Monetary Policy Transmission through Commodity Prices*

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Abstract

Monetary policy affects inflation not only through domestic demand and exchange rates, but also through its impact on commodity prices. We examine this commodity-price channel using high-frequency and medium-term evidence for oil and base metals. At high frequencies, a 10-basis-point increase in the U.S. policy rate lowers commodity prices by 1 to 6.4 percent within 18–24 business days. Beyond dollar appreciation, these effects are stronger for storable and industrial commodities, consistent with the roles of the cost of carry and expected demand in commodity pricing. Over longer horizons, commodity prices play an important role in the transmission of monetary policy to inflation. Six-month responses of oil and base metal prices account for roughly 40-80 percent of the effect of U.S. monetary policy shocks on headline inflation and about 50-80 percent of the effect on core inflation, depending on the econometric approach. Internationally, oil and base metal prices also constitute an important channel for the transmission of U.S. monetary policy to inflation abroad, with substantial heterogeneity across countries. These findings highlight the central role of commodity markets in shaping the domestic and international transmission of monetary policy.

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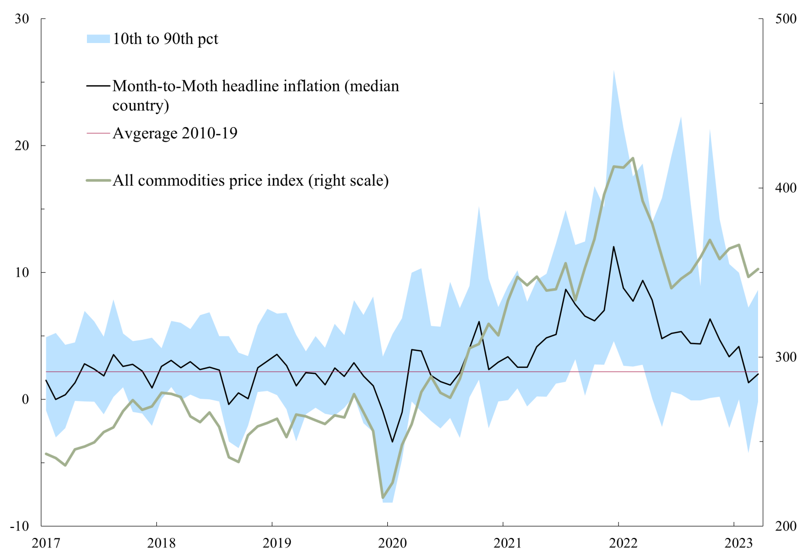
1 Introduction

Sharp fluctuations in commodity prices, in addition to pandemic-related dislocations and policy actions, have been blamed for the recent global surge in inflation (e.g., Gagliardone and Gertler, 2023; Bernanke and Blanchard, 2023; Ball, Leigh, and Mishra, 2022) and for its subsequent fall (Figure 1). Commodity prices, however, are not exogenous with respect to the macroeconomy (e.g., Barsky and Kilian, 2004; Jacks and Stuermer, 2020). Indeed, part of the recent monetary policy reaction may have worked through a commodity-price channel as policy actions from major central banks affect global activity and financial conditions, which are typically major drivers of fluctuations in commodity prices. But, how quantitatively important is the commodity price channel of monetary policy—especially US monetary policy—in driving inflation in the US and worldwide?

Figure 1. Headline inflation and commodity prices 2017-2023



Note: Year to year headline inflation distribution (shaded area) covers countries accounting for around 83.9% of WEO World GDP (in weighted purchasing power parity terms). Sources: Haver Analytics; IMF, Primary Commodity Price System; IMF staff calculations.

Empirical analysis of this question has been limited (Degasperi, Hong, and Ricco, 2026; Breitenlechner, Georgiadis, and Schumann, 2022; Ider, Kriwoluzky, Kurcz, and Schumann, 2023). This paper contributes to filling this gap by estimating the effects of monetary policy shocks on a variety of commodity prices and, through this channel, their feedback effects to the domestic economy and spillovers to consumer prices in other countries. In addition to focusing on headline inflation, we emphasize the role of metals prices in affecting core inflation.

The analysis focuses on the Federal Reserve and, to a lesser extent, the ECB—given the special role of the US dollar as a reserve currency and in the international payment system. Conceptually, US monetary policy can affect commodity prices through i) a cost of carry channel (by affecting the opportunity cost of commodity storage) ii) a real economy channel (by affecting current and future commodity consumption and uses) iii) a liquidity and portfolio channel (by affecting financial conditions and, thus, trading liquidity in physical and derivative markets), and iv) an exchange rate channel (as most commodities are traded in USD). Since monetary policy has typically long lags before affecting the real economy—something that we confirm in our results—an immediate effect of a monetary policy shock through the real-economy channel could only work through expectations and, thus, only for easy-to-store commodities. Realized demand can subsequently reinforce this response: in our monthly estimates, world industrial production begins to decline after approximately two months, while U.S. industrial production responds after five to six months.[1]

We start by investigating the high-frequency, daily, response of 39 USD-denominated commodity prices to monetary policy shocks. Using local projection methods for the period 1990-2019, we find large and heterogeneous responses of commodity prices to US monetary policy shocks: base metals, crude oil, cotton and rubber, precious metals, beverages, and cereals decline by 6.4%, 4.6%, 3.6%, 3.3%, 2.7%, and 1.7%, respectively, to a positive 10 basis points shock to the US monetary policy rate.[2] These responses are larger and more persistent than the ones implied by the 0.9% US dollar appreciation followed by the monetary policy tightening. Furthermore, for most metals and oil, inventories typically decline after a monetary policy tightening shock. Taken together, these results highlight the importance of the expected demand and the cost of carry channel. We repeat the previous analysis to study

[1] Recent evidence in Jacobson, Matthes, and Walker (2023) and Buda, Carvalho, Corsetti, Duarte, Hansen, Ortiz, Rodrigo, and Rodríguez Mora (2023) show that monetary policy can have high-frequency effects—days or weeks—on the economy. Our monthly results do not show strong evidence of impact effects. However, we do not need to take a stand on whether current or future demand affect commodity prices.

[2] Our baseline results use the monetary policy surprises in Bauer and Swanson (2023). The authors extend the surprises in Gertler and Karadi (2015) by including more FED announcement dates. In addition, the authors clean the surprises from any predictable information from previous macroeconomic variables. Our results are robust to using the shocks in Jarociński and Karadi (2020). In particular, we make use of the surprises that are cleaned from the informational effect of monetary policy

the effects of ECB monetary policy shocks on commodity prices. Our results suggest that, unlike the case of US monetary policy, ECB monetary policy shocks affect oil prices only.

To investigate the importance of the commodity-price channel in the transmission of monetary policy to consumer prices, we extend our analysis to a monthly frequency proxy-SVAR which jointly considers the different transmission mechanisms of monetary policy, including the real demand effects, the financial channel, and the commodity-price channel. We study the domestic and international effects of the commodity-price channel of US and ECB monetary policy.

To isolate the commodity-price channel of monetary policy, we perform two decompositions. First, following Cesa-Bianchi, Thwaites, and Vicondoa (2020), we re-estimate the impulse response functions imposing that U.S. monetary policy has no effect on commodity prices (oil and base metals). Second, we follow the approach of Sims and Zha (2006) and construct counterfactual shocks to oil and base metals that offset the initial response of commodity prices to the monetary policy shock. Unlike Sims and Zha (2006), who invert the system to recover a sequence of shocks, we use externally identified instruments for oil and base metals to construct counterfactual impulse response functions (IRFs). For oil prices, we use the supply-side shock of Kilian (2024). For base metals, we construct an instrument in the spirit of Romer and Romer (2004), Auerbach and Gorodnichenko (2013), and Bauer and Swanson (2023). Specifically, we utilize the residuals from the regression between the spread against financial-side and demand-side factors that capture the information set available to market participants at the time of the innovation.

Our results for the U.S. show that the commodity-price channel—mainly through oil and base metals—accounts for about 39%-78% of the first 6-months effect of U.S. monetary policy on U.S. headline CPI, depending on the econometric approach we employ. For core CPI, the contribution of the commodity-price channel reaches 53%-83% in the first 6-months. The main commodity affecting headline inflation is oil, while core inflation is mostly affected by base metals prices (e.g., copper and aluminum).

In our final section, we use a sample of 26 countries to examine the role of commodity prices in the international transmission of U.S. monetary policy to headline inflation. We find that commodity prices constitute an important channel through which U.S. monetary policy affects inflation abroad, although the magnitude of the channel varies substantially across countries. The commodity-price channel is particularly pronounced in advanced economies, where the greater pass-through of commodity price movements to consumer prices may contribute to stronger inflationary effects. We further examine the transmission to core inflation for a subsample of 20 countries, and find that both oil and base metal prices play an important role in shaping the response of foreign core inflation to U.S. monetary policy. Overall, our results highlight the importance of commodity markets in transmitting U.S. monetary policy across countries and in shaping both headline and underlying inflation dynamics.

Our paper contributes to three strands of literature. First, we contribute to the literature studying the drivers of commodity-price fluctuations (e.g., Kilian, 2009; Hamilton, 2009; Alessio Anzuini and Pagano, 2013; Frankel, 2014; Kilian and Murphy, 2014; Hammoudeh, Nguyen, and Sousa, 2015; Rosa, 2014; Baumeister and Kilian, 2016; Alam and Gilbert, 2017; Jacks and Stuermer, 2020). We provide new high-frequency evidence on the responses of a broad and disaggregated set of commodity prices to monetary policy shocks, using the externally identified monetary policy surprises of Bauer and Swanson (2023) and Jarociński and Karadi (2020). This granular analysis uncovers substantial heterogeneity across commodities: the responses are particularly strong and persistent for storable and industrial commodities, including oil and base metals. We then exploit this heterogeneity to investigate the mechanisms through which monetary policy affects commodity prices. The stronger responses of storable commodities, together with the responses of gold prices and commodity inventories, point to the importance of the cost-of-carry and expected-demand channels. We corroborate the high-frequency evidence using monthly data and a proxy-SVAR approach. Moreover, we provide evidence for monetary policy shocks from the ECB and the Bank of England.

Second, we contribute to the literature studying the international spillovers of monetary policy decisions by major central banks (e.g., Dedola, Rivolta, and Stracca, 2017; Camara, 2021; Degasperi, Hong, and Ricco, 2026). Our closest reference is Degasperi et al. (2026), who show that movements in global commodity prices account for an important share of the international transmission of U.S. monetary policy. Like their study, we use externally identified monetary policy shocks and a proxy-SVAR framework to quantify the commodity-price channel. We complement their analysis by uncovering the composition of this channel. In particular, we distinguish between oil and base metals and show that their importance differs across inflation measures: oil plays a relatively larger role in the transmission to headline inflation, whereas base metals account for a substantial share of the response of core inflation, both in the United States and abroad. More broadly, our evidence across major central banks indicates that the ability to influence global commodity prices is not exclusive to the Federal Reserve, although the strength and composition of the responses differ across central banks. Thus, our contribution is not to establish that commodity prices matter for international monetary-policy transmission, but to identify which commodities drive this channel, why their responses differ, and which domestic and international inflation measures they affect.

Finally, our results speak to the broader literature on the transmission of monetary policy and the role of commodity prices in inflation dynamics (e.g., Blanchard and Galı, 2007; Gertler and Karadi, 2015; Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020; Gagliardone and Gertler, 2023; Bernanke and Blanchard, 2023). Whereas an important part of this literature studies how commodity-price shocks affect inflation, economic activity, and monetary-policy decisions, we examine the reverse and complementary direction of causality: how monetary policy moves commodity prices and how these endogenous price movements subsequently feed back into domestic and foreign inflation. In this respect, we complement Degasperi, Hong, and Ricco (2026), Miranda-Agrippino and Rey (2022), Breitenlechner, Georgiadis, and Schumann (2022), and Ider, Kriwoluzky, Kurcz, and Schumann (2023) by documenting how the heterogeneous responses of different commodities shape the transmission of monetary policy to headline and core inflation.[3]

2 Conceptual Framework

Among central banks, the U.S. Federal Reserve plays a special role. This is because the bulk of cross-border capital flows are denominated in U.S. dollar and U.S. monetary policy is a key driver of the global financial cycle (Miranda-Agrippino and Rey, 2020; Dées and Galesi, 2021); changes in U.S. interest rates have, thus, pronounced repercussions for the rest of the world (e.g., Rey, 2016). Kearns, Schrimpf, and Xia (2018) document that the importance of the ECB's spillovers has increased over time, especially after the European debt crises. The authors also show that spillovers from other major central banks, such as the Bank of Japan of the Bank of England, are only mild. Therefore, this analysis will focus on the effects of

[3]In a related but distinct exercise, Castelnuovo et al. (2024) study how systematic monetary policy responds to commodity-price shocks.

U.S. and ECB monetary policy shocks.[4]

2.1 Transmission mechanisms

Conceptually, monetary policy can affect commodity prices through, at least, four channels. The first channel is the so-called cost of carry channel. Changes in interest rates affect the opportunity cost of commodity storage. Hence, a substantial increase in the Fed funds rate provides investors an incentive to reduce commodity storage and search for higher yields in the bond markets. Frankel (2014) also highlights another consequence of higher interest rates: they undermine the incentive for oil-producing countries to keep crude oil under the ground. By extracting oil instead of preserving it, OPEC countries could invest the proceeds at interest rates that were higher than the return to leaving it in the ground. Higher extraction rates increase supply; both lower demand and higher supply contribute to a fall in oil prices.[5] The same mechanisms apply to decisions about extracting minerals, logging forests, harvesting crops, etc.

A second channel is the real economy. Changes in interest rates affect investment and consumption, which then drives current and future commodity consumption. While the real effects of monetary policy take time to materialize, forward-looking agents in commodity markets adjust their portfolios today in expectation of future changes. Moreover, as documented by Ottonello and Winberry (2020), monetary policy has important effects on investment, especially for financially healthy firms. Hence, as several commodities, for example, base metals, have a large exposure to investment demand, commodity prices of more industrial commodities are also expected to react to monetary policy shocks.

A third channel is liquidity. Monetary policy of major central banks affects global financial conditions and, thus, it drives liquidity trading in physical and derivative markets (e.g., Miranda-Agrippino and Rey, 2022). Finally, as we consider commodities that are internationally traded in USD, there is the exchange rate channel. An appreciation of the USD dollar, all else equal, increases the price of commodities in foreign local currency, which

[4]In our Appendix, Table A4, we use Granger causality tests to show that U.S. and ECB monetary policy shocks tend to drive other major central banks monetary policy shocks. Hence, our results for the U.S. and ECB could represent a lower bound to total commodity-price channel of *global* monetary policy.

[5]In the Hotelling's resource model, higher interest rates raise the opportunity cost of holding the resource (above or underground); the resource owner is, thus, incentives to accelerate the extraction rate to capitalize on the higher present value of the resource's revenue reducing today's price of the exhaustible resource.

then decreases demand and stimulates supply, thus, putting downward pressure on prices.

In our first analysis of the effects of monetary policy on commodity prices, we consider daily high-frequency data. Since monetary policy has typically long lags affecting the real economy, an immediate effect of a monetary policy shock through the real-economy channel can only work through expectations and, thus, for easy-to-store commodities. In our next sections we study the longer-term effects of monetary policy for which we explicitly consider the current real demand channel.

3 High-frequency responses of commodity prices to monetary policy shocks

3.1 Data

We use disaggregated daily data on nominal commodity price futures (rolling front month contracts) from Bloomberg L.P., denominated in USD, for 39 different commodities (see Table 1 in our Appendix). We also aggregate these commodities prices, only those with data for the whole sample period 1990-2019, using trade weights from the IMF Primary Commodity Price System (PCPS) database into 11 sub-indexes (e.g., agriculture, energy, metals, food). Table A2 in our Appendix shows the commodities we use along with their weights.

Our measure of monetary policy shocks for the U.S. is from Bauer and Swanson (2023). The authors use the data from Swanson and Jayawickrema (2023) who not only consider FOMC announcements but also includes post-FOMC-meeting press conferences, speeches and Congressional testimony by the Fed Chair and Vice Chair, and FOMC meeting minutes releases. For instance, the authors consider 927 speeches and Congressional testimony by the Fed Chair for the period 1988 to 2023, which compares to 288 scheduled FOMC announcements for the same period.[6] Naturally, as noted by Swanson and Jayawickrema (2023) the inclusion of more events greatly increases the F-stat of the first stage. To filter these surprises from their predicable component, Bauer and Swanson (2023) regress them against macroeconomic and financial variables available to financial markets before the monetary

[6]The authors measure intradaily interest rate changes over a 30-minute window starting 10 minutes before each FOMC announcement and ending 20 minutes after de meeting. The measure of interest rates used by the author is the first principal component of the changes in Eurodollar futures contracts (ED1–ED4) around FOMC announcements.

policy surprises. In particular, the authors use Nonfarm payrolls surprise, employment growth, 3-months growth of S&P 500 index, the 3-months change in the slope of the yield curve, 3-months percent change in commodity prices, and skewness of the 10-year Treasury yield. We also consider an alternative measure of U.S. monetary policy surprises. In particular, we use the *pure* monetary policy shock identified within their proxy-SVAR. These results will be reported in the Appendix.

Our monetary shocks for Europe follow Jarociński and Karadi (2020). In particular, we use the *pure* monetary policy shock identified within their proxy-SVAR. This is the exogenous interest rate shocks that correlate negatively with the stock market on the day of the announcement.[7]

3.2 Empirical strategy

Following Jordà (2005) we run the following Local Projection (LP) regression

$$\ln y_{i,t+h} - \ln y_{i,t-1} = \alpha_{i,t} + \beta_{i,h} MPS_t + \sum_{l=1}^{L} \phi_{x,l} \mathbf{x}_{t-l} + \mu_{i,t} \tag{1}$$

in which $y_{i,t+h}$ is the price of commodity i at time $t+h$, for $h = 0, 1, \ldots, 24$. The variable MPS_t is the monetary policy shock, measured in basis points of futures' rates, around a 30-min window of the monetary policy announcement. The vector x_{t-l} includes the l^{th} lag of $\ln y_{i,t} - \ln y_{i,t-1}$ and the shock, MPS_t, with $L = 12$. Our sample for the U.S. covers the business days for the period 1990M1-2019M12, while the ECB data cover the business days in the period 1999M1-2019M12.[8]

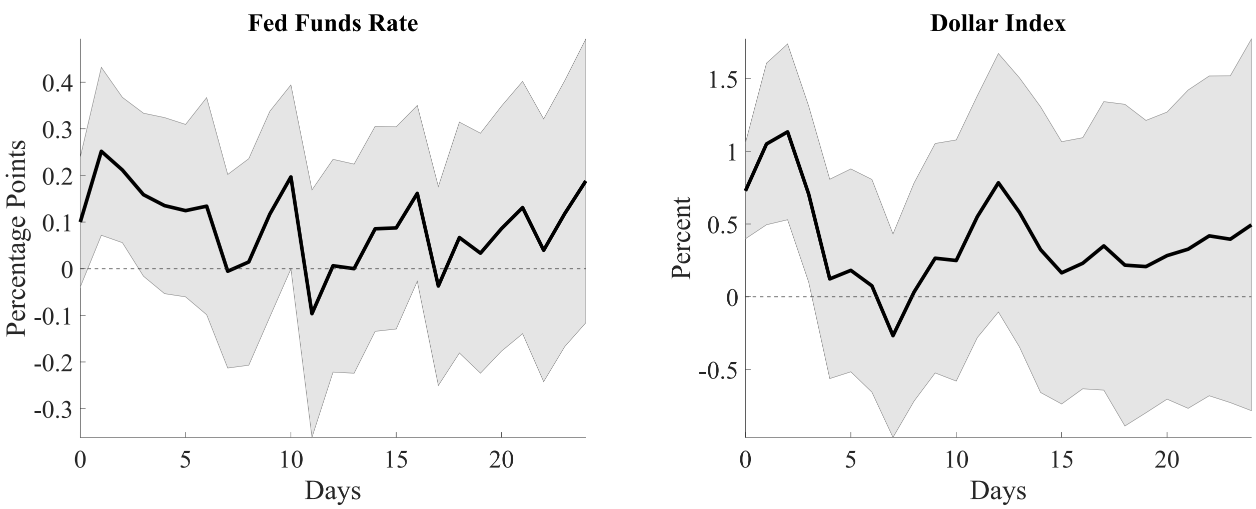
[7]For the U.S., Jarociński and Karadi (2020) obtain the 1st principal component of the surprises in interest rate derivatives with maturities from 1 month to 1 year (MP1, FF4, ED2, ED3, ED4, in their paper). The S&P500 is used to construct the shocks. For the ECB shocks, the authors obtain the 1st principal component of the Monetary Event-window changes in overnight index swaps (OIS) with maturities 1-, 3-, 6-months and 1-year (Identifiers: OIS1M, OIS3M, OIS6M, OIS1Y). The Euro Stoxx 50 is used to construct the shocks.

[8]We exclude the COVID-19 period because its exceptionally large macroeconomic fluctuations pose challenges for the estimation of conventional time-series models. Schorfheide and Song (2021) exclude crisis observations from model estimation, while Lenza and Primiceri (2022) show that estimates obtained after adjusting for the extreme volatility associated with the pandemic are similar to those obtained by dropping the pandemic observations. Ending the sample before the pandemic also facilitates comparison with Dées and Galesi (2021), the study most closely related to ours, which also uses pre-COVID-19 data.

3.3 United States: US monetary policy shocks

Before looking at commodity prices, we present the responses of the fed funds and the US dollar to a typical US monetary policy shock. Figure 2 depicts the impulse response function of a US monetary policy shock on the Fed Fund Rate (FFR) and the dollar exchange rate index (DXY). We can see that the shock has the expected effect on the Feds Fund Rate (left panel). We normalize the impact effect of the shock to a 10 basis points increase in the Fed Fund Rate. The effect peaks at 25 basis points after 1 day and while it persists it does with uncertainty. The dollar index also appreciates as expected with a peak response of 1.1% after 2 business days, however, the effect vanishes after a week (Figure 2, right panel).

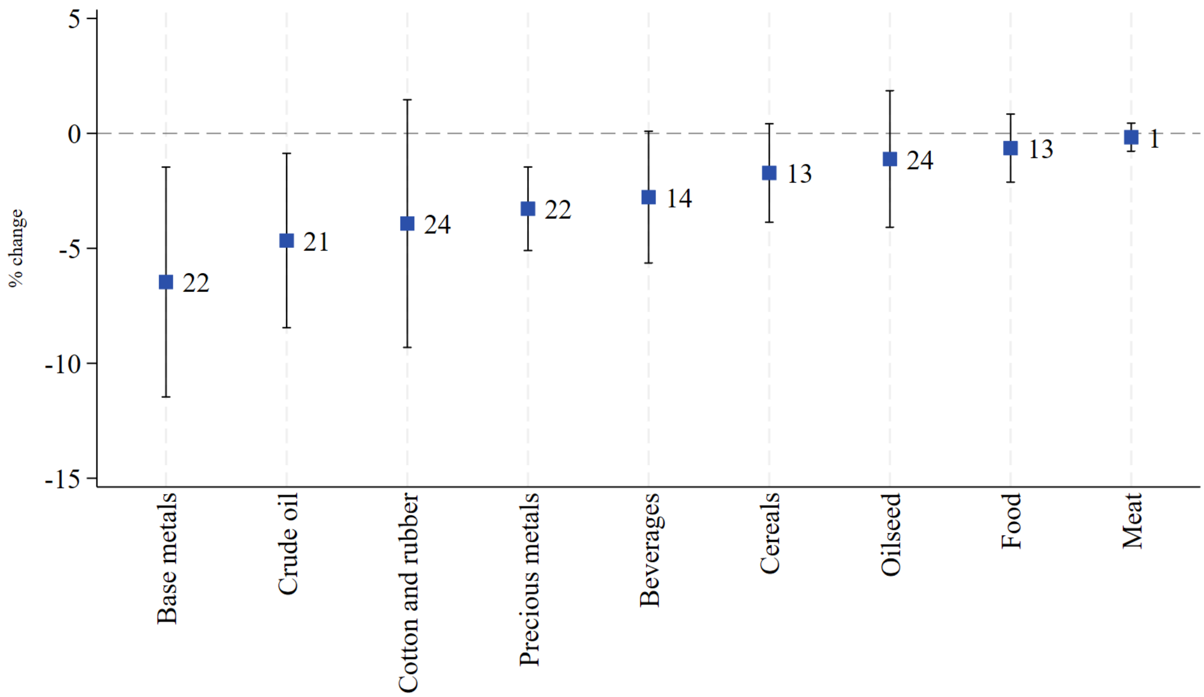
Figure 2. Impulse response of Fed Funds Rate and Dollar Index to a U.S. monetary policy shock (Bauer and Swanson, 2023)



Note: This figure reports the 24-day (x-axis) response of the Fed Funds rate (left panel), normalized to be 10 basis points on impact, and dollar index (right) to a contractionary U.S. monetary policy shock. The blue area represents 90% confidence bands, calculated using robust standard errors at each horizon.

We now report the peak response of commodity prices sub-indexes to a 10 basis points increase in U.S. monetary policy. Figure 3 shows that base metals and energy commodities are the most responsive commodity prices. After a 10 basis points increase in the Fed Funds Rate, base metal prices decline 6.4% (after 22 business days), and energy commodities (WTI and Brent oil prices) decline by 4.6% (after 21 business days). Other commodities such as cotton and rubber, beverages, precious metals, and cereals also show important declines.[9] The correlation between the U.S. dollar and commodity prices conditional to a monetary policy shock is, thus, in general, negative.[10]

Figure 3. Peak response of commodity price sub-indexes to a 10bp increase in Fed funds rate.



Note: This Figure shows the peak response of commodity prices, to a 10-basis points increase in the Fed funds rate, from estimating Equation (1) using Bauer and Swanson (2023) monetary policy surprises. The data are daily for the period 1990-2019. 90% confidence bands reported. The numbers by the box indicate the day (h) of the peak response.

In Figure A2 of the Appendix we show the commodity-specific response to a broader set of commodity prices. We observe that a large fraction of commodity prices decline after a

[9]Similar results hold when we use Jarociński and Karadi (2020) U.S. monetary policy surprises (see Figures A1 and A4).

[10]Some observers have documented a weakening or change in the unconditional correlation between commodity prices and the U.S. dollar in recent years. Such changes may reflect variation in the relative importance of the shocks jointly driving the two variables. Our results instead characterize their conditional comovement following an identified U.S. monetary policy shock: a monetary tightening appreciates the U.S. dollar while lowering commodity prices. This negative conditional relationship is robust to estimating the model over more recent subsamples.

U.S. monetary tightening. For example, the prices of coffee, sugar, wheat, and milk display a peak decline of 5.3%, 4.6%, 3.2%, 2.7%, respectively. All these responses are larger than the exchange rate responses, which implies that commodity prices overshoot, due to the channels emphasized above. In particular, as expected, more storable and industrial commodities are the most responsive. The response of gold prices sets a floor for storable metals, regarding the cost of carry channel. Therefore, the differential between base metals or oil and gold indicates the strength of the expected demand and investment channel.

Figure 4 provides further evidence of the channel. We plot the peak response of daily commodity inventories for a sub sample of energy and metal commodities for which we have daily information since 2017. We observe that, consistent with the price responses, base metals display a larger decline inventories after the monetary policy tightening. While real economic conditions do not respond immediately, the rise in the opportunity cost of storing commodities appears to operate in the direction and in the magnitude we expect. Indeed, storable and industrial commodities such as copper, cobalt, and aluminum display stronger inventory responses than storable but less industrial commodities such as silver and gold.

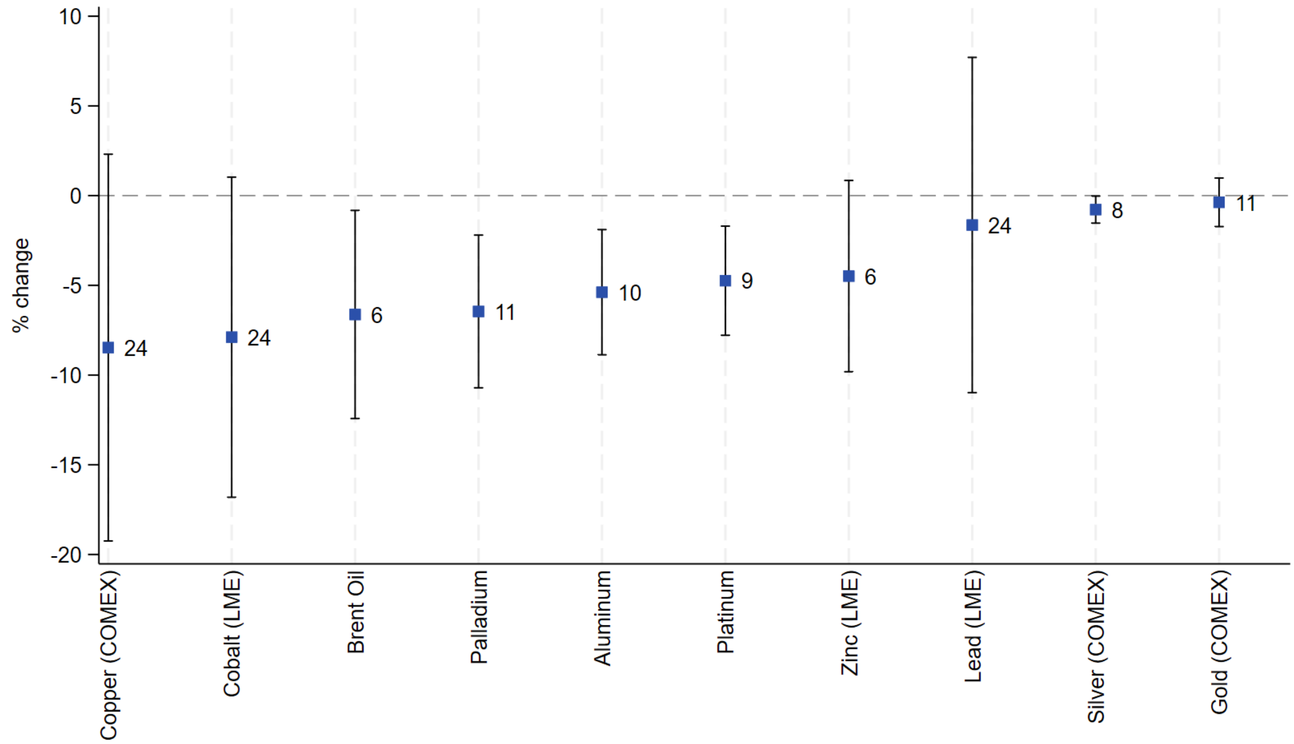
3.3.1 The case of Natural Gas

The response of natural gas prices deserves special attention. The Henry Hub price in Figure A1 of our Appendix shows no response to U.S. monetary policy shocks.[11] However, the natural gas market in the U.S. went through important structural changes in the last decade as shale gas production increased dramatically and found its export markets as liquefied natural gas (LNG). This has increased its storability and integration in the global LNG market increasing its co-movement with other gas prices.[12] Contrary to the whole sample, over the sample period 2016-2019 Henry Hub prices respond significantly to U.S. monetary policy shocks. Indeed, Figure A3 in our Appendix shows that for the sample 2016-2019 Henry Hub prices are the most responsive commodity price to U.S. monetary policy shocks.

[11]Henry Hub is a crucial benchmark and distribution point for natural gas in the United States. It is physically located in Erath, Louisiana, where several interstate and intrastate natural gas pipelines converge. The Henry Hub serves as a pricing reference point for natural gas futures and spot contracts traded on the New York Mercantile Exchange (NYMEX) and for LNG contracts.

[12]During the energy crisis in Europe in 2021-22, U.S. LNG exports hit their capacity limit temporarily isolating U.S. natural gas prices from international gas prices.

Figure 4. Peak response of commodity inventories to a 10bp increase in Fed funds rate



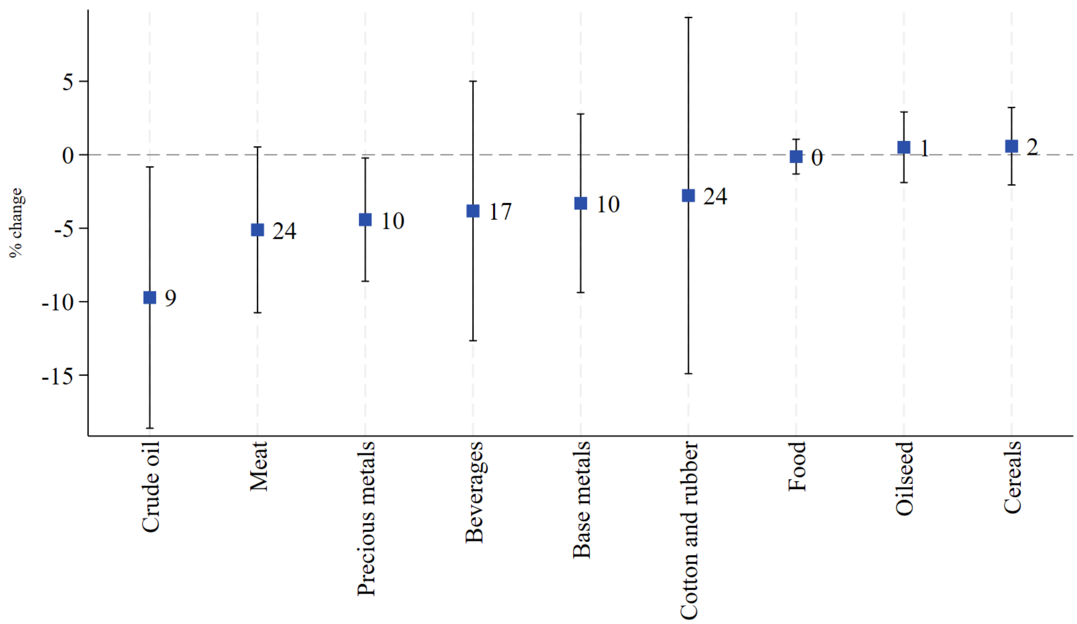
Note: This figures shows the peak response of commodity inventories, to a 10-basis points increase in the Fed funds rate, from estimating Equation (1) using Bauer and Swanson (2023) monetary policy surprises. The data are daily for the period 2017-2019. 90% confidence bands reported. The numbers by the box indicate the day (h) of the peak response.

3.4 Europe: ECB and UK monetary policy shocks

Here we estimate the impact of ECB monetary policy shocks, estimated by Jarociński and Karadi (2020), on commodity prices. As additional control in the specification (1), and to control for spillover from U.S. monetary policy, we add 24 business days lags of the one-year U.S. bond yield to control for U.S. monetary policy stance. For the other controls we maintain the same 12 business days lags we use in the U.S. specification. Figure 5 presents the results for the 9 subindexes. The effects on oil prices are like those documented for the U.S. but less precisely estimated. However, we find no effect on base metals, raw materials, and cereals. The results for disaggregated commodity prices. In general, ECB shocks have negative effects on commodity prices, but the responses are not precisely estimated.[13]

In our Appendix, Figure A6 we show the effects of UK monetary policy shocks, estimated by Cesa-Bianchi et al. (2020), on commodity prices. Responses are small and not statistically significant.[14]

Figure 5. Peak response of commodity price sub-indexes to a 10bp increase in ECB policy rate.



Note: This Figure shows the peak response of commodity prices, to a 10-basis points increase in the ECB policy rate, from estimating Equation (1) using Jarociński and Karadi (2020) monetary policy surprises. The data are daily for the period 1999-2019. 90% confidence bands reported. The numbers by the box indicate the day (h) of the peak response

4 The Commodity-Price Channel of U.S. Monetary Policy

Having established the importance of major central banks' monetary policies in driving commodity prices, we now examine the spillovers and spillbacks of US monetary policy to

[13] In Figure A5 we show the responses of commodity prices to U.S. monetary policy for a comparable sample, 1999-2019. There is a slight change in the ranking but the results stay the same. U.S. monetary policy has larger and more precise effects on a wide range of commodity prices.

[14] Similar, non-reported results, hold for We do not report the results from the Central Banks of Japan and Canada.

headline and core inflation. To this end, we first identify the effects of US monetary policy shocks on a broad set of macroeconomic and financial variables using a Proxy SVAR model. We then quantify the contribution of commodity price responses to the transmission of monetary policy shocks to inflation by decomposing the pass-through of monetary policy to headline and core inflation through selected commodity prices. Specifically, we implement the decomposition approaches proposed by Cesa-Bianchi and Sokol (2022) and Sims and Zha (2006).

4.1 Proxy-SVAR model

We start by identifying the effects of monetary policy shocks to a set of macroeconomic variables at the monthly frequency. In particular, we consider the following SVAR model:

$$A_0 Y_t = \sum_{j=1}^{p} A_j Y_{t-j} + B_0 \varepsilon_t$$

Where Y_t is a vector containing n variables of interest, ε_t is a vector of unobservable zero mean white noise processes or structural shocks (with a diagonal variance and covariance matrix), A_j is the dynamic matrix, and B_0 contains the coefficients with the impact effects of the structural shocks to the variables of interest. The structural SVAR above admits the following reduced form representation:

$$Y_t = \sum_{j=1}^{p} D_j Y_{t-j} + B \varepsilon_t \tag{2}$$

Where $B\varepsilon_t$ is a vector with the reduced-form residuals or innovations of the system $\mu_t = B\varepsilon_t = A_0^{-1} B_0 \varepsilon_t =$ and $D_j = A_0^{-1} A_j$. We focus on the identification of a monetary policy shock and, following a vast part of the literature, we use an instrument (a variable that is external to the VAR) to identify a particular structural shock. A key element for this strategy is that the instrument has to be correlated with the shock of interest and uncorrelated with other structural shocks, i.e.,

$$E[\epsilon_t^{MP}, z_t'] \neq 0$$
$$E[\epsilon_t^{others}, z_t'] = 0$$

We use the monthly monetary policy surprises identified by Bauer and Swanson (2023) as the external instrument in our Proxy SVAR model. Our baseline specification includes nine macroeconomic and financial variables: the one-year Treasury bill yield; end-of-month commodity prices, measured by the WTI crude oil price and a base metals price index;[15] the U.S. headline Consumer Price Index (CPI); U.S. core CPI; U.S. industrial production (IP); the global economic activity index of Kilian (2019); the excess bond premium (EBP); and the end-of-month U.S. dollar index (DXY). The sample spans January 1990 through December 2019. The VAR includes a constant and twelve lags of all endogenous variables.

The monetary policy surprises in Bauer and Swanson (2023), which we use as an external instrument, is constructed to isolate exogenous monetary policy surprises and is orthogonal to other structural shocks. We then implement the standard two-stage Proxy SVAR procedure to identify the effects of monetary policy shocks on the full set of macroeconomic variables. In the first stage, we regress the the reduced-form innovation of the one-year Treasury bill yield on the external instrument, thereby identifying the impact effect of the structural monetary policy shock on the policy rate. This estimate is then used to recover the impact responses of the remaining variables in the system, including commodity prices and inflation.

In the second stage, we regress the remaining reduced-form VAR innovations on the fitted values from the first stage. The resulting coefficients identify, up to a normalization, the relevant column of the structural impact matrix B_0, which characterizes the contemporaneous effects of the monetary policy shock on all variables in the system.

Once we have identified the impact effects of the monetary policy shock, we compute the impulse response functions in a traditional way for the monetary policy shock (e.g., in position i), where:

$$IR_t = B_i \quad \text{for} \quad t = 0$$

$$IR_t = \boldsymbol{D} \cdot \boldsymbol{IR}_{t-1} \quad \text{for} \quad t = 1, 2, \ldots, H$$

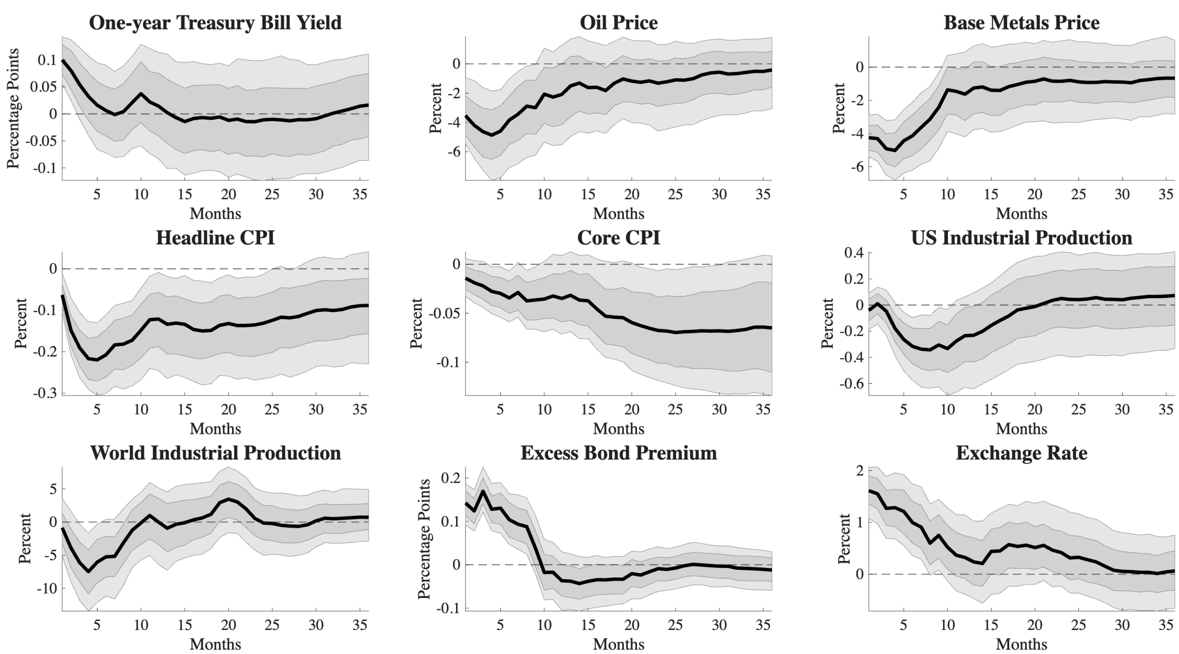
where $B_i = A_0^{-1} B_{0,i}$ is the i-th column of the impact matrix B. We estimate impulse

[15]To avoid timing issues when estimating the effects of high-frequency shocks, as emphasized by Kilian (2024), we measure commodity prices using end-of-month futures prices. Our base metals price index is constructed using aluminum (32%) and copper (68%), with weights matching their relative importance in the IMF base metals price index. Because the IMF index begins only in 1992, we construct this series to extend the sample back to 1990.

response functions over a 36-month horizon and report 68 and 90 percent confidence intervals obtained from 500 bootstrap replications.

Figure 6 presents the estimated impulse response functions, normalized to a 10-basis-point increase in the one-year Treasury bill yield on impact.[16] A monetary policy tightening of this magnitude leads to an immediate decline in oil prices of approximately 4 percent, with the effect persisting for about eight months. Consistent with the high-frequency evidence, base metal prices exhibit the largest response among the commodities considered. Following a 10-basis-point monetary policy tightening, base metal prices fall by around 4 percent after two months, with the effect dissipating after approximately ten months.[17]

Figure 6. Impulse response to US monetary policy using proxy-SVAR.



Note: The x-axis denotes months after the shock. The dark grey area denotes 68 percent confidence bands and the light grey area denotes 90 percent confidence bands, constructed via wild bootstrap with 500 replications. The number of lags p is 12.

[16]The first-stage F-statistic associated with the external instrument is 5.9. This value is comparable to those reported for monetary policy instruments based on high-frequency surprises in Bauer and Swanson (2023).

[17]Appendix Figure A7 shows that food prices decline by about 1 percent following a monetary policy tightening, although the response is considerably less persistent.

The responses of inflation, economic activity, and financial conditions are broadly consistent with the conventional effects of a monetary-policy tightening. On impact, the one-year Treasury bill yield increases, while headline CPI declines immediately. Core CPI, in contrast, responds more gradually and exhibits a more pronounced decline after approximately two years. The response of economic activity is also delayed. World Industrial Production and U.S. Industrial Production do not decline on impact; their responses become negative and statistically significant after approximately two and six months, respectively. We also observe significant impact increases in both the excess bond premium and the U.S. dollar index, consistent with previous findings in the literature (e.g., Miranda-Agrippino and Rey, 2020; Jarociński and Karadi, 2020; Cesa-Bianchi and Sokol, 2022; Degasperi et al., 2026).

The timing of these responses is consistent with the mechanisms discussed in Section 2.1. Because commodity prices respond within days, whereas measured economic activity does not decline on impact, revisions in expected future demand are likely to contribute to the immediate commodity-price response. The subsequent decline in realized global and U.S. economic activity may then reinforce and propagate this initial response.

In the Appendix, we also estimate the responses using the *pure* monetary policy identified by Jarociński and Karadi (2020). Figure A8 presents the corresponding results. On the one hand, the impulse responses obtained using the *pure* monetary policy shocks from Jarociński and Karadi (2020) closely resemble those from our benchmark specification, with the only notable difference being a slightly smaller decline in oil prices.[18]

4.2 The commodity-price channel of U.S. monetary policy

We quantify the contribution of oil and base metal prices to the transmission of U.S. monetary policy shocks to inflation using two complementary counterfactual approaches. The first provides a simple benchmark following Cesa-Bianchi and Sokol (2022). We modify the VAR so that commodity prices neither respond contemporaneously to U.S. monetary policy shocks nor react endogenously to innovations in the other variables in the system. Our second

[18]We contrast our results with those from using the central bank information shock from Jarociński and Karadi (2020). The information shock, see Figure A9, leads to an increase in inflation and output and a decline in the excess bond premium. However, the estimated responses are surrounded by substantial uncertainty. Regarding commodity prices, oil prices increase following a central bank information shock, while base metal prices show no statistically significant response. Overall, relative to *pure* monetary policy shocks, central bank information shocks appear to have weaker and less precisely estimated effects on commodity prices and inflation.

approach follows Sims and Zha (2006) and uses separately identified commodity-price shocks to construct the counterfactual.

4.2.1 Imposing Zero Response of Commodity Prices

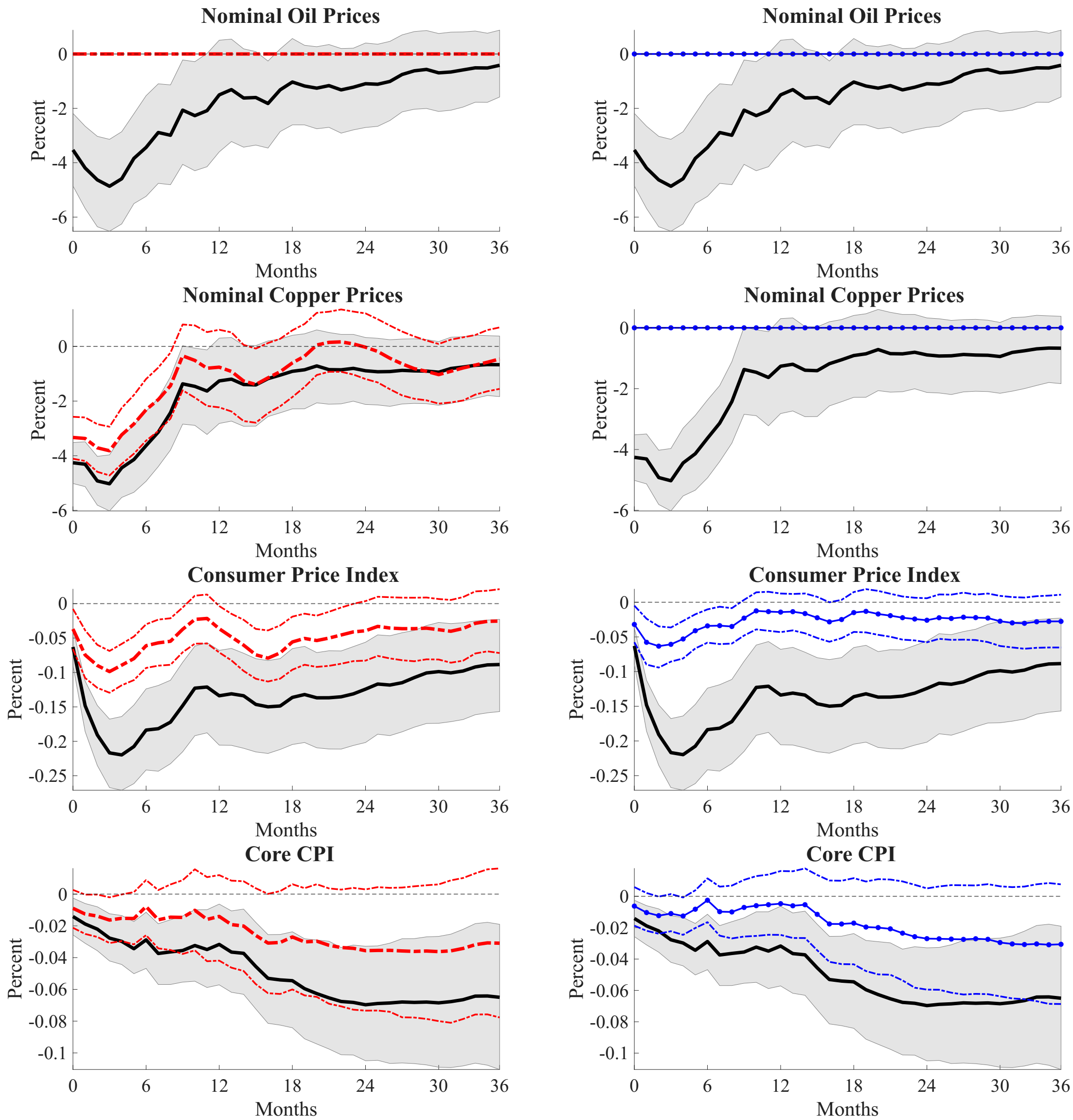
This exercise traces the transmission of a monetary policy shock when the endogenous responses of commodity prices are shut down. Appendix A1 provides details on its implementation and underlying assumptions. Specifically, the second and third rows of D in Equation (2) are set to zero, ensuring that oil and base metal prices do not respond to lags of the endogenous variables. Moreover, the elements $B_{2,1}$ and $B_{3,1}$ are set to zero, ensuring that oil and base metal prices do not respond on impact to the monetary policy shock.

Figure 7 presents the results of the decomposition exercise following Cesa-Bianchi and Sokol (2022). The results indicate that commodity prices account for an important share of the transmission of monetary policy shocks to inflation, particularly in the short run. The left column (red lines) shows the counterfactual responses when oil prices are held constant, while the right column (blue lines) reports the responses when both oil and base metal prices are prevented from reacting to the monetary policy shock.

The effects on headline inflation are substantial. During the first six months, panel 5 of Figure 7 shows that headline CPI declines by 0.22 percentage points in the benchmark specification (black line), but by only 0.10 percentage points when oil prices are held constant. When both oil and base metal prices are fixed at their steady-state values, panel 6, the decline is further reduced to 0.06 percentage points. The importance of the commodity-price channel persists over longer horizons. After three years, headline CPI falls by 0.09 percentage points in the benchmark model, compared with only 0.02 percentage points when oil prices are held constant and when both oil and base metal prices are shut down.

Panels 7 and 8 of Figure 7 show the importance of the commodity price channel on core inflation. After 6 months, we observe core inflation declining 0.03 percentage points in the benchmark specification and 0.008 percentage points when oil prices are assumed unchanged (panel 7). In panel 8, when oil and base metal prices are held fixed, core inflation is unchanged. After three years, core inflation would have declined by 0.03 percentage points, rather than by 0.064 percentage points, absent the oil and base metals prices responses.

Figure 7. Impulse Responses to a U.S. Monetary Policy Shock: The Role of Oil and Base Metal Prices (Counterfactual exercises following Cesa-Bianchi and Sokol, 2022).



Note: The figure compares the benchmark impulse response functions with two counterfactual scenarios, constructed following Cesa-Bianchi and Sokol (2022). The left column presents the counterfactual responses when oil prices are prevented from reacting to the monetary policy shock (red dashed lines). The right column presents the counterfactual responses when neither oil prices nor base metal prices are allowed to respond to the shock (blue dash-dotted lines). The horizontal axis measures months after the shock. One-standard-error confidence bands, constructed via wild bootstrap with 500 replications, are included.

4.2.2 External Instruments

Here, at each horizon following a U.S. monetary policy shock, we introduce sequences of oil and base metals shocks that offset the monetary-policy-induced responses of the corresponding commodity prices. We then use the estimated dynamic responses to these offsetting shocks to construct the associated counterfactual paths of the remaining variables in the system. When both oil and base-metal prices are neutralized, the required sequences of shocks are solved for jointly, thereby accounting for the effects of oil shocks on base-metal prices and vice versa. This procedure leaves the estimated VAR coefficients unchanged and asks how inflation would have responded to the monetary policy shock had the resulting movements in the selected commodity prices been neutralized.

In particular, our counterfactual exercise asks what path of oil and/or base metals supply shocks would be required to prevent the corresponding commodity prices from responding to the monetary policy shock. More formally, let $\tilde{\varepsilon}_{2,h}$ and $\tilde{\varepsilon}_{3,h}$ denote the counterfactual oil and base metals supply shocks, respectively, identified using external instruments.[19] We choose these shocks such that the responses of y_h (oil price) and/or z_h (base metal price) are zero at each horizon $h = 0, \dots, H$. For example, if we shut down only the response of oil prices, the impact response at $h = 0$ must satisfy

$$\hat{b}_{2,1}\varepsilon_{1,0} + \hat{b}_{2,2}\tilde{\varepsilon}_{2,0} = 0,$$

which implies

$$\tilde{\varepsilon}_{2,0} = -\frac{\hat{b}_{2,1}}{\hat{b}_{2,2}}\varepsilon_{1,0}.$$

Thus, the counterfactual introduces an oil supply shock that exactly offsets the contemporaneous response of oil prices to the monetary policy shock.

To neutralize the response of oil prices, we employ the oil supply news shock developed by Kilian (2024). This shock is identified using a novel procedure that constructs monthly proxies from daily surprises while accounting for the relationship between daily and average monthly

[19]Here, we estimate the coefficients of the impact matrix using separate Proxy SVAR models, with each specification designed to identify a different structural shock using its corresponding external instrument for the oil and the base metals markets.

prices, thereby facilitating the interpretation of the identified innovation as an oil supply news shock. This procedure allows us to isolate the contribution of commodity prices to the transmission of monetary policy and provides a direct answer to the following counterfactual question: How would macroeconomic variables respond to a monetary policy shock if oil and base metal prices did not react because their respective markets were simultaneously hit by offsetting commodity-specific shocks?

The first stage F-statistic of the shock is 47 and the Impulse Response Functions of the shock are reported in A10.

Identifying an analogous external instrument for base metals is considerably more challenging, as the literature does not provide a widely accepted supply shock for these markets. We therefore construct a proxy based on the difference between futures and spot copper prices, which captures the unexpected component of base metal price movements. The underlying intuition is that futures prices summarize market expectations of future copper prices, so the difference between the realized spot price and the previously expected price reflects an unanticipated innovation.

Let $F^{Cu}_{t-1,t}$ denote the copper futures price observed in period $t-1$ for delivery in period t, and let S^{Cu}_t denote the spot price realized in period t. We define the copper-price forecast error as

$$FE^{Cu}_t = \log S^{Cu}_t - \log F^{Cu}_{t-1,t}. \tag{3}$$

The futures price $F^{Cu}_{t-1,t}$ summarizes the market's expectation in period $t-1$ of the copper price that will prevail in period t. The difference between the subsequently realized spot price and this previously formed expectation therefore captures information about copper-market conditions that was not incorporated into prices at $t-1$.

To remove the components of the forecast error associated with demand-side and financial innovations, we estimate

$$FE^{Cu}_t = \alpha + \mathbf{\Gamma}'\mathbf{X}_t + \sum_{\ell=1}^{L} \mathbf{\Phi}'_\ell \mathbf{X}_{t-\ell} + z^{Cu}_t, \tag{4}$$

where $\mathbf{X}_t$ contains realized measures of global economic activity, U.S. economic activity, the U.S. dollar exchange rate, and the excess bond premium. These variables are intended to capture contemporaneous demand and financial developments that may contribute to the copper-price forecast error. Their lagged values absorb additional predictable variation.

Motivated by the orthogonalization approach of Bauer and Swanson (2023), we therefore purge the raw copper-price innovation of potentially confounding macroeconomic and financial variation. Unlike their application, which removes variation predictable before monetary-policy announcements, our filtering regression includes realized period-t variables because our objective is to remove unexpected demand and financial developments occurring between the formation of the futures price in $t-1$ and the realization of the spot price in t.

We use the residual z_t^{Cu} as our external instrument for base-metal price innovations. By construction, z_t^{Cu} is orthogonal to the observed contemporaneous and lagged demand and financial variables included in the filtering regression. We therefore interpret it as the component of the market-based copper-price forecast error that cannot be explained by these observed demand and financial conditions and is, accordingly, more likely to reflect supply-side developments in the copper market.

The first stage F-statistic of out base metal shock is 140 and the Impulse Response Functions are reported in Figure A11 of Appendix A3.

To further validate our proxy for base metals supply instrument, we examine whether it is orthogonal to other instruments and related variables. We conduct two complementary exercises. First, we test for pairwise Granger causality between our base metals supply instrument and four variables of interest: the monetary policy instrument, the oil supply news instrument, the global economic activity index, and the U.S. exchange rate. Specifically, we assess whether the base metals supply instrument is Granger-caused by, or Granger-causes, each of these variables. Second, we estimate contemporaneous OLS regressions between the base metals supply instrument and the same set of variables and assess the statistical significance of the resulting coefficients. If the instrument is orthogonal to these variables, we would expect neither evidence of Granger causality in either direction nor statistically significant contemporaneous correlations. Overall, these exercises provide additional evidence that the instrument captures base metals supply innovations rather than reflecting other sources of variation.

The results provide further evidence supporting the orthogonality of our base metals instrument. As reported in Table 1, we find no evidence of Granger causality in either direction between the base metals supply instrument and any of the variables considered, including the monetary policy instrument, the oil supply news instrument, the global economic activity

Table 1. Pairwise Granger Causality Tests

	BM Supply Instrument → Y_i		Y_i → BM Supply Instrument	
Variable (Y_i)	F-statistic	p-value	F-statistic	p-value
Monetary Policy Instrument	0.9190	0.5761	1.3304	0.1421
Global Economic Activity	0.8234	0.7062	0.8608	0.6561
US Exchange Rate	0.6041	0.9298	0.9380	0.5499
Oil Supply News Instrument	0.9555	0.5261	0.8395	0.6845

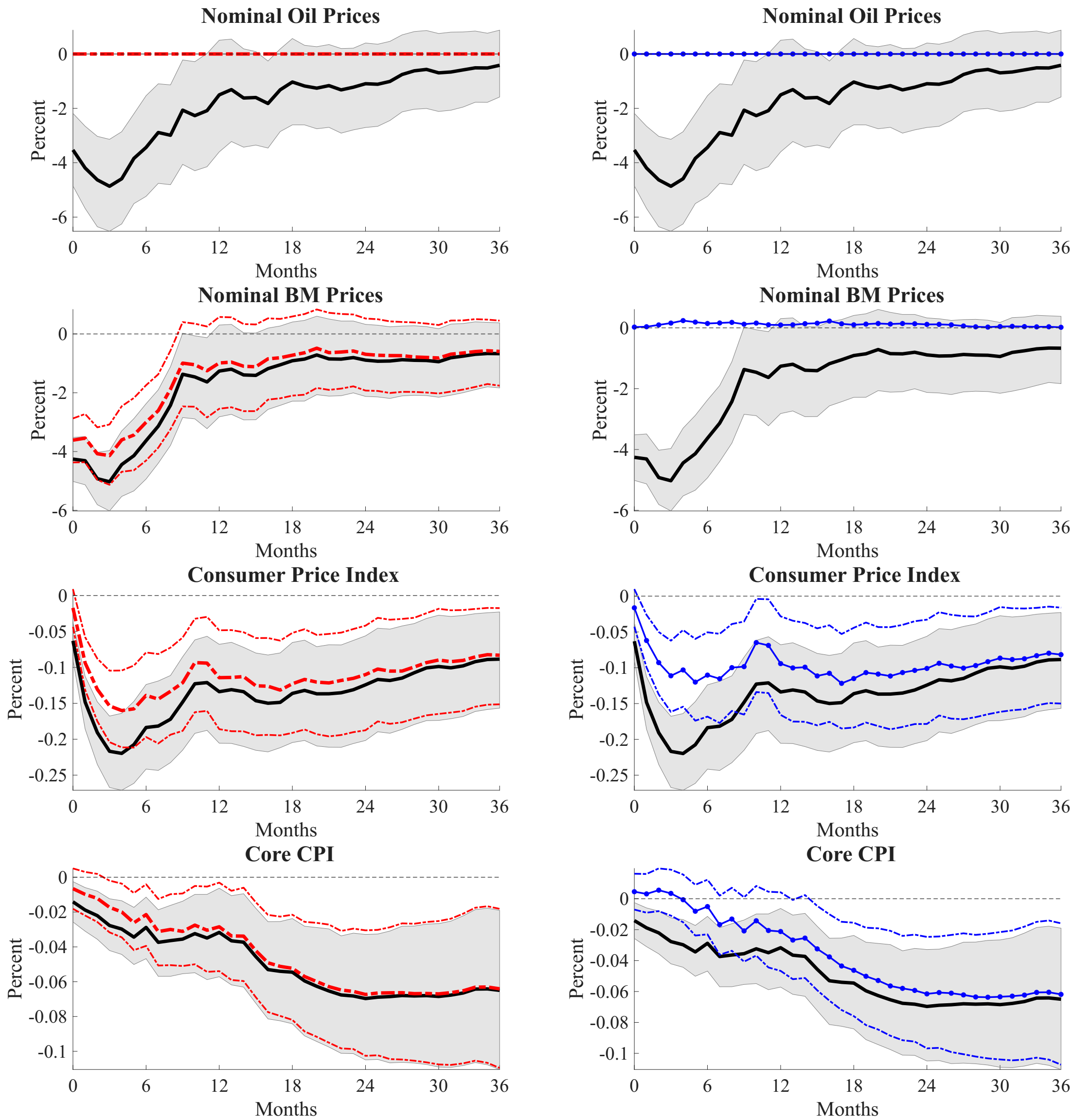
Notes: The table reports pairwise Granger causality tests between our instrument for base metal supply shocks and each of the remaining variables. The null hypothesis is that the lags of the variable on the left-hand side of the arrow do not Granger-cause the variable on the right-hand side. The reported p-values correspond to the joint F-test of the lagged coefficients.

index, and the U.S. exchange rate. In all cases, the null hypothesis of no Granger causality cannot be rejected at conventional significance levels. Consistent with these findings, the contemporaneous OLS estimates reported in Table A3 of our Appendix are not statistically significant for any of the variables considered. Taken together, the absence of both predictive relationships and statistically significant contemporaneous associations suggests that our instrument for base metals is not systematically related to other instruments or variables and provides additional support for its interpretation as an exogenous measure of base metals supply innovations.

We report the counterfactual impulse responses, in which commodity prices responses are exactly offset by a commodity specific shock, in Figure 8. Panel 5 shows similar results to Figure 7. Shutting down the response of oil prices reduces the 6-months response of headline inflation from 0.18 percentage points in the baseline to 0.14 percentage points in the counterfactual. Base metals also play a role in panel 6 by bringing down the 6-months response to about 0.11 percentage points.

We highlight the role of commodity prices in the transmission of monetary policy to core inflation. Oil prices contribute relatively little to the response of core CPI over the first six months. Base metal prices play an important role. During the first six months, core inflation declines by only 0.005 percentage points, compared to 0.03 in the baseline, when the response of base metal prices is neutralized. Another important observation is that, once the responses

Figure 8. Impulse Responses to a U.S. Monetary Policy Shock: The Role of Oil and Base Metal Prices (Counterfactual exercises following Sims and Zha, 2006).



Note: The figure compares the benchmark impulse response functions with two counterfactual scenarios, constructed following Sims and Zha (2006). The left column presents the counterfactual responses when oil prices are prevented from reacting to the monetary policy shock (red dashed lines). The right column presents the counterfactual responses when neither oil prices nor base metal prices are allowed to respond to the shock (blue dash-dotted lines). The horizontal axis measures months after the shock. One-standard-error confidence bands, constructed via wild bootstrap with 500 replications, are included.

of commodity prices are neutralized, the estimated effects of monetary policy shocks on core inflation are no longer statistically significant. These findings suggests that commodity prices account for a substantial share of the transmission of monetary policy to underlying inflation.

The significant effects of commodity prices on core inflation are consistent with recent evidence in Minton and Wheaton (2023) and Miranda-Pinto et al. (2024) on the role of oil and base metal prices, respectively. As emphasized by these authors, oil and metals constitute important intermediate inputs for downstream industries, including the construction sector, and fluctuations in their prices can therefore affect firms' production costs and, ultimately, underlying inflation. An additional mechanism contributing to this result operates through the exchange rate channel. As we show in the next section, absent the commodity-price channel, the U.S. dollar appreciates less than in the benchmark scenario following a monetary policy tightening. Consequently, the decline in global demand for commodities is attenuated when oil and base metal prices do not respond to the monetary policy shock. These results suggest that commodity prices amplify the international transmission of U.S. monetary policy by affecting both input costs and global commodity demand through exchange-rate movements.

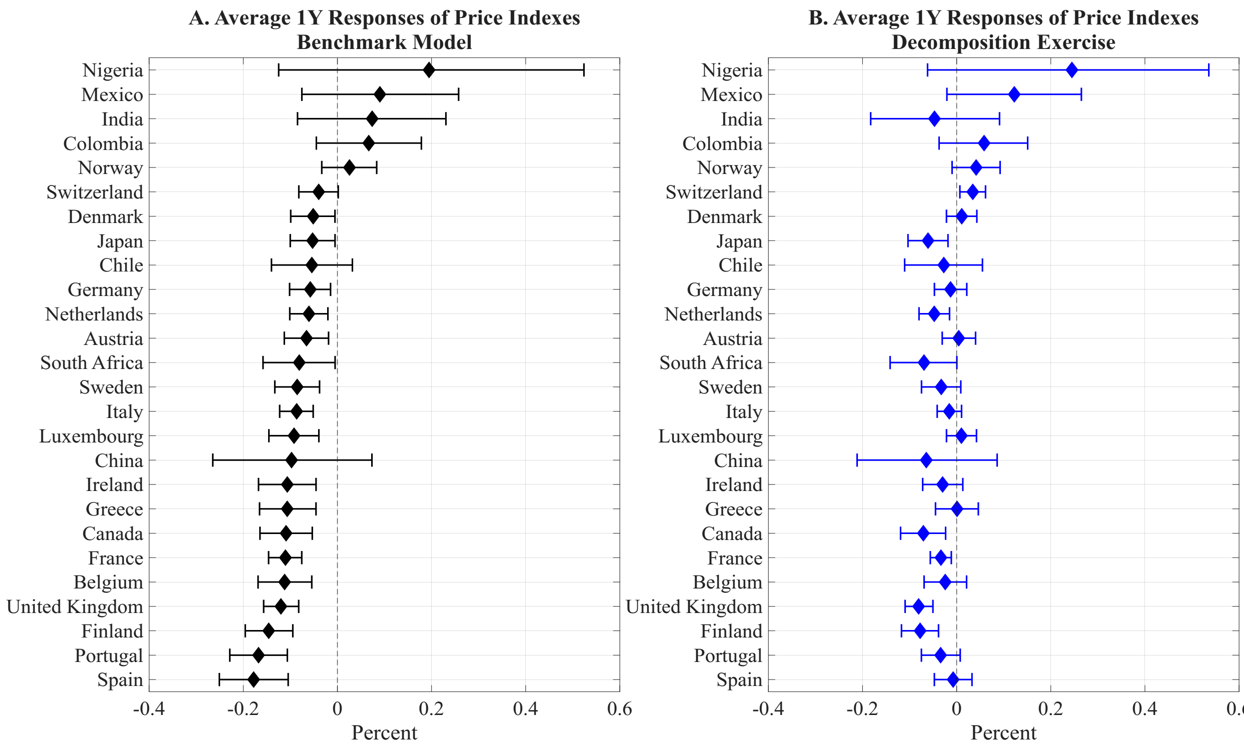
5 Cross-country spillovers

Here we investigate the importance of the commodity price channel in accounting for the spillovers of monetary policy on foreign inflation. To this end, we augment the proxy-SVAR including countries' CPI and the bilateral exchange rate between the US and each country. Our main focus is on the effects on headline inflation of oil and base metals prices. However, we also estimate the effects on core CPI for a subsample of 20 countries for which we have data available.

5.1 Imposing Zero Responses (Cesa-Bianchi and Sokol, 2022)

Figure 9 reports the cross-country responses of headline inflation to the U.S. monetary policy shock. Panel A depicts the baseline effects of U.S. monetary policy on countries' headline CPI (in black), while panel B plots the effects of U.S. monetary policy on countries' CPI absent the commodity-price channel (blue) of oil and base metal prices. As expected, most countries' headline CPI decline after a U.S. monetary policy tightening. From top to bottom,

Figure 9. Average headline consumer price index responses across countries.

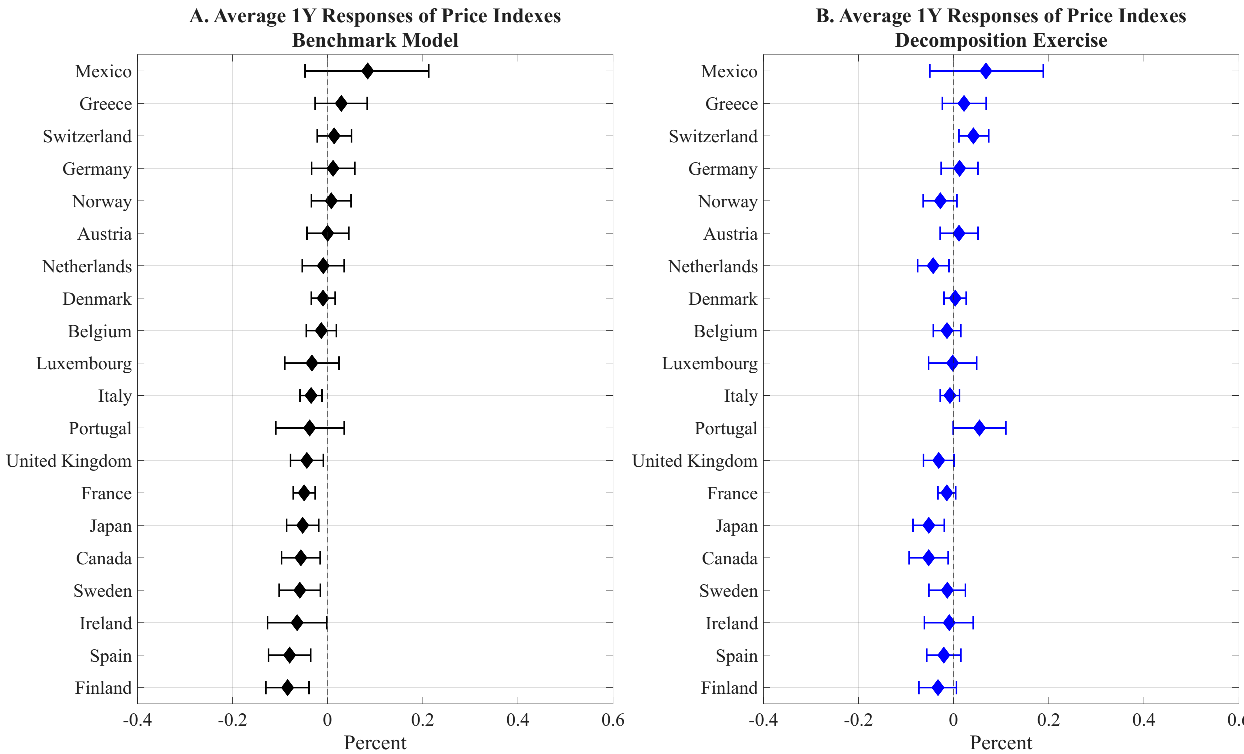


Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Cesa-Bianchi and Sokol (2022). One-standard-error confidence bands are included.

we organize the countries based on the size of the CPI decline. For example, over a period of 12 months, a 10 basis point increase in the U.S. monetary policy rate induces a 0.17% decline in the headline CPI of Spain. Notably, as it is clear in Panel B, all this effect is mediated by the response of oil and base metal prices. Indeed, the response of CPI in Spain is statistically zero when oil and base metals do not respond to monetary policy and lagged dynamics of other variables.

Figure 10 shows the effects of the U.S. monetary policy shocks on countries' core inflation (Panel A) and the corresponding responses when the endogenous movements in oil and base metal prices are shut down (Panel B). Countries are ordered from top to bottom by the magnitude of the decline in core CPI. We find that, for most countries, the negative and statistically significant response observed in the baseline specification becomes statistically indistinguishable from zero once oil and metals are held constant. For instance, over a period of 12 months, a 10 basis point increase in the U.S. monetary policy rate induces a 0.08%

Figure 10. Average core consumer price index responses across countries.



Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Cesa-Bianchi and Sokol (2022). One-standard-error confidence bands are included.

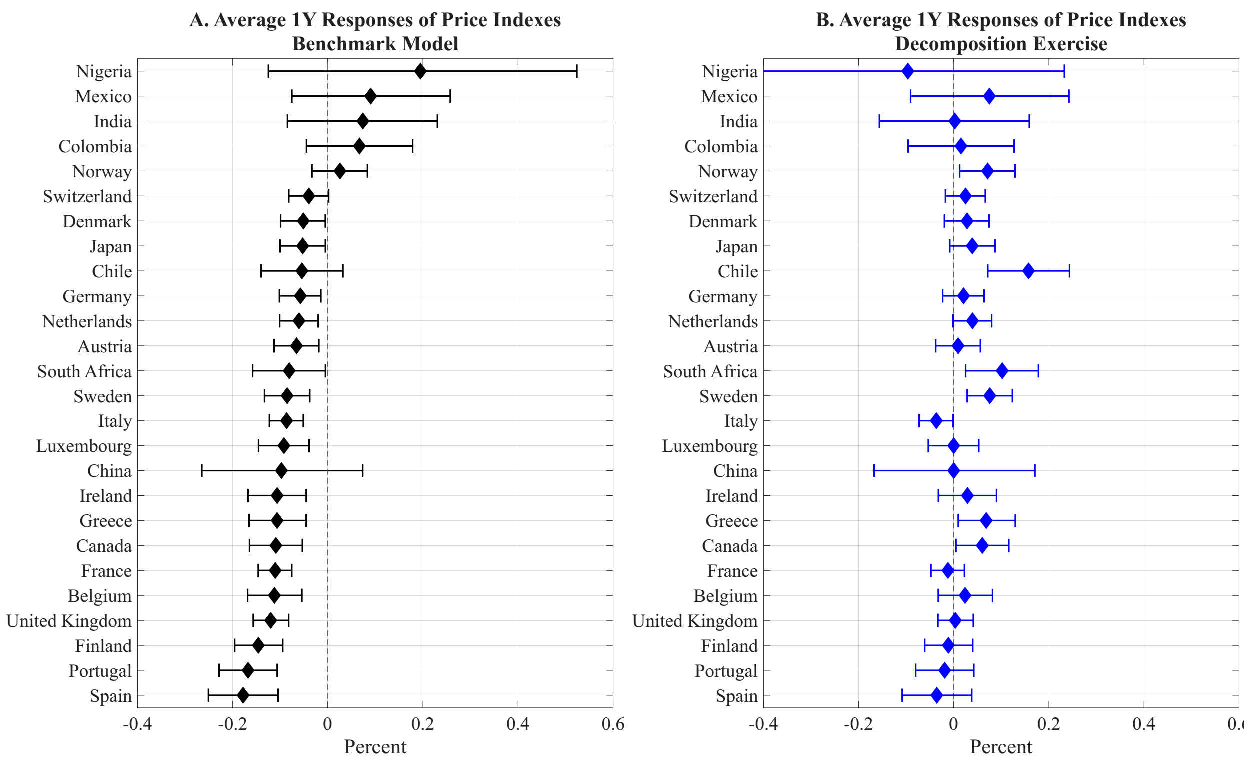
decline in the core CPI of Finland. After removing the impact of oil and metals, the decline is reduced to 0.03% and is no longer statistically significant.

In our Appendix, Figure A12, we show the response of the bilateral exchange rate between the US and each of the countries. As expected, in most countries we observe an appreciation of the US dollar. The exchange rate response is an additional channel in which US monetary policy can affect foreign inflation. The exchange rate channel is not independent of the commodity price channel. For instance, take the case of Switzerland, a small open economy commodity exporter. A US monetary policy tightening depreciates the Swiss Franc, but this depreciation is mitigated once commodity prices are assumed not to decline in response to US monetary policy.

5.2 External Instruments (Sims and Zha, 2006)

Here, we present the counterfactual responses of inflation when oil prices and the base metals price index are held constant by imposing concurrent supply-side shocks that offset their initial responses. Figure 11 reports the cross-country responses, baseline (Panel A) and counterfactual (Panel B), for headline inflation. The results are consistent with those in Section 5.1. The negative response of inflation in Finland, Spain, Ireland, and Sweden in the benchmark become statistically zero in the counterfactual when oil and base metals remain unchanged (Panel B).

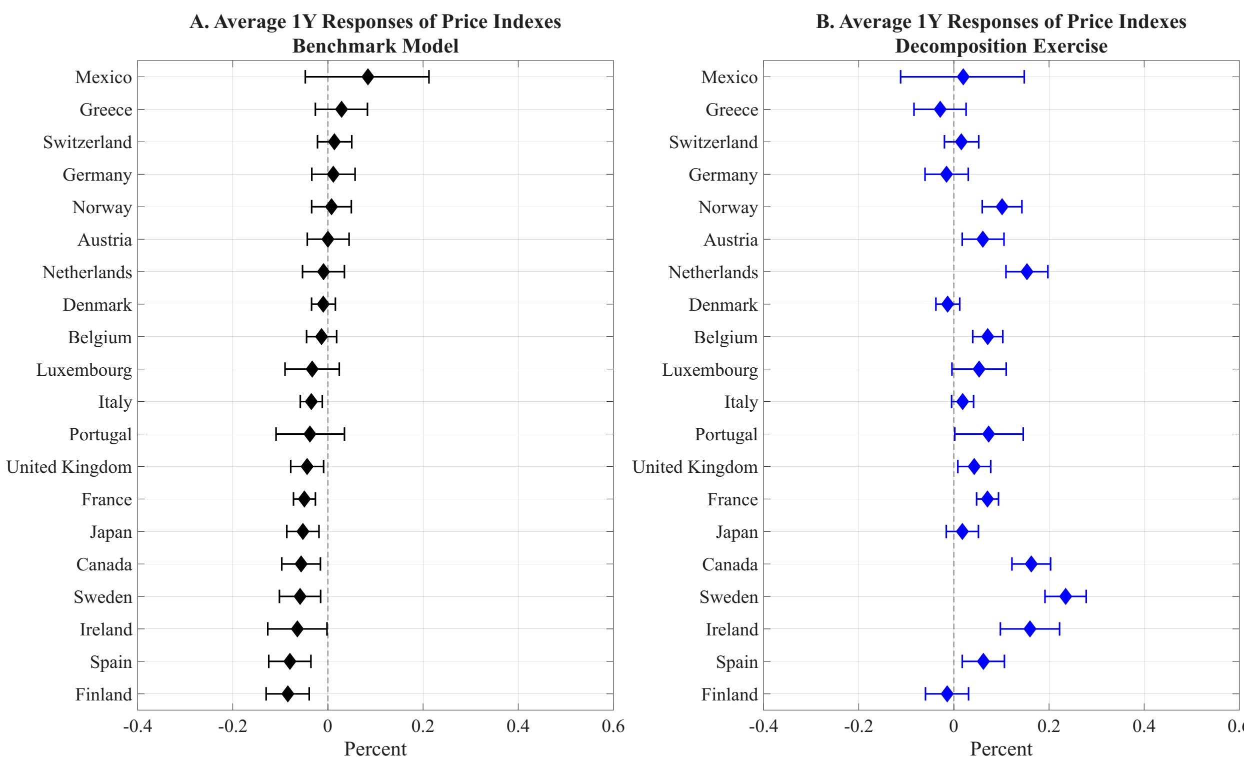
Figure 11. Average headline consumer price index responses across countries.



Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Sims and Zha (2006). One-standard-error confidence bands are included.

Figure 12 reports the baseline cross-country responses (Panel A) and the counterfactual responses (Panel B) for core inflation. The results show that the commodity channel is quantitatively important. For those countries with negative core inflation response in the benchmark (panel A), the counterfactual in panel B shows either zero or positive responses. Indeed, the counterfactual results with the Sims and Zha (2006)'s approach show a stronger role of the commodity-price channel. For instance, for Canada and Ireland, headline inflation increases in the counterfactual, while in the Cesa-Bianchi and Sokol (2022)'s approach these countries show slightly negative or zero responses. Key to this result is that this exercise does not simply hold commodity prices fixed: it introduces counteracting supply disturbances that may have independent effects on inflation. In commodity-exporting economies such as Canada, these effects may operate through both domestic cost pressures and income or wealth channels. For commodity-importing economies such as Ireland, the positive response is more plausibly associated with the direct inflationary effects of the counteracting supply shocks, transmitted through imported energy and commodity-intensive intermediate inputs.

Figure 12. Average core consumer price index responses across countries.



Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Sims and Zha (2006). One-standard-error confidence bands are included.

In Figure A13 of our Appendix we also show the response of the bilateral exchange rate between the U.S. and each country in our sample. The results are similar to those in Figure A12 for the reduced-form decomposition. For instance, a U.S. monetary policy tightening depreciates the Canadian dollar, a small open commodity-exporter economy. This depreciation is mitigated when counterfactual supply-side shocks are used to offset the endogenous decline in commodity prices following the U.S. monetary policy shock.

Conclusion

Monetary policy has a strong direct effect on commodity prices, especially for industrial and storable commodities such as oil and metals. Spillovers to other countries and, therefore, feedback to the domestic economy from US monetary policy shocks are fast. After a 10 bps monetary policy surprise, the decline in oil and base metal prices over the course of 12 months reduce domestic inflation by 0.07 percentage points (from 0.09% to 0.02%). In terms of spillovers, for the average country, a 10 bps monetary policy surprise reduces inflation by 0.05%. Most of this response is mediated by the commodity-price channel. This result implies that the commodity price channel of US monetary policy has relatively larger spillovers to other countries than spillbacks to the US. The commodity-price channel accounts for around 70% of the total decline in US headline CPI (12-month). Internationally, oil and base metal prices also constitute an important channel for the transmission of U.S. monetary policy to inflation abroad, with substantial heterogeneity across countries.

Spillovers from U.S. monetary policy shocks appear to be more pronounced for consumer prices in other advanced economies, while the responses of consumer prices in emerging markets and the associated commodity-price channel are less precisely estimated, potentially reflecting the greater prevalence of price regulations and controls in these economies. The commodity-price channel also plays an important role in the transmission of U.S. monetary policy to core inflation, both in the United States and across countries. This channel is largely driven by base metal prices, particularly copper and aluminum, highlighting the broader role of commodity markets in shaping the international transmission of monetary policy.

Major central banks should take into consideration their spillback and spillovers through a commodity price channel when setting their policy objectives. Finally, as the Federal Reserve tends to set the tone for the global monetary policy stance, and given that other major central banks such as the ECB can also affect commodity prices, the commodity price channel could be strengthened in periods of high monetary policy coordination.

References

Alam, Md Rafayet, and Scott Gilbert. 2017. "Monetary policy shocks and the dynamics of agricultural commodity prices: evidence from structural and factor-augmented VAR analyses." *Agricultural economics* 48 (1): 15–27.

Alessio Anzuini, Marco J. Lombardi, and Patrizio Pagano. 2013. "The Impact of Monetary Policy Shocks on Commodity Prices." *International Journal of Central Banking* 33nd.

Auerbach, Alan J, and Yuriy Gorodnichenko. 2013. "Output spillovers from fiscal policy." *American Economic Review* 103 (3): 141–146.

Ball, Laurence M, Daniel Leigh, and Prachi Mishra. 2022. "Understanding us inflation during the covid era."Technical report, National Bureau of Economic Research.

Barsky, Robert B., and Lutz Kilian. 2004. "Oil and the Macroeconomy Since the 1970s." *Journal of Economic Perspectives* 18 (4): 115–134. 10.1257/0895330042632708.

Bauer, Michael D, and Eric T Swanson. 2023. "A reassessment of monetary policy surprises and high-frequency identification." *NBER Macroeconomics Annual* 37 (1): 87–155.

Baumeister, Christiane, and Lutz Kilian. 2016. "Understanding the Decline in the Price of Oil since June 2014." *Journal of the Association of Environmental and resource economists* 3 (1): 131–158.

Bernanke, Ben, and Olivier Blanchard. 2023. "What caused the US pandemic-era inflation?" *Hutchins Center Working Papers.*

Blanchard, Olivier J, and Jordi Galı. 2007. "The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s so different from the 1970s?".

Breitenlechner, Max, Georgios Georgiadis, and Ben Schumann. 2022. "What goes around comes around: How large are spillbacks from US monetary policy?" *Journal of Monetary Economics* 131 45–60.

Buda, Gergely, Vasco M Carvalho, Giancarlo Corsetti, João B Duarte, Stephen Hansen, Álvaro Ortiz, Tomasa Rodrigo, and José V Rodríguez Mora. 2023. "Short and Variable lags." *Robert Schuman Centre for Advanced Studies Research Paper* (22): .

Camara, Santiago. 2021. "Spillovers of us interest rates: Monetary policy & information effects." *arXiv preprint arXiv:2111.08631*.

Castelnuovo, Efrem, Lorenzo Mori, and Gert Peersman. 2024. "Commodity Price Shocks and Global Cycles: Monetary Policy Matters CAMA Working Paper 36/2024 May 2024."

Cesa-Bianchi, Ambrogio, and Andrej Sokol. 2022. "Financial shocks, credit spreads, and the international credit channel." *Journal of International Economics* 135 103543.

Cesa-Bianchi, Ambrogio, Gregory Thwaites, and Alejandro Vicondoa. 2020. "Monetary policy transmission in the United Kingdom: A high frequency identification approach." *European Economic Review* 123 103375.

Dedola, Luca, Giulia Rivolta, and Livio Stracca. 2017. "If the Fed sneezes, who catches a cold?" *Journal of International Economics* 108 S23–S41.

Dées, Stéphane, and Alessandro Galesi. 2021. "The Global Financial Cycle and US monetary policy in an interconnected world." *Journal of International Money and Finance* 115 102395.

Degasperi, Riccardo, Seokki Simon Hong, and Giovanni Ricco. 2026. "The global transmission of US monetary policy." *Journal of International Economics* 104259.

Frankel, Jeffrey A. 2014. "Effects of speculation and interest rates in a "carry trade" model of commodity prices." *Journal of International Money and Finance* 42 88–112.

Gagliardone, Luca, and Mark Gertler. 2023. "Oil Prices, Monetary Policy and Inflation Surges."Technical report, National Bureau of Economic Research.

Gertler, Mark, and Peter Karadi. 2015. "Monetary policy surprises, credit costs, and economic activity." *American Economic Journal: Macroeconomics* 7 (1): 44–76.

Hamilton, James D. 2009. "Understanding crude oil prices." *The energy journal* 30 (2): .

Hammoudeh, Shawkat, Duc Khuong Nguyen, and Ricardo M Sousa. 2015. "US monetary policy and sectoral commodity prices." *Journal of International Money and Finance* 57 61–85.

Ider, Gökhan, Alexander Kriwoluzky, Frederik Kurcz, and Ben Schumann. 2023. "The Energy-Price Channel of (European) Monetary Policy."

Jacks, David S, and Martin Stuermer. 2020. "What drives commodity price booms and busts?" *Energy Economics* 85 104035.

Jacobson, Margaret M, Christian Matthes, and Todd B Walker. 2023. "Temporal Aggregation Bias and Monetary Policy Transmission."

Jarociński, Marek, and Peter Karadi. 2020. "Deconstructing Monetary Policy Surprises—The Role of Information Shocks." *American Economic Journal: Macroeconomics* 12 (2): 1–43. 10.1257/mac.20180090.

Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95 (1): 161–182. 10.1257/0002828053828518.

Kearns, Jonathan, Andreas Schrimpf, and Fan Dora Xia. 2018. "Explaining monetary spillovers: The matrix reloaded." *Journal of Money, Credit and Banking*.

Kilian, Lutz. 2009. "Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market." *American Economic Review* 99 (3): 1053–1069.

Kilian, Lutz. 2019. "Measuring global real economic activity: Do recent critiques hold up to scrutiny?" *Economics Letters* 178 106–110.

Kilian, Lutz. 2024. "How to construct monthly VAR proxies based on daily surprises in futures markets." *Journal of Economic Dynamics and Control* 168 104966.

Kilian, Lutz, and Daniel P Murphy. 2014. "The role of inventories and speculative trading in the global market for crude oil." *Journal of Applied econometrics* 29 (3): 454–478.

Lenza, Michele, and Giorgio E Primiceri. 2022. "How to estimate a vector autoregression after March 2020." *Journal of Applied Econometrics* 37 (4): 688–699.

Minton, Robert, and Brian Wheaton. 2023. "Delayed Inflation in Supply Chains: Theory and Evidence." *Available at SSRN 4470302*.

Miranda-Agrippino, Silvia, and Hélene Rey. 2020. "US monetary policy and the global financial cycle." *The Review of Economic Studies* 87 (6): 2754–2776.

Miranda-Agrippino, Silvia, and Hélène Rey. 2022. "The global financial cycle." In *Handbook of international economics*, Volume 6. 1–43, Elsevier.

Miranda-Pinto, Jorge, Andreas Pescatori, Martin Stuermer, and Xueliang Wang. 2024. "Beyond Energy: Inflationary Effects of Metals Price Shocks in Production Networks."

Nakamura, Emi, and Jón Steinsson. 2018. "High-frequency identification of monetary non-neutrality: the information effect." *The Quarterly Journal of Economics* 133 (3): 1283–1330.

Ottonello, Pablo, and Thomas Winberry. 2020. "Financial heterogeneity and the investment channel of monetary policy." *Econometrica* 88 (6): 2473–2502.

Rey, Hélène. 2016. "International channels of transmission of monetary policy and the Mundellian trilemma." *IMF Economic Review* 64 (1): 6–35.

Romer, Christina D, and David H Romer. 2004. "A new measure of monetary shocks: Derivation and implications." *American economic review* 94 (4): 1055–1084.

Rosa, Carlo. 2014. "The high-frequency response of energy prices to US monetary policy: Understanding the empirical evidence." *Energy Economics* 45 295–303.

Schorfheide, Frank, and Dongho Song. 2021. "Real-time forecasting with a (standard) mixed-frequency VAR during a pandemic."Technical report, National Bureau of Economic Research.

Sims, Christopher A, and Tao Zha. 2006. "Does monetary policy generate recessions?" *Macroeconomic Dynamics* 10 (2): 231–272.

Swanson, Eric T, and Vishuddhi Jayawickrema. 2023. "Speeches by the fed chair are more important than fomc announcements: An improved high-frequency measure of us monetary policy shocks." *Unpublished manuscript.*

A1 The commodity-price channel

Our baseline decomposition is based on Cesa-Bianchi et al. (2020). We note here that this is not a policy experiment. We are not after a structural change in the relation between commodity prices and the rest of the economy (which would be severely subject to Lucas' critique), but a decomposition of the inflation response.

Suppose that x represents US interest rate, y is the oil price, z the base metals price, and z an additional control. The SVAR representation of the model is as follows

$$\underbrace{\begin{bmatrix} a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} \\ a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} \\ a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} \\ a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4} \end{bmatrix}}_{A_0} \begin{bmatrix} x_t \\ y_t \\ z_t \\ w_t \end{bmatrix} = \sum_{j=1}^{p} A_j \begin{bmatrix} x_{t-j} \\ y_{t-j} \\ z_{t-j} \\ w_{t-j} \end{bmatrix} + B_0 \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{bmatrix}.$$

We can rewrite the system as

$$\begin{bmatrix} x_t \\ y_t \\ z_t \\ w_t \end{bmatrix} = \sum_{j=1}^{p} \underbrace{A_0^{-1} A_j}_{D_j} \begin{bmatrix} x_{t-j} \\ y_{t-j} \\ z_{t-j} \\ w_{t-j} \end{bmatrix} + \underbrace{A_0^{-1} B_0}_{B} \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{bmatrix}.$$

Therefore, the reduced-form representation is

$$\begin{bmatrix} x_t \\ y_t \\ z_t \\ w_t \end{bmatrix} = \sum_{j=1}^{p} \begin{bmatrix} d_{1,1}^{(j)} & d_{1,2}^{(j)} & d_{1,3}^{(j)} & d_{1,4}^{(j)} \\ d_{2,1}^{(j)} & d_{2,2}^{(j)} & d_{2,3}^{(j)} & d_{2,4}^{(j)} \\ d_{3,1}^{(j)} & d_{3,2}^{(j)} & d_{3,3}^{(j)} & d_{3,4}^{(j)} \\ d_{4,1}^{(j)} & d_{4,2}^{(j)} & d_{4,3}^{(j)} & d_{4,4}^{(j)} \end{bmatrix} \begin{bmatrix} x_{t-j} \\ y_{t-j} \\ z_{t-j} \\ w_{t-j} \end{bmatrix} + \begin{bmatrix} b_{1,1} & b_{1,2} & b_{1,3} & b_{1,4} \\ b_{2,1} & b_{2,2} & b_{2,3} & b_{2,4} \\ b_{3,1} & b_{3,2} & b_{3,3} & b_{3,4} \\ b_{4,1} & b_{4,2} & b_{4,3} & b_{4,4} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{bmatrix}. \tag{5}$$

The decomposition below imposes that commodity prices y and z do not react contemporaneously to monetary policy shocks ($\varepsilon_{1,t}$) and they do not respond to the dynamic effects from lags of x, y, z, w either. Therefore, tracing the effects of a shock to ε_1 would, thus, work only through its direct effect on x and w and the internal dynamics through lags in w and x.

$$
\begin{bmatrix} x_t \\ y_t \\ z_t \\ w_t \end{bmatrix} = \sum_{j=1}^{p} \begin{bmatrix} d_{1,1}^{(j)} & d_{1,2}^{(j)} & d_{1,3}^{(j)} & d_{1,4}^{(j)} \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ d_{4,1}^{(j)} & d_{4,2}^{(j)} & d_{4,3}^{(j)} & d_{4,4}^{(j)} \end{bmatrix} \begin{bmatrix} x_{t-j} \\ y_{t-j} \\ z_{t-j} \\ w_{t-j} \end{bmatrix} + \begin{bmatrix} b_{1,1} & b_{1,2} & b_{1,3} & b_{1,4} \\ 0 & b_{2,2} & b_{2,3} & b_{2,4} \\ 0 & b_{3,2} & b_{3,3} & b_{3,4} \\ b_{4,1} & b_{4,2} & b_{4,3} & b_{4,4} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{bmatrix}.
$$

A1.1 External Instruments Decomposition

We construct an alternative decomposition by estimating impulse responses on the variable of interest, which then shut down the response of commodity prices to U.S. monetary policy. To achieve this, we use additional external instruments to identify two additional orthogonal shocks to oil and base metal prices and use them to shut down the response of oil and base metal prices.

Our procedure is similar in spirit to Sims and Zha (2006). However, rather than constructing hypothetical shocks, we use externally identified shocks. The key difference in our exercise is that we use one shock at a time to shut down the response of one variable of interest. In our exercise, we will use two external instruments to replicate the responses of oil and base metal prices, at the time that we construct the corresponding responses from other variables to these shocks. This procedure will allow us to shut down the response of the commodity prices at the time in which we construct the counterfactual responses of other variables under this scenario, giving us a straightforward interpretation and address the following question: What is the counterfactual behavior of our variables of interest to a monetary policy shock if oil prices and base metals prices would have had no reaction giving an external shock that is proper to its market?

To make the counterfactual exercise more concrete, consider a four-variable system as in Equation (5), where x denotes the federal funds rate, y denotes the oil price, z denotes the base metals price, and w denotes another variable of interest, such as log CPI. Let ε_1 denote the monetary policy shock, ε_2 the oil supply shock, and ε_3 the base metals supply shock. Our identification strategy combines three external instruments to identify the corresponding columns of the impact matrix B. Specifically, we use the identified monetary policy shocks from Bauer and Swanson (2023) to estimate the first column of B, yielding $\hat{b}_{1,1}$, $\hat{b}_{2,1}$, $\hat{b}_{3,1}$, and $\hat{b}_{4,1}$. These coefficients capture the contemporaneous effects of a monetary policy shock on the federal funds rate, oil prices, base metals prices, and inflation, respectively. We then use the oil supply shock identified by Kilian (2024) to estimate the second column of B, obtaining $\hat{b}_{1,2}$, $\hat{b}_{2,2}$, $\hat{b}_{3,2}$, and $\hat{b}_{4,2}$. Finally, we use our external instrument for base metals supply shocks to identify the third column of B, yielding $\hat{b}_{1,3}$, $\hat{b}_{2,3}$, $\hat{b}_{3,3}$, and $\hat{b}_{4,3}$.[20] In particular, these coefficients capture the contemporaneous effects of a base metals supply shock on the federal funds rate, oil prices, base metals prices, and inflation.

We use these estimated impact coefficients to construct a counterfactual in which the transmission of a monetary policy shock through oil and/or base metals prices is shut down. Let the impulse response functions be defined as

$$\mathrm{IR}_0 = \hat{B}\mathbf{e}_i, \tag{6}$$

$$\mathrm{IR}_h = \boldsymbol{D}\mathrm{IR}_{h-1}, \qquad h = 1, \ldots, H, \tag{7}$$

where $\mathbf{e}_i$ is a selection vector associated with the ith structural shock, $\hat{B}\mathbf{e}_i$ is therefore the ith column of the estimated impact matrix $\hat{B}$, and $\boldsymbol{D}$ denotes the companion-form transition matrix. The standard impulse responses describe the dynamic effects of a structural shock in the absence of any additional intervention.

Our counterfactual exercise instead asks what path of oil and/or base metals supply shocks would be required to prevent the corresponding commodity prices from responding to the monetary policy shock. More formally, let $\tilde{\varepsilon}_{2,h}$ and $\tilde{\varepsilon}_{3,h}$ denote the counterfactual oil and base metals supply shocks, respectively, identified using external instruments. We choose these shocks such that the responses of y_h (oil price) and/or z_h (base metal price) are zero at each horizon $h = 0, \ldots, H$. For example, if we shut down only the response of oil prices, the impact response at $h = 0$ must satisfy

$$\hat{b}_{2,1}\varepsilon_{1,0} + \hat{b}_{2,2}\tilde{\varepsilon}_{2,0} = 0, \tag{8}$$

which implies

$$\tilde{\varepsilon}_{2,0} = -\frac{\hat{b}_{2,1}}{\hat{b}_{2,2}}\varepsilon_{1,0}. \tag{9}$$

[20] As we explain in the main text, for the base metals supply shock, we use the log difference between futures and spot copper prices as an external instrument. Specifically, we filter this measure using 12 lags of world industrial production, U.S. industrial production, the U.S. dollar, and the U.S. excess bond premium. The resulting residual is used as the external instrument for the base metals supply shock.

Thus, the counterfactual introduces an oil supply shock that exactly offsets the contemporaneous response of oil prices to the monetary policy shock.

Similarly, if we also shut down the response of base metals prices, the corresponding impact condition is

$$\hat{b}_{3,1}\varepsilon_{1,0} + \hat{b}_{3,3}\tilde{\varepsilon}_{3,0} = 0, \tag{10}$$

which implies

$$\tilde{\varepsilon}_{3,0} = -\frac{\hat{b}_{3,1}}{\hat{b}_{3,3}}\varepsilon_{1,0}. \tag{11}$$

However, shutting down the two commodity-price responses independently is not sufficient because each commodity supply shock can affect both commodity prices. In particular, the base metals supply shock affects oil prices through $\hat{b}_{2,3}$, while the oil supply shock affects base metals prices through $\hat{b}_{3,2}$. Consequently, an adjustment to one commodity shock that eliminates the response of its corresponding price may generate a nonzero response in the other commodity price. We therefore jointly shut down the responses of oil and base metals prices using an iterative procedure.

To illustrate, suppose that we first adjust the oil supply shock to eliminate the response of oil prices. The resulting adjustment to the oil shock also affects base metals prices through $\hat{b}_{3,2}\tilde{\varepsilon}_{2,0}$. We then introduce again the base metals supply shock, $\tilde{\varepsilon}^{(1)}_{3,0}$, to offset this induced response. The required adjustment satisfies

$$\hat{b}_{3,2}\tilde{\varepsilon}_{2,0} + \hat{b}_{3,3}\tilde{\varepsilon}^{(1)}_{3,0} = 0, \tag{12}$$

and therefore

$$\tilde{\varepsilon}^{(1)}_{3,0} = -\frac{\hat{b}_{3,2}}{\hat{b}_{3,3}}\tilde{\varepsilon}_{2,0}. \tag{13}$$

This additional base metals shock, however, affects oil prices through $\hat{b}_{2,3}$. We consequently adjust the oil supply shock again to offset this new response. The procedure continues by alternating between the oil and base metals supply shocks until the responses of both commodity prices are sufficiently close to zero.

More generally, at each horizon h, the counterfactual shocks are chosen to satisfy

$$\mathrm{IR}_h^y\left(\varepsilon_{1,h}, \tilde{\varepsilon}_{2,h}, \tilde{\varepsilon}_{3,h}\right) = 0, \tag{14}$$

$$\mathrm{IR}_h^z\left(\varepsilon_{1,h}, \tilde{\varepsilon}_{2,h}, \tilde{\varepsilon}_{3,h}\right) = 0. \tag{15}$$

The procedure therefore accounts for the cross-effects between the two commodity markets rather than treating the oil and base metals channels as independent.

The resulting counterfactual can be interpreted as an iterative shock-adjustment procedure that isolates the contribution of oil and base metals prices to the transmission of monetary policy. At each step, one external instrument is used to offset the response of its associated commodity price, while accounting for the induced response in the other commodity market. Because both identified commodity supply shocks are allowed to affect all variables in the system, the two commodity-price responses generally cannot be eliminated simultaneously in a single adjustment. The iterative procedure therefore alternates between the two instruments until convergence, yielding a counterfactual path in which the responses of both oil and base metals prices are approximately zero over the entire impulse-response horizon.

A2 Additional Tables

Table A1. Commodities, units, and trading volumes

Commodity Name	Exchange	Unit	Trading Volume
Arabica coffee	ICE Futures US Softs	USD/lb.	4,096,534
Brent Crude Oil	ICE Futures Europe Commodities	USD/bbl.	64,355,775
Class III Milk	Chicago Mercantile Exchange	USD/cwt	46,951
Cocoa	ICE Futures US Softs	USD/MT	2,995,523
Copper	Commodity Exchange, Inc.	USD/lb.	10,342,374
Copper	London Metal Exchange	USD/MT	4,396,941
Corn	Chicago Board of Trade	USD/bu.	37,904,454
Cotton	ICE Futures US Softs	USD/lb.	2,574,415
Feeder Cattle	Chicago Mercantile Exchange	USD/lb.	765,089
Frozen Concentrate Orange Juice	ICE Futures US Softs	USD/lb.	206,598
Gasoline	New York Mercantile Exchange	USD/gal.	14,036,792
Gold	Commodity Exchange, Inc.	USD/t oz.	31,960,854
Hard Red Winter Wheat	Chicago Board of Trade	USD/bu.	5,829,377
Heating Oil	New York Mercantile Exchange	USD/gal.	11,822,198
Henry Hub Natural Gas	New York Mercantile Exchange	USD/MMBtu	35,657,120
Lead	London Metal Exchange	USD/MT	1,029,971
Lean Hogs	Chicago Mercantile Exchange	USD/lb.	3,294,821
Live Cattle	Chicago Mercantile Exchange	USD/lb.	3,518,903
Low Sulphur Gas Oil	ICE Futures Europe Commodities	USD/MT	14,113,332
Newcastle Coal	ICE Futures Europe Commodities	USD/MT	7,058
Nickel	London Metal Exchange	USD/MT	2,506,100
Oats	Chicago Board of Trade	USD/bu.	81,026
Palladium	New York Mercantile Exchange	USD/t oz.	747,480
Platinum	New York Mercantile Exchange	USD/t oz.	3,533,576
Richards Bay Coal	ICE Futures Europe Commodities	USD/MT	6,278
Robusta Coffee	ICE Futures Europe Commodities	USD/MT	1,119,074
Rotterdam Coal	ICE Futures Europe Commodities	USD/MT	11,553
Rough Rice	Chicago Board of Trade	USD/cwt	131,613
Primary Aluminum	London Metal Exchange	USD/MT	7,549,365
Silver	Commodity Exchange, Inc.	USD/t oz.	12,409,386
Soybean	Chicago Board of Trade	USD/bu.	18,607,309
Soybean Meal	Chicago Board of Trade	USD/T.	8,328,540
Soybean Oil	Chicago Board of Trade	USD/lb.	8,709,643
Sugar No.11	ICE Futures US Softs	USD/lb.	16,502,918
Sugar No.16	ICE Futures US Softs	USD/lb.	37,125
Tin	London Metal Exchange	USD/MT	144,824
Wheat	Chicago Board of Trade	USD/bu.	11,920,664
WTI Crude Oil	New York Mercantile Exchange	USD/bbl.	147,772,482
Zinc	London Metal Exchange	USD/MT	2,691,901

Note: Average daily trading value in 2019

Table A2. Commodities weights in indexes

Commodity	All	Agriculture	Energy	Metal	Food	Base Metal	Beverage	Precious Metal	Soft	Cereal	Meat	Vegatable Oil
Aluminum	3.1%			8.9%		23.9%						
Beef	4.0%	14.4%			18.2%						57.6%	
Brent Crude	18.4%		50.0%									
Cocoa	1.2%	4.5%					46.1%					
Coffee Arabica	1.4%	5.2%					53.9%					
Copper	6.5%			18.4%		49.6%						
Corn	2.1%	7.6%			9.6%					34.8%		
Cotton	1.6%	5.7%							51.7%			
Gold	19.7%			55.4%				87.9%				
Lead	0.7%			2.0%		5.3%						
Nickel	1.3%			3.7%		10.1%						
Oats	0.1%	0.4%			0.5%					1.7%		
Orange	2.1%	7.5%			9.5%							
Palladium	0.6%			1.6%				2.6%				
Platinum	0.8%			2.4%				3.8%				
Rice	1.2%	4.2%			5.3%					19.1%		
Rubber	1.5%	5.4%							48.3%			
Silver	1.3%			3.6%				5.7%				
Soybeans	3.6%	13.0%			16.4%							85.8%
Soybeans Oil	0.6%	2.1%			2.7%							14.2%
Sugar No. 11	2.7%	9.7%			12.2%							
Swine	2.9%	10.6%			13.4%						42.4%	
Tin	0.3%			0.9%		2.4%						
Wheat	2.7%	9.7%			12.3%					44.4%		
WTI Crude	18.4%		50.0%									
Zinc	1.1%			3.2%		8.6%						

Note: this table presents the list of commodity prices that cover the whole sample period (1990-2019).

A2.1 Orthogonality of Instruments

Table A3. Contemporaneous Relationships with Y_1

Variable (Y_i)	Y_i on BM Supply Proxy	BM Supply Proxy on Y_i
Monetary Policy Shock	−0.00116	−5.6834
	(0.1243)	(0.1243)
Global Economic Activity	0.04797	0.00015
	(0.9601)	(0.9601)
US Exchange Rate	0.00016	0.00033
	(0.9966)	(0.9966)
Oil Supply News Shock	−0.00128	−0.09151
	(0.8433)	(0.8433)

Notes: The table reports OLS estimates of the contemporaneous relationship between our instrument for base metal supply shocks and each of the remaining variables. *p*-values are reported in parentheses.

A2.2 Testing independence across central banks

To test the hypothesis that monetary policy shocks in one country do not Granger-cause central bank decisions of another country, we run a series of pairwise Granger tests. We test for causality in both directions. In a regression of current values of a given shock (x) on its own lags and on the lags of another monetary policy shocks (y), rejecting the null hypothesis that coefficients on the lags of y are jointly zero provides evidence that y precedes - Granger causes - x. We focus on US, Canada, Japan and the ECB. Some of the pairwise tests do not reject the null of no Granger causality, although in three cases we find that monetary policy decisions of one central bank - ECB, US, US - have affected decisions of another monetary authority - US, ECB, UK - respectively. In the case of US and European monetary authority decisions, the influence is mutual and Granger causality runs both ways.

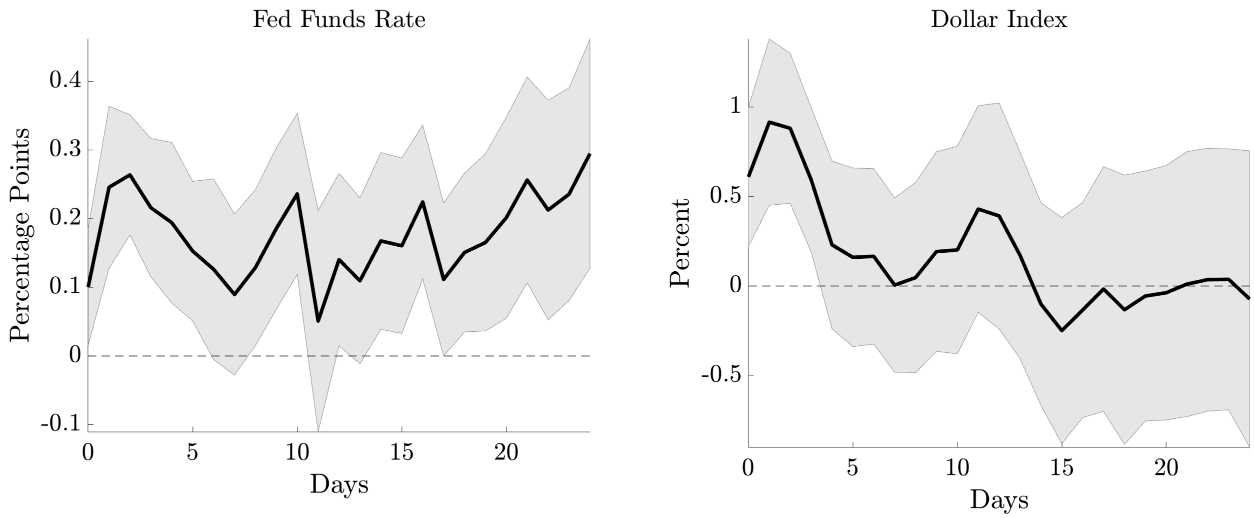
Table A4. Granger test results

Equation	Controls	Prob >chi2
US	Canada	0.109
Canada	US	0.267
US	Japan	0.658
Japan	US	0.374
US	ECB	0.012
ECB	US	0.029
US	UK	0.093
UK	US	0.007

Note: The third column shows the p value of a Wald test of the null hypothesis that the coefficients of the lagged values of the controls are jointly zero.

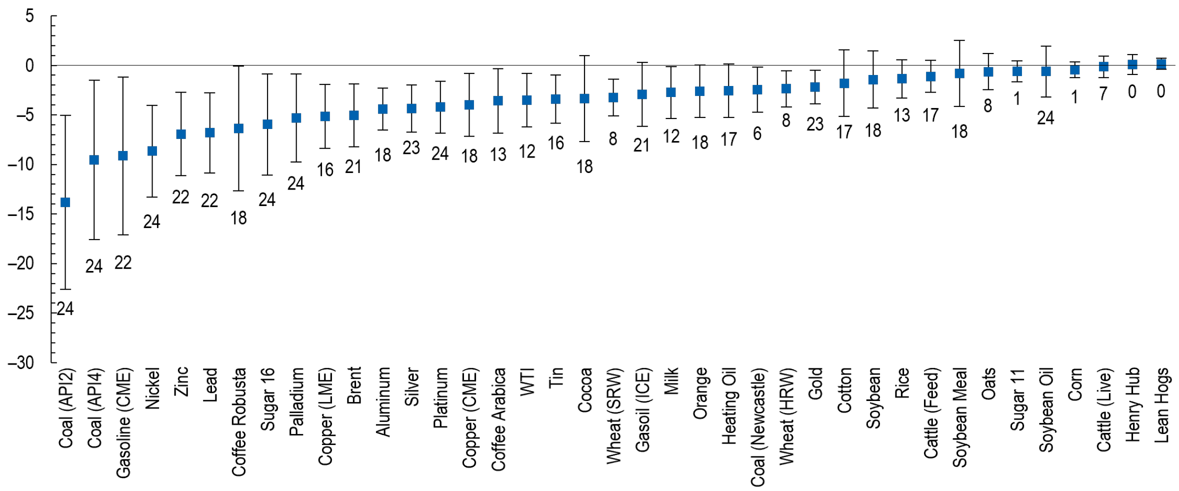
A3 Additional Figures

Figure A1. Impulse response of Fed Funds Rate and Dollar Index to a US monetary policy shock (Jarociński and Karadi, 2020)



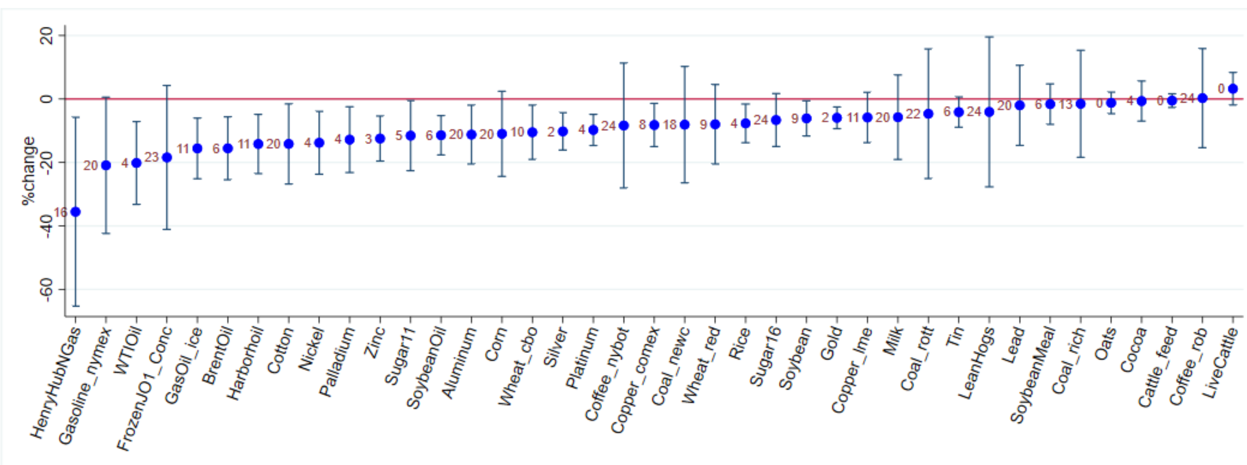
Note: This figure reports the 24-day (x-axis) response of the Fed Funds rate (left panel), normalized to be 10 basis points on impact, and dollar index (right) to a contractionary US monetary policy shock. The blue area represents 90% confidence bands, calculated using robust standard errors at each horizon.

Figure A2. Peak cumulative response of commodity prices to a 10bp increase in Fed funds rate.



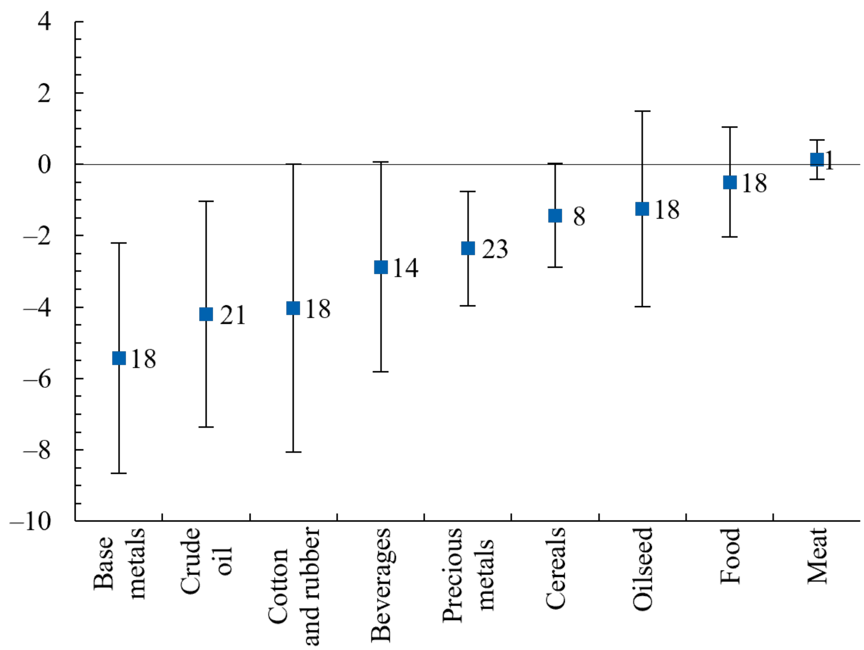
Note: 90% confidence bands reported. The numbers next to the box represent the day of the peak response.

Figure A3. Peak cumulative response of commodity prices to a 10bp increase in Fed funds rate (2016-2019).



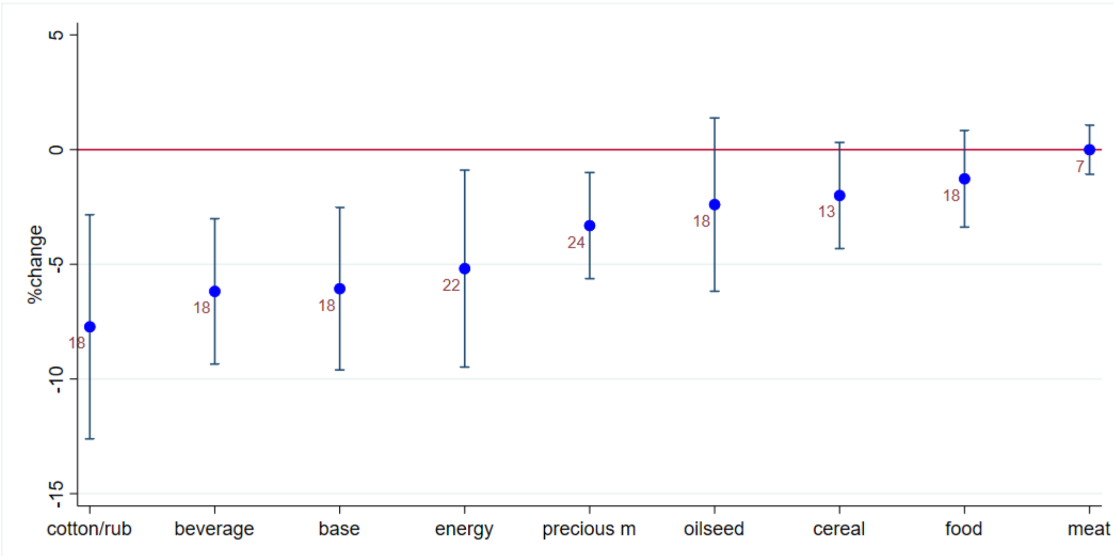
Note: 90% confidence bands reported. The numbers next to the box represent the day of the peak response.

Figure A4. Peak response of commodity price sub-indexes to a 10bp increase in Fed funds rate Jarociński and Karadi (2020).



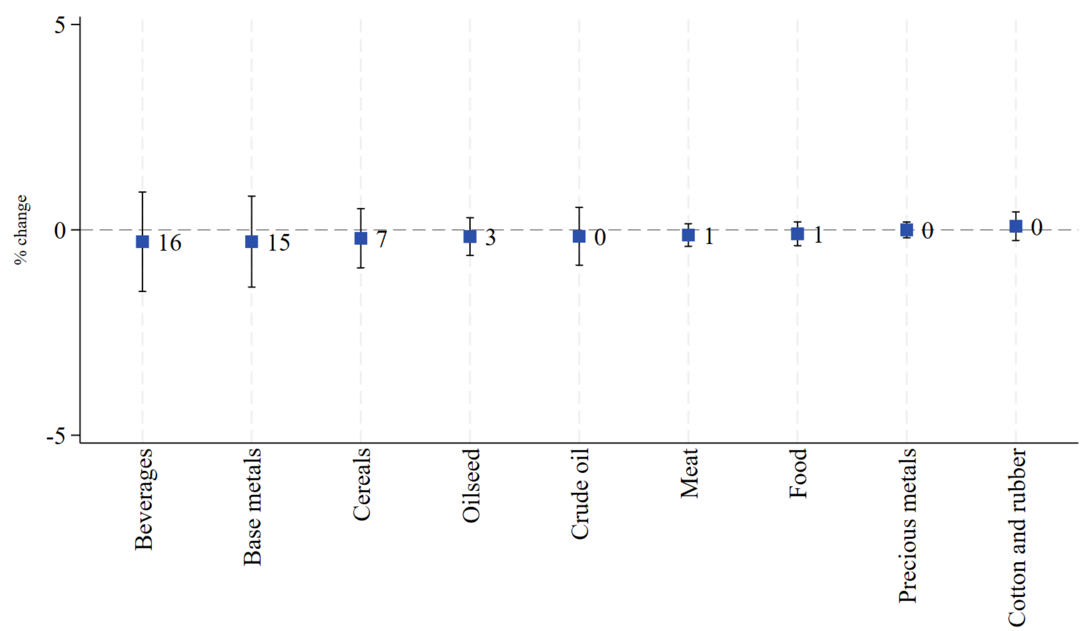
Note: This Figure shows the peak response of commodity prices, to a 10-basis points increase in the Fed funds rate, from estimating Equation (1). 90% confidence bands reported. The numbers by the box indicate the day (h) of the peak response.

Figure A5. Peak cumulative response of commodity prices to a 10bp increase in US rate: 1999-2019.



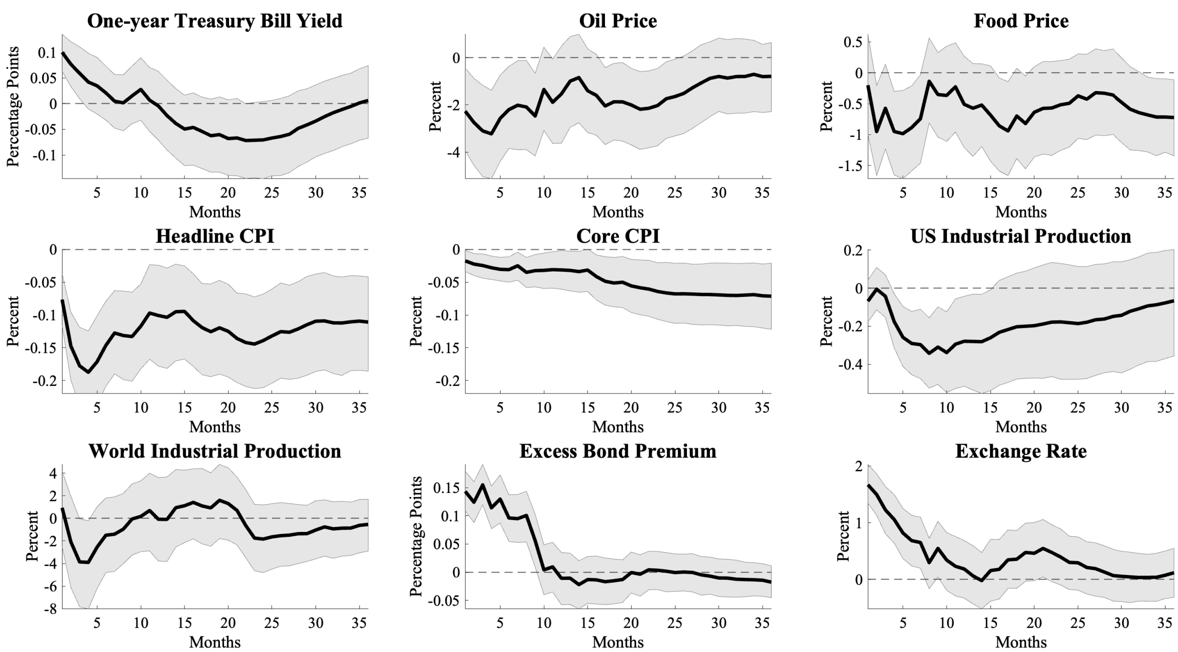
Note: 90% confidence bands reported. The numbers next to the box represent the day of the peak response.

Figure A6. Peak response of commodity price sub-indexes to a 10bp increase in UK interest rate



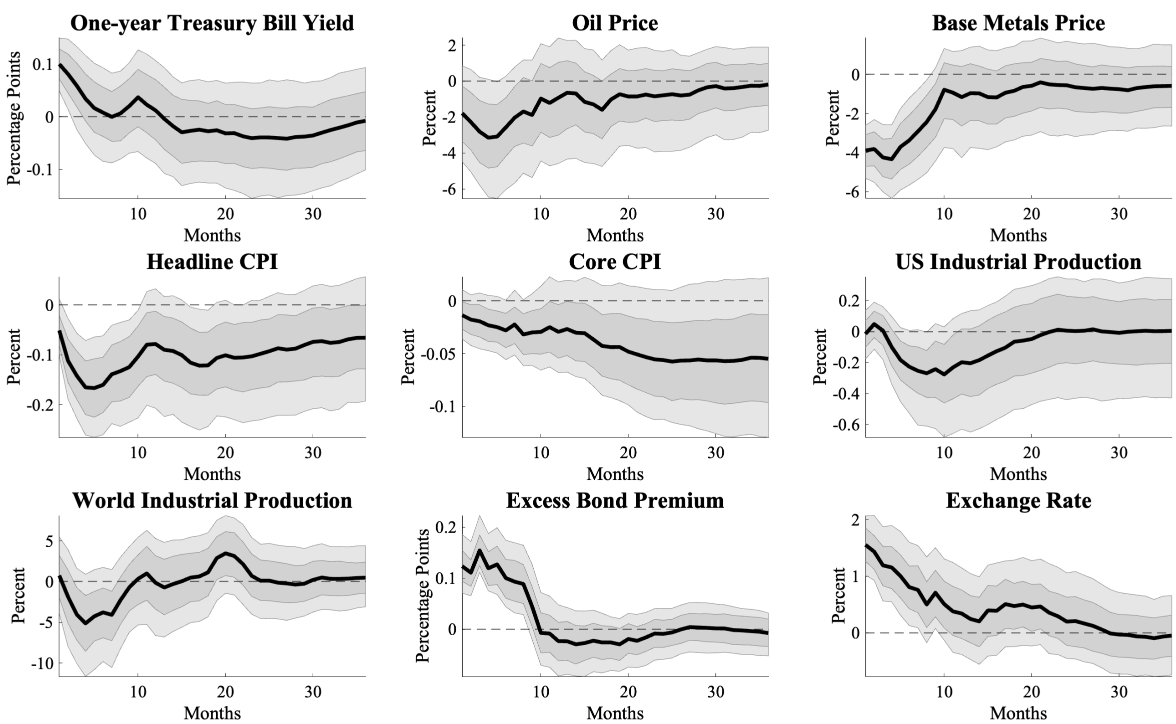
Note: 90 % confidence bands are reported. The sample period is 1997 to 2019. The numbers by the box indicate the day (h) of the peak response.

Figure A7. Impulse response to US monetary policy using the Proxy SVAR model: oil and food prices



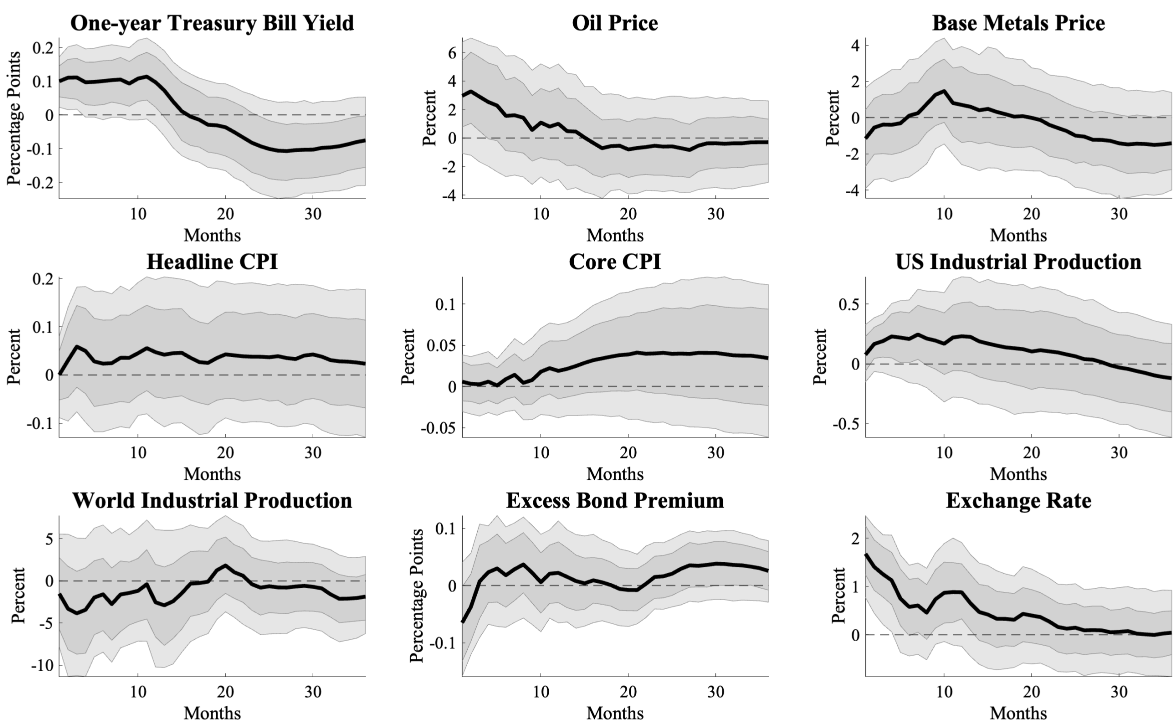
Note: The x-axis denotes months after the shock. The grey area denotes 68% confidence bands

Figure A8. Impulse response to US monetary policy using the Proxy SVAR model.



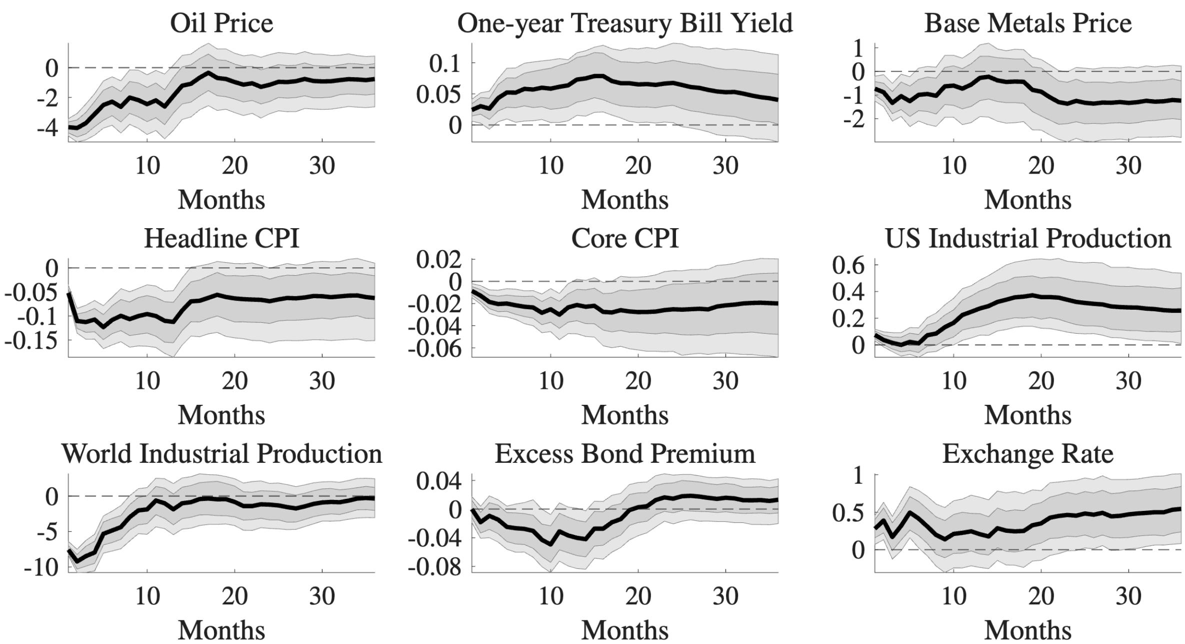
Note: The x-axis denotes months after the shock. The dark grey area denotes 68 percent confidence bands and the light grey area denotes 90 percent confidence bands.

Figure A9. Impulse response to US Central Bank Information shock



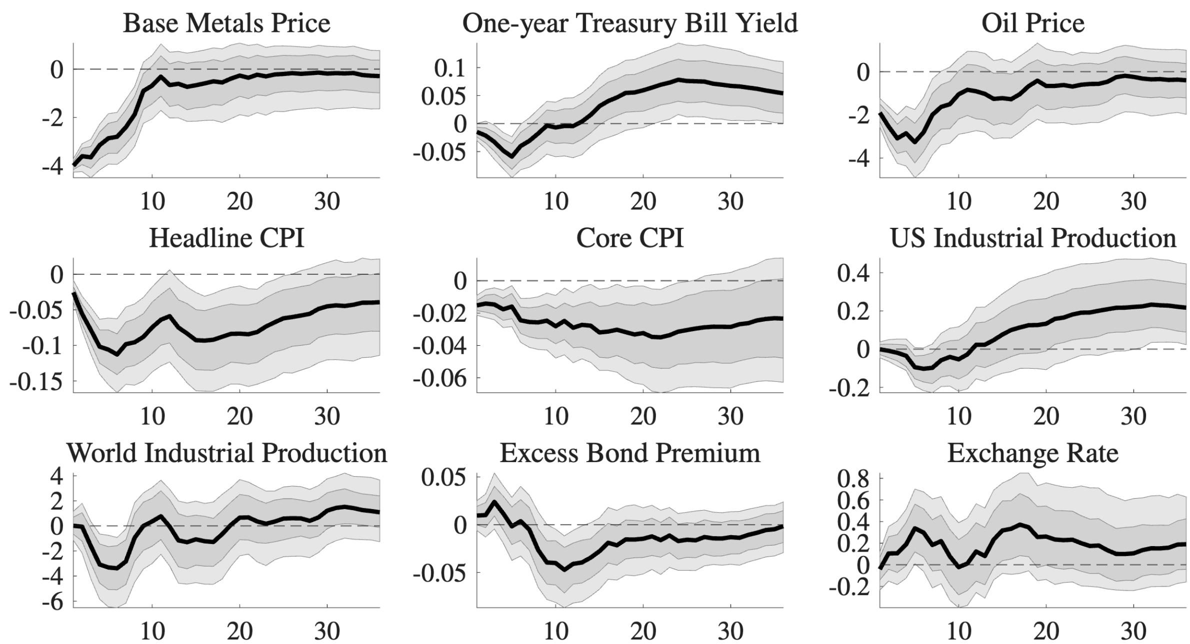
Note: The x-axis denotes months after the shock. The dark grey area denotes 68% confidence bands and the light grey area denotes 90% confidence bands.

Figure A10. Impulse response to Oil Price Shock Kilian (2024)



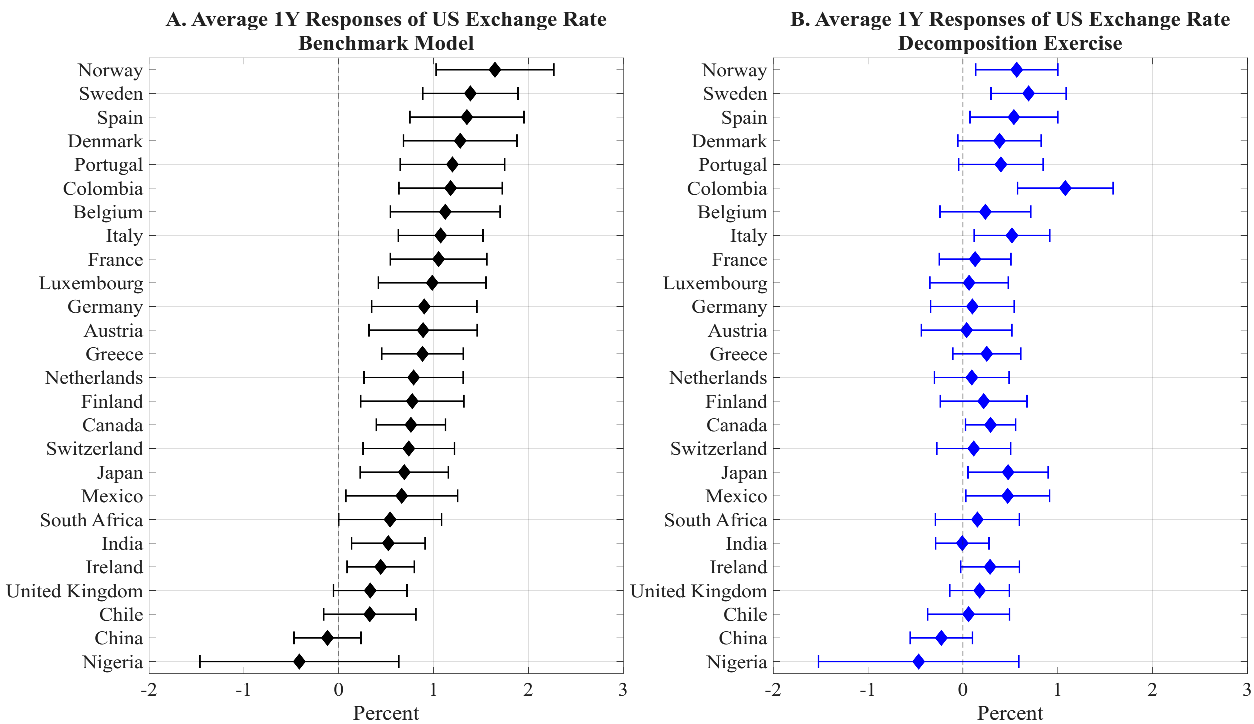
Note: The x-axis denotes months after the shock. The dark grey area denotes 68% confidence bands and the light grey area denotes 90% confidence bands.

Figure A11. Impulse response to Base Metal Price Shock



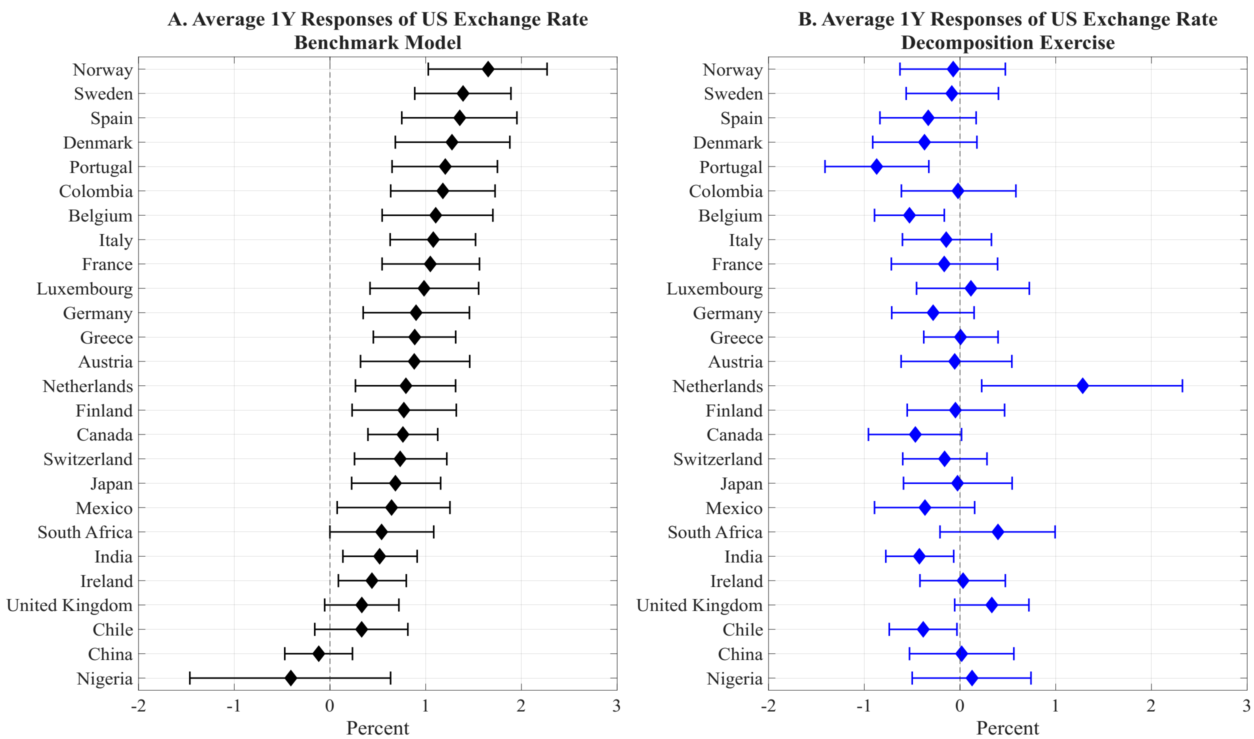
Note: The x-axis denotes months after the shock. The dark grey area denotes 68% confidence bands and the light grey area denotes 90% confidence bands.

Figure A12. 12-month effect of US monetary policy on countries exchange rate and zero-effects decomposition



Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Cesa-Bianchi and Sokol (2022). One-standard-error confidence bands are included.

Figure A13. 12-month effect of US monetary policy on countries exchange rate and external shocks' counterfactual



Note: The figure compares the average 12-month benchmark response with the counterfactual scenario when neither oil prices nor base metal prices are allowed to respond to the monetary policy shock, constructed following Sims and Zha (2006). One-standard-error confidence bands are included.