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Extraordinary Labor Market Developments and the 2022-23 Disinflation*

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Abstract

Two extraordinary U.S. labor market developments facilitated the sharp disinflation in 2022-23 without raising the unemployment rate. First, pandemic-driven infection worries and social distancing intentions caused a sizable drag on labor force participation that began to reverse in the first quarter of 2022, and perhaps earlier. As the reversal unfolded, it raised labor supply and reduced wage growth. Second, the pandemic-instigated shift to work from home (WFH) raised the amenity value of employment in many jobs and for many workers. This development lowered wage-growth pressures along the transition path to a new equilibrium with pay packages that recognized higher remote work levels and their benefits to workers. Surveys of business executives imply that the shift to WFH lowered average wage growth by two percentage points from spring 2021 to spring 2023. A direct inspection finds that average real wage growth from 2021 Q1 to 2024 Q1 in the U.S. economy was at least 3.5 to 4.4 ppts below the path suggested by pre-pandemic experience. This large shortfall in real wage growth aligns well with the interpretation of the 2022-23 disinflation offered here.

JEL Codes: E31, E50, J31

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Yuriy Gorodnichenko (2024) makes some important observations about the recent disinflation in Europe and the United States. Three of his observations set the stage for my remarks:

1. Disinflation was surprisingly rapid. As measured by the one-year change in the U.S. Consumer Price Index, for example, the inflation rate fell nearly six percentage points from June 2022 to June 2023 and by 5.3 ppts from July 2022 to December 2023.[1]
2. This disinflation episode looks nothing like a movement along a Phillips Curve. Instead, the inflation rate fell sharply with essentially no change in the unemployment rate.
3. It's implausible to credit the recent disinflation mainly to monetary policy, because inflation fell too early relative to the timing of policy tightening.

The recent tightening cycle began with a modest 25 basis point hike in the target Fed Funds rate in March 2022. Six more hikes from May to December brought a cumulative policy rate hike of 425bp, mostly in the second half of 2022.[2] Since monetary policy typically operates with "long and variable lags," it's hard to see how the recent tightening explains the abrupt fall in inflation.[3]

These observations call for explanation. In this regard, Yuriy highlights the role of energy and commodity market developments, which played an important role in Europe but a more modest one in the United States. The unwinding of pandemic-related disruptions in global supply chains also contributed to the recent disinflation. See, Comin et al. (2023), for example.

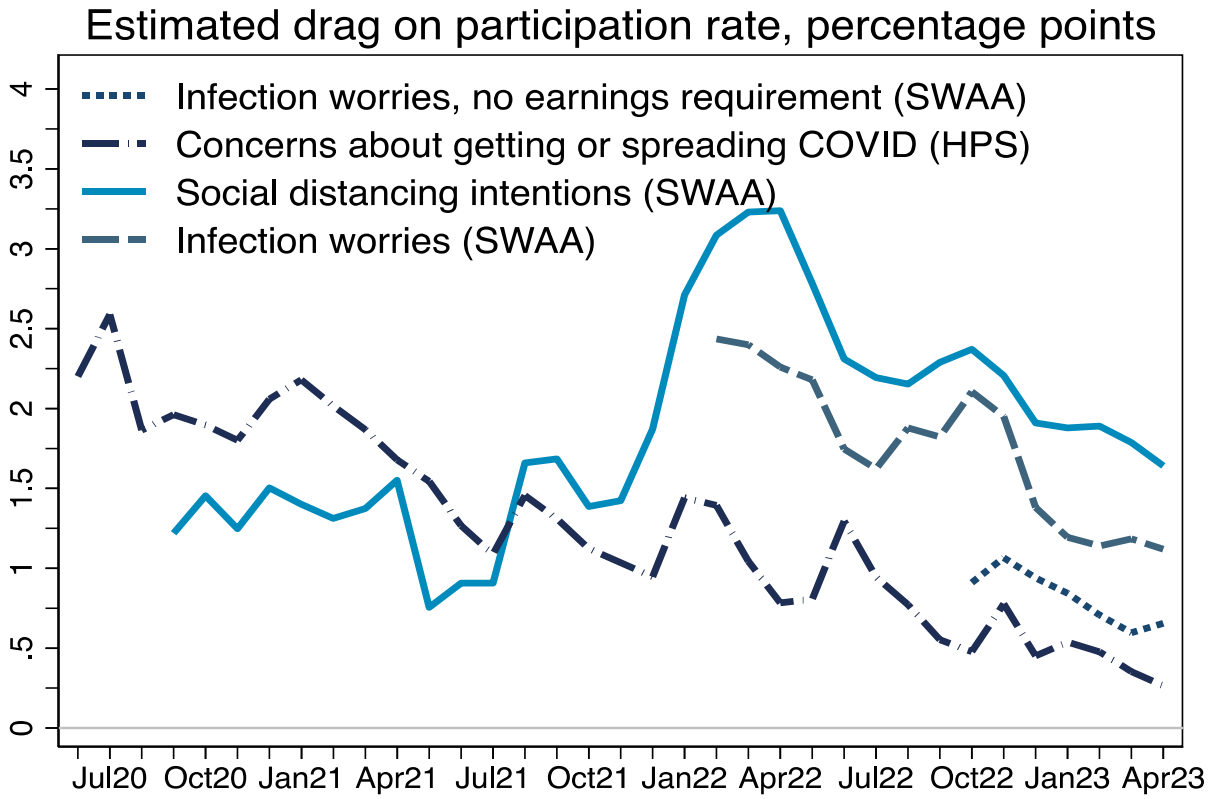
I will advance a different and complementary explanation for the recent disinflation that centers on two extraordinary labor market developments associated with the pandemic and its aftermath. The first is the sizable labor force withdrawal in 2020 and 2021, driven by infection worries and social distancing, followed by recovery in participation rates as infection worries and social distancing receded. The second development is the big and lasting shift to work from home.[4] I focus on the United States, for which I can offer better evidence. The second extraordinary development – and perhaps the first as well – is more pronounced in the United States than in Europe with the possible exception of the United Kingdom.

1. Labor Force Withdrawal and Return

Figure 1 presents several estimates for the effects of infection worries and social distancing behaviors on the U.S. labor force participation rate from June 2020 to April 2023. There are four distinct time series, each of which reflects a different estimation method or data source, as sketched below. The interested reader can consult Barrero, Bloom and Davis (2023b) for details.

[1] These statistics reflect the CPIAUCSL_PC1 series on FRED at https://fred.stlouisfed.org (accessed 4 June 2024).
[2] See the Fed's description of the "FOMC's target federal funds rate or change" at https://www.federalreserve.gov/monetarypolicy/openmarket.htm (accessed 4 June 2024).
[3] See "What Are Long and Variable Lags in Monetary Policy?" Federal Reserve Bank of St. Louis, 12 October 2023 at https://www.stlouisfed.org/on-the-economy/2023/oct/what-are-long-variable-lags-monetary-policy (accessed 4 June 2024). The concept of long and variable lags appears to have originated with Friedman (1960).
[4] See, for example, Barrero et al. (2021) and Aksoy et al. (2023).

Figure 1. Estimated Labor Force Drag from Social Distancing and Infection Worries, June 2020 to April 2023



Notes: Reproduced from Figure 5 in Barrero, Bloom and Davis (2023b), based on their analysis of micro data from the monthly Survey of Working Arrangements and Attitudes (SWAA) and the Census Bureau's monthly Household Pulse Survey (HPS).

The solid blue line reflects a regression model that relates individual-level labor force status as of the survey reference week to the individual's stated social-distancing intentions in the Survey of Working Arrangements and Attitudes (SWAA). Specifically, we combine the fitted regression model with a scenario that "turns off" voluntary social distancing to obtain the solid blue line. The peak implied negative effect of social distancing on labor force participation was about three percentage points. The identifying assumption here is that stated social-distancing intentions are exogenous, conditional on the other covariates in the regression model.

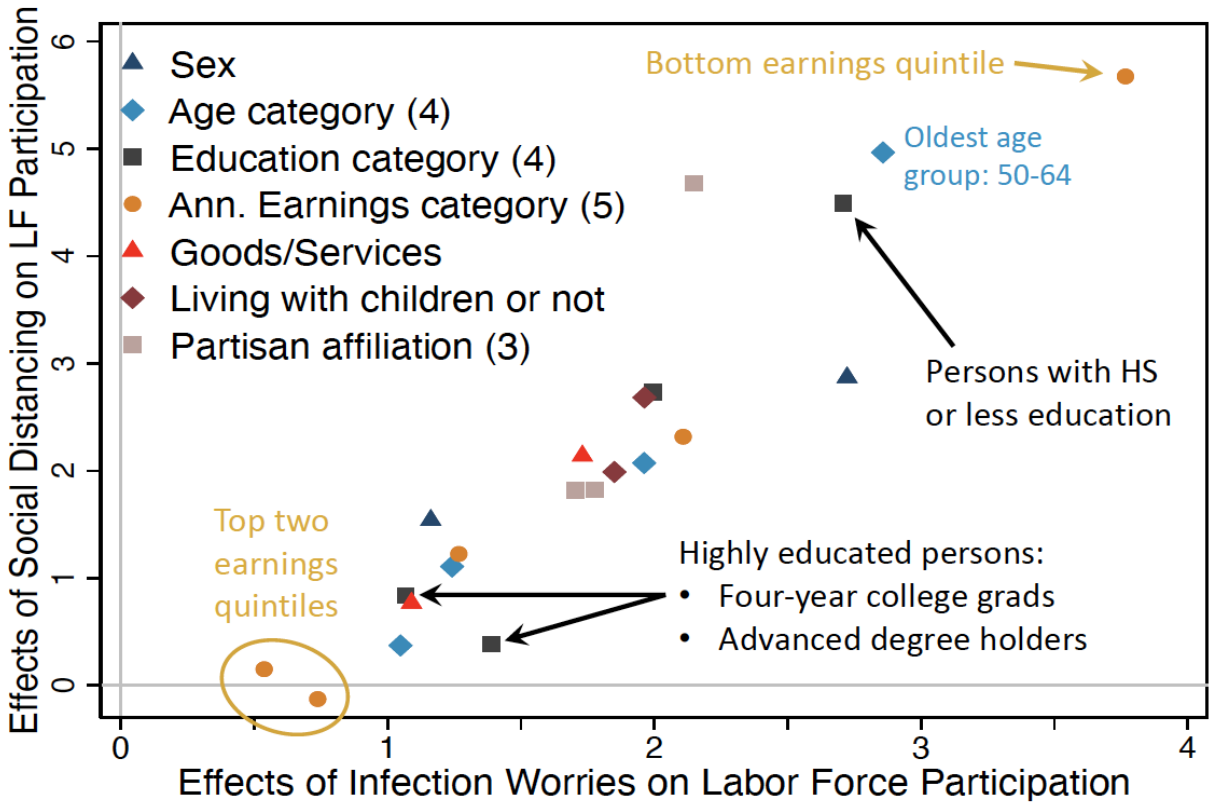
The other three curves in Figure 1 rely on an entirely different approach. Specifically, when the respondent is outside the labor force during the survey reference week, we ask why. We then count respondents who attribute their non-participation status to infection worries and express the count as a percentage of the relevant population. Thus, this second approach relies on self-assessed causal explanations of own labor force status. Here, the identification assumption is that the survey questions elicit accurate explanations for own behavior. We implemented this second approach using three question designs fielded across two independent surveys – one that we run, and one that the U.S. Census Bureau runs.

The four series in Figure 1 differ in the estimated drag on labor force participation. However, all four series suggest a material drag on participation rates. In addition, the various

estimates point to a reversal of the labor force drag since the first quarter of 2022 or earlier. That reversal raised labor supply and put downward pressure on wages.

Figure 2 presents estimates of the labor force drag associated with social distancing and infection worries by demographic group as of 2022. The estimates plotted on the vertical scale reflect the regression approach, while the ones on the horizontal scale reflect self-assessed causal effects. While the two approaches yield different level estimates for the labor force drag, as in Figure 1, the between-group patterns are – reassuringly – quite similar.

Figure 2. Labor Force Drag Estimates by Group, February 2022 to January 2023



Note: Reproduced from Figure A.5 in Barrero, Bloom and Davis (2023b).

According to Figure 2, the labor force withdrawal associated with social distancing and infection worries is very much concentrated in the lower parts of the earnings distribution, among the least educated, and among persons 50-64 years of age. For people in the top two earnings quintiles, the estimated drag on labor force participation is essentially zero according to the regression approach and modest (half to three-quarters of a percentage point) according to self-assessed causal effects.

2. The Effects on Wages and Inflationary Pressures

Thus far, I have shown evidence that pandemic-driven infection worries and social distancing intentions caused a sizable drag on labor force participation that began to reverse in the first quarter of 2022, and perhaps earlier. Barrero et al. (2023b) do not assess the effects of this labor force withdrawal and return on overall wage growth. Instead, they feed their estimates

for the labor supply effects of social-distancing intentions into a competitive equilibrium model with a stable production technology. In this way, they use the model to quantify the effects of social distancing on the education and experience structure of relative wages. They draw on previous research to set parameter values for the elasticity of substitution between college and non-college workers and across age-experience groups within the education categories.

Figure 3 displays the resulting model-implied estimates of how social-distancing effects on labor supply affected the wage structure in 2022 relative to a counterfactual with no social distancing. The wage effects are sizable, especially for non-college workers, and they rise with age. As Barrero et al. (2023b) discuss, these patterns align well with the observation that older and less-educated workers had stronger health-related reasons to engage in social-distancing behaviors. Less-educated workers also had fewer options to continue working while engaging in social distancing behaviors.

For the argument in this essay, Figure 1 to 3 yield the following messages. First, social distancing added to wage-growth pressures in the wake of the pandemic, especially in the lower rungs of the earnings distribution and for jobs filled by less educated workers. Second, the reversal of this process restrained wage growth in 2022 and 2023. Again, these effects were concentrated among those with less education and lower pay. Third, the timing of the reversal was fortuitous for the Fed, as it roughly coincided with its efforts to cut the inflation rate.

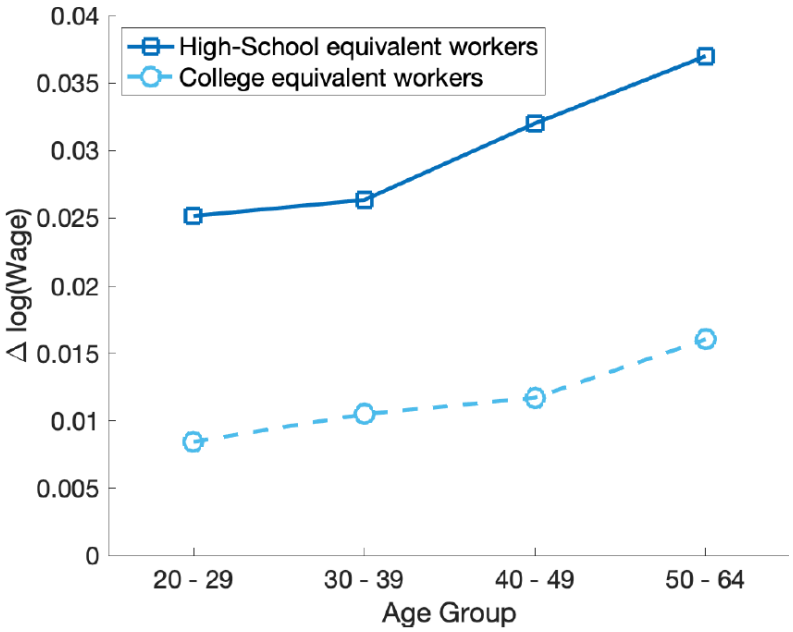
3. The Big Shift to Work from Home

The COVID-19 pandemic instigated a big, lasting shift in working arrangements. Figure 4 quantifies this shift in terms of full paid workdays performed at home. As the figure indicates, the work-from-home rate as of early 2024 is about four times the rate that prevailed in 2024. This big shift in how we work has had surprisingly benign (or even positive) effects on productivity. That's a major reason the shift has endured. See Barrero, Bloom and Davis (2023a) for a review of evidence on the productivity effects of the shift to work from home (WFH). My remarks here will focus on the amenity-value gains associated with the shift to WFH and the implications for wages and inflation.

Most workers like to work from home at least part of the workweek, because doing so saves on the money and time costs of commuting (about 65 minutes per day, on average, for American workers), improves flexibility in time use over the workday and workweek, increases personal autonomy, and relaxes residential location choices. For some people, WFH also complements care-giving activities at, or near, home such as caring for an ailing parent or partner.

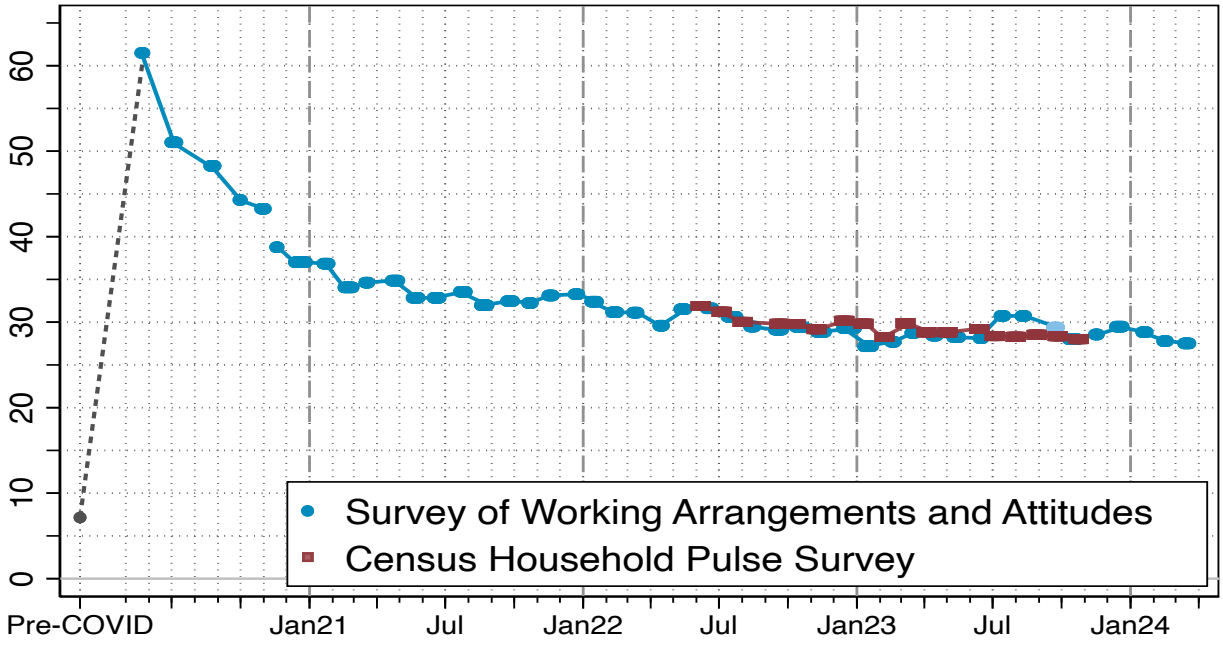
When asked directly via surveys, as in Barrero, Bloom and Davis (2021), most American workers prefer to WFH part of the week. The mean stated value of the option to WFH two or three days a week is about 8% of pay in the SWAA. That's large, and it's consistent with evidence from field experiments for particular groups of workers. However, it's also important to recognize that preferences over working arrangements differ widely in the cross section. Some people dislike WFH and require extra compensation to willingly do so. Others are nearly indifferent between WFH and working at the employer's site. The rest, a majority, differ widely in their willingness to pay for the opportunity to WFH part of the week. For present purposes, the key point is that some WFH is a valued job amenity for most American workers. It follows that the big shift to WFH raised the amenity value of employment in many jobs for many workers.

Figure 3. Estimated Social-Distancing Effects on the Wage Structure as of 2022



Notes: Reproduced from Figure 6 in Barrero, Bloom and Davis (2023b). They combine the estimated labor supply effects of social distancing intentions by age-education group with the competitive equilibrium model of Card and Lemieux (2001) to obtain the estimated social-distancing effects on the wage structure displayed in this figure.

Figure 4. Work from Home over Time in the United States, 2019 to March 2024



Notes: Samples restricted to working persons, 20-64, with annualized earnings > $10K. The "Pre-COVID" percentage relies on data from the 2019 American Time Use Survey. Monthly updates of this chart are available at www.WFHresearch.com.

4. Reduced Wage-Growth Pressures on the Transition Path[5]

Economic reasoning implies that employers and workers ultimately share the amenity-value gains associated with the big shift to WFH. Since workers initially reaped the direct benefits of the shift at pre-determined wages – i.e., wages set before the pandemic struck – employer benefits take the form of slower wage growth along the transition path to a new equilibrium with pay packages that recognize higher remote work levels.

Barrero et al. (2022) develop survey evidence to assess this mechanism and quantify its force. To do so, they put questions to hundreds of U.S. business executives in the Survey of Business Uncertainty, fielded by the Federal Reserve Bank of Atlanta. About four-in-ten executives said their firms relied on expanded WFH to moderate wage-growth pressures when looking back 12 months from April/May 2022. A similar share of executives said (as of April/May 2022) that their firms expected to rely on WFH to moderate wage growth over the next 12 months. When executives said that expanded WFH opportunities moderated wage growth (or would so so) at their firm, the survey asked how much. Integrating over all firm-level responses, and weighting each firm in proportion to its employment level, Barrero et al. find that the big shift to WFH reduced overall wage growth by about two percentage points over two years centered on April/May 2022.

The shift to remote work affects labor costs in other ways as well. Barrero et al. (2022) present evidence that increased reliance on remote work at the firm level is associated with more use of independent contractors, leased employees, domestic outsourcing, and foreign offshoring. These developments are also likely to reduce labor costs. In addition, fully remote employees do not require office space and the overhead costs that come with a physical footprint. To a lesser extent, hybrid working arrangements also let firms economize on space.

These employer cost savings need not come at the expense of their employees. WFH yields benefits that most workers appreciate and that some value greatly. Moreover, the relaxation of locational constraints afforded by WFH can simultaneously raise real worker wages and lower real product wages. To see this point, consider an employee who accepts a ten percent nominal wage cut in exchange for performing his job remotely and re-locating to another city with living costs that are twenty percent lower. In this example, the employee's real wage rises by about ten percent and the employer's real cost of securing his labor services falls by ten percent. Both employer and employee benefit.

5. Sluggish Real Wage Growth Since Early 2021

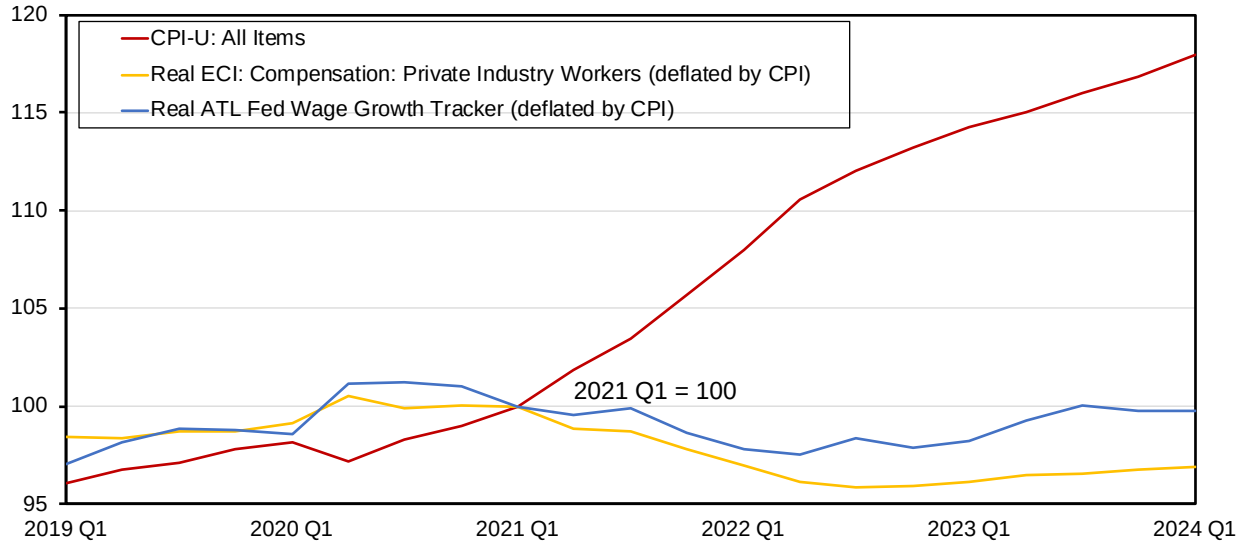
To summarize, two extraordinary labor market developments exerted unusual restraints on wage growth (and other labor-related costs) in recent years. First, a rebound in the labor force participation rate raised labor supply and restrained wage growth starting in the first quarter of 2022, and perhaps earlier. Second, the big shift to WFH lowered average wage growth by two percentage points from spring 2021 to spring 2023. The shift to WFH likely exerted downward pressure on wage growth outside of this time interval as well, given that wage adjustments take time. Even with flexible wages, search and matching frictions in the labor market imply that it takes time for people who value WFH to sort into jobs that offer the amenity. That, too, slows the aggregate wage adjustment process, as in the analysis of Bagga et al. (2023).

[5] This section is largely drawn from Davis (2024).

If this line of argument is correct, we should see unusually slow growth in aggregate real wages from the first quarter of 2021 through at least the middle of 2023. We should also see persistent shifts in the structure of real wages, with greater wage-growth restraint in sectors that offer more scope for remote work. I now take up these two matters in turn.

Figure 5 plots the U.S. Consumer Price Index and two real wage measures from 2019 Q1 through 2024 Q1. All series are normalized to a value of 100 in 2021 Q1. I use the Employment Cost Index (ECI) and the Atlanta Fed Wage Growth Tracker to measure average wages. The ECI aims to control for changes in the mix of jobs over time, and the Wage Tracker aims to control for changes in the mix of workers. Other leading wage indexes do not control for compositional shifts, which makes them less suitable for my purposes.[6]

Figure 5. U.S. Real Wage Behavior and the CPI, 2019 Q1 to 2024 Q1



Source: Bureau of Labor Statistics, Atlanta Fed, and author's calculations.

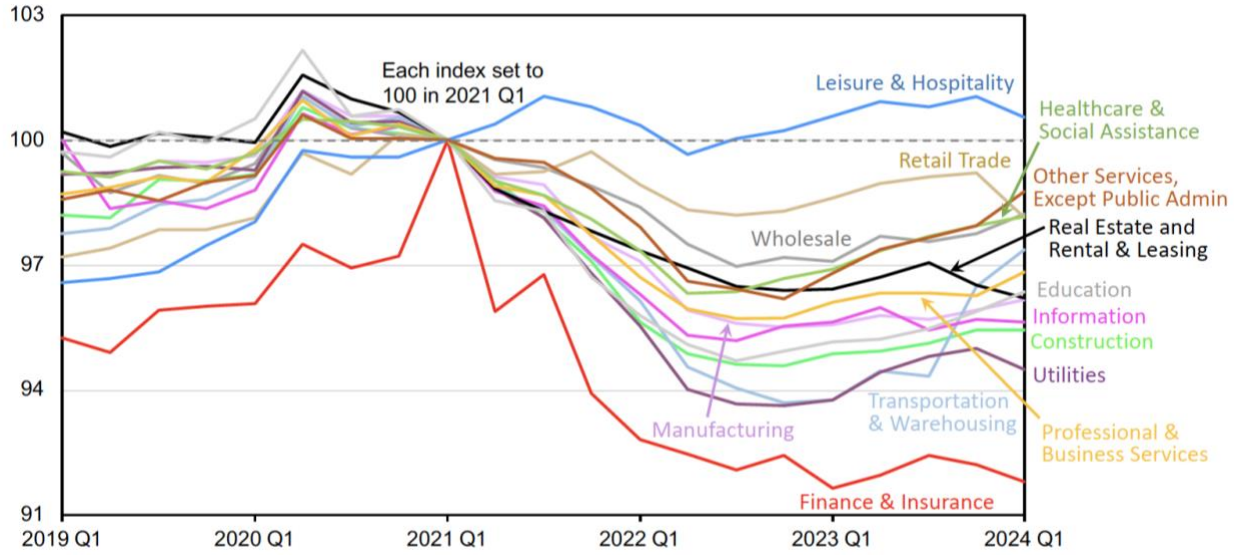
The deflated Wage Tracker series fell 0.2 ppts from 2021 Q1 through 2024 Q4, and the deflated ECI fell 3.3 ppts. Just how unusual is this real wage behavior? As a point of reference, consider the period from 2006 to 2019. The deflated ECI rose by an average of 0.4 ppts per year over this period, and the deflated Wage Tracker rose by 1.1 ppts per year. Both real wage measures moved in a procyclical manner during this period. In light of this history, and taking note of the very tight U.S. labor markets since 2021, it's reasonable to expect cumulative real wage growth from 2021 Q1 to 2024 Q1 of at least 1.3 ppts according to the deflated ECI and 3.3 ppts according to the deflated Wage Tracker. We saw nothing like that. Indeed, average real wages are down 3.5 to 4.4 ppts in the period from 2021Q1 to 2024Q1 relative to what's expected from history. That's a huge shortfall in real wage growth, and it aligns with my interpretation of the recent disinflation.[7]

[6] Initially, the pandemic greatly reduced the share of low-wage jobs and low-wage workers. Later, as the economy rebounded from the pandemic shock and labor force participation recovered, the share of low-wage jobs and low-wage workers returned to more normal levels. I am interested in the behavior of average real wages net of these compositional shifts, which is why I turn to the ECI and the Wage Tracker.

[7] Other economists have also taken note of slow real wage growth in recent years. See Bernanke and Blanchard (2023), for example.

Figure 6 displays the deflated ECI by major industry sector at a quarterly frequency from 2019 Q1 to 2024 Q1. As before, each series is indexed to 100 in 2021 Q1. Industry-level wage-growth differences over this period are broadly in line with the amenity-value interpretation of sluggish real wage growth sketched above.[8] The Leisure & Hospitality sector exhibits the strongest wage growth from 2021 Q1 to 2024 Q1. There are few WFH opportunities in this sector and, hence, little scope for amenity-value gains to restrain wage growth. Retail Trade, Healthcare & Social Assistance, and Other Services also show relatively strong wage growth since 2021 Q1. These sectors also offer limited scope to work from home. At the bottom of the ECI wage-growth distribution is Finance & Insurance, with a drop of more than eight percent from 2021 Q1 to 2024 Q1. This sector has among the highest WFH rates in the economy and much scope for amenity-value gains to restrain wage growth. However, two other sectors with high WFH rates – Information and Professional & Business Services – had wage growth from 2021 Q1 to 2024 Q1 that place them near the middle of the ECI wage-growth distribution. And the Construction sector, which offers limited WFH opportunities, experienced relatively slow wage growth from 2021 Q1 to 2024 Q1. Clearly, the amenity-value story does not fully explain the distribution of industry-level wage changes since early 2021.

Figure 6. ECI By Industry, Deflated by the CPI, 2019 Q1 through to 2024 Q1



Source: Bureau of Labor Statistics and author's calculations.

6. Concluding Remarks

This essay presents evidence that two extraordinary labor market developments exerted unusual restraints on wage growth (and other labor-related costs) in recent years. First, a rebound in the labor force participation rate raised labor supply and restrained wage growth starting in the first quarter of 2022, and perhaps earlier. Second, the big shift to WFH lowered average wage growth by two percentage points from spring 2021 to spring 2023, and it likely exerted downward pressure on wage growth outside of this time interval as well.

[8] That's also true in the industry breakdown of data from the Survey of Business Uncertainty that I discussed in Section 4 above. See Barrero et al. (2022). However, the SBU data support only coarse industry breakdowns.

These developments came at a fortuitous time for the Fed, as it sought to bring inflation back to acceptable levels with a series of policy rate hikes that began in March 2022. By exerting downward pressure on wages and other labor-related costs, these developments eased the way for a sharp reduction in inflation with no rise in unemployment – even before the effects of monetary policy tightening added to the disinflationary pressures.

My interpretation of the recent disinflation implies a period of unusually sluggish real wage growth as these labor market developments played out. In this respect, I show that average real wages were down 3.5 to 4.4 ppts in the period from 2021Q1 to 2024Q1 relative to what's expected from history. That's a huge shortfall in real wage growth, and an unusual one from a historic perspective.

Some economists attribute this shortfall in real wage growth to the surprise nature of the inflation surge that began in 2021 and continued through mid 2022. Because nominal wages adjust slowly, real wages initially fell in the wake of the inflation surge but will catch up over time according to this story. No doubt, the surprise nature of the inflation surge played a role in short-run real wage dynamics. As the main explanation for the real wage shortfall since early 2021, however, this story looks increasingly untenable. It has now been nearly two years since the inflation surge began to reverse. Yet, as Figure 5 shows, we have yet to see any signs of a real-wage catchup effect.

If the alternative story is correct, we can expect unusually strong real wage growth in the near future as wages finally catch up with the surprise inflation. That will raise labor costs relative to productivity, creating inflationary pressures. In contrast, my interpretation carries no implication of unusually strong real wage growth in the near future. Instead, it says we can expect real wage behavior to resume pre-pandemic patterns once (a) social distancing no longer depresses labor force participation and (b) compensation fully adjusts to higher WFH levels. Social distancing is a largely spent force and will remain so, barring another pandemic-like shock. The wage-moderation effects of the shift to WFH have mostly played out by now, in my judgement. Thus, I anticipate that, going forward, real wage growth will return to its usual relationship with productivity growth and labor market tightness.

That said, the shift to WFH set in motion two longer term forces that may restrain labor costs (relative to productivity) for several years to come. First, it initiated a partial untethering of worker residential locations from employer worksite locations (Akan et al., 2024). This process operates mainly on the new hires margin and will continue for many years as company-level workforces gradually turn over. For employers in high-cost locations, including most dense urban areas, this untethering process facilitates the sourcing of labor from places with lower living costs and lower wages. Second, the shift to WFH brings opens up new employment possibilities for persons with physical impairments, those with cognitive and psychological conditions that deter face-to-face encounters, persons who live in remote and job-scarce areas, dual-career couples facing joint-location constraints, and those with care-giving responsibilities at or near home. It remains to be seen whether, and how much, these opportunities for new and better employment options will be realized. There is potential for an expansion in labor supply that moderates wage-growth pressures over several years or more.

References

Aksoy, Cevat Giray, Jose Maria Barrero, Nicholas Bloom, Steven J. Davis, Mathias Dolls and Pablo Zarate, 2022. "Working from Home Around the World," *Brookings Papers on Economic Activity,* Fall.

Bagga, Sadhika, Lukas Mann, Ayşegül Şahin and Giovanni L. Violante, 2023. "Job Amenity Shocks and Labor Reallocation," working paper, 23 November.

Barrero, Jose Maria, Nicholas Bloom and Steven J. Davis, 2021. "Why Working from Home Will Stick," National Bureau of Economic Research Working Paper 28731.

Barrero, Jose Maria, Nicholas Bloom and Steven J. Davis, 2023a. "The Evolution of Work from Home," *Journal of Economic Perspectives*, Vol. 37 (4), Fall 2023, 23-50.

Barrero, Jose Maria, Nick Bloom and Steven J. Davis, 2023b. "Long Social Distancing," *Journal of Labor Economics,* 41, S1 (October), 129-172.

Barrero, Jose Maria, Nicholas Bloom, Steven J. Davis, Brent Meyer, and Emil Mihaylov, 2022. "The Shift to Remote Work Lessens Wage-Growth Pressures," NBER WP 30197.

Bernanke, Ben and Olivier Blanchard, 2023. "What Caused the US Pandemic-Era Inflation?" NBER Working Paper 31417.

Card, David and Thomas Lemieux, 2001. "Can Falling labor Supply Explain the Rising Return to College of Younger Men? A Cohort-Based Analysis," *Quarterly Journal of Economics,* 116, no. 2 (May), 705-746.

Comin, Diego A., Robert C. Johnson and Callum J. Jones, 2023. "Supply Chain Constraints and Inflation," NBER Working Paper 31179.

Davis, Steven J., 2024. "The Big Shift in Working Arrangements: Eight Ways Unusual," *Macroeconomic Review*, 23, no. 1, April 2024.

Friedman, Milton, 1960. *A Program for Monetary Stability.* Fordham University Press.

Gorodnichenko, Yuriy, 2024. "Monetary Policy in Europe: Out of the Woods?" Presentation at the Hoover Institution Conference on Getting Global Monetary Policy on Track, 2-3 May.