Federal Reserve Bank of San Francisco

On the existence of wage-price spirals
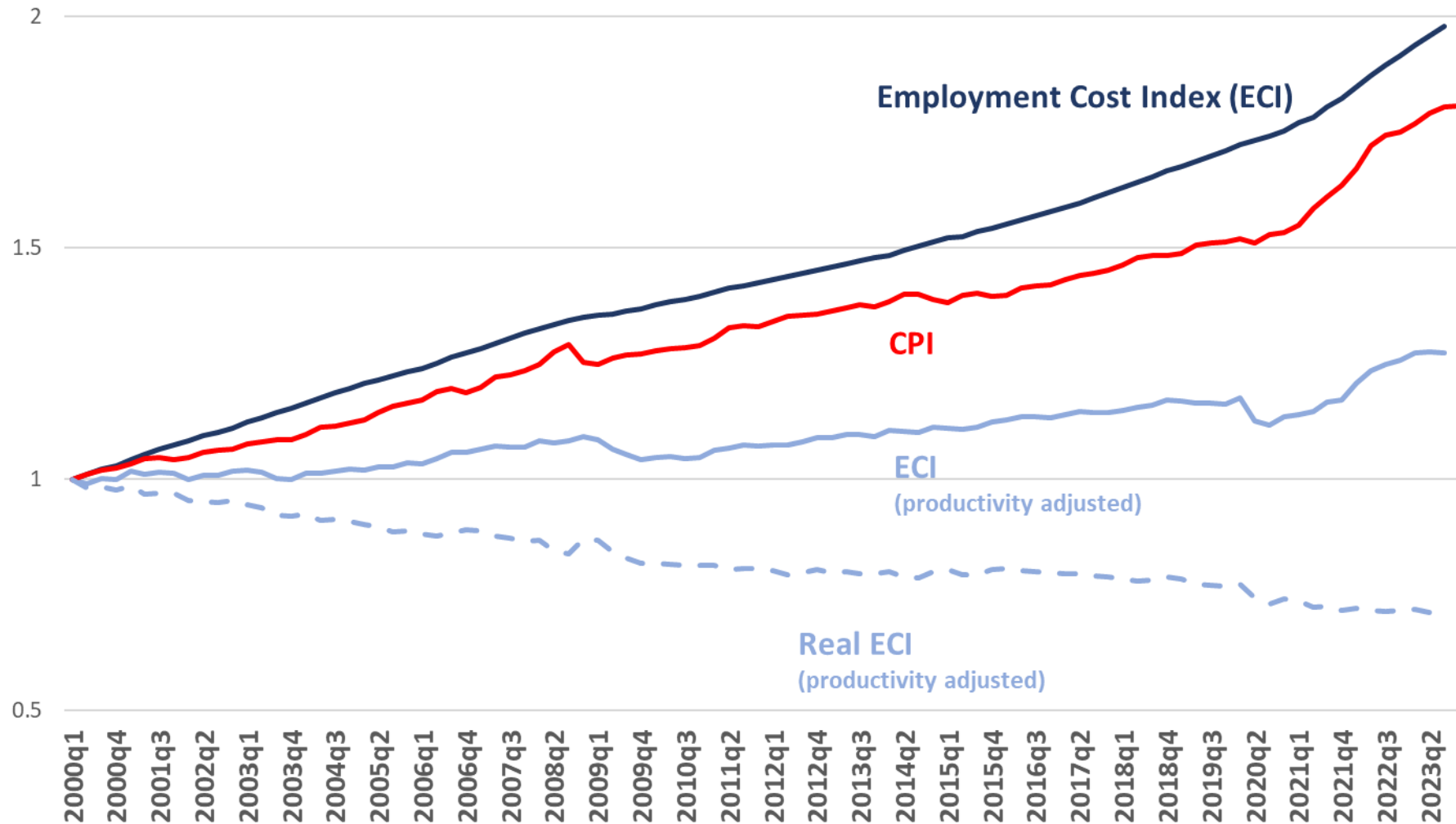## January 18, 2024

Adam Shapiro

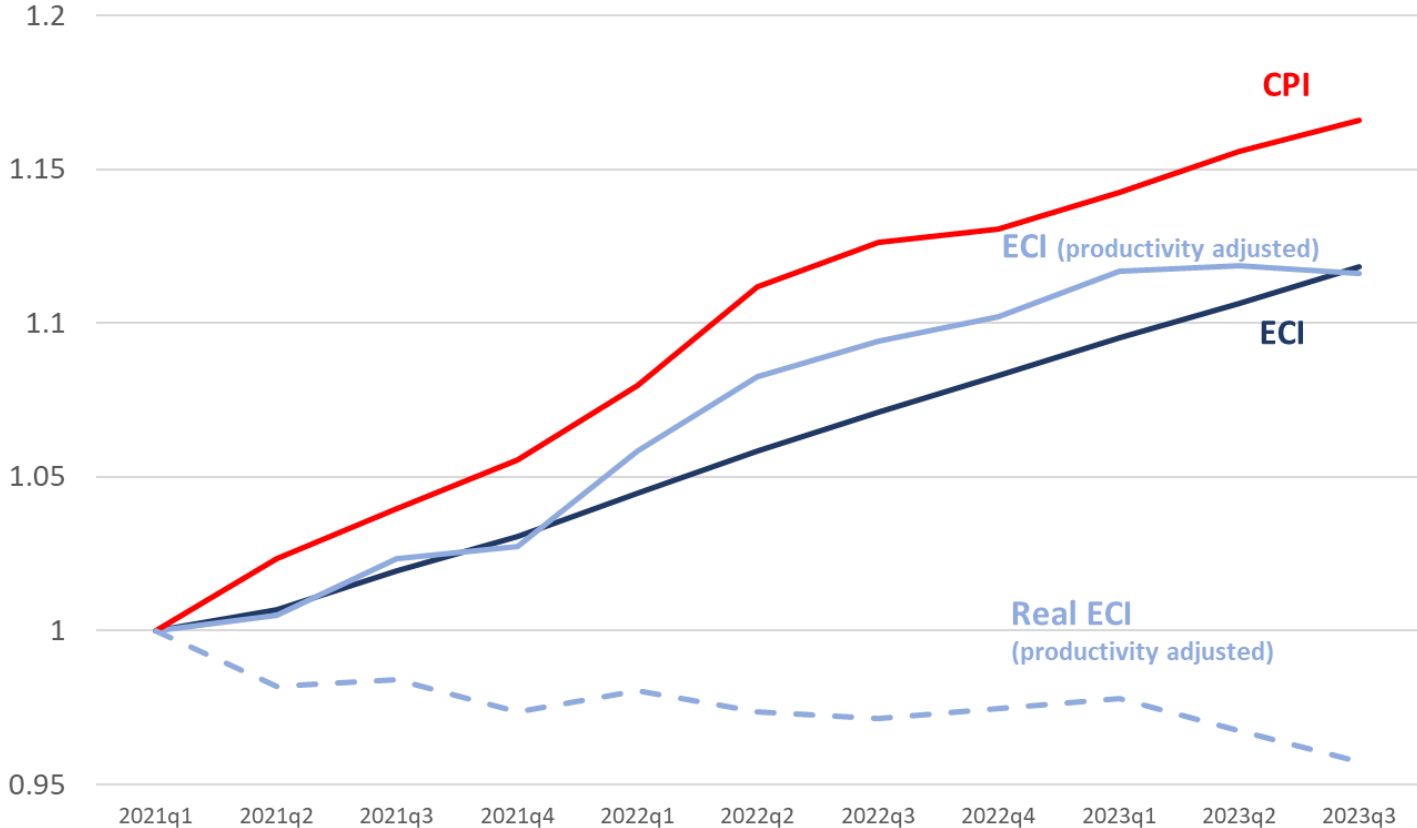# What is a wage-price spiral?
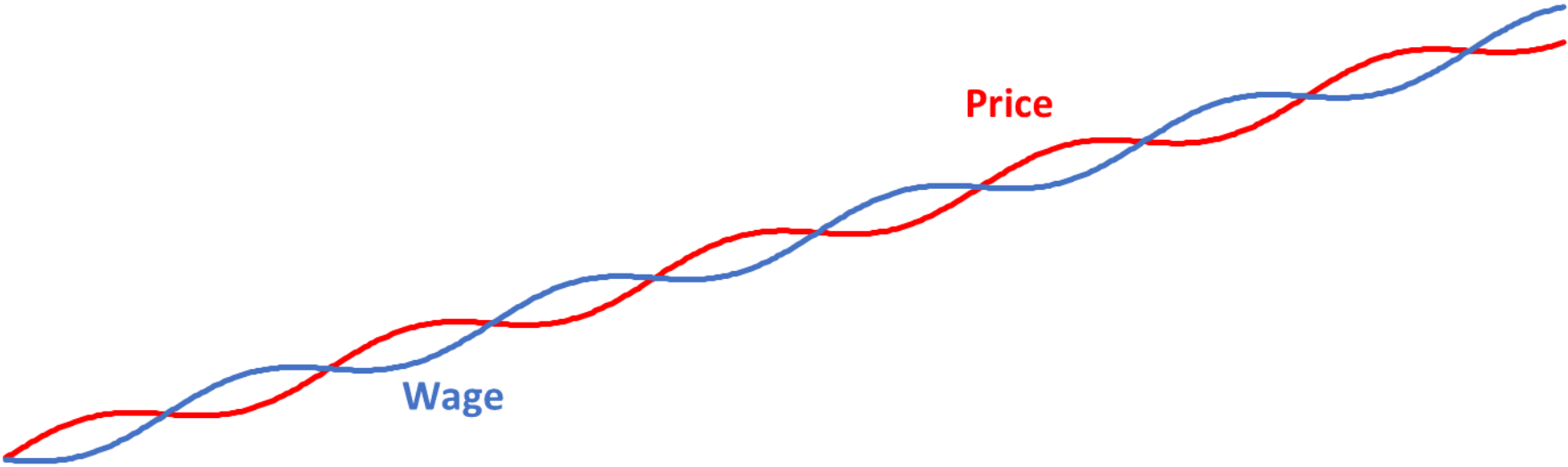
A bird's-eye view of wages and prices

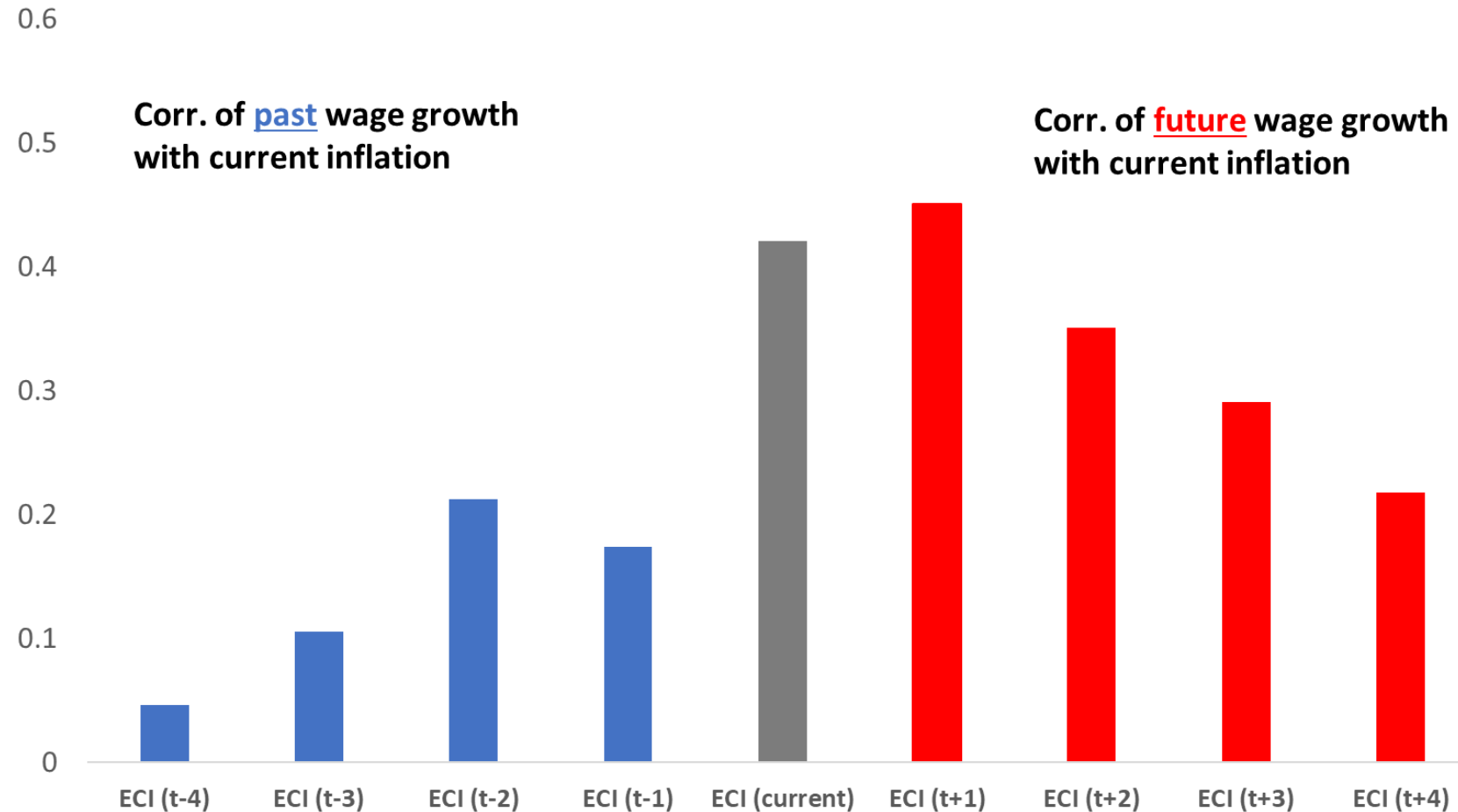**Prices and wages normalized to 2000q1**

Wages and prices in the post-pandemic period

Prices and wages normalized to 2021q1
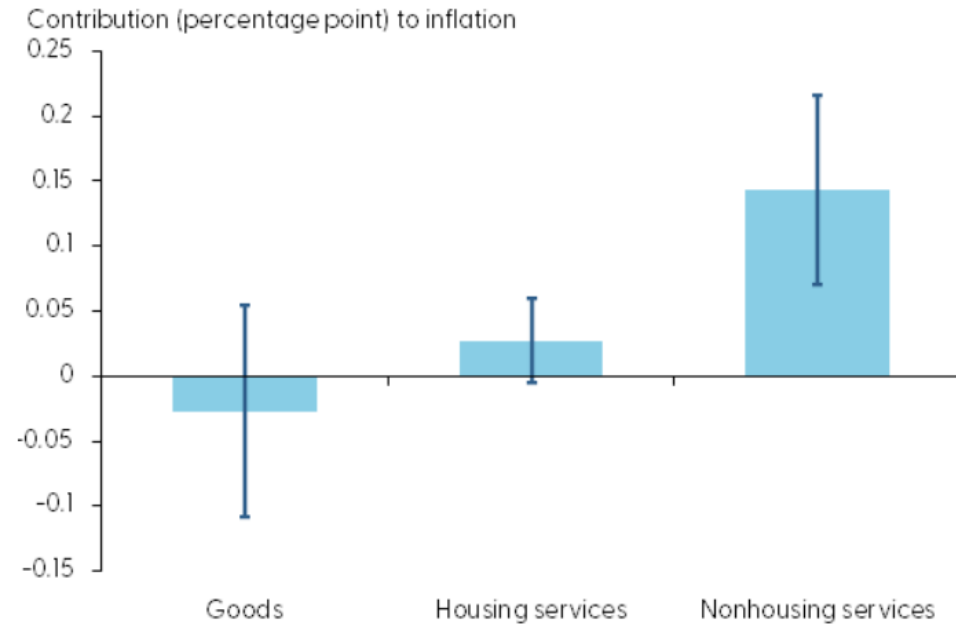
Wage growth tends to lag price growth

Intertemporal correlations of price and productivity-adjusted wage growth (1982-2023)

Corr. of past wage growth with current inflation

Corr. of future wage growth with current inflation

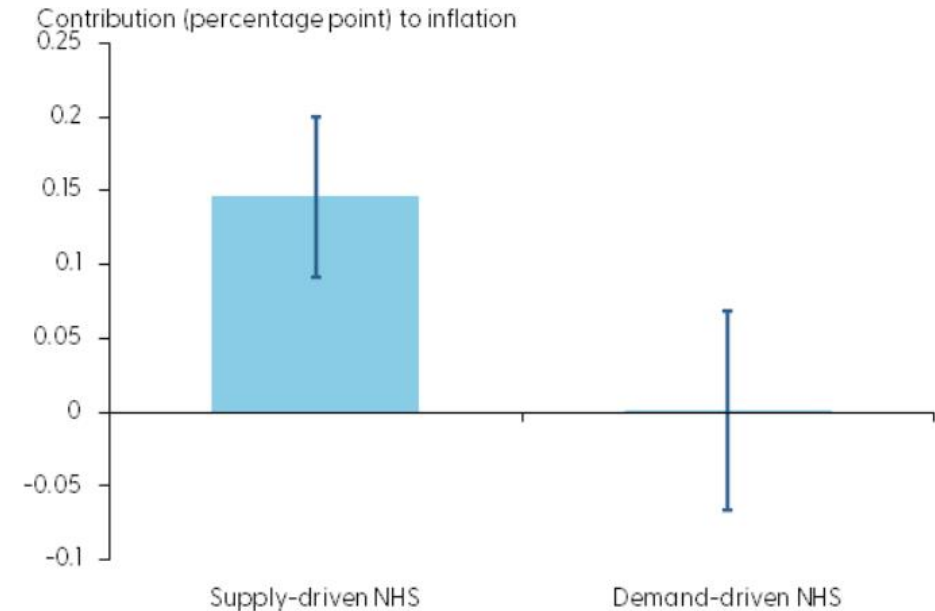# Pass-through tends to be small, isolated to services

Cumulative impact of ECI increase on core PCE inflation (sample period 1988-2023)

Note: Four-year cumulative impact of 1% increase in employment cost index.
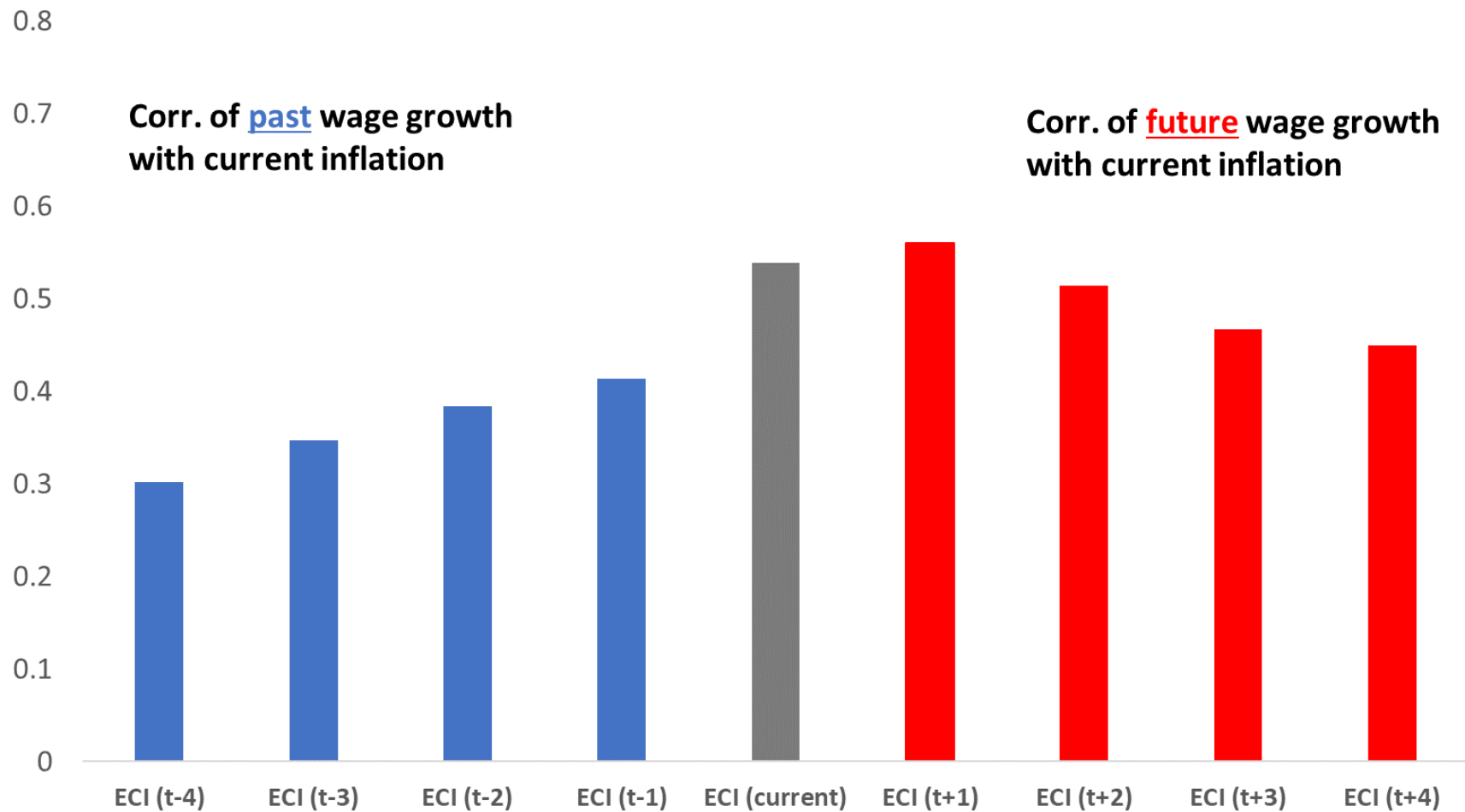
Note: Four-year cumulative impact of 1% increase in employment cost index

Shapiro, Adam "How Much Do Labor Costs Drive Inflation?." FRBSF Economic Letter 2023.13 (2023): 1-6.

Extra slides

Intertemporal correlations of price and wage growth (1982-2023)

Corr. of past wage growth with current inflation

Corr. of future wage growth with current inflation

Intertemporal correlations of price and productivity-adjusted wage growth

(1982-1999)

Corr. of past wage growth with current inflation

Corr. of future wage growth with current inflation

(2000-2023)

Corr. of past wage growth with current inflation
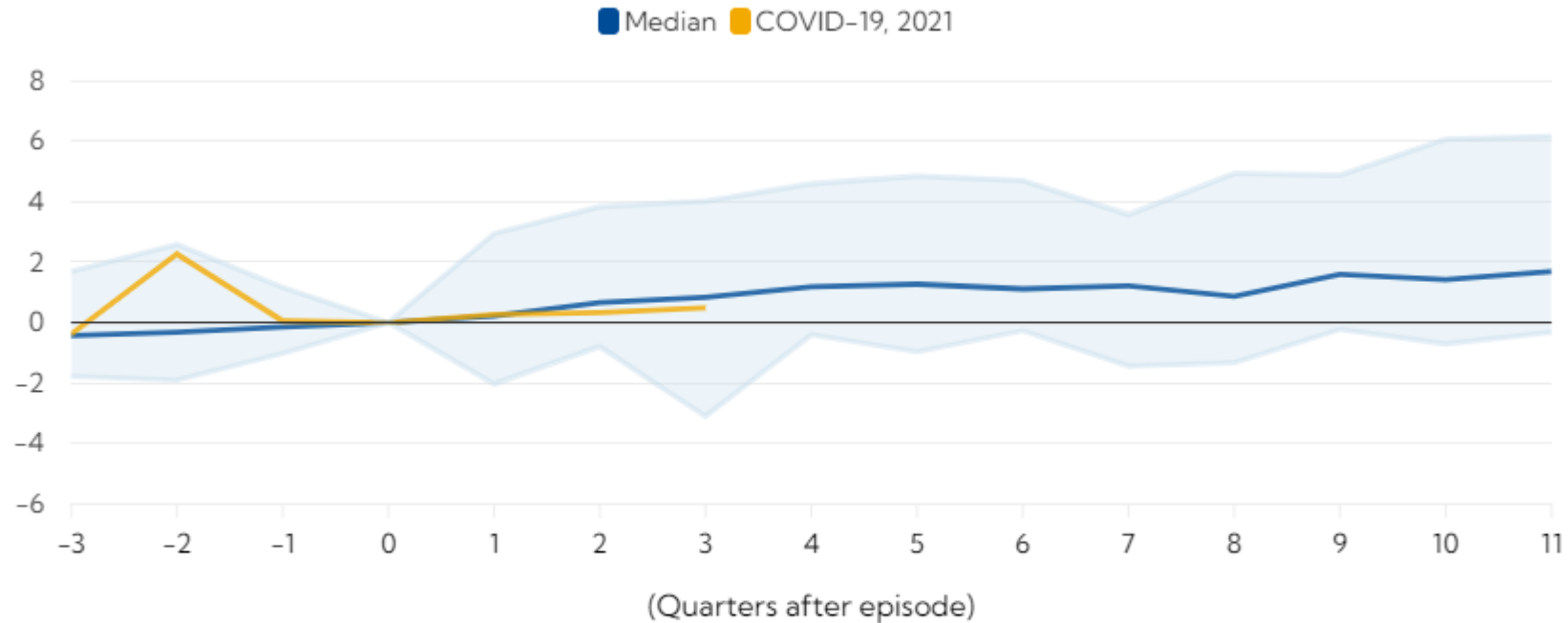
Corr. of future wage growth with current inflation
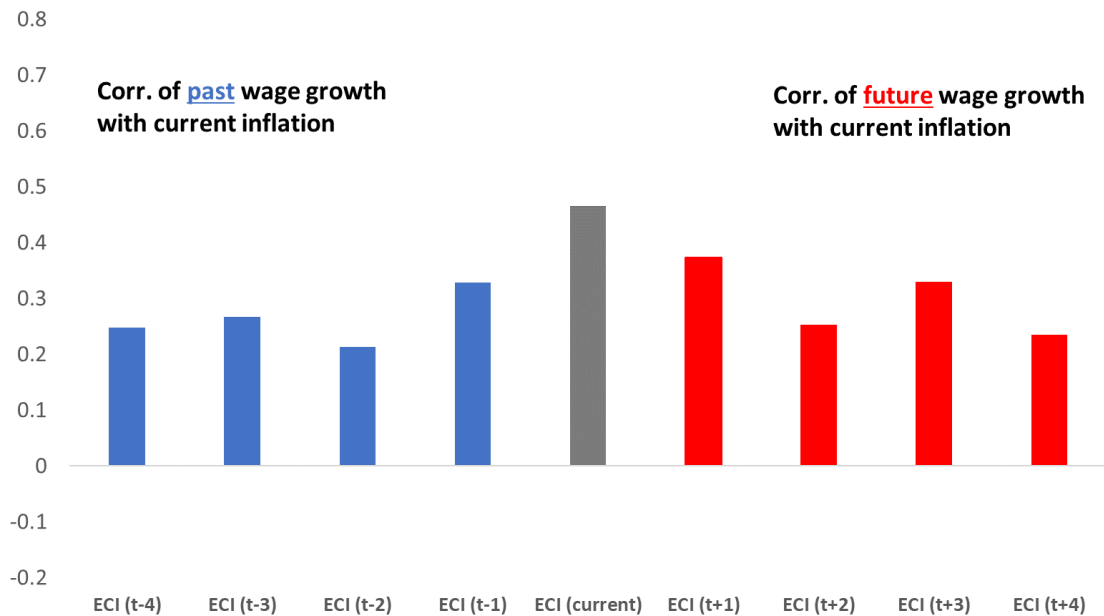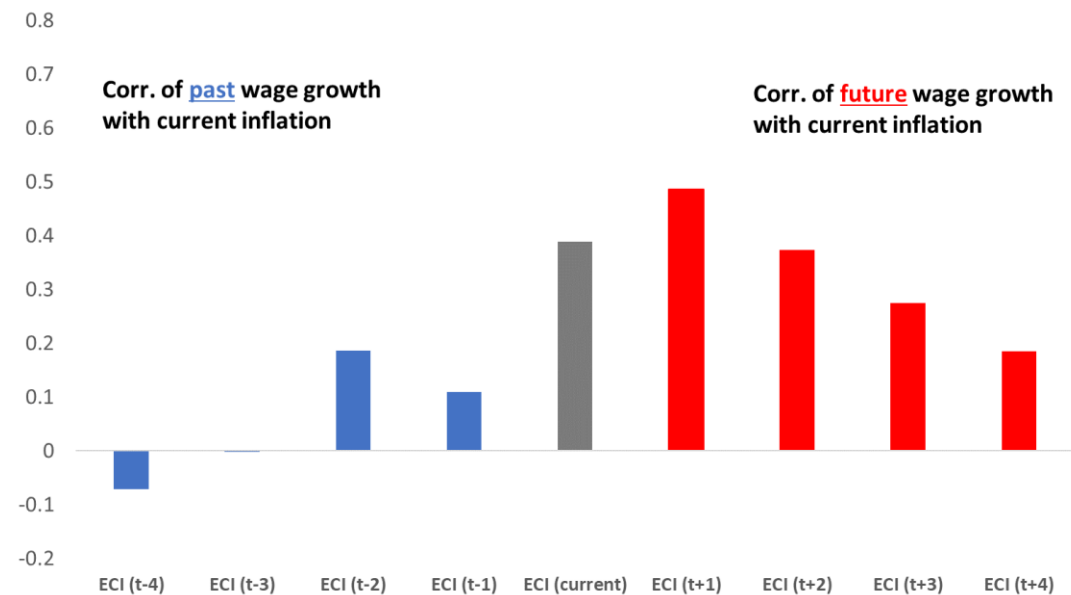
Wage-price spiral, international evidence

Nominal wage growth
(Percentage point differences relative to first quarter in which criteria are fulfilled)

■ Median ■ COVID–19, 2021

(Quarters after episode)

Sources: International Labour Organization; Organisation for Economic Co-operation and Development; US Bureau of Economic Analysis; and IMF staff calculations. · Note: The figure shows developments following episodes in which at least three of the preceding four quarters have (1) accelerating prices/rising price inflation, (2) positive nominal wage growth, (3) falling or constant real wages, and (4) a declining or flat unemployment rate. Twenty-two such episodes are identified within a sample of 30 advanced economies, the earliest going back to 1960. The COVID-19 episode represents an average of countries in the sample for the period starting in 2021:Q4. The shaded area indicates the range from the 10th to the 90th percentile of the outturns in the identified episodes. See World Economic Outlook October 2022 Chapter 2, Online Annex 2.3 for details.

Alvarez, J., Bluedorn, J., Bluedorn, M., Hansen, M., Hansen, N., Huang, Y.,& Sollaci, A. (2022). *Wage-price spirals: What is the historical evidence?*. International Monetary Fund.

Pass-through evidence from the minimum-wage literature

## Table 1 - Estimated Effect of a 10% Increase in the Minimum Wage on Prices across Studies

Study	Data	Method	Price Effect
Economy Wide Effect			
Sellekaerts (1981)	1974 to 1979 US time series data	general equilibrium model	0.20%
Cox and Oaxaca (1981)	1974 to 1978 US industry and macro level data	general equilibrium model	>0.20%
Wilson (1998)	1999-2000 US macro level data	general equilibrium model	0.02%
Gramlich (1976)	1948 to 1975 US time series data	Phillips curve estimation	<0.28%
Falconer (1978)	1938 to 1978 US time series data[1]	Phillips curve estimation	0.33%
Frye and Gordon (1981)	1890 to 1980 US time series data	Phillips curve estimation	0.02pp
Wolf and Nadiri (1981)	1963, 1972 and 1979 US CPS data	input-output model	0.30% to 0.40%
MaCurdy and O'Brien-Strain (1997, 200a and 200b), O'Brien-Strain (1999) and O'Brien-Strain and MaCurdy (2000)	1999 to 2000 US SIPP and CES California data	input-output model	0.30% to 2.16%
Lemos (2004)	1982 to 2000 Brazil CPI, household (PME) and firm (PIM) level data	regression analysis	0.04% to 0.27%
Lemos (2006a)	1982 to 2000 Brazil CPI, household (PME) and firm (PIM) level data	regression analysis	0.80%
Lemos (2006a)	1982 to 2000 Brazil CPI, household (PME) and firm (PIM) level data	regression analysis	3.50%
Gindlin and Lemos (2006)	1987 to 1994 Costa Rica CPI and household (HSEU) level data	regression analysis	no effect

Lemos, Sara. "A Survey of the Effects of the Minimum Wage on Prices." *Journal of Economic Surveys* 22.1 (2008): 187-212.

Pass-through evidence: avg. hourly earnings to CPI

(a) Response of CPI: 1964-2019 Sample
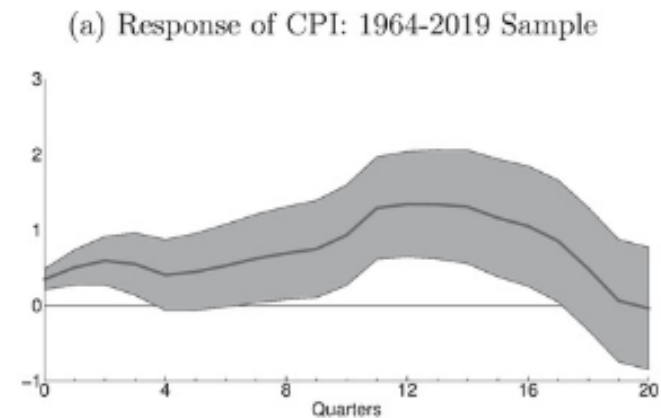
(c) Rolling Window Analysis: Response of CPI at 12 Quarters
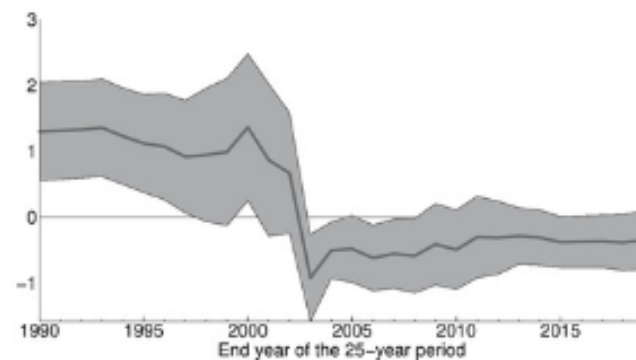
Heise, Sebastian, Fatih Karahan, and Ayşegül Şahin. "The Missing Inflation Puzzle: The Role of the Wage-Price Pass-Through."
Journal of Money, Credit and Banking 54.S1 (2022): 7-51.

Inflation *expectations* plausibly drive wages

Effects on wage inflation of 1% change in variables

Percent
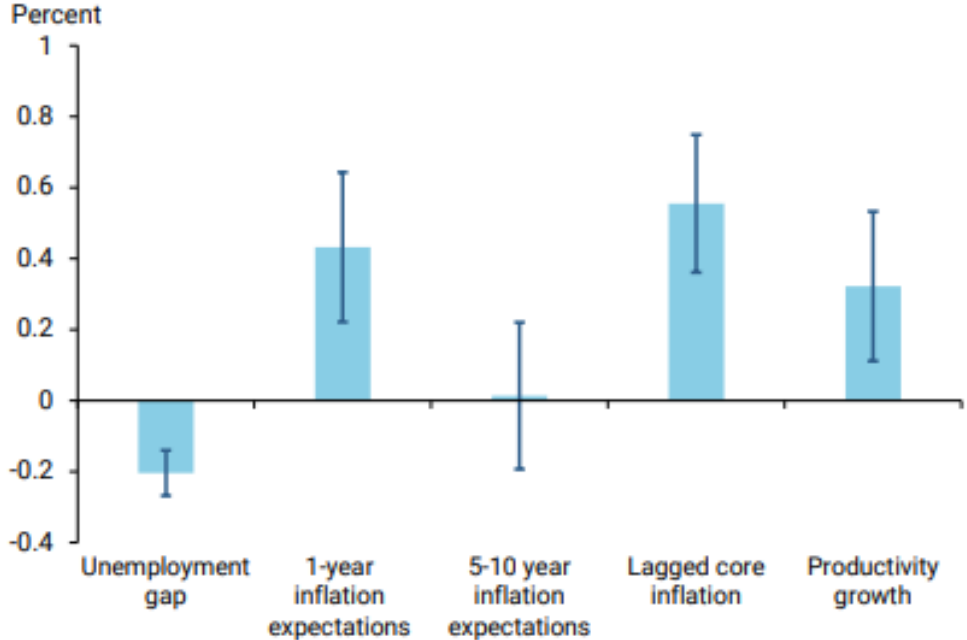
Glick, Reuven, Sylvain Leduc, and Mollie Pepper. "Will Workers Demand Cost-of-Living Adjustments?." FRBSF Economic Letter 21 (2022).

Changing components of wage inflation over time

Percent

- Other
- Inflation expectations
- Headline inflation
- Unemployment gap
- Last period wages
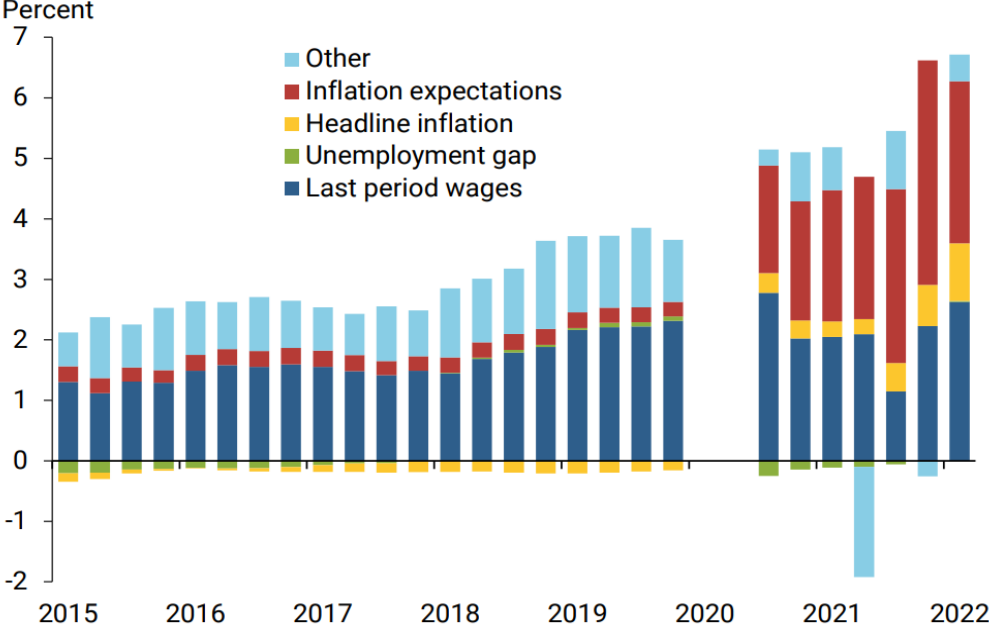
Jordà, Òscar, et al. "Wage Growth When Inflation Is High." FRBSF Economic Letter 25 (2022): 1-6.

Is wage compression likely to be persistent?
or
# Are we entering into a new era of reduced earnings inequality?

Stephanie Aaronson, Board of Governors of The Federal Reserve System

These remarks reflect my own views and not that of the Board of Governors of the Federal Reserve System or its staff

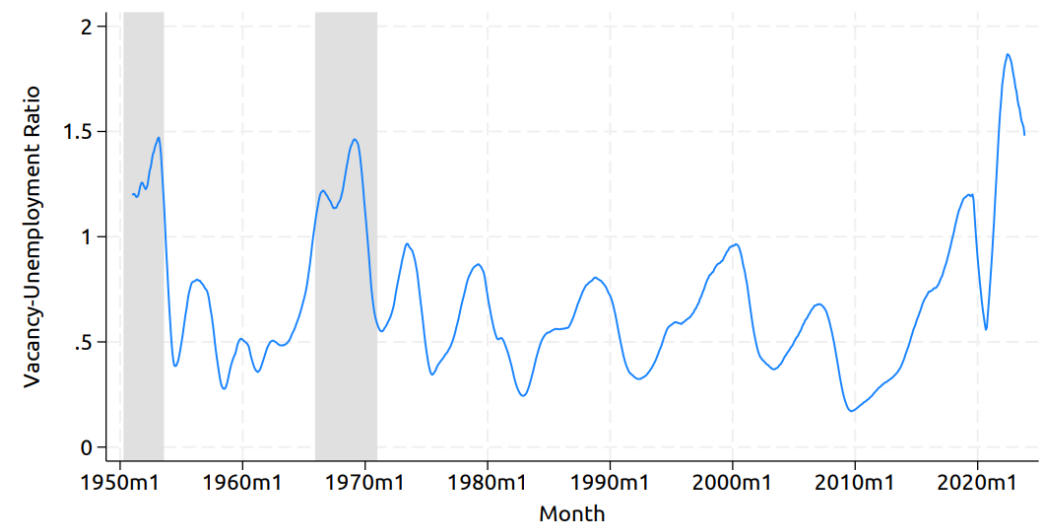I would like to thank Molly Harnish for help on these exhibits

Wage inequality and labor market tightness

Real Full-time Weekly Earnings
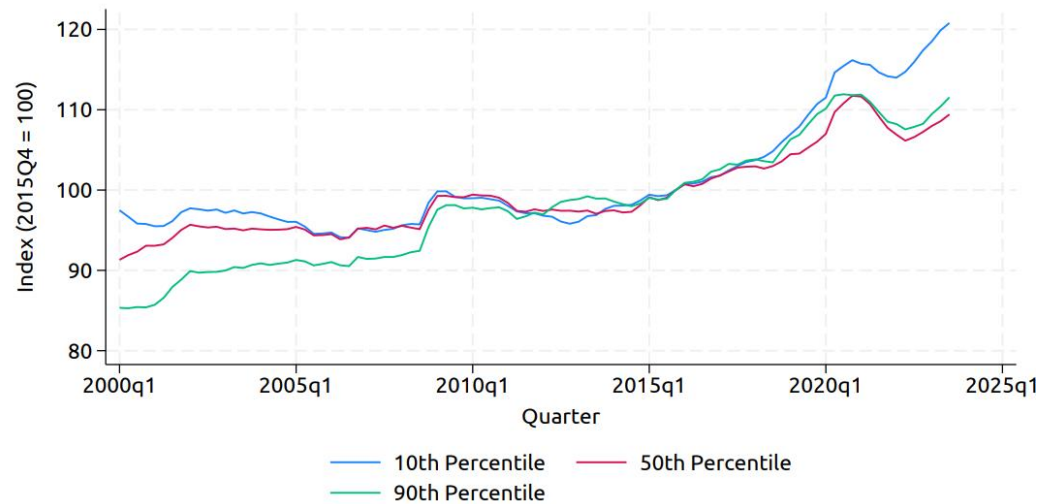
Note: Usual weekly earnings for full time wage and salary workers, in 2017 dollars.
Four-quarter moving average.
Source: Bureau of Labor Statistics via Haver Analytics.

V/U Ratio

Note: 12-month moving average. Overlays Barnichon's historical level of job openings and
BLS published JOLTS job openings. Gray shading indicates the Korean and Vietnam Wars.
Source: Barnichon (2010); Bureau of Labor Statistics.

Wages and the business cycle

Table 2. Gaps by Education Level and Gender, Full Sample, Age 25–64 Years[a]

| Characteristic	Education level	Men Constant	Men Ugap	Women Constant	Women Ugap
Unemployment rate	High school or less	3.350*** (0.106)	0.969*** (0.052)	3.291*** (0.068)	0.560*** (0.038)
	Some college	1.556*** (0.038)	0.583*** (0.019)	1.509*** (0.051)	0.365*** (0.047)
Nonparticipation rate	High school or less	9.848*** (0.231)	0.114 (0.119)	18.469*** (0.324)	0.179 (0.146)
	Some college	3.715*** (0.278)	0.258 (0.168)	5.588*** (0.304)	0.237* (0.139)
Hourly wages	High school or less	53.694*** (1.629)	−0.264 (1.117)	58.512*** (1.279)	−0.535 (0.910)
	Some college	33.728*** (1.386)	−0.213 (0.927)	35.725*** (1.351)	−0.290 (0.893)
Annual own earnings	High school or less	88.480*** (3.290)	2.782** (1.103)	97.156*** (1.847)	2.517*** (0.643)
	Some college	54.065*** (3.036)	2.327** (0.955)	50.452*** (1.802)	2.268*** (0.668)
Household income	High school or less	69.102*** (2.416)	1.597* (0.793)	77.731*** (1.429)	1.817*** (0.557)
	Some college	42.519*** (1.957)	1.229* (0.631)	43.705*** (1.632)	2.029*** (0.567)

Sources: Authors' estimates, using data from the U.S. Census Bureau, the Bureau of Labor Statistics (Current Population Survey), and the Congressional Budget Office (natural rate of unemployment).

a. Robust standard errors are in parentheses; *$p < .10$, **$p < .05$, ***$p < .01$. Sample period is 1976:Q1–2018:Q4 for the unemployment rate and labor force participation rate; 1987–2017 for annual own earnings and household income; and 1979:Q1–2018:Q4, when available, for hourly wages. The unemployment rate and nonparticipation rate gap for each group are defined as the outcome for the group indicated minus the outcome for the reference group. The wage, earnings, and income gaps for each group are defined as the outcome for the reference group minus the outcome for the group indicated. *Ugap* is defined as the aggregate unemployment rate minus the CBO's long-run natural rate of unemployment.
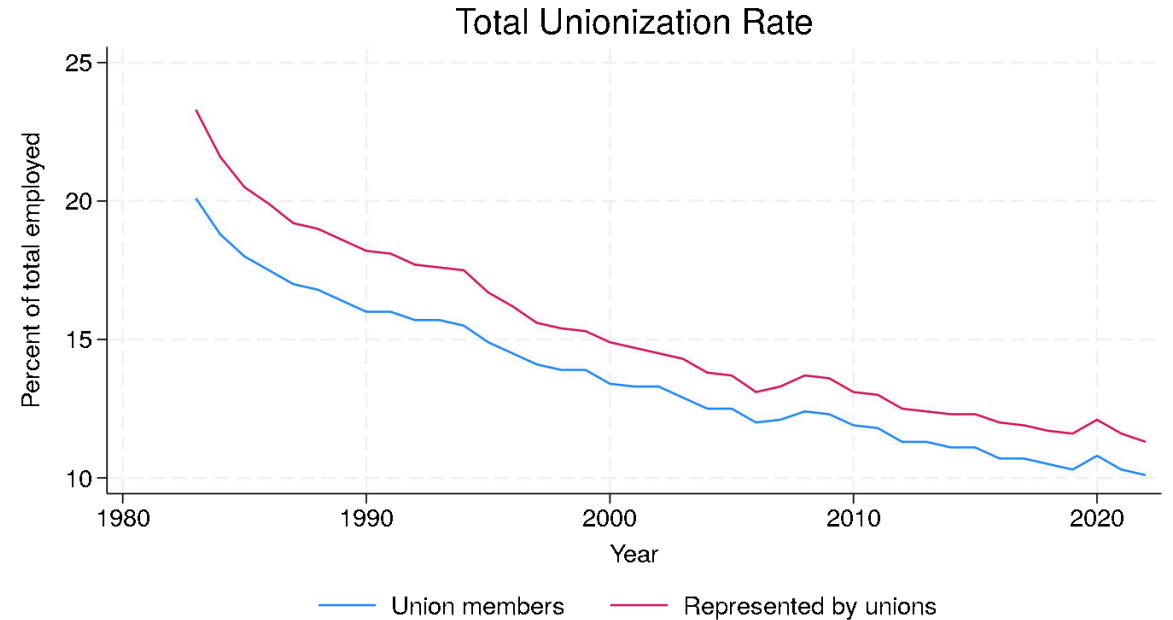
Table originally appeared in: Aaronson, Stephanie, Mary C. Daly, William Wascher, and David W. Wilcox, "Okun revisited: Who benefits most from a strong economy?" *Brookings Papers on Economic Activity,* Spring 2019.

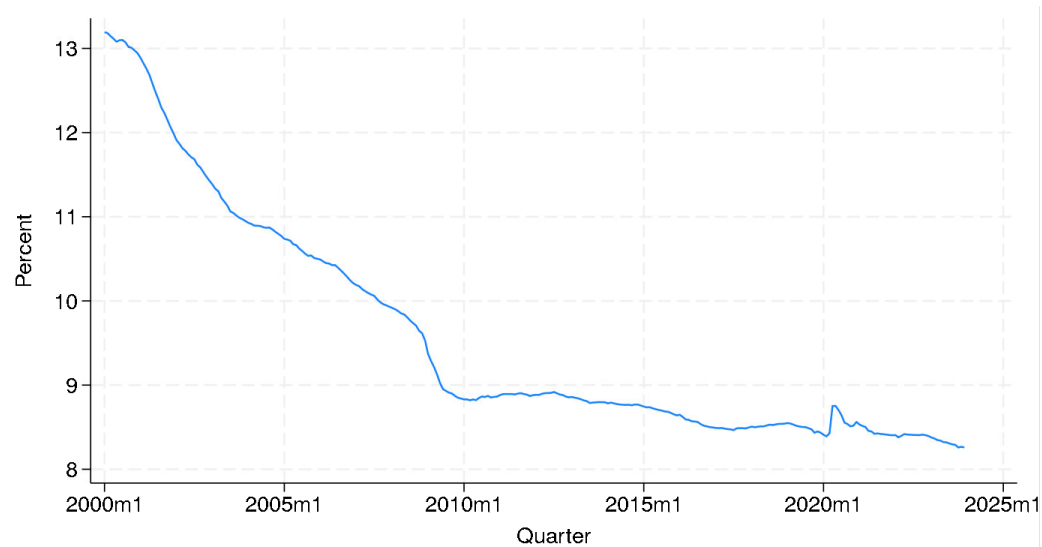# Institutional factors

The Minimum Wage
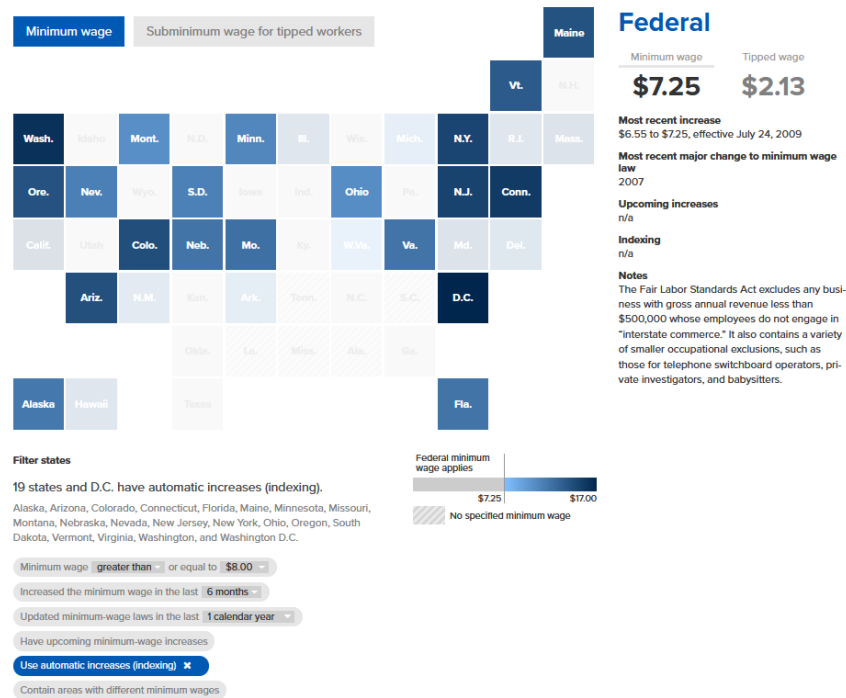
Unionization Rates

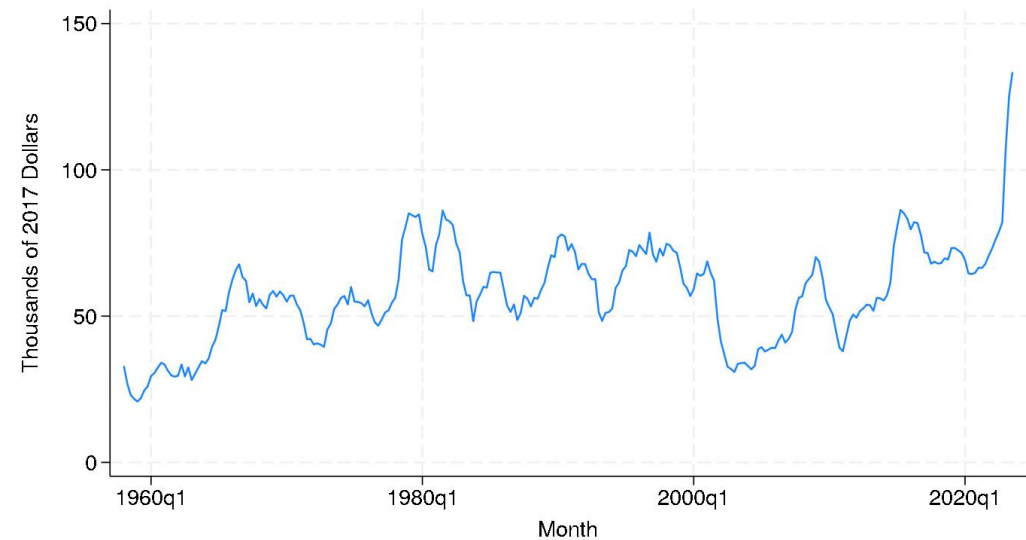Source: Bureau of Labor Statistics via Haver Analytics.

International Trade and Industrial Policy

Manufacturing share of employment

Note: Manufacturing employment as a share of total nonfarm employment.
Source: Bureau of Labor Statistics.

Real private investment in manufacturing

Note: Real private investment: manufacturing.
Source: Census Bureau.
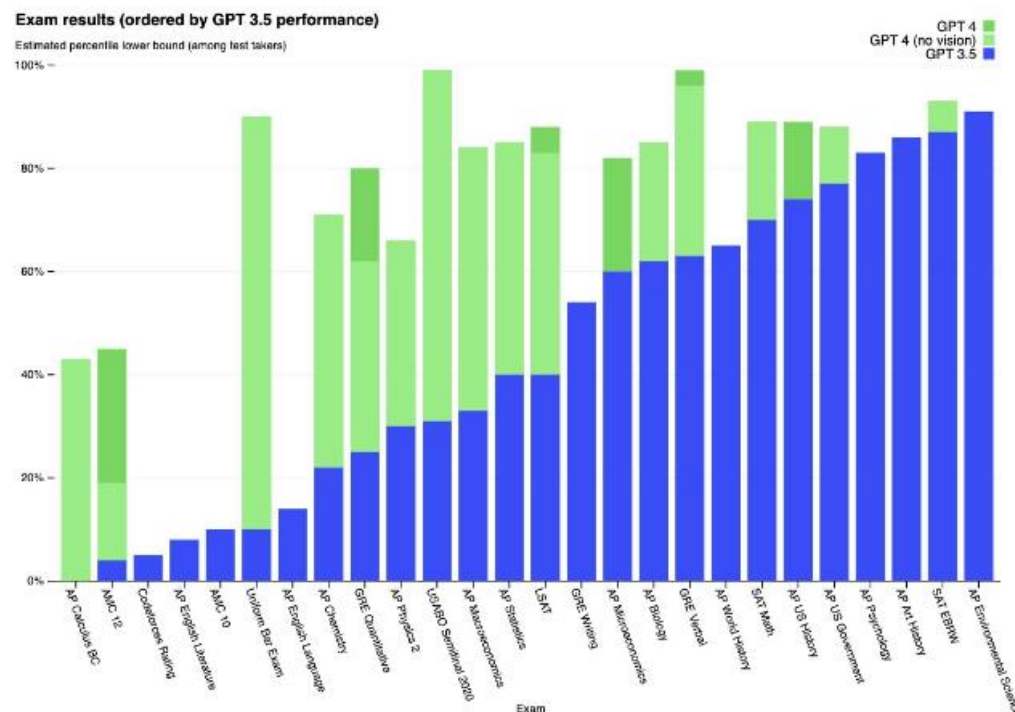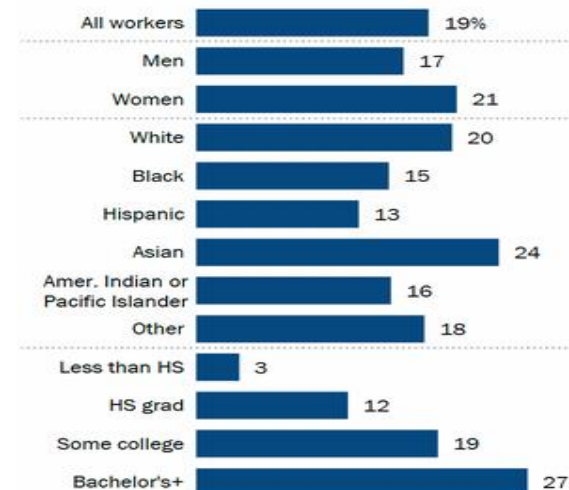
Artificial Intelligence

Figure 1: Taken directly from GPT-4 Technical Report (OpenAI, 2023b). To get a sense of how quickly model capabilities are progressing – consider the jump in exam performance between GPT-3.5 and GPT-4 (OpenAI, 2023b).

Eloundou, Manning, Mishkin, and Rock, "GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models"

On Recent U.S. Wage Developments

Steven J. Davis

Senior Fellow, Hoover Institution
https://stevenjdavis.com

Hutchins Center Conference on the Recent Evolution of Labor Markets

Brookings Institution
18 January 2024

U.S. Real Wage Behavior and the CPI, January 2019 to September 2023

Legend:
- Real ECI: compensation, private industry workers (deflated by CPI)
- CPI-U: All Items
- Real ATL Fed Wage Growth Tracker (deflated by CPI)

2021 Q1 = 100
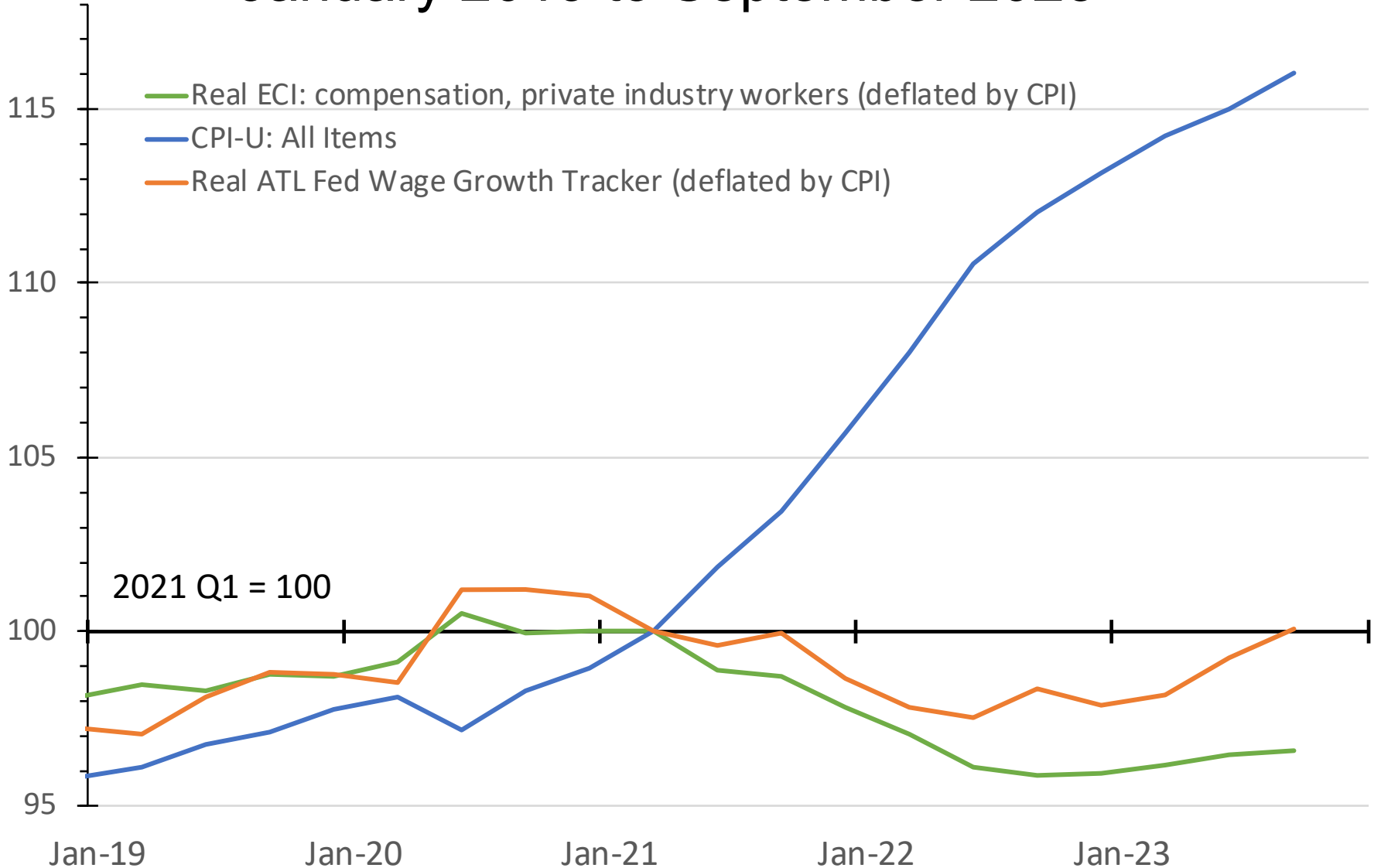
Sources: Bureau of Labor Statistics, Atlanta Fed, and authors' calculations.

Recent U.S. Episodes with Falling Real Wages

A. Using the Atlanta Fed Wage Tracker, Deflated by the CPI-U

Economic Episode	Percentage Real Wage Change		Unemployment Rate, Percent		Ratio of Vacancies to Unemployed Persons		Mean Vacancy Duration, Days	
	Annualized	Cumulative	Episode Average	Prior 12 Months	Episode Average	Prior 12 Months	Episode Average	Prior 12 Months
August 2007 to September 2008	-1.9	-1.7	5.1	4.5	0.56	0.68	22.4	22.9
August 2009 to December 2009	-2.8	-1.2	9.8	7.9	0.16	0.25	16.1	18.3
August 2010 to February 2012	-1.6	-2.6	9.0	9.8	0.24	0.18	20.4	17.2
April 2021 to October 2022	**-2.2**	**-4.5**	**4.6**	**7.8**	**1.50**	**0.66**	**42.2**	**27.7**

B. Using the Employer Cost Index of Total Compensation for Private Sector Workers, Deflated by the CPI-U

Economic Episode	Percentage Real Wage Change		Unemployment Rate, Percent		Ratio of Vacancies to Unemployed Persons		Mean Vacancy Duration, Days	
	Annualized	Cumulative	Episode Average	Prior 4 Quarters	Episode Average	Prior 4 Quarters	Episode Average	Prior 4 Quarters
Q4 2007 to Q3 2008	-2.3	-2.3	5.3	4.5	0.50	0.69	22.1	22.8
Q2 2009 to Q4 2009	-1.5	-1.2	9.6	8.5	0.17	0.21	16.4	17.6
Q4 2010 to Q1 2012	-1.0	-1.5	8.9	9.7	0.26	0.18	20.6	17.8
Q1 2021 to Q4 2022	**-2.8**	**-4.1**	**4.4**	**8.7**	**1.62**	**0.56**	**43.8**	**28.5**

Source: "The Shift to Remote Work Lessens Wage-Growth Pressures" by Barrero, Bloom, Davis, Meyer and Mihaylov, NBER WP 30197. Revision in progress.