Demand versus Supply: Which is More Important for Inflation?[*]

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Abstract

I use Phillips curve type regressions to assess the relative contributions of demand and supply forces to U.S. inflation during the pandemic era (February 2020 onward) and the decade after the Great Recession. Model 1 measures demand and supply using the vacancy-unemployment ratio and the New York Fed's Global Supply Chain Pressure Index. Model 2 uses the demand- and supply-driven components of PCE inflation from Shapiro (2026). Both models yield similar results: demand forces dominated during the pandemic era, while supply forces drove low inflation after the Great Recession, helping to explain why inflation remained persistently below the Fed's 2 percent goal despite highly accommodative monetary policy.

Keywords: *Inflation, Phillips curve, Demand, Supply, Pandemic era.*
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1 Introduction

The 12-month change in the headline personal consumption expenditures (PCE) price index rose from 1.66% in February 2020 at the start of the pandemic to a 40-year high of 7.25% in June 2022. Inflation has since declined substantially, standing at 2.74% in August 2025. The typical hybrid New Keynesian Phillips curve (NKPC) implies that inflation is driven by: (1) demand forces, (2) supply forces, (3) short-run expected inflation, and (4) lagged inflation. The relative importance of expected future inflation versus lagged inflation is linked to the degree of anchoring for short-run expected inflation. Shifts in the values of NKPC parameters can affect the relative contribution of these various sources to movements in inflation.

This paper uses Phillips curve type regressions to assess the relative contributions of demand and supply forces to U.S. inflation during the pandemic era (defined as the period from February 2020 onward) and the decade following the end of the Great Recession. In the first specification (Model 1), demand and supply forces are measured using the vacancy-unemployment ratio and the New York Fed's Global Supply Chain Pressure Index, respectively. In the second specification (Model 2), demand and supply forces are measured using the demand-driven and supply-driven components of PCE inflation constructed by Shapiro (2026). In both specifications, expected inflation is measured using the median 1-year ahead forecast from the Survey of Professional Forecasters (SPF). I also examine the sensitivity of the results to using household inflation expectations from the University of Michigan Survey.

The results derived from the two models are largely in agreement. For both models, variance decompositions imply that demand forces became more important for inflation during the pandemic era and dominated the influence of supply forces. For Model 1, the variance contribution of demand goes from almost zero to 48%. For Model 2, the variance contribution of demand goes from 25% to 64%. For each model, the variance contribution of supply during the pandemic era is lower than the contribution of demand. The results are robust to starting the variance decomposition one year later in February 2021, thereby focusing on the rise of PCE inflation above 2% and its subsequent decline. The results are also robust to the use of transformed demand and supply variables that are approximately uncorrelated with each other, but remain highly correlated with the original versions of the same variables. The variance decomposition results are in line with those obtained by Giannone and Primiceri (2024) and Bergholt, et al. (2025) who identify demand and supply shocks using Bayesian structural vector autoregressions with sign restrictions. Both studies find that demand shocks account for more than 50% of fluctuations in U.S. inflation during the pandemic era.

I show that demand forces continue to dominate supply forces if the variance decomposition for the pandemic era is done using 1-year ahead household inflation expectations from the University of Michigan Survey rather than SPF expectations. But if Model 1 employs the unemployment gap as the demand variable, rather than the vacancy-unemployment ratio, then the results for the pandemic era are markedly different. First, the contributions of demand and supply become more balanced. Second, the variance contribution of expected inflation rises to 63% when the pandemic era sample period ends in 2024.m12, thereby excluding a mid-2025 spike in household inflation expectations. These results align with the findings of Coibion and Gorodnichencko (2025) and Beaudry, Hou, and Portier (2024b) who argue that expected inflation was the main driver of pandemic era inflation, supplemented by supply forces. Both studies employ the unemployment gap and household inflation expectations in Phillips curve regressions. The key takeaway is that the choice of the demand variable, the source of inflation expectations, and the sample end date can all be important for the pandemic era results.

While the negative unemployment gap comoves strongly with the vacancy-unemployment ratio, the unemployment gap is highly volatile during the pandemic era. This volatility reduces its explanatory power for inflation. More generally, Barnichon and Shapiro (2024) show that the vacancy-unemployment ratio outperforms other measures of labor market slack when forecasting inflation. This is because movements in the ratio partly reflect shifts in the Beveridge curve which are important for explaining inflation fluctuations.

Counterfactual simulations provide another way of assessing the relative importance of demand versus supply variables as drivers of inflation over different periods. The exercise can be viewed as a type of level decomposition, in contrast to a variance decomposition. For these simulations, I allow only the demand variable, or only the supply variable, to evolve along the path observed in the data while holding the counterpart variable constant. The simulations allow expected inflation to respond to the counterfactual path of inflation using laws of motion that are estimated over the full sample. This setup captures the idea that if inflation had evolved differently in the data, then expected inflation would also have evolved differently.

Based on counterfactual simulations starting in February 2020, the models imply that movements in demand and supply variables both contributed to the rise and fall of pandemic-era inflation. But the "demand only" simulations provide a better fit of the U.S. inflation paths in three out of four cases, as measured by the mean absolute gap between counterfactual inflation and U.S. inflation. The demand variables remain above their pre-pandemic averages in August 2025 while supply variables have returned to their pre-pandemic averages. All else equal, further declines in the demand variables are needed to achieve 2% inflation.

Based on counterfactual simulations starting in December 2007, both models imply that movements in supply variables were the primary drivers of persistently low inflation during the decade following the end of the Great Recession. In all cases, the "supply only" simulations provide a better fit of the U.S. inflation paths from December 2007 to January 2020. Given that monetary policy operates to influence demand-driven inflation, the presence of supply-driven low inflation after the Great Recession helps to account for the Fed's difficulty in achieving its 2% inflation goal during these years, despite holding the federal funds rate close to zero for seven consecutive years from December 2008 to December 2015. Indeed, from June 2009 through February 2020, the 12-month headline PCE inflation rate was below the Fed's 2% goal for 101 out of 129 months, or 78% of the time.[1]

Related literature. Numerous studies have sought to identify the most important drivers of U.S. inflation during the pandemic era. A consensus view has not emerged in the literature.[2] Rather, the various studies emphasize different combinations of demand forces, supply forces, energy prices, or monetary policy accommodation. Table 1 provides a sampling of results in the literature.[3] The most common finding is that demand and supply forces both contributed to pandemic era inflation, with most studies placing higher importance on demand forces. This article reaches a similar conclusion.

Blanchard (2021) and Summers (2021) warned of the upside risks to inflation coming from excessive pandemic-era fiscal stimulus. Along these lines, cross-country studies by Jordà, et al. (2022) and de Soyres, Santacreu, and Young (2022) find that fiscal stimulus was larger and subsequent inflation was higher in the United States relative to other countries. This evidence supports a demand-driven view of pandemic-era inflation.

Using an estimated structural vector autoregression (SVAR) with sign restrictions, Giannone and Primaceri (2024) conclude that pandemic-era inflation was driven mainly by demand shocks as expansive fiscal policy shifted up aggregate demand. The relatively flat slope of the aggregate demand curve (a result of successful inflation targeting by central banks) implies that adverse supply shocks have relatively small impacts on inflation. Faria-e-Castro (2025) uses a medium-scale macroeconomic model to break down movements in inflation and output into impacts coming from various types of demand and supply shocks. He identifies expan-

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[1] Alternative hypotheses for persistently low inflation during these years have invoked the role played by the zero lower bound (ZLB) on nominal interest rates. See, for example, Hills, Nakata, and Schmidt (2019), Mertens and Williams (2019), and Lansing (2021).

[2] Similarly, there are many competing views about the main drivers of the Great Inflation that took place in the 1970s and early 1980s. See, for example, Nelson (2022), Bryan (2013), and Lansing (2000).

[3] See also the January 4, 2025 webcast of the AEA panel discussion on "Inflation and the Macroeconomy," with Ben Bernanke, John Cochrane, Jason Furman, and Christina Romer, available at www.aeaweb.org/webcasts/2025/inflation-macroeconomy.

sionary fiscal and monetary policy shocks that boosted demand as the main drivers of high inflation during the pandemic era.

Bergholt, et al. (2026) demonstrate that the use of estimated SVARs to decompose inflation into demand-driven and supply-driven components is subject to considerable modeling uncertainty regarding prior assumptions about the deterministic versus stochastic forces that govern the size of the constant terms in the SVAR. They propose a solution to this problem that involves imposing a "single-unit-root prior." After doing so, they find that demand shocks account for 56% of fluctuations in U.S. inflation in 2021 and 77% in 2022.

Table 1: Studies of pandemic-era inflation

Study	Primary driver	Methodology/mechanism
Jordà, et al. (2022) de Soyres, et al. (2022)	Demand	Cross-country fiscal stimulus
Giannone & Primaceri (2023) Bergholt, et al. (2026)	Demand	Structural VAR
Faria-e-Castro (2025)	Demand	Estimated DSGE model
Levy (2024)	Demand	U.S. imports of goods
Harding, et al. (2023) Benigno & Eggertsson (2023) Crust, et al. (2023), Hobijn, et al. (2023)	Demand	Nonlinear Phillips curve
Bianchi, et al. (2023)	Demand	Estimated DSGE model
Smets and Wouters (2024)	Supply	Estimated DSGE model
Guerrieri, et al. (2023) Bernanke & Blanchard (2025)	Supply	Structural VAR
Coibion & Gorodnichenko (2025) Beaudry, et al. (2024b)	Expectations & Supply	Estimated NKPC New Keynesian model
Gagliardone & Gertler (2023)	Oil prices	Calibrated DSGE model
Shapiro (2022, 2026), Ball, et al. (2022, 2025) di Giovanni, et al. (2023) Liu & Nguyen (2023), Koch & Noureldin (2024) Eickmeier & Hofmann (2025) Amiti, et al. (2024), Bai, et al. (2024)	Demand & Supply	Various

Levy (2024) argues that the observed supply chain bottlenecks were endogenous, i.e., the bottlenecks were caused by an extraordinary demand surge caused by: (1) excessive fiscal stimulus, (2) accommodative monetary policy, and (3) pandemic lockdowns that shifted consumption towards goods versus services. Using data on U.S. imports of containerized goods, he shows that the *quantities* of goods delivered to consumers *increased* substantially during the months following the onset of the pandemic, favoring a demand-driven explanation of the inflation surge. As a robustness check in the variance decompositions, I control for the endogeneity of demand or supply forces by employing transformed demand and supply variables that are approximately uncorrelated with each other.

Studies by Harding, Lindé, and Trabandt (2023), Benigno and Eggertsson (2023), and Crust, Lansing, and Petrosky-Nadeau (2023) find that elevated inflation levels since early 2021 are consistent with a non-linear Phillips curve that becomes steeper at lower levels of economic slack. Hobijn, et al. (2023) present evidence of non-linear Phillips curve relationships in a variety of countries. These results lend support to the importance of demand forces that reduced economic slack.[4]

Bianchi, Faccini and Melosi (2023) estimate a Dynamic Stochastic General Equilibrium (DSGE) model with "unfunded fiscal shocks," defined as fiscal shocks that do not trigger an offsetting adjustment to future fiscal policy.[5] They show that fiscal stimulus in the form of the Coronavirus Aid, Relief, and Economic Security (CARES) Act and the American Rescue Plan Act (ARPA) can account for most of the inflation rise during 2021 and 2022. Cochrane (2025) makes a similar argument.

Smets and Wouters (2024) extend the Bianchi, Faccini, and Melosi (2023) model to allow for "partially unfunded" versions of all shocks. This feature lessens the inflationary impact of demand shocks while enhancing the inflationary impact of supply shocks. They conclude that most of the rise and fall of pandemic-era inflation was due to supply disturbances in the form of price mark-up shocks.

Using SVARs and New Keynesian type models, Guerrieri, et al. (2023) and Bernanke and Blanchard (2025) emphasize the role of higher energy prices linked to the Ukraine war and disruptions of global supply chains as the primary drivers of pandemic-era inflation. Coibion and Gorodnichencko (2025) emphasize the de-anchoring of short-run inflation expectations driven by rising energy and commodity prices together with supply chain disruptions. Along similar lines, Beaudry, Hou, and Portier (2024b) argue that pandemic-era inflation was driven mainly by the interaction of broad-based supply shocks with households' boundedly rational inflation expectations in an environment with a relatively flat Phillips curve.

Using a calibrated DSGE model, Gagliardone and Gertler (2023) conclude that oil price shocks and accommodative monetary policy were the main drivers of pandemic-era inflation.

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[4] Ball, Leigh, and Mishra (2022, 2025) also allow for a nonlinear Phillips curve but their explanation for pandemic-era inflation includes an important role for energy prices and supply chain disruptions.

[5] The model can be viewed as one that allows for an endogenous inflation target that evolves so as to finance any unfunded government debt. The basic mechanism is the "fiscal theory of the price level," as explained by Cochrane (2023).

But a non-monetary demand shock also contributes to inflation starting in 2022. Using various methods, Shapiro (2022, 2025), Ball, Leigh, and Mishra (2022, 2025), di Giovanni, et al. (2023), Liu and Nguyen (2023), Koch and Noureldin (2024), Eickmeier and Hofmann (2025), Amiti, et al. (2024), and Bai, et al. (2024) all conclude that pandemic-era inflation was driven by a combination of demand and supply forces.

2 Candidate drivers of inflation

Furman (2022) discusses the potential sources of pandemic-era inflation from the perspective of terms that appear in the Phillips curve. The typical New Keynesian Phillips curve (NKPC) implies that inflation movements are driven by (1) demand forces, (2) supply forces, (3) expected inflation, and (4) lagged inflation. A typical formulation of the NKPC is

$$\begin{aligned}
\pi_t - \pi^* &= \kappa\, mc_t + u_t + \frac{\beta}{1+\beta(1-\mu_\pi)}\,(E_t\pi_{t+1} - \pi^*) + \frac{1-\mu_\pi}{1+\beta(1-\mu_\pi)}\,(\pi_{t-1} - \pi^*), \\
mc_t &= \text{firms' real marginal cost, deviation from mean (demand variable)}, \qquad (1) \\
u_t &= \text{cost push shock (supply variable)}, \\
E_t\pi_{t+1} &= \text{short-run expected inflation}, \\
\pi_{t-1} &= \text{lagged inflation},
\end{aligned}$$

where π^* is the central bank's inflation target, κ is the structural slope parameter, β is the firm's discount factor, and μ_π is the fraction of non-reoptimizing firms that index prices to the inflation target, rather than lagged inflation.[6]

Equation (1) states that inflation is partly driven by movements in short-run expected inflation. If the value of the slope parameter κ is small, as suggested by many empirical studies, then expected inflation becomes more important for determining movements in actual inflation. At the height of the Great Inflation in October 1979, Fed Chair Paul Volcker (1979) famously observed, "Inflation feeds in part on itself, so part of the job of returning to a more stable and more productive economy must be to break the grip of inflationary expectations."[7]

Jørgensen and Lansing (2025a) show that the value of μ_π is a simple measure of anchoring for short-run expected inflation, with higher values of μ_π implying stronger mean reversion

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[6] Equation (1) is a version of the NKPC specification derived by Cogley and Sbordonne (2008) which allows for drifting trend inflation. For the analysis here, I impose constant trend inflation equal to π^*, as in the version described by Mavroeidis, Plagborg-Møller, and Stock (2014, p. 131).

[7] More recently, Fed Vice Chair Clarida (2020) has stated: "With regard to inflation expectations, there is a broad agreement among academics and policymakers that achieving price stability on a sustained basis requires that inflationary expectations be well anchored...This is especially true in the world that prevails today, with flat Phillips curves in which the primary determinant of actual inflation is expected inflation."

of inflation to π^* in response to shocks.[8] Survey-based anchoring measures for short-run expected inflation show a modest decline in the sample period from early 2020 onward.[9]

From a theoretical perspective, the relative importance of inflation drivers can be influenced by shifts in the values of the NKPC parameters μ_π and κ, or shifts in the relative volatilities of demand versus supply shocks.[10]

3 Data

Figure 1 shows the data used in the analysis which runs from 2000.m1 to 2025.m8. This is a sample period of consistent U.S. monetary policy and stable long-run inflation expectations. I also use data from 1999.m1 to 1999.m12 to construct 12-month changes in the variables starting in 2000.m1.

In Figure 1, I interpret the ratio of the number of job vacancies to the number of unemployed workers (vu_t) as a demand variable.[11] I interpret the New York Fed's Global Supply Chain Pressure Index ($gscpi_t$) as a supply variable. The value of the index represents how many standard deviations supply chain conditions are above or below the sample average.[12] As alternative measures of demand and supply forces, I use the demand-driven (π_t^d) and supply-driven (π_t^s) components of PCE inflation from Shapiro (2026).[13]

Expected inflation ($E_t\pi_{t+12}$) is the median 1-year ahead forecast for CPI inflation from the Philadelphia Fed's quarterly Survey of Professional Forecasters, interpolated to obtain monthly values.[14] I examine the sensitivity of the results to using 1-year ahead household inflation expectations from the University of Michigan Survey.

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[8] Using a three equation New Keynesian model, they show that higher values of μ_π, driven plausibly by a shift to a more vigilant monetary policy regime, allow the model to account for numerous features of evolving U.S. inflation behavior since 1960. These features include lower inflation persistence and volatility, the shifting pattern of slope coefficients in reduced-form Phillps curve regressions, and the decreased sensitivity of survey-based inflation forecasts to movements in actual inflation. See also Jørgensen and Lansing (2021, 2026).

[9] See Lansing and Nucera (2023), Guerrieri, et al. (2023, p. 48), and Jørgensen and Lansing (2025a, p. 6).

[10] For empirical evidence of such shifts, see Lubik and Schorfheide (2004), Cogley and Sbordonne (2008), Galí and Gambetti (2009), Del Negro, et al. (2020), Hadjani (2023), Inoue, Rossi and Wang (2025), Jørgensen and Lansing (2025b), and Bergholt, Furlanetto, and Vaccaro-Grange (2026).

[11] Data on vacancies prior to 2000.m12 are from Barnichon (2010).

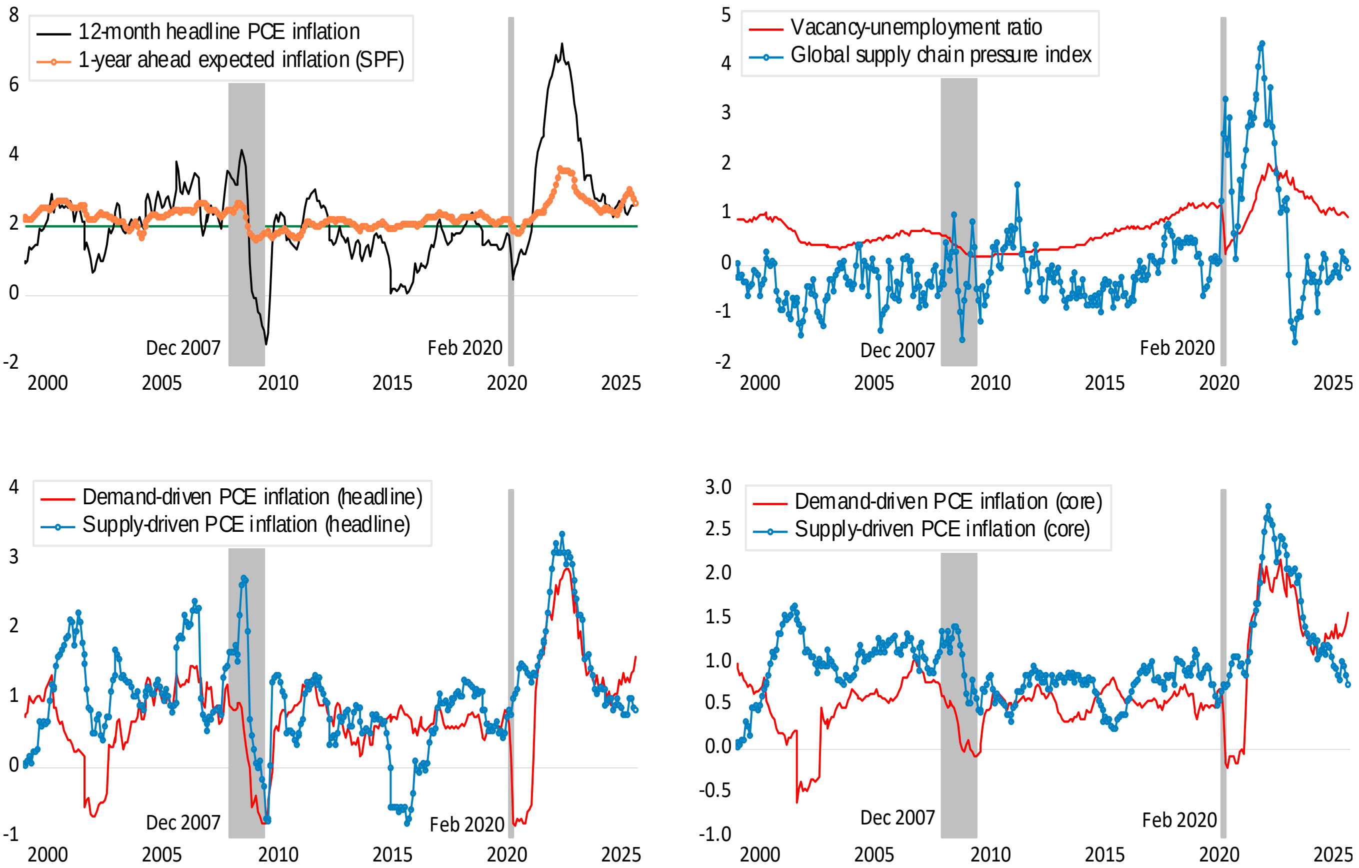
[12] Liu and Nguyen (2023) and Coibion and Gorodnichenko (2025) also employ $gscpi_t$ as a supply variable but instead use the unemployment gap as the demand variable. In Section 5, I show that the choice of demand variable is important for the pandemic era results.

[13] The demand (supply) driven component is measured using categories of the PCE basket of goods and services for which the unexpected change in price moves in the same (opposite) direction as the unexpected change in quantity during a given month.

[14] Specifically, I assign the quarterly survey reading to the middle month of each quarter and then use log-linear interpolation to connect the middle month reading to previous and subsequent middle month readings. The survey data runs through 2025.q3 which yields monthly data through August 2025.

Figure 1 shows that the demand and supply variables can often move in opposite directions. This occurs in the months immediately following the start of the Great Recession in December 2007 and the start of the pandemic recession in February 2020. In these examples, the demand variable is moving down while the supply variable is moving up. But in both cases, the pattern subsequently changes so that the demand and supply variables are either both moving down (after the Great Recession) or both moving up (after the pandemic recession). The impact on overall inflation is strengthened when the demand and supply variables are both moving in the same direction.[15] The comovement of each variable with overall inflation influences the variance decomposition results.

Figure 1: Headline PCE inflation and candidate drivers of inflation



Note: Data used to examine the drivers of PCE inflation from 2000.m1 to 2025.m8.

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[15] The demand- and supply-driven components of PCE inflation from Shapiro (2026) comove strongly during the Great Inflation era of the late 1970s and early 1980s.

Table 2 shows the correlation coefficients between 12-month changes in headline PCE inflation and 12-month changes in the driver variables. I use 12-month changes here to capture near-term comovements. But later in Section 6, I use regressions with variables expressed in levels for counterfactual simulations. In almost all cases, the correlation coefficient in Table 2 increases when going from the first sample period to second sample period. This result is particularly true for the demand variable vu_t where the correlation coefficient goes from 0.33 to 0.86. Similar correlation patterns are obtained using core PCE inflation.[16]

Table 2: Correlation coefficients with $\pi_t - \pi_{t-12}$, headline PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$vu_t - vu_{t-12}$	0.33	0.86
$gscpi_t - gscpi_{t-12}$	0.32	0.46
$\pi_t^d - \pi_{t-12}^d$	0.73	0.90
$\pi_t^s - \pi_{t-12}^s$	0.87	0.82
$E_t\pi_{t+12} - E_{t-12}\pi_t$	0.64	0.83
$\pi_{t-12} - \pi_{t-24}$	-0.49	0.03

Comparing across the two sample periods, the correlation coefficient between $\pi_t - \pi_{t-12}$ and its 12-month lagged value $\pi_{t-12} - \pi_{t-24}$ goes from -0.49 to 0.03. This result indicates lower mean reversion in the 12-month inflation change during the pandemic era, i.e., higher inflation persistence (Lansing 2022).

Figure 2 shows that the vacancy-unemployment ratio comoves broadly with demand-driven PCE inflation. The global supply chain pressure index comoves broadly with supply-driven PCE inflation. The correlation coefficient between 12-month changes in the two demand variables vu_t and π_t^d increases from 0.47 to 0.95 when going from the first sample period to the pandemic-era sample period. The correlation coefficient between 12-month changes in the two supply variables $gscpi_t$ and π_t^s increases from 0.27 to 0.39.

4 Phillips curve type regressions

Tables 3 and 4 show the results of regressing 12-month changes in headline PCE inflation on 12-month changes in: (1) a demand variable, (2) a supply variable, (3) expected inflation, and (4) lagged inflation. Model 1 uses vu_t and $gscpi_t$ as the demand and supply variables, respectively. Model 2 uses π_t^d and π_t^s as the demand and supply variables.

The estimated coefficients for Model 1 (Table 3) are mostly significant. The exceptions are the coefficient on vu_t in the first sample period and the coefficient on lagged inflation in

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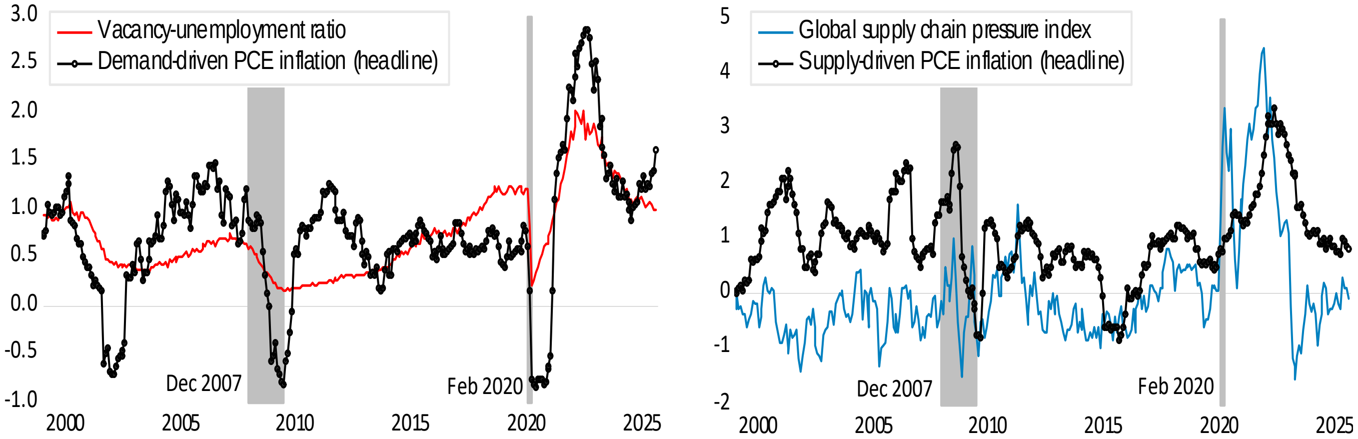
[16] Appendix A provides results using core PCE inflation in place of headline PCE inflation.

Figure 2: Demand and supply variables



Notes: The vacancy-unemployment ratio comoves broadly with demand-driven PCE inflation. The global supply chain pressure index comoves broadly with supply-driven PCE inflation. In both panels, the comovement is stronger during the pandemic era from February 2020 onward.

the second sample period.[17] The R^2 statistic increases from 64.3% to 92.7% when going from the first to the second sample period. Below, I will decompose these R^2 statistics into the percentage variation in $\pi_t - \pi_{t-12}$ that is attributable to each explanatory variable.

The non-significant regression coefficient on vu_t in the first sample period, together with the observation of persistently low inflation over much of the same time frame, provides insight into why many policymakers came to view the relationship between inflation and labor market slack (a demand variable) to be very weak or nonexistent during the years preceding the pandemic. Indeed, many empirical studies employing pre-pandemic inflation data estimate NKPC slope parameters that are small or not significantly different from zero.[18] According to former Fed Chair Yellen (2019): "The slope of the Phillips curve—a measure of the responsiveness of inflation to a decline in labor market slack—has declined very significantly since the 1960s. In other words, the Phillips curve appears to have become quite flat."[19]

The estimated coefficients for Model 2 (Table 4) are all statistically significant. The

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[17] The insignificant coefficient on vu_t in the first sample period foreshadows one of the findings in Section 6. Namely, the episode of low inflation in the decade after the Great Recession was driven mainly by supply forces.

[18] See, for example, Hazell, et al. (2022), Beaudry, Hou, and Portier (2024a), and Inoue, Rossi, and Wang (2025).

[19] See also the quote from Clarida (2020) in footnote 7 and the two New York Times articles: "*Biden and the Fed Leave 1970s Inflation Fears Behind*" (February 15, 2021) and "*Larry Summers Warned About Inflation. Fed Officials Push Back*" (March 25, 2021).

R^2 statistics exceed 90% in both sample periods. This is because π_t^d and π_t^s are actual components of headline PCE inflation π_t which appears on the left side of the regression equation.[20] Nevertheless, the estimated coefficients on the other two explanatory variables (expected inflation and lagged inflation) remain statistically significant. Notice, however, that the estimated coefficient on expected inflation is negative in the second sample period. This result is driven by the data from 2024.m6 onward when movements in headline PCE inflation and expected inflation are observed to move in opposite directions for one or two months at time. The corresponding regression for core PCE inflation (Appendix A, Table A2) yields a positive and statistically significant coefficient on expected inflation.

Table 3: Model 1 regressions, headline PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$vu_t - vu_{t-12}$	-0.24 (0.40)	**2.19** (0.21)
$gscpi_t - gscpi_{t-12}$	**0.41** (0.09)	**0.35** (0.06)
$E_t\pi_{t+12} - E_{t-12}\pi_t$	**3.12** (0.24)	**1.46** (0.22)
$\pi_{t-12} - \pi_{t-24}$	$\mathbf{-0.41}$ (0.04)	-0.06 (0.05)
R^2	64.3%	92.7%

Notes: Dependent variable is $\pi_t - \pi_{t-12}$, where π_t is 12-month headline PCE inflation. All regressions include a constant term. Standard errors in parentheses. Boldface indicates significant at the 5% level.

Table 4: Model 2 regressions, headline PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$\pi_t^d - \pi_{t-12}^d$	**0.75** (0.05)	**1.19** (0.05)
$\pi_t^s - \pi_{t-12}^s$	**0.83** (0.03)	**1.32** (0.07)
$E_t\pi_{t+12} - E_{t-12}\pi_t$	**0.85** (0.12)	$\mathbf{-0.56}$ (0.17)
$\pi_{t-12} - \pi_{t-24}$	$\mathbf{-0.12}$ (0.02)	$\mathbf{-0.12}$ (0.02)
R^2	92.6%	98.1%

Notes: Dependent variable is $\pi_t - \pi_{t-12}$, where π_t is 12-month headline PCE inflation. All regressions include a constant term. Standard errors in parentheses. Boldface indicates significant at the 5% level.

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[20] Shapiro (2026) also identifies a third "ambiguous" component of headline PCE inflation defined as $\pi_t^a = \pi_t - \pi_t^d - \pi_t^s$. I consider ambiguous inflation in Table 8.

5 Variance decompositions

I use the regression results in Tables 3 and 4 to perform variance decompositions. First, I add a residual term $resid_t$ to the estimated regression equation, creating an in-sample identity. The variables in the identity can be expressed as deviations from their sample means while the means are consolidated into the constant term. Multiplying both sides of the resulting expression by $\Delta_{12}\pi_t - E(\Delta_{12}\pi_t)$ where $\Delta_{12}\pi_t \equiv \pi_t - \pi_{t-12}$ and then taking the unconditional expectation of both sides yields an expression of the following form:

$$\begin{aligned} Var(\Delta_{12}\pi_t) \;\equiv\;& c_1\, Cov(\Delta_{12}vu_t,\, \Delta_{12}\pi_t) \;+\; c_2\, Cov(\Delta_{12}gscpi_t,\, \Delta_{12}\pi_t) \\ &+ c_3\, Cov(\Delta_{12}E_t\pi_{t+12},\, \Delta_{12}\pi_t) \;+\; c_4\, Cov(\Delta_{12}\pi_{t-12},\, \Delta_{12}\pi_t) \\ &+ Cov(resid_t,\, \Delta_{12}\pi_t), \end{aligned} \tag{2}$$

where c_1 through c_4 are the estimated regression coefficients from Table 3 and the covariance terms are computed using the data within the sample. The above equation states that movements in $\pi_t - \pi_{t-12}$ must be accounted for by movements in either the demand variable, the supply variable, expected inflation, lagged inflation, or the residual. Dividing both sides of the equation by $Var(\Delta_{12}\pi_t)$ and then multiplying by 100 yields the percentage variation assigned to each source.[21]

Table 5 shows the percentage variation in $\pi_t - \pi_{t-12}$ attributable to each source, depending on the sample period and the regression model.[22] The residual (or unexplained) variation is equal to $100 - R^2$, where R^2 is the statistic from the regression results in Table 3 or 4. All sources of variation are not orthogonal to each other, so the percentage assigned to each source can fall outside the range of 0% to 100%.

Comparing across the two sample periods, both models imply that demand forces became more important for inflation during the pandemic era and dominated the influence of supply forces. For Model 1, the variance contribution of demand goes from almost zero to 47.9%. For Model 2, the variance contribution of demand goes from 24.9% to 64.1%.

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[21] The procedure is analogous to studies that use a log-linear approximation of the equity return identity (dividend yield plus capital gain) to decompose the variance of the log price-dividend ratio into percentages attributable to: (1) future dividend growth rates, (2) future risk-free rates of return, or (3) future excess returns on equity. See, for example, Cochrane (1992).

[22] The results for core PCE inflation, shown in Appendix A, are broadly similar.

Table 5: Variance decompositions, headline PCE inflation

	2000.m1 to 2020.m1		2020.m2 to 2025.m8	
Source	Model 1	Model 2	Model 1	Model 2
Demand	−0.93%	24.9%	47.9%	64.1%
Supply	5.92%	51.4%	13.7%	46.4%
Expected π	39.3%	10.6%	31.3%	−12.0%
Lagged π	20.0%	5.64%	−0.18%	−0.33%
Residual	35.7%	7.44%	7.29%	1.87%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ attributable to each source. Residual $= 100 - R^2$ where R^2 is the statistic from the regression results in Tables 3 and 4. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

Model 1 implies that supply forces became somewhat more important during the pandemic-era relative to the earlier sample period, but the variance contribution remains relatively low at 13.7%. Model 2 implies that the variance contribution of supply forces declined from 51.4% to 46.4%. Both models imply that supply forces were more important than demand forces in the first sample period that includes the decade after the Great Recession when headline PCE inflation was persistently below 2%. I will come back to this point in the next section, where I perform counterfactual simulations that allow only the demand variable, or only the supply variable, to evolve according to the data while expected inflation and lagged inflation both respond to the counterfactual inflation path.

Table 6 shows that the variance contribution from demand implied by Model 1 rises to 67.8% if the pandemic-era sample period starts one year later in February 2021, thereby focusing on the rise of PCE inflation above 2% and its subsequent decline. In contrast, the variance contribution from demand implied by Model 2 for this period remains essentially unchanged at 64.2%.

Table 6: Variance decompositions, alternate sample period

	2021.m2 to 2025.m8	
Source	Model 1	Model 2
Demand	67.8%	64.2%
Supply	2.05%	44.5%
Expected π	26.6%	−10.3%
Lagged π	−0.29%	−0.14%
Residual	3.85%	1.65%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ assigned to each source, where π_t is 12-month headline PCE inflation. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

From Figure 1, we can see that the demand and supply variables often move together. This pattern raises the possibility that surging demand during the pandemic era played a role in causing supply chain disruptions (Levy 2024), or alternatively, that exogenous supply chain disruptions helped to boost demand (e.g., from panic buying). To address such concerns, Appendix B shows variance decompositions for headline PCE inflation using demand and supply variables that are transformed to be approximately uncorrelated with each other. But the transformed variables remain highly correlated with the original versions of the same variables. For both models, the results using the transformed variables are broadly similar to those in Tables 5 and 6.

Coibion and Gorodnichenko (2025) argue that Phillips curve regressions should employ household inflation expectations because these approximate the expectations of price-setting firms. They perform Phillips curve regressions using the unemployment gap as a demand variable, $gscpi_t$ as a supply variable, and 1-year ahead household inflation expectations from the University of Michigan Survey.[23] For the sample period 2020.m1 to 2025.m2, they find that expected inflation is the most important driver of inflation with labor market pressures playing a much smaller role. They further show that movements in expected inflation are primarily accounted for by changes in gasoline and other commodity prices. Beaudry, Hou, and Portier (2024b) report similar results.

Table 7 examines the sensitivity of the Model 1 variance decompositions for the pandemic era to: (1) use of 1-year ahead household inflation expectations rather than SPF expectations, (2) use of the unemployment gap, denoted by $ugap_t$, as the demand variable rather than vu_t, and (3) use of a different end date for the pandemic era, either 2024.m12 or 2025.m8.

Table 7: Variance decompositions, alternative specifications

	Model 1, Pandemic era			
	2020.m2 to 2024.m12		2020.m2 to 2025.m8	
Source	With vu_t	With $ugap_t$	With vu_t	With $ugap_t$
Demand	45.8%	15.1%	62.5%	25.7%
Supply	5.98%	9.11%	15.6%	29.6%
Expected π	40.1%	62.8%	10.2%	22.1%
Lagged π	−0.08%	0.11%	0.12%	1.03%
Residual	8.25%	12.9%	11.5%	21.5%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ attributable to each source where π_t is 12-month headline PCE Inflation. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other. In all columns, expected inflation is the 12-month change in the median 1-year ahead expected change in prices from the University of Michigan Survey.

In the first and third columns of Table 7, the demand variable is vu_t but expected inflation

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[23] The unemployment gap is the unemployment rate minus the noncyclical rate of unemployment from the Congressional Budget Office.

is now from the University of Michigan Survey. These results are broadly similar to the Model 1 results in Table 5 showing that demand forces dominated supply forces during the pandemic era. But notice that the contribution of expected inflation declines from 40.1% to 10.2% when adding 8 months of additional data ending in 2025.m8. This occurs because household inflation expectations rise from 2.8% in December 2024 to 6.6% in May 2025, followed by a decline back to 4.8% in August 2025. Over the same time interval, the 12-month inflation rate is little changed. The spiking behavior of household inflation expectations in mid-2025 reduces its explanatory power for inflation.[24] Expected inflation from the SPF does not undergo such a large spike.

In the second and fourth columns of Table 7, the demand variable is now $ugap_t$ while expected inflation continues to be from the University of Michigan Survey. The results for the pandemic era are now markedly different from the results in Table 5. First, the contributions of demand and supply are more balanced, regardless of the sample end date. Second, the contribution of household inflation expectations rises to 62.8% when the sample ends in 2024.m12, thereby excluding the mid-2025 spike in household inflation expectations. The results in the second column of Table 7 align with the findings of Coibion and Gorodnichencko (2025) and Beaudry, Hou, and Portier (2024b). But if we move to the fourth column which adds 8 months of additional data, then the contribution of household inflation expectations drops sharply to 22.1%.

The choice of demand variable, the source of inflation expectations, and the sample end date can all be important for the pandemic era results. For the sample period from 2020.m2 to 2025.m8, the correlation coefficient between $-ugap_t$ and vu_t is 0.77, but $ugap_t$ is much more volatile than vu_t. The coefficient of variation for $ugap_t$ is 4.24 versus 0.37 for vu_t and 0.53 for 12-month headline PCE inflation. The extreme volatility of $ugap_t$ reduces its explanatory power for inflation during the pandemic era. More generally, Barnichon and Shapiro (2024) show that vu_t outperforms other measures of labor market slack when forecasting 1-year ahead inflation using data going back to 1960. They demonstrate that movements in vu_t partly reflect shifts in the Beveridge curve which they say "are central to understanding inflation fluctuations—Phillips meets Beveridge."

Regardless of the sample period or model specification, the variance contribution from expected inflation is much higher in Model 1 than in Model 2. This is because Model 2 uses actual components of headline PCE inflation as driver variables, leaving much less variation

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[24] According to Andrade and Wicklein (2025, p. 6), the upward spike in household inflation expectations "could be partly attributable to tariff-related price uncertainty." The University of Michigan's Consumer Sentiment Index undergoes a sharp downward spike over the same time frame.

for other sources to explain. Shapiro (2026) identifies a third "ambiguous" component of headline PCE inflation defined as $\pi_t^a = \pi_t - \pi_t^d - \pi_t^s$. Table 8 shows variance decomposition results for Model 2 when I use the identity $\Delta_{12}\pi_t \equiv \Delta_{12}\pi_t^d + \Delta_{12}\pi_t^s + \Delta_{12}\pi_t^a$ in place of the regression equations in Table 4. This decomposition continues to yield a small residual due to rounding errors in each of the three components. The results in Table 8 are broadly similar to the Model 2 results in Table 5.

Table 8: Variance decompositions, including ambiguous inflation

	Model 2	
Source	2000.m1 to 2020.m1	2020.m2 to 2025.m8
Demand	33.0%	53.9%
Supply	61.6%	35.1%
Ambiguous	4.35%	10.2%
Residual	1.04%	0.74%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ assigned to each source where π_t is 12-month headline PCE inflation.

The level decomposition performed by Shapiro (2026) quantifies how each of the three inflation components contributes to the *magnitude* of overall inflation. Starting from this level decomposition, the variance decomposition in Table 8 quantifies how each of the three inflation components contributes to *fluctuations* in overall inflation.[25]

6 Counterfactual simulations

Counterfactual simulations provide another way of assessing the relative importance of demand versus supply variables as drivers of inflation over different sample periods. To perform the counterfactual simulations, I first estimate full-sample versions of Model 1 and Model 2, but with explanatory variables now expressed in level terms rather than 12-month changes. The results of the full-sample regressions are shown in Tables 9 and 10.

For the Model 1 regressions in Table 9, I include the nonlinear demand variable $|vu_t - 1|$ which allows for asymmetry in the response of inflation to movements in vu_t, depending on whether vu_t is above or below 1.[26] This variable captures the idea that the Phillips curve becomes steeper when the labor market is very tight, i.e., when $vu_t > 1$, along the lines of the nonlinear Phillips curves estimated by Ball, Leigh, and Mishra (2022, 2025), Benigno and

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[25] Table 8 shows variance decomposition results for $\pi_t - \pi_{t-12}$. The variance decomposition results for π_t itself are numerically very similar.

[26] For example, if the Phillips curve relationship is $\pi_t = c_0 + c_1(vu_t - 1 + |vu_t - 1|)$, then π_t will respond only when $vu_t > 1$.

Eggertsson (2023), and Crust, Lansing, and Petrosky-Nadeau (2023). The nonlinear demand variable is highly significant for both headline and core PCE inflation.

Model 1 also includes the nonlinear supply variable $|gscpi_t - 2|$ which captures the idea that cost push shocks have a larger impact on inflation when supply chains are severely disrupted, i.e., when $gscpi_t > 2$. The nonlinear supply variable is not significant for headline PCE inflation but highly significant for core PCE inflation. The linear Model 2 regressions in Table 10 exhibit R^2 statistics in excess of 95%, so nonlinear variables are not needed to fit the data.

The counterfactual simulations allow the value of expected inflation that appears in the estimated regression equations to respond to the counterfactual path of inflation. This setup captures the idea that if inflation had evolved differently in the data, then expected inflation would also have evolved differently. The response of $E_t \pi_{t+12}$ is governed by the laws of motion (3) and (4) which are estimated over the full sample from 2000.m1 to 2025.m8. Bernanke and Blanchard (2025) employ a similar specification but they allow short-run expected inflation to also respond to movements in long-run expected inflation. Here I assume that long-run expected inflation remains constant. Pfäuti (2025) develops a model that allows expected inflation to become more sensitive to lagged values of inflation when inflation rises above 4%. Including such a feature in equations (3) and (4) does not change the basic nature of the results regarding the relative importance of demand versus supply forces for inflation.[27]

Using the full-sample regression equations in Tables 9 and 10, I allow only the demand variable (vu_t or π_t^d) or only the supply variable ($gscpi_t$ or π_t^s) to evolve along the path observed in the data while holding the counterpart variable constant at its starting value for the simulation. Expected inflation $E_t \pi_{t+12}$ evolves according to the path determined by the estimated laws of motion (3) or (4). Lagged inflation π_{t-12} evolves along the counterfactual path of the simulation. The residual term that is implied by the regression equations in Tables 9 and 10 is set to zero for each period beyond the starting value.[28]

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[27] Pfäuti (2025, footnote 3) makes a similar point.

[28] Beaudry, Hou, and Portier (2024b) perform somewhat similar counterfactual inflation simulations using a linear estimated Phillips curve. However, they do not allow expected inflation to respond to the counterfactual path of inflation when only the demand variable evolves along the path observed in the data.

Table 9: Model 1 regressions, 2000.m1 to 2025.m8

Variable	Headline PCE inflation	Core PCE inflation
vu_t	**0.46**	**0.80**
	(0.18)	(0.09)
$\lvert vu_t - 1\rvert$	**1.64**	**1.00**
	(0.20)	(0.10)
$gscpi_t$	**0.33**	**0.35**
	(0.08)	(0.04)
$\lvert gscpi_t - 2\rvert$	0.13	**0.36**
	(0.10)	(0.05)
$E_t\pi_{t+12}$	**2.85**	**1.23**
	(0.17)	(0.08)
π_{t-12}	**−0.13**	**0.19**
	(0.04)	(0.03)
R^2	76.3%	89.3%

Notes: Dependent variable is π_t where π_t is 12-month headline or core PCE inflation. All regressions include a constant term. Standard errors in parenthesis. Boldface indicates significant at the 5% level.

Table 10: Model 2 regressions, 2000.m1 to 2025.m8

Variable	Headline PCE inflation	Core PCE inflation
${\pi^d}_t$	**0.95**	**1.01**
	(0.03)	(0.02)
${\pi^s}_t$	**1.09**	**1.24**
	(0.03)	(0.03)
$E_t\pi_{t+12}$	**0.29**	0.07
	(0.08)	(0.04)
π_{t-12}	−0.03	**0.03**
	(0.01)	(0.01)
R^2	95.6%	97.9%

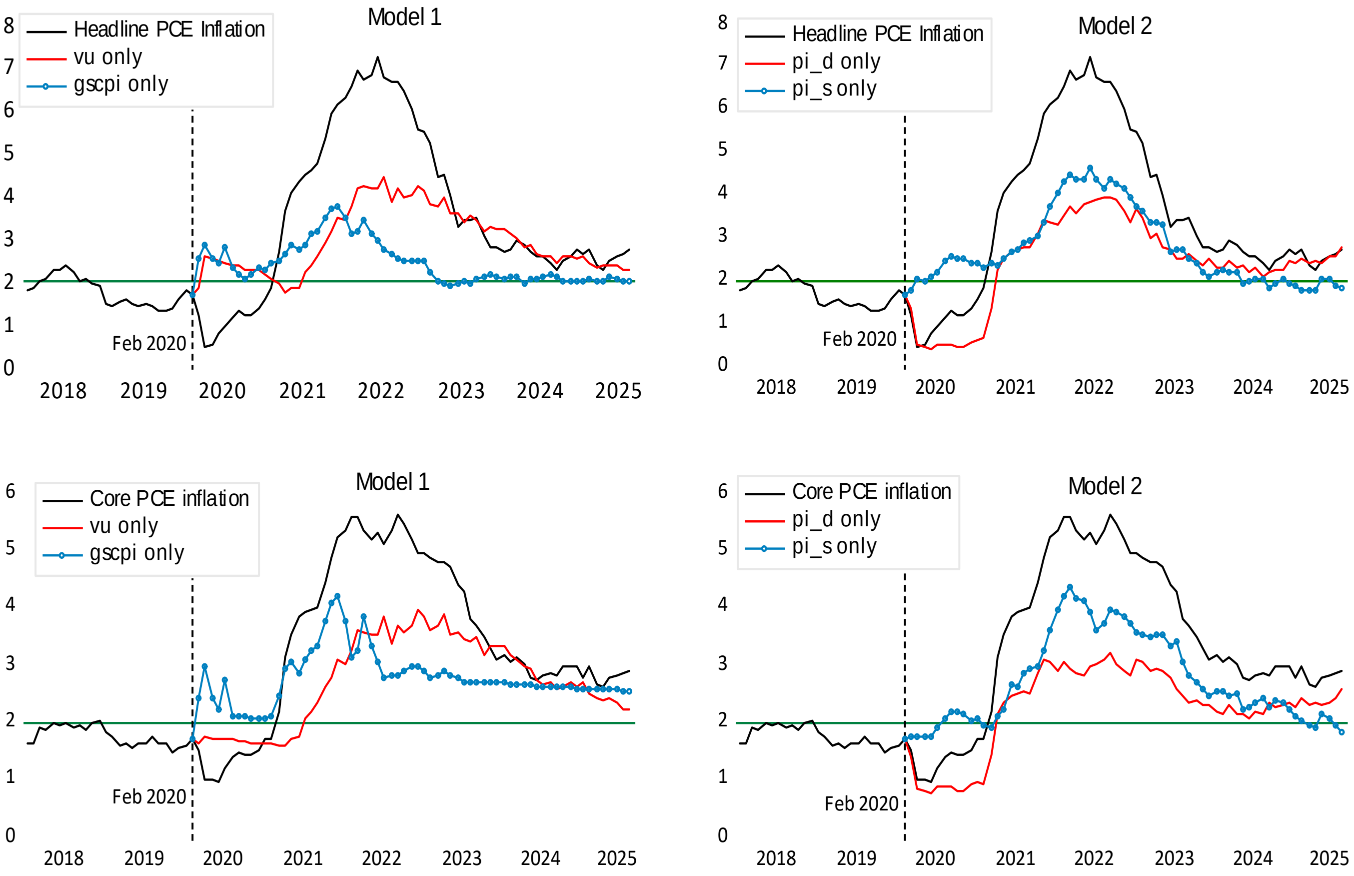
Notes: Dependent variable is π_t where π_t is 12-month headline or core PCE inflation. All regressions include a constant term. Standard errors in parenthesis. Boldface indicates significant at the 5% level.

$$E_t\pi_{t+12} = \underset{(0.03)}{\mathbf{0.11}} + \underset{(0.02)}{\mathbf{0.94}}\ E_{t-1}\pi_{t+11} + \underset{(0.004)}{\mathbf{0.02}}\ \pi^{head}_{t-1}, \quad R^2 = 96.8\%, \tag{3}$$

$$E_t\pi_{t+12} = \underset{(0.03)}{\mathbf{0.11}} + \underset{(0.02)}{\mathbf{0.93}}\ E_{t-1}\pi_{t+11} + \underset{(0.007)}{\mathbf{0.03}}\ \pi^{core}_{t-1}, \quad R^2 = 96.8\%. \tag{4}$$

Figure 3 shows the results of counterfactual simulations starting in February 2020. In the left panels, Model 1 implies that movements in vu_t and $gscpi_t$ both contributed to the rise and fall of pandemic-era inflation, but the contribution from vu_t is somewhat larger for both headline and core PCE inflation. Nevertheless, the contribution of $gscpi_t$ to inflation during the pandemic era is sizable.

Figure 3: Counterfactual simulations starting in February 2020



Notes: In the left panels, Model 1 implies that movements in vu_t and $gscpi_t$ both contributed to the rise and fall of pandemic-era inflation but the contribution from vu_t is somewhat larger. In the right panels, Model 2 implies that movements in π_t^d and π_t^s both contributed to the rise and fall of pandemic-era inflation but movements in π_t^d account for the initial decline of inflation in the months following February 2020.

In the right panels of Figure 3, Model 2 implies that movements in π_t^d and π_t^s both contributed to the rise and fall of pandemic-era inflation.[29] But movements in π_t^d account for the initial decline of inflation during the months immediately following the start of the pandemic recession in February 2020.[30] This result is consistent with the higher variance contribution

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[29] Shapiro (2022) obtains a similar result by comparing the paths of π_t^d and π_t^s to their pre-pandemic averages.

[30] Similarly, Bai, et al. (2024) conclude that demand shocks drove the initial decline in PCE goods inflation during this period.

of π_t^d versus π_t^s for the pandemic-era, as shown earlier in Table 5.

Table 11 shows the mean absolute gaps between the counterfactual inflations paths in Figure 3 and the corresponding U.S. inflation paths. A lower number implies a better fit of the U.S. inflation path. The "demand only" gaps are lower than the "supply only" gaps for three out of the four panels of Figure 3, with the bottom right panel (Model 2, Core PCE inflation) as the exception. For headline PCE inflation, the results in Table 11 imply that demand forces were more important, but the influence of supply forces was sizeable.

For both models, the relative importance of demand versus supply for pandemic era inflation appears more balanced in Table 11 when compared to the earlier variance decomposition results in Section 5. This outcome highlights the distinction between a variance decomposition (which quantifies contributions to fluctuations) and a level decomposition (which quantifies contributions to magnitude). The counterfactual simulations can be viewed as a type of level decomposition.

Table 11: Mean absolute gaps, 2020.m2 to 2025.m8

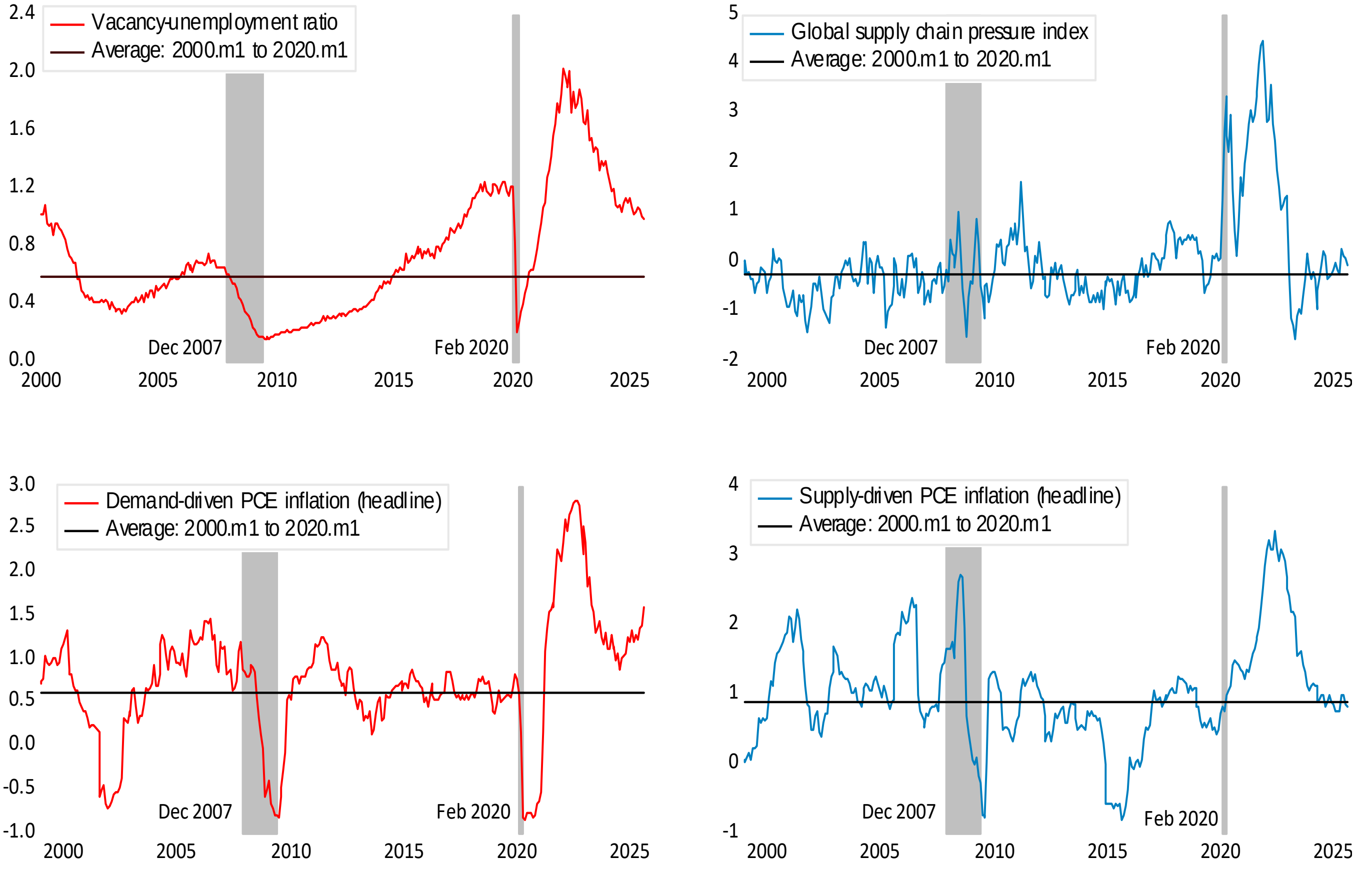
Simulation	Model 1	Model 2
Headline PCE inflation		
Demand only	1.13	1.14
Supply only	1.60	1.21
Core PCE inflation		
Demand only	0.84	1.17
Supply only	0.99	0.91

Notes: Numbers show the mean absolute gaps between the counterfactual inflation paths in Figure 3 and the corresponding U.S. inflation paths. A lower number implies a better fit of the U.S. inflation path.

Figure 3 shows that demand forces continue to push PCE inflation above 2% by varying degrees at the end of the data sample in August 2025. Confirming this idea, Figure 4 shows that the two demand variables (vu_t and π_t^d) remain above pre-pandemic averages in August 2025. In contrast, the two supply variables ($gscpi_t$ and π_t^s) have returned to pre-pandemic averages. All else equal, both models imply that further declines in the demand variables are needed to achieve 2% inflation.

Figure 5 shows counterfactual simulations starting in December 2007, the start of the Great Recession. Both Model 1 (left panels) and Model 2 (right panels) imply that the supply variable ($gscpi_t$ or π_t^s) is the primary driver of persistently low inflation in the decade following the end of the Great Recession in June 2009. Specifically, the simulations labeled "$gscpi$ only" or "π^s only" (blue lines) deliver inflation paths that are mostly below 2% for both headline and core PCE inflation from June 2009 onward. In the case of Model 1, the supply-driven explanation for low inflation after the Great Recession is somewhat stronger for headline inflation than for core inflation. From Figure 1, we see that $gscpi_t$ is mostly in negative territory during the low inflation episode while Figure 4 shows that π_t^s is mostly below its pre-pandemic average over the same time frame.

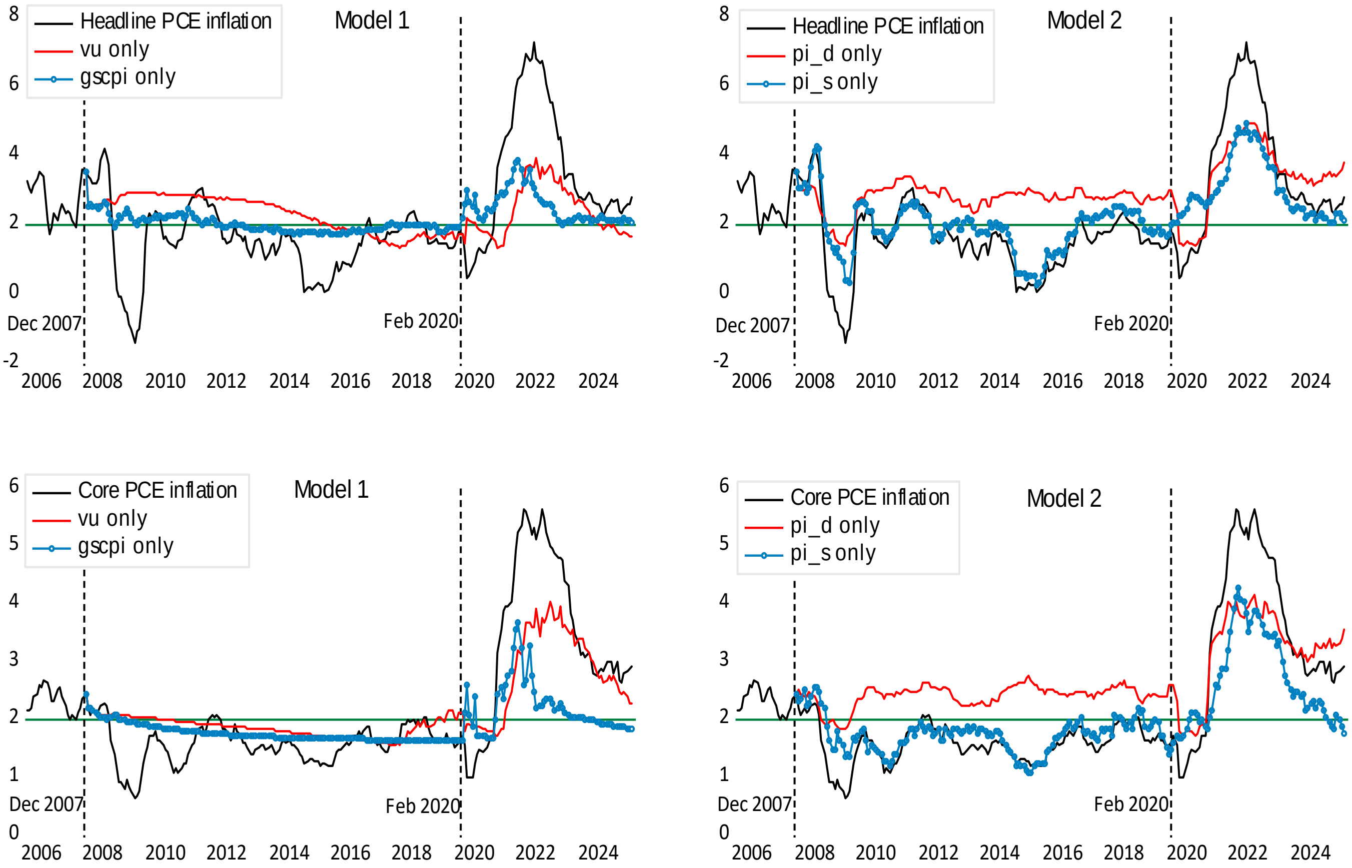
Figure 4: Comparing demand and supply variables to pre-pandemic averages



Notes: At the end of the data sample in August 2025, variables that measure demand forces (left panels) remain above pre-pandemic averages while variables that measure supply forces (right panels) have returned to pre-pandemic averages.

Table 12 shows the mean absolute gaps between the counterfactual inflations paths in Figure 5 and the corresponding U.S. inflation paths. Reversing the general pattern in Table 11, the "supply only" gaps are now lower than the "demand only" gaps in all four cases for the sample period ending in 2020.m1. Shapiro (2026) shows that a monetary policy shock that tightens policy acts to reduce demand-driven inflation but has no significant effect on supply-driven inflation. Oil-supply shocks act to increase supply-driven inflation, but decrease demand-driven inflation. The supply-driven episode of low inflation after the Great Recession helps to account for the Fed's difficulty in achieving its 2% inflation goal during these years, despite holding the federal funds rate close to zero for seven consecutive years from December 2008 to December 2015.[31]

Figure 5: Counterfactual simulations starting in December 2007



Notes: Both models imply that supply forces, as measured by $gscpi_t$ or π_t^s, were the primary drivers of persistently low inflation in the decade following the end of the Great Recession.

As the counterfactual inflation paths continue into the pandemic era, Figure 5 shows that both demand and supply variables contributed to the rise and fall of inflation. But the contribution coming from demand is mostly larger, particularly for core PCE inflation. Using

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[31] Eickmeier and Hofmann (2025) find that the episode of low inflation after the Great Recession was driven by a combination of strong supply factors and weak demand factors.

a different starting date for the simulation can influence the results because the response of expected inflation and lagged inflation to the counterfactual path of inflation creates history dependence.[32]

Table 12: Mean absolute gaps, 2007.m12 to 2020.m1

Simulation	Model 1	Model 2
Headline PCE inflation		
Demand only	1.03	1.31
Supply only	0.73	0.44
Core PCE inflation		
Demand only	0.34	0.83
Supply only	0.28	0.19

Notes: Numbers show the mean absolute gaps between the counterfactual inflation paths in Figure 5 and the corresponding U.S. inflation paths. A lower number implies a better fit of the U.S. inflation path.

In all simulations, the response of expected inflation to movements in counterfactual inflation is more important in Model 1 than in Model 2. This is because the Model 1 regression equations (Table 9) exhibit much larger estimated coefficients on $E_t\pi_{t+12}$. Nevertheless, holding expected inflation constant at the starting value of each counterfactual simulation does not alter the rankings of the mean absolute gaps in either Table 11 or Table 12.

7 Conclusion

Numerous studies have sought to identify the most important drivers of U.S. inflation during the pandemic era, defined here as the sample period from February 2020 onward. A consensus view has not emerged in the literature. I use Phillips curve type regressions to perform variance decompositions and counterfactual simulations of inflation over different sample periods. The exercises allow us examine the relative importance of inflation drivers during the pandemic-era when inflation surged to 40-year highs, but also during the years after the Great Recession when inflation remained stubbornly below 2%.

The Phillips curve regression coefficient on the vacancy-unemployment ratio is not significant in the pre-pandemic sample period from January 2000 to January 2020. This result, together with the observation of persistently low inflation over much of the same time frame, provides insight into why many policymakers came to view the relationship between inflation

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[32] See also Lansing (2025).

and labor market slack (a demand variable) to be very weak or nonexistent during the years preceding the pandemic.

The results presented here indicate that demand forces were more important than supply forces in driving inflation during the pandemic era. But the contribution of supply forces to inflation during this period was sizable. I show that the choice of demand variable, the source of inflation expectations, and the sample end date can all be important for the pandemic era results. These results help to reconcile some of the conflicting findings reported in the literature.

Finally, the analysis implies that supply forces were the primary drivers of persistently low inflation in the decade following the end of the Great Recession. This finding helps to explain the Fed's difficulty in achieving its 2% inflation goal during these years, despite highly accommodative monetary policy.

A Appendix: Core PCE inflation

Tables A1 through A5 show results using 12-month core PCE inflation. The results are broadly similar to those in Tables 2 through 6 using 12-month headline PCE inflation.

Table A1: Correlation coefficients with $\pi_t - \pi_{t-12}$, core PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$vu_t - vu_{t-12}$	0.38	0.88
$gscpi_t - gscpi_{t-12}$	0.06	0.32
$\pi^d_t - \pi^d_{t-12}$	0.43	0.92
$\pi^s_t - \pi^s_{t-12}$	0.69	0.90
$E_t\pi_{t+12} - E_{t-12}\pi_t$	0.74	0.78
$\pi_{t-12} - \pi_{t-24}$	−0.42	0.09

Table A2: Model 1 regressions, core PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$vu_t - vu_{t-12}$	−0.05	**1.91**
	(0.13)	(0.21)
$gscpi_t - gscpi_{t-12}$	−0.03	**0.18**
	(0.03)	(0.05)
$E_t\pi_{t+12} - E_{t-12}\pi_t$	**1.31**	**0.53**
	(0.08)	(0.21)
$\pi_{t-12} - \pi_{t-24}$	**−0.38**	0.02
	(0.04)	(0.07)
R^2	69.3%	85.1%

Notes: Dependent variable is $\pi_t - \pi_{t-12}$, where π_t is 12-month headline PCE inflation. All regressions include a constant term. Standard errors in parentheses. Boldface indicates significant at the 5% level.

Table A3: Model 2 regressions, core PCE inflation

Variable	2000.m1 to 2020.m1	2020.m2 to 2025.m8
$\pi^d_t - \pi^d_{t-12}$	**0.58**	**1.05**
	(0.04)	(0.04)
$\pi^s_t - \pi^s_{t-12}$	**0.80**	**1.12**
	(0.04)	(0.06)
$E_t\pi_{t+12} - E_{t-12}\pi_t$	**0.49**	0.02
	(0.06)	(0.07)
$\pi_{t-12} - \pi_{t-24}$	**−0.17**	0.00
	(0.03)	(0.02)
R^2	88.1%	98.4%

Notes: Dependent variable is $\pi_t - \pi_{t-12}$, where π_t is 12-month core PCE inflation. All regressions include a constant term. Standard errors in parentheses. Boldface indicates significant at the 5% level.

Table A4: Variance decompositions, core PCE inflation

	2000.m1 to 2020.m1		2020.m2 to 2025.m8	
Source	Model 1	Model 2	Model 1	Model 2
Demand	−0.62%	18.5%	62.3%	52.7%
Supply	−0.27%	41.9%	7.24%	45.3%
Expected π	54.3%	20.5%	15.4%	0.47%
Lagged π	15.9%	7.12%	0.15%	−0.03%
Residual	30.7%	11.9%	14.9%	1.59%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ attributable to each source. Residual $= 100 - R^2$ where R^2 is the statistic from the regression results in Tables A2 and A3. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

Table A5: Variance decompositions, Alternate sample period

	2021.m2 to 2025.m8	
Source	Model 1	Model 2
Demand	94.3%	57.0%
Supply	−6.73%	38.9%
Expected π	6.71%	2.81%
Lagged π	−1.61%	0.14%
Residual	7.36%	1.17%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ assigned to each source, where π_t is 12-month core PCE inflation. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

B Appendix: Uncorrelated demand and supply

Tables B1 and B2 show variance decomposition results for headline PCE inflation using demand and supply variables that are transformed to be approximately uncorrelated with each other.[33] The transformed variables are constructed as follows. For the sample period 1999.m1 to 2025.m8, I compute the residuals from a regression of the original demand variable (vu_t or π^d_t) on a constant and the original supply variable ($gscpi_t$ or π^s_t). The transformed demand variable is the average of the residual series and the original demand variable. For the same sample period, I compute the residuals from a regression of the original supply variable ($gscpi_t$ or π^s_t) on a constant and the original demand variable (vu_t or π^d_t). The transformed supply variable is the average of the residual series and the original supply variable. For the original variables, we have $Corr(vu_t, gscpi_t) = 0.38$ and $Corr(\pi^d_t, \pi^s_t) = 0.50$. For the

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[33] Kessy, Lewin, and Strimmer (2018) evaluate various transformations for achieving uncorrelated random variables while preserving a strong correlation between the transformed and original variables.

transformed variables, the corresponding correlation coefficients are reduced to 0.02 and 0.04, respectively. The correlation coefficients between each transformed variable and its original variable counterpart are in the range of 0.97 to 0.98.

The average of the residual and the original variable assigns a weight $\alpha = 0.5$ to each series. This weight can be optimized to achieve a zero correlation coefficient between the two transformed variables. The optimal weight on each of the two residual series is given by $\alpha^* = [1 - \sqrt{1-\rho^2}]/\rho^2$, where ρ is the correlation coefficient between the two original variables. If $|\rho|$ is not close to 1, then $\sqrt{1-\rho^2} \simeq 1 - \rho^2/2$, and we have $\alpha^* \simeq 0.5$. When $\alpha = \alpha^*$, the correlation coefficient between each transformed variable and its original variable counterpart is given by $1/\sqrt{2\alpha^*}$. When $\alpha^* \simeq 0.5$, we have $1/\sqrt{2\alpha^*} \simeq 1$.

The results in Tables B1 and B2 are broadly similar to those in Tables 5 and 6 using the original demand and supply variables. Similar results are obtained if the transformed variables are constructed using separate regressions for each of the two sample periods.

Table B1: Variance decompositions, headline PCE inflation

	2000.m1 to 2020.m1		2020.m2 to 2025.m8	
Source	Model 1	Model 2	Model 1	Model 2
Demand	−0.14%	20.2%	45.6%	76.2%
Supply	5.13%	56.1%	16.1%	34.2%
Expected π	39.3%	10.6%	31.3%	−12.0%
Lagged π	20.0%	5.64%	−0.18%	−0.33%
Residual	35.7%	7.44%	7.29%	1.87%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ attributable to each source. Residual $= 100 - R^2$ where R^2 is the statistic from regressions analogous to Table 3 and Table 4. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

Table B2: Variance decompositions, alternate sample period

	2021.m2 to 2025.m8	
Source	Model 1	Model 2
Demand	58.2%	72.9%
Supply	11.7%	35.9%
Expected π	26.6%	−10.3%
Lagged π	−0.29%	−0.14%
Residual	3.85%	1.65%

Notes: Numbers show the percentage variation in $\pi_t - \pi_{t-12}$ assigned to each source, where π_t is 12-month headline PCE inflation. The percentage can fall outside 0-100% because all sources of variation are not orthogonal to each other.

C Appendix: Influence of oil prices

Neither Model 1 or Model 2 can account for the sharp declines in both headline and core PCE inflation that took place from July 2008 to July 2009, coinciding with a sharp drop in oil prices. Headline PCE inflation declined from 4.1% to −1.5%. Around this time, the monthly average price per barrel of West Texas Intermediate crude oil went from a peak of \$134 to a low of \$39.[34] Table C1 shows the R^2 statistics obtained from regressing the full-sample Phillips curve residuals (computed from the regression equations in Tables 9 and 10) on a constant and 12-month oil price inflation. Oil prices have clearly been an important driver of inflation at times, particularly for headline inflation.

Table C1: R^2 from regressing Phillips curve residuals on oil price inflation

Inflation measure	Model 1	Model 2
Headline PCE inflation	26.6%	5.75%
Core PCE inflation	10.0%	1.30%

Note: Numbers are the R^2 statistics from regressing the full-sample Phillips curve residuals (computed from the regression equations in Tables 9 and 10) on a constant and 12-month oil price inflation computed using the monthly average price per barrel of West Texas Intermediate crude.

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[34] Oil price data are from the Federal Reserve Bank of St Louis' FRED database, labeled DCOILWTICO.

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