Discussion of Understanding U.S. Inflation During the COVID Era
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Focus: Examine the drivers of recent surge in inflation and present projections. Use a multi-step regression framework to decompose the surge in inflation:

- Tight labor market as measured by vacancy-to-unemployment ratio
- Headline shocks passed through to core inflation explained by energy and auto
- Soft vs. hard landing depends on the shape of the Beveridge curve and inflation expectations

Main Takeaway: Supply chain disruptions and energy prices account for bulk of the surge in inflation. Future will depend on labor market adjustment and inflation expectations.
1. **Regression framework**
   - A multi-step approach: Sensitive to endogeneity issues
   - Uncertainty: Hard to assess

2. **Tightness measure**
   - Gold standard? Trends and measurement challenges
   - Bad fit to 1970s: Troublesome

3. **Scenario analysis**
   - Unemployment inflow rate: Key to soft vs. hard landing
   - Beveridge Curve: Inconsistent with unemployment dynamics

4. **Way forward**
   - Model-based measurement approach
   - Unified approach: New Keynesian Phillips Curve coupled with rich labor market data
The paper employs a consecutive \textit{regress and predict} approach.

Start from:

\[ \pi_t = \pi^C_t + \pi^H_t \]

\( \pi_t \) = headline inflation
\( \pi^C_t \) = core inflation
\( \pi^H_t \) = headline inflation shocks
1. Regression Framework: First Step

Phillips Curve Regression:

\[ \pi_t^C - \pi_t^* = C + \kappa_1 \frac{V_t}{U_t} + \kappa_2 \left( \frac{V_t}{U_t} \right)^2 + \kappa_3 \left( \frac{V_t}{U_t} \right)^3 + \eta_1 (\pi_t - \pi_t^C) + \eta_2 (\pi_t - \pi_t^C)^2 + \eta_3 (\pi_t - \pi_t^C)^3 \]

**\( \pi_t^C \)** depends on

- expected inflation, \( \pi_t^* \): SPF ten year
- tightness, \( v_t/u_t \): HWI+JOLTS, Barnichon (2010)
- headline inflation shocks: \( \pi_t^H \)
1. Regression Framework: Second Step

**Headline inflation regressions:** Regress $\pi_t^H$ on various measures

- energy-price shocks
- auto-price shocks
- backlogs of work
- goods share of aggregate consumption

**Shocks?** All endogenous to shifts in demand, shifts in composition of demand, labor supply constraints, change in willingness to work etc.
Decomposing the Surge in Inflation

**Decomposition**: Use two reduced-form relationships consecutively to decompose the rise in inflation.

Headline inflation rose from 1.28% to 8.48% from December 2020 to July 2022.

- **Expected inflation**: 6.7%
- **V/U**: 14.4%
- **Energy prices**: 45.2%
- **Backlogs+auto prices**: 31.7%
Is This Approach Reasonable?

Supply side variables

Headline Shocks

Labor market tightness

Phillips Curve
Is This Approach Reasonable?

- Headline Shocks
- Phillips Curve
- Supply side variables
- Labor market tightness
## Simultaneous Growth of Wages and Import Prices

<table>
<thead>
<tr>
<th></th>
<th>Average 4-Quarter Change</th>
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<tbody>
<tr>
<td></td>
<td>2009:Q4-</td>
<td>2019:Q3</td>
<td>2020:Q2-</td>
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<tr>
<td></td>
<td>2022:Q1</td>
<td></td>
<td></td>
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<tr>
<td>Wage Growth (ECI)</td>
<td>2.2%</td>
<td>4.1%</td>
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<tr>
<td>Import prices (excl. petroleum)</td>
<td>0.3%</td>
<td>6.7%</td>
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<tr>
<td>- Industrial supplies excl. petroleum</td>
<td>0.7%</td>
<td>27.2%</td>
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<tr>
<td>- Capital goods</td>
<td>−0.4%</td>
<td>2.2%</td>
<td></td>
</tr>
<tr>
<td>Core CPI</td>
<td>1.9%</td>
<td>4.8%</td>
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</tbody>
</table>

**Reference:** Amiti, Heise, Karahan and Şahin (2022)
No Correlation between Input Prices and Wages in 2013-2019

- Consider 6-digit NAICS industries
- **Wages:** Weekly earnings from QCEW
- **Input Prices:** Construct using BEA’s Input-Output Matrix

Reference: Amiti, Heise, Karahan and Şahin (2022)
Positive Correlation Between Wages and Input Prices in 2021

Rising input prices are associated with increasing wages across industries.

Part of wage growth due to substitution from inputs towards domestic labor.

About 1/3 of the pick-up in wage inflation due to import price shocks alone.

Reference: Amiti, Heise, Karahan and Şahin (2022)
2. Is Vacancy-to-Unemployment A Panacea for the Phillips Curve?

- Economists have long been pursuing the perfect measure of slack.
- Emphasis on labor market tightness is nothing new (Perry, 1970, BPEA): 
  *For instance, many (including myself) argue that what matters is the difference between available jobs and available employees to fill those jobs.*
- Abraham, Haltiwanger and Rendell (BPEA, 2020) developed a sophisticated measure of tightness
- The historical performance of the tightness measure problematic (1970s)
Using Tightness Alone Does Not Solve Trend and Composition Issues

- The analysis starts in 1985
- Core CPI inflation ↑ 5.6 ppts in 1970s
- Core CPI inflation ↑ 4.5 ppts in 2021-22
- Caution against episode-specific indicators!
Using Tightness Alone Does Not Solve Trend and Composition Issues

- 1970-79: V/U = 0.70
- 2015-19: V/U = 0.86
- 2021-22: V/U = 1.06

- The analysis starts in 1985
- Core CPI inflation ↑ 5.6 ppts in 1970s
- Core CPI inflation ↑ 4.5 ppts in 2021-22
- Caution against episode-specific indicators!
3. Scenario Analysis and the Beveridge Curve

- Assume a log-linear relationship between tightness and unemployment
  \[ \frac{V}{u} = au^{b-1} \]

- Use a fitted Beveridge curve to convert the unemployment projections to tightness
- Revert the headline shocks to 0 over 12 months
- Use the Phillips Curve with implied $V/U$ to compute the core inflation gap
- Make different assumptions for inflation expectations

**Crucial assumption:** There is a one-to-one mapping between the unemployment rate and tightness
3. Scenario Analysis and the Beveridge Curve

Unemployment accounting identity implies:

\[ U_{t+1} = s_t(1 - U_t) - f_t U_t \]

\( s_t \) is the inflow rate to unemployment and \( f_t \) is the outflow rate from unemployment.

Search and matching frictions typically summarized by the matching function:

\[ f = H/U = M(V, U)/U = A(V/U)^\sigma \]

Flow steady-state implies a Beveridge curve of the form:

\[ u = \frac{s}{s + f} = \frac{s}{s + A(V/U)^\sigma} \]

The position of the Beveridge curve depends on the unemployment inflow rate.

References: Pissarides (1985), Elsby, Michaels, and Ratner (JEL, 2015), Figura and Waller (2022)
Soft Landing vs. Hard Landing in the Flow Space

- Soft landings associated with small increases in $s$
- Negative monetary policy shocks affects $s$ first.
- Rapid increase in $s$ and slow, hump-shaped declines of $f$.
- Soft vs. hard landing discussion should take into account $s$.

References: Hall (AER, 2005), Shimer (AER, 2005), Elsby, Hobijn, and Şahin (BPEA, 2010), White (2018)
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- Slowdown in $f$ during recessions
- Outflow rate is crucial in recovery dynamics
- Similar behavior in soft vs. hard landing

Model-based measurement approach that accommodates rich data better suited to identify drivers and implications of inflation.

- Uncertainty quantification
- More transparent
- Easier to implement counterfactual analysis
- Easier to incorporate sector-specific indicators
- Model and data-based regressions help with identification
- Policy analysis

**Recent Examples:** Amiti, Heise, Karahan and Şahin (2022), Crump, Eusepi, Giannoni and Şahin (2019, 2022), di Giovanni, Kalemli-Özcan, Silva, Yildirim (2022)
Example: Model-based Measurement Approach

Estimate a forward-looking New Keynesian Phillips Curve using three key inputs:

1. Unemployment flows by demographics
   → Help pin down the *secular trend* of unemployment, $\bar{u}$

2. Estimate wage and price NKPCs using Bayesian methods
   → Informative about *unemployment-inflation* trade-off
   → Use multiple measures of wages at the same time

3. Survey-based Inflation expectations (Six-months-ahead and Five-to-ten years ahead)
   → Informative about *current and future* slack

Reference: Crump, Eusepi, Giannoni and Şahin (2019, 2022)
Dual aging has been reducing trend unemployment.

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Underlying Inflation Above Long-run Trend

Source: Crump, Eusepi, Giannoni and Şahin, 2022
Mostly Due to Wage Growth

Source: Crump, Eusepi, Giannoni and Şahin, 2022
Underlying Wage Growth Highly Correlated with Job-filling Rate

Source: JOLTS and Crump, Eusepi, Giannoni and Şahin, 2022
Summary

Timely and thought-provoking paper on a timeless topic!

1. Regression framework
   - Hard to provide well-identified decompositions and quantify uncertainty

2. Tightness measure
   - Highly relevant measure but it has its own shortcomings
   - Cannot ignore the 1970s!

3. Scenario analysis
   - Unemployment inflow rate: key to soft vs. hard landing argument

4. Way forward
   - Model-based measurement approach