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(Occasional Papers)

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# US MONETARY POLICY SPILLOVERS TO THE EURO AREA

by Riccardo Degasperi\* and Fabrizio Venditti\*\*

## Abstract

We review the literature on US monetary policy spillovers, focusing on the channels of transmission that are most relevant for the euro area. Since the 2000s, the literature has increasingly stressed the role of financial markets, international trade and commodity prices in the transmission of US monetary policy and de-emphasized that of the bilateral exchange rate. We also present updated empirical evidence on the effects of US monetary policy on the euro-area economy, based on structural vector autoregressions and high-frequency identification of US monetary policy shocks. A rate hike by the Federal Reserve tightens financial conditions, depresses global activity, appreciates the US dollar and lowers the price of oil. The effects on the euro-area economy are recessionary and disinflationary, despite a depreciation of the euro.

**JEL Classification:** E5, F3, F4, C3.

**Keywords:** monetary policy, trilemma, exchange rates, monetary policy spillovers, international transmission, high-frequency identification.

**DOI:** 10.32057/0.QEF.2024.891

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\* DG Economics, Statistics and Research; via Nazionale 91, 00184 Rome, Italy. Email: [riccardo.degasperi@bancaditalia.it](mailto:riccardo.degasperi@bancaditalia.it) Web: [www.riccardo-degasperi.com](http://www.riccardo-degasperi.com)

\*\* DG Economics, Statistics and Research; via Nazionale 91, 00184 Rome, Italy. Email: [fabrizio.venditti@bancaditalia.it](mailto:fabrizio.venditti@bancaditalia.it) Web: [www.sites.google.com/site/fabriziovendittiecon/](http://www.sites.google.com/site/fabriziovendittiecon/)

We thank Marco Bernardini, Luisa Carpinelli, Stefano Neri, Giovanni Veronese, and Roberta Zizza for their useful



# 1 Introduction

The synchronized monetary policy tightening across advanced economies in response to the inflation surge of 2021-2022 highlighted the issue of international monetary policy coordination. The debate about policy spillovers gained renewed interest in mid-2024, when the ECB and other central banks in advanced economies started loosening policy while the Federal Reserve kept rates steady. In the euro area, this decoupling from the Fed raised worries over a possible revival of inflationary pressures due to a depreciation of the euro against the US dollar.

We provide two contributions to the debate. First, we selectively review the literature on US monetary policy spillovers, focusing on contributions that are relevant from a euro-area perspective. Such a selection is needed because the literature on the international effects of US monetary policy is vast and has grown tremendously in the past ten years. Most papers, however, highlight channels of transmission that are specific to emerging economies (EMEs). For instance, large stocks of debt denominated in US dollars amplify the negative effects on economic activity of a US monetary policy tightening. This is because the dollar appreciation makes debt harder to repay in dollar terms. However, the share of debt denominated in US dollars is very small for euro-area countries. Likewise, the depreciation of the domestic exchange rate is a more pressing issue for emerging markets than for advanced economies, due to the larger share of imported goods in their consumption basket.

Second, we present empirical evidence on the effects of US monetary policy on the euro area economy. The analysis updates and extends some of the existing work in the literature using state-of-art identification techniques and structural vector autoregressions. Using data between 1999 and 2024, we find that a rate hike by the Federal Reserve tightens financial conditions, depresses global activity, appreciates the US dollar and lowers the price of oil. The effects on the euro-area economy are recessionary and disinflationary, despite a depreciation of the euro. These effects are similar (qualitatively and quantitatively) to those that US monetary policy has on the domestic economy. This striking result is indeed not new in the literature, and is in line with findings in Ca'Zorzi et al. (2023).<sup>1</sup> The key point is that restrictive U.S. monetary shocks generate a tightening of global financial conditions and significant declines in oil prices (as outlined by the global financial cycle research strand by Helene Rey and co-authors) with rather homogeneous repercussions for advanced economies. The effects on euro area core inflation are, however, more muted on a shorter sample (ending in 2019). This is likely due to two factors. The first is the relatively

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<sup>1</sup>See in particular Chart C2 in the Appendix.

lower variability of consumer prices before 2019, which makes econometric estimates more uncertain. The second is the high sensitivity shown by euro-area core inflation to global energy prices in the more recent high-inflation episode. This has plausibly amplified, in the 1999-2024 sample, the role played by the commodity channel in transmitting US monetary policy shocks abroad.

## **2 The channels of transmission**

We discuss five channels through which US monetary policy affects advanced economies: (i) income absorption (ii) expenditure-switching (iii) financial linkages (iv) credit (v) commodity prices. The first two are part of the traditional Mundell-Fleming framework and not necessarily exclusive to the spillovers from US monetary policy. The remaining three are specific to the US and are related to the special role that US dollar denominated assets and the US dollar play in financial markets and in the invoicing of global trade.

### **2.1 The income channel**

In the traditional Mundell-Fleming framework, a tightening in the stance of US monetary policy rates has contractionary effects on the domestic economy, hence lowers demand for both domestic and foreign goods. Early empirical analyses find that this income effect is very strong in the short run, but peters out in the medium-longer run (Kim, 2001). Findings in Iacoviello and Navarro (2019) indicate that trade intensity with the United States contributes, to some extent, to explaining spillovers of U.S. monetary shocks to advanced economies. Dedola et al. (2017), however, find that this channel is more important for EMEs, especially for those with exchange rates pegged to the dollar, for which the fall in foreign demand is not cushioned by a depreciation of the domestic currency.

### **2.2 The expenditure-switching channel**

An increase in US interest rates relative to foreign rates leads to an appreciation of the US dollar. For a foreign economy, domestically produced goods and services become relatively less expensive than those produced in the US and attract domestic consumers. Imports fall and exports increase (i.e. the trade balance improves). Inflation in foreign economies also rises, as costlier imports and the trade balance improvement put pressure on consumer prices. Overall, through this channel, spillovers from tighter US monetary policy resemble



a positive demand shock and may potentially offset the income effect.<sup>2</sup> The strength of this offsetting effect, however, has been questioned by more recent papers for two reasons. First, in many cases, imports are invoiced in the currency of the importing country. In the euro area, in particular, around 50 percent of imports from extra-EU countries are priced in euros (Ortega and Osbat, 2020).<sup>3</sup> In this case (known as local currency pricing) the exchange rate pass-through on imports is significantly lower (Gopinath et al., 2010) and therefore there is less of an incentive for consumers to switch to domestic products when there is a depreciation. The degree of price stickiness plays an important role: the stickier the price adjustment, the lower the exchange rate pass-through. Gopinath et al. (2010) find that going from producer currency pricing, whereby imports are invoiced in the currency of the exporter, to local currency pricing reduces the exchange rate pass-through from 100 percent to 25 percent. This limits significantly the positive effects of the exchange rate depreciation on output as well as the upward pressure on prices. Second, a large share (about 40 percent) of global trade is invoiced in US dollars, regardless of the countries involved in the transaction (dominant currency pricing).<sup>4</sup> This implies that a broad appreciation of the US dollar makes imports more expensive even in bilateral exchanges among non-US economies, generally depressing global trade (Gopinath et al., 2020) and further contributing to the global recessionary effects of a US monetary policy tightening.

When two countries (A and B) trade in a vehicle country (i.e. a dominant currency that neither of them issues), the strength of the expenditure-switching channel depends on the relative share of exports and imports invoiced in the vehicle currency. Take the case in which a large share of the exports of country A to country B is invoiced in dollars. When the dollar appreciates, consumers in country B will switch to locally produced goods that have become relatively cheaper. Exports and economic activity in country A will correspondingly fall. At the same time, imagine that only a small share of the products that A imports from B is invoiced in dollars. Consumers in country A will also switch away from imports, due to the dollar appreciation, towards domestically produced products. This stimulates activity in country A via lower imports and higher domestic consumption, countering the recessionary

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<sup>2</sup>Kim (2001) finds that the expenditure-switching channel is stronger in the medium-long run and more than offsets the income effect discussed above.

<sup>3</sup>The share has remained fairly stable over time. Most of the remaining share of imports is invoiced in US dollars.

<sup>4</sup>Boz et al. (2022) document that the importance of both the dollar and the euro in trade invoicing has risen over time, despite the decline in the share of global trade accounted for by both economies. The euro, however, is used as a vehicle currency mostly by European economies outside of the euro area and in some parts of Africa, including countries of the CFA franc zone (see for instance Chart 24 in the 2021 report on the International role of the Euro, available at [https://www.ecb.europa.eu/pub/pdf/ire/article/ecb.ireart202106\\_03~152e664e63.en.pdf](https://www.ecb.europa.eu/pub/pdf/ire/article/ecb.ireart202106_03~152e664e63.en.pdf)).

effects due to lower exports. The net effect, however, is recessionary, if the share of exports to B invoiced in dollars is sufficiently large and the share of imports from B invoiced in dollars is sufficiently small.

### **2.3 The financial channel**

Besides the two traditional channels discussed above, US monetary policy affects the rest of the world through financial linkages. A Fed rate hike affects US yields at different maturities and reduces the prices of risky assets. Portfolio re-balancing by investors in the integrated global financial market raises foreign long-term yields and lowers foreign stock prices. This determines a positive correlation between the prices of US and foreign assets. Curcuru et al. (2018), for instance, find that on FOMC days over a third of the post announcement change in U.S. Treasury yields passes through to German yields. Asset purchases and forward guidance are transmitted internationally by generating a co-movement of domestic and foreign bond risk premia (Rogers et al., 2014, 2018).

The importance of the financial channel has risen over time, as financial integration has made cross-border capital reallocation easier and the international correlation of asset prices stronger, leading to a ‘Global Financial Cycle’ (Rey, 2013; Passari and Rey, 2015; Miranda-Agrippino and Rey, 2020; Miranda-Agrippino et al., 2020), driven not only by changes in the risk appetite of global investors but also by US monetary policy. The financial channel plays a major role in transmitting the recessionary effects of US monetary policy tightenings to the global economy (Rogers et al., 2014; Degasperri et al., 2020), and to the euro area (Ca’Zorzi et al., 2023). Advanced economies can contain these spillovers by easing monetary policy, while repercussions can be severe for fragile EMEs that enjoy less monetary autonomy (Dedola et al., 2017; Kalemli-Özcan, 2019).<sup>5</sup>

### **2.4 The credit channel**

By affecting asset prices and capital flows, US monetary policy has also an impact on the balance sheet position of global banks and on their cross-border exposure, ultimately influencing their lending decisions (Cetorelli and Goldberg, 2012; Bruno and Shin, 2015; Cerutti et al., 2017; Temesvary et al., 2018; Avdjiev and Hale, 2019; Morais et al., 2019;

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<sup>5</sup>The ECB analyzed the issue in its Strategy Review and concluded that “[...] over shorter horizons, global factors can affect monetary policy transmission [...]. Yet central banks have shown that they can resort to additional instruments such as asset purchases, forward guidance, macroprudential measures and the provision of foreign currency liquidity lines. Such measures [...] have helped to ensure monetary policy autonomy” (ECB, 2021).

Albrizio et al., 2020; Bräuning and Ivashina, 2020). A cross-country analysis, however, finds that “outside of highly financially open economies and emerging markets, international spillovers to non-bank private sector lending are significant but are not economically large” (Buch et al., 2019).

Closely related, the rising importance of Global Value Chains has increased the financing needs of multinational firms, which must finance larger stocks of inventories, payables, and receivables (i.e. they need more working capital). The use of the US dollar in invoicing makes credit in US dollars more important and working capital financing more sensitive to the strength of the US dollar, opening another channel of transmission of US monetary policy. Through working capital financing, a stronger dollar is associated with tighter funding conditions and lower trade. Bruno and Shin (2021) find that, following a dollar appreciation, exporters that are more reliant on dollar-funded bank credit suffer a greater slowdown in credit and exports.

## 2.5 The commodity channel

Neri and Nobili (2010) and Degasperis et al. (2020) highlight the key role of commodity markets in transmitting US monetary policy shocks. The intuition is that, since a US monetary policy tightening affects not only domestic conditions but also global demand, it also puts downward pressure on commodity prices. The effect on consumer prices is strong enough to generate a difference in the response of headline CPI compared to core CPI, which is larger the higher the share of commodity related goods in the CPI basket.

## 3 Empirical Analysis

Figure 1 presents the dynamic effects of a US monetary policy tightening for the main US and euro-area macroeconomic variables. The exercise is based on a structural vector autoregression, where identification of the effects of a US monetary policy tightening is obtained with instrumental variables techniques. High-frequency monetary policy surprises, that is jumps in the price of federal funds futures around FOMC announcements, are used as external instruments to capture exogenous changes in the US monetary stance. The baseline results in Figure 1 employ the instrument provided by Bauer and Swanson (2023).<sup>6</sup>

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<sup>6</sup>In order to derive robust conclusions, we also present results estimated on different samples, for different specifications, obtained with three alternative instruments among those proposed in the literature, the baseline being the one proposed by Bauer and Swanson (2023), displayed in blue lines and surrounded by grey credibility bands. See Appendix C for further details.

A US monetary policy tightening is recessionary and disinflationary both domestically and for the euro area. A one-standard-deviation contractionary shock – corresponding roughly to a 5 basis points rise in the 1-year treasury rate – induces a significant contraction of US industrial production on impact (by about 0.4 percent at the trough) and a protracted fall of headline CPI inflation. Financial markets contribute to this recessionary effect: the S&P 500 drops on impact by short of 3 percent, and the VIX – which measures implied volatility in the S&P 500 – increases on impact by more than 2 percentage points. The US dollar appreciates by 1 percent relative to the euro. The effects of US monetary policy are global. Global economic activity, proxied by world industrial production (Baumeister and Hamilton, 2019)<sup>7</sup>, contracts in line with US and euro-area activity. The price of Brent drops on impact by roughly 3 percent, contributing to the fall of headline inflation. Both the trade and the commodity channels are active, the latter result confirming findings in Neri and Nobili (2010) and Degasperi et al. (2020). The effects in the euro area are comparable in terms of sign, magnitude, and dynamics, to those in the US. Euro-area economic activity and inflation (both headline and core) fall in response to a US monetary policy shock. Policy rates in the euro area tend to fall, an indication that the ECB has historically leaned against these foreign shocks.<sup>8</sup> Yet, both the easing and the exchange rate depreciation fail to completely offset the recessionary and disinflationary effects of the shock.

Results from a larger model indicate that the financial channel contributes to conveying these shocks, as the Excess Bond Premium (EBP, a popular measure of risk appetite in financial markets) rises and euro-area stock prices fall. (Figure 2)

Also, separate estimates for services and non-energy industrial goods (NEIGs) inflation indicate a very similar response, confirming that the impact of the exchange rate depreciation, which should show up as a difference in the response of the prices of tradable and non-tradable products, is weak (Figure 3).

The fall in euro-area inflation is, to some extent, explained by the contraction in oil prices. Results from a counterfactual scenario where the price of Brent is kept steady are presented in Figure 4. The red areas report the unrestricted response, while the blue, dashed lines, show the effects of the US monetary policy shock in a counterfactual scenario in which the response of Brent price is completely offset by a sequence of oil supply news

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<sup>7</sup>The index measures monthly industrial production for OECD plus six other major countries (Brazil, China, India, Indonesia, the Russian Federation, and South Africa), providing a proxy of world industrial production. It is available at [https://drive.google.com/uc?export=download&id=1i5g107FbEUoWQrIdSpB\\_ZWBcN1Zuxm0R](https://drive.google.com/uc?export=download&id=1i5g107FbEUoWQrIdSpB_ZWBcN1Zuxm0R).

<sup>8</sup>For instance, the ECB introduced forward guidance as a reaction to the “Taper Tantrum” (Coenen et al., 2022, p. 18).

shocks.<sup>9</sup> When the oil price channel is shut, the contraction in both headline and core prices is more contained, both for the US and the EA, confirming the relevance of the commodity channel and that the global repercussions of US monetary policy are an important element of spillovers to the euro area.

The effects on euro-area core inflation are, however, more muted on a shorter sample, ending in 2019 (Figure 5). This is likely due to two factors. The first is the relatively lower variability of consumer prices before 2019, which makes econometric estimates more uncertain. The second is the high sensitivity shown by euro-area core inflation to global energy prices in the more recent high-inflation episode. This has plausibly amplified, in the 1999-2024 sample, the role played by the commodity channel in transmitting US monetary policy shocks abroad.

## 4 Conclusions

We review the literature on US monetary policy spillovers with a focus on papers relevant for the euro area. We highlight five channels through which US monetary policy affects the euro area: income absorption, expenditure-switching, financial linkages, credit, and commodity prices. The central role played by the US dollar as a vehicle currency for trade and in financing longer global value chains, and the importance of the US economy in global financial markets amplify the foreign effects of US monetary policy. These channels of transmission have become more relevant as globalization has progressed, while the importance of bilateral exchange has fallen.

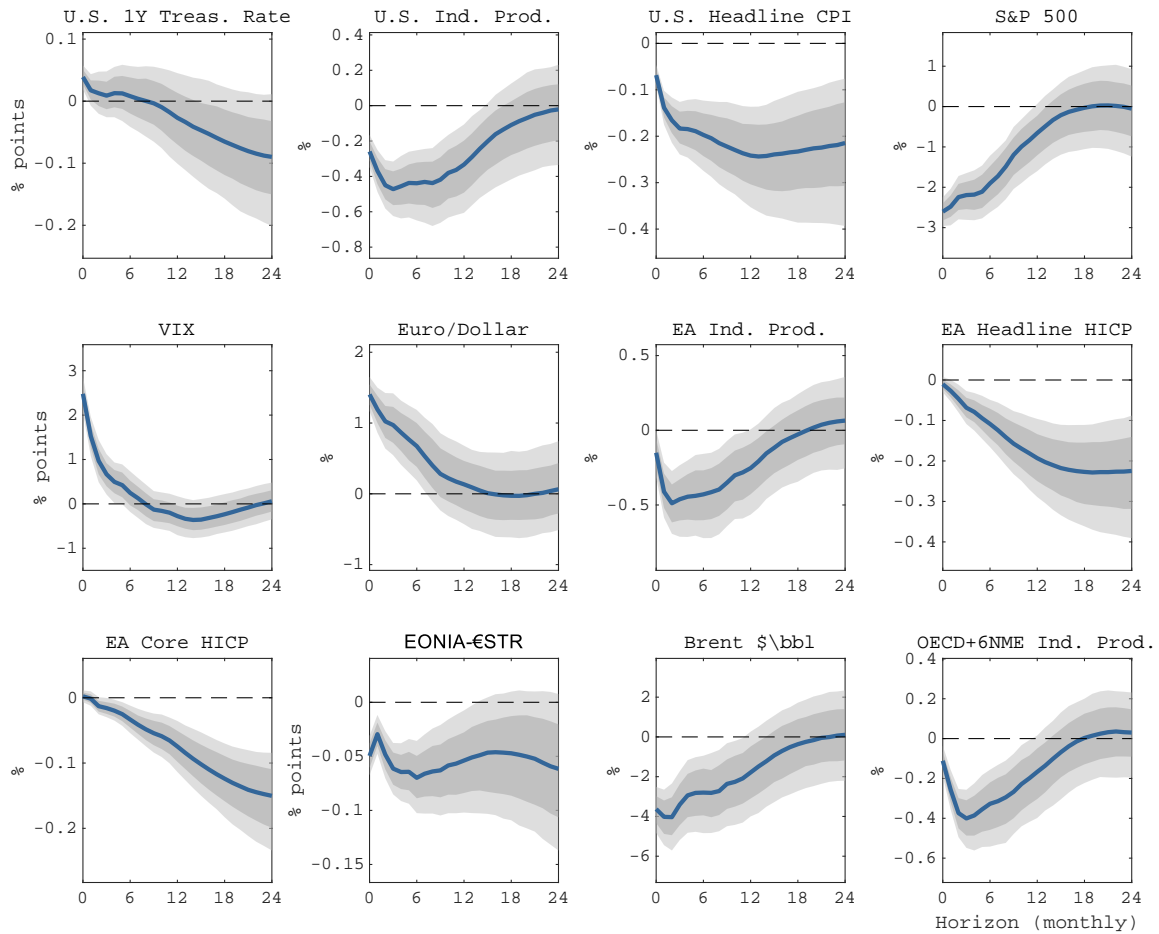
The empirical section, by using different identification strategies, different samples, and different specifications, provides robust estimates of the spillover effects of a US conventional monetary policy shock on the euro-area economy. In line with the literature, the results indicate that US monetary policy has sizeable effects on the euro area economy that are similar (qualitatively and quantitatively) to those on the domestic economy. A rate hike by the Federal Reserve tightens financial conditions, depresses global activity, appreciates the US dollar and lowers the price of oil. The effects on the euro-area economy are recessionary and disinflationary, despite a depreciation of the euro.

All in all, our analysis confirms the central role of the Federal Reserve in financial markets and the challenge that this represents for stabilization policies and for domestic monetary autonomy. Worries about monetary policy autonomy are mitigated by three considerations.

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<sup>9</sup>The methodology is based on Antolin-Diaz et al. (2021).

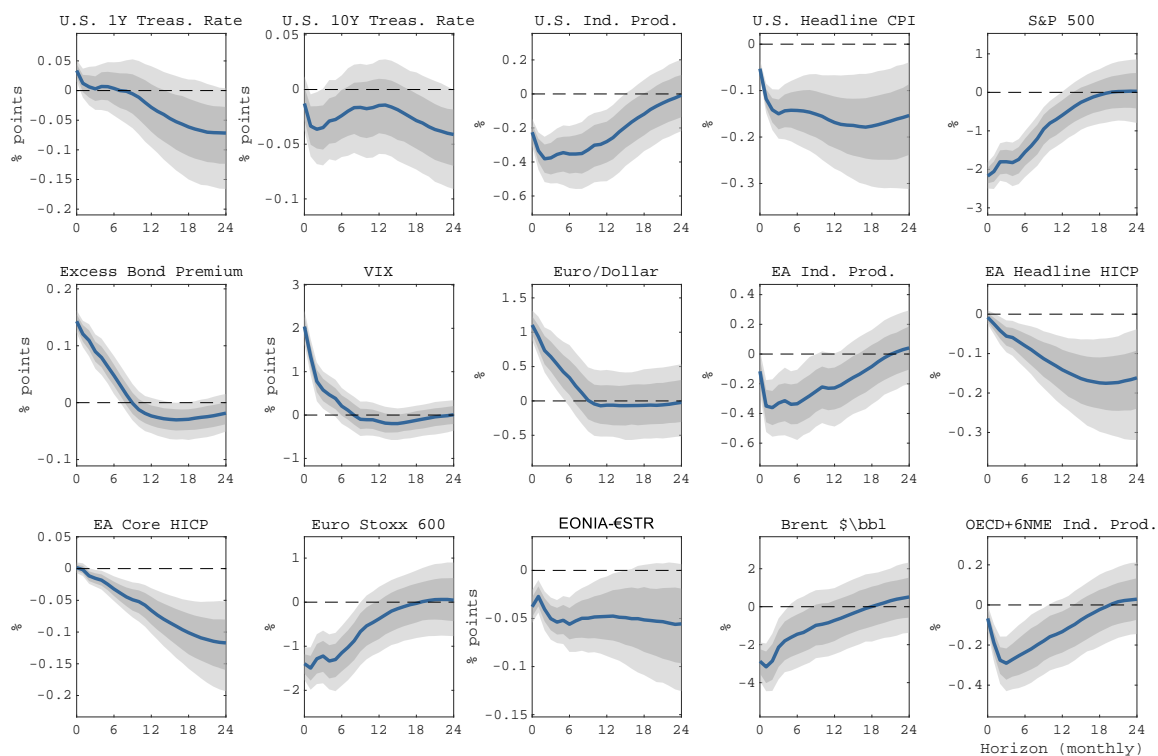
Figure 1: DOMESTIC AND SPILLOVER EFFECTS OF A U.S. TIGHTENING



*Note to Figure 1:* Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors. The shocks are identified by external instrument from Bauer and Swanson (2023). Sample length: 1999:01 – 2024:02. The shaded areas represent 68 percent and 90 percent credibility regions.

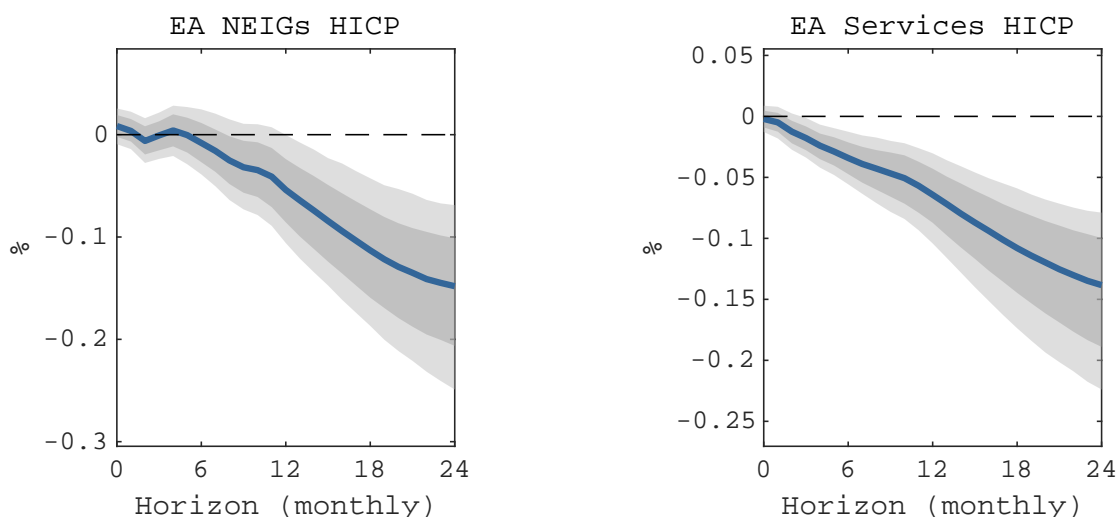
First, inflation and business cycles in the US and the euro area are also positively correlated. This implies that, by stabilizing the US economy, the Fed often contributes to stabilizing the euro-area economy. This was, for instance, the case in 2022, when US interest rates hikes helped defusing inflation around the globe. Second, the results of our analysis highlight that monetary and other cyclical policies are complementary. Limiting leverage through macroprudential policies, for instance, also contains spillovers via financial markets, granting more space and autonomy to domestic monetary policies. Third, shocks of a monetary nature, while generating statistically significant effects, explain a small share of the variability of key macroeconomic variables. Other shocks, whether domestic in nature or originating directly in financial markets, have quantitatively larger effects. In response to these, monetary autonomy obviously remains an important tool.

Figure 2: DOMESTIC AND SPILLOVER EFFECTS OF A U.S. TIGHTENING (LARGE MODEL)



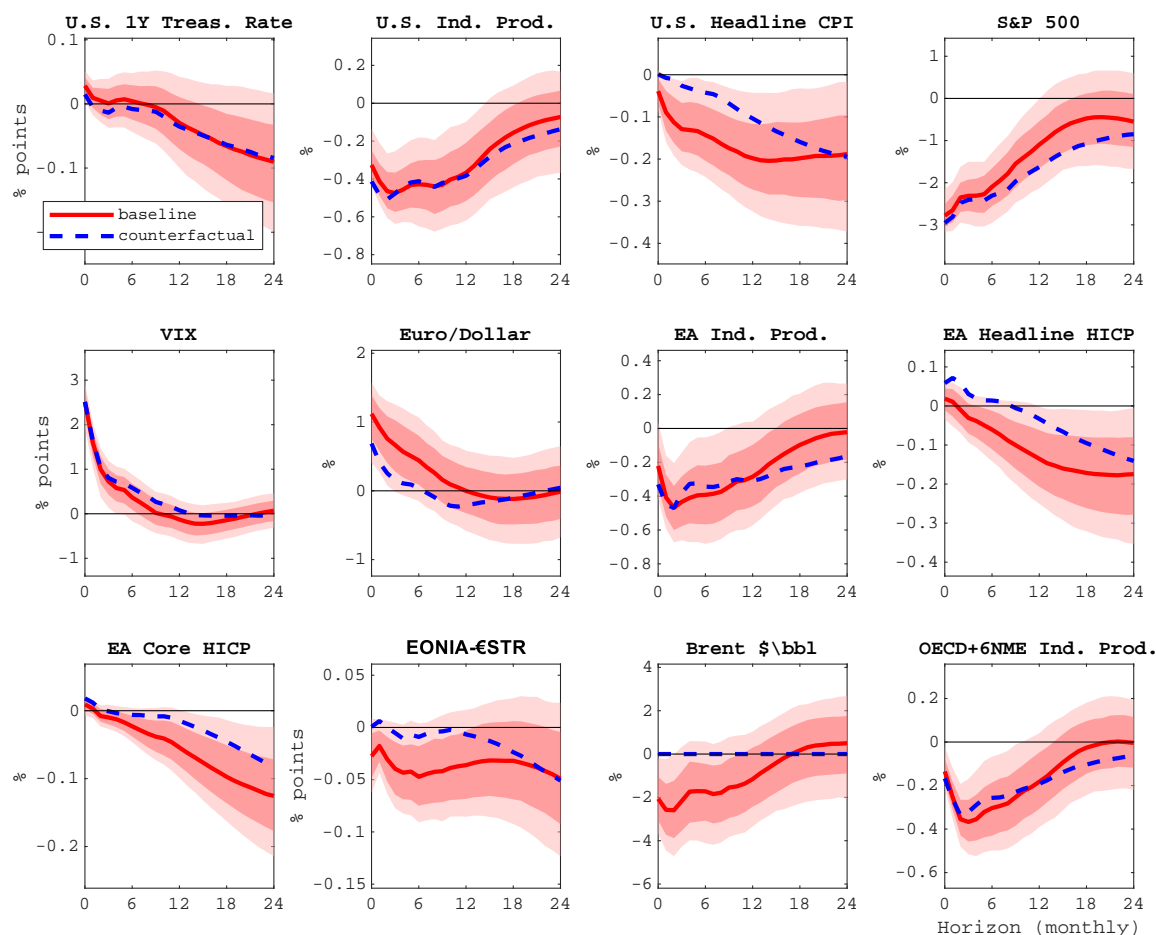
Note to Figure 2: Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors. The shocks are identified by external instrument from Bauer and Swanson (2023). Sample length: 1999:01 – 2024:02. The shaded areas represent 68 percent and 90 percent credibility regions.

Figure 3: SPILLOVERS TO SERVICES AND NEIGS HICP



Note to Figure 3: Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors. The endogenous variables are the same as those in Figure 1, but replacing Core HICP with either NEIGs or Services HICP. The shocks are identified by external instrument from Bauer and Swanson (2023). Sample length: 1999:01 – 2024:02. The shaded areas represent 68 percent and 90 percent credibility regions.

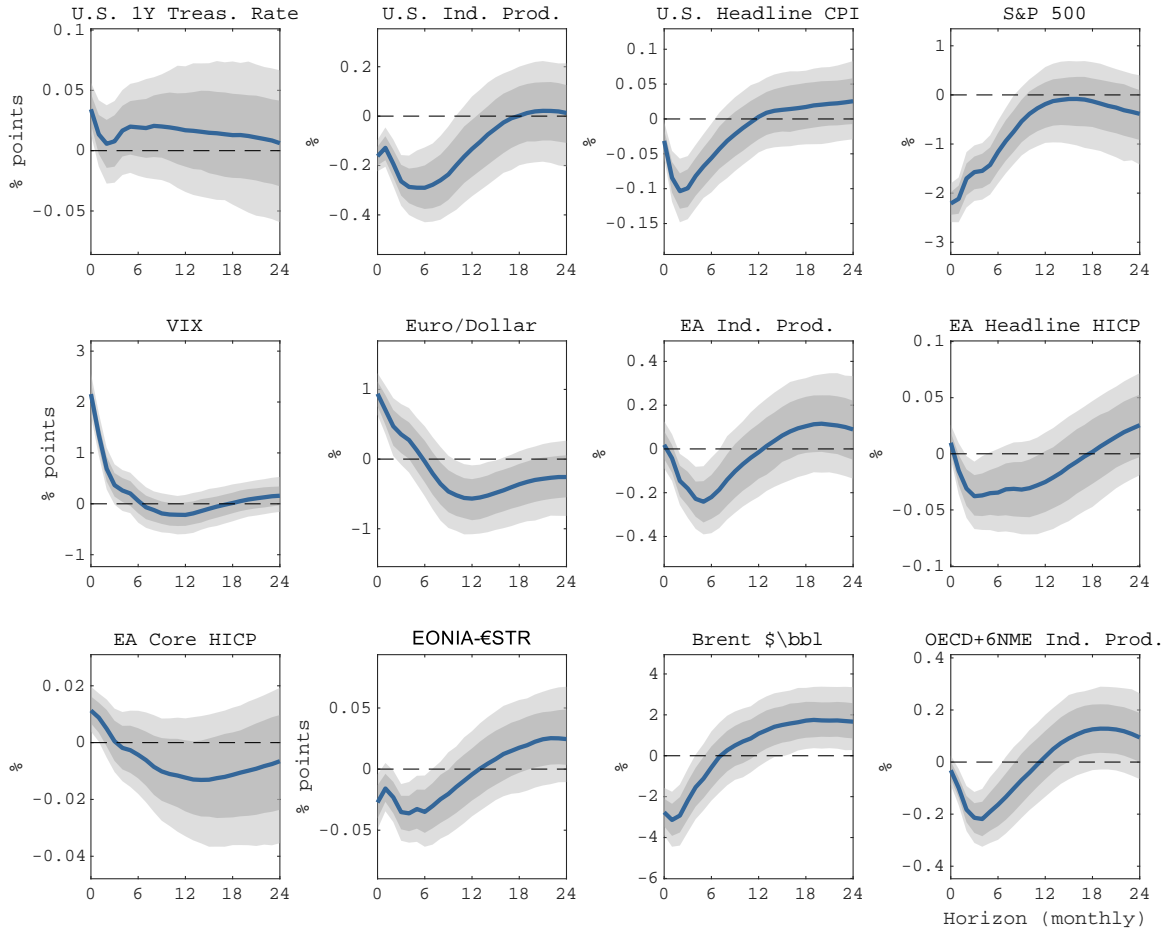
Figure 4: STRUCTURAL SCENARIO ANALYSIS – THE OIL PRICE CHANNEL



*Note to Figure 4:* Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors under a baseline scenario where the only shock is a U.S. monetary policy one and under a counterfactual scenario where, on top of the monetary policy impulse, the price of Brent is kept at the steady state by a sequence of oil supply news shocks. The methodology is based on Antolin-Diaz et al. (2021). The shocks are identified by external instrument from Bauer and Swanson (2023) and Känzig (2021). Sample length: 1999:01 – 2024:02. The shaded areas represent 68 percent and 90 percent credibility regions.



Figure 5: DOMESTIC AND SPILLOVER EFFECTS OF A U.S. TIGHTENING (REDUCED SAMPLE)



*Note to Figure 5:* Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors. The shocks are identified by external instrument from Bauer and Swanson (2023). Sample length: 1999:01 – 2019:12. The shaded areas represent 68 percent and 90 percent credibility regions.

# Supplementary Material

## A The Global Financial Cycle: additional papers

One of the central findings of the studies on the Global Financial Cycle is that shocks to the Global Financial Cycle appear to affect equally economies with flexible and pegged exchange rates, morphing the classical Trilemma of international economics, according to which an open capital account, an exchange rate peg, and autonomous monetary policy cannot coexist, into a dilemma, whereby capital account openness and monetary policy autonomy cannot coexist, irrespective of the exchange rate regime (Rey, 2013; Farhi and Werning, 2014; Edwards, 2015; Hofmann and Takats, 2015; Rey, 2016; Davis and Presno, 2017; Han and Wei, 2018). Most of the literature has concluded that these stark implications may be valid for fragile EMEs (see Appendix B) but that, in general, the Trilemma is still valid for advanced economies and less fragile developing economies (Georgiadis and Zhu, 2021),

Related to the existence and importance of a global financial cycle, Forbes and Warnock (2012) finds that capital flows cycles are driven predominantly by global factors, and in particular by global risk. However, they do not find evidence that these cycles are driven by US monetary policy. Cerutti et al. (2019) debates the importance of a global financial cycle, as it does not explain more than a quarter of the variation in capital flows. Acalin and Rebucci (2020) documents that the global financial cycle on average explains more than half of the variation in country-specific equity market returns, but it explains only a small fraction of the business cycle variation. Ha et al. (2020) studies the importance of country-specific and global macro factors relative to financial spillovers in explaining macroeconomic cycles in G7 countries. The global macro factor is a major driver of the macro cycle, but also shocks to equity and house prices that spill over to the real cycle play an important role. Déés and Galesi (2019) find that US monetary easings, both conventional and unconventional, generate a Global Financial Cycle that boosts economic activity worldwide, regardless of the exchange rate regime. Network effects amplify the importance of these spillovers. Jordà et al. (2019) uses a sample with 150 years of data for 17 advanced economies to show that the comovement of credit, equity and house prices has become stronger starting in the 1990s. Guichard (2017) reviews the relevant literature.

The overarching importance of US monetary policy relative to the monetary policies of other financial centres has been documented in many studies. For instance, Ehrmann and Fratzscher (2005) find that spillover effects from the US to the EA are stronger than in the opposite direction, but US markets are increasingly more reactive to euro area developments. Along the same line, Ca'Zorzi et al. (2023) compare the spillover effects generated by US

and Euro Area monetary policies and conclude that US spillovers are stronger. Fratzscher et al. (2016) find that unconventional EA policies had negligible effects on bond yields of countries outside the EA, but more sizable effects on equity markets. Apostolou and Beirne (2019) study the effect of volatility spillovers from the US and EA unconventional monetary policies to EMEs and find that, while the effect on stock and bond markets are similar, the effect on currency markets is greater when the shock originates in the US. Antonakakis et al. (2018) study the connectedness of the US, the EA, the UK and Japan, and find that EA spillovers are actually bigger than US ones (see also Aizenman et al., 2016; Morais et al., 2019; Brusa et al., 2020).

Several papers try to assess the degree of monetary autonomy granted by flexible exchange rates. Part of the literature documents that short-term rates of flexible exchange rate countries are less correlated to the centre country policy rate than those of peggers and interpret this as evidence that the Trilemma is still valid (for instance, Shambaugh, 2004; di Giovanni and Shambaugh, 2008; Goldberg, 2013; Klein and Shambaugh, 2015; Obstfeld, 2015; Georgiadis and Mehl, 2016; Aizenman et al., 2016; Caceres et al., 2016; Obstfeld et al., 2018, 2019).

A vast part of the literature tries to define and quantify the financial channel of US monetary policy, through which US domestic financial conditions are exported to the rest of the world. These papers focus on the international credit channel, by which appreciations of the dollar cause valuation effects on the balance sheets of countries that have assets and liabilities denominated in dollars, and on the risk-taking channel, by which US monetary policy affects the risk profile and the leverage of financial institutions, firms, and investment funds (Adrian and Song Shin, 2010; Ammer et al., 2010; Devereux and Yetman, 2010; Borio and Zhu, 2012; Bekaert et al., 2013; Morris and Shin, 2014; Bruno and Shin, 2015; Adrian et al., 2019; Cesa-Bianchi and Sokol, 2019; Kaufmann, 2020).

## **B Spillovers of U.S. Monetary Policy to EMEs**

An extensive part of the literature focusses on spillovers to emerging markets. The works of Canova (2005) and Maćkowiak (2007) find powerful spillover effects originating from advanced economies, and the US in particular, that affect aggregate macro and financial conditions in emerging markets. Some papers try to identify the determinants of the strength of these spillover effects. For instance, Ahmed et al. (2017) explore the importance of economic fundamentals in accounting for the vulnerability of EMEs to global financial shocks.

They find that emerging markets that experience larger capital inflows and greater exchange rate appreciation prior to financial crises are the ones that suffer the biggest deterioration in financial conditions. Aizenman et al. (2016) study the sensitivity of emerging markets to movements in policy rates, stock market prices, and exchange rates in four advanced economies conditional to a wide range of determinants. Coman and Lloyd (2019) show that EMEs with tighter prudential policies face smaller spillovers.<sup>10</sup>

A few papers document the importance of risk premia in the transmission of US financial conditions to emerging markets. Kalemli-Özcan (2019) shows that US monetary policy has larger spillover effects for EMEs than for AEs via its differential effect on risk premia. Higher risk premia in EMEs impair the transmission of domestic monetary policy to short rates. A policy that limits exchange rate volatility might then be very costly because it requires bigger movements in the policy rate. In this sense, exchange rate flexibility matters for the international transmission of monetary policy.<sup>11</sup> This study, together with Akinci and Queralto (2019), also shows how exchange rate stabilisation might be counterproductive for EMEs.

## C Monetary policy shocks identification

Identification of an exogenous change in the stance of US policy rates is obtained using an instrumental variable approach. The instrument, a high-frequency market surprise around monetary policy announcements, has been widely used in the literature (Gürkaynak et al., 2005; Gertler and Karadi, 2015). However, recent studies have highlighted the existence of a signaling channel of monetary policy that challenges the exogeneity of this instrument.

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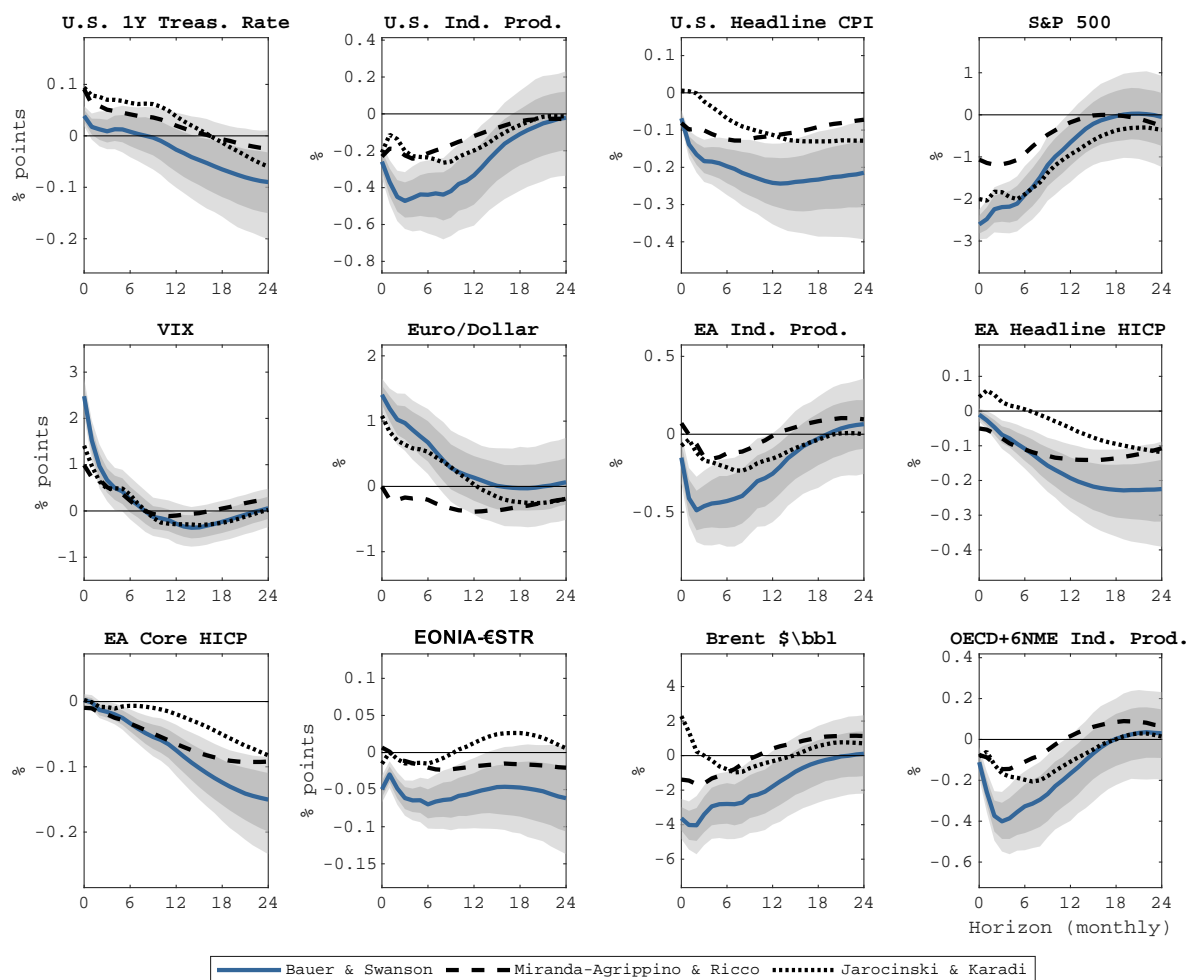
<sup>10</sup>Many papers find that flexible exchange rates do not insulate emerging economies from centre-country monetary spillovers. For instance, Takats and Vela (2014) document that US monetary conditions drive EME policy rates beyond what domestic factors would suggest. Similarly, Bhattarai et al. (2017) measure US monetary policy spillovers for a panel of 15 EMEs that are financially open and with flexible exchange rate regimes and find that they tend to mimic the monetary policy of the US, destabilising domestic conditions. Siklos (2018) studies the response to an exchange rate shock in 13 emerging markets and finds that there is no clear-cut monetary policy strategy that can insulate EMEs from external shocks. Many papers study the spillover effects from unconventional policies. Chen et al. (2014) find that spillovers from unconventional monetary policies are larger because of structural factors, such as the use of new instruments (asset purchases). Anaya et al. (2017) find that US expansionary unconventional monetary policy increases portfolio flows to EMEs and EMEs react by loosening domestic monetary policy, regardless of their exchange rate regime. Bhattarai et al. (2021) also find strong spillover effects of US QE on EMEs. A few papers deal with information shocks and shocks that are anticipated. Hoek et al. (2020) use a sign restriction similar to Jarociński and Karadi (2020a), where US monetary policy surprises that comove positively with stock prices are defined as ‘growth shocks’, while those that comove negatively are ‘monetary shocks’. They show that EMEs experience mild, or even positive, spillovers when facing a growth shock. Vicendoa (2019) studies the spillovers of US anticipated and unanticipated monetary policy shocks to emerging markets and find that they have similar effects.

<sup>11</sup>See also Akinci (2013), Albagli et al. (2019), and di Giovanni et al. (2020).

Monetary policy actions send signals to imperfectly informed agents about the Fed’s view of the economic state (Melosi, 2017). For agents with limited information, a policy rate hike can indicate either a deviation of the central bank from its monetary policy rule (a contractionary monetary shock) or better-than-expected economic fundamentals to which the monetary authority is responding.

Three strategies to separate these two different elements have been proposed in the literature. Miranda-Agrippino and Ricco (2021) take the residual from a regression of these surprises on Greenbook forecasts and revisions, which capture the private information set of the Fed. Jarociński and Karadi (2020a) classify a surprise as “monetary policy shock” if within the same window interest rates and stock prices have moved in opposite directions. Bauer and Swanson (2023) extend the surprises to speeches by FOMC members and clean them from information effects by orthogonalizing them with respect to macroeconomic and financial data that pre-date the announcements/speeches. The note presents results obtained with all three instruments. Figure C.1 replicates Figure 1 with all three instruments.

Figure C.1: DOMESTIC AND SPILLOVER EFFECTS OF A U.S. TIGHTENING (FULL SAMPLE, RESULTS OBTAINED WITH DIFFERENT INSTRUMENTS)



*Note to Figure C.1:* Impulse responses to a one-standard-deviation contractionary monetary policy shock from a Bayesian VAR(12) with standard Normal-Inverse-Wishart priors. The shocks are identified by external instrument from Bauer and Swanson (2023), Miranda-Agrippino and Ricco (2021) as extended in Degasperi and Ricco (2021), and Jarociński and Karadi (2020b). Sample length: 1999:01 – 2024:02. The shaded areas represent 68 percent and 90 percent credibility regions.

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