



Employ America Research Report

Misled by the Phillips Curve: How Inflation Predictions Went Wrong

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In a recent [Barron's](#) article, I examined why last year's predictions that fighting inflation would require an increase in the unemployment rate went so wrong. The flaws in these predictions can be traced back to three ideas: first, that vacancies are a good measure of labor market tightness; second, that inflation expectations posed a threat to inflation stability, and third, the reliance on the Phillips curve framework, which emphasizes a story around labor market pressures on inflation instead of supply-side stories.

In this piece, I use the more generous word count to dive deeper into the finer details of two of the models behind those predictions. Below, I will be showing more precisely how their projections differed from reality and why the mechanisms of those models failed to predict the disinflation we've seen over the past year, even as the unemployment rate remained low.

Introduction

“I think it’s fair to say – given how hot the economy is – the inflation performance at this point is better than I think many standard models would have predicted”

– Larry Summers, July 2023

Why did these standard models—including those of Summers himself—fail to explain the possibility that inflation could fall while the labor market remained strong? To illustrate some of the pitfalls made in inflation modeling last year, I revisit two papers, Domash and Summers (2022) (henceforth DS (2022)) and Ball, Leigh and Mishra (2022) (henceforth BLM (2022)), that forecasted high inflation if unemployment remained low.

These two papers essentially used estimated Phillips curve models to predict the trajectory of inflation conditional on labor market conditions. In doing so, they embed many traditional macroeconomic ideas which we at Employ America have been consistently critical of: most especially the use of vacancy rates to gauge the state of the labor market and the risk that there would be shifts in inflation expectations that necessarily cause or risk a runaway wage-price spiral. They fare poorly in explaining the recent path of inflation, even when the models are given access to information about the actual path of the variables they use to explain inflation.

The divergence between reality and the model forecasts are stark. The DS (2022) forecast of nominal wage acceleration and falling real wages was proven wrong almost immediately, as both nominal wage growth and price inflation began to fall a few months after the paper’s release. The BLM (2022) median CPI inflation forecasts have almost all been higher than actual median inflation in the months after the paper was presented, with especially large forecast errors over the past few months. These models demonstrate the pitfalls of using Phillips curve frameworks in trying to explain and predict inflation, and are unsuitable for guiding monetary policy.

Domash and Summers (2022): Runaway Wages, Runaway Inflation

DS (2022) measured labor market tightness using two “firm-side” measures: the vacancy-to-unemployment ratio (the pitfalls of which I’ve written about before) and a “firm-side unemployment rate”. This latter quantity is the unemployment rate that would be consistent with current vacancy and quit rates had the unemployment rate maintained the same pre-2020 relationship with those firm-side measures of labor market slack.

Throughout the labor market recovery, these two indicators have shown a far tighter labor market than the unemployment rate, due to a persistently high level of vacancies. Based on these tighter measures, the authors predicted that:

1. Nominal wage growth was likely to increase over the remainder of 2022, even if the labor market and price inflation cooled substantially faster than expected;
2. The high levels of nominal wage growth were likely to lead to higher inflation, by increasing labor costs, which would then erode real wage growth.

The claim that nominal wage growth was likely to continue to grow was based on a wage Phillips curve regression, with wage growth on the left-hand side, and a 12-month trailing average of labor market slack measures and a weighted average of three years of lagged inflation (to proxy for inflation expectations) on the right-hand side. They estimated this model on historical data and forecasted wage inflation based on assumptions about the course of labor market slack and inflation for the remainder of 2022. Under even very generous assumptions about the path of labor market slack and CPI inflation (including one where CPI inflation returned to 4.5% and the vacancy-to-unemployment ratio returned to 1 by December 2022!), the model forecasted higher nominal wage growth through the rest of 2022.

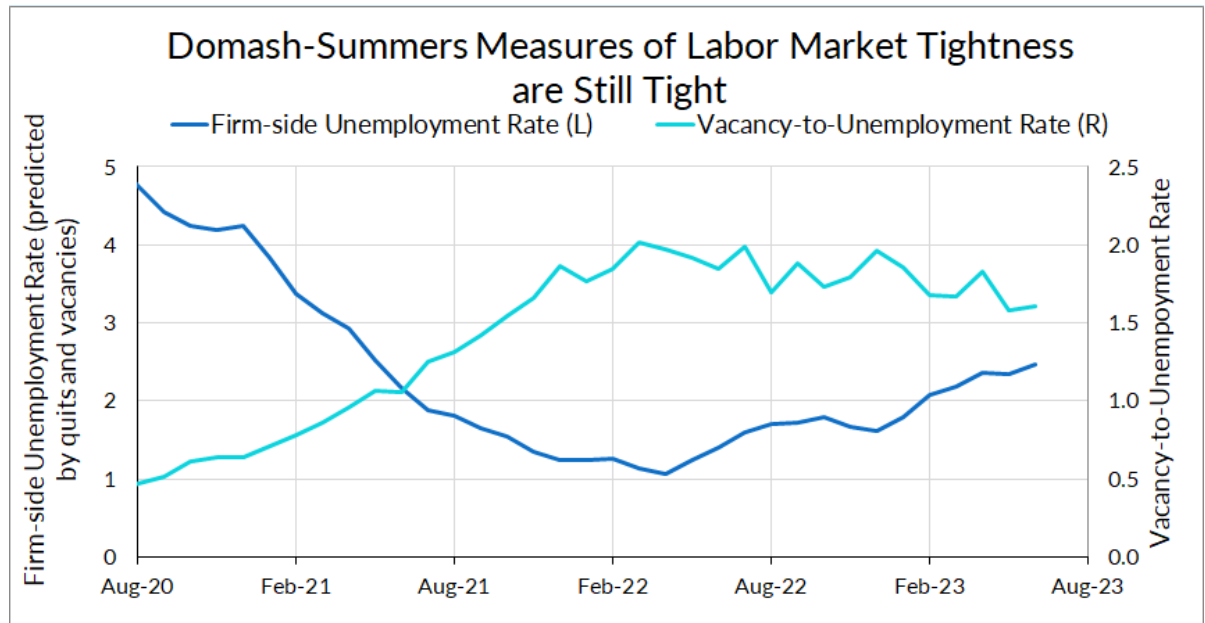
Table 1
Predicted wage inflation in Dec 2022 under different model assumptions

Slack indicator	Model Assumptions for Dec 2022			Model Predictions		
	V/U ratio	Firm-side unemployment rate	CPI inflation	Predicted wage inflation in March 2022	Predicted wage inflation in Dec 2022	Predicted increase in wage inflation, Mar 2022 – Dec 2022 (pp)
V/U ratio	1.5	#N/A	6.0%	6.5%	7.8%	1.3
V/U ratio	1.5	#N/A	4.5%	6.5%	7.3%	0.8
V/U ratio	1	#N/A	6.0%	6.5%	6.9%	0.4
V/U ratio	1	#N/A	4.5%	6.5%	6.6%	0.1
Firm-side UR	#N/A	1.5	6.0%	5.5%	5.9%	0.4
Firm-side UR	#N/A	1.5	4.5%	5.5%	5.8%	0.3
Firm-side UR	#N/A	2	6.0%	5.5%	5.8%	0.3
Firm-side UR	#N/A	2	4.5%	5.5%	5.7%	0.2

Notes: Estimates from a wage Phillips curve model of wage inflation on a 12-month trailing average of the slack indicator and 3-year weighted lagged CPI inflation. The model uses data from Jan 2001 – Present and predicts out-of-sample estimates for wage inflation for December 2022. The assumptions for future slack are conservative estimates: the V/U ratio today is 1.7 and the firm-side predicted unemployment rate is 1.5.

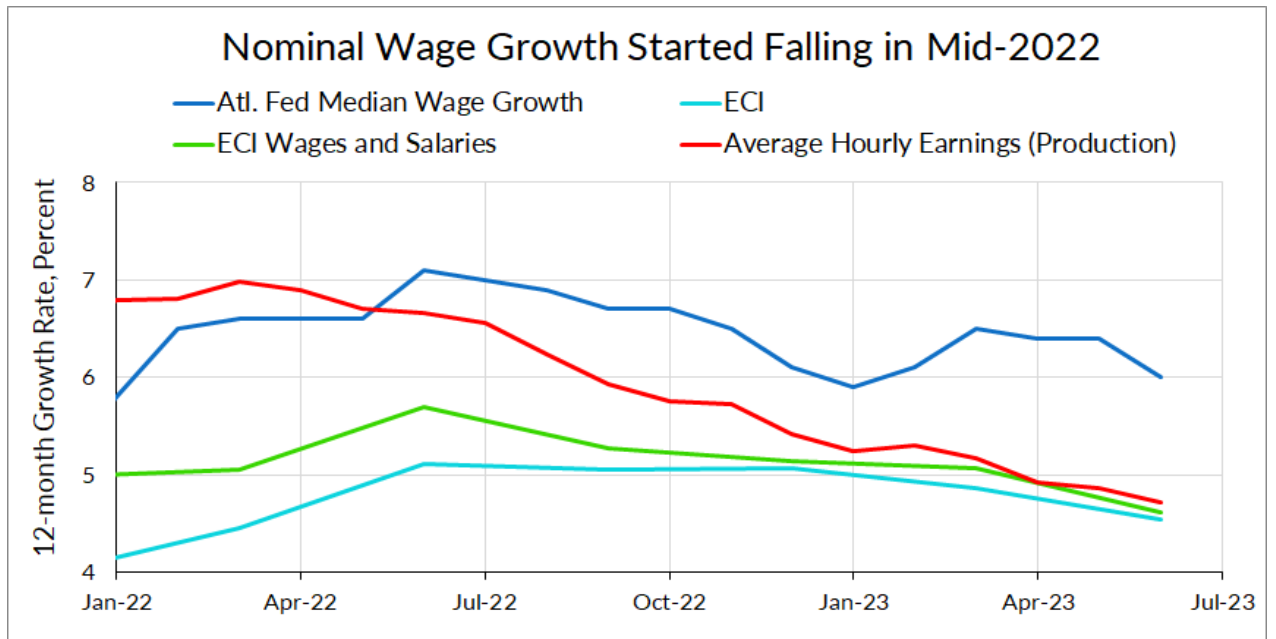
Source: [Domash and Summers \(2022\)](#). This prediction is for the Atlanta Fed’s Median Wage Growth Tracker.

In reality, the labor market remained tight (as measured by these slack measures), even relative to these “conservative” assumptions. In 2022H2, the vacancy-to-unemployment ratio averaged 1.84 over the latter half of 2022H2, far above the more conservative levels of 1 and 1.5 used in the forecast. By my calculations using their paper, the “firm-side unemployment rate” rose to 1.62 by the end of 2022, averaging 1.68 over the last six months of 2022. And 12-month CPI inflation only fell to 6.45% by December 2022, higher than the scenarios tested in the paper.



Source: Bureau of Labor Statistics, Author's Calculations. "Firm-side Unemployment Rate" is constructed according to a previous paper by Domash and Summers entitled "How Tight are U.S. Labor Markets?"

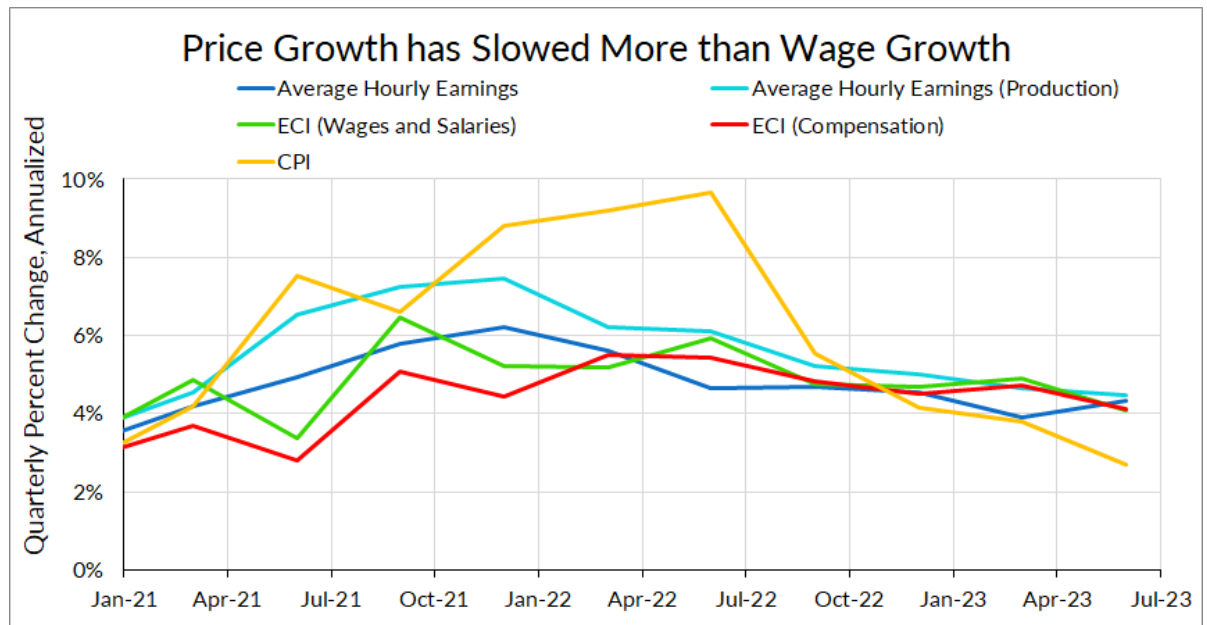
But, despite the labor market staying tight and inflation staying high relative to their scenarios, wage inflation *fell*.



Source: Bureau of Labor Statistics, Atlanta Fed, Author's Calculations

Why were these predictions so off? One reason is that the authors used a three-year weighted average of lagged inflation as their proxy for inflation expectations. This meant that as the model tries to project further into the future, the low inflation from 2019 and 2020 would have started to fall out of this moving average, and high (even if falling) inflation readings in 2022 would have moved in. This would have made it very difficult for the model to predict anything else other than increasing wage growth through 2022. In other words, the model forecasted high wage inflation because it embedded an assumption of very persistent wage-price spiral dynamics *by construction*. Because of these dynamics, a period of high inflation can induce the model into forecasting high, even accelerating, future nominal wage growth for a long time even if inflation falls.

The authors then raised the specter of a wage-price spiral, warning that levels of nominal wage growth of this magnitude were associated with high price inflation as well as declining or even negative real wage growth. Again, the opposite happened: both price inflation and wage inflation fell, but price inflation fell faster than wage inflation. In mid-2022, the decline in real wage growth halted and reversed. By the end of 2022, quarterly real wage growth turned positive once again.



Source: Bureau of Labor Statistics, Author's Calculations

In the end, none of the authors' dire predictions came to pass. In fact, disinflation started very soon after the paper was released. Rather than entering into a wage-price spiral, both wage and price inflation cooled, with price inflation falling faster than wage inflation. All of this happened despite persistently high levels of job openings as well as low unemployment.

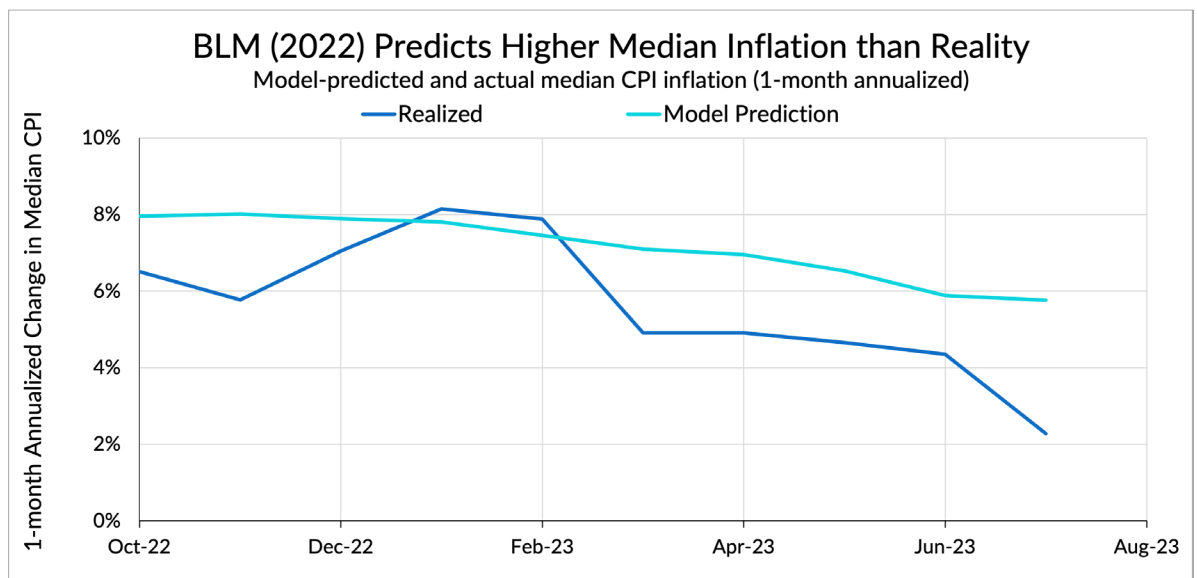
Ball, Leigh and Mishra (2022): Vacancies, Inflation Expectations and the Phillips Curve

Earlier this year, I wrote about [BLM \(2022\)](#), a paper presented at the prestigious [Brookings Papers on Economic Activity Conference in September, 2022](#). It is useful to revisit this model specifically because it contains features which have been put forth as explanations for why disinflation has come at so little cost to the labor market: a non-linear Phillips curve and a prominent role for inflation expectations.

To summarize, [BLM \(2022\)](#) modeled inflation as a function of inflation expectations, inflation shocks, and labor market slack. Specifically, they modeled the growth of monthly median CPI inflation using 10-year CPI inflation expectations from the Survey of Professional Forecasters, a cubic function of the 12-month average vacancy-to-unemployment rate, and "headline inflation shocks", measured as the difference between headline inflation and median inflation. They then ran scenario analyses, mapping out the path of inflation under different assumptions about the path of inflation expectations, the Beveridge curve, and inflation shocks.

As I did previously, I evaluate the BLM (2022) model by comparing the *actual* path of median CPI inflation to the model's prediction of median CPI inflation when using the actual paths of the explanatory variables since October 2022, the first month for which BLM (2022) made conditional predictions¹. That is to say, I ask the following question: Given the actual path of inflation expectations, vacancies, the unemployment rate, and inflation shocks, what does the model think median CPI inflation should be right now, and how does that compare with reality?

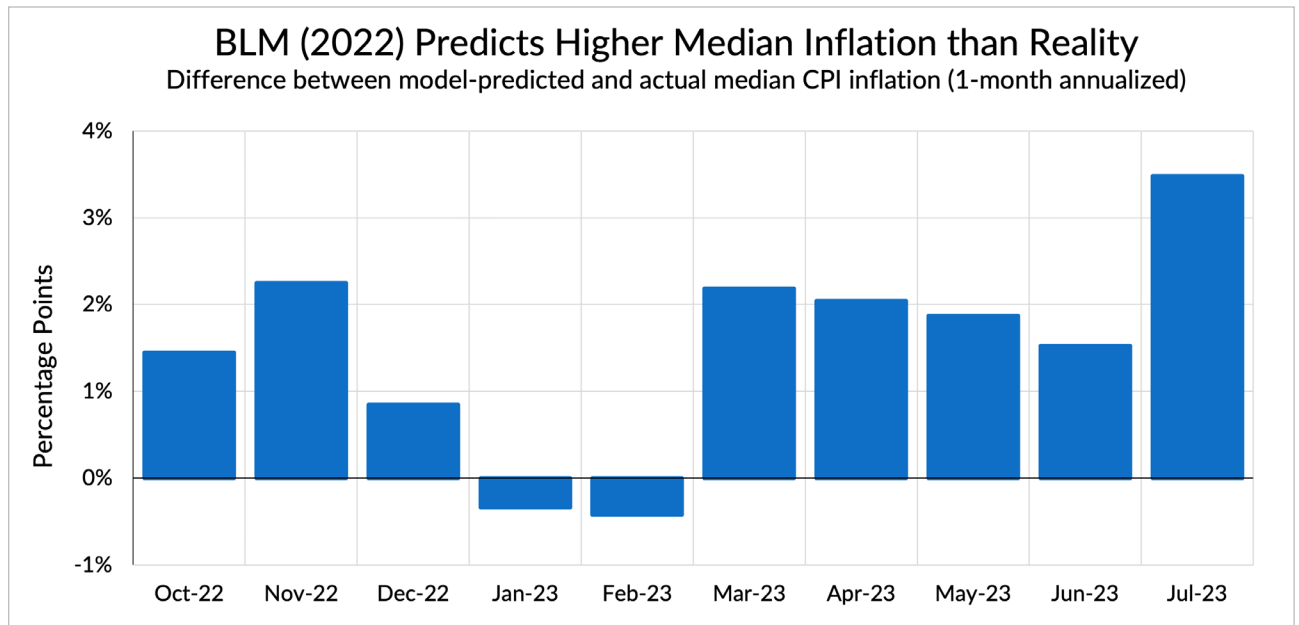
The model generally predicts higher median CPI inflation than was actually realized. For the last five months, the model thinks we should have seen annualized monthly inflation readings between 5.75% and 7%; instead, the median CPI inflation rate has come in under 5% since March.



Source: Bureau of Labor Statistics. The model is estimated on monthly data from January 1985 to September 2022. Data used for model estimation as well as prediction are the data available as of August 29th, 2023.

Below, I plot the differences between the model's prediction and reality, which are rather large. For six of the last ten months, the model prediction is over 1.5 percentage points higher than actual median CPI inflation. In fact, among the 462 months between January 1985 and July 2023, **five of the six highest prediction errors occur after September 2022.**

¹ I evaluate the model as presented in the [Brookings Papers on Economic Activity journal version of the paper](#), which is a slightly updated version of the model as presented during the [conference](#). In this version of the paper, the authors estimate the model using data up through September 2022, and make conditional forecasts for October 2022 forward. I also estimate the model using data up through September 2022, but I use data currently available, *not* the data available as of the publication of the paper. This matters because since the paper's publication there have been revisions to the CPI, JOLTS and unemployment rate data. Using different vintages of the data do not change the main takeaways of my analysis here. The most important difference is that the CPI headline shocks in early-mid 2022 are higher when using the older vintage data, so the model forecasts of inflation presented here are slightly lower than one would get if using the vintage data.

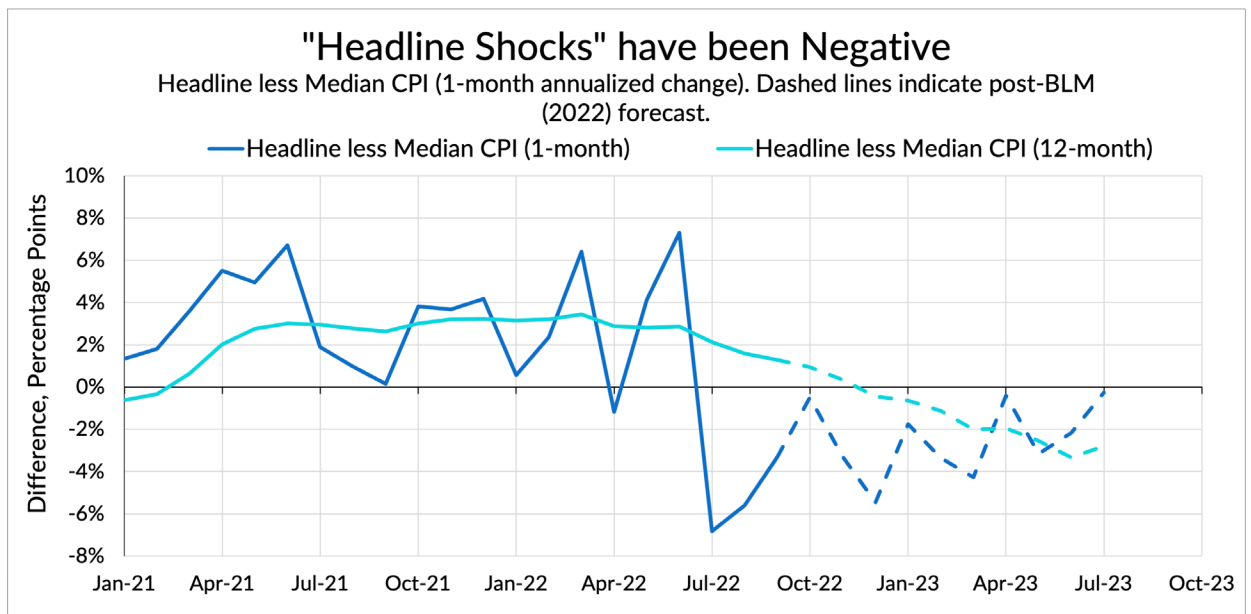


Source: Bureau of Labor Statistics, Author's Calculations

Why did the model predict much higher inflation than realized? Since the model's forecast of inflation relies on the trajectory of the three explanatory variables (inflation shocks, labor market tightness, and inflation expectations), we can investigate each factor separately.

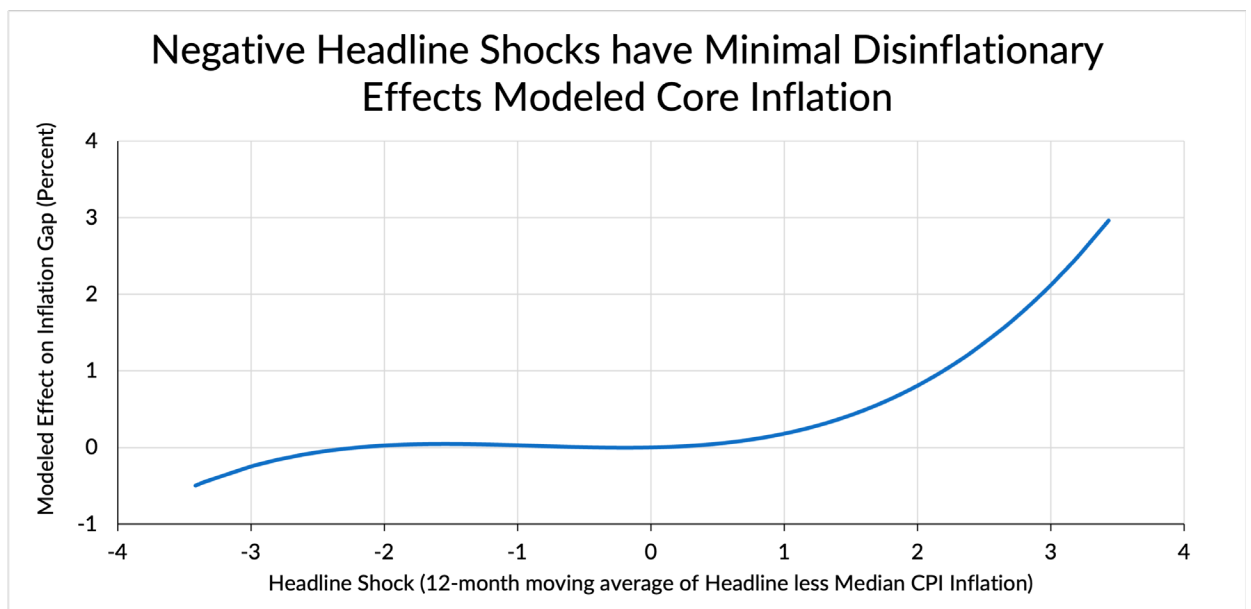
Headline Shocks

Ball, Leigh and Mishra used the difference between headline and median monthly CPI inflation to measure "headline shocks" to inflation, such as those driven by energy shocks and supply chain issues. While these were positive throughout 2021 and early 2022, these "headline shocks" have been negative since mid-2022.

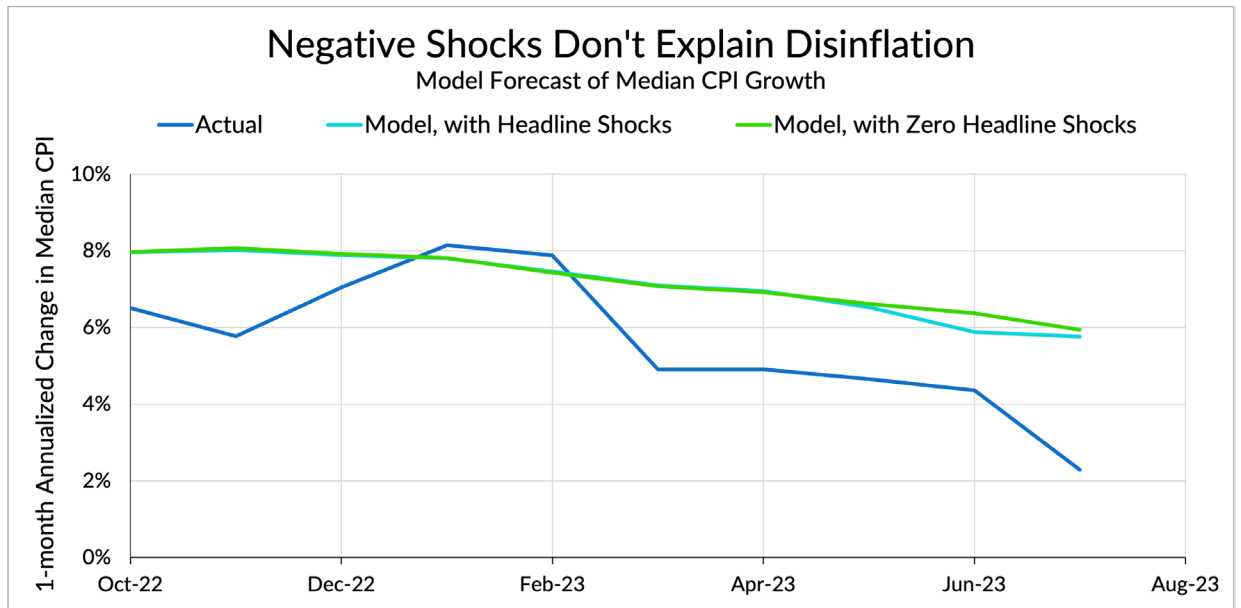


Source: Bureau of Labor Statistics, Author's calculations.

If headline shocks (measured in this way) turned from positive to negative, why didn't the model predict more disinflation? One reason is that one component in the forecast for median inflation is a cubic function of the headline shock. When one estimates the model on historical data, the cubic function of the headline shock is extremely flat for shocks between -2% and 1%:



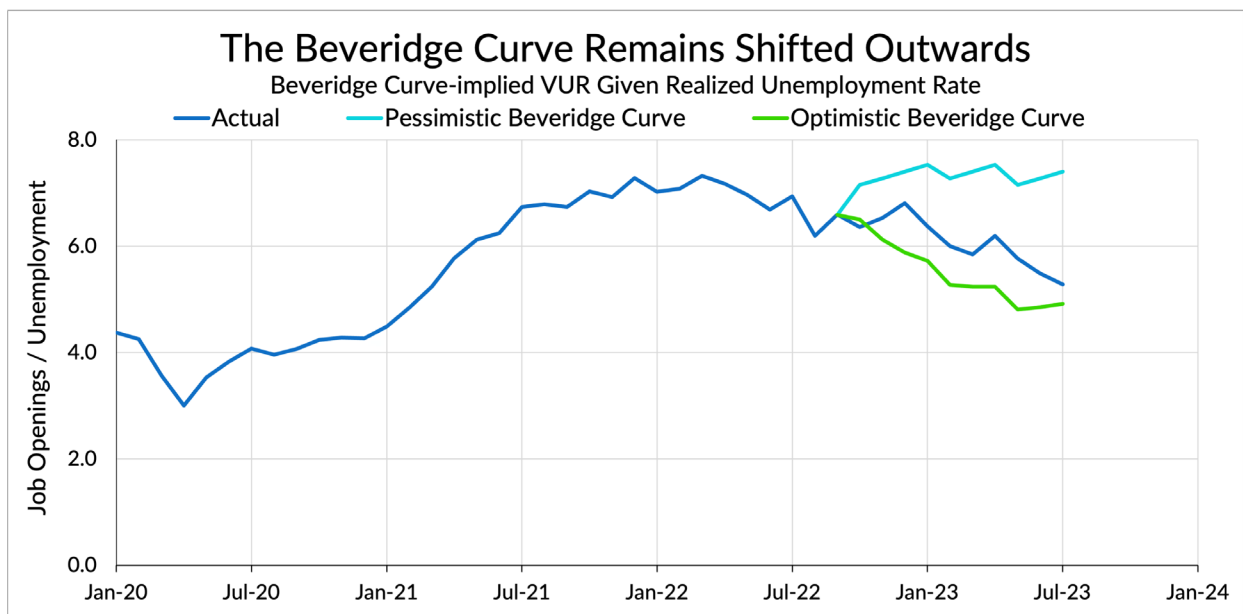
This means that moving from positive shocks to negative shocks in this range has almost no effect on the model's prediction of median inflation. Barring very consistent extreme differences between headline and median inflation, the model is unable to generate significant disinflation from these headline shocks. To demonstrate this, below I plot the model's prediction for median inflation given realized inflation expectations, realized labor market tightness, and either *realized* inflation shocks or *zero* inflation shocks. The difference between the model's predictions with real inflation shocks and zero inflation shocks is minimal:



Source: Bureau of Labor Statistics, Author's Calculations. The "Zero Headline Shocks" prediction uses realized inflation expectations, vacancy-to-unemployment ratios, but sets headline-less-median CPI inflation to zero for October 2022 forward.

Labor Market Tightness

In the paper, the authors laid out "optimistic" and "pessimistic" scenarios for the Beveridge curve. In the "optimistic" scenario, the Beveridge curve quickly shifts back by one-quarter to its pre-pandemic state every month, while in the "pessimistic" scenario, the Beveridge curve remains in its post-pandemic state. Since the vacancy-to-unemployment ratio is higher for any given unemployment rate when the Beveridge curve is more shifted out, the model predicts more inflation when the Beveridge curve is more shifted-out (for a given unemployment rate path).



Source: Bureau of Labor Statistics, Author's Expectations. The "pessimistic" Beveridge Curve assumes that vacancies will follow the post-pandemic Beveridge Curve, estimated on data between April 2020 and August 2022. The "optimistic" Beveridge Curve assumes that vacancies will shift back towards their pre-pandemic Beveridge Curve (estimated on data between July 2009 and March 2020) levels by 25% every month.annualized headline inflation and CPI inflation.

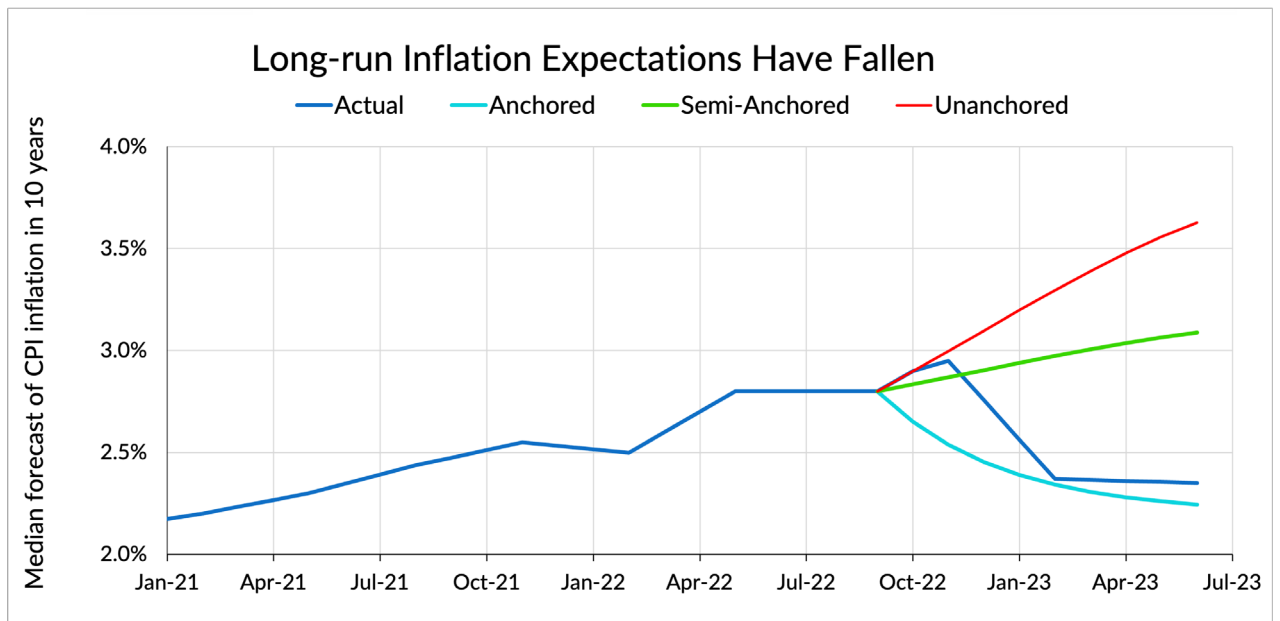
Over the last year, the Beveridge curve has performed somewhere in between the optimistic and pessimistic case, only partially shifting back from its post-pandemic state. As a result, the vacancy-to-unemployment rate has come down somewhat, but remains far above pre-pandemic levels.

In addition, the model uses an average of the previous 12 months of VUR to measure labor market slack, so while VUR has fallen, the 12-month average is still elevated. The 12-month average of VUR ending July 2023 is about the same level as the 12 months ending July 2022. In the eyes of the model, the labor market is still providing as much positive pressure to inflation as it was a year ago.

Inflation Expectations

In the paper, the authors made projections conditional on three different assumptions about the way long-run inflation expectations would move. In the most optimistic case, inflation expectations would remain anchored and revert quickly back to its pre-pandemic level. In the semi-anchored and unanchored scenarios, inflation expectations evolve in a way that would place a larger weight on recent headline inflation readings.

While inflation expectations stayed relatively elevated through the end of 2022, in 2023 they fell substantially. The 2023 Q2 median long-run expectation was 2.36%, fairly close to the "optimistic" scenario in the paper, in which long-run expectations anchor to their pre-pandemic level of 2.2.



Source: Bureau of Labor Statistics, Federal Reserve Bank of Philadelphia, Author's Calculations.

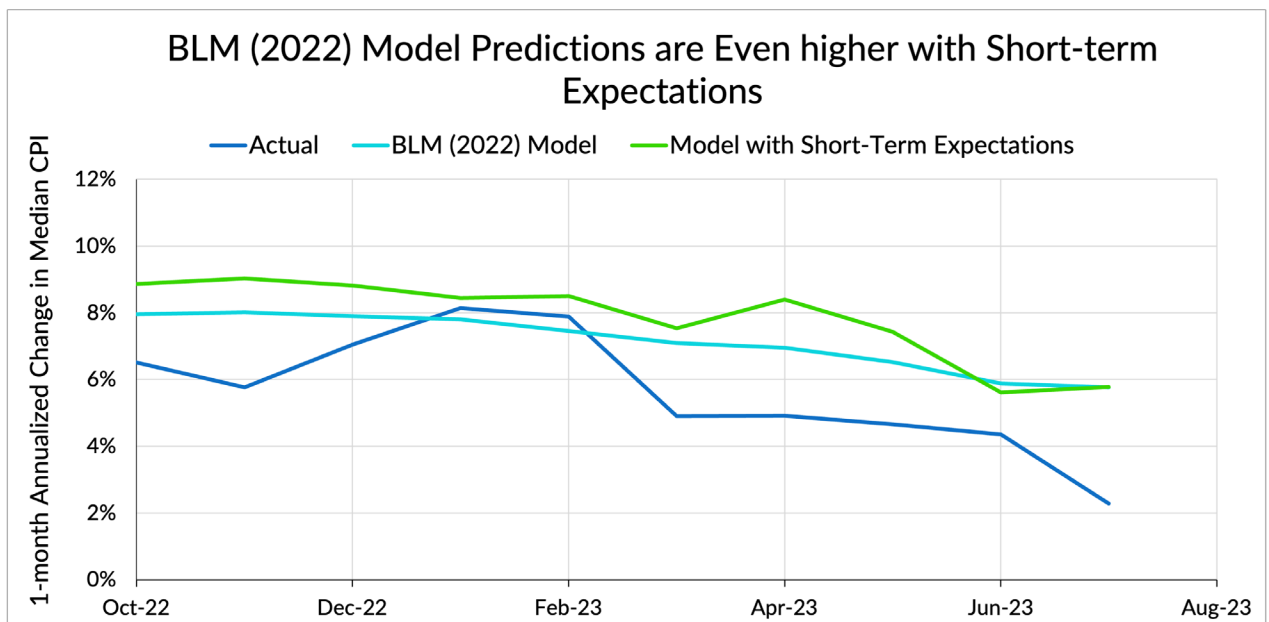
Some have argued that the Fed deserves credit for the recent disinflation because their monetary policy worked to lower inflation expectations. **This is exactly the kind of question that we should be able to test against these models.**

In the BLM (2022) model, median inflation is the sum of inflation expectations and the “inflation gap”, the latter of which is determined by labor market slack and headline shocks. In the paper, the authors used median 10-year expectations for CPI inflation from the Survey of Professional Forecasters to measure inflation expectations. Long-run inflation expectations have remained relatively stable throughout this period and never rose much. According to the model, the fall in long-run inflation expectations over the past year only contributes around -0.5pp to the fall in inflation. Even here, it is hard to explain falling inflation using the expectations channel as modeled even by its proponents.

Are long-run expectations actually the relevant measure of inflation expectations for determining inflation? At the conference discussion, former Federal Reserve Board of Governors member Laurence Meyer argued that short-run, not long-run, inflation expectations were the key to capturing potential shifts in inflation regimes. Over the past two years, short-run inflation expectations have risen and fallen much further than long-run inflation expectations. This raises the question—does shifting to short-run expectations salvage this model?

To check, I rerun the model substituting the Michigan Survey of Consumers median 1-year inflation expectations for the SPF 10-year median expectations. I recalculate the inflation gap by calculating the difference between the weighted median CPI inflation and the Michigan expectations measure, and regress the alternate inflation gap on the vacancy-to-unemployment ratio and headline shocks (as well as their quadratic and cubic terms) using data from January 1985 to September 2023. As I did with the standard model, I then use the model to create forecasts of median CPI inflation conditional on the actual path of the Michigan expectations measure, the vacancy-to-unemployment ratio, and headline shocks.

When these short-run inflation expectations are used instead, the model goes completely the wrong way, forecasting **even higher** inflation than the model with long-run inflation expectations. In fact, this change leads it to predict higher-than-actual median inflation for every month over the past year. According to the model, we should have been seeing median inflation prints between 7% and 10% annualized over the past few months, rather than consistent prints under 5%.



Source: Bureau of Labor Statistics, Author's Calculations

Why? One reason appears to be that short-run expectations are highly correlated with headline shocks, so when headline shocks are high, so too are short-run inflation expectations. This, in turn means that there is actually a very weak correlation between the “inflation gap” and headline shocks when short-run expectations are used. This means that the reduction in the headline shock doesn’t do as much to reduce the predicted median inflation in the model with short-term inflation expectations, relative to the model with long-term inflation expectations.

Ultimately, none of the mechanisms in the model were able to generate the disinflation actually observed. Headline shocks were negative, but the model does not generate significant disinflation from negative inflation shocks. The vacancy-to-unemployment ratio is still highly elevated. Long-run inflation expectations didn't have much room to fall, since they didn't rise that much in the first place.

Lessons Learned

Obviously, the journey back to low and stable inflation is far from over. The remaining "last mile" to 2% inflation is likely to continue following a bumpy, confusing, and complicated path. That said, it is useful to take stock of how far we've come and how we got here. Neither of the two models I covered above are able to rationalize the simultaneous existence of the disinflation that has happened and the strength of the labor market.

Many last year argued not only that we should risk a recession to combat inflation, but that recessionary job losses were a necessary cost that monetary policy should stomach. For some, mass unemployment was not simply collateral damage; it was the key mechanism through which inflation was to be controlled. Fortunately for American workers, this turned out not to be true.

These economists got it wrong because they were misled by ideas in macroeconomics that we at Employ America have been consistently pushing against. Although these ideas are commonly accepted in mainstream discourse, all failed the battle-test of whether they could improve our understanding of inflation during the post-COVID recovery, when it counted.

They relied heavily on the vacancy rate as a measure of labor market tightness, despite its flaws. They used a rigid Phillips curve framework in which the levels of labor utilization are tied to inflation, whereas in reality the tradeoffs between maximum employment and inflation are time-varying and better thought of in terms of the speed of labor market recovery rather than the outright level. They thought wage-price spirals were a serious inflationary threat, despite the evidence to the contrary. Finally, insufficient attention was paid to the disinflationary effects of normalizing supply chains, something we have been monitoring for quite some time now and continue to see as highly relevant for understanding growth, inflation, and employment going forward.

In the end, those who focused on the supply-side explanations of inflation would prove to have a better understanding of the dynamics behind our inflation problems (even if some predictions on that front underestimated the time it would take for those issues to resolve). The “supply side” of the economy can be subject to dynamic and durable shocks, and it spans much more than what the unemployment rate or wage growth can capture. Physical capacity challenges and commodity shortages were important features of the current inflationary episode. Going forward, understanding the supply side will continue to be key to understanding inflation.

For their part, the Fed, to their credit thus far, only partially bought into these dire predictions and assumptions. In 2022, they signaled that they were prepared to induce a “mild” recession in their fight against inflation. We are fortunate that the Fed did not fully buy into these models. Imagine if, say, Powell announced in an FOMC statement that the committee had decided that the new Summary of Economic Projections foresaw an unemployment rate of 6.5% under appropriate monetary policy, and that the Fed was prepared to hike into a deep recession. Or, suppose that there was some kind of shock, such as a banking crisis, that did result in a large increase in unemployment. Had the Fed seen the extreme measures these models call for as appropriate and necessary to reduce inflation, we could be living in a very different economy right now.