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How will the interaction of wages and prices play out in the last mile of disinflation?

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How will the Interaction of Wages and Prices Play Out in the Last Mile of Disinflation?

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Evercore ISI

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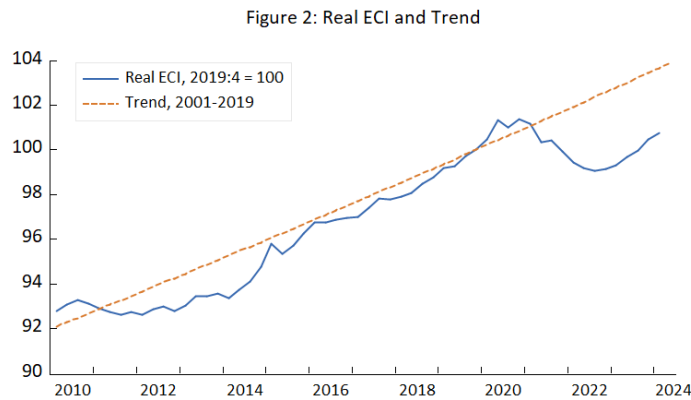
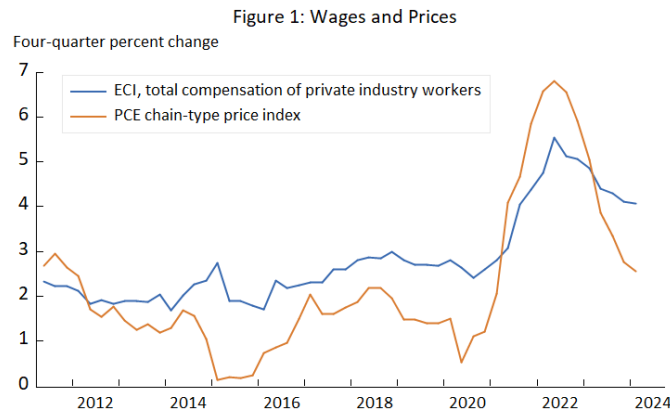
Abstract

This note develops an econometric model of inflation dynamics to assess recent developments. We find that most of the rapid decline in price pressures achieved in 2023 owes to the normalization of supply chains. With supply-chain disruptions now largely resolved, future progress toward disinflation will be more difficult and will likely depend on the interplay between wages and prices. A consideration that could loom large is the shortfall in wage gains relative to their pre-pandemic trend, leading to a “wage gap” or, equivalently, a rise in firm markups over cost. Using our model, we explore different ways in which the wage gap may evolve going forward and trace out the implications of these alternative scenarios for the Fed’s monetary policy. If high markups unleash important competitive pressures across firms, then inflation and thus interest rates could come down quickly. If, however, markups have a limited influence on price setting, the disinflation process could be more prolonged, as would the normalization of monetary policy. Finally, if wage gains remain elevated—perhaps motivated by attempts by workers to recover previous shortfalls in earnings—inflation and interest rates could stay high for a considerable period. Unfortunately, it isn’t clear based on the econometrics or recent experience which outcome is most likely.

1. Introduction

Inflation has been bouncing like a ping-pong ball, with surprisingly low inflation at the end of 2023 followed by a rebound in the early month of 2024. In this note, we revisit our analysis of a year ago (Kamin and Roberts, 2023) and ask to what extent the interaction of wages and prices may have played a role in the behavior of inflation over the recent past. We then look at how different assumptions about wage-price interactions may affect the outlook for inflation, and interest rates, over the next year or so.

We begin with a quick review of the latest data. As can be seen in Figure 1, after trailing increases in prices in 2021 and 2022, wage gains outstripped them last year. As a result, real wages made progress relative to their pre-Covid trend (Figure 2). In level terms, real wages by this measure were higher than on the eve of the Covid crisis (2019:Q4), although still about $\frac{3}{4}$ percent below the higher levels reached in 2020.



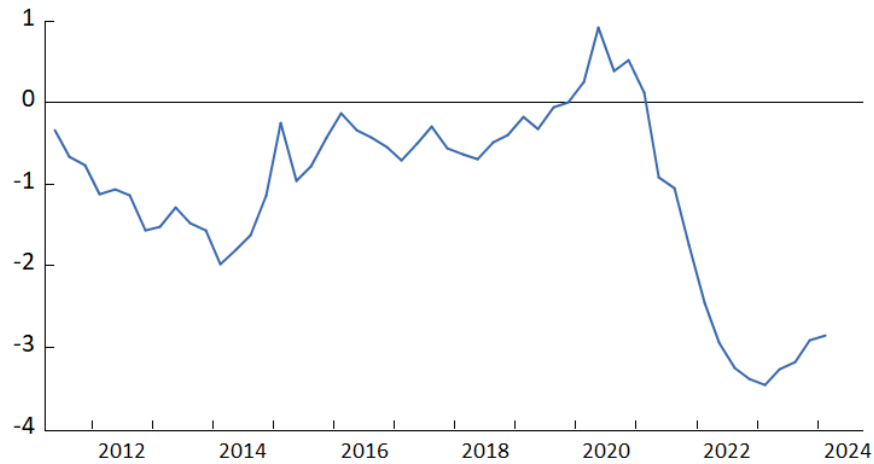
In Figure 3, we show the deviation of real wages from their pre-Covid trend.¹ Consistent with the dip in real wages below their trend shown in Figure 2, Figure 3 shows a substantial widening of the wage gap between mid-2020 and early 2023 before narrowing more recently. The counterpart of the initial widening of the wage gap has been a rise in the markup over costs that firms charge for their products. In our earlier note, Kamin and Roberts (2023), we emphasized two potential implications of the emergence of this wage gap. On the one hand, attempts by workers to recover their real wage losses and close the gap could lead to higher wage growth, price inflation, and, in extremis, a stagflationary cycle. But, on the other hand, because firms were enjoying inflated markups, competitive pressures might drive those markups down, allowing inflation to decline even as workers closed the wage gap.

¹ The wage gap is defined as the gap between real wages and their pre-Covid trend:

$$(1) \text{ wagegap}_t = \log \left[\frac{W_t}{P_t \text{trend}_t} \right] - \mu .$$

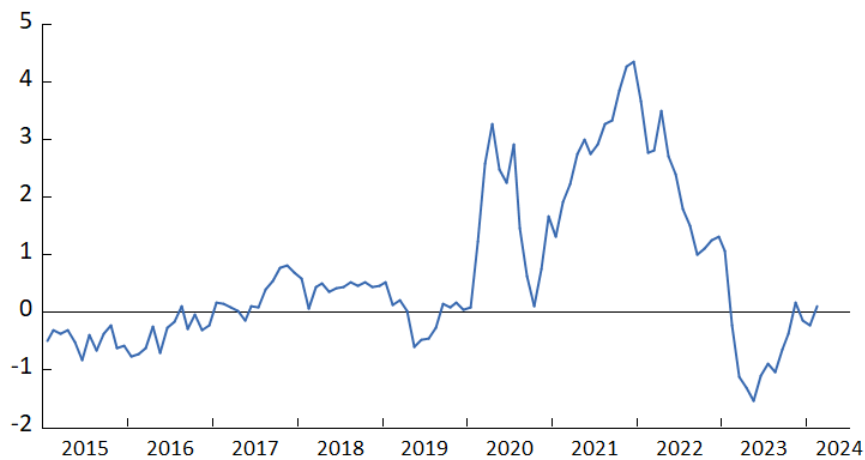
where W_t is the level of wages, which we take to be the ECI for private-sector hourly compensation; P_t is the level of prices, the overall PCE price index; and trend_t is the trend in the ratio of the ECI and the PCE price index during the 2001-2019 period. The gap is assumed to equal zero in 2019:Q4, on the eve of the pandemic.

Figure 3: The Wage Gap



At first blush, the sharp decline in inflation from mid-2022, coupled with the slower decline in wage growth, would seem to confirm the second and more felicitous possibility—that competitive pressures have helped push down price inflation last year. However, as Figure 4 suggests, supply chain pressures eased considerably last year—which could provide a competing explanation for the improvement in price inflation last year.

Figure 4: New York Fed Supply Chain Index



To assess the relative importance of these competing explanations, we revisit and update our previous analysis. We replace the stylized model of price-setting of our previous work with an estimated version of the model that includes a measure of supply-chain pressures. We then use this model to decompose the fall in inflation into its contributing factors. We find that a large portion of the disinflation of the past couple of years appears to reflect the normalization of supply chains, a factor distinct from the decline in markups discussed above. We conduct a similar analysis of the recent

evolution of wages and find that, according to our model, much of the deceleration of wages in 2023 can be explained by the reduction in price inflation.

We then turn to the prospects for inflation in 2024 and beyond. A first observation is that with supply chains now largely restored, that important source of disinflation will be less important going forward. We then turn to model simulations. As in our previous note, we find that the outlook for inflation turns importantly on the role that the wage gap (or, equivalently, price markups) play in the price-setting process: if high markups unleash important competitive pressures across firms, then inflation could come down rapidly. If, however, markups play a limited role in price setting, the disinflation process could be more prolonged. Finally, if wage gains remain elevated—perhaps motivated by attempts by workers to recover previous shortfalls in earnings—inflation and interest rates could stay high for a considerable period. As we will discuss, unfortunately, it isn't clear based on the econometrics or recent experience which outcome is most plausible. We are hopeful, however, that, as was the case last year, the predictions of models that assume competitive pressures affect firm pricing will be correct.

2. Prices: Model, Estimation, and Evaluation

2.1 Model of prices

In our previous note, we used a calibrated version of our price equation. Here, we use an estimated version of the equation. Following Bernanke and Blanchard (2023), we allow for lagged prices, and we introduce a term to capture the effects of supply-chain disruptions.

$$(1) \quad \Delta px_t = \chi_1 \Delta px_{t-1} + \chi_2 \Delta px_{t-2} + \gamma_p (\Delta \bar{w}_t - \Delta trend_t) + \phi SCP_t + (1 - \chi_1 - \chi_2) \lambda_p wagegap_t + u_t;$$

Δpx_t is the annualized percent change in core PCE prices, $\Delta \bar{w}_t$ is a three-quarter moving average of past nominal wage growth, and $\Delta trend_t$ is the trend growth of real wages. Therefore, increases in wages above the trend growth in real wages—which reflect the growth of productivity—show up as higher unit labor costs and thus boost price inflation. We impose the restriction that $\chi_1 + \chi_2 + \gamma_p = 1$. Price inflation thus reflects a weighted average of past inflation and wage growth in excess of trend real wage growth. SCP_t is a measure of supply-chain pressures. The coefficient λ_p captures the pressure that the wage gap would apply to inflation: recall that the wage gap essentially represents the inverse of the price markup, and so a negative wage gap implies an elevated markup. With $\lambda_p > 0$, the wage gap term thus captures the effect that the competitive pressures on inflation coming from an elevated markup.²

A key difference from Kamin and Roberts (2023) is that here, we include a measure of supply-chain pressures, SCP. We use the New York Fed's index of global supply-chain pressures, shown above in Figure 4.³ In qualitative terms, the New York Fed measure aligns with narratives around recent supply-chain disturbances: in 2020, and again in 2021, supply chains were severely disrupted, pushing the index to very high levels. The situation improved in 2022 and by 2023, the index had returned to more-normal

² The bracketed expression in the wage gap term allows the coefficient λ_p to capture the pressure that the wage gap would apply to inflation once the lags in the equation have been worked through.

³ Bernanke and Blanchard (2023) use a different measure of supply-chain pressures, one that is based on Google searches. Our measure has a couple of advantages relative to the measure B&B use. One is that it is available over a longer sample. Another is that it is readily available on the New York Fed's website and is regularly updated.

values; it even dipped to a below-average value in the middle of the year before ending the year at a value corresponding to no net supply-chain pressure.

2.2 Estimation of price equation

We first estimate a version of the price equation without the wage gap—that is, with $\lambda_p = 0$. The dependent variable is the annualized quarterly percent change of the core PCE price index. As can be seen in column 1 of Table 1, the equation includes two lags of core inflation. The sum of those coefficients is 0.56; the coefficient on wages, γ_p , is therefore 0.44.⁴ The coefficient on the supply-chain pressure variable, which we introduce as a two-quarter moving average, is 0.26, and is strongly statistically significant.⁵

Table 1. Estimates of core PCE models, 2001-2023

	(1)	(2)
Δp_{t-1}	.395 (.109)	.420 (.112)
Δp_{t-2}	.162 (.110)	.208 (.101)
$\Delta \bar{w}_t - \Delta trend_t (\gamma_p)$.443 --	.382 --
$\overline{Supply - chain pressure}_t (\phi)$.258 (.090)	.277 (.092)
$wagegap_t (\lambda_p)$.00 --	.039 (.048)
SER	.800	.800
R-bar-squared	.562	.562
DW	2.00	2.03

In Column 2, we add a wage-gap term. Its coefficient, λ_p , is not significantly different from zero. It is, however, not precisely estimated and a reasonable confidence interval would not exclude a moderately sized effect of the wage gap on price inflation, a possibility we explore later. The other coefficients of the model are not importantly different from those in the baseline equation, and are well within reasonable confidence intervals.

2.3 Evaluation of recent performance of price equation

In 2023, prices decelerated considerably from their 2022 pace. In this section, we use our model to assess the sources of that deceleration.

Table 2 shows the contributions of our baseline price equation's key drivers to recent price movements. Here, the key drivers are wages; the supply-chain variable; and the equation's residual. In addition, as shown by the contribution in the second column, the model's steady-state prediction of inflation—when wage growth equals its trend pace and there are no supply disruptions—is 2 percent,

⁴ The $\Delta trend_t$ term is constant and thus rolled into the intercept (not shown).

⁵ The r-squared of our equation is 0.56, which is considerably smaller than that of Bernanke and Blanchard's price equation. That result is likely explained by the different modeling assumptions we have made. Notably, B&B include food and energy prices as explanatory variables in a model of overall consumer prices.

the Fed's target, (The equation also includes lagged prices. In the table, we show the results of dynamic simulations that begin in 2020, and so the contributions include the eventual effects coming through the equation's own lags.)

Core PCE prices rose 5.1 percent over the course of 2022 and 3.2 percent in 2023, a deceleration of almost 2 percentage points. According to this model, improving supply chains were the key factor behind smaller increases in core prices last year, contributing 1.3 percentage points of the 1.9 pp deceleration. Given the lags in the equation, as well as the limited extent of their deceleration, wages only contributed 0.2 percentage point to the disinflation in 2023. In the final line of the table, we update the results through 2024:Q1. On this four-quarter basis, inflation edged down further with the contributions similar to those for calendar 2023.

Table 2: Contributions to four-quarter core inflation, baseline equation

	Core PCE prices	Inflation target	Wages	Supply-chain pressure	Residual
2020	1.5	2.0	-.1	.6	-.8
2021	4.9	2.0	.5	1.2	1.3
2022	5.1	2.0	2.0	1.6	-.4
2023	3.2	2.0	1.7	.3	-.8
2023-2022	-1.9	.0	-.2	-1.3	-.4
Memo: 2024:Q1	2.9	2.0	1.6	.1	-.7

Note: “Wage” contribution indicates the contribution of the deviation of wage growth from 2.8 percent.

The fit of the price equation in the past two years is poor; there are misses of -0.4 and -0.8 pp in 2022 and 2023, respectively, and the error continued into the first quarter of 2024 as well. These errors raise the possibility that the large wage gap of recent years—not included in this equation—may have played a role in holding down price inflation. To explore that possibility, Table 3 presents results from a version of the equation in which we add a wage-gap term to the equation, without changing the other coefficients. As noted above, we estimated the coefficient λ_p on the wage gap at .039; in the analysis shown in Table 3, we set this parameter at 0.06, still well within the confidence interval around the estimated coefficient.

As expected, the wage gap holds down price inflation in both 2022 and 2023, and reflecting the lags in the model, by somewhat more in 2023 than in 2022.⁶ With this setting of the wage-gap coefficient, the contribution of the equation residual to inflation is greatly reduced and explains just a bit of the decline in inflation last year.

Table 3: Contributions to recent price movements, equation that includes the wage gap

	Core PCE prices	Inflation target	Wages	Supply-chain pressure	Residual	Wage gap
2020	1.5	2.0	-.1	.6	-.8	.1
2021	4.9	2.0	.5	1.2	1.3	.0
2022	5.1	2.0	2.0	1.6	.0	-.4
2023	3.2	2.0	1.7	.3	-.1	-.7
2023-2022	-1.9	.0	-.2	-1.3	-.1	-.3
Memo: 2024:Q1	2.9	2.0	1.6	.1	.0	-.7

Note: “Wage” contribution indicates the contribution of the deviation of wage growth from 2.8 percent.

3. Wages: Model, Estimation, and Evaluation

3.1 Wage model

Our model for wages, as in our previous note, is:

$$(2) \Delta w_t = \Delta trend_t + \gamma_w \Delta \bar{p}_{t-1} + (1 - \gamma_w) ptr_t + \kappa_w (NRU_t - RU_t) - \lambda_w wagegap_t + v_t,$$

where Δw_t is quarterly wage growth, $\Delta trend_t$ is trend real wage growth, $\Delta \bar{p}_{t-1}$ is a three-quarter moving average of past overall PCE inflation, ptr_t is a measure of longer-run inflation expectations, RU_t is the unemployment rate, NRU_t is the natural rate of unemployment, and v_t is a (not-serially-

⁶ While the wage gap is in principle endogenous to the evolution of prices, for the purposes of this single-equation analysis, we hold it fixed. In Section 4, we explore full-model simulations, which endogenize the wage gap.

correlated) random error term. This model has several key features. It allows past inflation to affect wage growth; it allows for a Phillips-curve effect through the $\kappa_w(NRU_t - RU_t)$ term; and it allows for the possibility that the wage gap can affect wage gains—in current circumstances, with a negative wage gap, this term would put upward pressure on wage growth.

3.2 Estimates of baseline wage equation

The estimates of our baseline wage equation are shown in Column 1 of Table 4.⁷ The dependent variable is the annualized percent change in the employment cost index (ECI) for private-sector compensation per hour and we estimated the model on quarterly data over the 2001-to-2022 period. We assume that the public's perception of the Fed's inflation target, ptr_t , remains fixed at 2 percent, and this term is thus rolled into the intercept; the results are little different if we use an empirical proxy for ptr_t . (As discussed, for example, in Roberts, 2023, that assumption is consistent with the stability of survey and financial-market measures of the public's longer-run inflation expectations.) Similarly, $\Delta trend_t$ is also assumed to be fixed and incorporated into the intercept. For historical data on NRU_t , we use the estimates from the publicly available FRB/US model dataset; see the Appendix for a discussion of recent movements.

Table 4. Empirical models of quarterly growth in U.S. nominal wages, 2001-2022

	(1)	(2)
$\Delta \bar{p}_{t-1} (\gamma_w)$.430 (.067)	.498 (.181)
$RU_t - NRU_t (-\kappa_w)$	-.206 (.055)	--
$v - u ratio_t$	--	.415 (.075)
SER	.795	.823
R-bar-squared	.486	.450
DW	1.69	1.58

There is a statistically significant effect of past inflation on wage growth, as well as a statistically significant, negative, effect of the unemployment gap. We discuss the model shown in Column 2, which substitutes the vacancies-to-unemployment ratio for the unemployment gap, in Section 3.4 below.

3.3 Evaluation of recent wage-equation performance

Like prices, wages decelerated considerably from their 2022 pace in 2023 and, as with prices, we use our wage model to assess the sources of that deceleration. Later, we will pull the equations together and look at the implications for inflation going forward.

Two key conditioning factors in the wage equation are the natural rate of unemployment (NRU_t) and the public's longer-run inflation expectations (ptr_t). As we discussed above, we assume ptr_t remains fixed at the Fed's long-run target of 2 percent. Our assumptions for the natural rate of unemployment are discussed in detail in the Appendix. In brief, we assume that NRU_t was temporarily elevated in 2021 and 2022 following the pandemic but, given evidence of labor-market healing, began

⁷ These are the same as in Kamin and Roberts (2023).

to move down to more-normal levels in 2023 and will complete the process of normalization by the end of 2024.

Table 5 shows the contributions of the equation’s key drivers to recent wage movements. Total compensation per hour rose 5.1 percent over the course of 2022 and 4.1 percent in 2023, a deceleration of about one percentage point. According to our model, lower price inflation can account for about 80 percent of the deceleration in wages. The unemployment rate was about the same in 2022 and 2023 and so accounts for very little of the change in wage gains.

Table 5: Contributions to recent wage movements

	ECI	Trend wage growth	Inflation	Unemployment gap	Residual
2020	2.6	2.8	-.4	-.6	.7
2021	4.4	2.8	.4	-.2	1.3
2022	5.1	2.8	1.9	.2	.2
2023	4.1	2.8	1.1	.2	.1
2023-2022	-1.0	.0	-.8	.0	-.1
Memo: 2024:Q1	4.1	2.8	.8	.1	.4

Note: “Inflation” contribution indicates the contribution of the deviation of inflation from 2 percent.

Our wage equation fit well in 2022 and 2023, with only small residual errors in each year. For this reason, we don’t pursue the possibility that wage gap catch-up may have played a role in driving wages in the past couple of years; the equation seems to do well without that modification. That said, the residual popped up in the first quarter of 2024, raising some question about whether wage gap catch-up may become more important in the future.

3.4 V-U variant

Bernanke and Blanchard (2023), among others, consider the use of an alternative measure of labor-market pressure, the ratio of job vacancies to unemployment (the “v-u ratio”). In Column 2 of Table 4 above, we consider a variant of the equation in which we use the v-u ratio rather than the unemployment gap. As can be seen, the v-u ratio is statistically significant. The fit of the equation over this period is similar to that of our baseline equation, with an r-squared that is only slightly lower. As we discuss in the Appendix, this variable does not perform appreciably better in explaining movements in wages in recent years. As a consequence, we focus on the conventional unemployment gap specification.

4. Model Simulations

To generate an outlook for inflation going forward, we embed our equations in a large-scale macroeconomic model. We start with the publicly available version of the Fed Board staff’s FRB/US model.⁸ We then replace the original model’s equations for wage- and price-setting with the models of wages and prices sketched above. For variables other than wages and prices, we choose conditioning assumptions (add-factors to the model equations) that allow the model equations to replicate the Federal Reserve’s projections at the time of the March 2024 FOMC meeting, as reflected in the Summary of Economic Projections.⁹ (The June 2024 SEP was released only after our analysis had been

⁸ See Federal Reserve (2023) for information about the FRB/US model.

⁹ In particular, we use the public FRB/US database posted on the Federal Reserve’s website.

completed.) Thus, if inflation were to follow the projections in the March SEP, the model forecasts would replicate the March 2024 FOMC projections. We adopt this approach because the projections of the FOMC are prominent in discussions of the prospects for monetary policy. They typically do not differ greatly from private-sector forecasts. (See Roberts, 2022, for a comparison of private-sector forecasts and the SEP as of spring 2022.)

For the setting of monetary policy, we use a variant of the “inertial Taylor rule” that is part of the FRB/US model:

$$rff_t = 0.70 rff_{t-1} + (1 - 0.70)[r_t^* + \Delta p_t + 1.0(\Delta p_t - \pi^*)],$$

where rff_t is the federal funds rate, r^* is the equilibrium real federal funds rate, Δp_t is the rate of price inflation, measured as the trailing four-quarter percent change in core PCE prices, and π^* is the Federal Reserve’s inflation target (2 percent). This equation differs from the standard version in the FRB/US model in several ways.

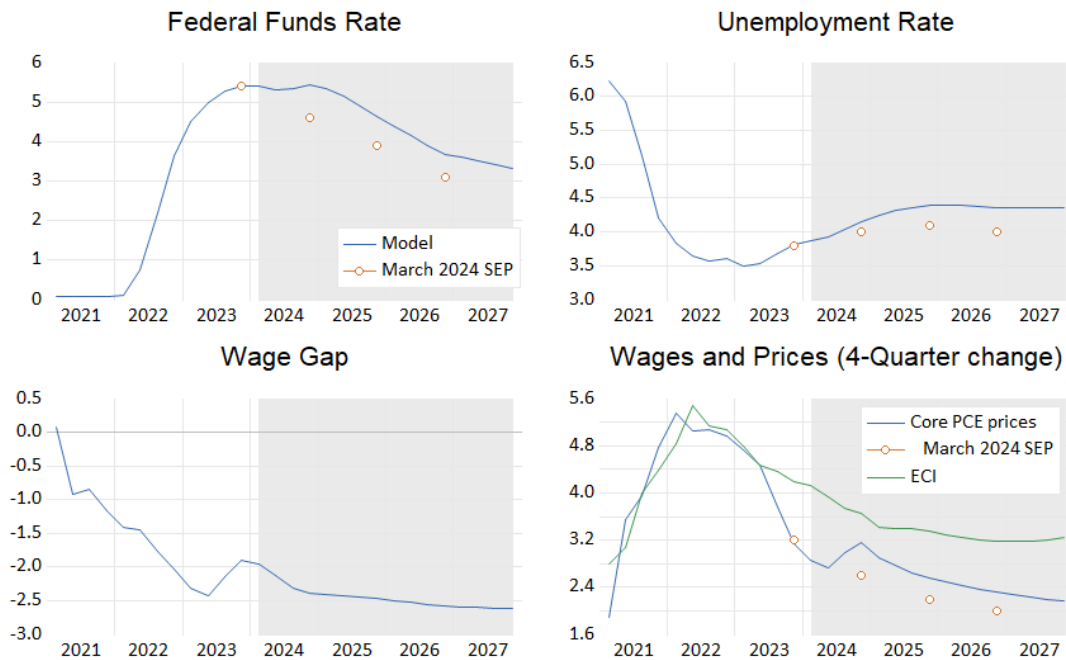
- We assume somewhat less inertia in the setting of policy than in the baseline version. As discussed in Roberts (2023), such a faster rate of adjustment helps the model replicate the more-rapid adjustment of interest rates in recent FOMC projections.
- The policy rule leaves out any influence of the output gap on monetary policy. One reason we leave out this term is that the FOMC has indicated that when the economy is beyond estimates of full employment—as, in the FOMC’s projections, is the case currently—they will not put weight on employment deviations (FOMC, 2024).
- To allow the model to fit the recent level of the federal funds rate, we make two further adjustments: We assume a larger coefficient on the inflation gap. And we assume that the intercept of the rule, r_t^* is currently elevated relative to the value of 0.6 percent in the FOMC’s March 2024 economic projections.¹⁰

We first consider a version of the model without the wage-gap term, using the price equation from Table 1, Column 1 and the wage equation from Table 4, Column 1. Figure 6 shows results. For reference, the figure also shows the FOMC’s March 2024 projections.¹¹

¹⁰ We assume that r_t^* is 1.8 percent as of 2024:Q1 and returns linearly to its longer-run value of 0.6 percent by the end of 2026.

¹¹ In the simulations, we assume that the supply-chain indicator, *SCP*, is at its neutral value of zero. As well, to map from core inflation to overall, we take as given the wedge between these measures of inflation implicit in the median SEP projections.

Figure 6: SEP and Model Simulation without the Wage Gap



Shading indicates projection period

For 2024, the model’s outlook for core inflation is 3.2 percent, about the same as in 2023. That projection is considerably higher than in the Fed’s projections from March 2024 to a large extent reflecting the bad news on inflation in the first few months of the year. Given the persistence of inflation in the model, inflation remains above the March SEP median projection through 2026. Nonetheless, core inflation moves down steadily over this period, falling to 2.3 percent by 2026.

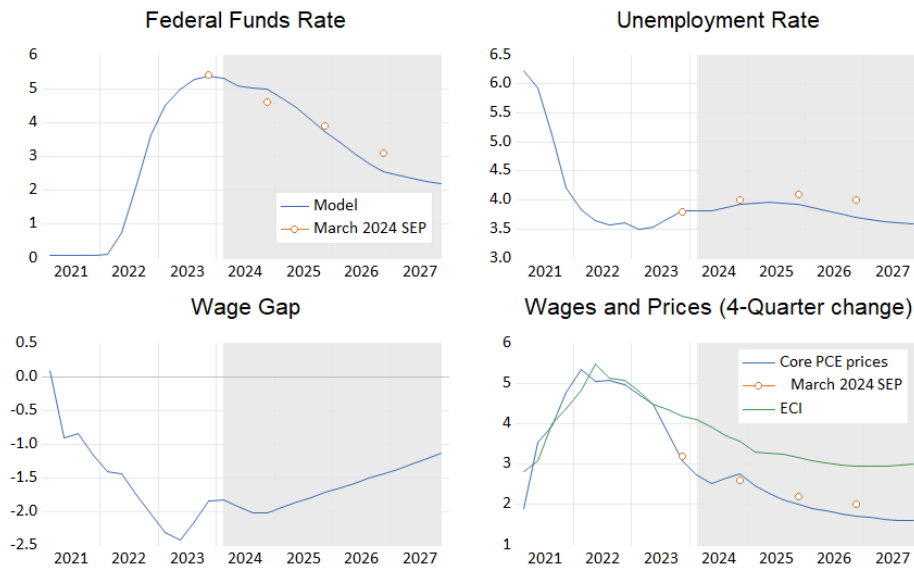
With inflation stubbornly high, the federal funds rate remains near recent levels through the end of 2024. As inflation comes down in 2025, so does the funds rate, and it is just above 4½ percent by the end of that year. With tighter policy and higher (real) interest rates, the unemployment rate is higher than in the SEP median projection.¹² As the bottom left panel emphasizes, in a model in which the wage gap does not put pressure on either wages or prices, there is no tendency for the wage gap to close. Although wage growth exceeds inflation, real wages do not rise faster than their trend pace.

In Figure 7, we consider the version of the model that includes the wage gap in the price equation. We set the value of λ_p to 0.06, the same value considered in Table 3. With the high level of the markup (depressed wage gap) putting downward pressure on inflation, core inflation is lower than in the previous scenario, falling to 2.8 percent in 2024. Inflation falls further in 2025, to a pace in line with the Fed’s 2 percent target; inflation falls further in 2026. With the wage gap depressing price

¹² We considered an alternative assumption for the natural rate of unemployment, in which the natural rate remains at an elevated value of 4.5 percent through the end of 2026, rather than moving down to its longer-run value just above 4 percent by the end of 2024. The resulting path for inflation was only slightly higher than in Figure 6, with inflation just 0.1 percentage point higher in 2025 and 2026.

inflation, this felicitous outcome for inflation comes despite wage gains that run well above price inflation, and the wage gap shrinks notably, especially after 2025, and it recoups about 40 percent of its initial shortfall over the 2023-to-2026 period. With lower inflation, the federal funds rate is also lower, allowing the unemployment rate to edge down to 3.7 percent by 2026.

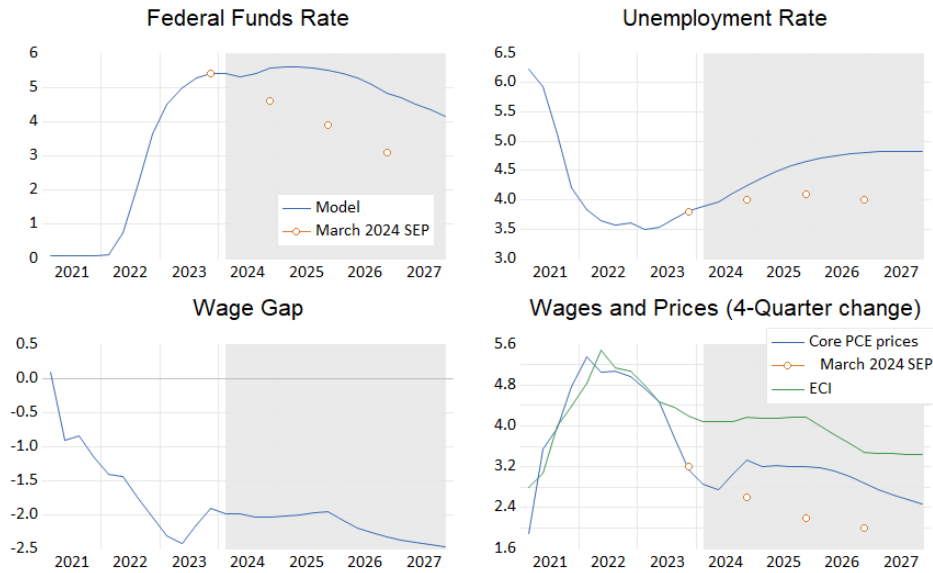
Figure 7: Model Simulation with Wage Gap in Price Equation



Shading indicates projection period

In Figure 8, we consider the possibility that stubbornly high wage gains will keep inflation near current levels through 2025. Here, we return to the version of the model used to generate the results in Figure 6, in which the wage gap does not put downward pressure on inflation. In addition, we assume that wage gains remain near recent levels just above 4 percent through 2025. In this case, inflation remains stuck above 3 percent through 2025. As a result, the federal funds rate also remains near recent levels over the next two years or so, with cuts delayed until 2026. Tight policy leads to a weaker economy and the unemployment rate rises above 4½ percent in 2025. While the deterioration in the economy arrives gradually in this simulation, the risk of a recession would surely be elevated over this period, with any increase in the unemployment rate coming more abruptly than suggested here. As in Figure 6, with the wage gap applying no pressure to either wages or prices, there is little tendency for the gap to return to its pre-Covid level. Firms pass the high growth in wage costs on to their customers.

Figure 8: Higher Wage Growth



Shading indicates projection period

5. Conclusions

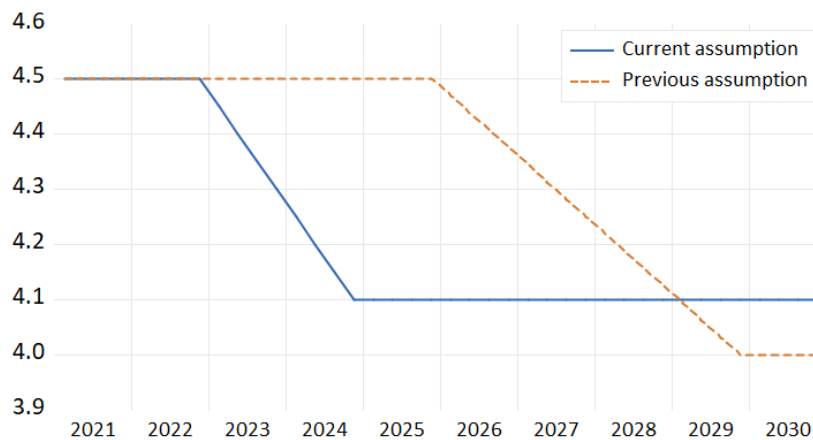
- According to our model, the normalization of supply-chain conditions played a key role in the disinflation of 2023. That source of disinflation is unlikely to be repeated, meaning that completing “the last mile” will have to come from other sources.
- While supply-chain normalization was the dominant factor in 2023’s deceleration, our analysis suggests that there is also room for competitive pressures on prices, in the context of elevated markups of price over cost, to have played a role. That said, the evidence for this channel is decidedly weaker than is the evidence for the supply-chain channel.
- In our simulations, the competitive-pressure channel has important implications for inflation going forward, with 2024 inflation about ½ percentage point lower when we include it. This scenario would also allow real wages to recover some of their shortfall relative to their historical trend.
- On the pessimistic side, our model also predicts that further deceleration of wages will also be critical for the last mile of disinflation: If wage growth remains near its recent pace while corporate markups remain unchanged, price increases are likely to remain around 3 percent and the federal funds rate may well remain above 4 percent.

Appendix

Assumptions for the natural rate of unemployment

We assume the natural rate of unemployment, NRU_t , was temporarily elevated coming out of the pandemic. Drawing on the analysis presented in Roberts (2023), we assumed that in 2021 and 2022, $NRU_t = 4.5$ percent. Given the improvements in labor-market functioning in 2023—notably the reductions in the quits rate and the ratio of job openings to unemployment—we assume that the natural rate of unemployment began returning to a more-normal level last year and that the process will be complete by the end of 2024. Figure A-1 shows our current assumption for NRU_t along with the assumption in Kamin and Roberts (2023). Note that we revised up our assumption about the longer-run value of NRU_t to be consistent with revisions in the Fed’s median projections; as discussed in the next section, we use the Fed’s projections as the point of departure for our own.

Figure A-1: Estimates of the Natural Rate of Unemployment



Evaluating the recent performance of the V-U version of the wage equation

Table A-1 shows the contributions of the elements of the v-u ratio version of the wage equation, the estimates shown in Column 2 of Table 4. In this version, the equation residual is smaller in 2021 than in our baseline equation (compare with Table 5 in the main text), by 0.5 percentage point. However, the errors in 2022 and 2023 are larger in absolute value, suggesting that the v-u ratio is not necessarily capturing labor-market pressures better than the unemployment gap in recent years. Between 2022 and 2023, it remains the case that the fall in inflation is the dominant explanation for the decline in wage growth last year. While the decline in the v-u ratio last year predicts some decline in wage gains, in the decomposition, that’s offset by the movement in the equation residual, which was less negative last year than in 2022.

Table A-1: Contributions to recent wage movements, variant with V-U ratio

	ECI	Trend wage growth	Inflation	V-U ratio	Residual
2020	2.6	2.8	-.4	.0	.3
2021	4.4	2.8	.5	.2	.8
2022	5.1	2.8	2.2	.5	-.4
2023	4.1	2.8	1.3	.4	-.3
2023-2022	-1.0	.0	-.9	-.1	.1
Memo: 2024:Q1	4.1	2.8	.9	.3	.1

Note: "Inflation" contribution indicates the contribution of the deviation of inflation from 2 percent and the v-u ratio contribution reflects the contribution of the ratio from its average value over the estimation period.

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