

# Supply-Side Information and Monetary Policy Surprises

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## Abstract

Monetary policy surprises, measured using high-frequency asset price revisions around central bank announcements, are the leading tool for identifying the effects of unexpected monetary actions. Recent research shows, however, that they partly reflect the Federal Reserve's information about demand conditions. This paper shows that supply conditions also enter these surprises, as revealed by the comovement of interest rates and the exchange rate. When a supply shock hits and the Fed is expected to raise rates while tolerating some supply-driven inflation, surprises signal higher medium-term rates and dollar depreciation. Accounting for this component helps explain why previous estimates find little decline in prices after tighter forward guidance.

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# 1 Introduction

Understanding how monetary policy affects inflation is a central question in macroeconomics. The difficulty is that monetary policy responds to inflationary pressures. Higher interest rates followed by higher prices need not mean that monetary tightening caused inflation. Instead, the central bank may have raised rates because it expected inflation to rise. This problem is particularly relevant when inflation comes from supply disruptions. Raising interest rates can damage activity, so central banks may tolerate some of the resulting inflation.<sup>1</sup> Exchange rates can help distinguish these forces. An unexpected monetary tightening would typically strengthen the currency, as it raises interest rates and reduces inflationary pressures. But when rates rise in response to these pressures, the prospect of higher prices can instead weaken the currency.<sup>2</sup>

In this paper, I use this difference in the exchange-rate response to study what markets learn about supply conditions during Federal Reserve announcements. I show that part of the interest-rate movements around these announcements reflects how markets perceive the Federal Reserve’s assessment of supply conditions and its response to the resulting inflation. When markets expect the Federal Reserve to raise rates while tolerating part of the supply-driven inflation, medium-term interest rates can rise while the dollar depreciates. This comovement distinguishes the supply component from unexpected monetary tightening. Separating it helps explain a puzzle in the transmission of forward guidance: previous research finds little decline in prices after tighter forward guidance, whereas I find a larger and statistically significant decline.<sup>3</sup>

My analysis is based on the high-frequency approach, which uses interest-rate movements in narrow windows around Federal Reserve announcements, usually called monetary-policy surprises, to isolate revisions that markets did not anticipate (Kuttner, 2001; Gürkaynak et al., 2005; Gertler and Karadi, 2015). Previous research shows that these surprises can also reflect the Federal Reserve’s assessment of economic conditions or its response to public news (Nakamura and Steinsson, 2018; Bauer and Swanson, 2023a). In particular, Miranda-Agrippino and Ricco (2021) and Jarociński and Karadi (2020) show that the information component transmits to the economy like a demand shock: interest rates rise together with economic activity and prices. I contribute to this literature by showing that part of those movements also reflects what markets learn about the Federal Reserve’s assessment of supply conditions.

To illustrate the mechanism of the paper, consider the Federal Reserve announcement of March 16, 2022. The Federal Reserve raised its policy rate, and the two-year Treasury yield increased by 5.1 basis points during the announcement. But the dollar depreciated by 0.34 per cent against the euro, rather than appreciating as after an unexpected monetary tightening. The accompanying

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<sup>1</sup>Nakamura et al. (2025) discuss why central banks with well-anchored inflation expectations may partly ‘look through’ supply shocks, tolerating some temporary inflation while remaining ready to increase interest rates more strongly if inflation persists or expectations become unanchored.

<sup>2</sup>Sims (1992) emphasized that apparent monetary-policy innovations may reflect central banks’ responses to anticipated inflationary pressures. He used information from exchange rates and international commodity prices to investigate this interpretation (pp. 988–989 and 996).

<sup>3</sup>For instance, see Swanson (2024).

statement warned that Russia’s invasion of Ukraine would put further upward pressure on inflation and weigh on economic activity. The Federal Reserve therefore faced a trade-off: increasing rates to contain inflation could further weaken activity. In my interpretation, markets understood that rates would rise but some supply-driven inflation would be tolerated. Higher US prices could then weaken the dollar despite the increase in interest rates.<sup>4</sup>

By contrast, take the March 2014 meeting and Yellen’s press conference. The Federal Reserve left its current policy rate unchanged, but Yellen discussed when future rate increases might begin as the Fed gradually ended its asset purchases. Asked how long after those purchases ended rates might increase, she replied “on the order of around six months,” depending on employment and inflation data. Markets interpreted this timing as earlier than expected. The surprise therefore concerned a sooner increase in future interest rates, rather than a change in the current policy rate. During the announcement, the two-year Treasury yield rose by 7.7 basis points and the dollar appreciated by 0.67 per cent against the euro, as after an unexpected monetary tightening.<sup>5</sup>

While the exchange rate helps distinguish unexpected monetary tightening from revisions related to perceived supply conditions, I also want to account for revisions in demand conditions. A more positive assessment of demand can also raise interest rates and appreciate the dollar. To distinguish stronger perceived demand from monetary tightening, I follow [Jarociński and Karadi \(2020\)](#) and look at stock prices. When markets perceive stronger demand, they expect higher profits, so stock prices can rise together with interest rates. After unexpected monetary tightening, stock prices instead fall.<sup>6</sup>

Stock prices alone, however, do not distinguish monetary tightening from revisions related to perceived supply conditions. When markets perceive greater supply pressures, they may expect higher interest rates but lower profits, so stock prices fall. This is the same combination of rates and stocks as after monetary tightening. The exchange rate helps distinguish the two: the dollar appreciates after monetary tightening, but can depreciate when markets expect the Federal Reserve to tolerate part of the supply-driven inflation. I use these joint movements to separate interest-rate surprises into unexpected monetary tightening, revisions associated with perceived demand conditions, and revisions associated with perceived supply conditions. Table 1 summarises these three cases.

I use high-frequency asset-price changes around Federal Reserve announcements from the dataset of [Acosta et al. \(2025\)](#), focusing on interest-rate revisions at short, medium, and long maturities,

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<sup>4</sup>FOMC statement and Powell’s press conference, March 16, 2022, pp. 8–9. Announcement-window market changes in both examples are from the U.S. Monetary Policy Event-Study Database of [Acosta et al. \(2025\)](#).

<sup>5</sup>Yellen’s press conference, March 19, 2014, pp. 14–15. [De Pooter \(2021\)](#) documents this interpretation and the market response.

<sup>6</sup>Stronger perceived demand could in principle depreciate the dollar if the effect of higher expected US prices outweighed that of higher nominal rates. Two pieces of evidence support appreciation as the baseline case. [Hofmann et al. \(2025\)](#) estimate that US monetary policy responds almost four times more strongly to demand-driven inflation than to supply-driven inflation. Moreover, [Jarociński \(2024\)](#) identifies Delphic forward guidance without imposing an exchange-rate restriction and finds that the dollar appreciates on impact, although the response is small and reverses after one day. Appendix B.1 shows that the results are robust even when I leave the exchange-rate response to demand unrestricted.

Table 1: Asset-price responses used to distinguish the three components.

| Markets’<br>interpretation         | Interest-rate<br>revision | Stock<br>prices | Dollar value<br>against the euro |
|------------------------------------|---------------------------|-----------------|----------------------------------|
| Unexpected monetary tightening     | Up                        | Down            | Appreciates                      |
| Stronger perceived demand          | Up                        | Up              | Appreciates                      |
| Greater perceived supply pressures | Up                        | Down            | Depreciates                      |

Notes: The signs refer to the separate components. The interest-rate revision is measured by the forward-guidance factor used in the identification. The supply row assumes that markets expect the Federal Reserve to tolerate part of the supply-driven inflation.

together with the stock market and the exchange rate, from February 1999 to May 2025. I start in February 1999 with the first FOMC meeting after the introduction of the euro, which allows me to use the exchange rate between the euro and the dollar. To study monetary policy during the zero lower bound, I use revisions in medium-term interest rates to measure forward guidance. I separate these revisions from surprises about the current policy rate, in the spirit of [Gürkaynak et al. \(2005\)](#). To distinguish revisions related to forward guidance from those related to asset purchases, I also consider long-term interest rates. I use the fact that large-scale asset purchases became an important policy tool during the financial crisis to separate the two, in the spirit of [Swanson \(2021\)](#).

I then decompose high-frequency monetary-policy surprises into monetary-policy, demand, and supply components within a monthly Bayesian vector autoregression, using the sign restrictions in Table 1. In particular, I use the forward-guidance factor to measure medium-term interest-rate revisions, the S&P 500 to measure changes in stock valuations, and EUR/USD to measure changes in the dollar’s value against the euro. I assume that only unexpected monetary policy and revisions related to perceived demand and supply conditions systematically affect these announcement surprises.

I find three main results. First, the narrative evidence and the relationship with commodity prices and past oil-supply shocks show that the supply component is closely related to supply disruptions. Its largest positive observations tend to occur around meetings where the Federal Reserve discusses worsening supply conditions, while negative observations tend to coincide with easing supply pressures. I document these episodes using the Federal Reserve statements, press conferences, and minutes. I also show that past oil-supply news identified around OPEC announcements ([Känzig, 2021](#)) predicts the supply component, but not the monetary-policy or demand components. Increases in commodity prices before Federal Reserve meetings also predict the supply component.

Second, the supply component raises prices and inflation expectations, with little persistent increase in expected real rates. Long-run inflation expectations rise over the weeks after the announcement. I also find that the supply component increases the probability of inflation reaching at least four per cent in the next calendar year. Commodity prices rise by about one per cent within a quarter, and the New York Fed’s Global Supply Chain Pressure Index ([Benigno et al., 2022](#)) rises immediately and peaks after one month. The price level rises by about seven basis points after two

years, while real GDP changes little. Using the classification of [Shapiro \(2024\)](#), I also show that the increase in prices is concentrated in consumption categories classified as supply-driven based on opposite movements in prices and quantities relative to their predicted values.

Third, separating the supply component helps explain why tighter forward guidance has been found to have little effect on prices. [Swanson \(2024\)](#) finds that the CPI initially rises after tighter forward guidance and declines only slightly at longer horizons. I find a similar response when I do not control for the supply component and use only changes in interest rates and equity prices: the price level declines by only about four basis points after two years. By adding the exchange rate to separate the supply component, I find a larger and statistically significant decline in prices, reaching thirteen basis points after two years. In both cases, the monetary-policy component raises the two-year Treasury yield by about 2.5 basis points on impact.

To distinguish revisions related to supply conditions from monetary tightening and demand, I use a model to derive the effects of each on asset prices. In particular, I show when supply-related news can raise interest rates and lower stock prices while the dollar depreciates. The model is a New Keynesian model with sticky prices, real-wage rigidity, and monetary-policy, demand, and supply shocks. The supply shock represents an increase in the price of an imported input, as in [Blanchard and Galí \(2007a\)](#). Because prices are sticky, changes in the interest rate affect real activity. Real-wage rigidity makes the supply shock enter the Phillips curve: when the price of the imported input increases, real wages do not adjust enough to absorb it, increasing firms' costs and squeezing their margins. The firms that get to reset their prices then increase them, generating inflation. The central bank faces the trade-off of increasing interest rates to contain inflation, but higher expected real rates encourage households to save rather than spend, slowing economic activity. A positive demand shock instead creates more spending, an increase in economic activity and, through the Phillips curve, an increase in inflation. In this case, increasing interest rates contains both economic activity and inflation without the same trade-off.

In the model, the Federal Reserve adjusts interest rates in response to inflation and output. I allow it to raise rates less strongly when inflation comes from supply pressures. The central bank partially accommodates the shock when it raises the expected real interest rate but allows part of the inflation to pass into current prices. The same pattern can arise without a supply-specific coefficient when the Taylor rule produces only a moderate increase in the expected real rate following temporary inflation. I then show how different degrees of accommodation change the responses of expected future policy rates, equity prices, and the exchange rate.

Finally, investors know the model but do not observe the monetary-policy, demand, and supply shocks directly. They use the announcement to learn about the Federal Reserve's assessment of economic conditions and its expected policy response. When markets learn that the Federal Reserve sees greater supply pressures, they may expect it to raise interest rates while tolerating part of the resulting inflation. This can lead to higher medium-term interest rates, lower stock prices, and dollar depreciation. I use this combination of asset-price movements to identify the supply component.

*Related literature.* This paper contributes to the literature that uses high-frequency monetary-policy surprises to estimate monetary transmission to financial markets and the real economy (Gertler and Karadi, 2015; Swanson, 2021, 2024). A central question is whether interest-rate movements around announcements identify unexpected monetary policy or also reflect the economic conditions to which the central bank responds. I contribute by showing how exchange-rate movements help identify revisions related to perceived supply conditions. Separating these revisions matters for monetary transmission. In my estimates, tighter forward guidance produces a larger and statistically significant decline in prices once I control for the supply component.

One explanation for the puzzles obtained using high-frequency surprises is that monetary-policy announcements also reveal information about the economy. This idea goes back to Romer and Romer (2000), who show that policy actions reveal information about inflation that private forecasters do not already possess. Romer and Romer (2004) account for the Federal Reserve’s forecasts when constructing a narrative measure of monetary-policy shocks, removing the systematic response to its assessment of economic conditions. Nakamura and Steinsson (2018), Jarociński and Karadi (2020), and Miranda-Agrippino and Ricco (2021) study the information effect in the high-frequency setting using different approaches. Jarociński and Karadi (2020) separate monetary policy from information using interest rates and stock prices, while Miranda-Agrippino and Ricco (2021) use the Federal Reserve’s forecasts to account for the information contained in policy surprises. My paper studies how perceived supply conditions enter these surprises. Adverse supply news can raise medium-term interest rates and lower stock prices, just as unexpected monetary tightening does. Gürkaynak et al. (2021) show that currencies sometimes depreciate after announcements that raise interest rates and examine whether information about economic conditions, including supply conditions, can explain these movements. I use the exchange rate to distinguish these responses and then examine whether the resulting component is related to supply conditions using announcement narratives, commodity prices, and independently identified oil-supply news.

Bauer and Swanson (2023a) provide a different explanation based on the Federal Reserve’s response to public news. Markets may underestimate how strongly the Federal Reserve will respond to information already available before the announcement. An interest-rate surprise can therefore reflect this response without revealing private information about the economy. For given economic conditions, learning that the Fed will tighten more should lower expected inflation. This differs from my supply component, where markets revise rates upward while expecting the Fed to tolerate part of the supply-driven inflation. Ricco and Savini (2025) examine this distinction between information about economic conditions and revisions in the perceived policy rule. They find that information effects explain the price and output puzzles in their sample, while policy-rule revisions play a smaller role.

Bauer and Swanson (2023b) address the predictability of monetary-policy surprises by controlling for pre-announcement economic and financial news. My results show that their corrected surprise remains correlated with the supply component. Accounting for public news and separating perceived supply conditions therefore address different aspects of the identification problem.

My decomposition measures revisions related to the Federal Reserve’s assessment of and response to supply conditions, without separately identifying how much comes from private information or learning about its response to public news.

Two closely related papers already consider perceived supply shocks. [Jarociński and Karadi \(2020\)](#) introduce supply information in an extension using stock prices and inflation compensation, leaving the interest-rate response unrestricted. Adding this component leaves their estimated monetary-policy responses broadly unchanged. [Acosta \(2026\)](#) combines newspaper-based measures of output and inflation forecast revisions with interest-rate surprises. He identifies the shocks using changes in their variances across Federal Reserve communication regimes and also studies the transmission of monetary news about future rates. My contribution is a different identification based on announcement-window exchange-rate movements, together with evidence on what the supply component captures. I then compare the estimated transmission of forward guidance with and without separating this component. In my sample, which includes the recent supply disruptions, separating perceived supply conditions substantially changes the estimated response of prices.

The paper also relates to work on monetary policy responses to supply-driven inflation ([Gagliardone and Gertler, 2023](#); [Benigno and Eggertsson, 2023](#); [Hofmann et al., 2025](#); [Nakamura et al., 2025](#)). This literature studies the extent to which central banks should accommodate temporary inflation caused by supply disturbances. [Kase et al. \(2026\)](#) show how fiscal constraints can limit monetary tightening after inflationary supply shocks. Their mechanism provides one possible explanation for the accommodation that markets perceive in my estimates. I provide a market-based measure of how investors perceive this response around Federal Reserve announcements. I then study what follows for expected real rates, inflation expectations, and the transmission of forward guidance.

Finally, [Boehm and Kroner \(2026\)](#) identify asset-price variation around Federal Reserve announcements that is not explained by movements in the yield curve. Their positive non-yield shock raises equity prices, depreciates the dollar, and lowers implied volatility. The supply component also depreciates the dollar, but it lowers equity prices and raises implied volatility. Despite these differences, it has a positive association with the non-yield shock and explains about 7 per cent of its variation. The three announcement components jointly explain 23 per cent. This comparison shows that separating supply-related revisions helps account for some of the announcement variation missed by the yield curve, while the two objects capture different asset-price patterns.

The rest of the paper is organised as follows. Section 2 presents the model and derives the asset-price responses used in the identification. Section 3 describes the announcement data, and Section 4 explains how I separate the monetary-policy, demand, and supply components. Section 5 examines whether the supply component is related to supply disruptions using announcement narratives, commodity prices, and independent oil-supply news. Section 6 studies the financial and macroeconomic responses, while Section 7 studies inflation expectations. Section 8 shows how separating the supply component changes the estimated price response to forward guidance. Section 9 reports the robustness checks, and Section 10 concludes.

## 2 Policy responses and asset prices

The model explains why an upward revision in expected policy rates can be accompanied by different movements in equity prices and the exchange rate. I first derive the responses to monetary-policy, demand, and supply disturbances separately. I then allow investors and the Federal Reserve to enter a meeting with different assessments of demand and supply conditions. The model represents this difference by giving investors noisy signals, while the Federal Reserve observes the disturbances and follows a policy rule understood by investors.<sup>7</sup> The announcement conveys the Federal Reserve's assessment together with the expected policy path, leading investors to revise their beliefs and asset prices.

I depart from a standard New Keynesian model in three dimensions. The first two are in the spirit of [Blanchard and Galí \(2007a\)](#) and [Blanchard and Galí \(2007b\)](#). First, I represent the supply shock as an increase in the real price of an imported input.<sup>8</sup> Second, the model has real-wage rigidity. When the imported input becomes more expensive, the real wage does not fall enough to absorb the increase in firms' costs. This creates a wedge between the natural level of output, defined as the allocation under flexible prices while retaining real-wage rigidity and monopolistic competition, and the efficient level of output. The supply shock therefore enters the Phillips curve and creates inflationary pressure even when output falls. Third, I introduce a supply-dependent coefficient in the Taylor rule. This coefficient allows me to study different degrees of accommodation of the supply shock.

I derive below the conditions under which the imported-input shock raises inflation while output falls. I define the policy response as partially accommodative when the nominal rate rises by more than expected inflation next period but by less than current inflation. The first inequality means that the expected real rate rises. The second compares the impact responses, but in the model inflation and interest rates have the same persistence, so it also implies that cumulative inflation rises by more than the cumulative path of nominal rates. Uncovered interest parity and long-run purchasing-power parity then imply that the dollar depreciates. Equity prices also fall as lower output and narrower profit margins reduce expected profits, while the higher expected real rate reduces their present value. These are the asset-price signs used in the empirical analysis.

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<sup>7</sup>Appendix [E.5](#) relaxes this assumption and allows markets to be uncertain about the policy rule. If markets expect the Federal Reserve to be more accommodative, the dollar depreciates further, but interest rates increase by less and the decline in stock prices is smaller. A more hawkish expected response has the opposite effects. In both cases, the three signs used in the identification can still arise when the revision towards more adverse supply conditions is large enough.

<sup>8</sup>Oil is the clearest example, as in [Blanchard and Galí \(2007a\)](#), but the shock can also represent increases in the prices of imported energy, commodities, or other intermediate inputs.

## 2.1 The economy and the policy response

Output, inflation, and the nominal policy rate satisfy

$$y_t = \mathbb{E}_t y_{t+1} - (i_t - \mathbb{E}_t \pi_{t+1}) + \delta_s u_t^s + \varepsilon_t^d, \quad (1)$$

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \kappa y_t + u_t^s, \quad (2)$$

$$i_t = \phi^\pi \pi_t + \phi^y y_t - \phi^s u_t^s + \varepsilon_t^m. \quad (3)$$

Here  $y_t$  is output,  $\pi_t$  is domestic inflation, and  $i_t$  is the nominal policy rate. The expected policy real rate is  $r_t \equiv i_t - \mathbb{E}_t \pi_{t+1}$ . The disturbances  $u_t^s$ ,  $\varepsilon_t^d$ , and  $\varepsilon_t^m$  represent supply, demand, and monetary-policy shocks. Each follows an independent autoregressive process with persistence  $\rho_s$ ,  $\rho_d$ , and  $\rho_m$ .

The first two equations are the dynamic IS curve and the New Keynesian Phillips curve. A higher expected real rate lowers current spending, while a demand shock raises it. The supply disturbance raises firms' marginal costs and therefore inflation. The positive term  $\delta_s u_t^s$  in the IS curve comes from the mean reversion in the imported-input price. As the shock fades, purchasing power improves. Through the Euler equation, this expected recovery supports current spending. This term works against the contractionary effect of higher expected real rates. Appendix E.1 derives these equations from an imported-input economy following [Blanchard and Galí \(2007a\)](#).

The third equation is a nominal policy rule. The coefficients  $\phi^\pi > 1$  and  $\phi^y \geq 0$  govern the responses to inflation and output. The coefficient  $\phi^s \geq 0$  allows the response to inflation to depend on its source. A larger  $\phi^s$  lowers the nominal-rate response to a given supply disturbance and therefore represents greater accommodation.

## 2.2 Partial accommodation

Consider a supply disturbance that raises inflation and lowers output under the stagflation condition derived in Appendix E.2. Let  $b_x^s$  denote the equilibrium impact response of variable  $x$  to one unit of the disturbance. The total nominal-rate response relative to the inflation response is

$$\mathcal{R}_s(\phi^s) \equiv \frac{b_i^s}{b_\pi^s} = \phi^\pi + \phi^y \frac{b_y^s}{b_\pi^s} - \frac{\phi^s}{b_\pi^s}. \quad (4)$$

The first term is the response to inflation specified by the policy rule. Because output falls, the second term reduces the rate increase. The supply adjustment reduces it further.

**Definition 1** (Partial accommodation). *I call the equilibrium policy response partially accommodative while tightening in real terms when*

$$\rho_s < \mathcal{R}_s(\phi^s) < 1. \quad (5)$$

In the model, the expected real interest rate is the nominal rate minus expected inflation next period. After the supply shock, its response is  $b_i^s - \rho_s b_\pi^s$ . It increases when the nominal rate rises by

more than expected inflation next period. The second inequality says that the nominal rate rises by less than current inflation. I call this combination partial accommodation. The central bank raises the expected real rate, but less than it would if the nominal rate increased one-for-one with current inflation.<sup>9</sup>

I introduce  $\phi^s$  to study how different degrees of accommodation change the response to the same supply shock. Since it enters the Taylor rule with a negative sign, a larger  $\phi^s$  reduces the increase in nominal and expected real rates. Output then falls by less and inflation rises by more. Partial accommodation can also arise when  $\phi^s = 0$ . Appendix E.3 derives the conditions for this case.

### 2.3 The exchange rate and equity

The exchange rate and equity prices provide the two signs that distinguish the three interpretations of a rise in the nominal policy rate. I begin by normalising each asset-price response by the response of the nominal interest rate:

$$K_{x,j} \equiv \frac{b_x^j}{b_i^j}, \quad j \in \{m, d, s\}. \quad (6)$$

Thus,  $K_{x,j}$  is the response of  $x$  associated with a one-unit increase in the nominal rate under interpretation  $j$ . Since disturbance  $j$  persists at rate  $\rho_j$ , the expected policy rate  $h$  periods ahead rises by  $\rho_j^h$ . The response of the expected policy real rate is

$$K_{r,j}^{\text{pol}} = 1 - \rho_j K_{\pi,j}. \quad (7)$$

The exchange rate reflects two opposing forces. A higher expected US interest-rate path makes dollar assets more attractive and appreciates the dollar. A higher US price level reduces its purchasing power and depreciates it. Let  $e_t$  be the price of foreign currency in dollars, so an increase is a dollar depreciation. Holding foreign rates, foreign prices, and the currency premium fixed, uncovered interest parity and long-run purchasing-power parity give

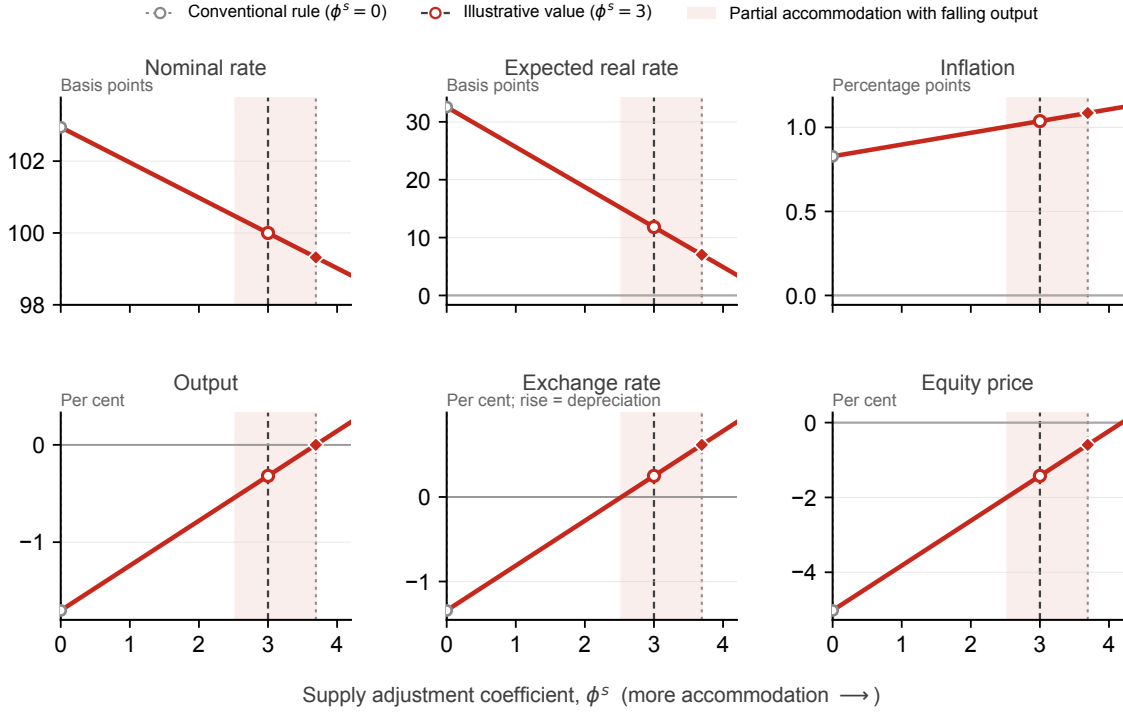
$$\begin{aligned} K_{e,j} &= \underbrace{\frac{K_{\pi,j}}{1 - \rho_j}}_{\text{US price-level response}} - \underbrace{\frac{1}{1 - \rho_j}}_{\text{US nominal-rate path}} \\ &= K_{\pi,j} - \frac{K_{r,j}^{\text{pol}}}{1 - \rho_j}. \end{aligned} \quad (8)$$

Appendix E.4 derives this expression and allows foreign rates and currency premia to move.

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<sup>9</sup>I abstract from interest-rate smoothing to keep the solution simple. Allowing the policy rate to adjust gradually gives a hump-shaped response, which is closer to the empirical focus on medium-term rates and the small persistent response of expected real rates. Partial accommodation then applies to the paths of inflation and interest rates rather than only to their impact responses: expected nominal rates rise, but their cumulative response remains smaller than cumulative inflation. The dollar therefore depreciates, and the three signs used in the identification can still hold. Adding smoothing makes the lagged policy rate another state variable and considerably complicates the analytical solution.

Figure 1: Responses to a fixed adverse supply shock as the supply adjustment coefficient changes.



Notes: The shock is normalised to raise the nominal rate by 100 basis points at  $\phi^s = 3$ . The shaded region contains the values for which the response is partially accommodative and output still falls. The conventional rule is  $\phi^s = 0$ , and the final marker denotes the value at which output no longer falls. A rise in the exchange rate is a dollar depreciation.

The dollar depreciates after a partially accommodated supply disturbance, but appreciates after an unexpected monetary tightening or an expansionary demand disturbance. For supply, the upper bound in the partial-accommodation condition gives  $b_i^s < b_\pi^s$ . Because both responses inherit the persistence of the disturbance, the cumulative price-level response exceeds the cumulative nominal-rate response, and the dollar depreciates. At the same time, the lower bound gives  $b_i^s > \rho_s b_\pi^s$ , so the expected policy real rate rises. An unexpected monetary tightening instead lowers inflation and raises the expected real rate, and both responses appreciate the dollar. After an expansionary demand disturbance, the policy rule raises the nominal rate by more than inflation when  $\phi^\pi > 1$  and  $\phi^y \geq 0$ . The nominal-rate path then dominates the price-level response, and the dollar appreciates (see equation (68) in the Appendix).<sup>10</sup>

<sup>10</sup>Appendix B.1 shows that the results are robust even when I leave the exchange-rate response to the demand component unrestricted. The supply component and its responses are very similar to the baseline results.

Equity prices depend on expected profits and the returns investors require to hold equity. Let  $K_{\text{div},j}$  denote the response of dividends and let  $\bar{\rho}$  govern equity duration. A Campbell–Shiller linearisation gives

$$K_{\text{eq},j} = \frac{\underbrace{(1 - \bar{\rho})\rho_j K_{\text{div},j}}_{\text{expected-dividend response}} - \underbrace{K_{r,j}^{\text{pol}}}_{\text{expected-real-rate response}} + \underbrace{\Lambda_q K_{y,j}}_{\text{equity-premium channel}}}{1 - \bar{\rho}\rho_j}, \quad (9)$$

The denominator sums the effects on equity prices over time, as the response to disturbance  $j$  declines at rate  $\rho_j$ . Equation (9) shows why equity prices help separate demand from the other two cases. After the supply disturbance,  $K_{\text{div},s} < 0$  and  $K_{y,s} < 0$ , while  $K_{r,s}^{\text{pol}} > 0$ . Each term in the numerator therefore lowers equity prices. The same signs arise after an unexpected monetary tightening: output and dividends fall, while the expected real rate rises. Demand is different because it raises output and expected dividends. I allow the equity premium to move countercyclically with expected activity, consistent with [Campbell and Cochrane \(1999\)](#), so it falls after demand. These two effects raise equity prices, while the increase in the expected real rate works in the opposite direction. Equity prices rise when the first two effects dominate (see equation (76) in the Appendix), as in [Jarociński and Karadi \(2020\)](#).

These signs give the restrictions used in the empirical analysis. An increase in medium-term interest rates together with an increase in equity prices identifies stronger demand. When these rates rise and equity prices fall, a dollar appreciation identifies unexpected monetary tightening, while a depreciation identifies adverse supply conditions under partial accommodation. Table 1 summarises these three cases.

Figure 1 shows how the degree of accommodation changes the responses to the same adverse supply disturbance. Under the conventional rule, the expected real rate rises strongly and the dollar appreciates. As accommodation increases, the expected real rate rises by less, the decline in output becomes smaller, and inflation rises by more. Under partial accommodation, the expected real rate still rises and output still falls, while the dollar depreciates and equity prices decline.

## 2.4 Announcements and market interpretation

Until now, I have considered one shock at a time, assuming that investors know whether it comes from monetary policy, demand, or supply. Around Federal Reserve announcements, investors do not observe these shocks directly. They use the information in the announcement to revise their beliefs about all three.

Let  $\mathcal{I}_t^-$  and  $\mathcal{I}_t^+$  denote the information available immediately before and after the announcement. For each shock  $j$ , I denote the change in investors' beliefs by

$$\Delta_t^j \equiv \mathbb{E}[\varepsilon_t^j \mid \mathcal{I}_t^+] - \mathbb{E}[\varepsilon_t^j \mid \mathcal{I}_t^-], \quad (10)$$

where  $j \in \{m, d, s\}$  and  $\varepsilon_t^s \equiv u_t^s$ . I choose the signs so that positive values represent tighter monetary policy, stronger demand, and more adverse supply conditions, respectively.

Consider a revision in perceived supply conditions. It changes the nominal rate by  $b_i^s \Delta_t^s$  and any other asset price  $x$  by  $b_x^s \Delta_t^s$ . Their ratio is  $K_{x,s} = b_x^s / b_i^s$ , the response of  $x$  per unit of the rate revision. The same calculation applies to monetary policy and demand.

Define  $f_t^j \equiv b_i^j \Delta_t^j$  as the contribution of source  $j$  to the model rate revision. Since an announcement can change beliefs about all three sources, the total revision is

$$f_t = b_i^m \Delta_t^m + b_i^d \Delta_t^d + b_i^s \Delta_t^s \equiv f_t^m + f_t^d + f_t^s, \quad (11)$$

For any asset price  $x$ , the announcement-window movement is

$$\Delta_t^A x = K_{x,m} f_t^m + K_{x,d} f_t^d + K_{x,s} f_t^s, \quad (12)$$

where  $K_{x,j}$  is defined in equation (6). Because each shock has persistence  $\rho_j$ , its effect on policy changes the interest rates that markets expect over the next one to two years. In the empirical analysis, I measure this part of the rate revision with the forward-guidance factor.

In the data, I observe the forward-guidance factor, equity prices, and the exchange rate, but not the three underlying components. Equation (12) expresses each observed asset-price movement as a combination of monetary-policy, demand, and supply revisions. I use the signs in Table 1 to separate these three components.

The fixed-rule case is already enough to obtain the supply signs. If an announcement leads markets to revise towards more adverse supply conditions, expected policy rates rise, equity prices fall, and the dollar depreciates when the expected policy response is partially accommodative. A change in the expected degree of accommodation alone cannot produce this combination.<sup>11</sup> To observe higher expected policy rates, lower equity prices, and a depreciation, markets must also revise towards more adverse supply conditions. These signs do not reveal whether markets also changed the degree of accommodation they expected from the Federal Reserve. My supply component captures the combined effect of these revisions on asset prices.

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<sup>11</sup> Appendix E.5 derives this result. Holding perceived adverse supply conditions fixed, a higher posterior mean of  $\phi^s$  makes investors expect a smaller increase in nominal rates, a smaller decline in output, and more inflation. Equity prices rise and the dollar depreciates. A lower posterior mean of  $\phi^s$  reverses these responses.

### 3 Data and announcement surprises

I use interest-rate surprises, the S&P 500 return, and the EUR/USD return around Federal Reserve announcements to identify the monetary-policy, demand, and supply components. The data come from the U.S. Monetary Policy Event-Study Database of [Acosta et al. \(2025\)](#). From these interest-rate and asset-price changes, I construct the forward-guidance factor described below.

My sample contains 216 FOMC announcements from February 1999 through May 2025. I take the announcement dates from the updated event list of [Jarociński \(2024\)](#) through September 2024 and add the five subsequent announcements. This list includes some unscheduled policy actions but excludes ten events in the complete database. These include several emergency announcements in March 2020 and the monetary-policy framework speech in August 2020. Appendix C reports the excluded dates.

The announcement window includes both the statement and the press conference when one is held. For meetings with a press conference, I measure changes from ten minutes before the statement to sixty minutes after the press conference begins. For announcements without a press conference, I use the window from ten minutes before to twenty minutes after the statement.

I construct three factors to measure surprises about the current policy rate, forward guidance, and asset purchases, following [Gürkaynak et al. \(2005\)](#) and [Swanson \(2021\)](#). The extraction uses ten series. Two come from federal funds futures: the current-meeting target-rate surprise and the change in the third monthly contract, counting the current month as the first. Three come from the second, third, and fourth quarterly Eurodollar futures contracts through 2021 and SOFR futures contracts from 2022. These contracts provide measures of three-month interest rates at different future dates. The remaining five series are changes in two-, five-, and ten-year Treasury yields, the S&P 500 index return, and the EUR/USD return.

I separate the three factors by imposing restrictions on their loadings and their variation over time. I first standardise the ten series and extract their first three principal components. I then rotate the components so that only the target factor loads on the current-meeting target-rate surprise. Among the other two factors, I choose the asset-purchase factor to maximise its sum of squared observations from September 2008 onward. The remaining factor measures forward guidance. I normalise the target, forward-guidance, and asset-purchase factors to have unit loadings on the standardised current-meeting surprise, two-year Treasury yield, and ten-year Treasury yield, respectively.

I use the forward-guidance factor because announcements can change medium-term interest rates even when the current policy rate does not move. This is particularly important during the periods in my sample when the federal funds rate was at its effective lower bound. A positive factor represents an upward interest-rate revision associated with forward guidance. This revision can reflect how markets perceive the Federal Reserve’s assessment of demand or supply conditions and its response to them. It can also reflect an unexpected monetary tightening.

For the identification, I combine the forward-guidance factor with the observed S&P 500 and EUR/USD returns to identify the three announcement components. An increase in EUR/USD

means that the dollar depreciates. Since stocks and the exchange rate also enter the factor extraction, I check whether my results depend on their inclusion. Appendix C.3 repeats the analysis using a forward-guidance factor constructed from interest rates alone. The resulting supply component has a correlation of 0.92 with my baseline component. I retain stock prices and the exchange rate in the factor extraction so that the factors also use information from these asset-price movements. This choice is motivated by Boehm and Kroner (2026) and Bauer et al. (2026), who show that Federal Reserve announcements generate movements in risk-sensitive asset prices that interest-rate surprises alone do not fully explain.

## 4 Identification

I use the monthly Bayesian vector autoregression (BVAR) setup of Jarociński and Karadi (2020) to study how the three components transmit to financial markets and the real economy. I change the identification by also using the exchange rate to distinguish perceived supply conditions from unexpected monetary tightening. My identification uses the forward-guidance factor, stock prices, and the exchange rate to separate the monetary-policy, demand, and supply components.

I bring the announcement surprises to monthly frequency by summing their values across announcements within each month. In months without an announcement, I set these sums to zero. I denote the three series by  $m_t$ , which contains the forward-guidance factor, the EUR/USD return, and the S&P 500 return measured over the announcement window. The monthly financial and macroeconomic variables are collected in  $y_t$ : the two-year Treasury yield, the S&P 500, real GDP, the GDP deflator, and EUR/USD. The stock-price and exchange-rate variables in  $y_t$  measure their monthly levels, while those in  $m_t$  measure only their announcement-window changes.

I include the two-year Treasury yield to study the response of interest rates beyond the current policy rate. This is important during the periods when the federal funds rate was at its effective lower bound. Real GDP and the GDP deflator are observed quarterly. I interpolate them to monthly frequency using the Stock–Watson procedure described in Appendix C (Stock and Watson, 2010).

I treat the announcement surprises as unpredictable from lagged variables in the BVAR. I therefore set their intercept and lag coefficients to zero. The monthly financial and macroeconomic variables depend on twelve lags of both groups of variables and can respond to announcement news within the same month. The system is

$$\begin{pmatrix} m_t \\ y_t \end{pmatrix} = \sum_{p=1}^P \begin{pmatrix} 0 & 0 \\ B_{ym}^p & B_{yy}^p \end{pmatrix} \begin{pmatrix} m_{t-p} \\ y_{t-p} \end{pmatrix} + \begin{pmatrix} 0 \\ c_y \end{pmatrix} + \begin{pmatrix} u_t^m \\ u_t^y \end{pmatrix}, \quad \begin{pmatrix} u_t^m \\ u_t^y \end{pmatrix} \sim \mathcal{N}(0, \Sigma), \quad (13)$$

where  $P = 12$ . In Section 5.3, I separately test whether public news available before a meeting predicts the identified components. I estimate the BVAR using a Minnesota prior. Appendix A reports the prior, estimation procedure, and diagnostics.

I identify the three announcement components by restricting their effects on  $m_t$ . Let  $u_t = B\varepsilon_t$ , where  $u_t$  contains the reduced-form innovations and  $\varepsilon_t$  contains mutually uncorrelated structural

innovations with unit variance. The matrix  $B$  gives their impact effects. I impose that the remaining macroeconomic shocks have zero impact on the announcement surprises. The three announcement components can affect all the variables in  $y_t$  immediately.

I choose the signs so that a positive value represents unexpected monetary tightening, more adverse perceived supply conditions, or stronger perceived demand. All three raise the forward-guidance factor. Monetary tightening lowers stock prices and appreciates the dollar. The supply component also lowers stock prices, but depreciates the dollar. The demand component raises stock prices and appreciates the dollar. Table 2 reports these restrictions, which follow the model in Section 2. I impose them only on the announcement surprises. The responses of the monthly variables, including output, prices, and the two-year yield, are unrestricted both on impact and at subsequent horizons.

Table 2: Identifying restrictions on the impact matrix.

|                           | Monetary<br>policy | Supply<br>component | Demand<br>component | Macro<br>shocks |
|---------------------------|--------------------|---------------------|---------------------|-----------------|
| Forward-guidance factor   | +                  | +                   | +                   | 0               |
| EUR/USD                   | −                  | +                   | −                   | 0               |
| S&P 500                   | −                  | −                   | +                   | 0               |
| Macroeconomic block $y_t$ | •                  | •                   | •                   | •               |

Notes: sign (+, −), zero (0), and unrestricted (•) restrictions on the contemporaneous response of each variable to each structural innovation. The three announcement surprises respond only to the three announcement components (zeros in the last column) and with the signs of the model in Table 1; the macroeconomic block responds freely. EUR/USD is positive when the dollar depreciates.

For each posterior draw, I retain rotations that satisfy the signs in Table 2. I report responses to a one-standard-deviation component. Appendix A describes the estimation and identification procedure.

My supply component measures revisions in how markets perceive supply conditions and the Federal Reserve’s response to them. Under the model, more adverse supply conditions can raise expected policy rates while lowering stock prices and depreciating the dollar when markets expect partial accommodation. An announcement may also change the degree of accommodation markets expect. The identification does not separately measure these two revisions. The next section examines what the component captures using narrative evidence, commodity prices, and external measures of economic news.

## 5 Evidence on the supply component

I use three exercises to study what my supply component captures. First, I compare it with commodity prices and discuss narrative evidence on some key dates, using the Federal Reserve statements and press conferences together with the movements in interest rates and the dollar. Second, I show whether past oil-supply surprises identified around OPEC announcements predict

my supply component. Third, I examine which past economic news predicts the supply, monetary-policy, and demand components.

## 5.1 Announcement history and commodity prices

Figure 2 plots the supply component for every announcement in the sample together with the commodity-price index, and Figure 3 compares the standardised cumulative sum of the supply component with the standardised log commodity-price index. Both figures show how my supply component moves with commodity prices. In Figure 2, periods in which the supply component is positive, shown by red dots, tend to coincide with periods in which commodity prices increase. Negative components, shown by blue dots, tend to coincide with decreasing commodity prices. Figure 3 then shows how, when I sum the supply component over time, it follows the log commodity-price index. This gives me visual evidence that my supply component is related to commodity-price pressures.

In this section, I also discuss narrative evidence on three key dates: April 2011, December 2021, and March 2022. I focus on the supply conditions perceived by the Federal Reserve, its policy response, and the movements in expected rates and the dollar. Appendix D.1 discusses the remaining episodes among the twenty largest observations in each tail.

The April 2011 press conference shows the trade-off behind partial accommodation. The statement linked part of the increase in oil prices to “concerns about global supplies of crude oil” and expected its effect on inflation to be transitory. When Bernanke was asked what the Federal Reserve could do about higher gasoline and food prices, he called the increase in oil prices a “double whammy”: it raised inflation but also reduced households’ purchasing power and growth. He said that little could be done about gasoline prices “without derailing growth entirely” and added that the Federal Reserve could not create more oil. Policy would instead try to stop the increase from passing into other prices and wages. The Federal Reserve would therefore not offset all the initial inflation because of the effect on growth.

The April 2011 announcement combines a positive forward-guidance factor with a depreciation of the dollar. The factor is small: its value of 0.25 corresponds to one quarter of a standard deviation in announcement-window movements in the two-year Treasury yield. The dollar depreciates by 0.59 per cent, and the decomposition assigns 1.8 standard deviations to the supply component.<sup>12</sup> Contemporary reporting makes the same distinction. Reuters attributed the dollar decline to Bernanke’s indication that the Federal Reserve was in no hurry to tighten and to the weaker near-term outlook.<sup>13</sup>

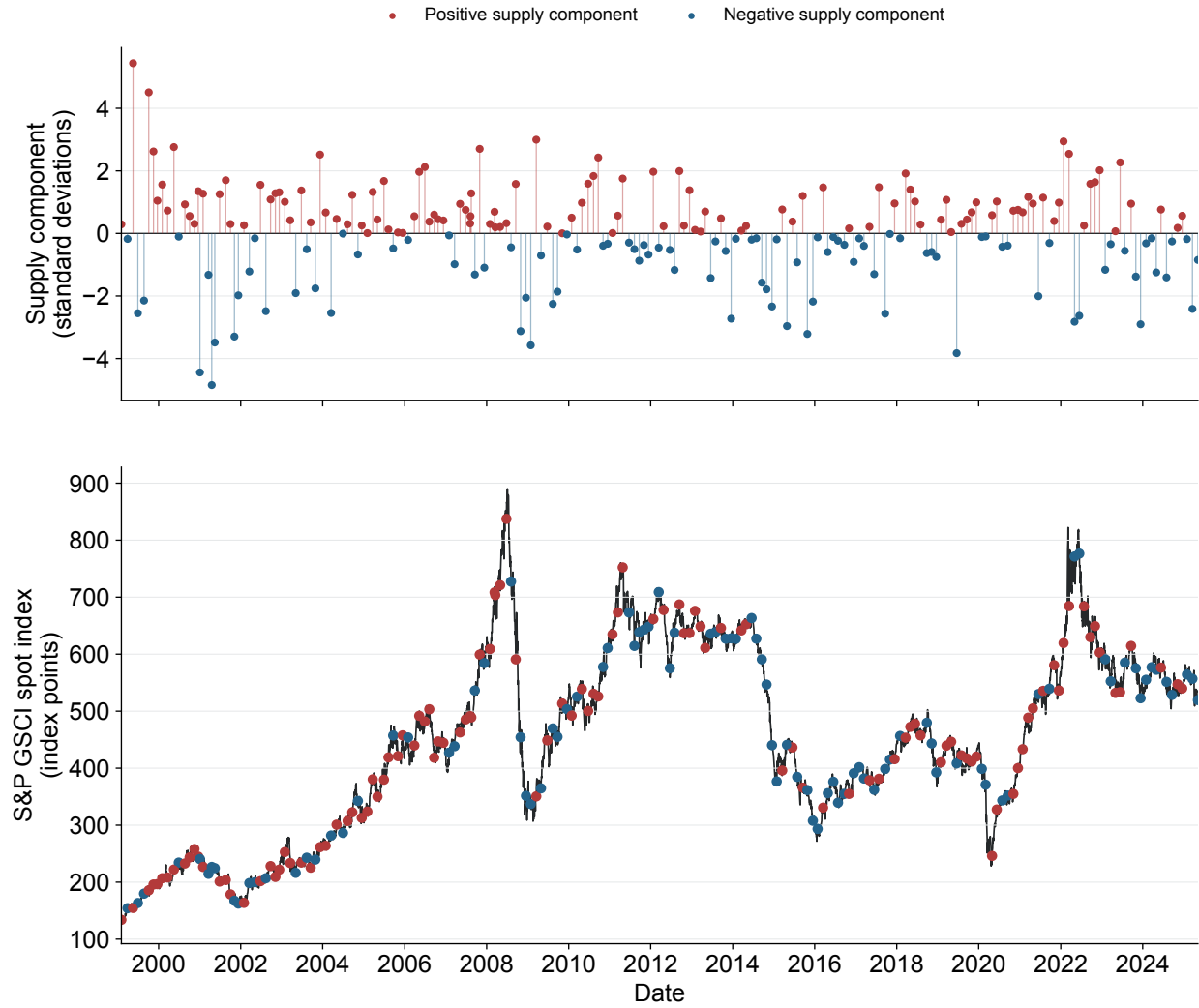
At the December 2021 meeting, the Federal Reserve attributed persistent inflation to supply constraints and signalled a gradual increase in interest rates. Powell said that bottlenecks and supply constraints were “limiting how quickly production can respond” and had been “larger and

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<sup>12</sup>The announcement also contains a large dovish monetary-policy component: the raw two-year Treasury yield falls by 2.8 basis points and equity prices rise.

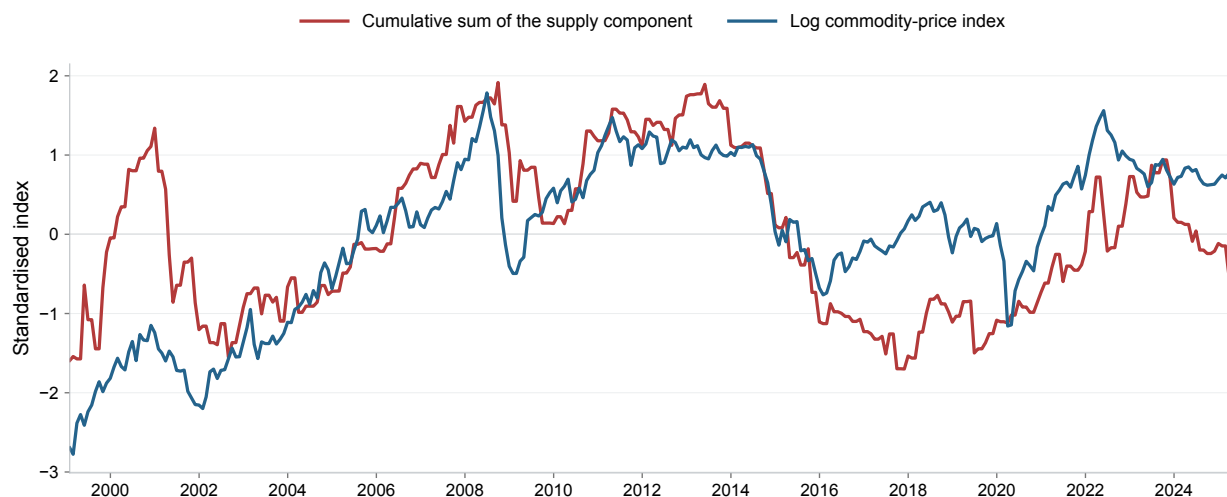
<sup>13</sup>FOMC statement and press conference of April 27, 2011; Reuters, “Dollar slide continues after Fed’s Bernanke speaks”, April 27, 2011.

Figure 2: The supply component around Federal Reserve announcements and commodity prices.



Notes: All announcements in 1999–2025. Red indicates positive supply components and blue indicates negative components. Dots on the daily S&P GSCI spot index mark the same announcement dates. Appendix [D.1](#) discusses the largest observations in each tail.

Figure 3: The cumulative sum of the supply component and the log commodity-price index.



Notes: January 1999–May 2025. The supply component is summed within months and cumulated, with zero added in months without an announcement. Commodity prices are the log month-end S&P GSCI spot index. Each series is demeaned and divided by its own full-sample standard deviation.

longer lasting than anticipated.” Inflation was therefore expected to remain well above two per cent into the following year. The Federal Reserve responded by accelerating the end of its asset purchases, and the projected policy rate for the end of 2022 rose from 0.3 to 0.9 per cent. Powell described the expected adjustment as a “gradual pace of policy firming.”<sup>14</sup> Powell therefore described supply-driven inflation as more persistent, but the expected adjustment in interest rates as gradual.

Across the full December 2021 announcement, medium-term interest rates rise while the dollar depreciates. The forward-guidance factor is positive, at 1.49, and the dollar depreciates by 0.31 per cent. During Powell’s press conference, the dollar depreciates by 0.46 per cent. The decomposition assigns one standard deviation to the supply component, so the supply-related revision is large relative to a typical announcement in the sample.

The March 2022 press conference links the change in the Federal Reserve’s projections directly to the new supply pressures from the war in Ukraine. The Federal Reserve lowered its growth projection for 2022 from 4 to 2.8 per cent. When asked whether this revision reflected tighter monetary policy, Powell said that this was not a large part of it. He instead pointed to the spillovers from the war, including higher oil and commodity prices that would “weigh on GDP.” He also said that the war could make supply chains more tangled and delay their expected improvement. At the same meeting, the Federal Reserve raised the current policy rate by 25 basis points and projected a rate of 1.9 per cent at the end of 2022, while its inflation projection rose to 4.3 per cent.

Across the full March 2022 announcement, medium-term interest rates also rise while the dollar

<sup>14</sup>FOMC statement, Summary of Economic Projections, and press conference of December 15, 2021; Reuters, “Fed signals three rate hikes in the cards in 2022 as inflation fight begins”, December 15, 2021.

depreciates. The forward-guidance factor is positive, at 1.03, and the dollar depreciates by 0.34 per cent. The depreciation occurs during Powell’s press conference, when the dollar falls by 0.55 per cent. The supply component reaches 2.5 standard deviations. Reuters also reported that the dollar fell because the meeting delivered no additional hawkish surprise and investors reduced some of their more aggressive policy bets.<sup>15</sup>

Appendix D.1 applies the same approach to the other large positive and negative observations of the supply component and reports the complete rankings.

## 5.2 Independent oil-supply news

I also show that past oil-supply news predicts the supply component of monetary-policy surprises, whereas it does not predict the demand or monetary-policy component. I use the oil-supply surprises identified by Känzig (2021). Känzig measures revisions in expectations about future oil supply using daily changes in oil futures prices around production announcements by the Organization of the Petroleum Exporting Countries (OPEC). This exercise therefore shows that a measure used in the literature to study the macroeconomic transmission of oil-supply shocks is also related to FOMC monetary-policy surprises, but specifically to the supply component I identify.

To study this relationship, I regress each of my three components on the most recent oil-supply surprise identified by Känzig. For each FOMC meeting, I use the nearest earlier OPEC announcement within thirty, sixty, ninety, or one hundred and eighty days. I consider two measures. The first is Känzig’s principal-component measure, which summarises the daily changes in West Texas Intermediate (WTI) crude-oil futures with maturities from one to twelve months. The second is the change in the front-month futures contract. Table 3 reports the results for each component and window.

Both the principal-component measure and the front-month futures measure predict the supply component. The relationship is strongest when the OPEC announcement occurs within thirty days of the FOMC meeting: the two measures have  $t$ -statistics of 2.73 and 2.96. As I extend the window to include oil-supply surprises further away from the FOMC announcement, the relationship becomes less clear, although the coefficients remain positive and most are statistically significant. I do not find the same pattern for the other two components. The demand component is unrelated to both oil measures in every specification, while the estimates for the monetary-policy component are generally small and insignificant.

## 5.3 Public news and existing monetary-policy surprises

I run a further exercise where I ask which past economic news predicts my supply component, together with the monetary-policy and demand components. I follow Bauer and Swanson (2023b), who show that monetary-policy surprises are predictable using six pieces of economic news. These are the most recent nonfarm-payroll surprise, payroll growth over the previous year, changes over

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<sup>15</sup>FOMC statement, Summary of Economic Projections, and press conference of March 16, 2022; Reuters, “Dollar falls as hawkish Fed delivers without an extra kick”, March 16, 2022.

Table 3: Prior oil-supply news and the three FOMC-day components.

| Measure             | Window   | Supply<br>component | Monetary<br>policy | Demand<br>component | $N$ |
|---------------------|----------|---------------------|--------------------|---------------------|-----|
| Principal component | 30 days  | +0.149***<br>(2.73) | +0.013<br>(0.33)   | +0.025<br>(0.41)    | 84  |
|                     | 60 days  | +0.115*<br>(1.89)   | +0.060<br>(1.53)   | +0.015<br>(0.32)    | 139 |
|                     | 90 days  | +0.076<br>(1.49)    | +0.038<br>(1.14)   | +0.001<br>(0.04)    | 156 |
|                     | 180 days | +0.081**<br>(2.26)  | +0.046*<br>(1.73)  | −0.002<br>(−0.07)   | 209 |
| Front contract      | 30 days  | +0.134***<br>(2.96) | +0.014<br>(0.46)   | +0.021<br>(0.42)    | 84  |
|                     | 60 days  | +0.123**<br>(2.31)  | +0.051<br>(1.48)   | +0.013<br>(0.35)    | 139 |
|                     | 90 days  | +0.086*<br>(1.81)   | +0.033<br>(1.14)   | +0.001<br>(0.04)    | 156 |
|                     | 180 days | +0.080**<br>(2.21)  | +0.038<br>(1.59)   | +0.003<br>(0.13)    | 209 |

Notes: OLS of each identified FOMC-day component on the [Känzig \(2021\)](#) oil-supply-news shock at the nearest OPEC announcement in the  $W$  days before the meeting, one regression per cell, with  $t$ -statistics in parentheses and \*, \*\*, \*\*\* marking significance at the 10, 5, and 1 per cent levels. The principal-component measure aggregates the OPEC-day response of the oil futures curve. The front-contract measure is the front-month futures price change.  $N$  is the number of FOMC meetings with an OPEC announcement inside the window. Full 1999–2025 sample.

the previous three months in the S&P 500, the slope of the yield curve and commodity prices, and the option-implied skewness of the ten-year Treasury yield. They show that controlling for this news is important because markets may underestimate the Federal Reserve’s response to it. Monetary-policy surprises can then be correlated with the systematic component of monetary policy.

I run the same exercise for each of my three components. The supply component is predicted mainly by news related to commodity prices, whereas the demand component picks up news related to payrolls, the stock market, and Treasury skewness. Commodity-price growth has a coefficient of 0.40 and a  $t$ -statistic of 3.25 for the supply component, but does not predict the other two components. Once I separate the supply and demand components from forward guidance, the remaining monetary-policy component is not predicted by any of the six pieces of news, either individually or jointly. The joint  $p$ -value is 0.48. This supports interpreting this component as an unexpected monetary-policy decision. Table 4 reports the results.

Table 4: Which news predicts which announcement component.

|                       | Forward guidance  | Monetary<br>policy | Supply<br>component | Demand<br>component |
|-----------------------|-------------------|--------------------|---------------------|---------------------|
| Payroll surprise      | 0.06***<br>(2.79) | −0.04<br>(−0.87)   | 0.15**<br>(2.49)    | 0.09**<br>(2.20)    |
| Payroll growth, 12m   | 0.13***<br>(3.07) | 0.05<br>(0.44)     | 0.13<br>(0.91)      | 0.22***<br>(2.72)   |
| S&P 500, 3m           | 0.15***<br>(2.92) | 0.15<br>(1.38)     | −0.08<br>(−0.67)    | 0.30***<br>(3.19)   |
| Yield-curve slope, 3m | −0.06<br>(−1.49)  | −0.02<br>(−0.18)   | −0.15<br>(−1.57)    | −0.06<br>(−0.90)    |
| Commodity prices, 3m  | 0.08*<br>(1.76)   | −0.05<br>(−0.53)   | 0.40***<br>(3.25)   | 0.06<br>(0.68)      |
| Treasury skewness     | 0.13**<br>(2.57)  | 0.10<br>(1.11)     | 0.13<br>(1.19)      | 0.20**<br>(2.10)    |
| $R^2$                 | 0.21              | 0.03               | 0.10                | 0.17                |
| Joint $p$ -value      | < 0.001           | 0.480              | 0.002               | < 0.001             |
| Meetings              | 199               | 199                | 199                 | 199                 |

Notes: OLS of the raw forward-guidance surprise and the three identified components (columns) on the six pre-announcement news variables of [Bauer and Swanson \(2023b\)](#) (rows), standardised, with heteroskedasticity-robust  $t$ -statistics in parentheses; \*, \*\*, and \*\*\* denote two-sided significance at the 10, 5, and 1 per cent levels. Payroll surprise is the latest nonfarm-payrolls surprise before the meeting; payroll growth is its twelve-month log change; the S&P 500, yield-curve-slope, and commodity-price variables are thirteen-week changes; Treasury skewness is the option-implied skewness of the ten-year yield. Scheduled FOMC meetings, 1999–2023.

The last exercise is again related to [Bauer and Swanson \(2023b\)](#). I show that their measure of unexpected monetary policy remains correlated with my supply component, but not with the demand component, even after they control for public news. Before their correction, its correlations with the supply and demand components are 0.42 and 0.23. After the correction, the correlation

with demand falls to 0.11 and is no longer statistically significant, while the correlation with supply remains 0.31 and statistically significant. This exercise shows that monetary-policy surprises may still contain revisions in how markets assess supply conditions and the Federal Reserve’s response to them. Controlling for their measures of public news does not therefore remove all the variation associated with my supply component. I use the exchange rate, together with interest rates and stock prices, to separate this supply-related variation from unexpected monetary tightening.

Table 5: The Bauer–Swanson surprises and the three components.

|                                               | Monetary<br>policy  | Supply<br>component | Demand<br>component | Joint $R^2$ |
|-----------------------------------------------|---------------------|---------------------|---------------------|-------------|
| MPS                                           | +0.55***<br>(+6.42) | +0.42***<br>(+5.15) | +0.23**<br>(+2.04)  | 0.50        |
| MPS <sup>⊥</sup>                              | +0.52***<br>(+6.35) | +0.31***<br>(+3.92) | +0.11<br>(+1.08)    | 0.36        |
| MPS <sup>⊥</sup> ,<br>residualised components | +0.53***<br>(+6.82) | +0.35***<br>(+4.62) | +0.13<br>(+1.17)    | 0.43        |

Notes: correlations of the [Bauer and Swanson \(2023b\)](#) monetary policy surprise (MPS) and its orthogonalised version (MPS<sup>⊥</sup>) with the three identified components, all aggregated to FOMC months, 1999–2023. The third row first residualises each component on the same six pre-meeting variables. The last column is the  $R^2$  from regressing the row variable on the three components jointly. Heteroskedasticity-robust  $t$ -statistics are in parentheses; \*, \*\*, and \*\*\* denote two-sided significance at the 10, 5, and 1 per cent levels. All series are standardised.

## 6 Financial and macroeconomic responses

This section reports how the monetary-policy, supply, and demand components propagate to financial markets and the real economy. To study their effects on financial markets, I regress announcement-day changes in different asset prices on the three components. I then study their effects after the announcement using daily local projections following [Jordà \(2005\)](#). To study their transmission to the real economy, I use the monthly Bayesian vector autoregression described in Section 4, which estimates how output, prices, and financial variables respond over time.

I have two main results. First, the supply component raises nominal yields but produces little persistent increase in expected real rates. The increase in nominal yields comes from higher expected future rates rather than an increase in term premia. Stock-market volatility also rises, as measured by the VIX. Second, the monthly responses show that the supply component raises prices while real GDP changes little. The increase in prices is concentrated in the supply-driven categories identified by [Shapiro \(2024\)](#), and is accompanied by higher commodity prices and greater pressure on global supply chains. In contrast, the monetary-policy component lowers both economic activity and prices.

## 6.1 The announcement-day response

Table 6 first shows that, over the announcement day, the two-year nominal yield, the stock market, and the exchange rate move in the directions implied by the identification of the three components. For a one-standard-deviation monetary-policy component, the two-year yield increases by 3.1 basis points, stock prices fall by 0.4 per cent, and the dollar appreciates by 0.4 per cent. The demand component raises the two-year yield by 1.8 basis points and stock prices by 0.2 per cent, while the dollar appreciates by 0.1 per cent. These changes are measured from the previous trading day’s close to the end of the announcement day, extending beyond the narrow window used for identification.

Table 6: Asset-price responses on the announcement day.

|                                   | Monetary policy    | Supply component  | Demand component   |
|-----------------------------------|--------------------|-------------------|--------------------|
| Two-year nominal yield, 1999–2025 | +3.1***<br>(+6.38) | +0.9**<br>(+2.48) | +1.8***<br>(+4.17) |
| S&P 500, 1999–2025                | −0.4***<br>(−5.93) | −0.1**<br>(−2.14) | +0.2***<br>(+2.92) |
| EUR/USD, 1999–2025                | −0.4***<br>(−7.40) | +0.1**<br>(+2.38) | −0.1**<br>(−2.16)  |
| Two-year TIPS yield, 2005–2025    | +5.8***<br>(+9.69) | +1.3**<br>(+2.29) | +3.3***<br>(+5.31) |
| VIX, 1999–2025                    | +0.5***<br>(+3.38) | +0.1**<br>(+2.08) | −0.3*<br>(−1.80)   |

Notes: each entry is the response to a one-standard-deviation component from an event-level local projection at horizon zero. The outcome is the cumulative change from the day before the meeting to the end of the announcement day. Yields are in basis points, the S&P 500 and EUR/USD in per cent, and the VIX in index points. A positive EUR/USD response is a dollar depreciation. Heteroskedasticity-robust *t*-statistics are in parentheses. \*, \*\*, and \*\*\* denote significance at the 10, 5, and 1 per cent levels. The inflation-protected yield is reported from 2005 because short-maturity TIPS were less liquid earlier in the sample.

Table 6 also shows that the supply component raises the two-year nominal yield by less than the other two components, while lowering stock prices, depreciating the dollar, and increasing stock-market volatility. A one-standard-deviation supply component raises the yield by 0.9 basis point, lowers stock prices by 0.1 per cent, depreciates the dollar by 0.1 per cent, and raises the VIX by 0.1 index point. All four responses are statistically significant. These movements are consistent with the interpretation of partial accommodation in the model: nominal interest rates rise, but the dollar depreciates and stock prices fall.

Figure 29 in Appendix D.9 examines whether this dollar depreciation is due to markets pricing in a larger increase in euro-area interest rates than in US rates. The comparison addresses the possibility that a global supply shock hits the euro-area economy harder, so markets expect the ECB to tighten more and the dollar depreciates. This is not what I find: following the supply component, the one-year US yield rises by 1.24 basis points, compared with 0.39 basis point for the euro-area rate. The US response is also larger at two and five years, although those differences are

imprecisely estimated. The dollar therefore depreciates even though the short-term interest-rate differential moves in favour of the US. This is consistent with the interpretation that, even when the supply shock is global, markets are pricing in both the Federal Reserve’s assessment of supply-driven inflation in the US and its expected policy response, rather than just a stronger expected tightening by the ECB.

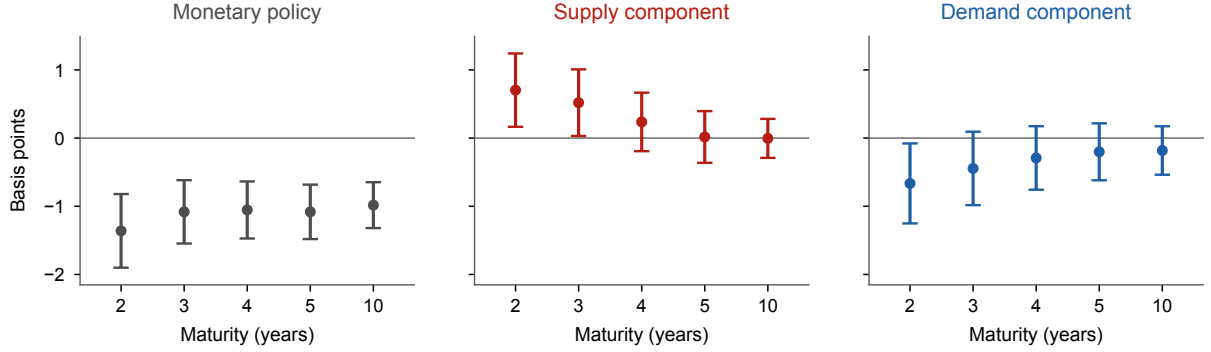
I also study the announcement-day responses of breakeven inflation using the measures constructed by [Gürkaynak et al. \(2010\)](#). These measures are the differences between nominal and inflation-protected zero-coupon Treasury yields at the same maturity. I use them to examine how the three components affect inflation compensation on the announcement day and, in particular, whether the supply component raises it. For each maturity, I regress the change from the previous trading day’s close to the announcement day’s close on the three components jointly.

I use the dollar rather than breakeven inflation in the identification for several reasons. First, TIPS were less liquid in the early years of the market, particularly at short maturities ([Gürkaynak et al., 2010](#); [Nakamura and Steinsson, 2018](#)). I therefore start this exercise in 2005, which leaves out the first six years of my identification sample. Second, the disruption to TIPS liquidity during the financial crisis makes breakevens harder to interpret. Following [Nakamura and Steinsson \(2018\)](#), I exclude July 2008 through June 2009 from this exercise. Using the same restriction for identification would also remove policy announcements during the financial crisis. Third, breakevens contain inflation risk and liquidity premia as well as expected inflation ([Gürkaynak et al., 2010](#)). Their maturities also matter: the shortest measure used here covers two years, so an increase in inflation expected to last only a few months is averaged over a much longer period. In the model, the dollar responds to perceived supply conditions and the expected policy response even when the inflationary pressure is temporary. I therefore use breakevens as an additional check on the interpretation of the components.

Figure 4 shows that the supply component raises inflation compensation at shorter maturities. The two-year measure rises by 0.70 basis point and the three-year measure by 0.52 basis point, with the increases statistically significant at the 5 and 10 per cent levels, respectively. The estimated response becomes smaller at longer maturities and is close to zero at five and ten years. This pattern is consistent with markets expecting the inflationary pressure to be concentrated in the near term. The monetary-policy component lowers inflation compensation at every maturity. The demand component has a slightly negative two-year response, significant at the 10 per cent level, while its longer-maturity responses are smaller and not statistically significant.

I also show that the supply and monetary-policy components explain part of the Fed non-yield shock of [Boehm and Kroner \(2026\)](#). They identify asset-price movements around Federal Reserve announcements that changes in the yield curve do not explain. My supply component explains about 7 per cent of their measure and the monetary-policy component explains about 15 per cent. Together, the three components explain 23 per cent. The demand component explains less than 1 per cent. This result adds to the distinction I make in the introduction: looking only at revisions associated with a positive economic outlook misses supply news, which is related to part

Figure 4: Breakeven inflation responses on the announcement day.



Notes: OLS responses of two-, three-, four-, five-, and ten-year breakeven inflation from [Gürkaynak et al. \(2010\)](#). The sample contains 158 FOMC announcements from January 2005 through May 2025, excluding July 2008 through June 2009. The dependent variable is the change from the preceding trading day's close to the announcement day's close, in basis points. Each regression includes an intercept and the three components jointly. The components retain their baseline normalisation. Dots show coefficients and whiskers show pointwise 90 per cent confidence intervals using heteroskedasticity-robust (HC1) standard errors. Breakevens include inflation-risk and liquidity premia.

of these otherwise unexplained asset-price movements. Figure 24 in Appendix D.4 reports these comparisons.

My components can explain part of their measure even though they change interest rates. The reason is that an announcement can contain different news whose effects on rates offset each other. For example, adverse supply news raises interest rates, while unexpected monetary easing lowers them. Both depreciate the dollar. We can therefore observe a depreciation with little change in yields, even though each component changes rates.<sup>16</sup> In my data, the supply component is positively correlated with their measure, while unexpected monetary tightening is negatively correlated with it. This is consistent with the possibility discussed by [Boehm and Kroner \(2026\)](#) that their non-yield shock combines several underlying shocks.

I then ask whether the increase in nominal yields after the supply component comes from expected future rates or term premia. I separate the two-year yield into the average expected short rate over the next two years and a term premium, which is the compensation investors require for holding a longer-maturity bond. Using the decomposition of [Adrian et al. \(2013\)](#), I find that the supply component raises the fitted two-year yield by 1.1 basis points and expected short rates by 1.2 basis points, with no statistically significant change in the term premium. The increase in nominal yields therefore comes from higher expected future rates. Table 7 reports these results together with the decomposition of real yields.

<sup>16</sup>To see this, suppose there are two independent shocks,  $z_s$  for adverse supply news and  $z_m$  for monetary tightening, each with variance one. Let the yield change be  $g = z_s + z_m$  and consider the measure  $n = z_s - z_m$ . Its covariance with the yield change is  $\text{Cov}(g, n) = \text{Var}(z_s) - \text{Var}(z_m) = 0$ : the two terms cancel. But its covariance with supply is  $\text{Cov}(n, z_s) = 1$ , and with monetary tightening it is  $\text{Cov}(n, z_m) = -1$ . So  $n$  is related to both shocks even though it is uncorrelated with their combined effect on yields. I use this example to explain the distinction, not to estimate the composition of BK's factor.

Table 7: Expected-rate and term-premium responses on the announcement day.

|                                     | Monetary policy    | Supply component  | Demand component  |
|-------------------------------------|--------------------|-------------------|-------------------|
| ACM fitted nominal yield, two years | 3.81***<br>(13.88) | 1.14***<br>(5.89) | 2.01***<br>(5.89) |
| ACM expected short rates, two years | 3.00***<br>(11.12) | 1.20***<br>(6.40) | 1.69***<br>(4.69) |
| ACM nominal term premium, two years | 0.81***<br>(2.89)  | -0.06<br>(-0.34)  | 0.32*<br>(1.90)   |
| DKW expected real rates, five years | 1.38***<br>(11.31) | 0.27***<br>(2.84) | 0.89***<br>(4.69) |
| DKW real term premium, five years   | 1.30***<br>(7.15)  | 0.01<br>(0.11)    | 0.68***<br>(4.75) |

Notes: responses in basis points to a one-standard-deviation announcement component. Each row is estimated by regressing the change from the preceding trading day to the end of the announcement day on the three components jointly. Heteroskedasticity-robust  $t$ -statistics are in parentheses. The nominal decomposition uses the 1999–2025 sample. The D’Amico–Kim–Wei estimates use the 2005–2025 sample. Uncertainty in the estimated yield decompositions is not included in the reported standard errors. \*, \*\*, and \*\*\* denote significance at the 10, 5, and 1 per cent levels.

The increase in expected nominal rates following the supply component is accompanied by only a small increase in expected real rates. The nominal decomposition above does not tell us how much of the increase in expected rates compensates for expected inflation. I therefore use the decomposition of [D’Amico et al. \(2018\)](#) to measure the average expected short real rate over the next five years, the shortest horizon available in their data. On the announcement day, this measure rises by only 0.3 basis point after the supply component, compared with 1.4 basis points after monetary policy and 0.9 basis point after demand. I find no statistically significant change in the five-year real term premium following the supply component.

## 6.2 Daily responses

I then use daily local projections following [Jordà \(2005\)](#) to study how the three components transmit to financial markets over the following thirty trading days. I show that the supply component is followed by a dollar depreciation that lasts for about twenty trading days, a decline in stock prices, an increase in the VIX, and little persistent tightening in expected real rates.

For each variable, I estimate its change from the trading day before the announcement to day  $h$  after it:

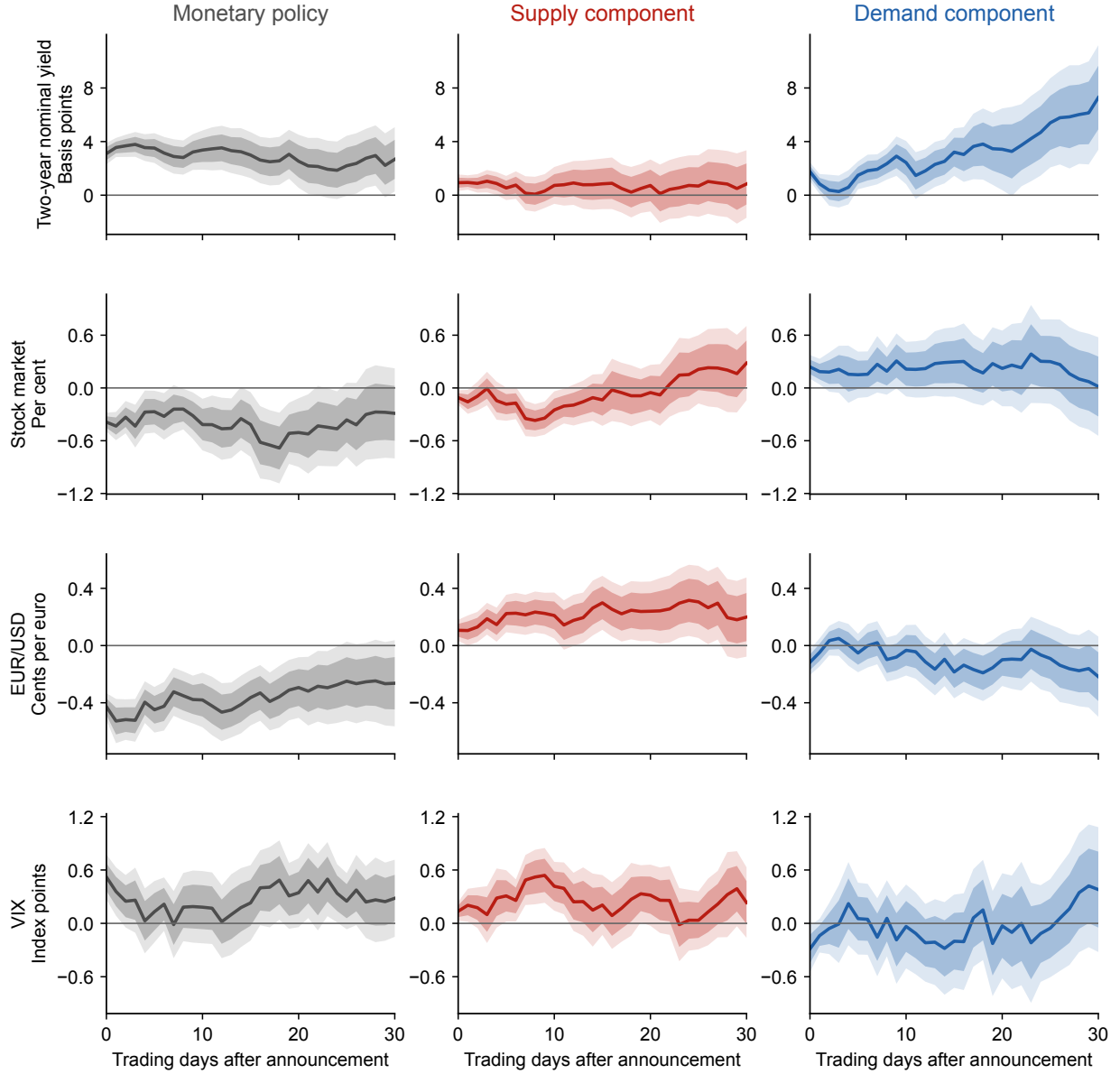
$$y_{i,h} - y_{i,-1} = \alpha_h + \beta_h^{\text{mp}} \varepsilon_i^{\text{mp}} + \beta_h^{\text{sup}} \varepsilon_i^{\text{sup}} + \beta_h^{\text{dem}} \varepsilon_i^{\text{dem}} + u_{i,h}. \quad (14)$$

Here  $i$  denotes the meeting and  $h$  the number of trading days after it. The three components enter together and are each scaled to one standard deviation.

Figure 5 shows that equity prices fall by about 0.25 per cent within ten days after the supply component before recovering. Its nominal-yield response becomes imprecisely estimated.

The decline in stock prices after the supply component is accompanied by an increase in expected

Figure 5: Daily asset-price responses after Federal Reserve announcements.



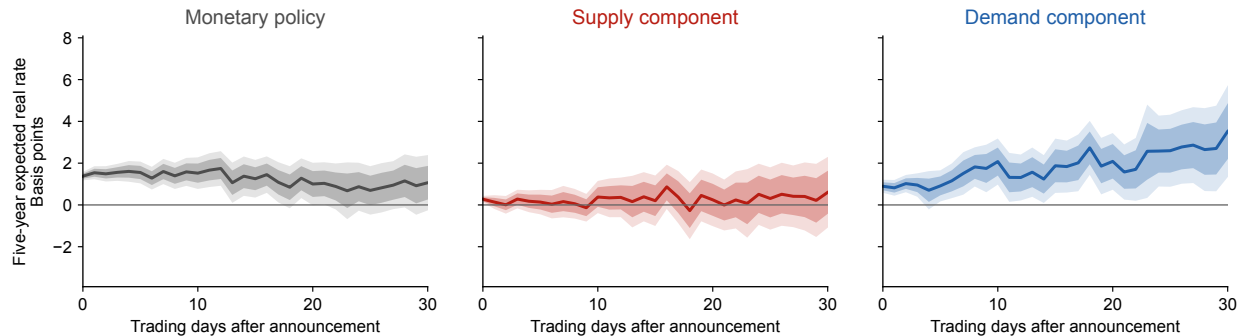
Notes: Event-level local projections from 1999 to 2025. The dependent variable is the cumulative change from the day before the announcement to the horizon shown. A rise in EUR/USD is a dollar depreciation. Solid lines are point estimates; inner and outer bands are 68 and 90 per cent confidence intervals. The three components enter each regression jointly.

stock-market volatility. The VIX rises by 0.1 index point on the announcement day and by 0.4 point after ten trading days, before the response fades. Together with the fall in equity prices, the increase in the VIX is consistent with markets revising towards more adverse economic conditions.

The monetary-policy component produces the financial responses expected after an unexpected tightening: the two-year nominal yield rises, stock prices fall, the dollar appreciates, and the VIX increases. The yield remains about three basis points higher after thirty trading days. Following the demand component, the yield also rises, reaching about seven basis points after thirty trading days, but the VIX initially falls. The decline in expected stock-market volatility is consistent with the stronger economic outlook associated with demand news.

I find little evidence that the initial increase in expected real rates after the supply component develops into persistent tightening. I use the same daily regressions to follow the average expected short real rate over the next five years, measured using the D’Amico–Kim–Wei decomposition. The five years refer to the future rates included in this average. The thirty trading days refer to how long I follow changes in that average after the announcement. After rising by 0.3 basis point on the announcement day, its response remains small and is imprecisely estimated over the following month (Figure 6). The daily estimates therefore do not show a persistent, precisely estimated increase in expected real rates following the supply component. Appendix D.2 also reports the response of the forward real yield covering years five to ten after the announcement.

Figure 6: Expected real rates after the three announcement components.



Notes: Daily local projections of the D’Amico–Kim–Wei five-year expected-real-rate component, in basis points, from 2005 to 2025. The measure is the average expected path of short real rates over the following five years. Solid lines are point estimates; inner and outer bands are 68 and 90 per cent confidence intervals. The estimation uncertainty in the D’Amico–Kim–Wei decomposition is not included in the bands.

### 6.3 Monthly macroeconomic propagation

I use the monthly Bayesian vector autoregression (BVAR) described in Section 4 to study the macroeconomic transmission of the monetary-policy, demand, and supply components. Figure 7 shows the responses to a one-standard-deviation increase in each component. A positive monetary-policy component represents an unexpected tightening, while positive demand and supply components represent revisions towards stronger perceived demand and more adverse perceived supply

conditions.

The monetary-policy component has the textbook macroeconomic responses to an unexpected tightening. The two-year yield increases by around 2.5 basis points on impact, while real GDP and the price level fall. After two years, real GDP is about 0.1 per cent lower and the price level is about thirteen basis points lower. Stock prices also fall, and the dollar initially appreciates.

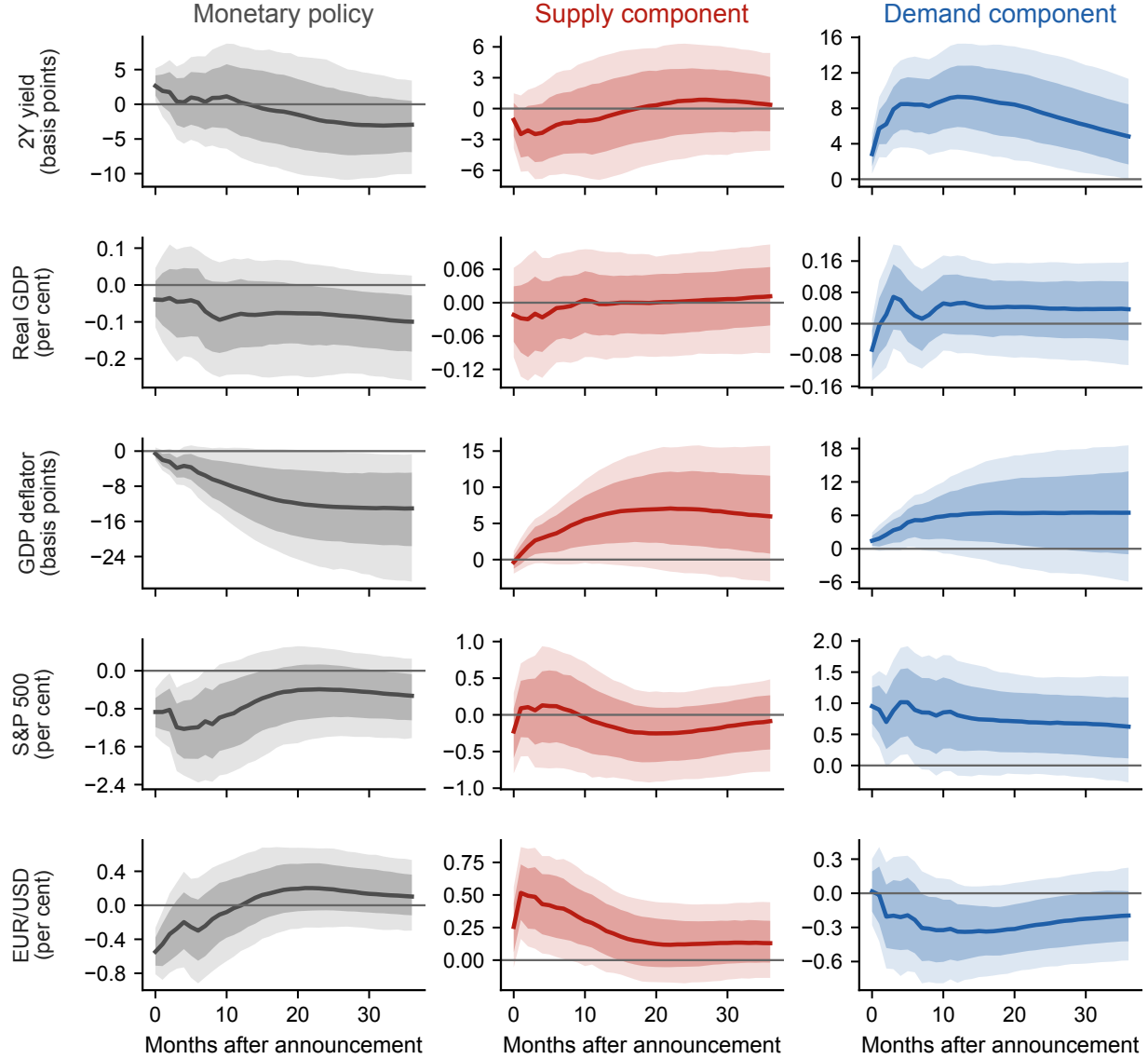
The supply component instead raises the price level and depreciates the dollar, while real GDP changes little. The price level increases gradually, reaching about seven basis points after two years. The dollar depreciates by about one quarter of a per cent on impact and remains weaker for more than a year. Real GDP initially falls, but I do not find a statistically significant response at any horizon. The stock market decreases on impact and its response remains mostly negative over the subsequent months, although it is not precisely estimated.

The propagation of the perceived supply component is consistent with partial accommodation: the GDP deflator increases, real economic activity stays roughly flat, and the two-year yield does not increase persistently. The BVAR therefore points towards markets expecting the Federal Reserve to balance the trade-off between weaker economic activity and higher prices, without tightening as strongly as it does following news about stronger demand.

The demand component has macroeconomic responses consistent with the information effects discussed by [Jarociński and Karadi \(2020\)](#), although I find a less precisely estimated positive response of real GDP. Interest rates increase strongly and persistently, together with the price level, while real GDP rises after an initial decline. These responses suggest that markets perceive stronger demand and expect the Federal Reserve to tighten in response, partly offsetting its effect on economic activity and prices.

These results matter for the estimated transmission of forward guidance. If supply-related revisions are counted as unexpected monetary tightening, the increase in prices following supply news offsets part of the decline following monetary tightening. I may therefore estimate a small price response even when unexpected monetary tightening lowers prices. In [Section 8](#), I compare the estimated responses with and without separating the supply component.

Figure 7: Impulse responses to the three announcement components, baseline 1999–2025 sample.

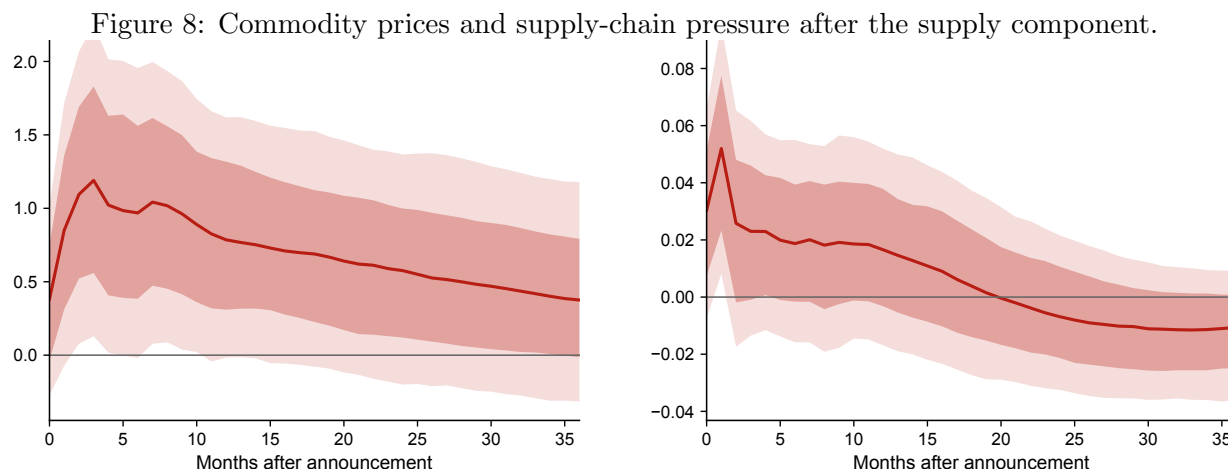


Notes: responses to a one-standard-deviation monetary-policy component (left column), supply component (centre), and demand component (right), from the VAR identified in Section 4. Rows, top to bottom: the two-year Treasury yield, real GDP, the GDP deflator, the S&P 500, and the euro-dollar exchange rate (a rise is a dollar depreciation). Variables in logs are scaled by 100. The two-year yield and GDP deflator are reported in basis points, real GDP and the S&P 500 in per cent, and the euro-dollar rate as a percentage change using its full-sample mean of 1.18 dollars per euro. Solid line: posterior median; shaded bands: inner 68 and outer 90 per cent credible sets. The supply component raises the price level and depreciates the dollar while leaving output little changed; the demand component raises equities and appreciates the dollar.

## 6.4 Input costs and inflation

I also show that the supply component is followed by an increase in commodity prices and supply-chain pressures. To study these responses, I add the S&P GSCI commodity-price index and the Global Supply Chain Pressure Index of [Benigno et al. \(2022\)](#) to the BVAR. The second index is a measure of global supply-chain pressures constructed by the Federal Reserve Bank of New York.<sup>17</sup>

Following the supply component, commodity prices increase by about one per cent within a quarter and remain higher for roughly two years. Figure 8 also shows that supply-chain pressures increase immediately and reach their highest response after one month, before declining. The response after one month is statistically significant at the 90 per cent level. These results provide further evidence that my component captures perceived supply conditions and are consistent with the increase in input costs considered in the model.



Notes: response of the S&P GSCI commodity index (left, in per cent) and the New York Fed Global Supply Chain Pressure Index (right, in index points) to a one-standard-deviation supply component. The two indices are added to the baseline monthly VAR over 1999–2025. Solid line: posterior median; shaded bands: inner 68 and outer 90 per cent credible sets. Neither variable enters the identification. Source for the Global Supply Chain Pressure Index: Federal Reserve Bank of New York.

I then ask whether the increase in prices following my supply component comes from consumption categories related to supply pressures. I use the classification of [Shapiro \(2024\)](#), who estimates a vector autoregressive (VAR) model for each of 129 consumption categories with two variables, price and quantity. He uses twelve lags of both variables and a ten-year rolling window. He then takes the residuals and checks whether they are consistent with a demand or supply shock based on standard sign restrictions. Residuals with the same sign are consistent with a demand shock,

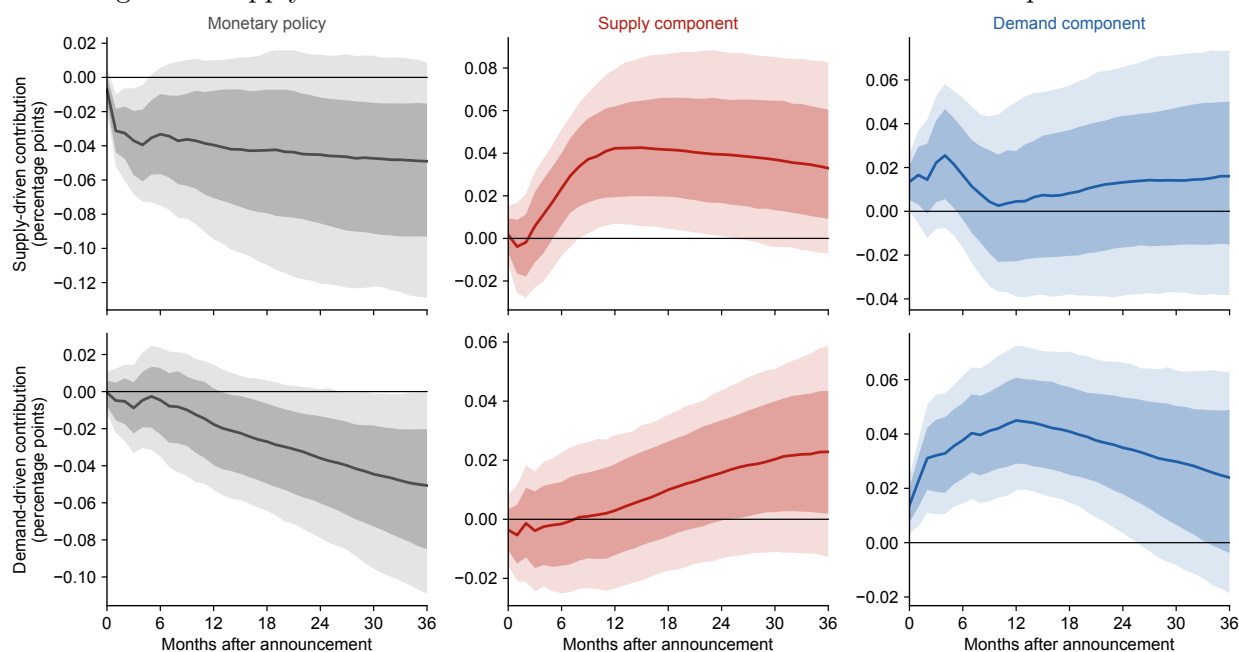
<sup>17</sup>The components of the index include measures of global transportation costs and manufacturing supply-chain conditions. Transportation costs are measured using the Baltic Dry Index, the Harpex index, and airfreight cost indices from the U.S. Bureau of Labor Statistics. The index also uses Purchasing Managers' Index (PMI) surveys of manufacturing firms in seven economies: China, the euro area, Japan, South Korea, Taiwan, the United Kingdom, and the United States. The survey components are delivery times, backlogs, and purchased stocks. Delivery times measure delays affecting producers. Backlogs measure orders received but not yet started or completed. Purchased stocks measure firms' inventory accumulation.

while residuals with opposite signs are consistent with a supply shock.

He then takes the actual price change in each category and assigns its contribution to supply- or demand-driven inflation, weighting it by that category's share of PCE expenditure in the previous month. He repeats this procedure every month, so the same category can be classified as supply-driven in one month and demand-driven in another. I cumulate his published inflation contributions and add the resulting series separately to the BVAR to study each group's contribution to the PCE price level.

The supply component increases the supply-driven contribution to prices, while the demand component increases the demand-driven contribution. Figure 9 shows that, after the supply component, the supply-driven contribution rises gradually and reaches about 0.04 percentage point after one year. The increase is statistically significant at the 90 per cent level, while the demand-driven contribution remains close to zero. After the demand component, the demand-driven contribution increases by about 0.045 percentage point after one year, while the supply-driven contribution stays close to zero. This exercise shows that the increase in prices following my supply component comes mainly from categories that Shapiro classifies as supply-driven. Appendix D.7 reports the results using his published year-on-year headline and core measures.

Figure 9: Supply- and demand-driven contributions to the headline PCE price level.



Notes: cumulative contribution of supply-driven inflation (top row) and demand-driven inflation (bottom row) to the headline PCE price level after a one-standard-deviation monetary-policy component (left), supply component (centre), and demand component (right). Shapiro's annualised monthly contributions are divided by twelve and cumulated from January 1969. A response is the cumulative difference from the path without the shock, in percentage points. Solid line: posterior median; shaded bands: inner 68 and outer 90 per cent credible sets. VAR sample: 1999–2025. The supply, demand, and ambiguous contributions sum to headline PCE inflation; the figure displays the first two. Appendix D.7 reports Shapiro's published year-on-year headline and core inflation contributions.

## 7 Inflation expectations

### 7.1 The upper tail of expected inflation

I also study whether my supply component increases the probability that forecasters assign to inflation of at least four per cent in the next calendar year. I use the Survey of Professional Forecasters, which asks each respondent to report probabilities for different ranges of inflation. I take the average probability across respondents that annual-average GDP-price inflation will be at least four per cent. Here, inflation is the percentage change in the annual-average GDP price index from one calendar year to the next. Since the survey is quarterly, I linearly interpolate this probability to monthly frequency and add it to the BVAR. Appendix C.8 describes the construction and reports the results for core PCE and core CPI inflation.

My supply component increases the probability that forecasters assign to inflation of at least four per cent in the next calendar year. Figure 10 shows that this probability increases by about 0.21 percentage point over the following year. To give a sense of the magnitude, an increase of this size from the sample average of 3.9 per cent would bring the probability to approximately 4.1 per cent. In contrast, the demand component produces an increase of similar size, but it reaches its peak earlier and declines more quickly. The monetary-policy component instead lowers the probability by up to 0.29 percentage point. The supply component therefore produces a more persistent increase in this probability than the demand component.

### 7.2 Long-run inflation expectations

I then study whether my supply component also raises long-run inflation expectations. I use five-year five-year-forward inflation compensation, calculated as the difference between nominal and inflation-protected Treasury forward yields using the data of [Gürkaynak et al. \(2010\)](#). This measure covers inflation over the five-year period beginning five years from the date of observation.<sup>18</sup> I use daily local projections to study its response over the following thirty trading days and the BVAR to study its persistence over subsequent months.

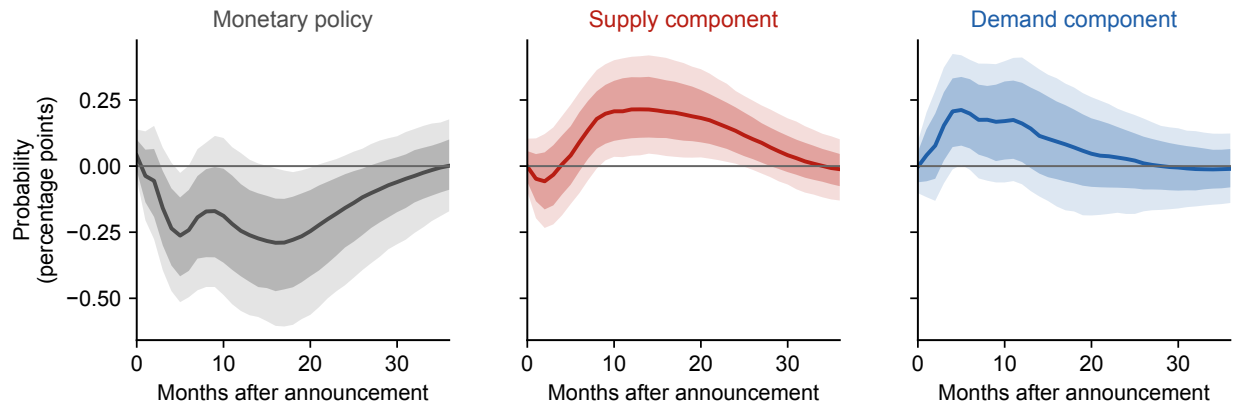
My supply component raises long-run inflation compensation, but the increase takes place in the weeks after the announcement. Figure 11 shows little change on the announcement day and an increase of 3.8 basis points after thirty trading days. In the BVAR, inflation compensation increases by 2.6 basis points after one month and remains 1.3 basis points higher after one year. These responses are statistically significant at the 90 per cent level. The demand component also raises inflation compensation, but its effect disappears within a year. The monetary-policy component instead lowers it, although the estimates are less precise at longer horizons.

My supply component therefore increases the probability that forecasters assign to inflation of at least four per cent in the next calendar year and raises inflation compensation between five and ten years ahead. At the same time, I find little persistent increase in expected real rates.

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<sup>18</sup>I use inflation compensation as a proxy for inflation expectations. It also includes inflation-risk and liquidity premia, so changes in the measure can reflect changes in these premia as well as expected inflation.

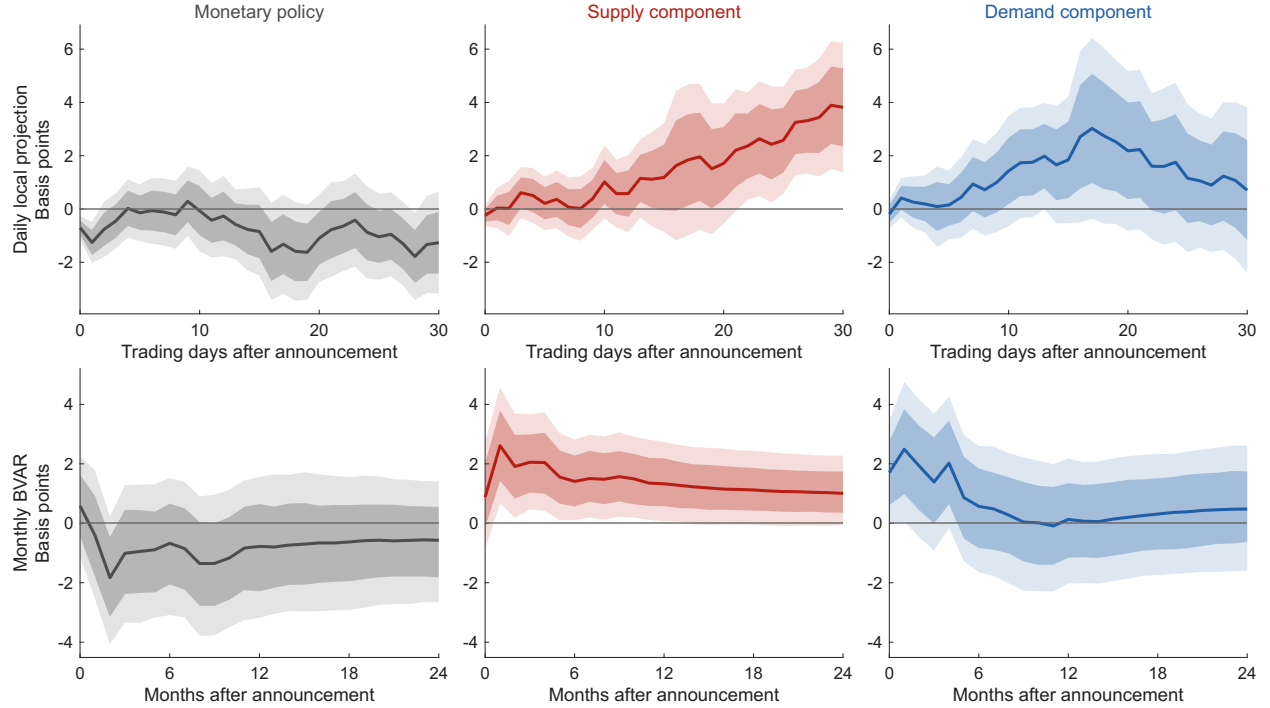
Figure 10: The probability of inflation at or above 4 per cent.



Notes: response of the mean SPF probability that annual-average GDP-price inflation in the next calendar year is at least 4 per cent, measured in percentage points of probability. The quarterly survey measure is linearly interpolated to monthly frequency and added in levels to the baseline VAR. Solid lines are posterior medians; inner and outer bands are 68 and 90 per cent credible sets. Sample: 1999–2025.

Taken together, these results support the interpretation that markets expect the Federal Reserve to accommodate part of the supply-driven inflation. Markets revise expected nominal rates upward, but they also expect some of the increase in inflation to remain.

Figure 11: Long-run inflation compensation after the three announcement components.



Notes: response of five-year five-year-forward inflation compensation, in basis points, to a one-standard-deviation monetary-policy component (left), supply component (centre), and demand component (right). Top row: equation (14), with inner 68 and outer 90 per cent Newey–West intervals, across 166 FOMC announcements from 2005 to 2025. Bottom row: monthly BVAR from January 2005 to May 2025, with inner 68 and outer 90 per cent credible sets. The BVAR contains twelve lags and includes the D’Amico–Kim–Wei five-year expected-real-rate component.

## 8 The supply component and the price response to forward guidance

I now study whether the supply component helps explain why tighter forward guidance has been found to have little effect on prices. [Swanson \(2024\)](#) finds that the CPI initially rises after tighter forward guidance and declines only slightly at longer horizons. My previous results show that the supply component raises prices, whereas the monetary-policy component lowers them. However, both raise medium-term interest rates and lower stock prices during the announcement. Using only these two asset prices can therefore assign part of the supply component to monetary policy and reduce the estimated decline in prices. I examine how this response changes when I also use the exchange rate to separate the supply component.

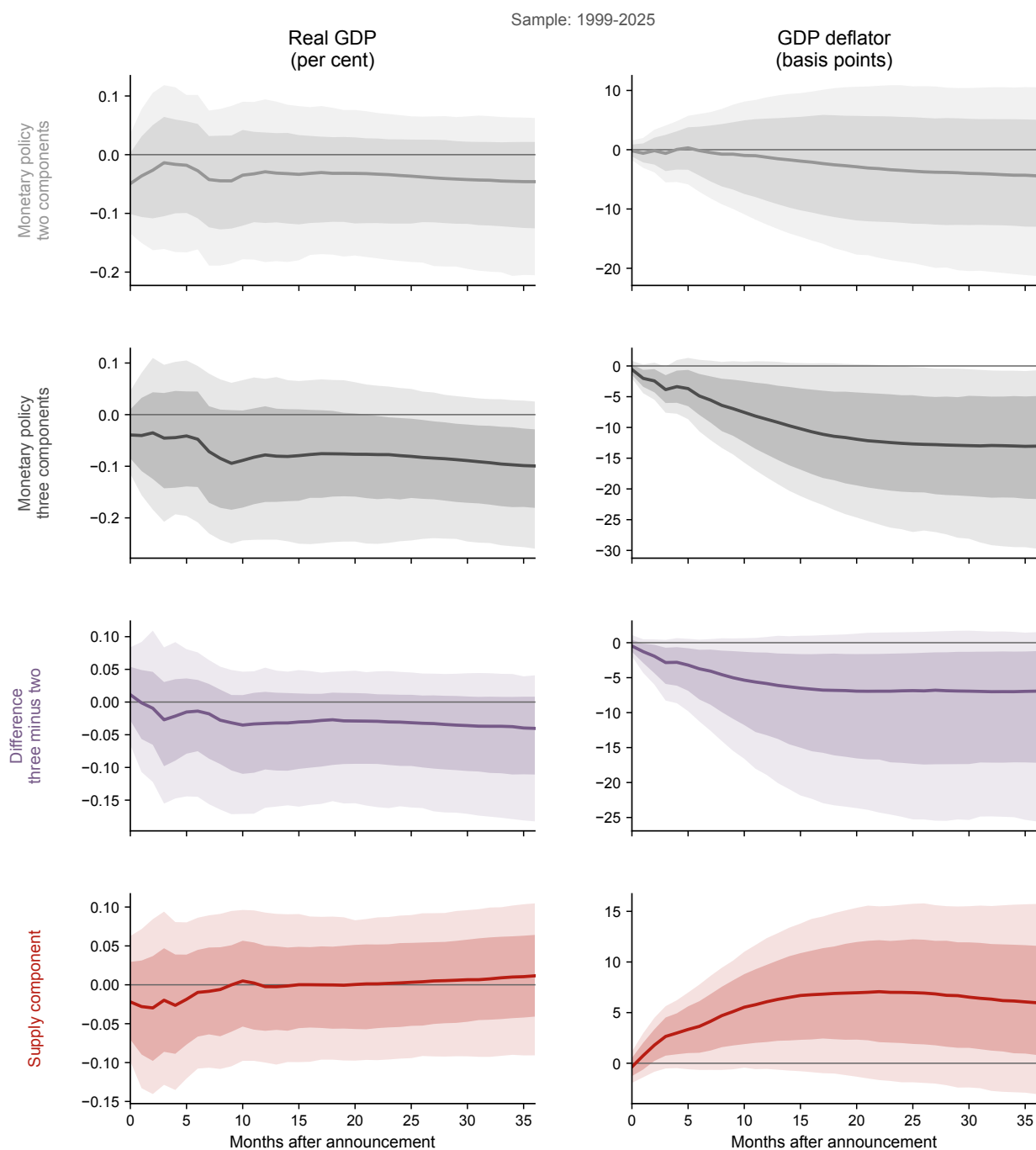
I use the same estimated BVAR for both identifications. In the first, I follow [Jarociński and Karadi \(2020\)](#) and use the forward-guidance factor and stock prices to separate monetary policy from perceived demand conditions. An increase in the forward-guidance factor together with a decline in stock prices identifies monetary tightening, while an increase in both identifies stronger perceived demand. In the second, I also use the exchange rate to separate perceived supply conditions from monetary policy. When the forward-guidance factor rises and stock prices fall, the dollar appreciates after monetary tightening and depreciates after the supply component. The data and the reduced-form BVAR estimates are the same in both exercises. [Figure 12](#) reports the monetary-policy responses under the two identifications, their difference, and the response to the supply component.

I find that prices fall by more when I separate the supply component from monetary policy. The light-grey response in the first row of [Figure 12](#) shows a decline of about four basis points after two years when I use only the forward-guidance factor and stock prices. With my identification, the decline reaches thirteen basis points, as shown by the dark-grey response in the second row, and is statistically significant at the 90 per cent level. Real GDP also falls by more, although the estimate is less precise. The red response in the last row shows why supply news matters for this comparison: the supply component increases prices by about seven basis points after two years, while monetary policy lowers them.

The larger decline in prices is not due to a larger increase in the forward-guidance factor. I report responses to a one-standard-deviation component under each identification. The median impact on the forward-guidance factor is 0.10 under my identification and 0.26 when I use only the forward-guidance factor and stock prices. I therefore find a larger decline in prices with a smaller initial increase in the factor. The purple response in the third row of [Figure 12](#) is the response under my three-component identification minus the response under the two-component identification, calculated for each posterior draw. It compares one-standard-deviation components, rather than responses scaled to the same increase in the forward-guidance factor.

I therefore find that controlling for perceived demand conditions alone is not enough to recover the decline in prices that I estimate after monetary tightening. [Jarociński and Karadi \(2020\)](#)

Figure 12: The supply component and the price response to forward guidance.



Notes: responses of real GDP (left) and the GDP deflator (right). The first row reports monetary policy under the two-component identification, which uses the forward-guidance factor and stock prices. The second row reports monetary policy under the three-component identification, which also uses the dollar. The third row reports the draw-by-draw difference between these responses, and the fourth reports the supply component. Both identifications use the same reduced-form posterior draws. Each response is scaled to a one-standard-deviation identified component. Sample: 1999–2025.

also consider supply information, but their supply extension leaves the monetary-policy responses broadly unchanged. In my exercise, separating supply changes the estimated price response. This helps explain the weak response to tighter forward guidance discussed by [Swanson \(2024\)](#): a measure that still includes supply news can combine the increase in prices after that news with the decline after unexpected monetary tightening.

## 9 Robustness

I check whether my results depend on how I construct the forward-guidance factor, the announcement window, and the sample period. I also use alternative price measures and estimate local projections to compare the results with those from the BVAR.

I first construct the forward-guidance factor using only interest-rate surprises. The resulting supply component has a correlation of 0.92 with my baseline component and produces similar impulse responses. I then use only the policy-statement window, excluding the press conference. The correlation with the baseline component is 0.90, and the dollar response remains similar. The price response is about two thirds of the baseline response, suggesting that information released during the press conference contributes to the estimated increase in prices. Appendix [C.3](#) reports both exercises.

I also estimate the responses over different sample periods. When I start the sample in October 2012, the dollar still depreciates after the supply component and real GDP changes little. The two-year yield rises by about five basis points, while the GDP-deflator response is less precisely estimated. When I end the sample in 2019, the main financial-market responses remain similar, but the price responses of all three components are imprecisely estimated. The observations after 2019 are therefore important for estimating their effects on prices.

I then check how much the results depend on the unusually large movements during the first months of the pandemic. I use pandemic priors that reduce the influence of March–August 2020. The supply component still raises the price level by about seven basis points after two years. The monetary-policy component still lowers the GDP deflator, with a decline of about six basis points after two years. I also replace the GDP deflator with headline CPI and PCE prices. Both increase at medium horizons after the supply component, although the estimates are less precise than those for the GDP deflator. Appendix [B](#) reports these results.

Finally, I use local projections to check whether the responses depend on the BVAR specification. Local projections estimate the response at each horizon directly and do not use the Minnesota prior. Following the supply component, I again find weak output, an increase in the GDP deflator, and a depreciation of the dollar, with little persistent change in the two-year yield. The confidence intervals are wider, particularly for stock prices. Appendix [B.4](#) reports these estimates.

## 10 Conclusion

This paper shows how exchange-rate movements around Federal Reserve announcements can be used to study how markets perceive the Federal Reserve's assessment of and response to supply shocks. The key identification idea is that the Federal Reserve faces a trade-off between stabilising inflation and supporting economic activity after an adverse supply shock. Markets may therefore expect the Federal Reserve to tolerate some supply-driven inflation and price a depreciation of the dollar even when they revise future policy rates upward. The model shows how this combination can arise under partial accommodation.

I show that the resulting supply component is related to commodity prices, is predicted by past oil-supply shocks, and raises the price level.

These results point to the importance of measuring and separating this component when estimating monetary transmission to financial markets and the real economy. I find that without controlling for the supply component, tighter forward guidance has only a small and imprecisely estimated effect on prices. I thus show that looking at exchange-rate movements can help control for the supply component and reveal a larger decline in prices after tighter forward guidance.

These results also raise questions for further research. Beyond demand and supply, what other economic conditions do markets perceive the Federal Reserve to be responding to? Can movements in different asset prices help measure perceived monetary accommodation of expansionary fiscal policy? How do revisions in the Federal Reserve's assessment of risks to economic activity affect those same asset prices? These questions remain open and provide directions for my future research.

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# A The Bayesian VAR: estimation, identification, and diagnostics

## A.1 Estimation

I estimate the BVAR using the monthly announcement surprises and the five financial and macroeconomic variables described in Section 4. The announcement block,  $m_t$ , contains the forward-guidance factor and the EUR/USD and S&P 500 returns measured within the announcement window. I sum each series across announcements within a month and set it to zero in months without an announcement. A positive EUR/USD return means that the dollar depreciates. Appendix C describes the announcement sample and lists the excluded events.

I use the monthly variables in  $y_t$  to study how the announcement components transmit to financial markets and the real economy. These variables are the two-year Treasury yield, the S&P 500 index, real GDP, the GDP deflator, and EUR/USD. The yield, stock index, and exchange rate are measured at the end of each month. For real GDP and the GDP deflator, I construct monthly estimates from quarterly data using the procedure of [Stock and Watson \(2010\)](#). The stock index, real GDP, and the GDP deflator enter as 100 times their natural logarithms, so their responses approximate percentage changes. The two-year yield comes from the Gürkaynak–Sack–Wright zero-coupon Treasury curve.

I allow each variable in  $y_t$  to depend on twelve lags of both the announcement surprises and the monthly variables. For  $m_t$ , I set the intercept and all lag coefficients to zero. This assumes that the announcement surprises are unpredictable from the lagged variables included in the BVAR. The reduced form is

$$m_t = u_t^m, \tag{15}$$

$$y_t = c_y + \sum_{\ell=1}^{12} \left( B_{ym}^{\ell} m_{t-\ell} + B_{yy}^{\ell} y_{t-\ell} \right) + u_t^y, \quad \begin{pmatrix} u_t^m \\ u_t^y \end{pmatrix} \sim \mathcal{N}(0, \Sigma). \tag{16}$$

The covariance matrix  $\Sigma$  allows the announcement surprises and the innovations in the monthly variables to move together within the same month. The lag coefficients describe how the effects continue through subsequent months, both through past announcement surprises and through past values of the monthly variables.

I use a Minnesota prior because twelve lags of eight variables leave many coefficients to estimate. The prior pulls the lag coefficients towards their prior means, with tighter restrictions on more distant lags. For variables treated as persistent, the first own-lag coefficient has prior mean one. All other lag coefficients have prior mean zero. The overall tightness is  $\lambda_1 = 0.2$  and the lag decay is  $\lambda_2 = 1$ . The prior variances also account for differences in the scales of the variables, using residual standard deviations from individual autoregressions.

I draw the coefficients and covariance matrix using a Gibbs sampler. The covariance matrix  $\Sigma$  has an inverse-Wishart prior. I discard the first 1,000 iterations and retain every fourth subsequent iteration until I obtain 1,000 posterior draws. The monthly sample runs from January 1999 to May

2025. Appendix B reports the alternative-sample and pandemic-prior estimates.

## A.2 Identification

I identify the monetary-policy, supply, and demand components using their effects on the forward-guidance factor, stock prices, and the exchange rate within the announcement window. The signs are those reported in Table 2. All three components raise the forward-guidance factor. Monetary tightening lowers stock prices and appreciates the dollar, while more adverse perceived supply conditions lower stock prices and depreciate the dollar. Stronger perceived demand instead raises stock prices and appreciates the dollar. I leave their effects on the monthly variables unrestricted.

To recover these components from the BVAR, I write its innovations as  $u_t = B\varepsilon_t$ . The shocks in  $\varepsilon_t$  have unit variance and are mutually uncorrelated, and  $B$  measures their contemporaneous effects on the eight variables. The estimated covariance matrix requires  $BB' = \Sigma$ , but several matrices satisfy this condition. I use the announcement-window restrictions to select among them.

I allow the three announcement components to affect all five monthly variables immediately. The other five shocks can affect the monthly variables, but their effects on the announcement surprises are set to zero. To impose this restriction, I order the three announcement surprises first in the Cholesky factor  $P$  and rotate only its first three columns:

$$B = PQ, \quad Q = \begin{pmatrix} Q_m & 0 \\ 0 & I_5 \end{pmatrix}, \quad Q_m Q_m' = I_3. \quad (17)$$

Each rotation  $Q_m$  gives a different combination of the three announcement innovations while preserving the estimated covariance matrix. I retain combinations whose effects satisfy the signs assigned to monetary policy, supply, and demand.

For each posterior draw of the BVAR coefficients and covariance matrix, I draw rotations following Rubio-Ramírez et al. (2010). I retain the first rotation that satisfies all nine restrictions in Table 2 and use it to calculate the impulse responses. The algorithm tries up to 1,000 rotations for each posterior draw. It finds an acceptable rotation for every baseline draw and for more than 98 per cent of the draws in each reported alternative specification.

To study how separating supply changes the estimated transmission of forward guidance, I also estimate an identification using only the forward-guidance factor and stock prices. Following the distinction in Jarociński and Karadi (2020), an increase in the forward-guidance factor together with lower stock prices identifies monetary tightening, while an increase in the factor together with higher stock prices identifies an information component. I leave the exchange-rate response and the third announcement component unrestricted. Table 8 reports these restrictions.

Without the exchange rate, adverse supply news can enter the component identified as monetary tightening because both raise the forward-guidance factor and lower stock prices. In my identification, the dollar appreciates after monetary tightening and depreciates after adverse supply news when markets expect partial accommodation. The comparison therefore shows how the estimated monetary-policy responses change when I also use the dollar to separate perceived supply

Table 8: Sign restrictions of the two-component identification.

|                         | Monetary policy | Information | Unrestricted component |
|-------------------------|-----------------|-------------|------------------------|
| Forward-guidance factor | +               | +           | –                      |
| EUR/USD                 | –               | –           | –                      |
| S&P 500                 | –               | +           | –                      |

Notes: The restrictions apply to the contemporaneous responses of the announcement surprises. A dash denotes an unrestricted response. The third announcement component remains in the system but is not assigned an economic interpretation.

conditions.

I keep the estimated BVAR unchanged when comparing the two identifications. For each posterior draw, I use the same Cholesky factor and select one rotation satisfying the three-component restrictions and another satisfying the two-component restrictions. I then subtract the two-component monetary-policy response from the three-component response at each horizon. Section 8 reports this difference. Each response is to a one-standard-deviation component, so the initial change in the forward-guidance factor can differ between the two identifications. The difference measures the change in the estimated response under these two identifications, rather than the contribution of supply to a fixed monetary-policy shock.

I report the median BVAR response across the accepted draws, together with pointwise credible intervals. The 68 per cent interval runs from the 16th to the 84th percentile, and the 90 per cent interval runs from the 5th to the 95th percentile. For the comparison between identifications, I calculate these percentiles from the differences obtained within each posterior draw.

### A.3 Diagnostics

Table 9 shows how much each component contributes to the variation in the announcement surprises. The supply component accounts for 13 per cent of the variance in forward guidance, 12 per cent in EUR/USD, and 8 per cent in stock returns. Demand accounts for most of the variation in forward guidance, while monetary policy accounts for most of the exchange-rate variation. Monetary policy and demand together account for most of the variation in stock returns. The table also reports how each announcement surprise responds to a one-standard-deviation increase in each component.

The three estimated announcement components have small correlations in the event sample. The correlation between monetary policy and supply is 0.08, between monetary policy and demand is 0.02, and between supply and demand is  $-0.04$ .

Table 9: Diagnostics of the baseline identification.

| Surprise         | Impact response    |                     |                     | Variance share     |                     |                     |
|------------------|--------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
|                  | Monetary<br>policy | Supply<br>component | Demand<br>component | Monetary<br>policy | Supply<br>component | Demand<br>component |
| Forward guidance | +0.10              | +0.15               | +0.49               | 5%                 | 13%                 | 82%                 |
| EUR/USD          | −0.35              | +0.10               | −0.06               | 84%                | 12%                 | 4%                  |
| S&P 500          | −0.47              | −0.12               | +0.38               | 55%                | 8%                  | 38%                 |

Notes: The first three columns report posterior-median impact responses to a one-standard-deviation increase in each component, in the units of the announcement surprises. The last three columns report posterior means of the variance shares. For each draw, I calculate a component’s share by dividing its squared impact response by the sum of the squared responses to all three components. The sample runs from January 1999 to May 2025.

## B Robustness of the macroeconomic responses

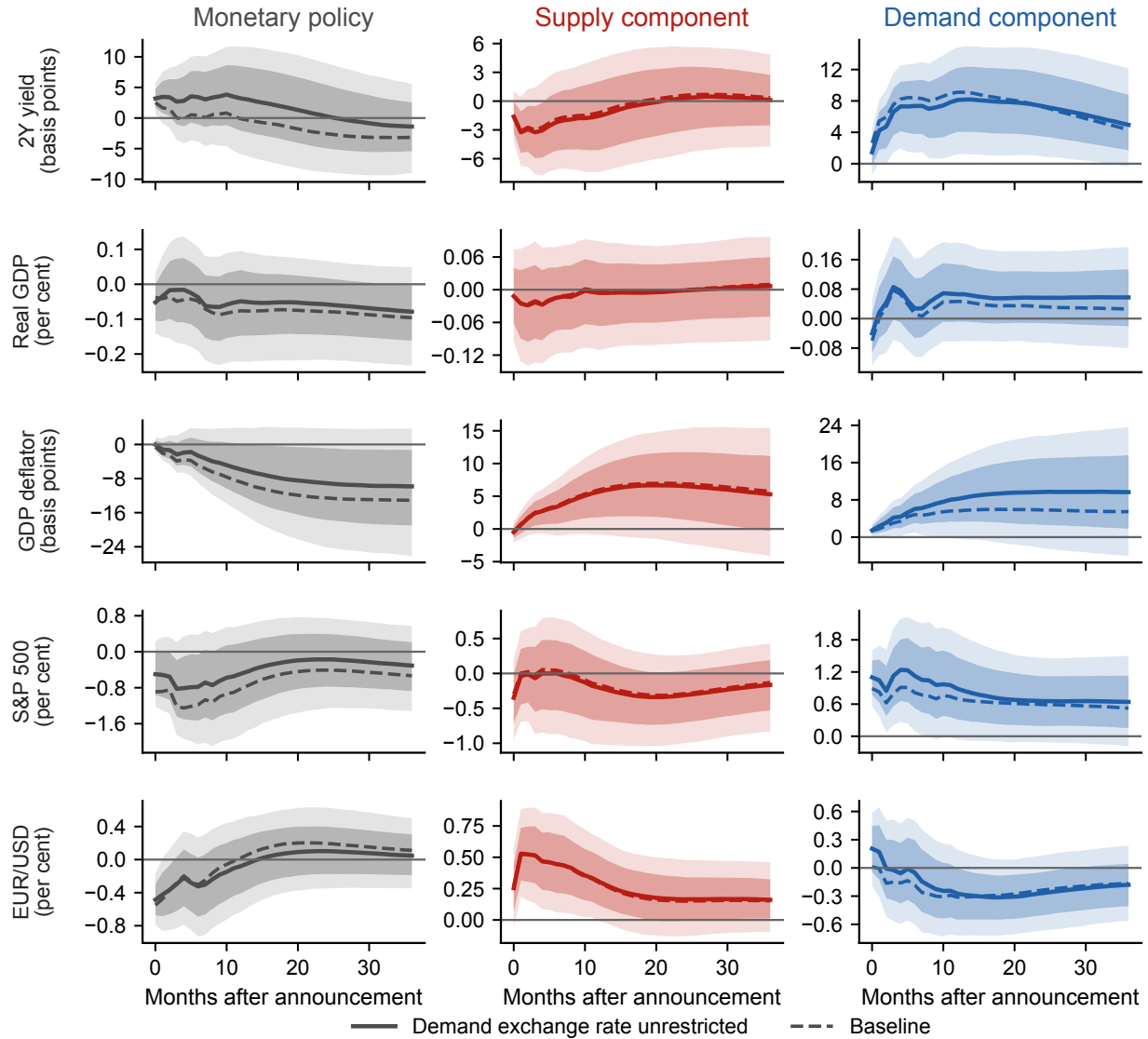
This appendix examines whether the macroeconomic responses depend on the exchange-rate restriction on the demand component, the price index, the estimation sample, or the treatment of the pandemic.

### B.1 Leaving the exchange-rate response to demand unrestricted

In the baseline identification, I impose that the dollar appreciates after the demand component. I check whether this restriction matters by leaving the exchange-rate response to demand unrestricted. I still impose that medium-term interest rates and stock prices increase.

Figure 13 compares the results. The supply component has a correlation of 0.9997 with the one obtained under the baseline restrictions, and its responses are very similar.

Figure 13: Leaving the exchange-rate response to demand unrestricted.



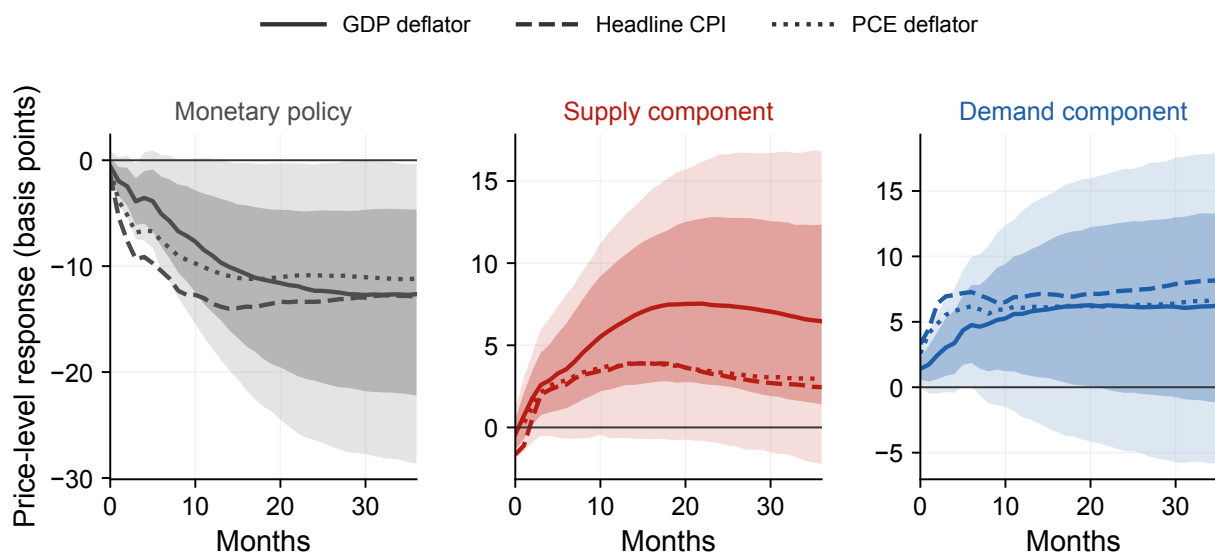
Notes: Solid lines and shaded areas show the median responses and the 68 and 90 per cent credible intervals when the exchange-rate response to demand is unrestricted. Dashed lines show the median responses under the baseline restrictions. An increase in EUR/USD is a dollar depreciation.

## B.2 Alternative price measures

I also estimate the responses using headline CPI and the PCE deflator to see whether the increase in prices after the supply component depends on using the GDP deflator. In each exercise, I replace the GDP deflator and keep the other variables and estimation sample unchanged. Figure 14 compares the responses of the three price indices.

Both alternative price indices increase at medium horizons after the supply component. Their responses are smaller and less precisely estimated than the GDP-deflator response, but their medians remain within the baseline credible intervals. The increase in prices therefore also appears when I use measures of consumer prices, although their own credible intervals include zero.

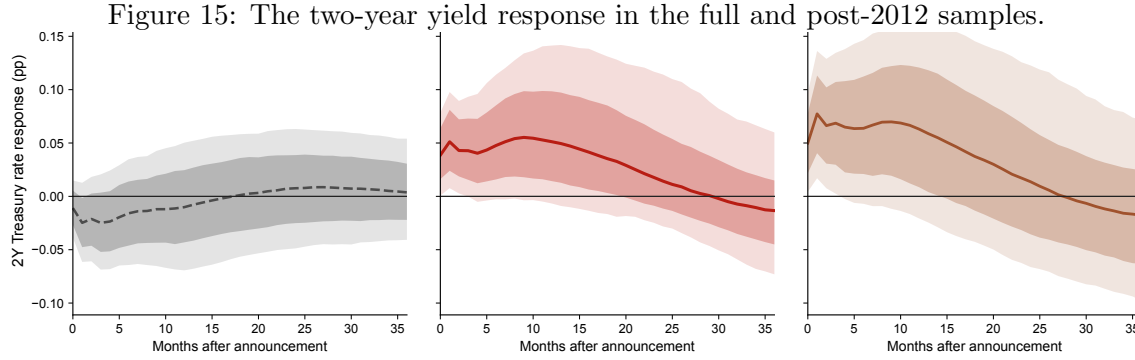
Figure 14: Price-measure robustness.



Notes: median price-level responses in otherwise identical three-component VARs estimated over 1999–2025. The solid line and shaded regions are the GDP-deflator median and its 68 and 90 per cent credible bands. The dashed and dotted lines are the headline-CPI and PCE-deflator medians. Their own credible bands are omitted for readability and include zero under the supply component.

## B.3 Alternative samples and pandemic treatment

I change the estimation sample to study whether the responses depend on the period included in the BVAR. I first begin the sample in October 2012, then estimate the BVAR using only observations before 2020. A third exercise keeps the full sample but reduces the influence of the exceptional observations during the first months of the pandemic.



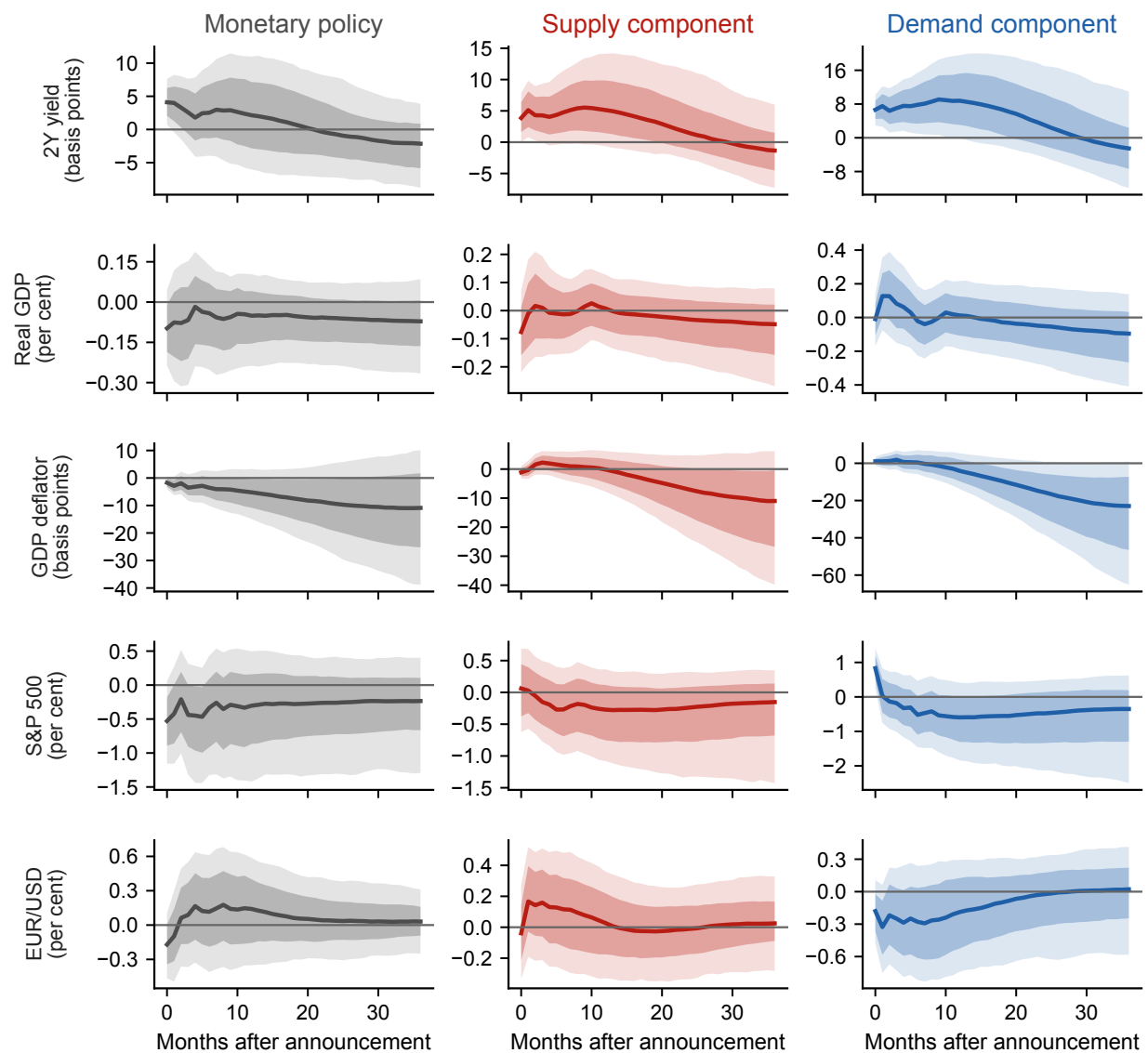
Notes: response of the two-year Treasury yield, in percentage points, to a one-standard-deviation supply component. The panels report the full 1999–2025 sample, the sample beginning in October 2012, and the difference between their responses. Solid line: posterior median; shaded band: 68 per cent credible set.

Figure 15 shows that the Federal Reserve is perceived as responding more strongly to adverse supply conditions in the more recent sample. When I begin the estimation in October 2012, the two-year yield rises by about five basis points after the supply component and remains higher for more than a year. In the full sample, instead, the yield does not increase persistently. The difference suggests that the expected policy response to supply-driven inflation has become more hawkish over time. Figure 16 shows that the dollar still depreciates and real GDP changes little in the post-2012 sample, while the increase in the GDP deflator is less precisely estimated.

The main financial-market responses also remain when I end the sample in 2019, although the price responses become less precisely estimated for all three components. Figure 17 reports these estimates. The period covered by this exercise matters for interpreting the results. Inflation was generally low before the pandemic, while the subsequent period includes large supply disruptions and commodity-price increases. Excluding these observations may make the effects of perceived supply conditions on prices harder to estimate. This is important when studying monetary transmission, although the sample comparison alone does not distinguish the effect of larger supply disturbances from a change in their pass-through to prices.

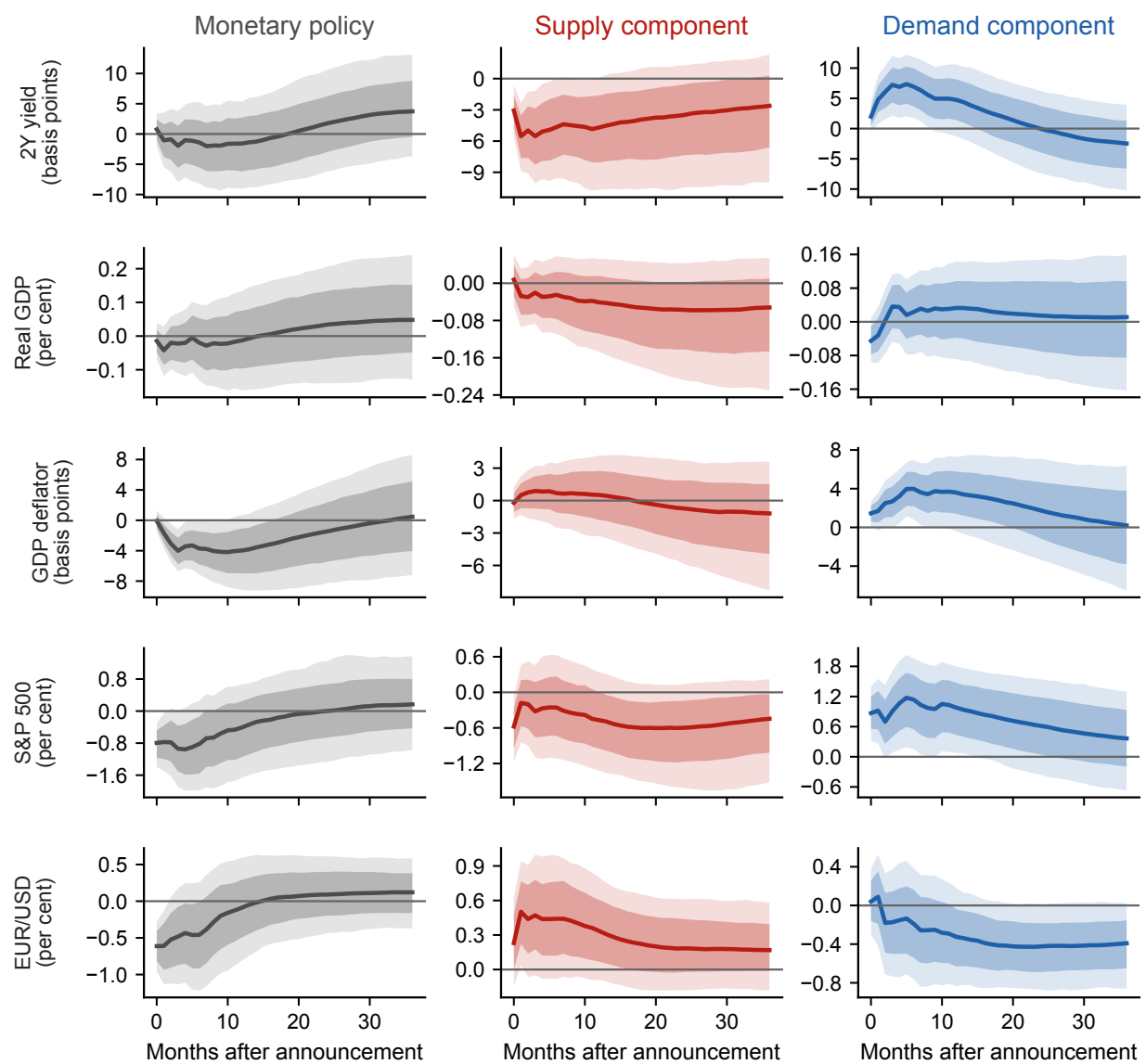
The increase in prices after the supply component remains close to the baseline when I reduce the influence of the exceptional pandemic observations. For this exercise, I re-estimate the BVAR with the pandemic priors of [Cascaldi-Garcia \(2022\)](#), which reduce the influence of observations from March to August 2020. Figure 18 also shows that the monetary-policy component still lowers the GDP deflator, while the supply component raises it.

Figure 16: Impulse responses to the three announcement components, 2012-Q4–2025 sample.



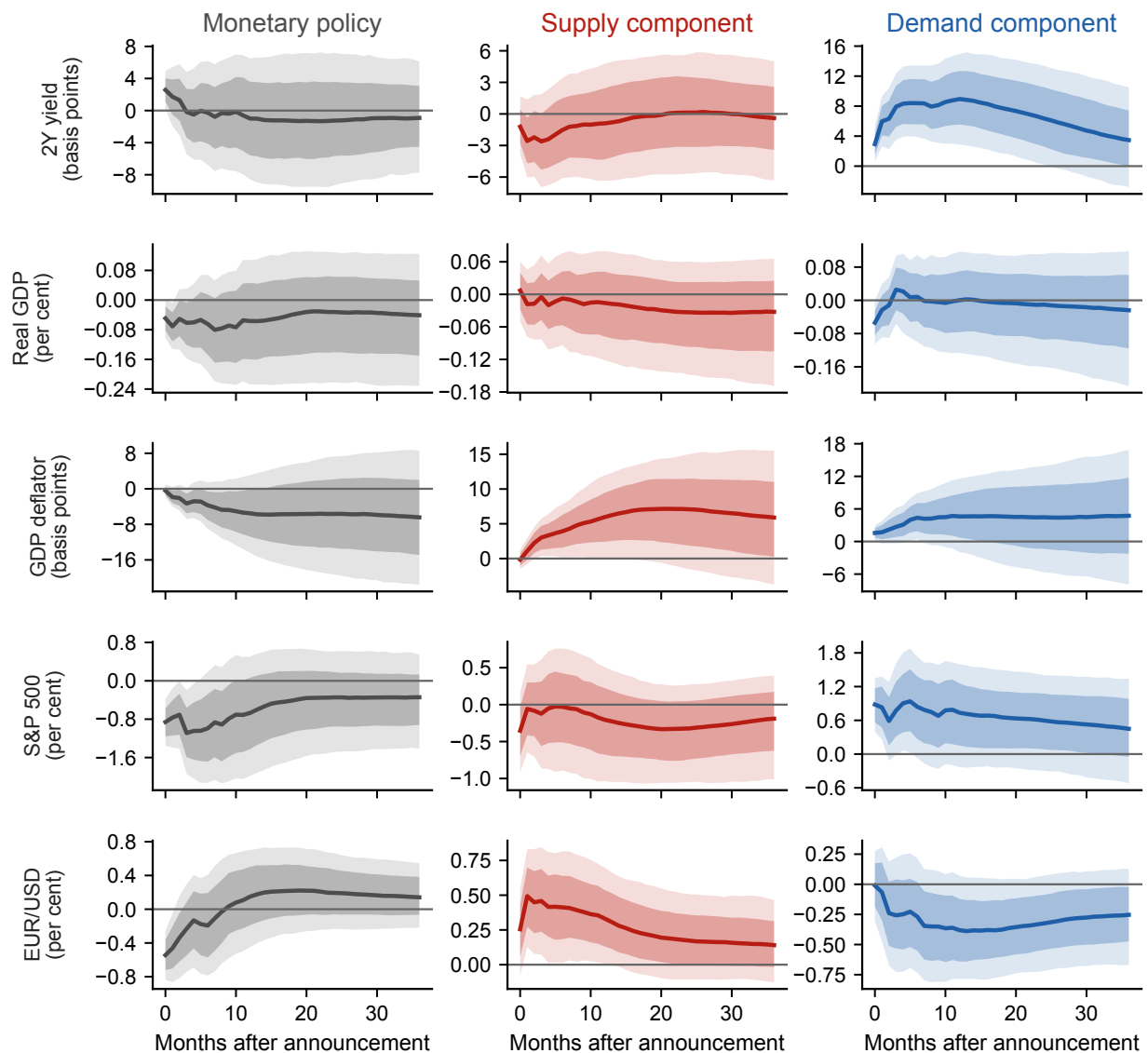
Notes: as Figure 7, estimated from 2012-Q4.

Figure 17: Impulse responses to the three announcement components, 1999–2019 (pre-COVID) sample.



Notes: as Figure 7, estimated on 1999–2019, ending before the onset of the COVID-19 pandemic.

Figure 18: Impulse responses to the three announcement components, baseline sample with pandemic priors.



Notes: as Figure 7, full 1999–2025 sample re-estimated with pandemic priors that downweight March to August 2020 (Cascaldi-Garcia, 2022).

## B.4 Local projections

I also use monthly local projections to study whether the macroeconomic responses depend on estimating their propagation with a BVAR. I keep the three announcement components from the baseline identification and estimate a separate regression at each horizon. This allows me to estimate their effects without using the Minnesota prior or obtaining later responses by iterating the VAR.

For each announcement, I recover the three components using the inverse of the posterior-median impact matrix and the observed announcement surprises. I sum each component across announcements within a month and set it to zero in months without an announcement. For each variable  $z_t$  and horizon  $h$ , I estimate

$$z_{t+h} = a_h + \beta_h^m \hat{\varepsilon}_t^m + \beta_h^s \hat{\varepsilon}_t^s + \beta_h^d \hat{\varepsilon}_t^d + \sum_{\ell=1}^{12} \Gamma'_{h,\ell} X_{t-\ell} + e_{t+h}. \quad (18)$$

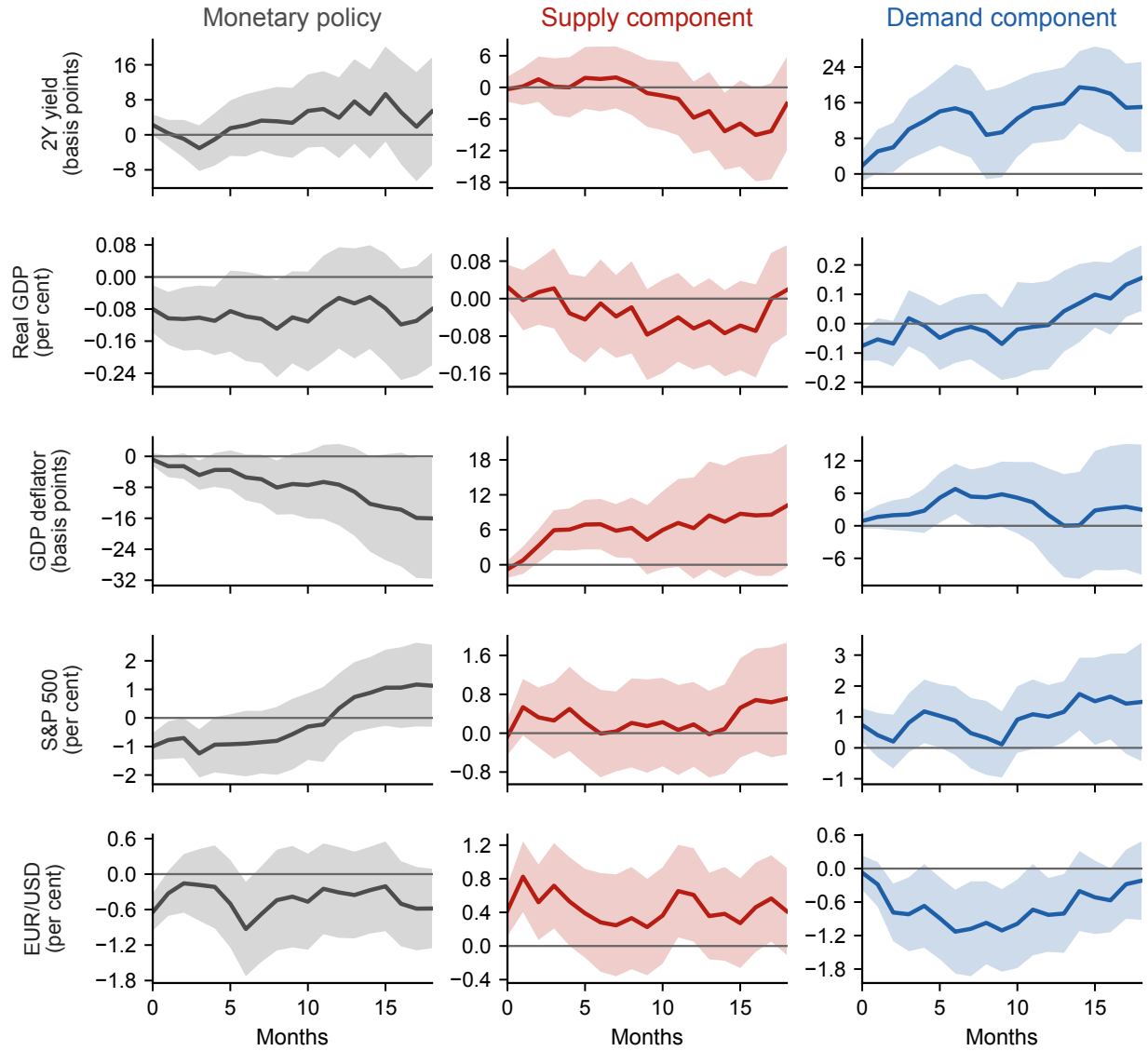
The three components enter each regression together. The vector  $X_t$  contains the three components and the five financial and macroeconomic variables in the baseline BVAR. I include twelve monthly lags of these variables and estimate responses through eighteen months.

I apply the Herbst–Johannsen bias correction using the implementation of [Montiel Olea et al. \(2025\)](#) and report 90 per cent heteroskedasticity-robust confidence intervals. The sample runs from 1999 to 2025. At each horizon, I exclude observations if either the announcement month or the month of the response falls between March and August 2020. The confidence intervals account for uncertainty in estimating these regressions, taking the extracted announcement components as given.

The local projections reproduce the main macroeconomic responses to the supply component. Figure 19 shows that the GDP deflator increases, the dollar depreciates, and real GDP changes little. The two-year yield does not increase persistently. These responses also appear when I estimate each horizon separately, without imposing the BVAR’s dynamic structure or Minnesota prior.

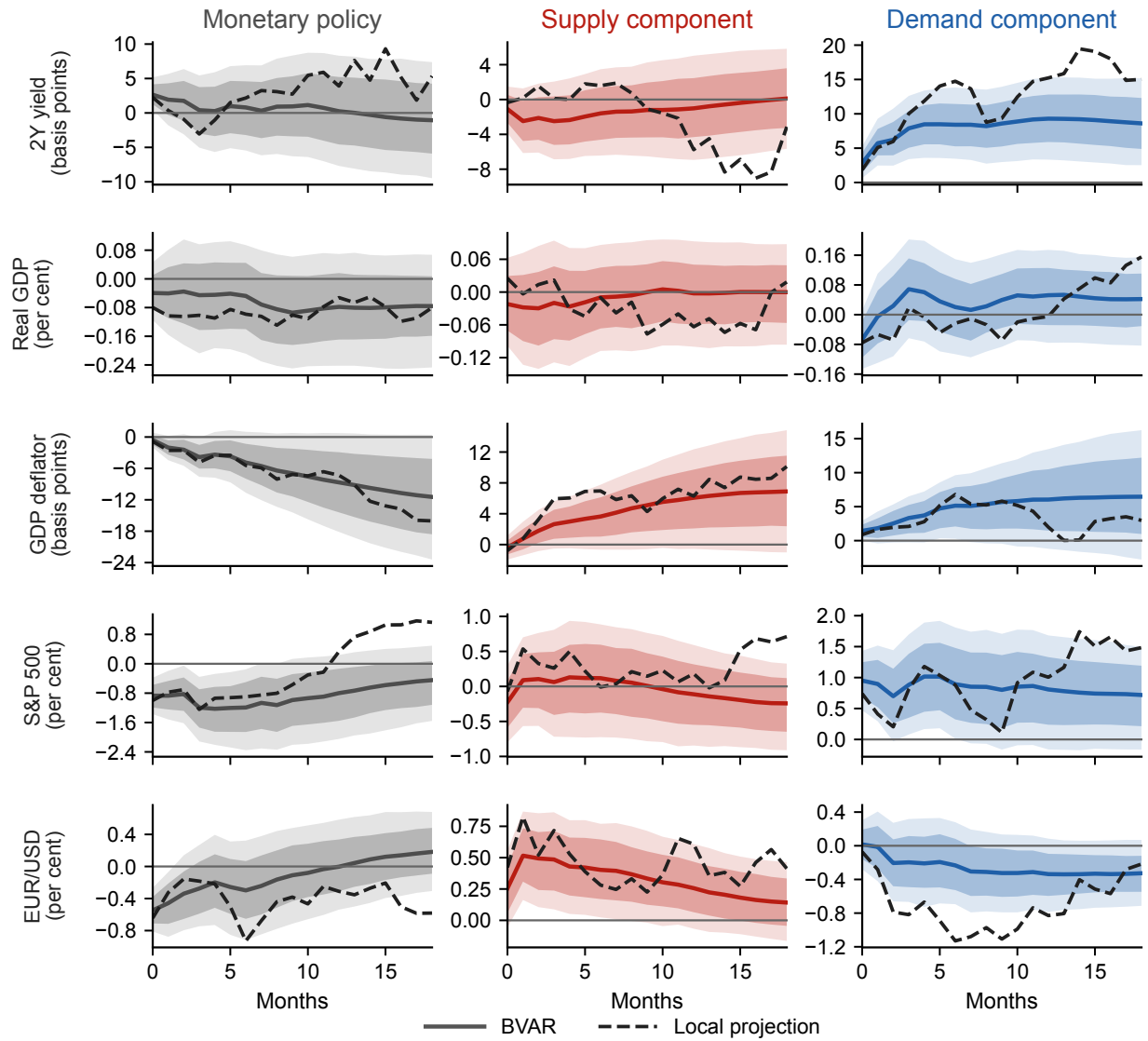
Figure 20 compares these estimates directly with the BVAR responses. The increase in prices and the dollar depreciation after the supply component appear under both methods. The main difference concerns stock prices, whose local-projection response becomes positive at longer horizons and is imprecisely estimated. The evidence on prices and the exchange rate therefore extends beyond the baseline BVAR.

Figure 19: Macroeconomic responses estimated by local projections.



Notes: responses to one-unit monetary-policy, supply, and demand components. Solid lines are bias-corrected local-projection estimates from equation (18); shaded regions are pointwise 90 per cent heteroskedasticity-robust confidence intervals. The two-year yield and GDP deflator are reported in basis points; real GDP, the S&P 500, and EUR/USD are reported in per cent. Full 1999–2025 sample excluding projections whose initial or response month falls in March–August 2020.

Figure 20: Local-projection and Bayesian VAR responses.



Notes: the solid coloured lines and shaded regions report the baseline Bayesian VAR posterior medians and their 68 and 90 per cent credible sets. The dashed lines report the local-projection estimates from Figure 19. Both estimators use the same extracted components, variables, and twelve monthly lags. The Bayesian VAR uses the full sample, whereas the local projections omit observations whose initial or response month falls between March and August 2020.

## C Data and factor construction

### C.1 Announcement sample and windows

The empirical analysis uses 216 Federal Reserve announcements from February 1999 through May 2025. For announcements through 18 September 2024, I use the updated event list of [Jarociński \(2024\)](#). I then add the five announcements through 7 May 2025. The list contains scheduled FOMC meetings and unscheduled policy actions.<sup>19</sup>

I measure changes in interest rates, stock prices, and the exchange rate over the same announcement window. The window begins ten minutes before the FOMC statement and ends sixty minutes after the press conference begins. For announcements without a press conference, it ends twenty minutes after the statement. The baseline window therefore includes both the statement and the press conference when one is held. Appendix C.3 reports the results using only the statement window.

### C.2 Construction of the forward-guidance factor

I construct the forward-guidance factor from ten announcement-window surprises in the U.S. Monetary Policy Event-Study Database of [Acosta et al. \(2025\)](#). The first five are constructed from changes in interest rates implied by futures contracts. MP1 measures the unexpected change in the policy rate at the current meeting, while FF3 measures the change in the third monthly federal funds futures contract. ED2, ED3, and ED4 measure changes in the second through fourth quarterly contracts. These series use Eurodollar futures through 2021 and SOFR futures from 2022. The remaining interest-rate surprises are changes in the two-, five-, and ten-year Treasury yields. I also include the S&P 500 and EUR/USD returns. Interest-rate changes are in percentage points, while the two returns are in per cent. A positive EUR/USD return represents a depreciation of the dollar.

I standardise the ten surprises and extract their first three principal components. I then rotate them to obtain target, forward-guidance, and asset-purchase factors. The target factor has a unit loading on the standardised MP1 surprise, while the other two factors have zero loadings on this variable. I identify the asset-purchase factor by choosing the rotation that maximises its variation from September 2008 onward and normalise it on the standardised ten-year Treasury-yield surprise. I normalise the remaining factor on the standardised two-year Treasury-yield surprise and use it as the forward-guidance factor. The identification in Section 4 combines this factor with the raw S&P 500 and EUR/USD returns measured over the same announcement window.

### C.3 Alternative factor constructions

I check whether the supply component depends on how I construct the forward-guidance factor. The first exercise excludes stock prices and the exchange rate from the principal-component analysis and constructs the three factors using interest-rate surprises only. The second exercise uses the

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<sup>19</sup>Relative to the complete USMPD list, I exclude 17 September 2001, 22 January and 8 October 2008, 9 May 2010, 4 October 2019, 15, 19, 23, and 31 March 2020, and the monetary-policy framework speech on 27 August 2020.

same ten variables as the baseline but measures them only around the policy statement, excluding the press conference. For each exercise, I re-estimate the BVAR and repeat the identification.

Excluding stock prices and the exchange rate from the factor construction has little effect on the results. The new supply component has a correlation of 0.92 with the baseline component. Its macroeconomic responses also remain within the baseline credible intervals. The use of the raw S&P 500 and EUR/USD returns in the identification is therefore not driving the supply component through their inclusion in the forward-guidance factor.

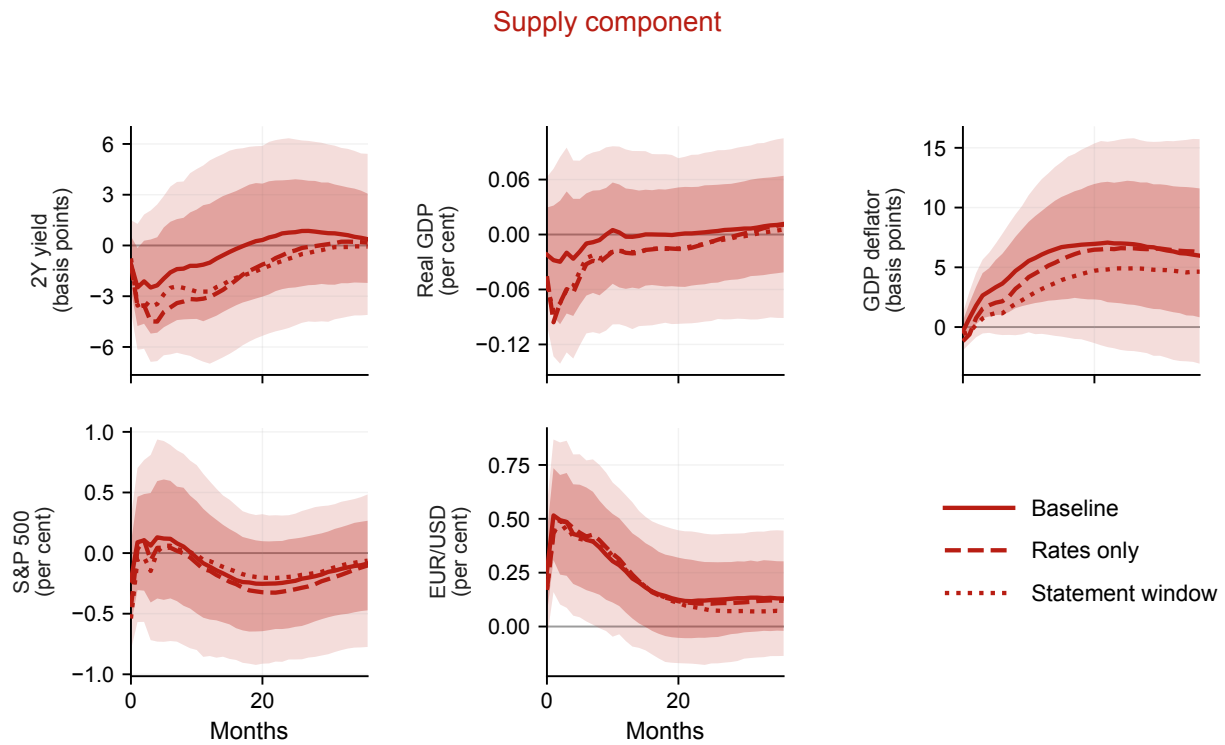
The statement-window supply component has a correlation of 0.90 with the baseline component. The dollar response remains similar, while the increase in prices is about two thirds of the baseline response and is less precisely estimated. This comparison shows that the press conference also contributes to the supply revisions measured over the full announcement. Table 10 compares the components event by event, and Figure 21 reports their macroeconomic responses.

Table 10: The identified components under alternative factor constructions.

| Component        | Rates-only factors |                | Statement window |                |
|------------------|--------------------|----------------|------------------|----------------|
|                  | Correlation        | Sign agreement | Correlation      | Sign agreement |
| Monetary policy  | 0.96               | 88%            | 0.84             | 92%            |
| Supply component | 0.92               | 90%            | 0.90             | 87%            |
| Demand component | 0.93               | 90%            | 0.89             | 86%            |

Notes: event-level correlation and sign agreement between the components from each alternative factor construction and the baseline components, across 216 FOMC announcements from 1999 to 2025. The rates-only construction uses interest-rate surprises alone. The statement-window construction uses the baseline variables from ten minutes before to twenty minutes after the statement. Each variant repeats the VAR estimation and the sign-restriction procedure of Section 4.

Figure 21: Macroeconomic responses under alternative factor constructions.



Notes: responses to a one-standard-deviation supply component. The solid line and shaded areas report the baseline posterior median and its 68 and 90 per cent credible sets. The dashed line uses the factor extracted from interest-rate surprises alone. The dotted line uses the baseline variables over the statement window. The two-year yield and GDP deflator are reported in basis points, real GDP and the S&P 500 in per cent, and EUR/USD as a percentage change using its full-sample mean of 1.18 dollars per euro. Full 1999–2025 sample.

## C.4 Monthly financial and macroeconomic variables

The monthly BVAR contains the two-year Treasury yield, the S&P 500 index, real GDP, the GDP deflator, and EUR/USD. The yield, stock index, and exchange rate are measured at the end of the month. The stock index, real GDP, and the GDP deflator enter as 100 times their natural logarithms. EUR/USD enters in dollars per euro. The two-year yield comes from the Federal Reserve Board’s Gürkaynak–Sack–Wright zero-coupon Treasury curve. I obtain the S&P 500 and EUR/USD series through LSEG Workspace. The national accounts and the monthly indicators used to construct real GDP and the GDP deflator are obtained from the Bureau of Economic Analysis through FRED.

I add other variables to this system when studying the interpretation and transmission of the supply component. The exercises on supply pressures use the S&P GSCI commodity-price index from S&P Dow Jones Indices through LSEG Workspace and the Global Supply Chain Pressure Index from the Federal Reserve Bank of New York. The analysis of long-run inflation expectations uses five-year five-year-forward inflation compensation from the Federal Reserve Board’s fitted Treasury curves. To study expected real rates, I use the five-year expected-real-rate measure of [D’Amico et al. \(2018\)](#). These variables are added as outcomes and do not enter the sign restrictions.

## C.5 Daily financial-market variables

I use daily data to follow financial-market movements after each Federal Reserve announcement. The variables include nominal and inflation-protected Treasury yields, inflation compensation, the S&P 500, EUR/USD, and the VIX. Nominal and inflation-protected yields come from the Federal Reserve Board’s fitted Treasury curves and are available at two, five, and ten years, as well as at the five-year five-year-forward horizon. I calculate inflation compensation as the difference between nominal and inflation-protected yields at the same maturity. The S&P 500 and EUR/USD series are from LSEG Workspace. The VIX is produced by the CBOE and obtained through FRED.

The analysis of real yields begins in 2005 because short-maturity inflation-protected Treasury securities were less liquid earlier in the sample. I also use the five-year expected-real-rate measure of [D’Amico et al. \(2018\)](#). I assign each identified component to its announcement date and estimate the subsequent changes in these variables over the following trading days.

## C.6 Independent oil-supply news

I use the oil-supply surprises of [Känzig \(2021\)](#) as an external measure of supply news. These surprises are identified from changes in oil futures prices around announcements by the Organization of the Petroleum Exporting Countries. I use the 2025 vintage of the author’s data and consider both measures provided by Känzig. The first is the change in the nearest-maturity oil futures contract. The second is the principal component of changes across the oil futures curve. I use the OPEC announcement dates to match each measure with the preceding or subsequent Federal Reserve announcement.

## C.7 Monthly GDP and the GDP deflator

I construct monthly measures of real GDP and the GDP deflator because the original series are available only quarterly. Following [Stock and Watson \(2010\)](#), I use monthly indicators to distribute each quarterly observation across its three months.

For GDP, I first divide quarterly nominal GDP into its expenditure components. These include consumption, non-residential structures, equipment, residential investment, inventories, exports, imports, and government consumption and investment. I associate each component with monthly data that measure similar economic activity. For example, construction spending is used for structures and residential investment, manufacturers' orders and shipments for equipment, inventories for the change in private inventories, and monthly trade data for exports and imports. I use the monthly PCE price index to interpolate the GDP deflator. The quarterly national accounts and monthly indicators are obtained from the Bureau of Economic Analysis and other source agencies through FRED.

For each component, I remove its trend with a cubic spline and estimate a state-space model for the remaining monthly variation. The monthly indicators provide information about this variation, while the three monthly estimates are constrained to aggregate to the observed quarterly value. I estimate the model by maximum likelihood and recover the monthly series with the Kalman filter and smoother. I then add the interpolated expenditure components to obtain nominal GDP and divide it by the interpolated deflator to obtain real GDP. I construct the series from 1959 onward, while the BVAR uses observations from January 1999 through May 2025.

## C.8 SPF upper-tail inflation expectations

I use the Survey of Professional Forecasters to measure the probability that forecasters assign to elevated inflation. In each survey, respondents report probabilities for different ranges of annual-average GDP-price inflation in the next calendar year. I calculate the mean probability that this inflation rate will be at least 4 per cent.

Through 2013, I obtain this probability by adding the five reported ranges at or above 4 per cent in the SPF PRPGDP worksheet. From 2014 onward, the worksheet reports one range for inflation of 4 per cent or more. I express the resulting series in percentage points of probability.

The survey is conducted in February, May, August, and November. I interpolate between consecutive survey observations so that the probability can enter the monthly BVAR:

$$U_m = U_q + \frac{d_m - d_q}{d_{q+1} - d_q}(U_{q+1} - U_q), \quad (19)$$

where  $U_q$  is the probability reported in survey quarter  $q$  and  $d_m$  is the date of month  $m$ . I add this probability to the BVAR in levels. The identification does not restrict its response. The replication material also reports the results using the shorter core CPI and core PCE series, which begin in 2007.

## D Further validation and robustness

### D.1 Narrative review of the largest observations

I examine the twenty largest positive and twenty largest negative observations to understand how the supply component relates to the Federal Reserve’s discussion of supply conditions and its expected policy response. For each meeting, I read the statement, press conference, and minutes to see what the Federal Reserve says about supply pressures, their effects on inflation and economic activity, and how monetary policy should respond. I also examine contemporary articles to understand how the announcement was interpreted at the time. I then compare this evidence with the movements in interest rates and the dollar over the announcement window.

Here, I discuss the meetings not covered in Section 5, where I examine April 2011, December 2021, and March 2022. For each episode, I report the size of the supply component and the movements in interest rates and the dollar. When the monetary-policy or demand components help explain these movements, I discuss them as well.

The statements and press conferences help me understand what the Federal Reserve communicated about supply conditions, but they do not directly show how this information differed from what markets expected before the meeting. This is particularly difficult for the earlier announcements, where the statement gives a shorter account of economic conditions and there is no press conference. I therefore read these accounts together with contemporary reporting and the movements in asset prices. An announcement can lead markets to revise their assessment of supply conditions, demand, and monetary policy at the same time. I therefore also discuss the monetary-policy and demand components when they help explain the movements in interest rates and the dollar.

**Positive observations.** The May 2006 meeting shows how the Federal Reserve responds to higher energy prices that add to inflation pressure while weakening economic activity. Brent had risen by about 12 per cent over the preceding thirty trading days. The Federal Reserve expected higher energy prices to contribute to slower growth, but also warned that energy and other commodity prices could add to inflation pressure. It raised the policy rate by 25 basis points and said that “some further policy firming may yet be needed.”<sup>20</sup> My decomposition identifies a supply component of 2.0 standard deviations, making this a large supply-related revision in the sample. Medium-term interest rates rise during the announcement, with a positive forward-guidance factor of 0.71 and an increase of 6.3 basis points in the two-year Treasury yield. The dollar appreciates slightly, by 0.03 per cent. This meeting also contains positive monetary-policy and demand components, both of which contribute to dollar appreciation in my decomposition. The supply component therefore pushes the dollar towards depreciation, but the other two components offset this movement. The Federal Reserve’s discussion of energy prices helps explain the supply-related revision within an announcement that also contains other news.

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<sup>20</sup>FOMC statement of May 10, 2006.

The June 2006 announcement combines a positive forward-guidance factor with a depreciation of the dollar, while the Federal Reserve again discusses the effects of higher energy prices on inflation and growth. The statement attributes part of the slowdown in activity to earlier increases in interest rates and energy prices, but warns that energy and other commodity prices could sustain inflation pressures. The Federal Reserve raises the policy rate by 25 basis points and makes further tightening dependent on the “outlook for both inflation and economic growth.”<sup>21</sup> The forward-guidance factor is positive, at 0.15, and the dollar depreciates by 0.81 per cent. My decomposition identifies a supply component of 2.1 standard deviations together with a monetary-policy component of  $-1.7$  standard deviations. Both perceived adverse supply conditions and unexpected monetary easing contribute to dollar depreciation. Their contributions to the forward-guidance factor instead have opposite signs. The announcement also raises stock prices by 0.55 per cent and lowers the two-year Treasury yield by 4.6 basis points, even though the forward-guidance factor, which combines information across several asset prices, remains positive.

The October 2007 meeting shows the Federal Reserve supporting economic activity while facing renewed inflation pressure from energy and commodity prices. Brent had risen by about 15 per cent over the preceding thirty trading days. The Federal Reserve cut the policy rate by 25 basis points to limit the effects of financial-market disruption on the economy and expected the housing correction to slow growth. At the same time, it warned that higher energy and commodity prices could add to inflation. After the cut, it judged that “the upside risks to inflation roughly balance the downside risks to growth.”<sup>22</sup> Contemporary reporting interpreted this assessment as indicating that further rate cuts were not immediately needed.<sup>23</sup> The forward-guidance factor is positive, at 0.80, and the two-year Treasury yield rises by 7.8 basis points during the announcement. My decomposition identifies a supply component of 2.7 standard deviations, together with positive monetary-policy and demand components. As in May 2006, these other revisions contribute to dollar appreciation and offset the depreciation associated with the supply component. The dollar therefore changes little overall, appreciating by 0.02 per cent, while stock prices fall by 0.43 per cent.

The January 2022 meeting combines news about persistent supply constraints with a stronger expected monetary-policy response. Powell explained that bottlenecks and supply constraints were preventing production from responding quickly to demand and had been “larger and longer lasting than anticipated.” He also expected the Omicron wave to weigh on near-term growth. Although improvements in supply conditions were expected to help reduce inflation, their timing remained uncertain. The Federal Reserve therefore signalled that it would soon begin raising interest rates. Powell stressed that inflation was higher and the labour market stronger than when the previous tightening cycle began.<sup>24</sup> Reuters reported that markets interpreted his answers as leaving room for faster rate increases than previously expected.<sup>25</sup> My decomposition identifies a supply compo-

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<sup>21</sup>FOMC statement of June 29, 2006.

<sup>22</sup>FOMC statement of October 31, 2007.

<sup>23</sup>MarketWatch, “[Wall Street Rallies After Fed Decision](#)”, October 31, 2007.

<sup>24</sup>Press conference of January 26, 2022.

<sup>25</sup>Reuters, “[Wall Street gains evaporate, S&P 500 ends lower on Fed tightening timeline](#)”, January 26, 2022.

ment of 2.9 standard deviations together with an unexpected monetary tightening of 2.3 standard deviations. Over the full announcement window, the forward-guidance factor is positive, at 0.10, the two-year Treasury yield rises by 10.5 basis points, and stock prices fall by 1.88 per cent. The dollar appreciates by 0.43 per cent. In my decomposition, the monetary-policy component contributes to this appreciation, offsetting the depreciation associated with the supply component and the negative demand component.

The December 2022 meeting shows that the Federal Reserve still saw supply constraints as a source of inflation, even as some supply-chain pressures were easing. Powell recognised that improving supply conditions were helping to reduce goods inflation, but described a “structural labor shortage” and explained that participation had not recovered as expected. The statement also linked the war in Ukraine to higher inflation and weaker global activity. The Federal Reserve raised its policy rate by 50 basis points, and Powell stressed that further increases would be needed despite the slowdown in growth.<sup>26</sup> Reuters also emphasised the prospect of further tightening despite the weak growth outlook.<sup>27</sup> My decomposition identifies a positive supply component of 2.0 standard deviations, a positive monetary-policy component of 1.3 standard deviations, and a negative demand component of  $-1.7$  standard deviations. The demand revision lowers the forward-guidance factor, offsetting the increases associated with the other two components and leaving the total factor negative, at  $-0.42$ . The dollar appreciates by 0.13 per cent as the monetary-policy component offsets the depreciation associated with perceived supply conditions and weaker demand. Over the same announcement window, the two-year Treasury yield rises by 5.9 basis points and stock prices fall by 1.50 per cent.

The May and October 1999 announcements both have a positive forward-guidance factor while the dollar depreciates. The forward-guidance factor is positive, at 0.94 in May and 0.78 in October, and the dollar depreciates by 0.08 and 0.35 per cent, respectively. My decomposition identifies supply components of 5.4 and 4.5 standard deviations. At both meetings, the Federal Reserve leaves the current policy rate unchanged but signals that tightening may be needed to contain inflation. The May statement points to tight labour markets and demand growing faster than productivity. Reuters also links the inflation concerns to the preceding increase in consumer prices, partly driven by oil. In October, the Federal Reserve warns that costs could increase “significantly in excess of productivity.” These statements discuss inflation risks arising from demand relative to productive capacity, rather than explicitly attributing them to adverse supply shocks.<sup>28</sup>

The November 1999 and May 2000 announcements also combine a positive forward-guidance factor with dollar depreciation, although the statements mainly discuss demand growing faster than productive capacity. The forward-guidance factor is positive, at 0.64 in November and 0.31 in May, while the dollar depreciates by 0.10 and 0.15 per cent, respectively. My decomposition identifies supply components of 2.6 and 2.8 standard deviations. In November, the Federal Reserve raises

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<sup>26</sup>FOMC statement and press conference of December 14, 2022.

<sup>27</sup>Reuters, “[Fed’s Powell says inflation battle not won, more rate hikes coming](#)”, December 14, 2022.

<sup>28</sup>FOMC statements of May 18 and October 5, 1999. Reuters via Wired, “[Fed Moves Spook Markets](#)”, May 18, 1999.

the policy rate by 25 basis points and warns that activity continues to expand faster than the economy's growth potential. In May, it raises the rate by 50 basis points, explaining that demand continues to exceed even the rapid productivity-driven growth in supply. Brent had risen by about 10 and 20 per cent over the preceding thirty trading days, respectively. Higher oil prices therefore provide additional context for the inflation concerns, while the statements emphasise pressure on productive capacity rather than a deterioration in supply. <sup>29</sup>

The August 2001 announcement combines monetary easing with concerns about weaker economic activity. The Federal Reserve cuts its policy rate by 25 basis points, pointing to declining business profits, weaker investment, and slowing growth abroad. Contemporary reporting also emphasises concern about a prolonged slowdown.<sup>30</sup> The forward-guidance factor is negative, at  $-1.94$ , and the dollar depreciates by 0.70 per cent. My decomposition identifies a positive supply component of 1.7 standard deviations alongside a large negative demand component and monetary easing.

The December 2003 announcement combines a positive forward-guidance factor with dollar depreciation, as the Federal Reserve reduces its assessment of deflation risk but maintains an accommodative policy stance. It leaves the policy rate at 1 per cent and says accommodation can continue for a "considerable period." The forward-guidance factor is positive, at 0.81, and the dollar depreciates by 0.11 per cent. My decomposition identifies a supply component of 2.5 standard deviations alongside positive monetary-policy and demand components. The minutes, released in January 2004, also report concerns about higher commodity prices and employee benefit costs adding to inflation pressure. They provide additional evidence on the Federal Reserve's assessment, although this discussion was not included in the announcement-day statement.<sup>31</sup> Over the surrounding period, the New York Fed attributes dollar weakness to concerns about the US current-account deficit and expectations that US rates would remain low relative to foreign rates.<sup>32</sup>

The March 2009 announcement combines a sharp dollar depreciation with an expansion of the Federal Reserve's asset purchases. The statement describes falling activity, tight credit conditions, and subdued inflation.<sup>33</sup> The dollar depreciates by 2.07 per cent, and my decomposition identifies a supply component of 3.0 standard deviations alongside a monetary easing component of  $-5.0$  standard deviations. Both components contribute to depreciation in the decomposition. The statement explains the decision to provide further monetary support, but does not give a direct account of adverse supply news. For this meeting, the narrative therefore provides less support for the supply interpretation than in the episodes discussed above.

The September 2012 announcement combines a positive forward-guidance factor and dollar depreciation with a discussion of commodity-price pressures and further monetary accommodation. The statement notes that "the prices of some key commodities have increased recently." In the

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<sup>29</sup>FOMC statements of November 16, 1999, and May 16, 2000.

<sup>30</sup>FOMC statement of August 21, 2001. ABC News, "[Fed Cuts Rates Again](#)", August 21, 2001.

<sup>31</sup>FOMC statement of December 9, 2003. Minutes of the December 9, 2003 meeting, released on January 29, 2004.

<sup>32</sup>Federal Reserve Bank of New York, "[Treasury and Federal Reserve Foreign Exchange Operations, October–December 2003](#)", February 5, 2004.

<sup>33</sup>FOMC statement of March 18, 2009.

press conference, Bernanke also discusses how drought and geopolitical tensions had contributed to fluctuations in food and fuel prices in recent years. With unemployment still elevated, the Federal Reserve announces additional purchases of mortgage-backed securities to support the recovery, while expecting inflation over the medium term to remain at or below its objective.<sup>34</sup> The forward-guidance factor is positive, at 1.32, and the dollar depreciates by 0.70 per cent. My decomposition identifies a supply component of 2.0 standard deviations alongside monetary easing and a positive demand component. The meeting therefore brings together commodity-price pressures and a policy decision to provide further support to economic activity.

The August and September 2010 announcements and the January 2012 meeting combine a positive forward-guidance factor with dollar depreciation, while the Federal Reserve announces further support for the recovery. In August 2010, it decides to reinvest principal payments from its securities holdings. In September, it signals that additional accommodation may be needed, and in January 2012 it extends its guidance for exceptionally low rates to late 2014. The statements in August and September 2010 describe weak activity as restraining cost pressures. In January 2012, Bernanke also explains that oil and commodity prices had flattened or declined after their earlier increases.<sup>35</sup> Contemporary reporting links the dollar's decline in September 2010 and January 2012 to the prospect of further monetary accommodation.<sup>36</sup> My decomposition also identifies monetary easing at all three meetings, alongside positive supply components ranging from 1.8 to 2.4 standard deviations. The dollar depreciates by about 0.7–0.8 per cent at each announcement. These meetings therefore illustrate how the estimated supply component can coexist with monetary easing within the same announcement.

The March 2018 and June 2023 press conferences discuss risks to supply and the persistence of supply constraints. In March 2018, Powell reports that businesses are concerned about changes in trade policy, although these concerns have not yet changed the Federal Reserve's current outlook. Reuters also links some stock-market selling during the press conference to his remarks about tariffs. My decomposition identifies a supply component of 1.9 standard deviations. The dollar depreciates by 0.51 per cent, while the forward-guidance factor is slightly negative, alongside negative monetary-policy and demand components. In June 2023, Powell explains that further declines in goods inflation require “continued healing in supply conditions.” Supply conditions had improved substantially, but businesses still reported that they had not returned to normal.<sup>37</sup> The supply component is 2.3 standard deviations. At this meeting, the forward-guidance factor is positive, at 1.33, but the dollar appreciates by 0.25 per cent. The announcement also contains positive monetary-policy and demand components, both of which contribute to appreciation in my

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<sup>34</sup>FOMC statement and press conference of September 13, 2012. Contemporary reporting also emphasised the unexpectedly open-ended commitment to asset purchases. Washington Post, “[Stocks surge on Fed's QE3 plan](#)”, September 13, 2012.

<sup>35</sup>FOMC statements of August 10 and September 21, 2010, and January 25, 2012. Press conference of January 25, 2012.

<sup>36</sup>Reuters, “[Dollar sells off on Fed statement](#)”, September 21, 2010. Business Recorder, “[Dollar falls as Fed extends low-rate pledge](#)”, January 25, 2012.

<sup>37</sup>Press conferences of March 21, 2018, and June 14, 2023. Reuters, “[World stocks flat as investors weigh inflation, trade concerns](#)”, March 21, 2018.

decomposition.

**Negative observations.** In June 1999, the Federal Reserve explained that stronger productivity was containing inflation despite tighter labour markets. The statement said that “strengthening productivity growth has contained inflationary pressures.” It raised the policy rate by 25 basis points but also removed its bias towards further tightening. Contemporary reporting linked the rally in stocks and bonds to this change in the policy outlook.<sup>38</sup> In my announcement window, the forward-guidance factor is slightly negative, at  $-0.05$ , and the dollar depreciates by 0.34 per cent. I identify a negative supply component of  $-2.6$  standard deviations alongside monetary easing. The productivity discussion supports the interpretation of improving supply conditions, while the easing component contributes to dollar depreciation.

In January 2001, lower oil prices had reduced import costs, although natural-gas and electricity prices were still rising. Brent had fallen by about 29 per cent over the preceding thirty trading days. In the later-released transcript, Greenspan explained that lower oil prices had reduced the implied “import tax.” The public statement still described high energy costs as a burden on households and businesses.<sup>39</sup> I identify a negative supply component of  $-4.4$  standard deviations alongside monetary easing and a large positive demand component. The forward-guidance factor is positive, at 3.21, and the dollar appreciates by 0.42 per cent.

The April 2001 rate cut followed a decline in energy costs for firms. The producer-price report published six days earlier showed that intermediate energy prices had fallen by 1.4 per cent in March. Contemporary industry reporting linked stabilising energy prices and lower inflation to the Federal Reserve’s ability to cut rates.<sup>40</sup> I identify a negative supply component of  $-4.8$  standard deviations alongside monetary easing of  $-4.0$  standard deviations. The forward-guidance factor is negative, at  $-1.30$ , and the dollar depreciates by 0.92 per cent. In my decomposition, monetary easing offsets the appreciation associated with the negative supply component.

The May and November 2001 announcements combine a negative forward-guidance factor with a small appreciation of the dollar. The Federal Reserve cuts rates by 50 basis points at both meetings to support weak economic activity. The minutes, released later, also discuss how energy prices affect the inflation outlook. In May, policymakers expect “projected declines in energy prices” to help contain inflation, although energy costs remain high. By November, energy prices have fallen, partly because of weaker global demand, and policymakers expect these declines to reduce core inflation.<sup>41</sup> My decomposition identifies negative supply components of  $-3.5$  and  $-3.3$  standard deviations. The forward-guidance factor is negative at both meetings, at  $-1.01$  and  $-0.73$ , while the dollar appreciates by 0.09 and 0.07 per cent, respectively.

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<sup>38</sup>FOMC [statement of June 30, 1999](#). CNNfn, “[Wall Street gets a Fed gift](#)”, June 30, 1999.

<sup>39</sup>FOMC [statement of January 3, 2001](#), and [internal conference-call transcript](#), printed p. 4.

<sup>40</sup>Bureau of Labor Statistics, “[Producer Price Indexes—March 2001](#)”, released April 12, 2001. Heavy Duty Trucking, “[Fed Cuts Interest Rates Again](#)”, April 18, 2001. The April 18 FOMC [statement](#) focused on weak investment, profits, and the outlook for activity.

<sup>41</sup>FOMC statements of [May 15, 2001](#), and [November 6, 2001](#). The minutes of the [May meeting](#) were released on June 28, 2001, and those of the [November meeting](#) on December 13, 2001.

The August 2002, March 2004 and August 2009 announcements describe weak demand or limited inflation pressure. In August 2002, the Federal Reserve points to weaker demand and financial markets. In March 2004, low inflation and unused capacity allow it to remain patient before raising rates. In August 2009, it expects economic slack to contain cost pressures even though energy and commodity prices have risen.<sup>42</sup> The forward-guidance factor is negative at all three meetings. The dollar depreciates by 0.11 per cent in August 2002 and appreciates by 0.08 and 0.56 per cent in March 2004 and August 2009. I identify negative supply components ranging from  $-2.3$  to  $-2.5$  standard deviations, although these statements primarily discuss weak activity and subdued inflation rather than declining input costs.

The October 2008 and January 2009 announcements combine a negative forward-guidance factor with dollar appreciation, while the Federal Reserve links lower inflation to falling energy and commodity prices. Before the October meeting, Brent had fallen by about 26 per cent over thirty trading days. The statement identifies “declines in the prices of energy and other commodities” together with weaker activity as reasons to expect inflation to moderate. The Federal Reserve cuts its policy rate by 50 basis points. In January, it again points to lower commodity prices and economic slack as sources of subdued inflation, while keeping the policy rate near zero.<sup>43</sup> The forward-guidance factor is negative at both meetings, at  $-1.46$  and  $-0.34$ , and the dollar appreciates by 0.68 and 0.88 per cent, respectively. My decomposition identifies supply components of  $-3.1$  and  $-3.6$  standard deviations.

The December 2013 and 2014 meetings and the April and October 2015 meetings associate low inflation with lower energy and import prices. In December 2013, Bernanke explains that falling oil prices are making it harder for inflation to return to target. By December 2014, Brent had fallen by about 27 per cent over the preceding thirty trading days. Yellen explains that lower oil prices reduce inflation but also support households’ purchasing power. She describes their overall effect on the US economy as positive and expects their effect on inflation to be temporary. The April and October 2015 statements again attribute below-target inflation partly to lower energy and non-energy import prices.<sup>44</sup> My decomposition identifies negative supply components at all four meetings, ranging from  $-2.3$  to  $-3.2$  standard deviations. The dollar appreciates by 0.30 per cent in December 2013, 0.48 per cent in December 2014, and 0.70 and 1.23 per cent in April and October 2015. The forward-guidance factor is positive at the two December meetings and slightly negative at the two 2015 meetings.

In September 2017, the Federal Reserve expects the increase in gasoline prices after the hurricanes to raise inflation only temporarily. It also expects the disruption to activity to fade, while inflation apart from the hurricane effects remains below its objective.<sup>45</sup> The forward-guidance factor is positive, at 0.53, and the dollar appreciates by 1.05 per cent. My decomposition identifies

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<sup>42</sup>FOMC statements of [August 13, 2002](#), [March 16, 2004](#), and [August 12, 2009](#).

<sup>43</sup>FOMC statements of October 29, 2008, and January 28, 2009.

<sup>44</sup>FOMC press conferences of [December 18, 2013](#), and [December 17, 2014](#). FOMC statements of [April 29, 2015](#), and [October 28, 2015](#).

<sup>45</sup>FOMC [statement of September 20, 2017](#).

a negative supply component of  $-2.6$  standard deviations alongside positive monetary-policy and demand components.

In June 2019, Powell discussed how lower oil prices were supporting household spending, while also reducing investment. Brent had fallen by about 11 per cent over the preceding thirty trading days. He explained that lower oil prices were “leading to lower gas prices, which supports spending.” At the same meeting, the Federal Reserve left rates unchanged but indicated that it could cut them, which Reuters linked to the increase in stock prices.<sup>46</sup> The forward-guidance factor is negative, at  $-1.44$ , and the dollar depreciates by 0.12 per cent. I identify a negative supply component of  $-3.8$  standard deviations. The announcement also contains monetary easing and weaker perceived demand, which contribute to dollar depreciation in my decomposition. The dollar can therefore depreciate even though the supply component alone would imply an appreciation.

The May and June 2022 announcements also contain revisions to the expected pace of tightening. In May, Powell says that a 75-basis-point increase is not being actively considered. In June, after delivering an increase of that size, he says that he does not expect such moves to be common.<sup>47</sup> The forward-guidance factor is approximately zero in May and negative at  $-0.78$  in June, while the dollar depreciates by 0.65 and 0.58 per cent. I identify negative supply components of  $-2.8$  and  $-2.6$  standard deviations alongside monetary easing at both meetings. These remarks concern the policy response while supply pressures remain elevated.

In December 2023, Powell linked the decline in inflation to improving supply conditions. More people were entering the labour force, immigration had recovered, and the shortages and bottlenecks from the pandemic were easing. He explained that these “significant supply-side gains” had helped the economy grow without the increase in unemployment that many forecasters had expected. He also said that interest rates were likely near their peak and that the Federal Reserve had started discussing when to cut them.<sup>48</sup> The forward-guidance factor is negative, at  $-1.60$ , and the dollar depreciates by 0.77 per cent. My decomposition identifies both improving perceived supply conditions, with a supply component of  $-2.9$  standard deviations, and monetary easing, with a monetary-policy component of  $-2.8$  standard deviations. The easing contributes to dollar depreciation, while the negative supply component works in the opposite direction.

In March 2025, Powell explains why higher projected inflation does not lead to a higher projected policy path. He attributes part of the inflation revision to tariffs and explains that weaker growth and higher inflation have offsetting implications for policy. He also says that looking through tariff inflation could be appropriate if its effects fade quickly and longer-term inflation expectations remain anchored.<sup>49</sup> The forward-guidance factor is negative, at  $-0.61$ , and the dollar depreciates by 0.22 per cent. My decomposition identifies a negative supply component of  $-2.4$  standard deviations alongside monetary easing.

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<sup>46</sup>FOMC [press conference of June 19, 2019](#), p. 13. Reuters, “[Stocks approach record as Fed soothes Wall Street’s fears](#)”, June 19, 2019.

<sup>47</sup>FOMC press conferences of [May 4, 2022](#), p. 7, and [June 15, 2022](#), p. 4.

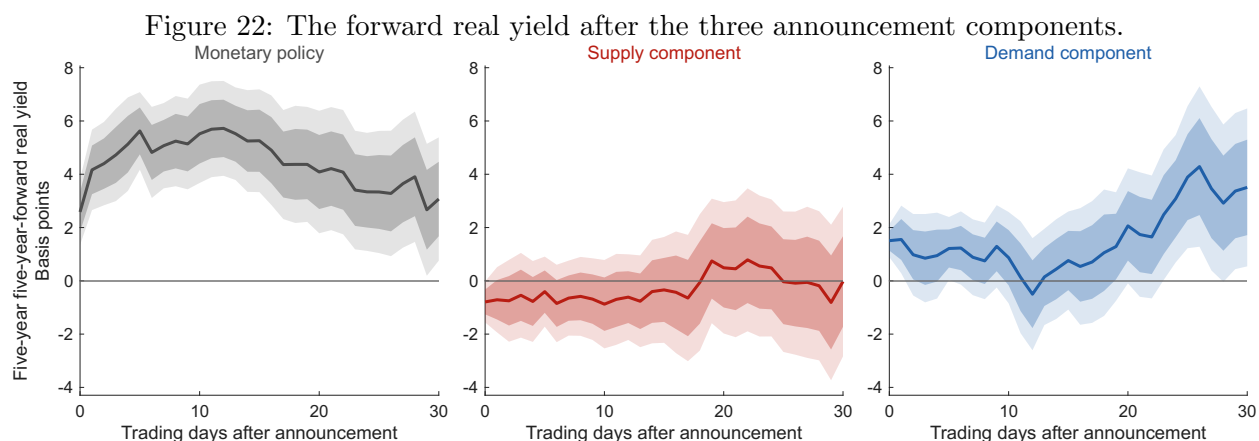
<sup>48</sup>FOMC [press conference of December 13, 2023](#), pp. 1–2, 6–8.

<sup>49</sup>FOMC [press conference of March 19, 2025](#), pp. 5–6.

## D.2 The forward real yield

I also study how the three components affect real yields at longer horizons. I use the five-year five-year-forward real yield, which covers the five-year period beginning five years after the announcement, and estimate its response using daily local projections.

Figure 22 shows that the supply component does not produce a persistent increase in the forward real yield. It falls by 0.8 basis point on the announcement day and returns to approximately zero after thirty trading days. The monetary-policy component instead raises the yield by 2.6 basis points on the announcement day and by 3.1 basis points after thirty trading days. The demand component also raises it, with the response increasing from 1.5 to 3.5 basis points over the same period.



Notes: Daily local projections of the five-year five-year-forward real yield, in basis points, from 2005 to 2025. Solid lines are point estimates; inner and outer bands are 68 and 90 per cent confidence intervals. A traded real yield can contain real term and liquidity premia and is not a direct observation of the expected policy real rate.

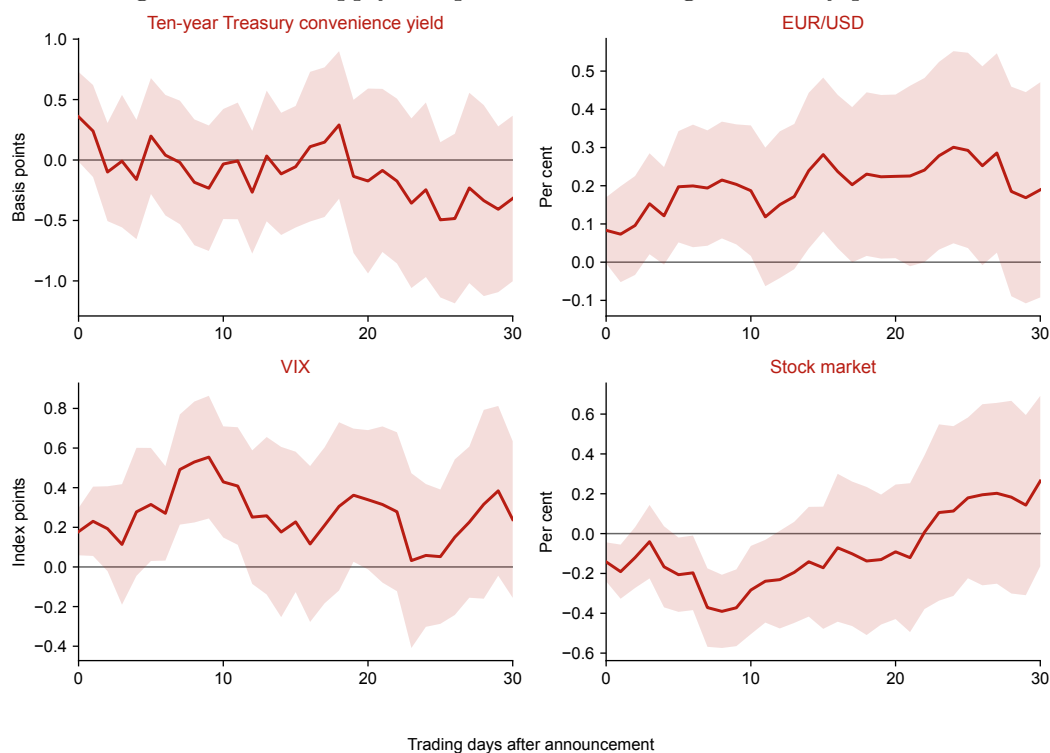
## D.3 Risk and monetary-policy uncertainty

I first examine whether the fall in stock prices and the increase in the VIX after the supply component reflect a global flight to safety. In this case, investors would move towards dollar assets and US Treasuries, which would tend to appreciate the dollar and increase the Treasury convenience yield. This yield measures the additional value investors place on holding US Treasuries relative to comparable foreign government bonds. Figure 23 shows that the dollar instead depreciates and the convenience yield does not increase. These responses do not support a flight-to-safety interpretation of the supply component.

I also examine whether the supply component is associated with greater uncertainty about future policy rates. Table 11 reports its correlation with announcement-day changes in the monetary-policy uncertainty measure of [Bauer et al. \(2022\)](#), at horizons of twelve and twenty-four months. The correlations with the supply component are small and not statistically significant at either horizon. The monetary-policy and demand components instead have positive and statistically

significant correlations with both measures. The increase in the VIX after the supply component therefore occurs without a clear increase in measured uncertainty about future policy rates.

Figure 23: The supply component and the flight-to-safety pattern.



Notes: response of the ten-year Treasury convenience yield, measured as the covered-interest-parity basis of ten-year Treasuries against G10 government bonds, EUR/USD, the VIX, and the log NYSE index to a one-standard-deviation supply component. EUR/USD and the stock market are in per cent; a rise in EUR/USD is a dollar depreciation. Estimates are daily local projections from equation (14); the horizon is in trading days. Solid line: point estimate; shaded band: 90 per cent confidence interval. The estimation period begins when each series becomes available and ends in 2025.

Table 11: The three announcement components and market-based monetary-policy uncertainty.

|                  | $\Delta\text{MPU}$ (12m) | $\Delta\text{MPU}$ (24m) |
|------------------|--------------------------|--------------------------|
| Monetary policy  | +0.275***<br>(2.89)      | +0.368***<br>(4.17)      |
| Supply component | +0.095<br>(1.15)         | +0.045<br>(0.60)         |
| Demand component | +0.237***<br>(2.77)      | +0.153*<br>(1.81)        |

Notes: correlation of monetary policy, the supply component, and the demand component with the FOMC-day change in the market-based monetary-policy uncertainty measure of [Bauer et al. \(2022\)](#), at the twelve- and twenty-four-month horizons. Heteroskedasticity-robust  $t$ -statistics from univariate regressions in parentheses; \*, \*\*, and \*\*\* denote two-sided significance at the 10, 5, and 1 per cent levels. Retained FOMC announcements with available data,  $N = 216$ .

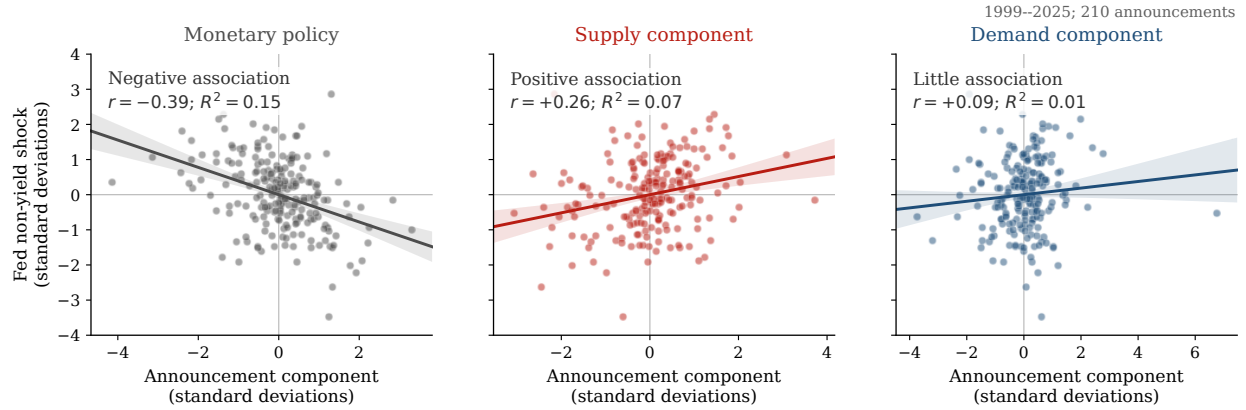
## D.4 The Fed non-yield shock

I compare my three components with the Fed non-yield shock of [Boehm and Kroner \(2026\)](#) to study whether perceived supply conditions help explain asset-price movements that changes in the yield curve do not capture. Their measure summarises these movements around Federal Reserve announcements. A positive value is associated with higher stock and commodity prices, dollar depreciation, and lower implied volatility.

The supply and monetary-policy components explain part of the variation in their measure, while the demand component explains very little. Figure 24 reports the comparison across 210 matched announcements. The supply component is positively correlated with their measure and explains about 7 per cent of its variation. The monetary-policy component is negatively correlated with it and explains about 15 per cent. The demand component explains less than 1 per cent, while the three components together explain 23 per cent. Perceived supply conditions therefore help explain a part of the non-yield variation that demand-related revisions do not capture.

The relation with my components is possible even though their factor is orthogonal to changes in the yield curve. An announcement can contain adverse supply news together with unexpected monetary easing. The two revisions move interest rates in opposite directions, but both depreciate the dollar. Their effects on rates can therefore offset each other while still moving other asset prices, as discussed in Section 6. This helps explain how their factor can be related to both components without requiring either component to leave yields unchanged.

Figure 24: The Fed non-yield shock and the three announcement components.

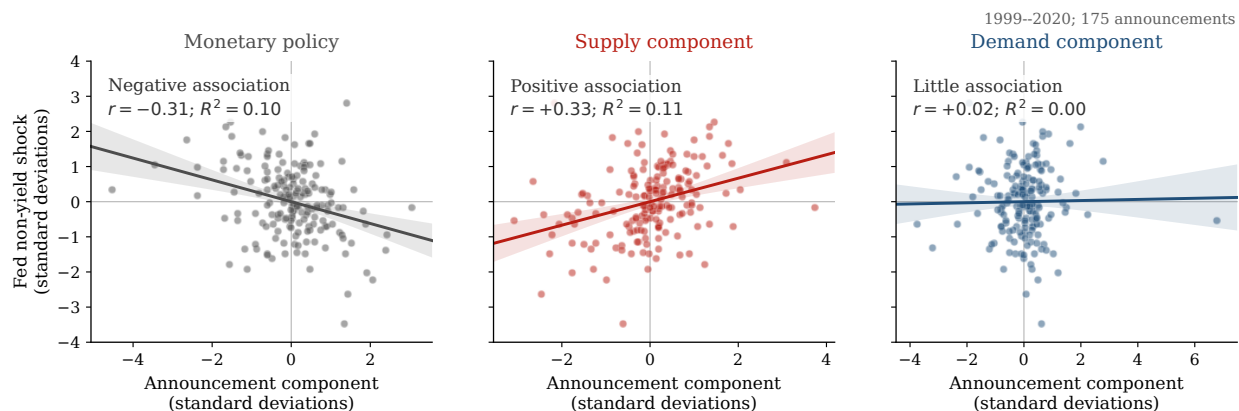


Notes: scatter plots of the Fed non-yield shock of [Boehm and Kroner \(2026\)](#) against monetary policy, the supply component, and the demand component. Each variable is standardised over the 210 matched announcements from 1999 to May 2025. Lines are univariate OLS fits; shaded areas are 90 per cent heteroskedasticity-robust confidence bands. The Fed non-yield shock is measured over the authors' fourteen-hour baseline window. The three components are measured from the statement through the press conference.

## D.5 The Fed non-yield shock through 2020

The supply component is related to the Fed non-yield shock even before the increase in inflation in 2021–2022. I repeat the comparison using the 175 matched announcements from 1999 through 2020. Figure 25 shows that the supply component explains about 11 per cent of the variation in their measure, compared with 10 per cent for the monetary-policy component and less than 0.1 per cent for demand. The contribution of supply is therefore already present in the earlier part of the sample, when inflation was generally lower.

Figure 25: The Fed non-yield shock and the three announcement components through 2020.



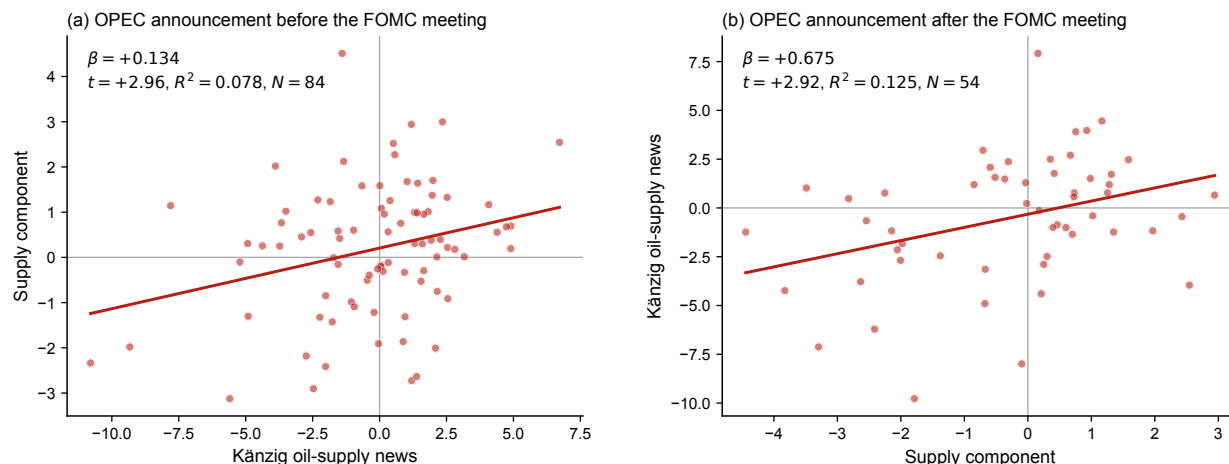
Notes: scatter plots of the Fed non-yield shock of [Boehm and Kroner \(2026\)](#) against monetary policy, the supply component, and the demand component. Each variable is standardised over the 175 matched announcements from 1999 through 2020. Lines are univariate OLS fits; shaded areas are 90 per cent heteroskedasticity-robust confidence bands. The Fed non-yield shock is measured over the authors' fourteen-hour baseline window. The three components are measured from the statement through the press conference.

## D.6 Oil-supply news before and after FOMC announcements

My supply component is related to oil-supply news both before and after Federal Reserve announcements. Figure 26 first plots the relationship studied in Section 5.2. For each FOMC meeting, I take the most recent OPEC announcement within the preceding thirty calendar days and regress my supply component on Känzig's front-month futures surprise. The relationship is positive, with a  $t$ -statistic of 2.96 across 84 matched announcements.

I then ask whether my supply component predicts oil-supply news at the next OPEC announcement. I take the first OPEC announcement within thirty calendar days after each FOMC meeting and regress Känzig's principal-component measure on my supply component. The right panel shows a positive relationship, with a  $t$ -statistic of 2.92 across 54 matched announcements. The supply component therefore contains information related to subsequent oil-supply news, as well as to news already released before the Federal Reserve meeting.

Figure 26: The supply component and Känzig's oil-supply news.



Notes: left, the supply component against the front-contract Känzig shock at the nearest OPEC announcement in the thirty days before each FOMC meeting; right, the principal-component Känzig shock at the nearest OPEC announcement in the thirty days after each meeting against the supply component. Lines are OLS fits with HAC inference. Full 1999–2025 sample.

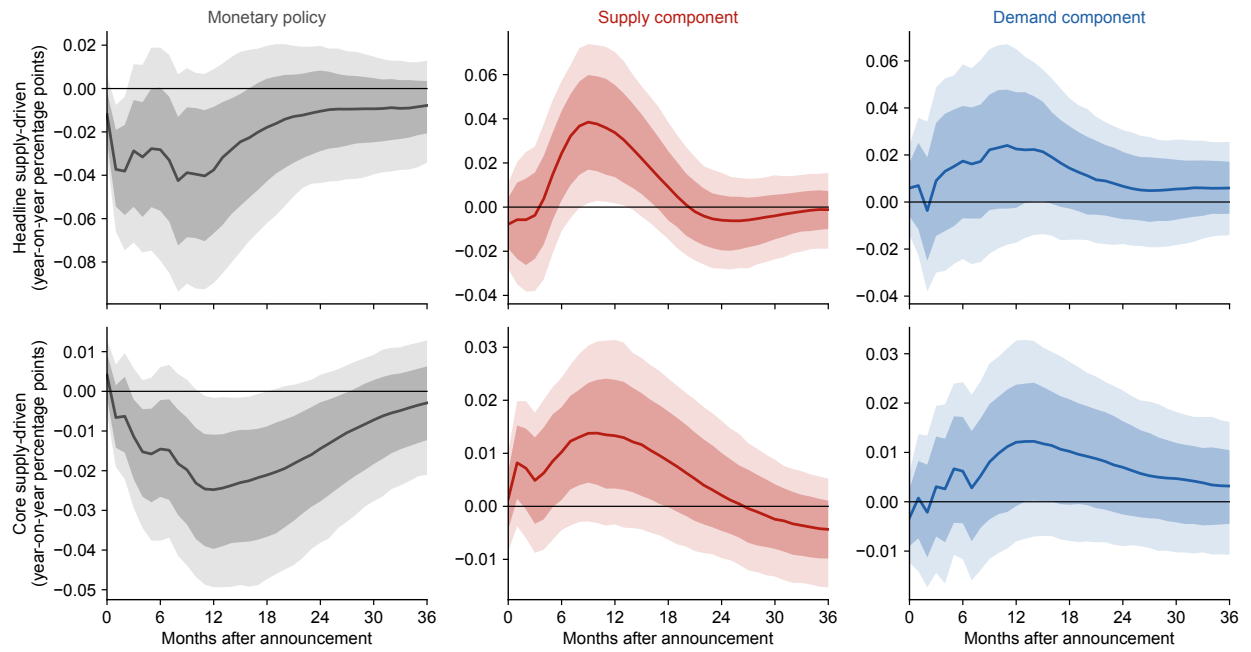
## D.7 Year-on-year supply- and demand-driven inflation

I also estimate the responses using the year-on-year supply- and demand-driven contributions to inflation published by [Shapiro \(2024\)](#). In the main text, I cumulate his monthly contributions to study their effects on the price level. Here, I include the published year-on-year measures separately in the BVAR and consider both headline and core PCE inflation, which excludes food and energy.

The supply component raises supply-driven inflation in both headline and core PCE. Figure 27 shows that the headline response reaches about 0.04 percentage point within the first year. The core response is smaller and less precisely estimated, but it also increases. The positive response therefore remains when food and energy are excluded, although the evidence is stronger for headline inflation.

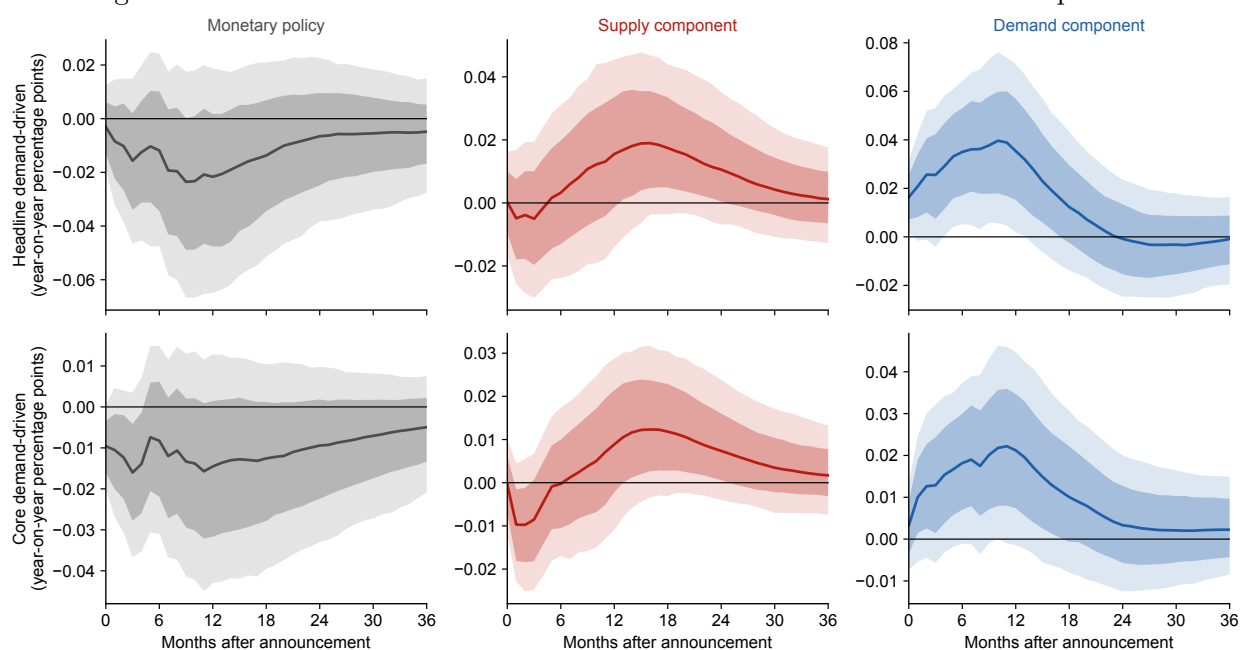
The demand component instead produces a larger increase in demand-driven inflation. Figure 28 shows positive responses for both headline and core PCE, which peak within the first year and then decline. The monetary-policy component lowers both supply- and demand-driven inflation, although some responses are imprecisely estimated.

Figure 27: Supply-driven PCE inflation after the three announcement components.



Notes: year-on-year supply-driven contributions to headline PCE inflation (top row) and core PCE inflation (bottom row), from [Shapiro \(2024\)](#), after a one-standard-deviation monetary-policy component (left), supply component (centre), and demand component (right). Solid line: posterior median; shaded bands: inner 68 and outer 90 per cent credible sets. VAR sample: 1999–2025.

Figure 28: Demand-driven PCE inflation after the three announcement components.



Notes: year-on-year demand-driven contributions to headline PCE inflation (top row) and core PCE inflation (bottom row), from [Shapiro \(2024\)](#), after a one-standard-deviation monetary-policy component (left), supply component (centre), and demand component (right). Solid line: posterior median; shaded bands: inner 68 and outer 90 per cent credible sets. VAR sample: 1999–2025.

## D.8 A second oil-news shock

I also compare my supply component with the OPEC surprises of [Degasperi \(2023\)](#). He distinguishes oil-supply news from oil-demand news using the movements in oil futures and stock prices around OPEC announcements. Oil-supply news moves these prices in opposite directions, while oil-demand news moves them in the same direction. For each measure, I match each FOMC meeting to the most recent OPEC announcement of that type within the preceding thirty calendar days and regress my three components separately on the oil surprise.

Both oil-news measures predict my supply component, while neither has a statistically significant relationship with the monetary-policy or demand component. Table 12 reports positive coefficients for the stagflationary and expansionary measures, with  $t$ -statistics of 1.76 and 2.20, respectively. The regressions use 39 and 38 matched announcements. These results provide further evidence that my supply component is related to oil-market news, although the relationship is present for both types of news identified by Degasperi.

Table 12: Prior Degasperi oil news and the three FOMC-day components.

| OPEC news      | Monetary<br>policy | Supply<br>component | Demand<br>component | $N$ |
|----------------|--------------------|---------------------|---------------------|-----|
| Stagflationary | +0.000<br>(0.01)   | +0.130*<br>(1.76)   | +0.044<br>(0.56)    | 39  |
| Expansionary   | −0.005<br>(−0.17)  | +0.139**<br>(2.20)  | +0.001<br>(0.01)    | 38  |

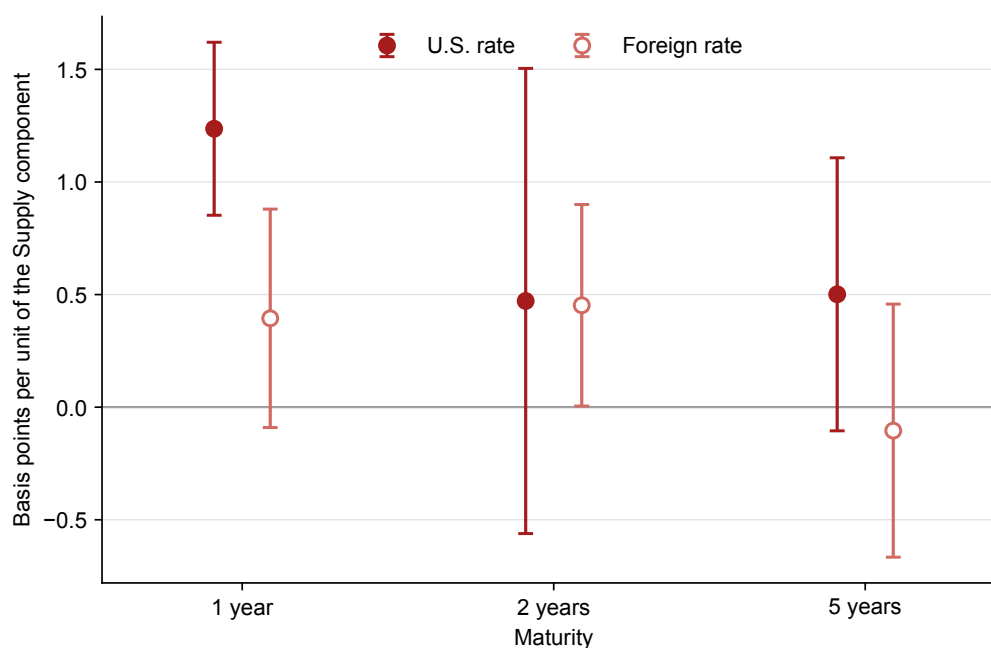
Notes: OLS of each identified FOMC-day component on the [Degasperi \(2023\)](#) shock at the nearest OPEC announcement in the thirty days before the meeting, one regression per cell. HAC  $t$ -statistics are in parentheses; \*, \*\*, and \*\*\* denote significance at the 10, 5, and 1 per cent levels. Full 1999–2025 sample.

## D.9 Foreign interest-rate responses

I also check whether the dollar depreciation comes from markets pricing in a larger increase in euro-area interest rates than in US rates. The question is whether a global supply shock hits the euro-area economy harder, so markets expect the ECB to tighten more and the dollar depreciates. To study this, I regress changes in US Treasury yields and euro-area overnight-indexed swap rates on my monetary-policy, supply, and demand components. I run a separate regression for each rate at maturities of one, two, and five years, including the three components together. For each maturity, I use the same FOMC meetings for the US and euro-area regressions and compare the coefficients on the supply component.

Figure 29 shows that the one-year US yield rises by 1.24 basis points after the supply component, compared with 0.39 basis point for the euro-area rate. The dollar therefore depreciates even though the one-year interest-rate differential moves in favour of the US. The estimated US response is also larger at two and five years, although the differences are not precisely estimated.

Figure 29: US and euro-area interest-rate responses to the supply component.



Notes: Points are coefficients from FOMC-date regressions that include the three announcement components jointly; bars are 90 per cent confidence intervals. Euro-area rates are overnight-indexed swaps through May 2020. Because FOMC announcements follow the European close, the foreign change is measured from the announcement-date European close to the next European close.

## E Model derivations

### E.1 An imported-input foundation

I derive the supply disturbance in the main text from an increase in the real price of an imported input. The increase raises firms' production costs and reduces households' purchasing power. I follow the imported-oil framework of [Blanchard and Galí \(2007a\)](#), allowing the input to represent oil or other imported intermediate goods. I also extend their wage-setting equation, as explained below.

Domestic firms use labour and the imported input to produce their goods. Firm  $i$  has the production function

$$Q_t(i) = A_t M_t(i)^{\alpha_m} N_t(i)^{\alpha_n}, \quad \alpha_m > 0, \quad \alpha_n > 0, \quad \alpha_m + \alpha_n = 1. \quad (20)$$

Here  $Q_t(i)$  is gross output,  $A_t$  is productivity,  $M_t(i)$  is the imported input, and  $N_t(i)$  is labour. The production function has constant returns to scale. Let  $P_{m,t}$  denote the input price,  $W_t$  the nominal wage, and  $\Psi_t(i)$  nominal marginal cost. Cost minimisation gives

$$P_{m,t} M_t(i) = \alpha_m \Psi_t(i) Q_t(i), \quad W_t N_t(i) = \alpha_n \Psi_t(i) Q_t(i).$$

The parameters  $\alpha_m$  and  $\alpha_n$  therefore also measure the shares of the imported input and labour in variable costs.

The supply disturbance is an increase in the input price relative to the price of domestic output. Denoting the latter by  $P_{q,t}$ , I define the real input price in logs as

$$s_t \equiv p_{m,t} - p_{q,t}.$$

An increase in  $s_t$  means that firms pay more for the input relative to the price at which they sell their goods. The real input price follows

$$s_t = \rho_s s_{t-1} + e_t^s, \quad 0 < \rho_s < 1. \quad (21)$$

An increase in the imported-input price reduces the consumption that domestic income can finance. To derive this relationship, I distinguish gross output from domestic value added, which excludes the imported input. Following [Blanchard and Galí \(2007a\)](#), I define the value-added deflator  $P_{y,t}$  by

$$P_{q,t} = P_{y,t}^{1-\alpha_m} P_{m,t}^{\alpha_m},$$

which gives

$$p_{y,t} = p_{q,t} - \frac{\alpha_m}{1 - \alpha_m} s_t.$$

Households also purchase the imported input directly. If its share in their consumption basket is

$\chi$ , the consumer price index is

$$p_{c,t} = p_{q,t} + \chi s_t.$$

With balanced trade, nominal consumption equals nominal domestic value added,  $P_{c,t}C_t = P_{y,t}Y_t$ . Substituting the price indices gives

$$c_t = y_t - \omega s_t, \quad \omega \equiv \frac{\alpha_m}{1 - \alpha_m} + \chi. \quad (22)$$

For a given level of domestic value added, consumption falls when the imported input becomes more expensive. The first term in  $\omega$  comes from its use in production, and the second from households' direct purchases.

The expected recovery in purchasing power also affects current consumption. Households' Euler equation is

$$c_t = \mathbb{E}_t c_{t+1} - (i_t - \mathbb{E}_t \pi_{t+1}^c) + \varepsilon_t^d,$$

where  $\pi_t^c$  is consumer-price inflation and  $\varepsilon_t^d$  is the demand disturbance. Consumer-price inflation differs from domestic-output-price inflation,  $\pi_t$ , because households also buy the imported input:

$$\pi_{t+1}^c = \pi_{t+1} + \chi(s_{t+1} - s_t).$$

Substituting this expression and equation (22) into the Euler equation gives

$$y_t = \mathbb{E}_t y_{t+1} - (i_t - \mathbb{E}_t \pi_{t+1}) + \frac{\alpha_m}{1 - \alpha_m} (s_t - \mathbb{E}_t s_{t+1}) + \varepsilon_t^d.$$

The terms involving  $\chi$  cancel, leaving the effect of the input used in production. Since  $\mathbb{E}_t s_{t+1} = \rho_s s_t$ , the IS curve is

$$y_t = \mathbb{E}_t y_{t+1} - (i_t - \mathbb{E}_t \pi_{t+1}) + d s_t + \varepsilon_t^d, \quad d \equiv \frac{\alpha_m(1 - \rho_s)}{1 - \alpha_m}. \quad (23)$$

The positive term  $d s_t$  reflects the temporary nature of the input-price increase. Households expect purchasing power to recover as the input price falls, and consumption smoothing supports spending today. This effect works against the decline in spending caused by higher expected real rates. Whether output rises or falls in equilibrium also depends on inflation and the policy response.

### E.1.1 Inflation and dividends

The real input price also affects firms' marginal costs. To derive this channel, first consider wage setting. In [Blanchard and Galí \(2007a\)](#), the real wage responds only partially to the consumption and employment terms that would determine it under flexible wages. Write this condition as

$$w_t - p_t^w = (1 - \gamma)(c_t + \varphi n_t), \quad p_t^w = p_{q,t} + \chi_w s_t, \quad 0 \leq \gamma \leq 1, \quad \chi_w \geq \chi. \quad (24)$$

The parameter  $\gamma$  measures real-wage rigidity. When  $\gamma = 0$ , the wage fully reflects households' marginal rate of substitution. A larger  $\gamma$  makes the wage respond less to consumption and employ-

ment. The index  $p_t^w$  is the price level relevant for wage setting. Blanchard and Galí's specification is the case  $\chi_w = \chi$ . The extension  $\chi_w > \chi$  allows wages to respond to a broader set of prices that move with the supply disturbance than the imported share entering the balanced-trade identity.

Cost minimisation links the wage, the input price and firms' marginal cost. Combining that condition with (24) and (22) gives the log markup gap

$$\hat{\mu}_t = -\Gamma_y y_t - \Gamma_s s_t, \quad \Gamma_y > 0, \quad \Gamma_s \geq 0. \quad (25)$$

Here the markup is the price charged by the firm relative to its marginal cost. Higher output raises labour costs and reduces this margin. The input price also reduces the markup when real wages adjust incompletely or when the wage-setting index places more weight on the input price than the consumption basket does.

The response to the real input price is

$$\Gamma_s = \frac{\gamma[\alpha_m + (1 - \alpha_m)\chi] + (1 - \alpha_m)(\chi_w - \chi)}{1 - (1 - \gamma)[\alpha_m - (1 - \alpha_m)\bar{\eta}]}, \quad \bar{\eta} \equiv \frac{\alpha_m}{\mathcal{M}^p - \alpha_m}, \quad (26)$$

where  $\mathcal{M}^p$  is the steady-state gross markup. The denominator is a small value-added adjustment caused by the effect of the markup on the imported-input bill. The first term in the numerator is the Blanchard–Galí real-wage-rigidity channel. The second is the broader wage-index response. Thus,  $\Gamma_s > 0$  when  $\gamma > 0$  or  $\chi_w > \chi$ . With flexible wages and  $\chi_w = \chi$ , the input price does not create a markup gap.

Under Calvo pricing, only a fraction of firms can reset their prices each period. Firms that cannot reset absorb higher marginal cost in a lower markup, while firms that can reset raise their prices. Domestic inflation consequently satisfies

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} - \lambda_p \hat{\mu}_t, \quad \lambda_p \equiv \frac{(1 - \theta)(1 - \beta\theta)}{\theta},$$

where  $\theta$  is the fraction of firms that keep their price unchanged. Substituting (25) gives

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \kappa y_t + \lambda s_t, \quad \kappa \equiv \lambda_p \Gamma_y, \quad \lambda \equiv \lambda_p \Gamma_s. \quad (27)$$

The coefficient  $\kappa$  is the inflationary effect of stronger activity. The coefficient  $\lambda$  is the cost-push generated by the real input price. This second term allows inflation to rise while output falls.

The same markup response determines firms' profits. Dividends, measured in units of domestic gross output, satisfy

$$\frac{\text{Div}_t}{P_{q,t}} = Q_t \left( 1 - \frac{1}{\mathcal{M}_t^p} \right).$$

Using the first-order approximation between gross output and value added, log-linearising this expression and substituting (25) gives

$$\widehat{\text{div}}_t = \delta_d y_t - \gamma_s \lambda s_t, \quad \delta_d > 0, \quad \gamma_s > 0. \quad (28)$$

The first term is the increase in sales net of the additional production costs. The second is the decline in the profit margin caused by the higher input price. In terms of the steady-state markup,

$$\gamma_s = \frac{1}{(\mathcal{M}^p - 1)\lambda_p}, \quad \delta_d = 1 - \gamma_s \kappa. \quad (29)$$

Finally, express the real input-price disturbance in units of its direct inflationary effect:

$$u_t^s \equiv \lambda s_t, \quad \delta_s \equiv \frac{d}{\lambda}. \quad (30)$$

The normalisation gives the supply disturbance a coefficient of one in the Phillips curve. Its coefficient in the IS curve is  $\delta_s = d/\lambda$ , which compares the expected-recovery effect on spending with the direct cost-push effect on inflation. Equations (23) and (27), together with the nominal policy rule

$$i_t = \phi^\pi \pi_t + \phi^y y_t - \phi^s u_t^s + \varepsilon_t^m, \quad (31)$$

become equations (1)–(3) in the main text.

## E.2 Equilibrium responses

Because the model is linear, its response to each disturbance can be solved separately. Let  $b_x^j$  denote the response of variable  $x$  to one unit of disturbance  $j$ . If that disturbance has persistence  $\rho$ , define

$$A(\rho) \equiv 1 - \rho + \phi^y, \quad B(\rho) \equiv 1 - \beta\rho, \quad F(\rho) \equiv \phi^\pi - \rho, \quad (32)$$

and

$$\Delta_N(\rho) \equiv A(\rho)B(\rho) + \kappa F(\rho) > 0. \quad (33)$$

These terms collect the coefficients that appear repeatedly when the IS curve, Phillips curve and policy rule are solved together. Since  $0 < \beta < 1$ ,  $0 < \rho < 1$ ,  $\phi^\pi > 1$  and  $\phi^y \geq 0$ , all four objects are positive.

Consider first the supply disturbance. Since  $\mathbb{E}_t u_{t+1}^s = \rho_s u_t^s$ , conjecture that output and inflation respond as  $y_t = b_y^s u_t^s$  and  $\pi_t = b_\pi^s u_t^s$ . Substituting these responses into the three equilibrium equations gives

$$A(\rho_s)b_y^s + F(\rho_s)b_\pi^s = \delta_s + \phi^s, \quad (34)$$

$$-\kappa b_y^s + B(\rho_s)b_\pi^s = 1. \quad (35)$$

The first equation combines household spending with the policy rule. The term  $\delta_s$  is the support to current spending from the expected decline in the input price. The term  $\phi^s$  appears on the same side because a larger supply adjustment lowers the policy rate for a given disturbance and therefore supports output. The second equation is the Phillips curve. Its right-hand side equals one because the supply disturbance is measured in units of its direct inflationary effect.

Solving these two equations gives

$$b_y^s = \frac{(\delta_s + \phi^s)B(\rho_s) - F(\rho_s)}{\Delta_N(\rho_s)}, \quad (36)$$

$$b_\pi^s = \frac{A(\rho_s) + \kappa(\delta_s + \phi^s)}{\Delta_N(\rho_s)}. \quad (37)$$

Inflation rises because every term in the numerator of  $b_\pi^s$  is positive. Output falls when the policy and inflation responses outweigh the spending support generated by the expected decline in the input price. From (36), this condition is

$$\phi^s < \frac{\phi^\pi - \rho_s}{1 - \beta\rho_s} - \delta_s. \quad (38)$$

The nominal and expected real-rate responses are

$$b_i^s = \phi^\pi b_\pi^s + \phi^y b_y^s - \phi^s, \quad b_r^s = b_i^s - \rho_s b_\pi^s. \quad (39)$$

The IS curve provides a more revealing expression for the expected real rate:

$$b_r^s = \delta_s - (1 - \rho_s)b_y^s. \quad (40)$$

If output falls, the expected real rate must rise by more than  $\delta_s$ . The increase offsets both the expected recovery in consumption and the decline in current output.

The comparative static with respect to the supply adjustment is

$$\frac{\partial b_y^s}{\partial \phi^s} = \frac{B(\rho_s)}{\Delta_N(\rho_s)} > 0, \quad (41)$$

$$\frac{\partial b_\pi^s}{\partial \phi^s} = \frac{\kappa}{\Delta_N(\rho_s)} > 0, \quad (42)$$

$$\frac{\partial b_r^s}{\partial \phi^s} = -\frac{(1 - \rho_s)B(\rho_s)}{\Delta_N(\rho_s)} < 0, \quad (43)$$

$$\frac{\partial b_i^s}{\partial \phi^s} = \frac{\rho_s \kappa - (1 - \rho_s)B(\rho_s)}{\Delta_N(\rho_s)} < 0. \quad (44)$$

A larger  $\phi^s$  therefore raises output, increases inflation and reduces the expected real-rate response. The final inequality holds when  $(1 - \rho_s)(1 - \beta\rho_s) > \rho_s \kappa$ . Under this condition, a larger  $\phi^s$  also moderates the nominal-rate response. These are the movements shown in Figure 1.

Finally, measure the nominal response relative to the inflation generated by the disturbance:

$$\mathcal{R}_s(\phi^s) \equiv \frac{b_i^s}{b_\pi^s} = \phi^\pi + \phi^y \frac{b_y^s}{b_\pi^s} - \frac{\phi^s}{b_\pi^s}. \quad (45)$$

Current inflation rises by  $b_\pi^s$ , while expected next-period inflation rises by  $\rho_s b_\pi^s$ . The condition

$$\rho_s < \mathcal{R}_s(\phi^s) < 1$$

therefore means that the nominal rate rises by more than expected next-period inflation but by less than current inflation. The expected policy real rate increases, while part of current inflation passes into the price level.

A positive demand disturbance enters the IS curve directly and raises desired current spending. Conditional on this disturbance, the equilibrium coefficients satisfy

$$A(\rho_d)b_y^d + F(\rho_d)b_\pi^d = 1, \quad (46)$$

$$-\kappa b_y^d + B(\rho_d)b_\pi^d = 0. \quad (47)$$

The first equation shows the direct increase in demand. The second has a zero on its right-hand side because the disturbance does not raise firms' costs directly. It affects inflation only through the increase in output. Solving gives

$$b_y^d = \frac{B(\rho_d)}{\Delta_N(\rho_d)}, \quad b_\pi^d = \frac{\kappa}{\Delta_N(\rho_d)}, \quad (48)$$

$$b_i^d = \frac{\phi^\pi \kappa + \phi^y B(\rho_d)}{\Delta_N(\rho_d)}, \quad b_r^d = \frac{\kappa F(\rho_d) + \phi^y B(\rho_d)}{\Delta_N(\rho_d)}. \quad (49)$$

All four responses are positive. Stronger desired spending raises output. Higher output raises marginal cost and inflation. The policy rule responds to both changes, so the nominal rate rises. Since the nominal response exceeds the increase in expected inflation, the expected policy real rate also rises.

A contractionary monetary-policy disturbance raises the policy rate directly. The corresponding equilibrium system is

$$A(\rho_m)b_y^m + F(\rho_m)b_\pi^m = -1, \quad (50)$$

$$-\kappa b_y^m + B(\rho_m)b_\pi^m = 0. \quad (51)$$

The negative term in the first equation reflects the direct contractionary effect of the higher policy rate on spending. Solving gives

$$b_y^m = -\frac{B(\rho_m)}{\Delta_N(\rho_m)}, \quad b_\pi^m = -\frac{\kappa}{\Delta_N(\rho_m)}, \quad (52)$$

$$b_r^m = \frac{(1 - \rho_m)B(\rho_m)}{\Delta_N(\rho_m)}, \quad b_i^m = \frac{(1 - \rho_m)B(\rho_m) - \rho_m \kappa}{\Delta_N(\rho_m)}. \quad (53)$$

The expected policy real rate rises, which lowers spending and output. The decline in output

reduces marginal cost and inflation. The observed nominal rate also rises when

$$(1 - \rho_m)(1 - \beta\rho_m) > \rho_m\kappa. \quad (54)$$

This condition ensures that the direct policy increase is larger than the endogenous reduction in the nominal rate caused by lower current and expected inflation.

### E.3 Determinacy and an alternative expected-real-rate rule

The conditional responses above describe the equilibrium generated by each fundamental disturbance. Determinacy requires this equilibrium to be the unique bounded solution. To examine uniqueness, hold the structural disturbances at their steady-state values. The supply-specific term then disappears from the policy rule because it multiplies  $u_t^s$ . The remaining homogeneous system is

$$\begin{pmatrix} 1 + \phi^y & \phi^\pi \\ -\kappa & 1 \end{pmatrix} \begin{pmatrix} y_t \\ \pi_t \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & \beta \end{pmatrix} \mathbb{E}_t \begin{pmatrix} y_{t+1} \\ \pi_{t+1} \end{pmatrix}. \quad (55)$$

The Blanchard–Kahn condition is

$$\kappa(\phi^\pi - 1) + (1 - \beta)\phi^y > 0. \quad (56)$$

The conventional inflation response and the response to output therefore govern determinacy. The condition holds when  $\phi^\pi > 1$  and  $\phi^y \geq 0$ . The supply adjustment  $\phi^s$  changes how policy responds to a fundamental supply disturbance, but it does not change the response to self-fulfilling movements in inflation or output. It can therefore alter the conditional responses in Figure 1 without affecting equilibrium uniqueness.

The main text uses a nominal policy rule because it makes the supply-specific adjustment explicit. The same accommodation mechanism can also be expressed through a rule for the expected policy real rate. Set  $\phi^s = 0$  and consider

$$i_t - \mathbb{E}_t \pi_{t+1} = \phi^r \pi_t + \phi^y y_t + \varepsilon_t^m. \quad (57)$$

Equivalently, the nominal rate is

$$i_t = \mathbb{E}_t \pi_{t+1} + \phi^r \pi_t + \phi^y y_t + \varepsilon_t^m. \quad (58)$$

The first term compensates for expected inflation. The coefficients  $\phi^r$  and  $\phi^y$  determine how the expected real rate responds to current inflation and output.

Conditional on a supply disturbance with persistence  $\rho_s$ , expected next-period inflation is  $\rho_s b_\pi^s$ . The nominal response relative to current inflation is therefore

$$\frac{b_i^s}{b_\pi^s} = \rho_s + \phi^r + \phi^y \frac{b_y^s}{b_\pi^s}. \quad (59)$$

Partial accommodation requires

$$\rho_s < \frac{b_i^s}{b_\pi^s} < 1. \quad (60)$$

The lower bound says that the nominal rate rises by more than expected next-period inflation, so the expected policy real rate increases. The upper bound says that it rises by less than current inflation. Holding output fixed, these inequalities reduce to

$$0 < \phi^r < 1 - \rho_s.$$

When the supply disturbance lowers output, the term  $\phi^y b_y^s / b_\pi^s$  further moderates the nominal response.

Under the expected-real-rate rule, determinacy requires

$$\kappa \phi^r + (1 - \beta) \phi^y > 0. \quad (61)$$

A positive response of the expected real rate to inflation is therefore consistent with partial accommodation and a unique equilibrium.

The rules above describe the one-period expected policy real rate. To connect this object to a longer real yield, hold term and liquidity premia fixed and define its expected-rate component as

$$r_t^L \equiv (1 - \delta_L) \sum_{k=0}^{\infty} \delta_L^k \mathbb{E}_t r_{t+k}, \quad 0 < \delta_L < 1. \quad (62)$$

Conditional on disturbance  $j$ , the expected policy real-rate response declines at its persistence  $\rho_j$ . Hence

$$r_t^{L,j} = \frac{1 - \delta_L}{1 - \delta_L \rho_j} r_t^j. \quad (63)$$

The multiplier is positive, so the one-period rate and the expected-rate component of the long real yield have the same sign. Its value is below one, because averaging future rates dilutes the impact response. Observed inflation-protected yields can additionally move through real term and liquidity premia.

## E.4 Exchange rates and equity

### E.4.1 The exchange rate

Let  $e_t$  be the log price of foreign currency, so an increase is a dollar depreciation. Consider a foreign investor who can hold a one-period foreign bond or a one-period dollar bond. Measured in foreign currency, their gross returns are

$$R_{t+1}^* = \exp(i_t^*), \quad R_{t+1}^\$ = \exp(i_t - \Delta e_{t+1}),$$

where  $\Delta e_{t+1} = e_{t+1} - e_t$ . If  $M_{t+1}^*$  is the investor's nominal stochastic discount factor, the two bonds satisfy

$$1 = \mathbb{E}_t[M_{t+1}^* R_{t+1}^*], \quad 1 = \mathbb{E}_t[M_{t+1}^* R_{t+1}^\$].$$

Under conditional log-normality, subtracting the two Euler equations gives

$$\mathbb{E}_t \Delta e_{t+1} = i_t - i_t^* + \frac{1}{2} \text{Var}_t(\Delta e_{t+1}) - \text{Cov}_t(m_{t+1}^*, \Delta e_{t+1}),$$

where  $m_{t+1}^* = \log M_{t+1}^*$ . Define the currency premium as

$$\lambda_t^\$ \equiv \text{Cov}_t(m_{t+1}^*, \Delta e_{t+1}) - \frac{1}{2} \text{Var}_t(\Delta e_{t+1}).$$

Uncovered interest parity can then be written as

$$e_t = \mathbb{E}_t e_{t+1} - (i_t - i_t^*) + \lambda_t^\$. \quad (64)$$

Iterating forward gives

$$e_t = \bar{e}_t - \sum_{k \geq 0} \mathbb{E}_t(i_{t+k} - i_{t+k}^*) + \sum_{k \geq 0} \mathbb{E}_t \lambda_{t+k}^\$, \quad (65)$$

where

$$\bar{e}_t \equiv \lim_{H \rightarrow \infty} \mathbb{E}_t e_{t+H}.$$

I close the model by imposing purchasing-power parity in the long run:

$$\lim_{H \rightarrow \infty} \mathbb{E}_t [e_{t+H} - p_{t+H} + p_{t+H}^*] = \text{constant}.$$

The long-run exchange-rate revision therefore reflects the cumulative difference between domestic and foreign inflation.

The expression in the main text holds foreign interest rates and the currency premium fixed. Conditional on interpretation  $j$ , the normalised nominal-rate revision is one on impact and subsequently declines at rate  $\rho_j$ . Its cumulative response is therefore  $1/(1 - \rho_j)$ . Inflation is revised by  $K_{\pi,j}$  on impact, so the cumulative price-level response is  $K_{\pi,j}/(1 - \rho_j)$ . Substitution into (65) gives

$$K_{e,j} = \frac{K_{\pi,j}}{1 - \rho_j} - \frac{1}{1 - \rho_j} = K_{\pi,j} - \frac{K_{r,j}^{\text{pol}}}{1 - \rho_j}, \quad (66)$$

where  $K_{r,j}^{\text{pol}} = 1 - \rho_j K_{\pi,j}$ . The first term in the first expression is the long-run price-level response and depreciates the dollar. The second is the nominal-rate path and appreciates it. For the supply shock, the upper bound in the partial-accommodation condition gives

$$\mathcal{R}_s = \frac{b_i^s}{b_\pi^s} < 1.$$

Since  $K_{\pi,s} = b_{\pi}^s/b_i^s = 1/\mathcal{R}_s$ , it follows that  $K_{\pi,s} > 1$ . The exchange-rate response is therefore

$$K_{e,s} = \underbrace{\frac{K_{\pi,s}}{1 - \rho_s}}_{\text{cumulative US inflation response}} - \underbrace{\frac{1}{1 - \rho_s}}_{\text{cumulative US nominal-rate response}} > 0. \quad (67)$$

Under demand,

$$K_{\pi,d} = \frac{\kappa}{\phi^{\pi}\kappa + \phi^y B(\rho_d)} < 1, \quad K_{e,d} = \frac{K_{\pi,d} - 1}{1 - \rho_d} < 0, \quad (68)$$

because  $\phi^{\pi} > 1$  and  $\phi^y \geq 0$ . The rate path therefore outweighs the price-level increase and the dollar appreciates. Finally, provided the nominal rate rises after monetary tightening,  $K_{\pi,m} < 0$  and  $K_{r,m}^{\text{pol}} > 0$ . Hence

$$K_{e,m} = \underbrace{K_{\pi,m}}_{\text{lower price level}} - \underbrace{\frac{K_{r,m}^{\text{pol}}}{1 - \rho_m}}_{\text{higher expected real rates}} < 0. \quad (69)$$

Both forces appreciate the dollar.

For the general case, let  $K_{z,j}^{(k)}$  denote the revision in variable  $z$  at horizon  $k$  under interpretation  $j$ . The exchange-rate response then retains the corresponding foreign and premium revisions:

$$K_{e,j} = K_{\bar{e},j} - \sum_{k \geq 0} \left( K_{i,j}^{(k)} - K_{i^*,j}^{(k)} \right) + \sum_{k \geq 0} K_{\lambda^s,j}^{(k)}. \quad (70)$$

Foreign-rate and currency-premium revisions therefore also contribute to the exchange-rate response. The depreciation derived in the main text applies when the domestic price-level and nominal-rate channels dominate these additional terms. Figure 29 checks whether the dollar depreciation could instead reflect a larger increase in euro-area interest rates. At the one-year horizon, the US rate increases by more than the euro-area rate following the supply component. The dollar depreciation at this horizon therefore does not come from an increase in foreign rates relative to US rates. The differences at longer maturities are estimated less precisely.

#### E.4.2 Equity

Equity is a claim on firms' future real dividends. A Campbell–Shiller linearisation gives

$$v_t = \text{constant} + \sum_{k \geq 0} \bar{\rho}^k \left[ (1 - \bar{\rho}) \mathbb{E}_t d_{t+1+k} - \mathbb{E}_t r_{t+k}^{\text{disc}} \right], \quad (71)$$

where  $\bar{\rho}$  measures equity duration and the real discount rate is the expected policy real rate plus the equity premium. The impact dividend response reaches next period with the factor  $\rho_j$ , while the current policy real rate immediately discounts the future payoff stream. Both paths subsequently

decline at  $\rho_j$ . Let the revision in the required excess return satisfy

$$K_{\lambda,j} = -\Lambda_q K_{y,j}, \quad \Lambda_q \geq 0. \quad (72)$$

This reduced-form relation captures countercyclical required returns: an improvement in expected activity lowers the equity premium. Summing the three paths yields

$$K_{eq,j} = \frac{(1 - \bar{\rho})\rho_j K_{div,j} - K_{r,j}^{\text{pol}} + \Lambda_q K_{y,j}}{1 - \bar{\rho}\rho_j}. \quad (73)$$

The dividend term raises equity, while the expected-real-rate term lowers it through discounting. The last term raises equity when expected activity improves and lowers it when activity weakens. The signs are most transparent from the numerator. Under the stagflationary supply response,  $K_{div,s} < 0$ ,  $K_{y,s} < 0$  and  $K_{r,s}^{\text{pol}} > 0$ , so

$$\underbrace{(1 - \bar{\rho})\rho_s K_{div,s}}_{\text{lower dividends}} - \underbrace{K_{r,s}^{\text{pol}}}_{\text{higher expected real rate}} + \underbrace{\Lambda_q K_{y,s}}_{\text{higher required return}} < 0. \quad (74)$$

Lower dividends and the higher expected real rate already reduce equity when  $\Lambda_q = 0$ . The countercyclical premium reinforces this response. Monetary tightening has the same ordering:

$$\underbrace{(1 - \bar{\rho})\rho_m \delta_d K_{y,m}}_{\text{lower dividends}} - \underbrace{K_{r,m}^{\text{pol}}}_{\text{higher expected real rate}} + \underbrace{\Lambda_q K_{y,m}}_{\text{higher required return}} < 0. \quad (75)$$

For demand, the higher expected real rate works against the other two channels. Equity rises when

$$\underbrace{(1 - \bar{\rho})\rho_d \delta_d K_{y,d}}_{\text{higher dividends}} + \underbrace{\Lambda_q K_{y,d}}_{\text{lower required return}} > \underbrace{K_{r,d}^{\text{pol}}}_{\text{higher expected real rate}}. \quad (76)$$

Equivalently,  $\Lambda_q$  must exceed  $[K_{r,d}^{\text{pol}} - (1 - \bar{\rho})\rho_d \delta_d K_{y,d}]/K_{y,d}$ . The calibration below verifies this condition. The equity premium enters after output, inflation and the policy rate have been determined by the three-equation macroeconomic system.

## E.5 Announcement beliefs

This section explains how an announcement changes investors' beliefs and how those revisions affect asset prices. Before the meeting, investors have an assessment of demand and supply conditions. The announcement gives them information about the Federal Reserve's assessment, which can differ from their own. Investors then revise their beliefs about economic conditions and the resulting policy response. In the baseline, investors know the policy rule and hold it fixed. They revise their beliefs about the disturbances and therefore about the interest rates implied by that rule. I then allow investors to also revise their beliefs about the Federal Reserve's response to supply conditions.

Let  $z_t$  collect the monetary-policy, demand, and supply disturbances defined in the main text:

$$z_t = \begin{pmatrix} \varepsilon_t^m & \varepsilon_t^d & u_t^s \end{pmatrix}', \quad z_t \sim \mathcal{N}(0, \Sigma_z). \quad (77)$$

Before the meeting, investors have imperfect information about demand and supply conditions. I represent this information with two noisy signals:

$$g_t^d = \varepsilon_t^d + \xi_t^d, \quad g_t^s = u_t^s + \xi_t^s. \quad (78)$$

Each signal equals the corresponding disturbance plus an error. I assume that the errors are Gaussian and independent of  $z_t$ . These signals, together with public information, form investors' information set before the announcement,  $\mathcal{I}_t^-$ . Their beliefs about the three disturbances are

$$z_t \mid \mathcal{I}_t^- \sim \mathcal{N}(\widehat{z}_t^-, P_t^-), \quad \widehat{z}_t^- = \mathbb{E}[z_t \mid \mathcal{I}_t^-]. \quad (79)$$

Here,  $\widehat{z}_t^-$  contains investors' estimates of the three disturbances before the meeting, while  $P_t^-$  measures their remaining uncertainty and the covariances between the disturbances.

In the baseline, I assume that the Federal Reserve observes the three disturbances and follows the policy rule known to investors. The announcement can therefore reveal information about economic conditions even though investors already know how the Federal Reserve responds to them.

During the announcement, investors observe the policy decision and receive further information about demand and supply conditions. These signals add to the information they had before the meeting. Let  $a_t$  collect their unexpected content:

$$a_t = H_t(z_t - \widehat{z}_t^-) + \nu_t, \quad \nu_t \sim \mathcal{N}(0, R_t). \quad (80)$$

The difference  $z_t - \widehat{z}_t^-$  measures how the disturbances differ from investors' previous estimates. The matrix  $H_t$  describes how these differences enter the policy decision and communication.

Investors know the model and the policy-rule coefficients, so they know how each disturbance affects the policy rate. These responses form the first row of  $H_t$ ,  $b_i = (b_i^m, b_i^d, b_i^s)$ . However, the rate decision alone does not tell them which disturbances led to that decision. They also use the Federal Reserve's communication about demand and supply to revise their estimates. The remaining rows of  $H_t$  describe the information conveyed by this communication.

I assume that investors observe the announced rate without measurement error, so the first element of  $\nu_t$  is zero. The other elements represent noise in the communication signals, with covariance matrix  $R_t$ . Investors update their estimates using these signals. How much they revise depends on their uncertainty before the announcement and the precision of the new information.

Investors use the announcement to revise their estimates of the three disturbances. For example, a higher-than-expected interest rate alone does not tell them whether the Federal Reserve is unexpectedly tightening policy or responding to demand or supply conditions. Its communication

helps them distinguish these possibilities. If the Federal Reserve reports greater supply pressures than investors expected, they can revise their estimate of the supply disturbance upward.

Let  $\Delta_t$  denote the difference between investors' estimates after and before the announcement. Under the Gaussian assumptions,

$$\Delta_t \equiv \mathbb{E}[z_t \mid \mathcal{I}_t^-, a_t] - \widehat{z}_t^- = P_t^- H_t' (H_t P_t^- H_t' + R_t)^{-1} a_t. \quad (81)$$

The equation gives the revision for each disturbance. Investors put more weight on signals that are more precise relative to the information they already have.

The revisions in investors' beliefs change interest rates and other asset prices. Let  $b_i^j$  and  $b_x^j$  denote the responses of the policy rate and an asset price  $x$  to disturbance  $j$ . If investors revise their estimate of that disturbance by  $\Delta_t^j$ , its contribution to the rate surprise is

$$f_t^j = b_i^j \Delta_t^j. \quad (82)$$

For example, the supply contribution depends on how much investors revise their estimate of supply pressures and how the policy rate responds to those pressures in the model. Since investors observe the policy rate without measurement error, the three contributions add up to the observed rate surprise:

$$f_t = b_i \Delta_t = \sum_j f_t^j.$$

This gives equation (11) in the main text.

The same belief revisions change stock prices and the exchange rate:

$$\begin{aligned} \Delta_t^A x &= \sum_j b_x^j \Delta_t^j \\ &= \sum_j K_{x,j} f_t^j, \quad K_{x,j} = \frac{b_x^j}{b_i^j}. \end{aligned} \quad (83)$$

Each asset-price movement therefore combines the effects of the three revisions. Investors use the announcement to update their beliefs, and asset prices respond. In the empirical analysis, I observe these asset-price movements and use the signs implied by the model to distinguish the monetary-policy, demand, and supply components.

In the baseline, investors know how the Federal Reserve responds to economic conditions. The announcement changes their assessment of the disturbances, but not their beliefs about the policy rule. I now relax this assumption, motivated by [Bauer and Swanson \(2023a\)](#) and [Sastry \(2026\)](#), who consider how markets learn about the Federal Reserve's response to economic conditions. I allow investors to revise how much supply-driven inflation they expect the Federal Reserve to tolerate. An announcement can then lead them to perceive greater supply pressures and, at the same time, a stronger policy response. I ask whether interest rates can still rise while the dollar depreciates when both revisions occur.

For a given supply disturbance and policy response, the model gives  $x_t^s = b_x^s(\phi^s)u_t^s$ , where  $x$  is the nominal interest rate or the exchange rate. The size of the response therefore depends on two things: the supply disturbance  $u_t^s$  and the degree of accommodation  $\phi^s$ . In the baseline, investors are uncertain about the first. In this extension, they are uncertain about both. I hold the other parameters fixed. Since the policy rule contains  $-\phi^s u_t^s$ , a lower  $\phi^s$  means less accommodation. The announcement changes their estimate of this response:

$$\Delta_t^A x^s = \mathbb{E}[b_x^s(\phi^s)u_t^s | \mathcal{I}_t^+] - \mathbb{E}[b_x^s(\phi^s)u_t^s | \mathcal{I}_t^-], \quad x \in \{i, e\}. \quad (84)$$

The superscripts  $-$  and  $+$  denote information before and after the announcement. For the exchange rate, I hold foreign interest rates, foreign prices, and currency premia fixed, as in the baseline.

The announcement can change investors' assessment of supply pressures, the accommodation they expect, and how they relate the two. As before,  $\hat{u}_t^{s,-}$  and  $\hat{u}_t^{s,+}$  are their estimates of the supply disturbance before and after the announcement. I use  $\hat{\phi}_t^{s,-}$  and  $\hat{\phi}_t^{s,+}$  in the same way for accommodation. The operator  $\Delta_t$  denotes the change from before to after the announcement. The revision separates into three terms:

$$\begin{aligned} \Delta_t^A x^s = & \underbrace{b_x^s(\hat{\phi}_t^{s,-})\Delta_t \hat{u}_t^s}_{\text{change in perceived supply pressures}} \\ & + \underbrace{\hat{u}_t^{s,+} \frac{\partial b_x^s}{\partial \phi^s} \Delta_t \hat{\phi}_t^s}_{\text{change in perceived accommodation}} \\ & + \underbrace{\frac{\partial b_x^s}{\partial \phi^s} \Delta_t \text{Cov}(\phi^s, u_t^s)}_{\text{change in their perceived relationship}}. \end{aligned} \quad (85)$$

The first term changes supply pressures while keeping accommodation at its earlier estimate. The second changes accommodation, given the updated estimate of supply pressures. The derivative measures how the model's response changes with accommodation. It is constant because  $b_x^s(\phi^s)$  is affine in  $\phi^s$ , so this decomposition is exact rather than a first-order approximation.

The third term allows investors to revise how they associate supply pressures with accommodation. Before the announcement, they may believe that greater supply pressures would be accompanied by more accommodation. The announcement could weaken this association even if their average estimates of supply pressures and accommodation remain unchanged. The term  $\Delta_t \text{Cov}(\phi^s, u_t^s)$  is the difference between the covariances conditional on  $\mathcal{I}_t^+$  and  $\mathcal{I}_t^-$ . It enters because the expected response depends on the product of the two uncertain quantities:

$$\mathbb{E}[\phi^s u_t^s | \mathcal{I}_t^\pm] = \hat{\phi}_t^{s,\pm} \hat{u}_t^{s,\pm} + \text{Cov}(\phi^s, u_t^s | \mathcal{I}_t^\pm).$$

A revision towards less accommodation raises the nominal rate and appreciates the dollar when investors perceive adverse supply conditions. The rate derivative is given in equation (44). For the

exchange rate, I differentiate  $b_e^s = (b_\pi^s - b_i^s)/(1 - \rho_s)$  from equation (66). Together, these give

$$\begin{aligned}\frac{\partial b_i^s}{\partial \phi^s} &= \frac{\rho_s \kappa - (1 - \rho_s)(1 - \beta \rho_s)}{\Delta_N(\rho_s)} < 0, \\ \frac{\partial b_e^s}{\partial \phi^s} &= \frac{\kappa + 1 - \beta \rho_s}{\Delta_N(\rho_s)} > 0.\end{aligned}\tag{86}$$

The first inequality uses the condition  $(1 - \rho_s)(1 - \beta \rho_s) > \rho_s \kappa$  stated above. If  $\hat{u}_t^{s,+} > 0$ , a fall in  $\hat{\phi}_t^s$  therefore raises the rate and lowers  $e_t$ , which is a dollar appreciation. A decline in the covariance has the same signs through the third term. An increase in the covariance instead lowers the rate and depreciates the dollar, holding the two means unchanged.

Greater supply pressures can still raise rates and depreciate the dollar when investors also expect less accommodation. Consider an upward revision in supply pressures,  $\Delta_t \hat{u}^s > 0$ , with  $\hat{u}_t^{s,+} > 0$ . Suppose the pre-announcement estimate of accommodation satisfies the baseline partial-accommodation condition, so  $b_i^s(\hat{\phi}_t^{s,-}) > 0$  and  $b_e^s(\hat{\phi}_t^{s,-}) > 0$ . If perceived accommodation falls and the covariance declines, all three terms raise the nominal rate. Their exchange-rate effects work in opposite directions. The dollar still depreciates if

$$\begin{aligned}& \underbrace{b_e^s(\hat{\phi}_t^{s,-}) \Delta_t \hat{u}^s}_{\text{depreciation from greater supply pressures}} \\ & > \underbrace{\hat{u}_t^{s,+} \frac{\partial b_e^s}{\partial \phi^s} |\Delta_t \hat{\phi}^s|}_{\text{appreciation from less accommodation}} + \underbrace{\frac{\partial b_e^s}{\partial \phi^s} |\Delta_t \text{Cov}(\phi^s, u_t^s)|}_{\text{appreciation from lower covariance}}.\end{aligned}\tag{87}$$

This extension allows the announcement to reveal a stronger policy response, as in the learning mechanism of [Bauer and Swanson \(2023a\)](#). For given adverse supply conditions, a revision towards less accommodation raises interest rates and appreciates the dollar. If markets also revise supply pressures upward, however, the dollar can still depreciate under the condition above. The supply component can therefore reflect both greater perceived supply pressures and a more hawkish response to them. Its interpretation does not require markets to keep their beliefs about the policy rule unchanged.

## E.6 Calibration

The calibration illustrates how higher input prices can raise expected interest rates and depreciate the dollar while reducing output and equity prices. The model period is one quarter. Table 13 reports the parameters used in Figure 1 and the coefficients derived from them.

I set the quarterly discount factor to  $\beta = 0.99$  and the Phillips-curve slope to  $\kappa = 0.024$ , using the estimate of [Rotemberg and Woodford \(1997\)](#). They estimate this coefficient by matching the responses of output, inflation, and interest rates to a monetary-policy shock. The policy rule uses the conventional inflation coefficient  $\phi^\pi = 1.5$  and the quarterly counterpart,  $\phi^y = 0.125$ , of the output coefficient in [Taylor \(1993\)](#). These values satisfy condition (56).

Table 13: Model calibration.

| Parameter                      | Value  | Description                                                                        |
|--------------------------------|--------|------------------------------------------------------------------------------------|
| <i>Households and firms</i>    |        |                                                                                    |
| $\beta$                        | 0.99   | Quarterly discount factor.                                                         |
| $\kappa$                       | 0.024  | Phillips-curve slope, <a href="#">Rotemberg and Woodford (1997)</a> .              |
| $\mathcal{M}^p$                | 1.40   | Price relative to marginal cost.                                                   |
| $\theta$                       | 0.75   | Share of firms that keep prices unchanged each quarter.                            |
| $\gamma$                       | 0.90   | Real-wage rigidity, <a href="#">Blanchard and Galí (2007a)</a> .                   |
| <i>Input prices</i>            |        |                                                                                    |
| $\alpha_m$                     | 0.021  | Oil share in production, 2023 BEA accounts.                                        |
| $\chi$                         | 0.017  | Oil share in final expenditure, 2023 BEA accounts.                                 |
| $\chi_w$                       | 0.076  | Input-price weight in the wage-setting price index.                                |
| $\rho_s$                       | 0.85   | Persistence of the real input price.                                               |
| <i>Policy and asset prices</i> |        |                                                                                    |
| $\phi^\pi$                     | 1.50   | Inflation response in the Taylor rule.                                             |
| $\phi^y$                       | 0.125  | Output response in the Taylor rule, in quarterly units.                            |
| $\phi^s$                       | 3.00   | Supply adjustment in the policy rule.                                              |
| $\rho_d$                       | 0.85   | Persistence of the demand disturbance.                                             |
| $\rho_m$                       | 0.50   | Persistence of the monetary-policy disturbance.                                    |
| $\bar{\rho}$                   | 0.995  | Equity duration, based on a two per cent annual dividend yield.                    |
| $\Lambda_q$                    | 0.25   | Response of the equity premium to activity.                                        |
| <i>Implied coefficients</i>    |        |                                                                                    |
| $d$                            | 0.0032 | Direct input-price term in the IS curve.                                           |
| $\lambda$                      | 0.0079 | Direct input-price term in the Phillips curve.                                     |
| $\delta_s = d/\lambda$         | 0.409  | IS coefficient after normalising the supply disturbance.                           |
| $\delta_d$                     | 0.301  | Dividend elasticity to output, holding the input price fixed.                      |
| $\gamma_s$                     | 29.1   | Coefficient on the inflation-normalised disturbance $u_t^s$ .                      |
| $\gamma_s \lambda$             | 0.229  | Size of the negative dividend elasticity to the input price, holding output fixed. |

The steady-state markup determines the profit margin that firms earn before the shock. I use  $\mathcal{M}^p = 1.4$ , so prices are 40 per cent above marginal cost. This value lies between the typical markup of 1.3 reported by [Hall \(2018\)](#) and the aggregate markup of 1.61 estimated by [De Loecker et al. \(2020\)](#) for 2016.

I use the 2023 BEA input–output accounts to calibrate the importance of oil in production and final expenditure. Following the approach of [Blanchard and Galí \(2007a\)](#), the calculation uses the oil and gas extraction and petroleum and coal products sectors. Oil supplied to the remaining industries gives a production share of approximately 0.021, while domestic final uses give a share of approximately 0.017. These calculations include domestically produced and imported oil. I use them as proxies for  $\alpha_m$  and  $\chi$  in the model, which represents the input as imported.

The persistence of the input price determines how quickly households expect purchasing power to recover. I set  $\rho_s = 0.85$ , close to the estimated persistence of real Brent prices over 1999–2025. An autoregression using the last monthly average in each quarter gives a coefficient of approximately 0.865 when Brent is deflated by the GDP deflator. Using quarterly averages gives approximately 0.889. I use 0.85 as a rounded approximation. With  $\alpha_m = 0.021$  and  $\rho_s = 0.85$ , the coefficient  $d = \alpha_m(1 - \rho_s)/(1 - \alpha_m)$  is approximately 0.0032.

Real-wage rigidity prevents wages from fully absorbing the increase in input costs. I set  $\gamma = 0.9$ ,

one of the values considered by [Blanchard and Galí \(2007a\)](#). I also allow the input price to have a larger weight in wage setting than in consumption, with  $\chi_w = 0.076$  and  $\chi = 0.017$ . This captures the possibility that wage setting responds to other prices that move with the imported input. For given consumption and employment, higher input prices then lead to a larger wage increase and a greater squeeze on firms' margins. The value of  $\chi_w$  is a calibration choice, not an estimated expenditure share. Together with  $\theta = 0.75$ , it gives  $\lambda \approx 0.0079$  and  $\delta_s = d/\lambda \approx 0.409$ .

The model can also produce the supply pattern without this extra weight in wage setting. Setting  $\chi_w = \chi$ , using the quarterly-average persistence estimate  $\rho_s = 0.889$ , and reducing the markup to 1.3 gives higher rates, dollar depreciation and lower output and equity prices for a supply adjustment between approximately 3.99 and 4.28. The monetary-policy and demand components retain their asset-price signs. This alternative requires more accommodation than the baseline value  $\phi^s = 3$  and gives a narrower range of policy responses with the supply pattern.

The dividend coefficients follow from the markup and price-setting parameters. With a steady-state markup of  $\mathcal{M}^p = 1.4$ , equation (29) gives  $\delta_d \approx 0.301$  and  $\gamma_s \approx 29.1$ . The size of  $\gamma_s$  reflects the normalisation of the supply disturbance in units of its direct inflationary effect. In the dividend equation, it multiplies  $\lambda s_t$ , rather than  $s_t$  alone. The coefficient on the input price is therefore  $\gamma_s \lambda \approx 0.23$ : a one per cent increase in the real input price directly reduces dividends by approximately 0.23 per cent, holding output fixed.

The demand disturbance has the same persistence as the supply disturbance,  $\rho_d = 0.85$ , while  $\rho_m = 0.50$  gives the monetary-policy disturbance a one-quarter half-life. The equity calculation uses  $\Lambda_q = 0.25$ . Condition (76) requires  $\Lambda_q > 0.22$  for stronger demand to raise equity prices. I set it to 0.25. At  $\phi^s = 3$ , both the supply disturbance and an unexpected monetary tightening lower equity for every  $\Lambda_q \geq 0$ . Both reduce expected activity and dividends while raising the expected policy real rate.

Figure 1 shows how the response to the same supply shock changes as the central bank tolerates more of the resulting inflation. With  $\phi^s = 0$ , the nominal rate rises more than inflation and the dollar appreciates. The dollar depreciates once  $\phi^s$  exceeds approximately 2.53, while output falls for values below 3.69. I use  $\phi^s = 3$ , which gives both dollar depreciation and a decline in output. At this value, the nominal rate rises by 0.964 percentage point for a one-percentage-point increase in inflation. For comparison, [Hofmann et al. \(2025\)](#) estimate an interest-rate response of 1.02 to supply-driven inflation, with a standard error of 0.40, and 3.75 to demand-driven inflation. In this calibration, interest rates rise almost one-for-one with supply-driven inflation, close to the response estimated by Hofmann et al.

I scale the supply shock to raise the nominal rate by 100 basis points at  $\phi^s = 3$  and keep its size unchanged across the policy responses in the figure. At  $\phi^s = 3$ , inflation rises by 1.04 percentage points, output falls by 0.32 per cent, and the expected real rate rises by 11.8 basis points. The central bank therefore raises both nominal and real rates, but the dollar still depreciates because the nominal-rate increase is smaller than the increase in inflation.