The Role of Wages in Trend Inflation: Back to the 1980s

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Overview

Measurement of trend inflation using disaggregated price and wage data in a dynamic factor model

(up to 17) disaggregated price and (up to 13) disaggregated wage series (**new**)	Stochastic volatility in shocks→instability in price/wage dynamics	Time-varying links between trend and disaggregated components→ explain changes in focus on wage inflation over time

Takeaway: Wages are important for inflation forecasts (in a time-varying way) & the signal for price inflation in wages reached the highest level since the 1980s in recent years

Literature

Trend inflation

- Cross-sectional info.—use many price series (Bryan and Cecchetti, 1994)
- Time-series info.—extract trends use smoothing techniques
  - Simple—moving average as in Atkeson and Ohanian, 2001
  - Complex—unobserved component models as in Stock and Watson, 2007

Literature on wage inflation and price inflation

- Models of the “wage-price” spiral (e.g., Blanchard, 1986)
- Empirical work on wages as an inflation predictor
  - Gordon, 1988; Hess and Schweitzer, 2000; Knotek and Zaman, 2014; Bidder, 2015; and Peneva and Rudd, 2017
- Empirical work finds little role for wages, but does this reflect instability?

The Multivariate Model

- MUCSVO (Del Negro & Otrok ,2008; Stock & Watson, 2016; FRBNY)

$$x(j,t) = a(j,\tau,t) \cdot \tau(c,t) + a(j,e,t) \cdot e(c,t) + \tau(j,t) + e(j,t) \ (1)$$

  - Multivariate unobserved components model (MUC)
    - Standard model: Kalman filter to extract a common trend from series
  - with stochastic volatility (SV)
    - SV accounts for the changes in volatility that are important for inflation
    - Related research includes Stock and Watson, 2007; Kiley, 2008; Reis and Watson, 2010; Mertens, 2016; Stock and Watson, 2016
  - and outlier adjustments (O)
    - For large shocks. e.g., energy and food prices (Stock & Watson, 2016)
    - And for COVID shock (Almuzara & Sbordone, 2022 (FRBNY); this paper)

Data (1973:Q1-2023:Q3)

- Price indexes for personal consumption expenditures (PCE) in 17 categories of goods and services
- Average hourly earnings (AHE) across 13 industries
- A few salient characteristics of the data
  - Both price and wage indexes highly correlated with core inflation over entire sample—that is, the common trend is important
  - Price series have substantially different volatility across categories
  - Wage series generally have similar volatility

Specifications

- The MUCSVO model for the 17 components of PCE prices
- The MUCSVO model for the 17 components of PCE prices and 13 AHE series
- The MUCSVO model for three components of PCE prices—prices excluding food and energy, prices for food, and prices for energy
- The MUCSVO model for three components of PCE prices in the previous model and for two aggregate AHE series (AHE for goods-producing and for services-providing industries)
- A UCSVO model for overall PCE prices

Trend inflation and wages

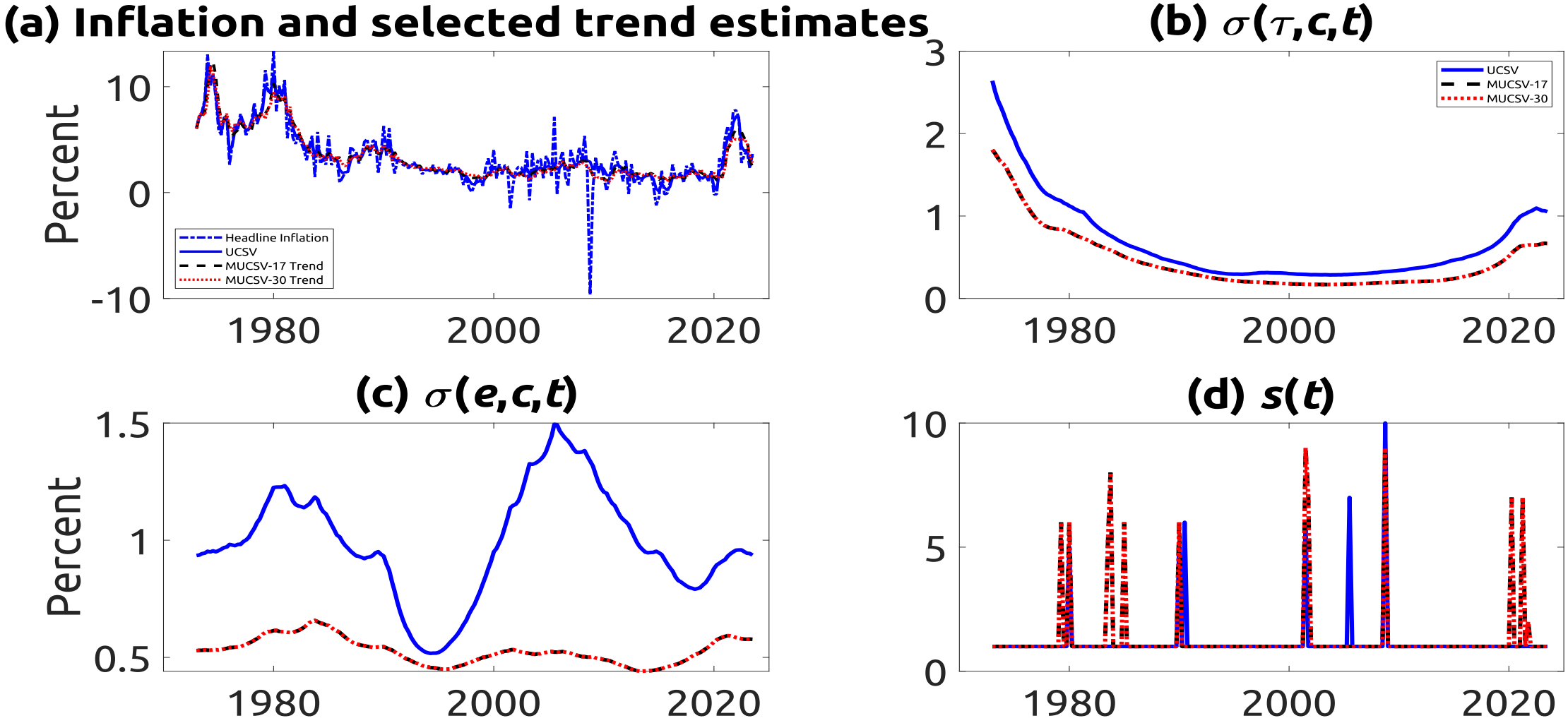
- Weighted average of trends, where weights are expenditures shares

$$Trend\ PCE\ Inflation(t) = \sum_{j=1}^{N} w(j,t) \cdot [a(j,\tau,t) \cdot \tau(c,t) + \tau(j,t)] \quad (12)$$

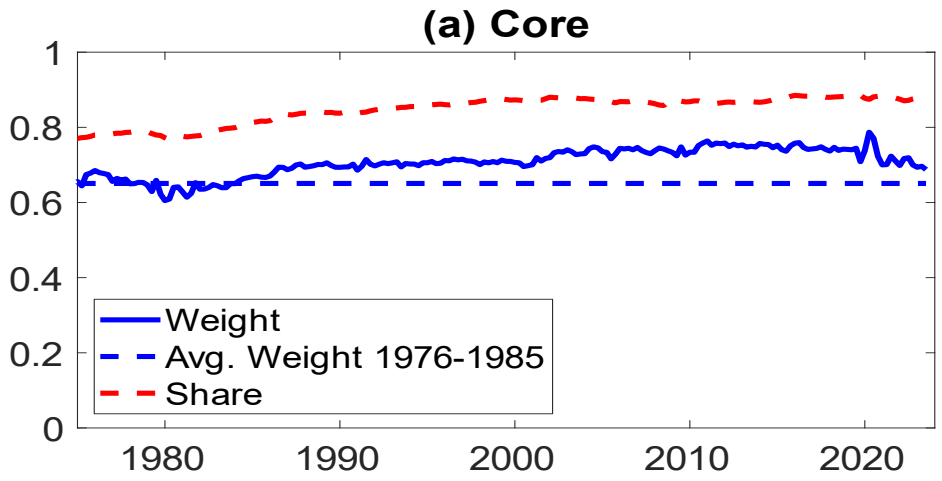
- Wages have a weight ω through their signal/filtering, which could reflect

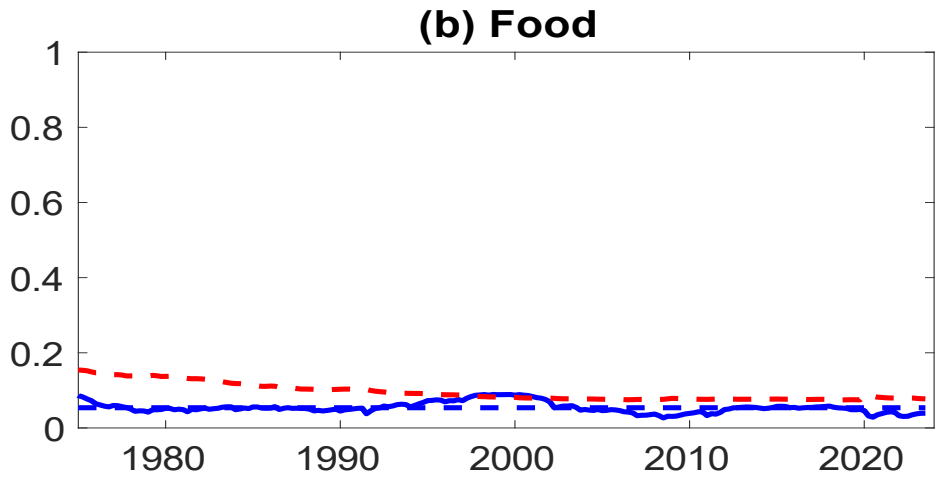
$$Trend\ PCE\ Inflation(t) = \sum_{j=1}^{N} \sum_{i=0}^{\infty} \omega(j,t-i) \cdot x(j,t-i) \quad (13)$$

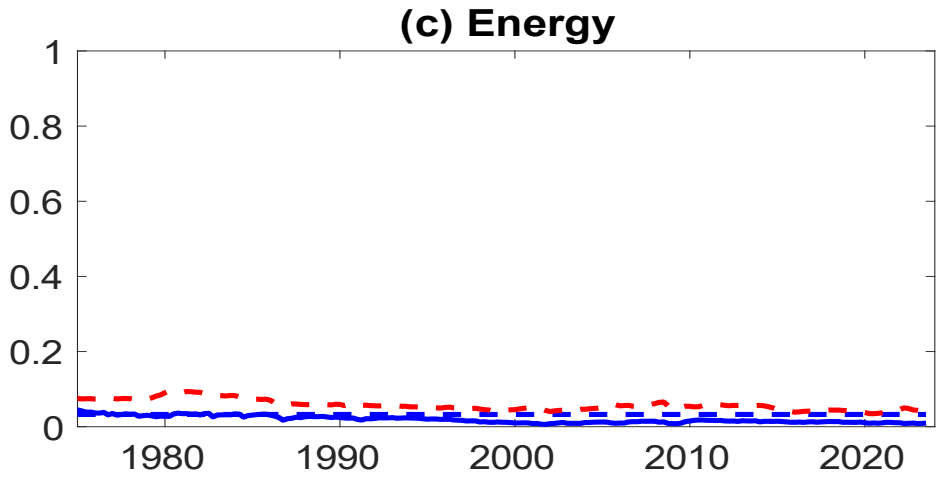
Some model properties

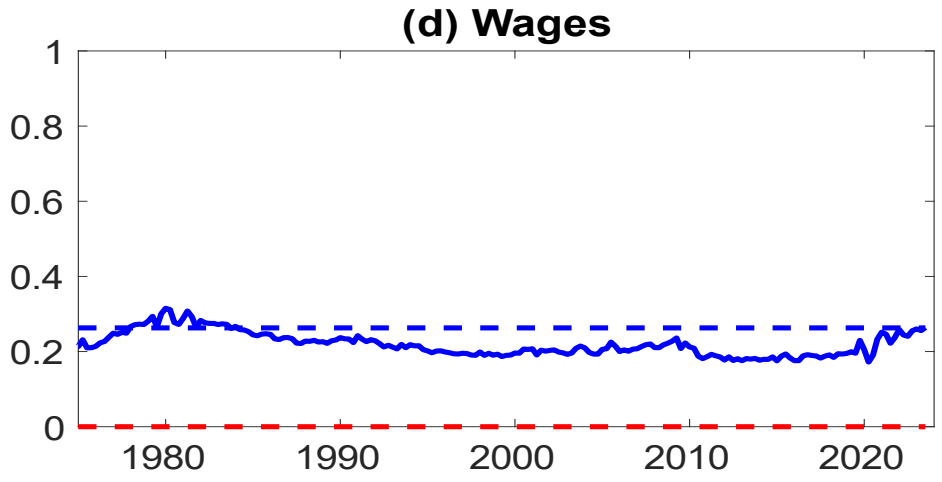


Expenditure (w) and filtering (ω) weights

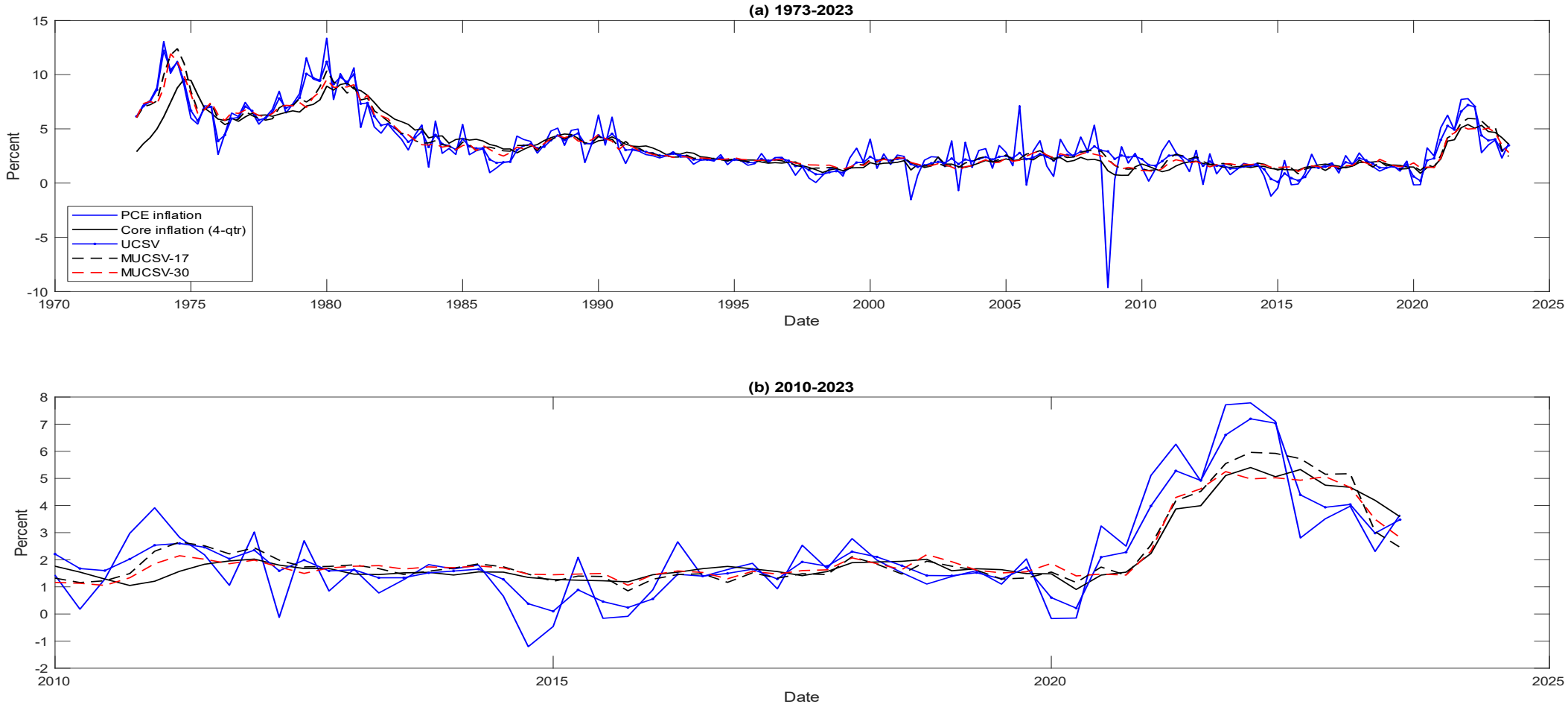








While wages receive a sizable weight, models are (often) similar



While wages receive a sizable weight, models are similar and forecasting is hard

Model	Four-Quarter Horizon MSFE (S.E.)	Eight-Quarter Horizon MSFE (S.E.)	Twelve-Quarter Horizon MSFE (S.E.)
4-qtr. core inflation	1.62 (0.60)	1.33 (0.67)	0.98 (0.48)
UCSV	1.91 (0.70)	1.53 (0.67)	1.21 (0.51)
MUCSV-3	1.88 (0.70)	1.37 (0.64)	1.05 (0.47)
MUCSV-17	1.92 (0.71)	1.42 (0.66)	1.05 (0.44)
MUCSV-5	**1.57 (0.53)**	**1.23 (0.53)**	**0.96 (0.41)**
MUCSV-30	1.68 (0.59)	1.33 (0.58)	0.99 (0.39)
Model average	1.70 (0.62)	1.32 (0.62)	0.99 (0.45)

Forecasting inflation has been hard since COVID, but wages help (last 10 years)

Model	Four-Quarter Horizon MSFE (S.E.)	Eight-Quarter Horizon MSFE (S.E.)
4-qtr. core inflation	2.64 (1.55)	2.81 (1.95)
UCSV	3.08 (1.61)	3.00 (1.92)
MUCSV-3	3.20 (1.70)	2.83 (1.83)
MUCSV-17	3.14 (1.74)	2.92 (1.90)
MUCSV-5	**2.34 (1.23)**	**2.38 (1.52)**
MUCSV-30	2.44 (1.36)	2.58 (1.67)
Model average	2.72 (1.49)	2.71 (1.78)

Summary

This research estimates trend inflation using disaggregated price and wage data in a multivariate unobserved components model

Wages are found to be important for estimates of trend inflation

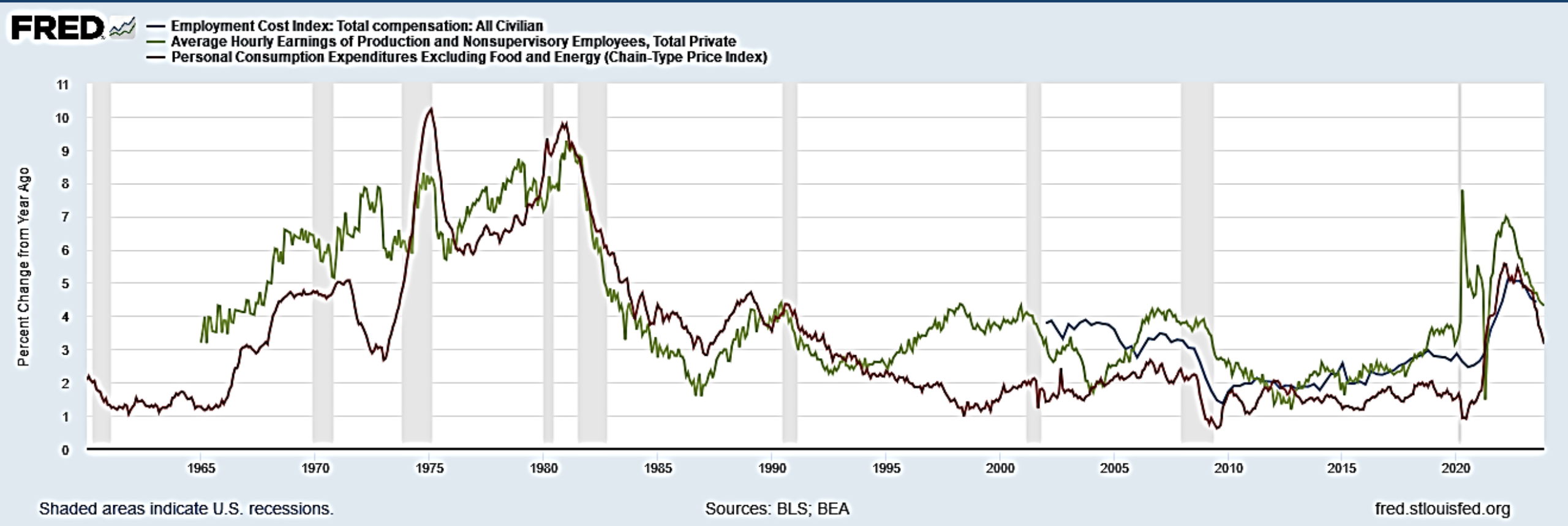
A time-varying weight on wages which has returned to 1980s levels	Incorporating wages reduces uncertainty somewhat	Incorporating wages enhances forecast accuracy, especially since COVID

All models make large forecast errors—forecasting is hard

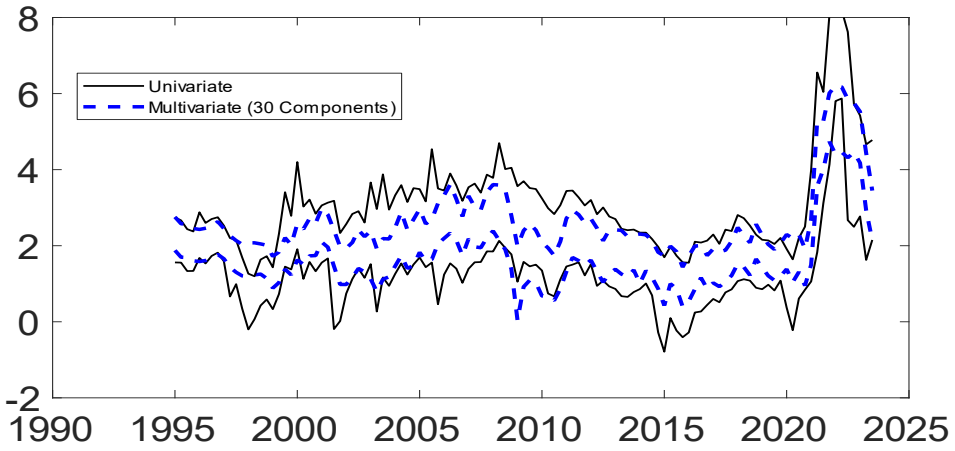
Appendix

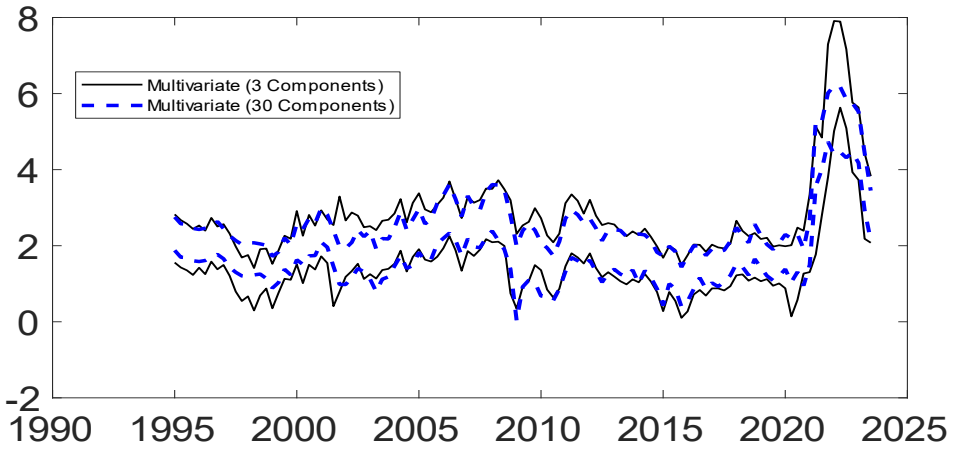
Motivation

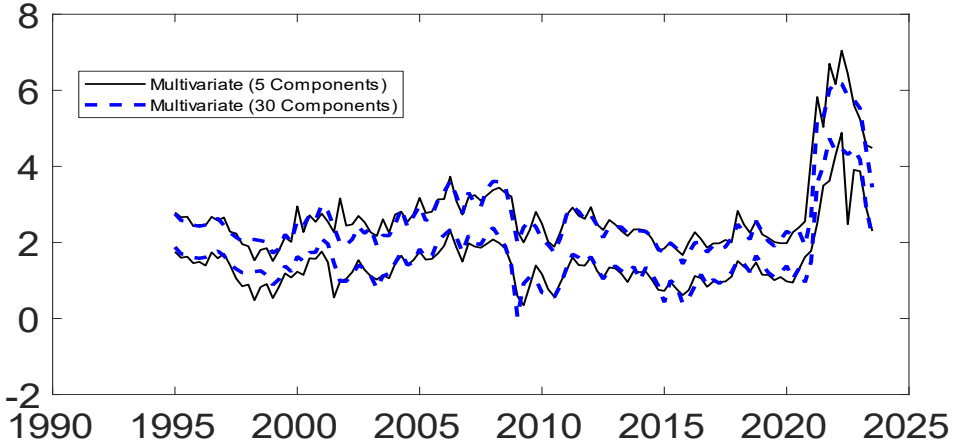
- J. Powell, Nov. ‘22: “wage growth remains well above levels… consistent with 2 percent inflation”
- L. Brainard, Jan. ‘23: “wages do not appear to be driving inflation in a 1970s-style wage–price spiral”

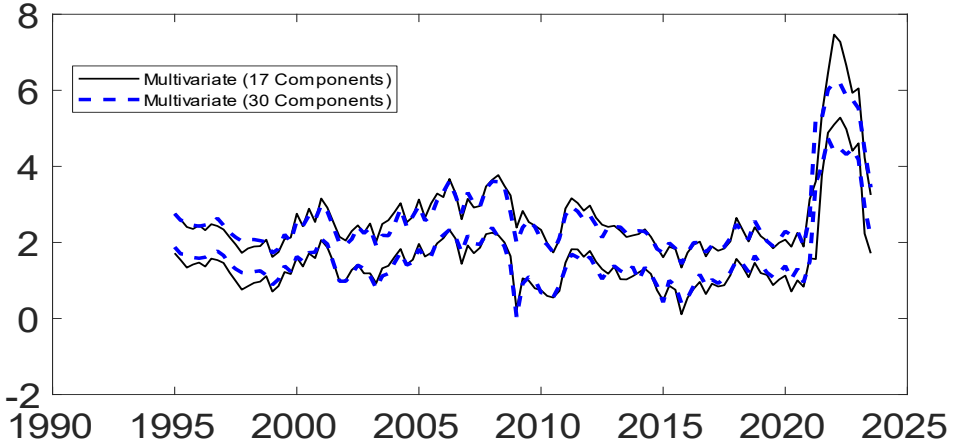


Adding wages reduces uncertainty









Contribution

- Measurement of trend inflation in a dynamic factor model involving
  - (up to 17) disaggregated price and (up to 13) disaggregated wage series (**new**)
  - Stochastic volatility in price and wage shocks
  - Time-varying links between trend and disaggregated components

- Why is this (new) combination of features valuable?
  - Stochastic vol. & time-varying coefficients→instability in price/wage dynamics
  - Model may explain changes in focus on wage inflation over time
  - The flexibility of the framework may shed light on current inflation trends

The Multivariate Model—details (1)

Set of equations for N observed series, $x(j,t)$ for $j = 1{:}N$

$$x(j,t) = a(j,\tau,t) \cdot \tau(c,t) + a(j,e,t) \cdot e(c,t) + \tau(j,t) + e(j,t) \quad (1)$$