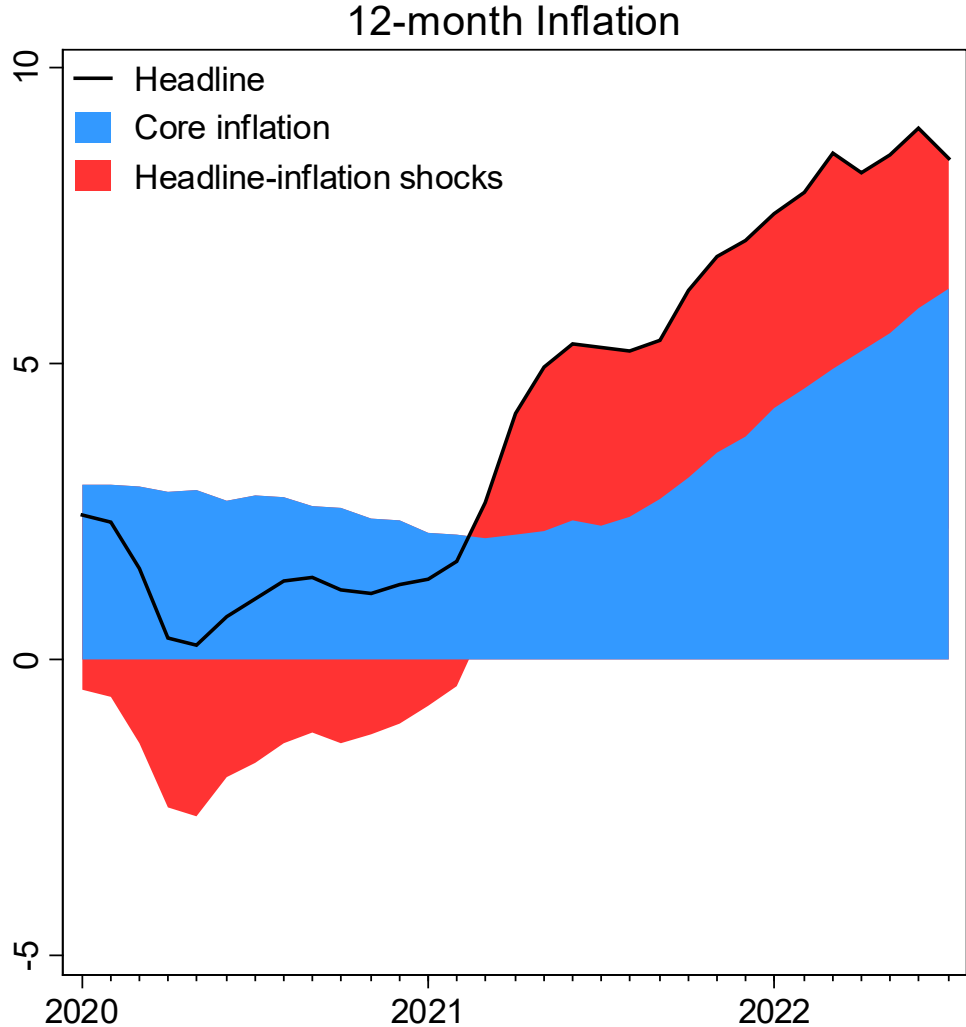
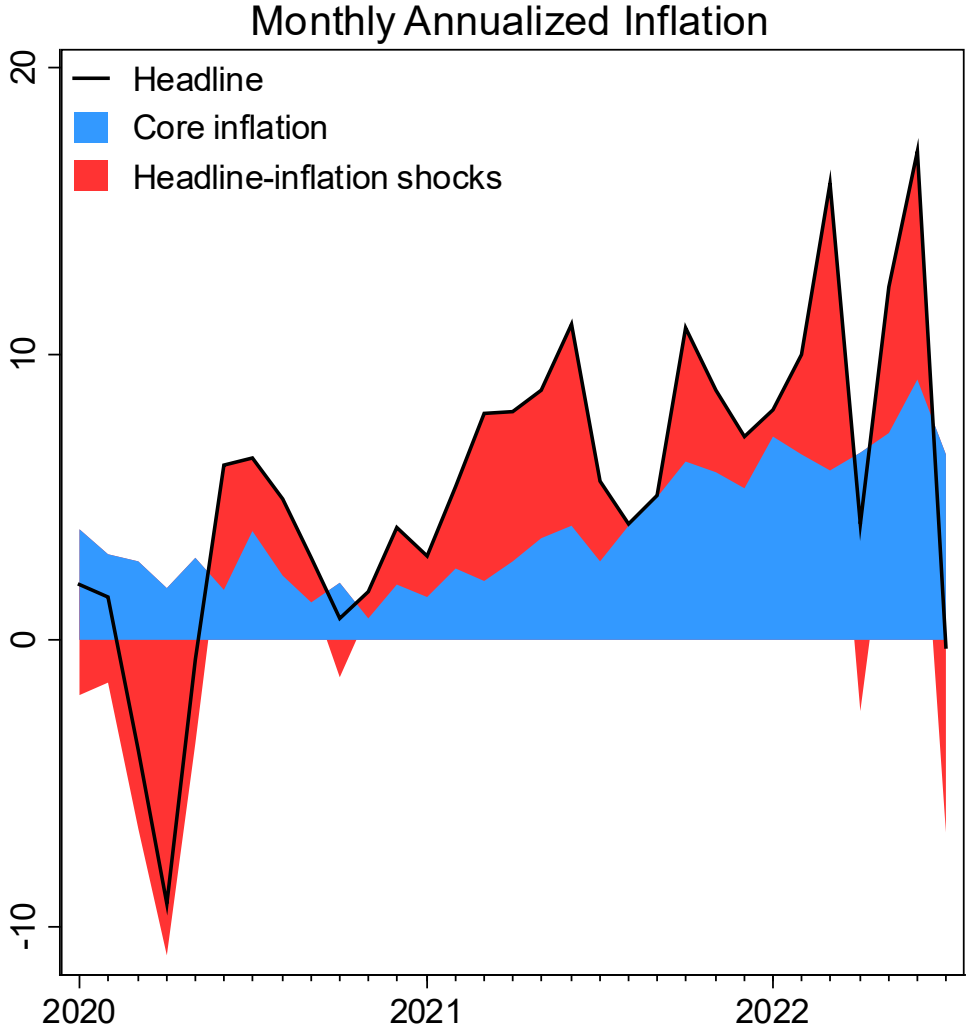
- Measure: Deviation of headline from core.

This paper:

1. Explain both core and headline shocks during COVID era so far.
2. Assess what might happen in the future.

High Inflation: Both Core and Headline Shocks

CPI Inflation (Percent)



Explaining Core Inflation

Expectations:

- Long-term expectations. Hazell and others (2022).
- Measure: SPF 10-year ahead forecast. Also consider Michigan 5-year ahead.

Labor market tightness:

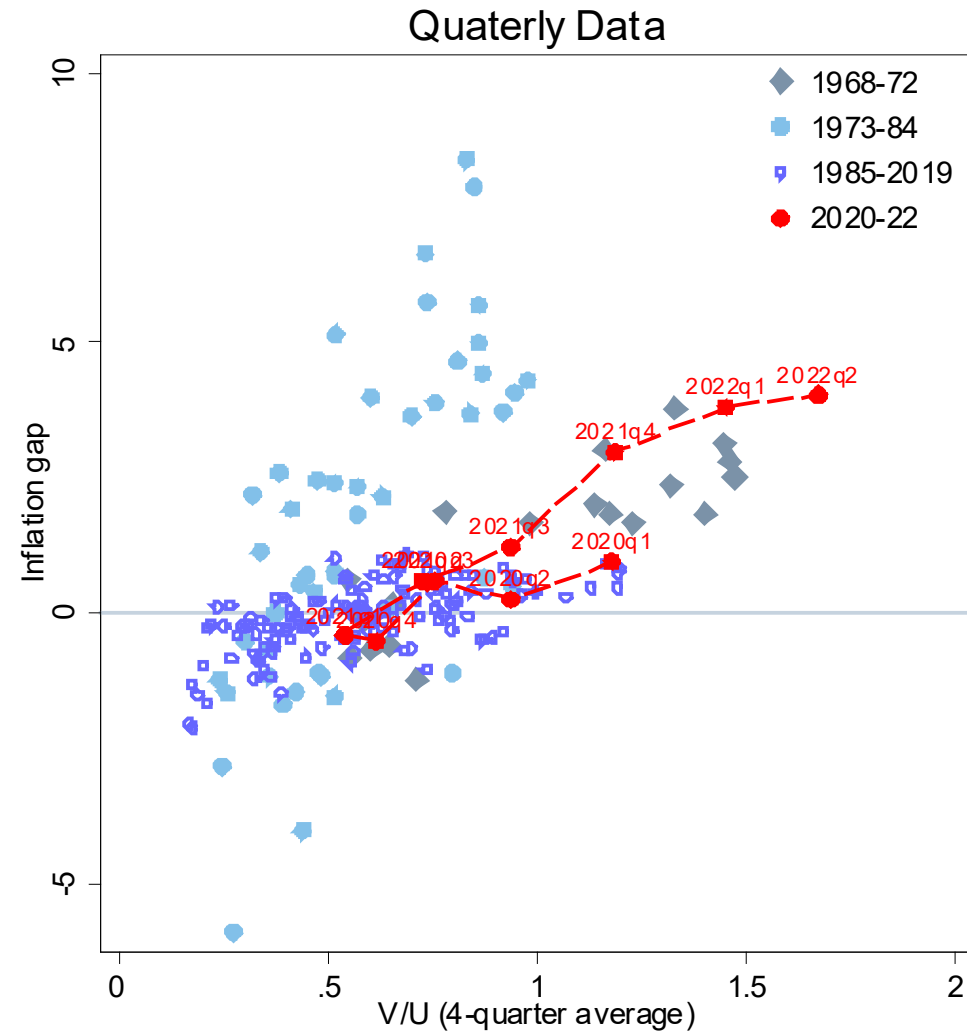
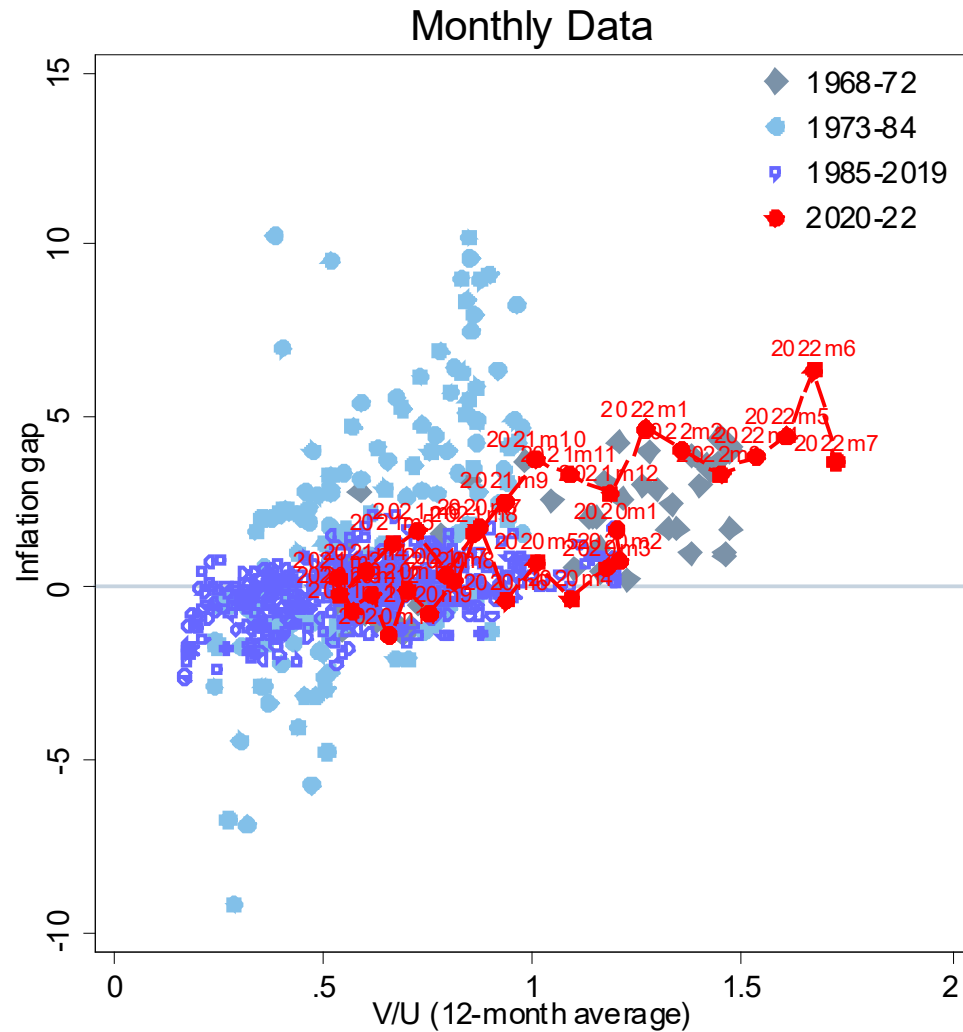
- Measure: Vacancy/unemployed ratio (V/U). Furman and Powell (2022) and others.
- Focus on effect over time (12-month average).
- Contrast results with traditional measure (unemployment).

Pass-through of past headline shocks :

- Channels: wages or other costs. Blanchard (2022), di Giovanni and others (2022).
- Focus on pass-through over time (12-month average).

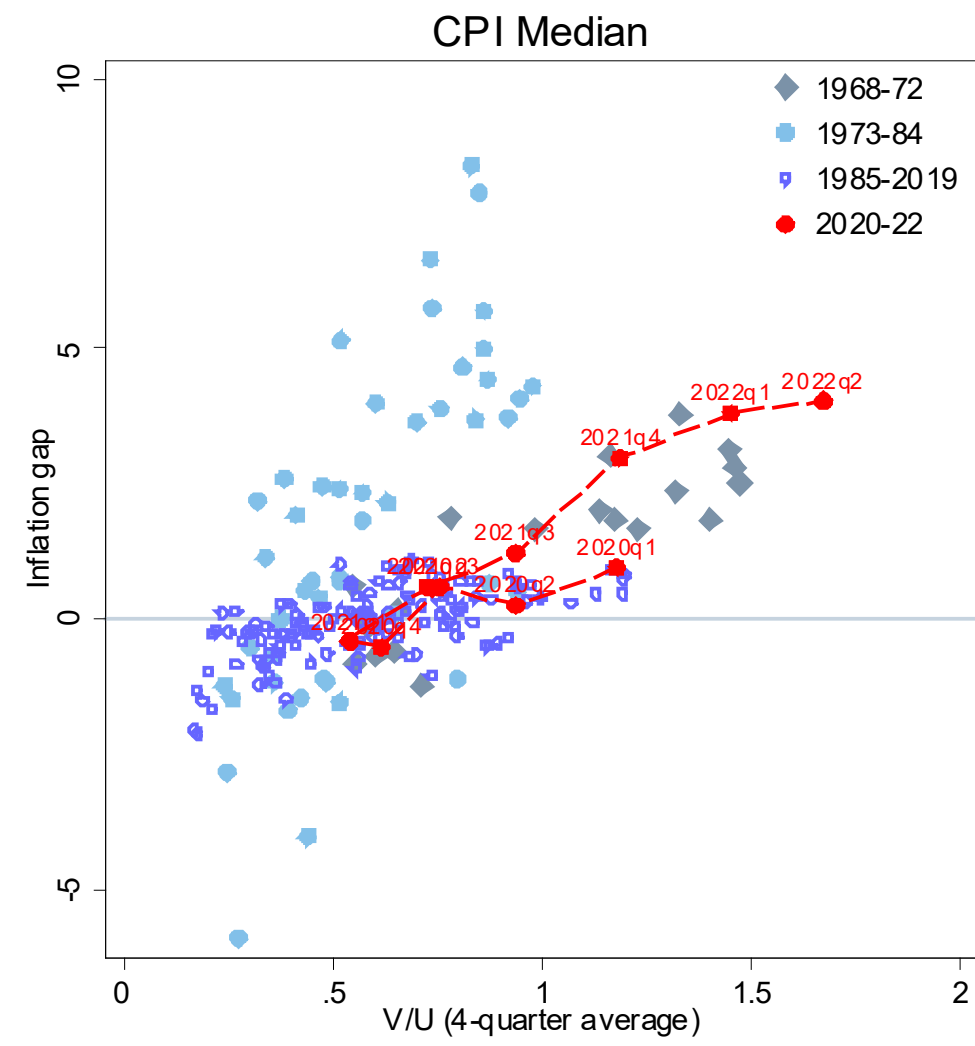
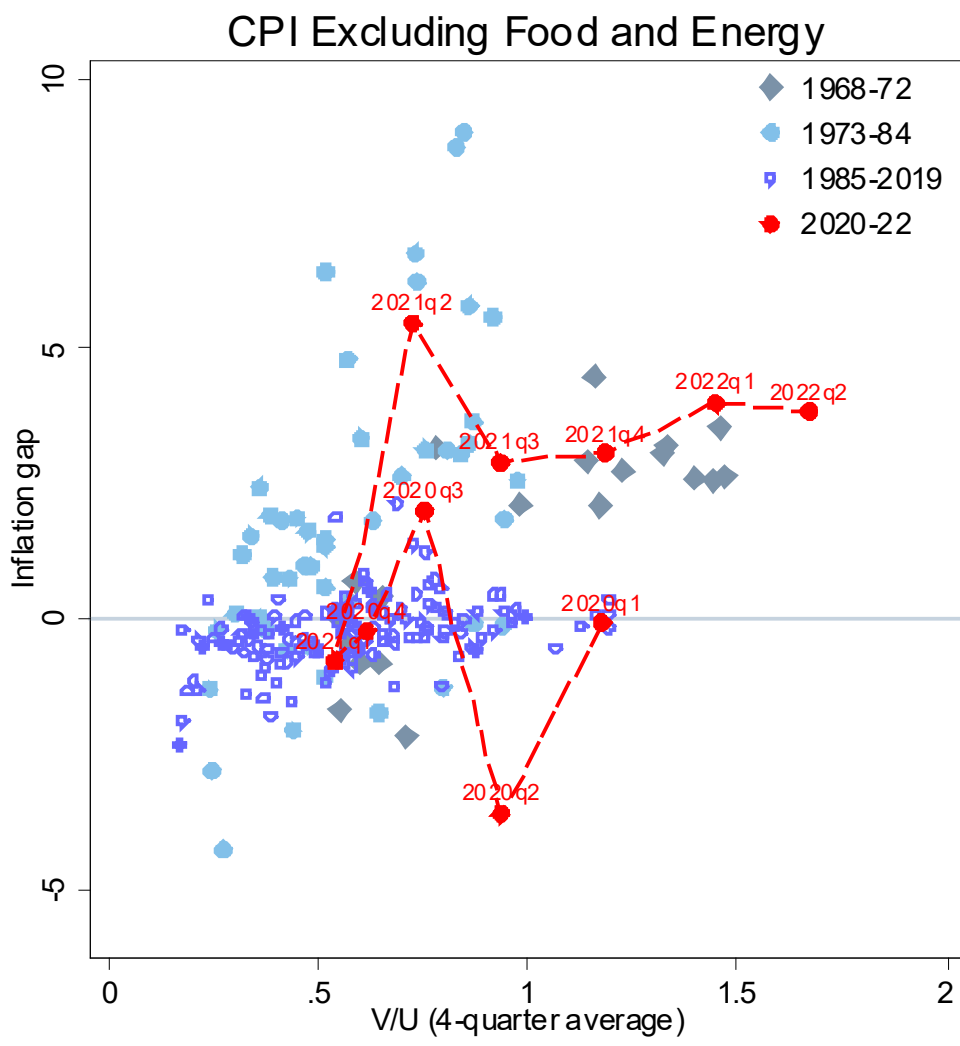
Core Inflation: Strong Role of V/U

Inflation Gap (Median – Long-term Expectations) vs. V/U (12-month or 4-quarter Average)



The Importance of Core Measurement: XFE Inflation vs Median

Inflation Gap (Core Measure – Long-term Expectations) vs. V/U (4-quarter Average)



Allowing for Non-linearities

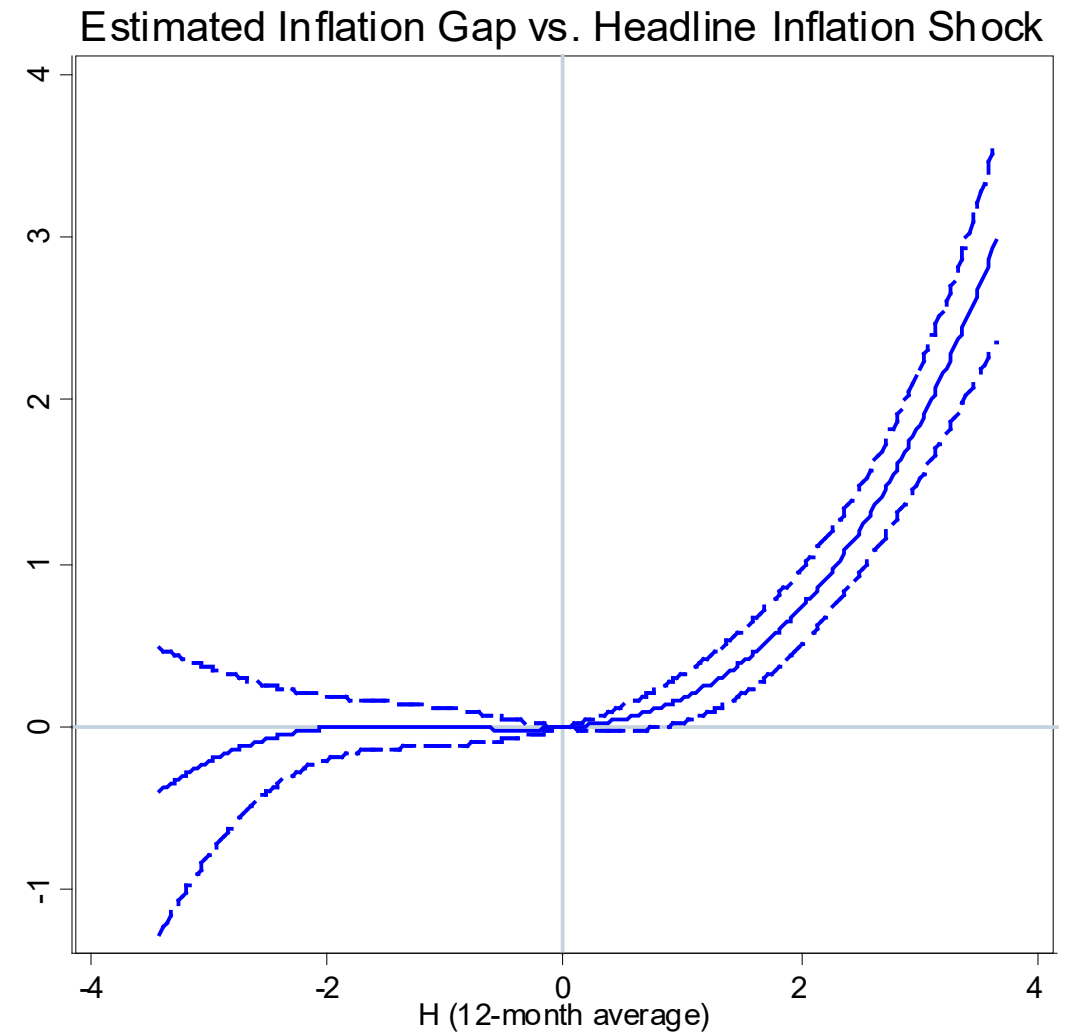
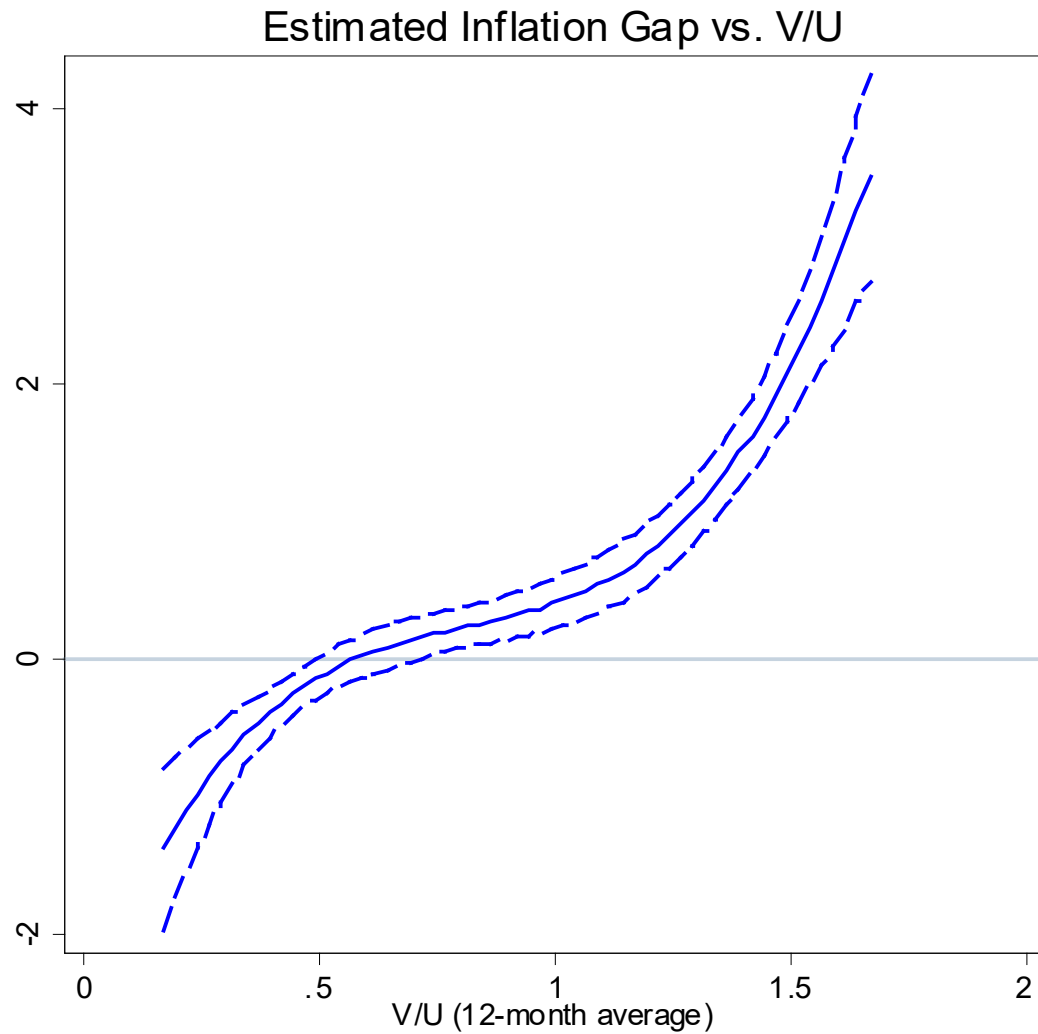
Motivation:

- Gagnon and Collins (2019): U-inflation tradeoff steeper at low U.
- Blanchard (2022): salience of large shocks.
- Ball and Mankiw (1994): asymmetric effects in presence of menu costs, trend inflation.
- Owyang and Vermann (2014): “rockets and feathers.”

Application:

- Specify core inflation gap as cubic function of V/U and of past headline-inflation shocks.
- Also consider locally weighted scatter-plot smoothing (lowess).

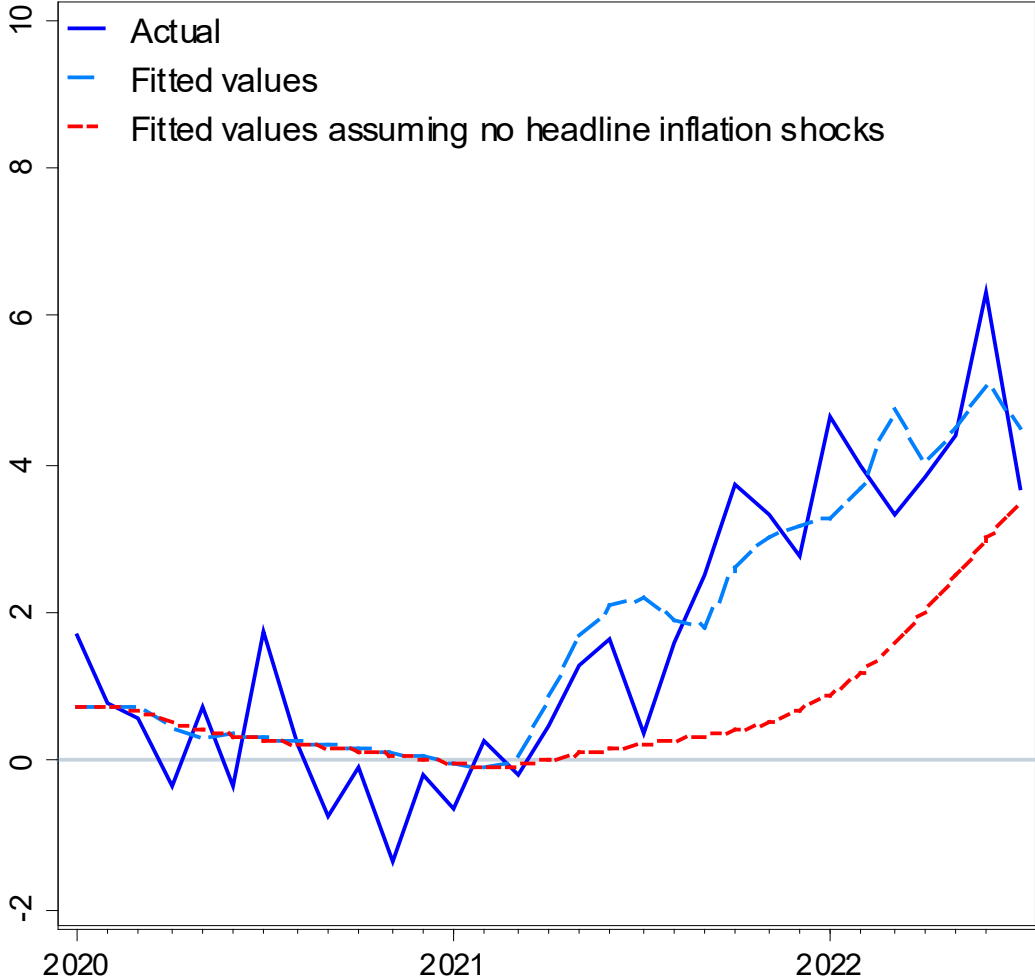
Evidence of Non-linearity and Asymmetry



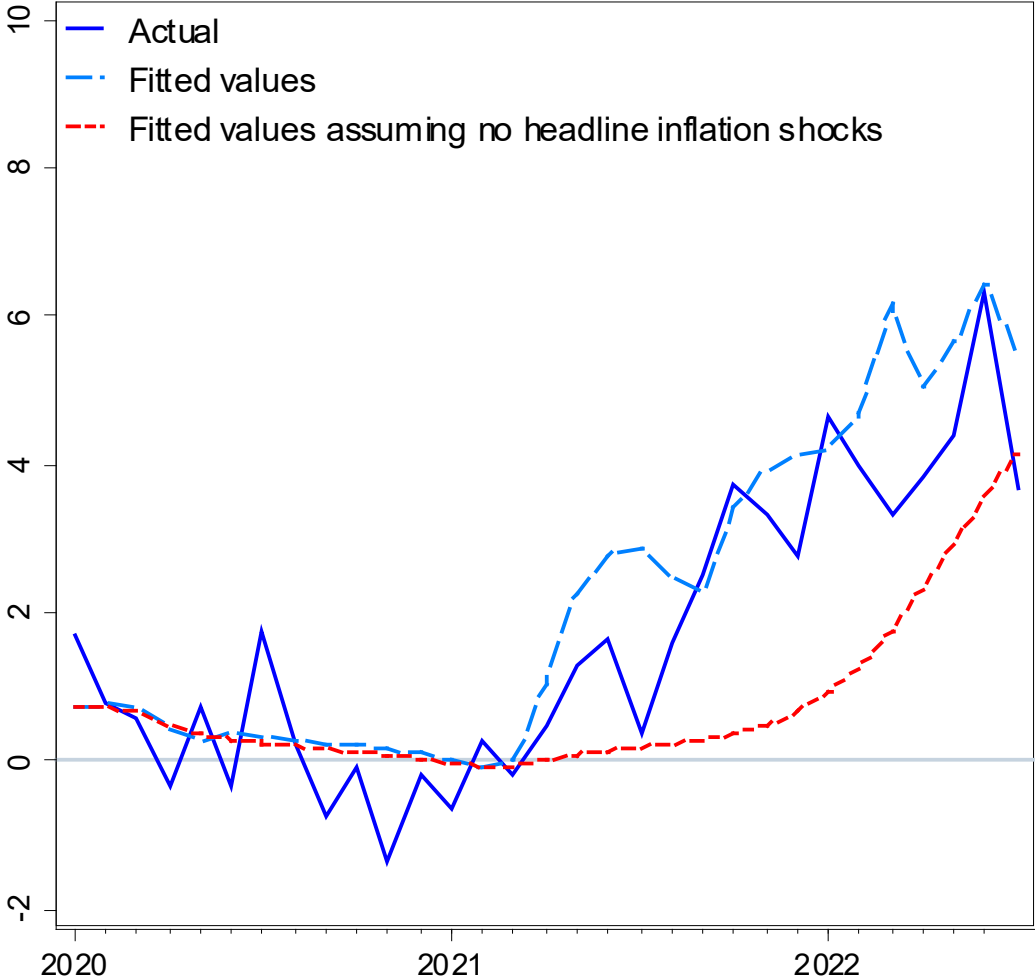
Note: Bands report 95% conf. intervals. H = headline-inflation shocks. Inflation gap = median inflation – long-term expectations. Sample: 1985-2022.

Framework Explains Rise in Core Inflation During the Pandemic

Sample: 1985-2022



Sample: 1985-2019

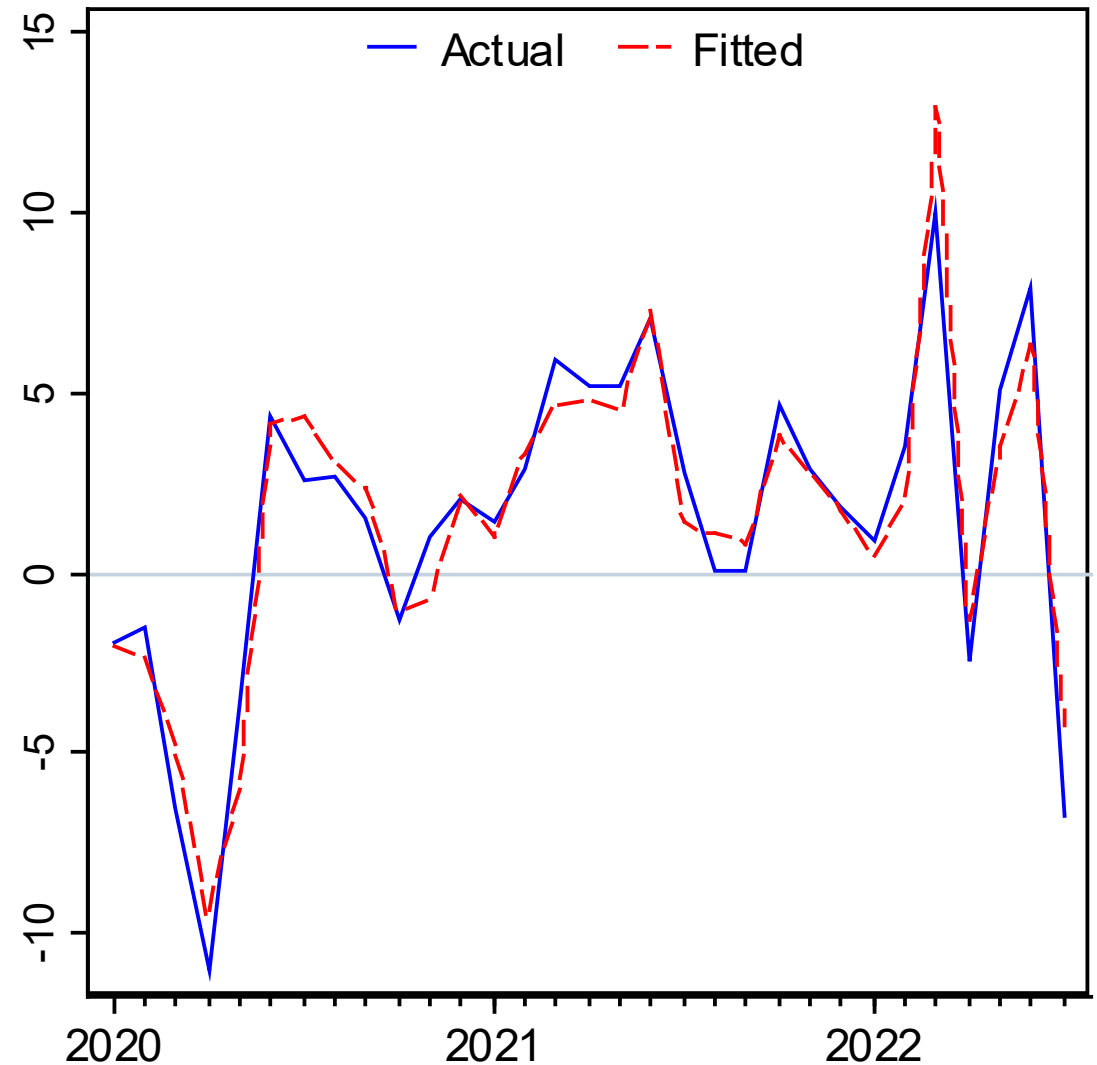


Three Factors Drive Headline Shocks: Energy, Backlogs, Autos

1. Energy price inflation minus median.
2. Firms' backlogs of work (IHS Markit).
3. Auto-related inflation minus median.

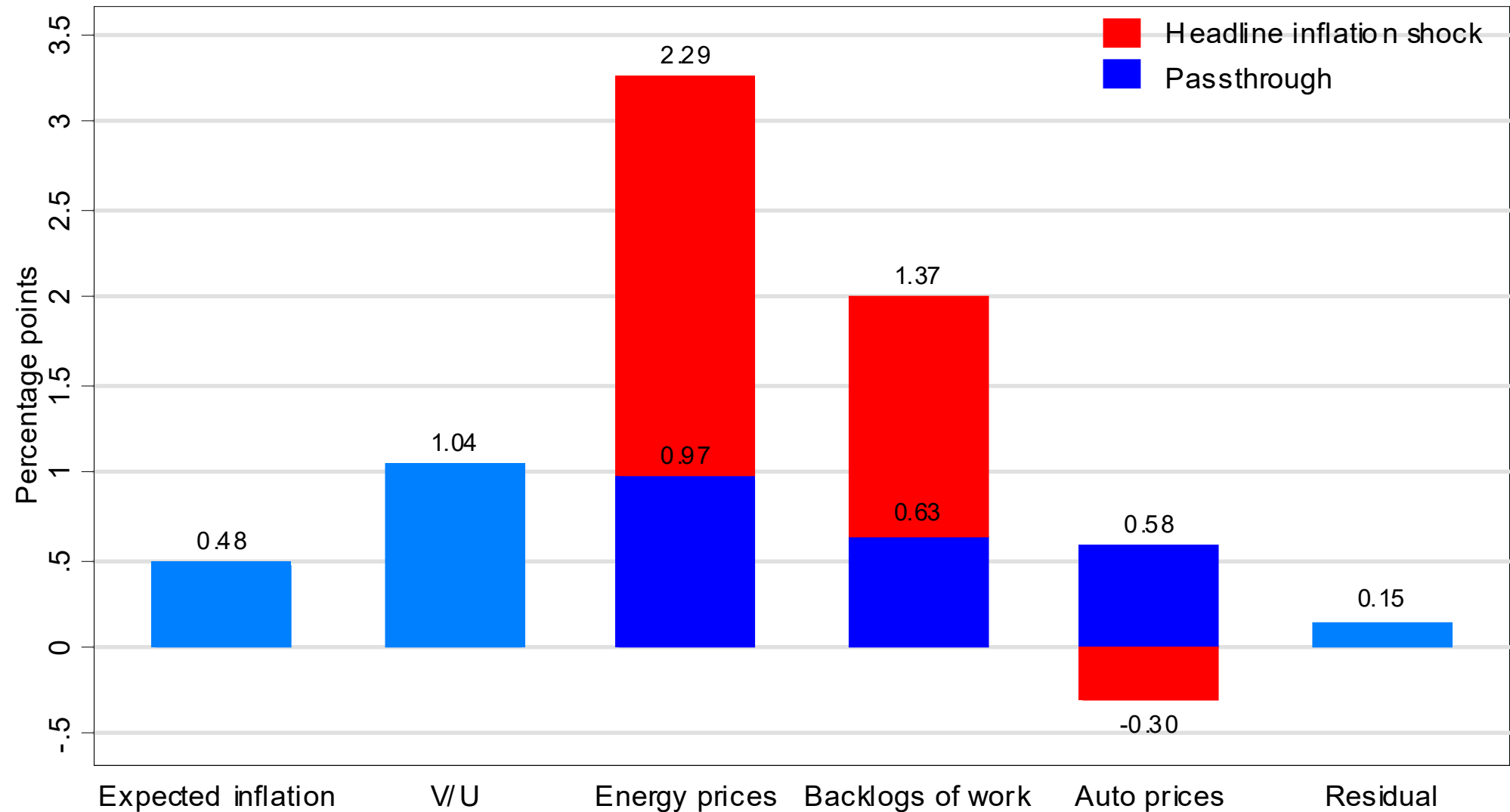
Strong fit.

Other factors investigated: less relevant
(COVID lockdowns affecting multiple sectors).



Accounting for the Rise in Inflation

Decomposition: Rise in 12-month CPI Headline Inflation from December 2020 to July 2022



The Future: Two Big Questions

Focus on two factors that will shape how much U needs to rise to contain inflation:

Question 1

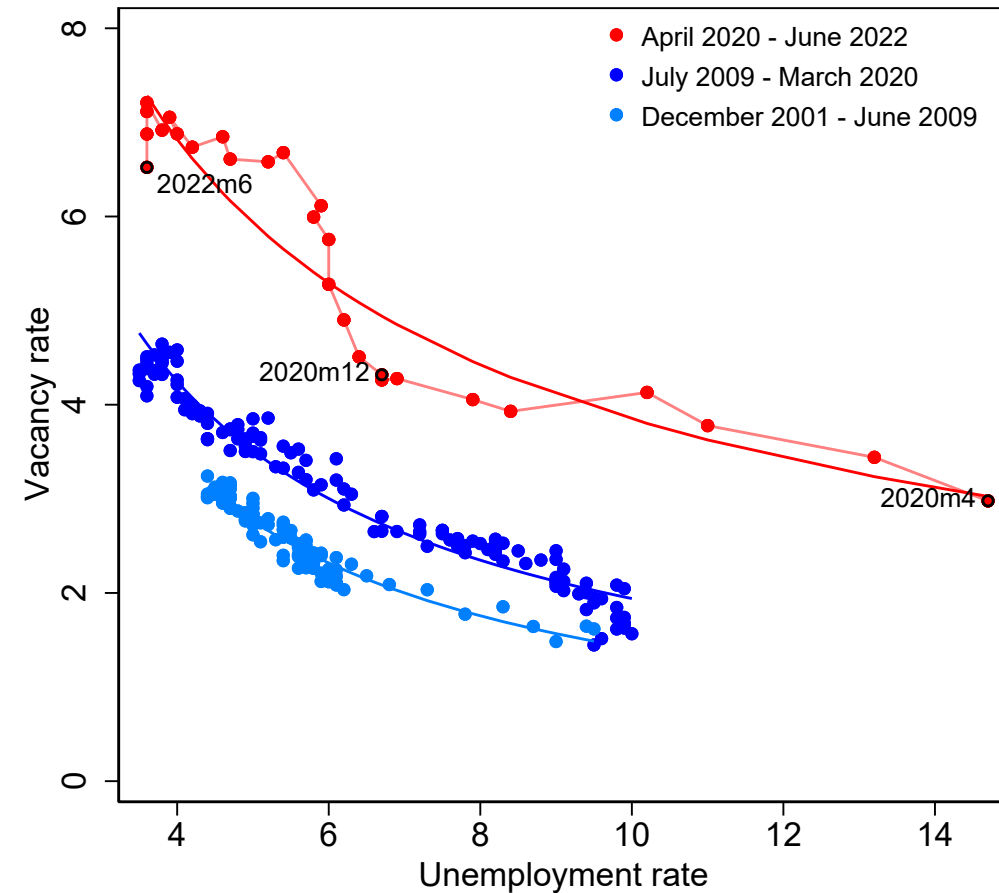
Beveridge Curve. Shifted out during the pandemic. Will the curve shift back?

Optimistic case: Move to pre-COVID (blue).

Pessimistic case: Stay on COVID (red).

Relates to debate between Figura and Waller (2022) and Blanchard, Domash and Summers (2022) about whether V can fall without a large rise in U.

Beveridge Curve



Note: Lines indicate log-linear relationship for each period.

The Future: Two Big Questions

Question 2

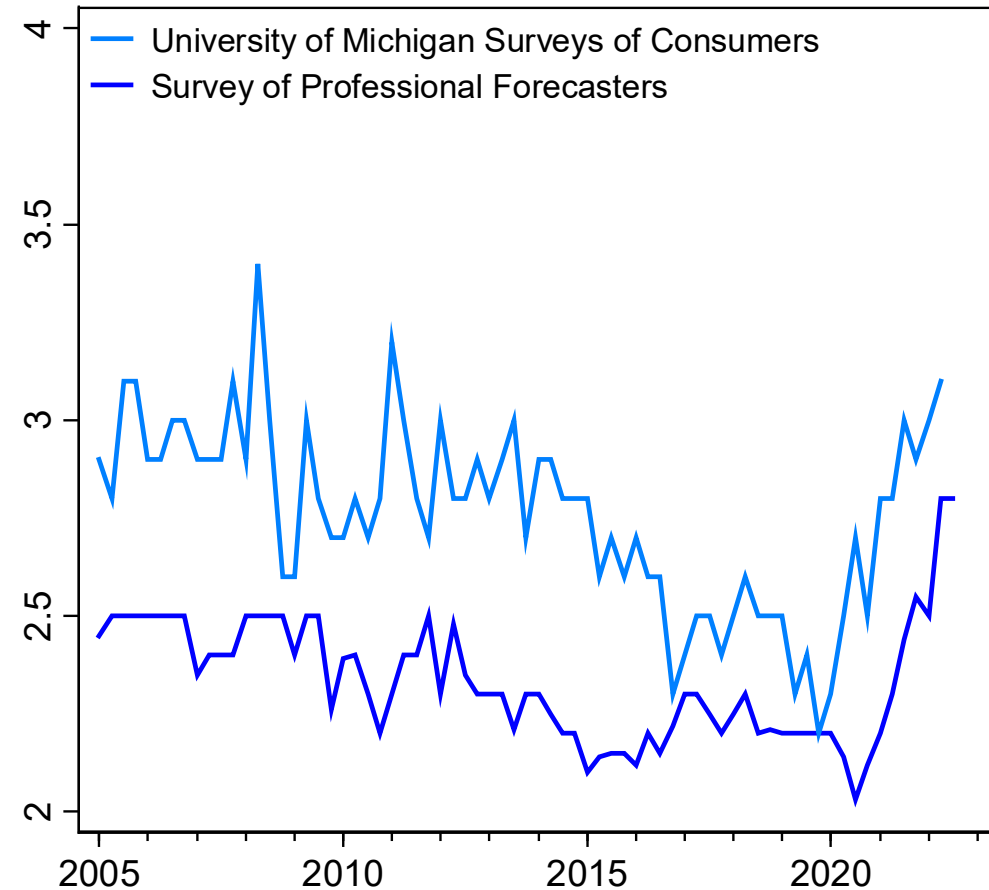
Inflation expectations. Will they remain anchored? SPF and Michigan have drifted up slightly.

Optimistic case: revert to 2019 level.

Pessimistic cases:

1. Expectations drift as during COVID.
2. Drift as in 1985-1998 (pre-“anchoring”).

Long-term Inflation Expectations



Where is Inflation Heading?

Derive core inflation paths conditional on paths for unemployment. Focus on three paths:

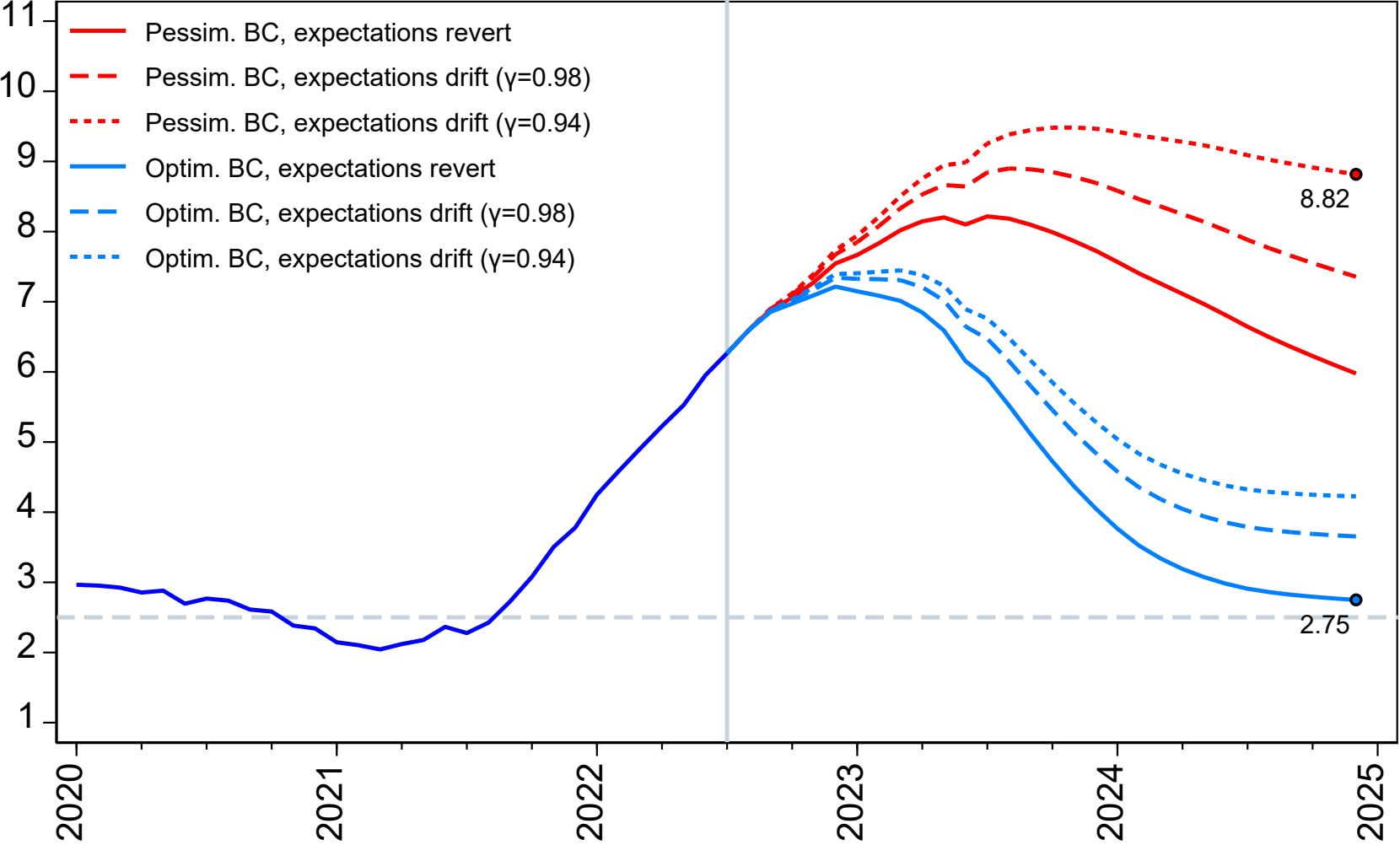
1. FOMC June 2022 Summary of Economic Projections. U peaks at 4.1%.
2. IMF 2022 Article IV Consultation Staff Report. U peaks at 5.3%.
3. High U scenario (Summers 2022). U rises to 7.5% for two years.

For each path, consider alternative Beveridge Curve and inflation expectations assumptions.

In all cases, set future headline-inflation shocks to zero. Low serial correlation. Caveat.

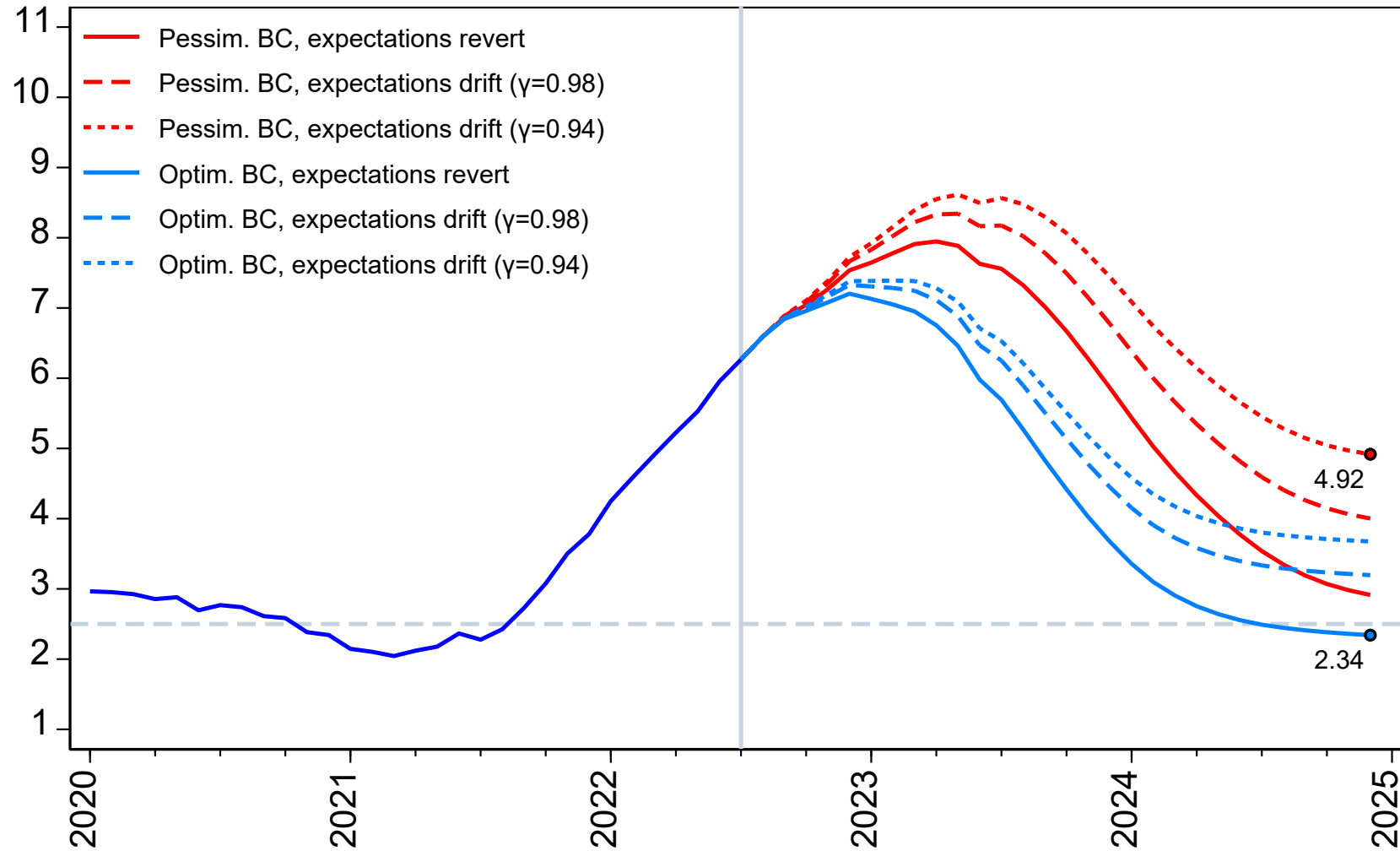
Derive paths for 12-month CPI median inflation using equations (PC, BC, inflation expectations process) estimated in the paper.

Inflation with FOMC Unemployment Projections



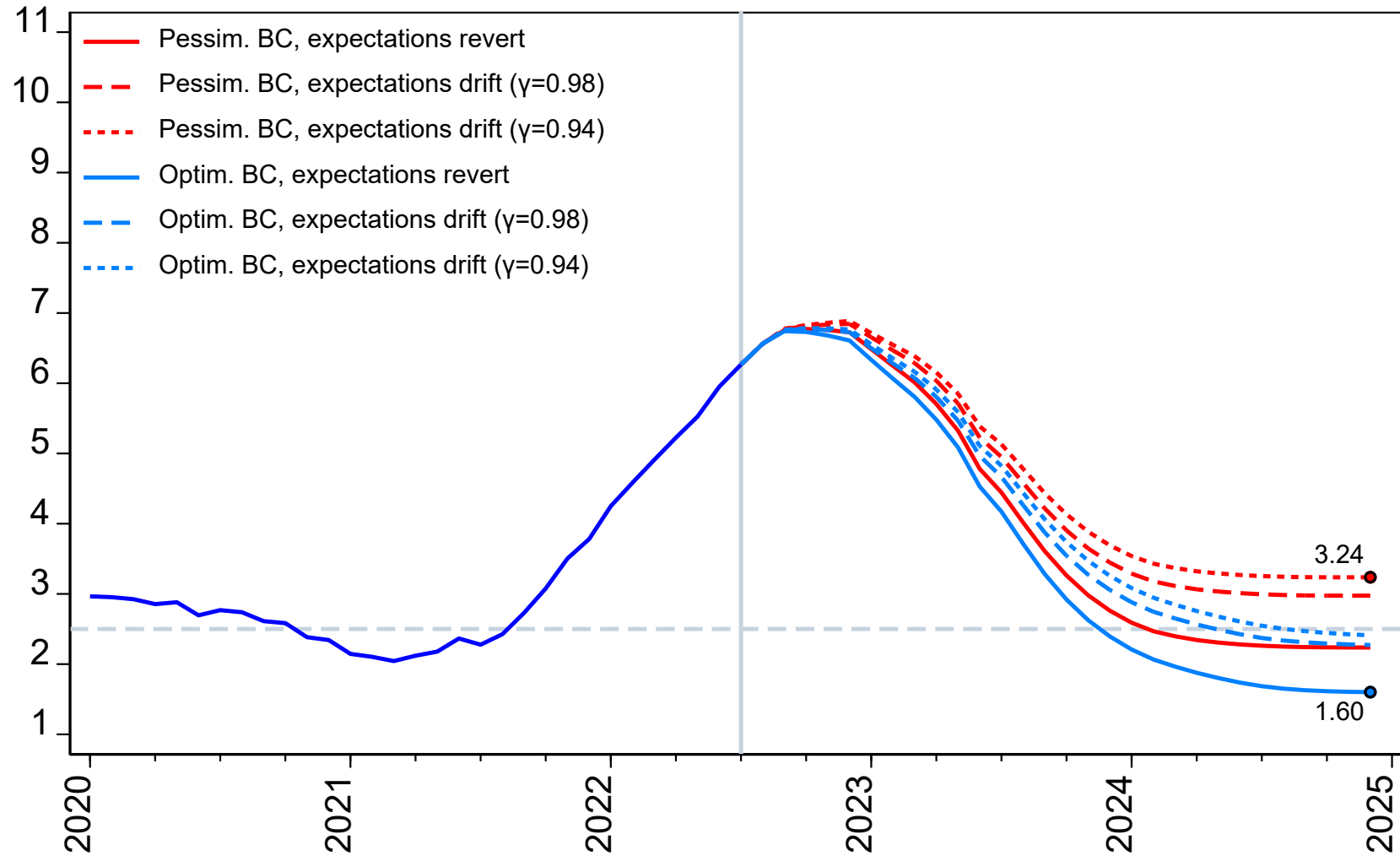
Note: Calculations for core (weighted median CPI) inflation using median unemployment path in June 2022 FOMC Summary of Economic Projections. Dashes show 2.5% target for weighted median CPI inflation from Atlanta Fed Underlying Inflation Dashboard.

Inflation with Higher (IMF Staff) Unemployment Path



Note: Calculations for core (weighted median CPI) inflation using unemployment path underlying 2022 IMF Article IV Staff Report. Dashes show 2.5% target for weighted median CPI inflation from Atlanta Fed Underlying Inflation Dashboard.

Inflation Paths with Even Higher (7.5%) Unemployment Path



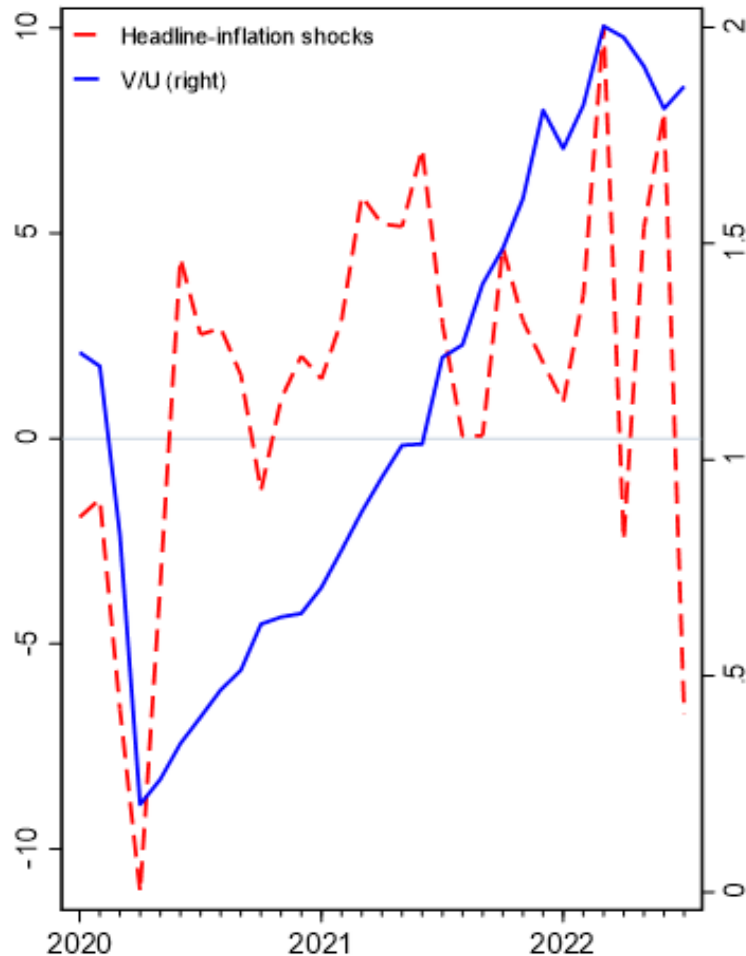
Note: Calculations for core (weighted median CPI) inflation assuming 7.5% unemployment during 2023-2024. Dashes show 2.5% target for weighted median CPI inflation from Atlanta Fed Underlying Inflation Dashboard.

Extra Slides

Relation Between H and V/U

Headline-inflation Shocks Not Associated with V/U

Headline Shocks and V/U



Estimated Equation for Headline Shocks, 2020-22

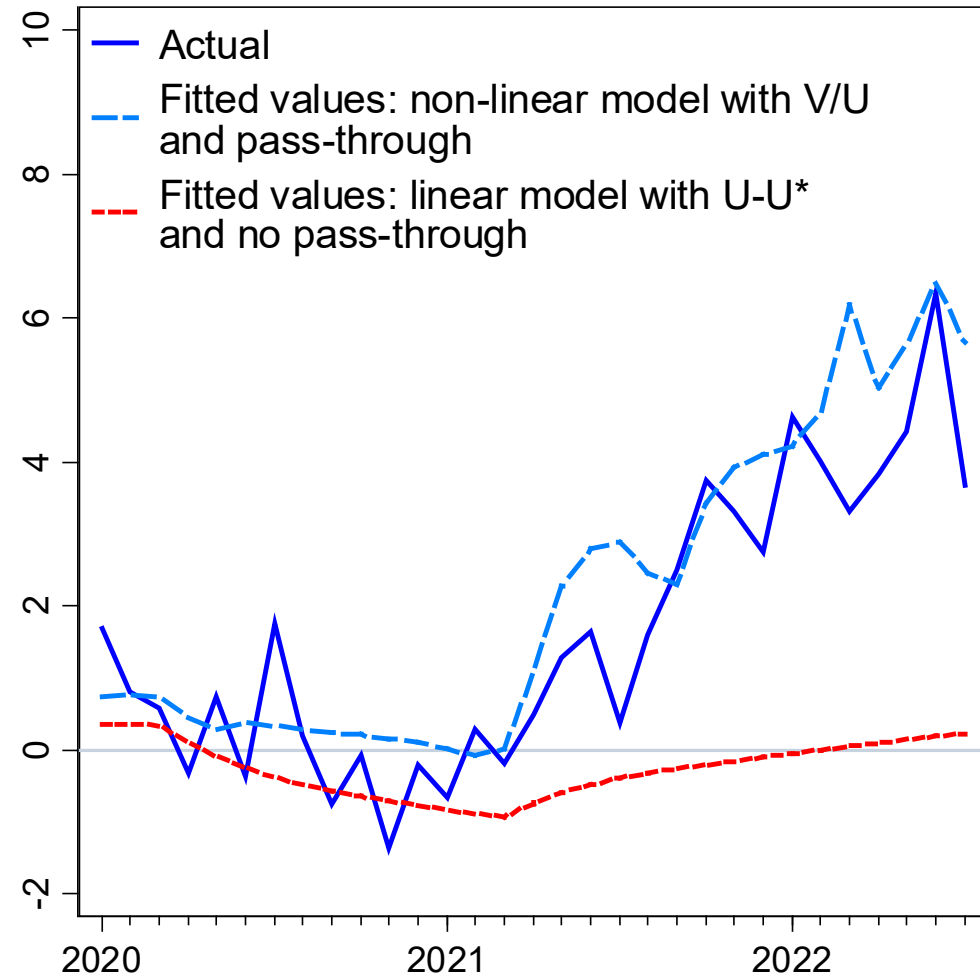
	(1)	(2)	(3)
Energy price inflation		0.054*** (0.007)	0.053*** (0.008)
Backlogs of work		0.198*** (0.065)	0.193** (0.069)
Weighted average of car inflation rates		0.063*** (0.008)	0.065*** (0.008)
V/U	-2.035 (2.687)	-0.967 (0.868)	-17.392 (24.245)
V/U-squared			15.500 (24.037)
V/U-cubed			-4.549 (7.467)
Constant	3.547 (2.322)	-10.073*** (3.312)	-4.501 (8.248)
Observations	31	31	31
R-squared	0.026	0.924	0.925
Rbar-squared	-0.00802	0.912	0.906

Why Has High Inflation Been Such a Surprise?

Predictions for Median CPI Inflation Gap During the Pandemic: Comparison Across Models

1. Nonlinear model with V/U and pass-through effect.
2. Linear model with $U - U^*$ and no pass-through effect (Ball and others, 2021).

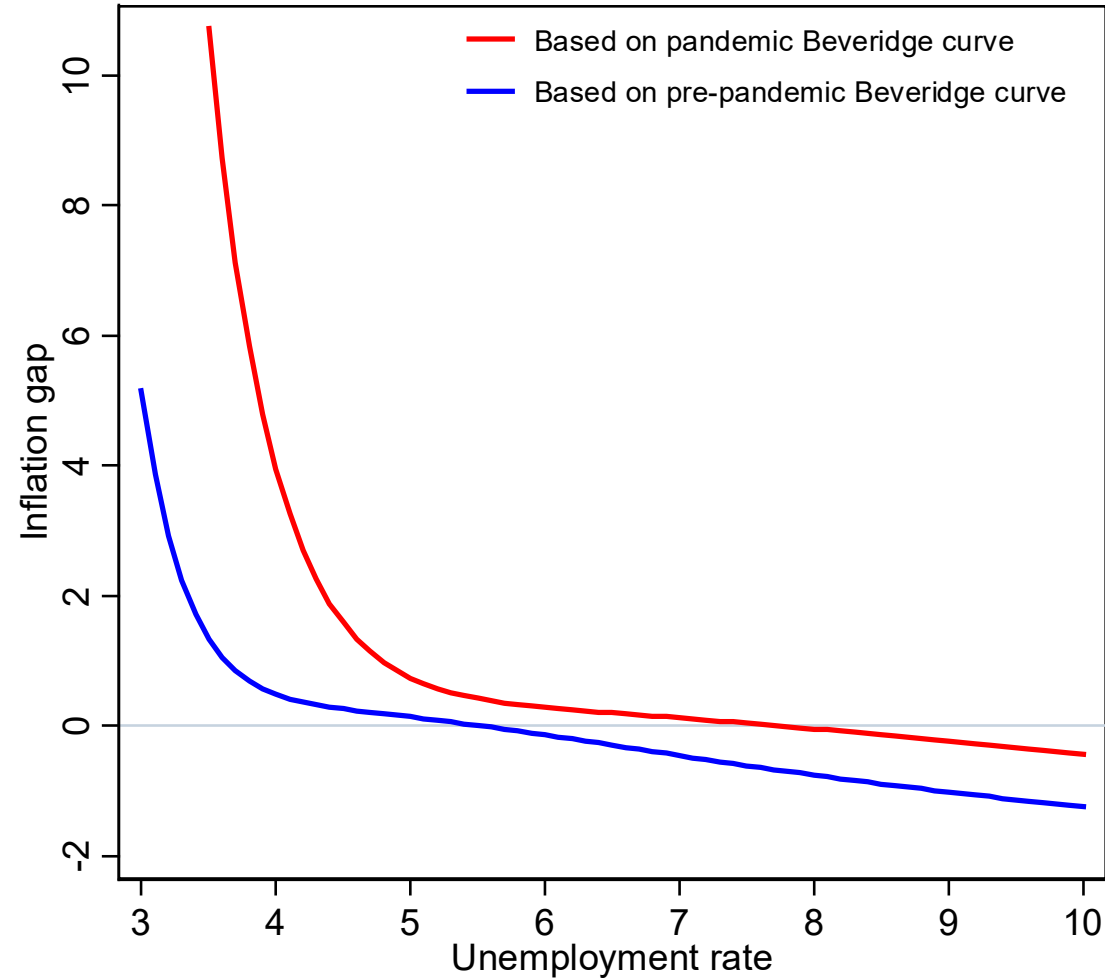
Parameters estimated with pre-pandemic (1985-2019) sample. U^* from CBO.



Relation Between Core Inflation and U.

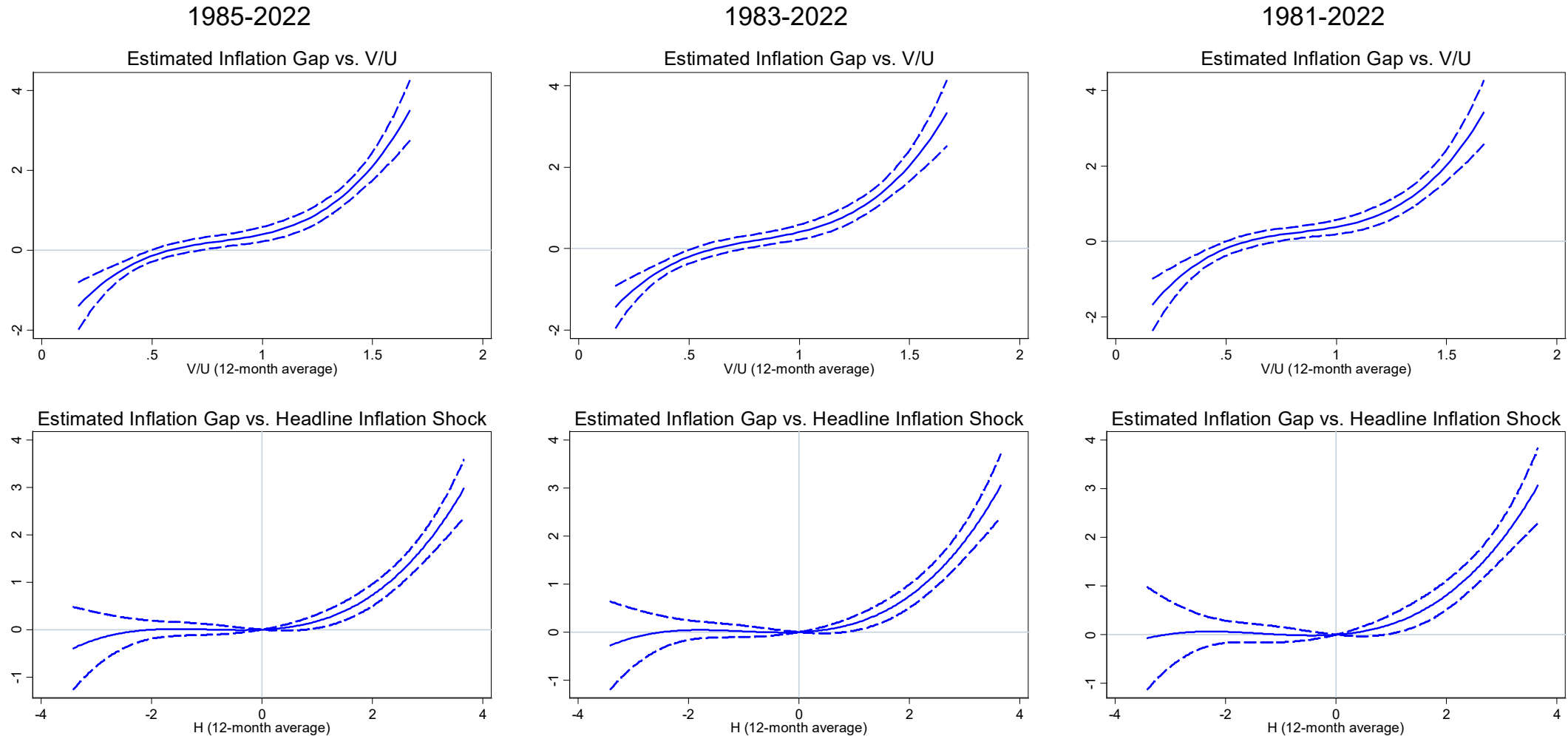
Derivation: Substitute V/U from Beveridge Curve into Phillips Curve with V/U

Median CPI Inflation Gap vs. U for Different BC



Robustness: Evidence of Non-linearity and Asymmetry

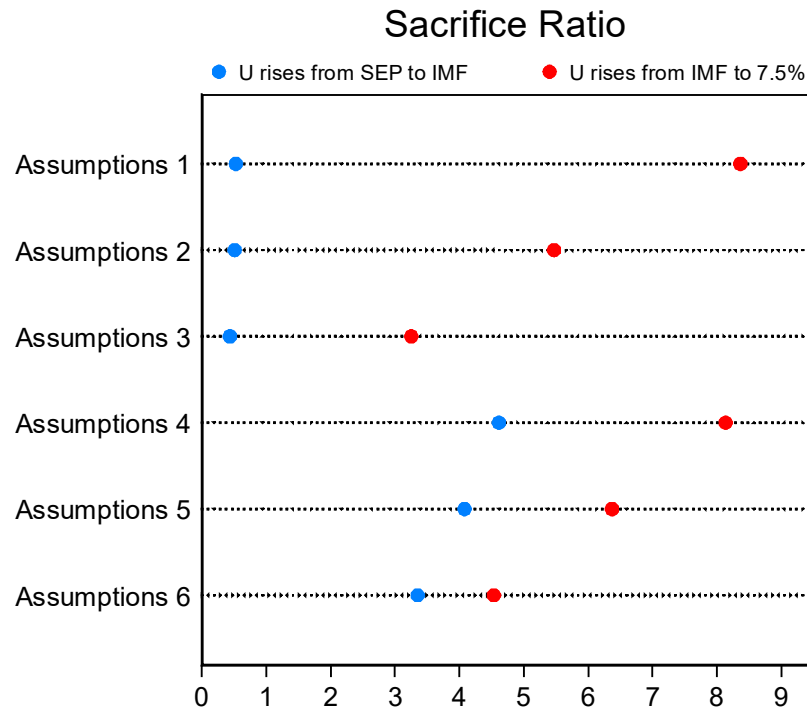
Results robust to starting the “Great Moderation” at alternative dates (1981, 1983, 1985).



Note: Bands report 95% conf. intervals. H = headline-inflation shocks. Inflation gap = median inflation – long-term expectations.

Implied Sacrifice Ratios

Sacrifice Ratio: Cumulative difference in the U rate (in point-years) between the SEP and IMF (or between the IMF and the 7.5%) paths between August 2022 and December 2024 divided by the difference in 12-month inflation in December 2024.



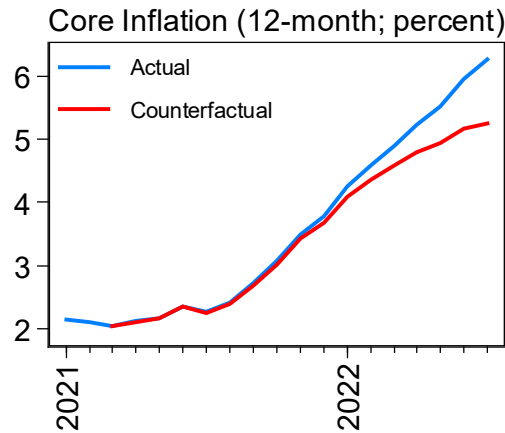
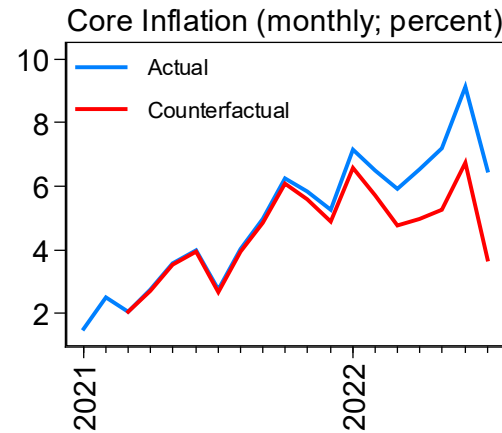
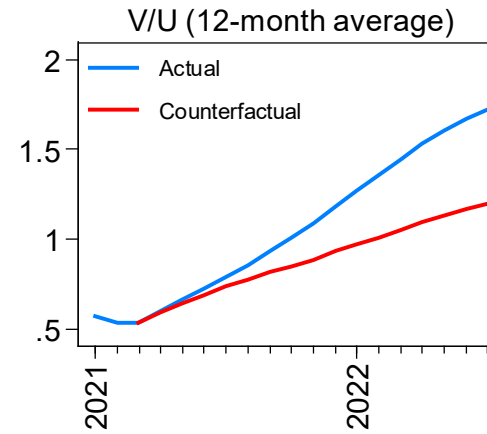
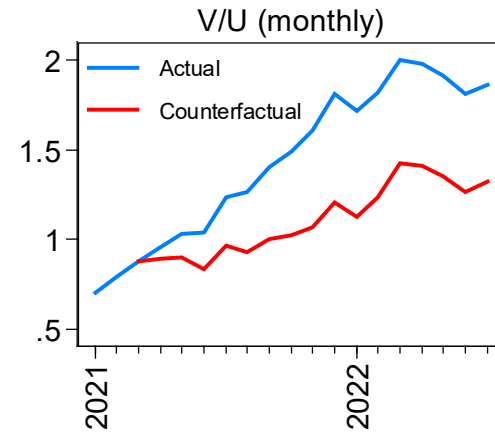
Across assumption sets, the sacrifice ratio is relatively low when U rises from the SEP path to the IMF staff path.

Raising unemployment further to 7.5% comes with relatively limited additional disinflation benefit at a substantial U cost.

Assump.	BC	Expectations	Assump.	BC	Expectations
1	Pessimistic	Revert	4	Optimistic	Revert
2	Pessimistic	Drift ($\gamma = 0.98$)	5	Optimistic	Drift ($\gamma = 0.98$)
3	Pessimistic	Drift ($\gamma = 0.94$)	6	Optimistic	Drift ($\gamma = 0.94$)

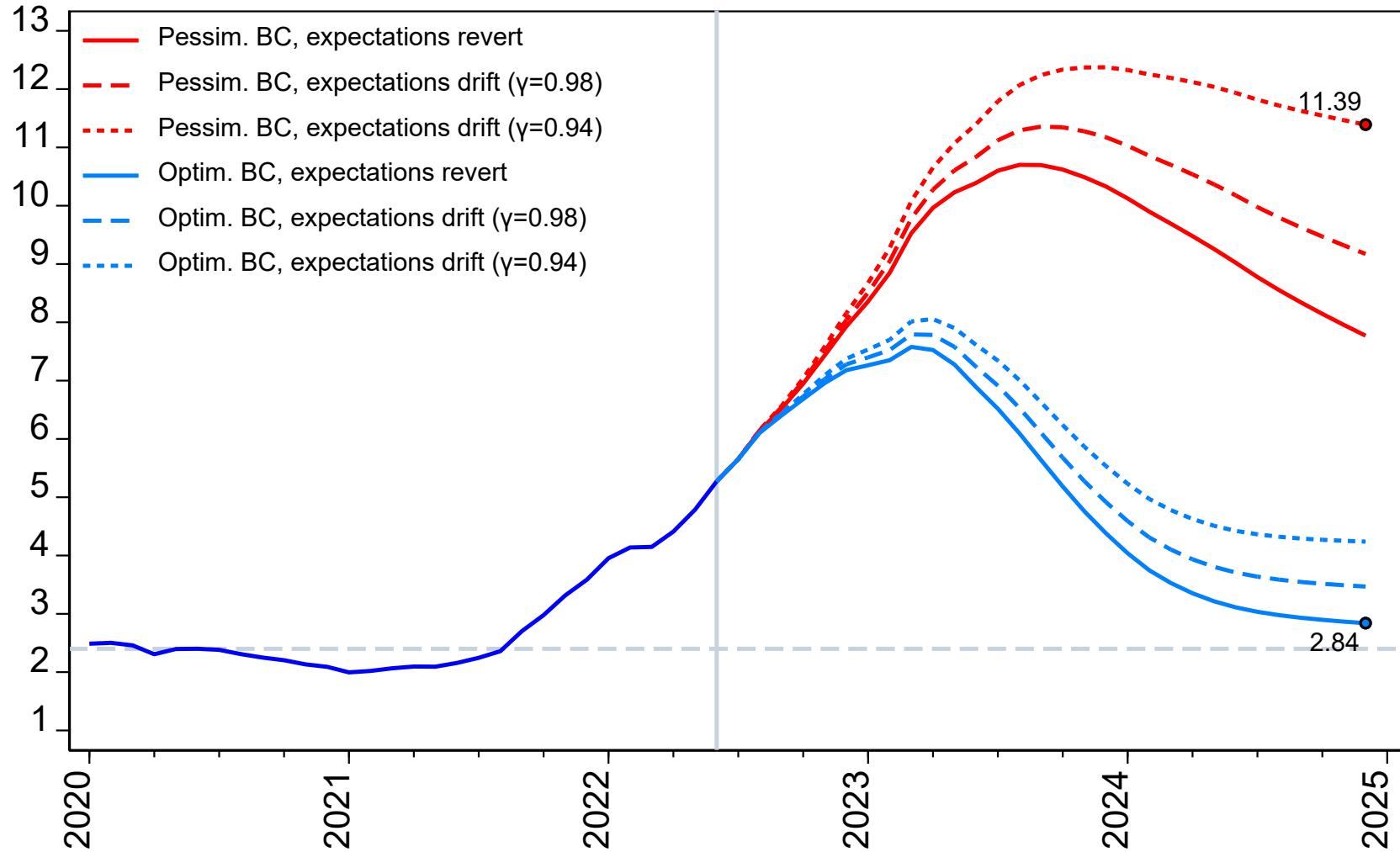
American Rescue Plan Played a Role

Counterfactual Scenario Without American Rescue Plan



Note: Impact of American Rescue Plan on V/U comes from Barnichon, Oliveira, and Shapiro (2021). Core inflation denotes median CPI inflation. Monthly inflation is annualized. Impact on core inflation derived from Phillips Curve relation estimated for 1985-2022.

PCE Core Inflation with FOMC Unemployment Projections



Note: Calculations for core (weighted median) PCE inflation using unemployment path in June 2022 FOMC Summary of Economic Projections. Dashes show 2.4% target for weighted median PCE following approach of Atlanta Fed Underlying Inflation Dashboard.