Heaven or Earth?
The Evolving Role of Global Shocks for Domestic Monetary Policy

Kristin Forbes—MIT-Sloan School of Management, NBER and CEPR
Jongrim Ha—World Bank-Prospects Group
M. Ayhan Kose—World Bank-Prospects Group, Brookings Institution and CEPR*

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Abstract: Business cycles are increasingly driven by global shocks, rather than the domestic demand shocks prominent in earlier decades, posing challenges for central banks seeking to meet domestic mandates and communicate their policy decisions. This paper analyzes the evolving influence and characteristics of global and domestic shocks in advanced economies from 1970-2024 using a new FAVAR model that decomposes movements in interest rates, inflation, and output growth into four global shocks (demand, supply, oil, and monetary policy) and three domestic shocks (demand, supply, and monetary policy). We find that the role of global shocks has increased sharply over time and that their characteristics differ from those of domestic shocks across multiple dimensions. Compared to domestic shocks, global shocks have a larger supply component, higher variance, more persistent effects on inflation, and are more asymmetric (contributing more to tightening than to easing phases of monetary policy). As global supply shocks have become more prominent, central banks have also been less willing to "look through" their effects on inflation than for comparable domestic shocks. The distinct characteristics and rising influence of global shocks—particularly global supply shocks—have significant implications for modeling monetary policy and designing central bank frameworks.

Keywords: Demand shocks; supply shocks; geopolitical risk; oil prices; supply-chain disruptions; global uncertainty, central banks, Federal Reserve; European Central Bank

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* Email contacts for authors: kjforbes@mit.edu, jongrimha@worldbank.org, and akose@worldbank.org. Thanks to Silvia Miranda-Agrippino, Mirco Balatti, Mario Crucini, Veronica Guerrieri, Anil Kashyap, Dohan Kim, Annie Soyean Lee, Benoit Mojon, Nikita Perevalov, Guillermo Verduzco Bustos, Eric Swanson, and participants at the 2025 CEPR-KIEL Conference, 2025 Macroeconomic Policy Perspectives Conference, 2025 Asia Economic Policy Conference, and 2025 Fall NBER IFM meetings for their valuable feedback on early drafts. The findings, interpretations, and conclusions expressed in this paper are those of the authors and should not be attributed to the institutions with which they are affiliated.

... if you know Heaven and know Earth, you may make your victory complete ... Sun Tzu (5th century BC)

In this era of hyperglobalisation, are central banks still masters of their domestic monetary destinies? Or have they become slaves to global factors? ... Mark Carney (2015)

I. Introduction

In the fifth century BC, the Chinese philosopher and military strategist Sun Tzu wrote about the importance of understanding the impact of "heaven" (events outside a general's control) and "earth" (the local territory) when designing a battle strategy. Over 2500 years later, central banks are struggling with analogous challenges regarding the role of the global shocks that are beyond their control and how they interact with the domestic economy. During the "Great Moderation" from the mid-1980s through the mid-2000s, business cycles were largely driven by shocks to domestic demand, such that monetary policy benefited from the "divine coincidence" and rarely faced a tradeoff between supporting inflation and activity (Bernanke 2004; Blanchard and Gali 2007). Over the last two decades, however, a series of severe global shocks has driven sharp swings in activity and inflation, often creating difficult tradeoffs for central banks (Tenreyro 2023; Forbes, Ha and Kose 2025) and sparking debates about how monetary policy should best respond (Lagarde 2024; Powell 2023). If geopolitical tensions, trade fragmentation, and climate-related uncertainty persist, the increased role of "heavenly" shocks beyond the control of central banks will continue to have an important impact on the macroeconomy and monetary policy. If the nature of the shocks driving activity and inflation has fundamentally changed, central banks may need to rethink their modelling strategies, policy frameworks and communication strategies.[1]

In order to understand how the shocks behind monetary policy have changed and what this implies for central banks, this paper provides a systematic, cross-country analysis of seven global and domestic drivers of the cyclical variation in interest rates and other key macroeconomic variables over the last 55 years. The analysis focuses on a new factor-augmented vector autoregressive (FAVAR) model estimated for 13 advanced economies. The results show that the role of global shocks in driving interest rate movements has steadily increased, more than doubling from 1970–98 to 1999–2019, and more than tripling through 2020-24, to now account for about half of the variation in interest rates (and substantially more in some economies). The characteristics of these global shocks are also significantly different than those of the previously dominant domestic shocks in several dimensions. Global shocks have a larger supply component, greater variance, and a more persistent effect on inflation, and more often correspond to a tightening (instead of easing) in monetary policy. In addition, global supply shocks are less likely to be "looked through" than comparable domestic supply shocks. Understanding the differences between domestic demand shocks—which have traditionally been central to most macroeconomic models—and the increasingly important global shocks is crucial for forecasting, formulating monetary policy, and communicating reaction functions.

Our analysis builds on several areas of research. It links to a large literature highlighting the growing role of global variables for the domestic economy and financial markets (Miranda-Agrippino and Rey 2020;

[1] These considerations contributed to the ECB's 2025 framework revisions (2025 Monetary Policy Assessment). For additional discussions by central bank board members on how the nature of the shocks affecting monetary policy has evolved, see discussions by Clare Lombardelli (BoE), Phillip Lane (ECB), and Anna Seim (Riksbank) in the "Review of Monetary Policy Strategy by Central Banks" at the PIIE on April 24, 2025.

Forbes 2019; Ha, Kose, and Ohnsorge 2019; Obstfeld and Taylor 2004). It also draws on the extensive literature identifying and decomposing the sources of different types of cycles—including business and inflation cycles (Harding and Pagan 2002; Ciccarelli and Mojon 2010; Ha et al. 2024). This literature often decomposes the shocks behind business cycles into demand and supply components, sometimes further differentiating monetary policy and oil shocks (Madeira, Madeira, and Monteiro 2023; Giannone and Primiceri 2024). Most of this work, however, does not differentiate between the global and domestic sources of these shocks. This paper also links to the related and extensive DSGE literature, which models the macroeconomic impact of various shocks and is used for forecasting and setting monetary policy. Open-economy DSGE models include a wider set of relationships between domestic economies and the rest of the world than the earlier closed-economy versions,[2] but still usually assume that the effects of global (and most domestic) shocks are linear and symmetric, despite evidence that price adjustments can be asymmetric (Ball and Mankiw 1994) and that the transmission of large shocks is non-linear (Cavallo et al. 2023; Dedola et al. 2024; Schnabel 2025).[3]

To the best of our knowledge, this paper is the first systematic analysis of the specific global and domestic drivers of interest rate fluctuations across countries and over time—a more granular decomposition enabled by the long time series in our panel dataset.[4] It also contributes to the very recent literature on the post-pandemic inflation surge, which debates the relative importance of demand and supply shocks (and their interaction), but pays little attention to whether the shocks were primarily global or domestic.[5] While disentangling these effects in real time is difficult (Mankiw 2024), several papers have discussed how an insufficient understanding of the role of demand versus supply shocks during this period may have contributed to the delay in tightening monetary policy and the subsequent inflation surge (see Giannone and Primiceri 2024; Forbes et al. 2024). An insufficient understanding of the extent to which these shocks were global versus domestic could also have contributed to the widespread inflation forecast errors during this period, particularly if global shocks have more nonlinear or asymmetric effects than domestic shocks (as shown below).

The remainder of this paper is divided into six sections. Section II develops our FAVAR model that forms the core of the paper. The model includes four distinct global shocks (for demand, supply, oil, and monetary policy) and three domestic shocks (for demand, supply, and monetary policy) to explain fluctuations in interest rates, inflation and output. This section also discusses the data sources used to construct the monthly time series from 1970-2024 for our sample of 13 advanced economies that is the focus of the subsequent analysis. Then we estimate key inputs to the FAVAR model (the global factors for interest rates, inflation and output growth) using a dynamic factor model. The section closes with a series

[2] Open-economy DSGE models include global shocks such as to foreign demand, terms-of-trade, exchange rates, and global interest rates. Adolfson et al. (2007), Monacelli (2005), and Justiniano and Preston (2010) analyze how global shocks shape domestic inflation, output, and interest rate dynamics through trade and financial linkages. Corsetti, Dedola, and Leduc (2010) and Garcia-Cicco et al. (2010) further emphasize the importance of global supply and risk premium shocks in explaining macroeconomic volatility in open economies. Policy institutions have embedded similar global shocks in their models—such as in the IMF's GIMF (Kumhof et al. 2010), the ECB's BASE model (Angelini et al. 2019), and the Bank of Canada's ToTEM III (Corrigan et al. 2021).

[3] Two noteworthy exceptions of recent New Keynesian models that allow for nonlinearities and asymmetries consistent with the results in this paper are Karadi et al. (2024) and Ascari et al. (2025).

[4] The only exception is the related paper, Forbes, Ha and Kose (2024), which develops and analyzes the interest rate cycles used in part of the analysis below.

[5] Key papers in this debate include: Ball, Leigh and Mishra (2022, 2025), Bernanke and Blanchard (2024), Coibion and Gorodnichenko (2025), Di Giovanni et al. (2023), Gagliardone and Gertler (2023), Giannone and Primiceri (2024), Ha et al. (2024), Ha, Kose, and Ohnsorge (2019), and Shapiro (2022).

of impulse responses to verify that the model estimates are consistent with existing theory and empirical evidence on the impact of different types of shocks on macroeconomic variables.

Section III assesses the evolving role of global versus domestic shocks for domestic monetary policy. We use the FAVAR model to decompose the share of the variation in interest rates into global and domestic shocks over different periods since 1970. The role of the global shocks increased sharply after 1999, more than doubling from the earlier part of the sample to explain over one-third of the variance of interest rates over 1999-2019. The role of global shocks increased again in 2020 to explain almost half of the variance in interest rates over 2020-24, such that the contribution of the global shocks was roughly equal to that of domestic shocks on average for the first time in the sample (and even larger for several major advanced economies, particularly the euro area).

This increased role of "heaven", i.e., global shocks outside the control of any individual central bank, could have limited implications for domestic monetary policy if these shocks have similar characteristics and effects on macroeconomic variables as domestic shocks. For example, if both domestic and global supply shocks are similar (other than whether they originate from home or abroad), they would likely merit the same monetary policy response (ignoring any cross-border spillover effects). On the other hand, if global shocks tend to be different than the corresponding domestic shocks—such as by originating more from supply shocks, being larger, being more persistent, having asymmetric effects, or having a greater impact on inflation—they may require different policy responses, frameworks, and communication strategies. In this case, accurately identifying whether a shock originates from global or domestic sources, as well as whether it reflects a shock to demand or supply (or other sources), would be critical to modelling the effect and formulating the appropriate policy response.

Therefore, Section IV explores whether global and domestic shocks differ in their characteristics and effects on domestic economies across six key dimensions. We focus on the period from 1999-2019 in order to draw lessons for today, but also compare changes relative to earlier periods and around the pandemic. First, we compare the sources of global and domestic shocks, such as the relative contributions of supply, demand, and monetary policy shocks. Second, we assess differences in the size and volatility of the shocks. Third, we evaluate how sensitive monetary policy is to each type of shock, controlling for the source and size. Fourth, we test if different types of global and domestic shocks have more persistent effects on inflation. Fifth, we examine whether there are directional asymmetries, i.e., whether global and domestic shocks differ in their implications for monetary tightening versus easing. Finally, we compare the roles of these global shocks for inflation and output versus interest rates to assess if there have been changes in the extent to which monetary policy "looks through" global and domestic supply shocks.

The results suggest that global and domestic shocks have distinct characteristics and effects on monetary policy across each of the six dimensions analyzed. First, there are notable differences in the sources of each type of shock when explaining the variation in interest rates. Global shocks have a larger supply component than domestic shocks (34% versus 14%) over 1999-2019, while domestic shocks have a larger monetary policy component than global shocks (38% versus 21%). The role of supply increased even more sharply for global shocks around the pandemic, such that global supply (including oil price) shocks became more important than global demand shocks in 2020-24. This is a sharp contrast to the decompositions for domestic shocks, for which demand shocks are two to three times more important than supply shocks in each period (including 2020-24).

The rising contribution of global shocks over time—particularly global supply shocks—to the variation in interest rates could reflect two additional dimensions in which global and domestic shocks differ: their volatility and country sensitivity to each type of shock (after controlling for its source and size). The volatility of global shocks was greater than that of domestic shocks over 1999-2019 (as well as over 2020-24), and has increased over time for global shocks, but decreased over time for domestic shocks. Global shocks were also more likely to be "large" over 1999-2019 (defined as greater than one standard deviation), as well as over 2020-24. In contrast, country sensitivity to global shocks (even after controlling for the source of the shock) has tended to be lower than for domestic shocks, albeit the gap narrowed around the pandemic. This suggests that the increased role of global shocks through 2019 does not reflect a greater sensitivity of interest rates to global shocks—but instead is attributable to the other characteristics by which global and domestic shocks differ.

The fourth dimension by which global and domestic shocks differ is in the persistence of their effects on inflation. The impact of domestic shocks on inflation typically dissipates within a year, whereas the effects of global shocks tend to persist for more than three years. This greater persistence of global than domestic shocks occurs in aggregate (i.e., when not controlling for the source of the shock), as well as when differentiating by demand versus supply versus monetary policy shocks. In other words, global shocks from each source are much more persistent than comparable domestic shocks.

A fifth difference between global and domestic shocks is an asymmetry in the direction of their effects on monetary policy. Global shocks play a more prominent role in explaining increases than decreases in interest rates, and there are significant differences in the sources of the global and domestic shocks driving rates in each direction. For example, global monetary policy shocks make little contribution to reductions in interest rates (but often play a significant role in rate hikes), whereas domestic monetary policy shocks contribute meaningfully to reductions in interest rates (and make little contribution to rate hikes).

A final set of results highlights how the role of global and domestic shocks has evolved differently for interest rates versus inflation and output growth, with implications for central banks' willingness to "look through" these different types of shocks. Over the full period, supply shocks (both global and domestic) explain a larger share of the variation in inflation and output growth than interest rates, consistent with models suggesting that monetary policy should, under certain conditions, "look through" at least some of the effects of supply shocks on inflation and growth (Bandera et al. 2023; Tenreyro 2023). Since 1998 (and particularly over 2020-24), however, global supply shocks have played an even larger role in explaining the variation in interest rates than for inflation and output—the opposite of the pattern over the full period and for just domestic supply shocks. In other words, monetary policy responds more strongly (and is less likely to look through) global supply shocks than domestic supply shocks. This is consistent with estimates that the importance of global shocks has increased even more for interest rates than for the other macroeconomic variables over time, suggesting a greater "globalization" of interest rates than of other key variables that affect monetary policy. The more limited willingness of central banks to "look through" the impact of global than domestic supply shocks is also consistent with the earlier evidence on how global shocks differ from domestic shocks (such as having a larger variance and greater persistence).

Most of the analysis reported above relies on the baseline FAVAR model developed in Section II. Section V summarizes a wide range of extensions and robustness exercises. The section begins with a decomposition of the role of different shocks for individual economies (focusing on the G-5). Then we summarize a series of sensitivity tests, including: alternative definitions for key global and domestic variables, excluding the largest economies, and alternative modelling specifications (including time-varying coefficients) and identification schemes. Our headline results showing an increased role of global shocks in explaining interest rate variation over time, as well as documenting the six dimensions by which global shocks differ from domestic shocks, are all robust to these exercises. Section VI concludes with a discussion of the implications of a greater role for shocks from "heaven" for monetary policy models, frameworks, and communication.

II. Methodology: FAVAR Model, Database and the Global Factors

In order to understand the evolving global and domestic sources of fluctuations in interest rates, inflation and output growth, this section develops a new factor-augmented VAR (FAVAR) that is used for the estimates and analysis throughout this paper. This model builds on a large literature using VAR models to decompose the shocks behind interest rates and other macroeconomic variables (Uhlig 2005; Charnavoki and Dolado 2014; Madeira, Madeira, and Monteiro 2023), but our framework has the important advantage of providing a richer decomposition of the underlying shocks. It not only differentiates between global and domestic sources for each type of shock (i.e., supply, demand, and monetary policy), but also allows for a more detailed decomposition of supply shocks (into global and domestic sources, as well as separating out the role of oil prices). This section begins by introducing the FAVAR model and framework. Then it provides information on the sample and dataset used to estimate the model and estimates the global factors used as inputs for the FAVAR model in the remainder of the paper. The section closes by reporting a series of impulse responses to assess whether the framework is consistent with existing theory and empirical evidence.

II.1 The FAVAR Model

The FAVAR model central to our analysis includes four global variables (global interest rates, global inflation, global output growth, and global oil price growth) and three domestic variables (domestic interest rates, domestic inflation, and domestic output growth). More specifically, to estimate the contributions of different global and domestic shocks, we employ the following model:

$$B_0 Z_t = \alpha + \sum_{i=1}^{L} B_i Z_{t-i} + \varepsilon_t$$

$$\varepsilon_t \sim N(0, \textstyle\sum_t),$$

where Z_t consists of global interest rates ($f_t^{R,global}$), global inflation ($f_t^{\pi,global}$), global output growth ($f_t^{y,global}$), oil price growth (Δop), domestic interest rates ($R^{domestic}$), domestic inflation ($\pi^{domestic}$), and domestic output growth ($y^{domestic}$).

The ε_t is a vector of orthogonal structural innovations and includes seven shocks. There are four global shocks: (i) common changes in monetary policy across countries ("global monetary policy"); (ii) the global demand for goods and services ("global demand shock"); (iii) the global supply of goods and services ("global supply shock"); and (iv) oil prices ("oil price shock"). There are also three domestic shocks: (v) domestic monetary policy ("domestic monetary policy shock"); (vi) the domestic supply of goods and services ("domestic supply shock"); and (vii) the domestic demand for goods and services ("domestic demand shock").[6]

The model assumes stochastic volatility of the structural shocks—the residuals represented by the time-varying residual covariance matrix $\sum_t$. These shocks are independently (but not identically) distributed across time. Although many VAR models assume that the variance-covariance matrix of residuals is constant over time, this assumption could be problematic in our exercise since there are several periods

[6] Our global and domestic shocks are motivated by theoretical studies on the sources of movements in interest rates, output, and inflation in the United States. For instance, Smets and Wouters (2007) decomposes the variation in these variables into demand shocks (including risk premium and fiscal), price mark-up shocks (including commodity prices), supply shocks, and interest rate shocks.

with substantially heightened volatility in our long time series, such as around the oil crises in the 1970s and the COVID-19 pandemic (Lenza and Primiceri 2022). Therefore, we allow the variance-covariance matrix of residuals $\sum_t$ to be period-specific, hence rendering stochastic volatility and introducing heteroskedasticity (Carriero, Corsello, and Marcellino 2019).[7]

We estimate this FAVAR model using monthly data with four lags (based on the AIC and SIC information criteria).[8] The Bayesian routine we employ first searches for 1,000 successful draws from at least 2,000 iterations with 1,000 burn-ins; the results are based on the median of these 1,000 successful draws. The estimation process is standard Gibbs sampling, except that the volatility of residuals is endogenously determined. Structural shocks are assumed to have unit variance.

We identify the seven shocks using sign and zero restrictions, following previous research on the drivers of inflation and monetary policy. Postulating that B_0^{-1} in our model has a recursive structure such that the reduced form errors can be decomposed according to $u_t = B_0^{-1}\varepsilon_t$, the sign and zero restrictions imposed over the first month are:

$$\begin{bmatrix} u_t^{R,global} \\ u_t^{y,global} \\ u_t^{\pi,global} \\ u_t^{op,global} \\ u_t^{R,domestic} \\ u_t^{y,domestic} \\ u_t^{\pi,domestic} \end{bmatrix} = \begin{bmatrix} + & + & * & * & 0 & 0 & 0 \\ - & + & + & - & 0 & 0 & 0 \\ - & + & - & + & 0 & 0 & 0 \\ * & + & + & + & 0 & 0 & 0 \\ * & * & * & * & + & + & * \\ * & * & * & * & - & + & + \\ * & * & * & * & - & + & - \end{bmatrix} \begin{bmatrix} \varepsilon_t^{GMonPolicy} \\ \varepsilon_t^{GDemand} \\ \varepsilon_t^{GSupply} \\ \varepsilon_t^{GOilPrice} \\ \varepsilon_t^{DMonPolicy} \\ \varepsilon_t^{DDemand} \\ \varepsilon_t^{DSupply} \end{bmatrix}$$

The * stands for an unrestricted initial response. These restrictions assume that domestic shocks (labelled with a "D") do not affect global variables contemporaneously (i.e., in the same month).[9] Global shocks (labelled with a "G"), however, can affect domestic variables (without any sign or zero restrictions).

The sign restrictions identifying the shocks are consistent with previous work. A positive global demand shock increases global growth, global inflation, the global interest rate, and oil prices. A positive global supply shock raises global growth and oil prices but reduces global inflation and has an indeterminate effect on global interest rates (Charnavoki and Dolado 2014; Ha et al. 2024). A positive domestic supply shock raises domestic growth, but reduces domestic inflation, with an indeterminate effect on domestic interest rates. A positive domestic demand shock raises domestic growth, inflation, and interest rates. The identification assumptions related to oil price shocks also closely follow earlier studies (Melolinna

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[7] Specifically, ε_t is serially independent with zero mean and variance $\sum_t$. We assume that $\sum_t = F\Lambda_t F'$, where F is a lower triangular matrix with ones on its main diagonal, while Λ_t is a period-specific diagonal matrix whose diagonal elements $\Lambda_{jj,t}$ (the time-varying variances) follow a stochastic process (Cogley and Sargent 2005).

[8] We use first-differenced data, such that the SIC (AIC) statistics support lag lengths of 2-4 months, depending on the countries and periods included in the sample. Extending the lag length to 8-12 months does not lead to any meaningful impact on the main results but loses some observations in the sample.

[9] We only impose these zero restrictions on spillovers for the contemporaneous month, thereby allowing spillovers from the economies in our sample to the global variables after a month and not making the small-open economy assumption that is typical in much of this literature (i.e., assuming zero spillovers from each economy to the global variables over a longer period of time). Also, since spillovers from the largest economies in our sample (such as the United States and euro area) to other economies could occur within a month in some circumstances, Section V.3 reports sensitivity tests excluding the major advanced economies. There is no impact on the key results.

2015; Charnavoki and Dolado 2014), which assume that a positive cost (commodity price) shock reduces growth and raises commodity prices and inflation.[10] A contractionary (positive) domestic monetary policy shock lowers domestic growth and inflation, with an indeterminate effect on oil prices (see Uhlig 2005; Madeira, Madeira, and Monteiro 2023; Gerlach and Smets 1995). A positive global monetary policy shock increases global interest rates while decreasing global (output) growth and inflation.

Finally, it is worth discussing the interpretation of the global monetary policy shock in more detail. This is defined as the component of simultaneous monthly changes in domestic interest rates across central banks (captured by the global interest rate factor—discussed in more detail in the next section) that is not predicted by lags of global output, inflation, oil prices, and domestic variables. In our econometric framework, this corresponds to a latent common factor that captures the co-movement of interest rates across the sample. The common factor could reflect coordinated policy actions among central banks, parallel shifts in policy, or convergence in policy reaction functions, all of which can generate synchronized movements in policy rates. Since the common factor could have different relationships with different countries (i.e., interest rates in some countries can comove more tightly with the common factor), we do not impose any relationship between this factor and domestic interest rates.[11] Together with the analysis of global demand and supply shocks, this framework allows us to examine the relative importance of domestic and global monetary policy shocks in order to distinguish the roles of global versus domestic forces.

II.2 Database

The FAVAR model is estimated using monthly data for interest rates, output growth, and inflation from January 1970 through September 2024. In our baseline analysis, we focus on 13 advanced economies (Australia, Canada, Denmark, euro area, Israel, Japan, Korea, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States), treating the euro area as one entity.[12] **Appendix Table A1** provides more information on the underlying data and sample.

We focus on these economies primarily because of their size and the availability of data on interest rates, output, and inflation for most of the sample period. Specifically, we select these economies based on the following criteria: (i) they are defined as advanced economies in the World Bank's Global Economic Prospects report, January 2024 (World Bank 2024); (ii) they are independent countries with GDP of at least $100bn in 2023; and (iii) they have data for activity (GDP or industrial production), inflation and interest rates from at least 1980.

To measure the domestic variables in the FAVAR model, we primarily rely on data from Haver Analytics, supplemented with information from the OECD and other sources listed below. We measure interest rates using shadow interest rates (from Krippner 2013), and for periods and economies that the shadow rate is

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[10] For similar approaches to the identification of supply, demand and oil price shocks, see Gambetti, Pappa, and Canova (2008), Melolinna (2015), and Antolín-Díaz and Rubio-Ramírez (2018).

[11] As shown in the sign-restriction matrix in Section II.1, these monetary policy shocks are interpreted as distinct from negative global demand shocks—such as an increase in the risk premium. In particular, a global monetary policy shock leads to an increase in global interest rates alongside declines in global output and inflation, whereas negative global demand shocks are assumed to generate simultaneous declines in interest rates, output, and inflation.

[12] The euro area countries included in the analysis are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain. Although changes in interest rates in Denmark often closely mirror those of the euro area, there are periods when they diverge, so we include Denmark as a separate entity. Excluding Denmark from the analysis has no meaningful impact on the key results.

not available, we use overnight market rates (e.g., discount rates) or 3-month Treasury bill yields. If none of these are available, we use the policy interest rate (from the BIS). We start with shadow interest rates (or market rates) as these better capture changes in monetary policy when central banks relied more heavily on unconventional tools after 2008 (such as quantitative easing).[13]

For robustness checks (in Section V.2), we use only the nominal policy interest rate set by the central bank, which has less variation (particularly during periods when interest rates were at lower bounds) and yields less precise model estimates. In each case, we measure euro area interest rates as the GDP-weighted average of the relevant interest rate for individual member countries before 1999, and then the rate for the ECB after it began implementing monetary policy for member countries. We measure inflation based on the headline CPI price index, and measure output growth as the growth rate of industrial production (which is more widely available than GDP growth at a monthly frequency, particularly early in the sample). All variables are month-on-month, demeaned, and stationary, with details in **Appendix Table A1**.

The three global variables in the FAVAR model—the global interest rate, global inflation, and global output growth—are estimated as factors using a simple dynamic factor model (discussed in Section II.3). The final global variable, oil price growth, is measured as the month-on-month growth rate for nominal oil prices (calculated as the simple average of Dubai, West Texas Intermediate, and Brent benchmarks) from the World Bank's monthly Pink Sheet of commodity prices.

The resulting dataset covers January 1970 through September 2024, and much of our analysis evaluates how relationships have changed meaningfully over this long period. We begin by focusing on five sub-periods. Each of these sub-periods includes some type of recession/crisis and recovery period, with the divisions between sub-periods often marking a major global event that might have changed the nature of macroeconomic cycles. The five sub-periods are:

- ***1970-84***: the global recessions of 1975 and 1982, and the first and second oil crises in the 1970s
- ***1985-98:*** the 1991 global recession, the global downturn in 1997-98 associated with the Asian and Russian financial crises, and a series of debt defaults and emerging market crises
- ***1999-2007***: the bursting of the tech bubble, the 2001 global downturn, and the lead up to the 2008 Global Financial Crisis
- ***2008-19:*** the Global Financial Crisis and the 2009 global recession, the 2012 global downturn associated with the euro area debt crisis, and the 2014-16 collapse in oil prices
- ***2020-24:*** the outbreak of the COVID-19 pandemic and corresponding 2020 global recession, the 2022 Russian invasion of Ukraine and corresponding commodity price shock and post-pandemic inflation surge

The first two sub-periods (from 1970-98) are before the creation of the euro area, while the later three periods (from 1999-2024) are when the ECB set monetary policy for its member countries. The sub-periods before 1999 were also when central banks used a wider range of monetary policy tools, frameworks, and strategies—with some central banks putting more weight on monetary targets and exchange rates (and interest rates determined partly by markets as well as central bank operations). Over the 1990s and 2000s,

[13] The shadow interest rate is estimated as the shortest maturity rate based on the shadow yield curve using a dynamic factor model with variables closely associated with different types of monetary policy operations (Krippner 2013). The resulting shadow rate is essentially equal to the policy interest rate in "non-lower" bound or unconventional monetary policy environments. The shadow interest rate is available from 1995 for Australia, Canada, the euro area, Japan, New Zealand, Switzerland, the United Kingdom, and the United States.

however, most central banks in our sample transitioned to some form of inflation targeting, albeit these more comparable frameworks also involved their own evolution of tools and frameworks (such as the greater use of balance sheet policies and forward guidance).

This initial analysis suggests that the role of global factors increased sharply after 1999, and then sharply again around the pandemic in 2020. It is unclear if the changes around the pandemic and post-pandemic inflation will persist, so for much of the analysis in the paper, we focus on the window over 1999-2019 as most comparable to today. Finally, to simplify terminology, we will refer to the window from 2020-24 as the "pandemic" period, even though it also includes major events that occurred after the pandemic such as the war in Ukraine and subsequent inflation surge.

II.3 The Global Factors

In order to identify the global factors for interest rates, inflation, and output needed to estimate the FAVAR model, we use a dynamic factor model. This section summarizes this model, the resulting estimates, and how to interpret these "heavenly" factors. More details and the full results are in Appendix B.

We use a simple dynamic factor framework to estimate the following model of the global factors for interest rates, inflation, and output growth (as employed in Ha et al. 2024):

$$R_t^i = \beta_{global}^{R,i} f_t^{R,global} + e_t^{R,i}$$

$$\pi_t^i = \beta_{global}^{\pi,i} f_t^{\pi,global} + e_t^{\pi,i}$$

$$Y_t^i = \beta_{global}^{\pi,i} f_t^{Y,global} + e_t^{Y,i}$$

where R_t^i, π_t^i, and Y_t^i refer to interest rates, inflation, and output growth in country *i* in month *t*, respectively. The $f_t^{R,global}$, $f_t^{\pi,global}$ and $f_t^{Y,global}$ are the global factors for interest rates, inflation, and output growth in month *t*, respectively. The factors and error terms follow independent autoregressive processes, as is standard in this literature. The error terms are assumed to be uncorrelated across countries at all leads and lags. We estimate the model using standard Bayesian techniques, as described in Kose, Otrok, and Whiteman (2003, 2008).

Next, we use the data discussed in Section II.2 to estimate the contributions of each of the three global factors to the variances of each of the corresponding variables. The resulting estimates of the contribution of the global factor to the variance of national interest rates, inflation and output are discussed in detail in Appendix B, with results for the longer periods specified above in **Appendix Table B1** and **Appendix Figure B1**, and then for shorter five-year rolling windows in **Appendix Figure B2. Appendix Figure B3** presents the evolution of global factor estimates.

Several results are worth highlighting. First, the global interest rate factor played a modest role in driving fluctuations in national interest rates over the full sample period; it accounted for 13 percent of the interest rate variation, on average, over 1970-2024. Second, the importance of the global interest rate factor has risen sharply, more than tripling since the 1990s.[14] Specifically, the size of the global factor jumped from explaining about 10% of the interest rate variation over 1970-84 and 1985-98, to about 30%

[14] We calculate the variance contribution of the global rate factor using other sub-sample periods (which are not based on when the ECB began setting interest rates) or excluding some large economies (such as the United States or the euro area). The key patterns of an increased role for the global rate factor over time are unchanged, as discussed in Section V.3 and shown in **Table 2**.

over 1999-2007 and 2008-19, and then 38% over 2020-24. Interest rate cycles have become much more synchronized over the past quarter century.

Third, this increased global synchronization in interest rates coincides with stronger comovement in inflation and output growth, but the comovement in interest rates has increased by even more and to higher levels than for the other two variables. More specifically, the share of the global factor for inflation and output growth roughly doubled from 1970-84 through 2008-19 (versus tripling for interest rates). As a result, the global factor explained a larger share of the variation in interest rates in the period before the pandemic (at 29%), as compared to only 24% for domestic inflation and 13% for output growth.[15] After estimating the full FAVAR model below, Section IV.6 will utilize this richer set of results to return to this issue of why interest rates have become more "globalized" than inflation and growth. The global factor for each variable also increased sharply over 2020-24, with a particularly large jump for output growth reflecting the synchronized collapse and then rebound in output around the pandemic lockdowns.

Finally, it is important to highlight what these estimates of the global (aka "heavenly") factors capture: the comovement in the relevant variables across the economies in our sample. Changes in these global factors could therefore result from a wide range of developments. For example, an increase in the global interest rate factor could reflect: (1) a large, exogenous shock that affects all countries simultaneously (such as a global supply shock from a pandemic or blockage of a major shipping route); (2) a shock emanating from one economy that affects the other countries in the sample at the same time (such as a monetary policy surprise in the United States or the 2008 Global Financial Crisis); (3) a highly synchronized policy response across the economies in the sample (such as a coordinated fiscal response or more widely shared framework for monetary policy); or (4) stronger linkages between countries over time, such as through trade or financial flows, such that exogenous shocks or shocks to one economy have larger effects across the sample.

These developments, which contribute to the global factor, have different interpretations and could yield different policy conclusions. The estimates of the global factor in this section do not differentiate between these explanations, but the more detailed decompositions in the remainder of the paper help differentiate (to some extent) between these explanations. The terms "global shocks" or "shocks from heaven" used throughout this paper are intended to capture this broad set of channels that are largely outside the control of individual central banks, and in many cases also outside the control of individual domestic policymakers.

II.4 Impulse Response Functions

Before addressing our main questions on the relative importance and characteristics of global versus domestic shocks, we evaluate if our baseline model with seven global and domestic shocks appears to work well by delivering results consistent with theory and previous empirical work. Specifically, we use the model to estimate cumulative impulse response functions (IRFs) for each of the variables following one-standard-deviation global and domestic shocks over 1970-2024. These impulse responses for each of the seven shocks on the domestic variables—inflation, output, and interest rates—are shown in **Figure**

[15] These estimates of the role of the global factor for interest rates, inflation, and output growth are similar if we focus on medians (instead of averages) in our sample. Also, within each country, the global factor for interest rates has increased significantly over time.

1.[16] The blue bar is the average of the point estimates of the IRFs across the 13 economies in the sample and the orange lines are the 90 percent error bands.

The impulse responses are almost all significant (with the two exceptions for interest rates discussed below) and have the expected signs and patterns, consistent with existing theory as well as empirical evidence on the global transmission of demand, monetary policy, and supply shocks. More specifically, following positive global and domestic demand shocks, inflation, output, and interest rates move in the same direction, while following positive global and domestic monetary policy shocks, interest rates rise while output and inflation decline. Following positive (disruptive) global and domestic supply shocks, inflation increases (due to cost-push pressures) and output declines.

Given our focus on monetary policy, the impulse responses for the impact of different shocks on domestic interest rates merit closer attention. The results for the impact of global and domestic demand and monetary policy shocks not only have the expected sign, but are all statistically significant. The response of interest rates to supply shocks is ambiguous—and usually insignificant. This is not surprising, as these shocks have less clear theoretical and empirical foundations, and the monetary policy response is more likely to vary based on a range of factors. For example, this could reflect that central banks "look through" supply shocks in certain situations, or that the impact of these impulse responses varies over time such that results for the full sample (1970-2024) are insignificant. We explore these alternative explanations in more detail below—with evidence supporting both.

Finally, this set of impulse responses appears to be robust in the sense that they involve minimal sign restrictions; we only impose restrictions on the contemporaneous correlation between domestic shocks and domestic variables and between global shocks and global variables, with no restrictions between global shocks and domestic variables. The results showing a significant impact of global shocks on domestic variables—particularly inflation and output—confirm that, despite these minimal assumptions, the identified shocks are meaningful and consistent with the extensive literature on the transmission of global shocks to domestic economies.

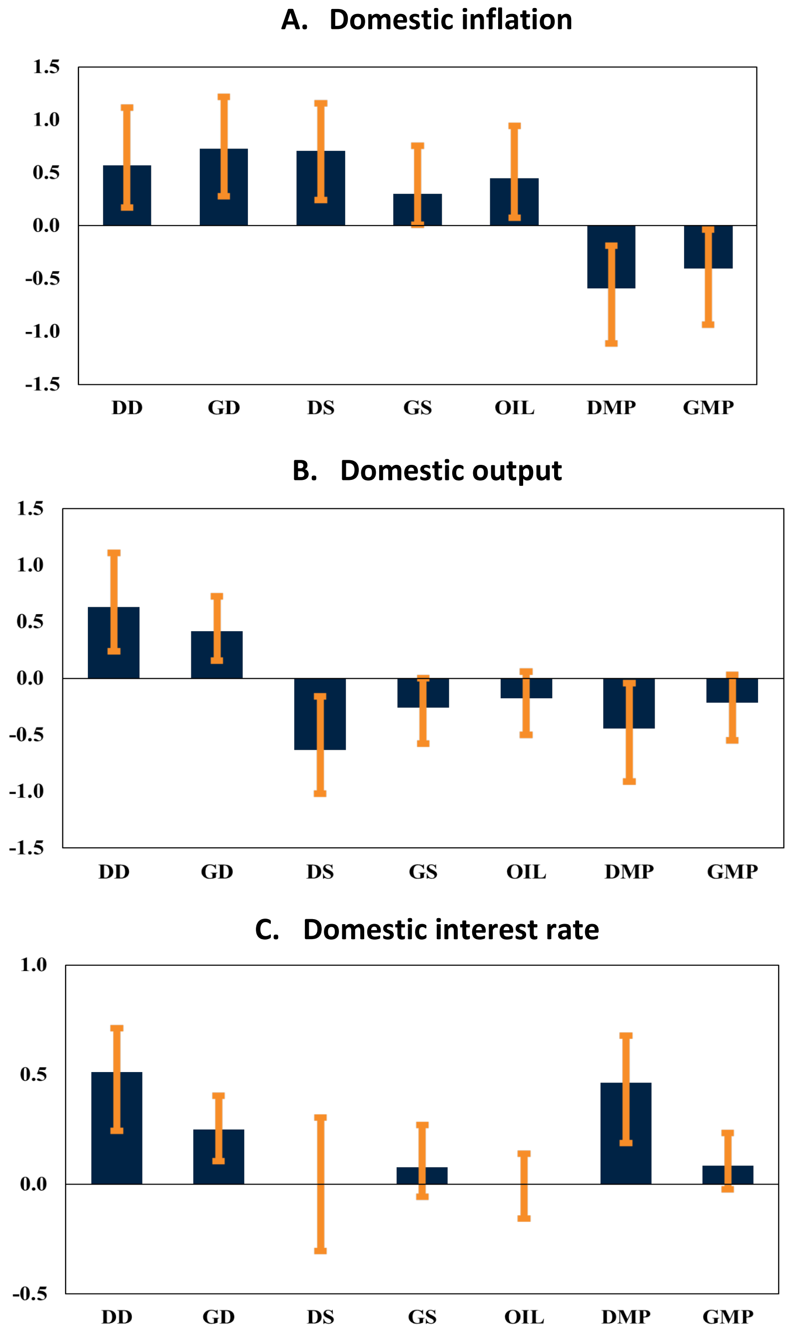
III. The Role of Global versus Domestic Shocks over Time

How important are global shocks (versus domestic shocks) in explaining the variation in interest rates? And has the role of global shocks evolved over time? This section uses the FAVAR model developed in Section II to estimate variance decompositions quantifying the importance of global and domestic shocks to national interest rates over the full period from 1970-2024 and then over the five shorter windows. The analysis focuses on simple averages across the economies in the sample in order to focus on the broader cross-country experience (with more details on the cross-country variation in Section V.1).

[16] While **Figure 1** shows the average results for the sample, the comparable impulse responses for individual countries are generally very similar and usually significant, particularly for the impact of global and domestic demand shocks and domestic monetary policy shocks.

Figure 1 Impulse Response Functions of Domestic Variables

(Percentage points, averages across 13 advanced economies over 1970-2024)



Sources: Authors' calculations based on monthly data for 13 advanced economies.

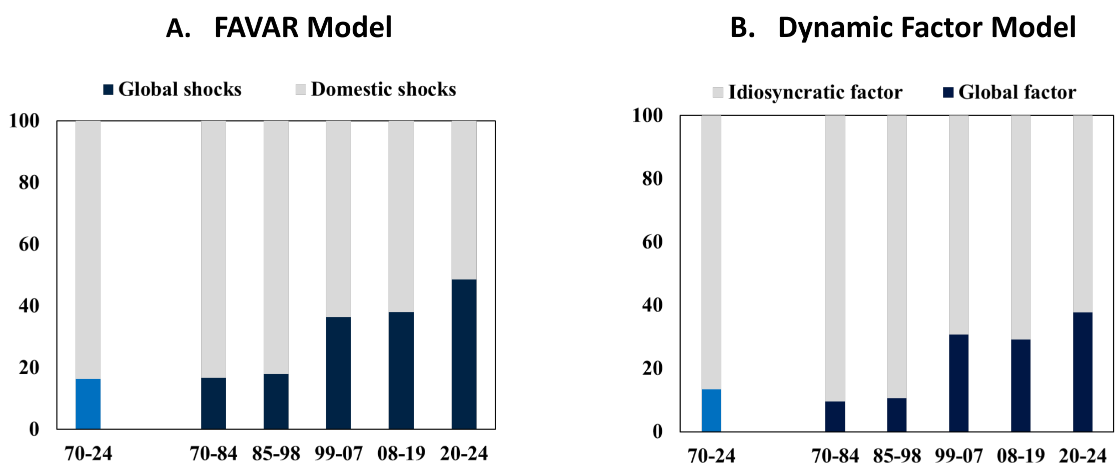
Note: The figures show the cumulative impulse response functions of domestic variables following one-standard-deviation global and domestic shocks over 1970-2024. The blue bar is the average of the point estimates of the IRFs across the 13 economies in the sample and the orange lines are the 90 percent error bands. The underlying FAVAR model consists of four global variables (inflation, output growth, interest rates, and oil prices) and three domestic variables (inflation, output growth, and interest rates). DD, DS, and DMP indicate domestic demand, supply, and monetary policy shocks, respectively and GD, GS, GMP, and OIL indicate global demand, supply, monetary policy, and oil price shocks, respectively.

A number of papers study the cross-country comovement of interest rates (Crucini, Kose and Otrok 2011; Lindenberg and Westermann 2012; Henriksen, Kydland, and Sustek 2013) and find an increase in this comovement over time. Forbes, Ha and Kose (2024) further documents "waves" in the synchronization in policy interest rates across advanced economies from 1970-2024. These waves show that during certain periods a large share of economies abruptly and simultaneously adjust monetary policy in the same direction, underscoring the role for global shocks, while during other periods there is substantial divergence in interest rate adjustments, suggesting a larger role for domestic shocks.

To begin our assessment of the evolving role of global and domestic shocks, **Figure 2** (Panel A) shows the decomposition of the variance of national policy interest rates using the FAVAR model from Section II into the contribution of all four global shocks (in dark blue) and all three domestic shocks (in grey).[17] The top line of **Table 1** (Panel A) reports the underlying estimates. The left bar in **Figure 2** shows that over the full sample period from 1970-2024, global shocks account for only 16 percent of the variation in interest rates on average in the 13 economies (ranging from 2 percent in New Zealand and Norway to 62 percent in the euro area). In contrast, domestic shocks explain the lion's share of the variance of domestic interest rates over the full period, accounting for more than four-fifths of rate fluctuations on average.

Figure 2 Contributions of Global Shocks and Global Factors to the Variation in Domestic Interest Rates

(Percent of total variation, averages across advanced economies)



Sources: Authors' calculations based on monthly data from 1970 through 2024 for sample of 13 advanced economies. Notes: Panel A shows the forecast error variance decompositions of domestic policy interest rates over a 40-month horizon based on the FAVAR model developed in Section II.1 that consists of four global variables (output growth, inflation, interest rates, and oil prices) and three domestic variables (output growth, inflation, and interest rates). See Table 1 for underlying estimates. Panel B shows the average variance contribution of the global interest rate factor to the variations in country-specific interest rates based on the dynamic factor model in Section II.3. See Appendix B for additional details and underlying estimates.

[17] The confidence intervals of the estimated variance shares are large, as is typically found using similar VAR methodologies, as well as reflecting the large number of variables included in our FAVAR model. Many of the differences over time highlighted above, however, are still statistically significant. For instance, the contribution of global shocks to interest rates is significantly greater at the 90 percent level in most countries for the subperiods before versus after 1998.

These averages over 55 years, however, mask important changes in the role of global and domestic shocks over time. To assess how their relative importance has evolved, we calculate the same variance contributions for domestic interest rates over the five sub-periods from Section III.2. The right sides of **Figure 2** (Panel A) and **Table 1** show the results. The contribution of global shocks to the variance of interest rates roughly doubled from the earlier half of the sample (1970-98) to the latter half (1999-2024), and roughly tripled from 17% in the earliest subperiod (1970-84) to almost 50% in the latest subperiod (2020-24). In other words, the contribution of global shocks over the last five years is roughly equal to that of domestic shocks for the first time in the sample (on average). In fact, and as shown in the country-specific results in Section V.1, the global shocks are larger than the domestic shocks over 2020-24 for the largest advanced economies in our sample (Canada, the euro area, Japan, the United Kingdom and United States).[18] Granted, some of the increase in the role of global shocks over 2020-24 may reflect the unusual characteristics of the pandemic and post-pandemic inflation surge, but even ignoring this latter period, there has still been more than a doubling of the impact of global shocks over our sample period.

It is also worth comparing these results from the FAVAR model estimating the role of global shocks in explaining the variation in domestic interest rates (**Figure 2**, Panel A) with the results of the dynamic factor model in Section II.3 estimating the global factor in interest rates (Panel B). Over the full period from 1970-2024, the FAVAR models estimates that 16% of the variation in interest rates is explained by global shocks (on average), which is very similar to estimates from the dynamic factor model that 15% of the comovement in interest rates is explained by the global interest rate factor. Also, in each case the importance of the global component increases significantly over time, jumping after 1999, and then again over 2020-24. Both sets of results are consistent with national interest rates becoming increasingly more synchronized across economies over time—even ignoring the sharp movements around the pandemic.

To conclude, both the FAVAR model and global factor model suggest that the role of global shocks in explaining the variation of interest rates has not only increased over time, but increased notably around 1999 and then again around the pandemic and post-pandemic inflation over 2020-24. The changes in the role of global shocks around 1999 appear to have persisted, while it is unclear if the changes around the pandemic are transitory and reflect the unique aspects of this period. Therefore, as our goal is to understand differences between global and domestic shocks for monetary policy today, in the analysis which follows we focus on the role of global factors over 1999-2019. We will also report all results for the earlier period (when the role of global influences was smaller), as well as over the last five years (starting with the pandemic) for comparison. In most cases, the main results on the different characteristics of global and domestic shocks are similar across each of these periods, although some results are accentuated during the pandemic window from 2020-24.

[18] The role of global shocks is smaller in many of the smaller advanced economies, with the prominent exception of Switzerland, as shown in Appendix C.

Table 1 Contributions of Shocks to Variation in Interest Rates, Inflation, and Output Growth

(Percent of total variation, averages across advanced economies)

A. Interest Rates

Shocks	1970-2024	1970-1998	1999-2019	2020-24
Total Global Shocks	***16.1***	***15.5***	***33.7***	***49.2***
Oil Price	2.8	3.1	5.3	9.2
Global Supply	3.3	3.2	6.1	10.9
Global Demand	6.1	5.6	15.1	17.3
Global Monetary Policy	3.9	3.5	7.3	11.8
Total Domestic Shocks	***83.9***	***84.5***	***66.3***	***50.8***
Domestic Supply	11.8	13.2	9.4	9.5
Domestic Demand	37.0	35.8	31.9	22.7
Domestic Monetary Policy	35.1	35.6	25.1	18.5

B. Inflation

Shocks	1970-2024	1970-1998	1999-2019	2020-24
Total Global Shocks	***27.4***	***37.2***	***25.8***	***33.9***
Oil Price	6.2	6.6	6.9	8.2
Global Supply	4.3	7.2	3.6	6.3
Global Demand	11.2	14.8	9.5	11.6
Global Monetary Policy	5.7	8.6	5.9	7.6
Total Domestic Shocks	***72.6***	***62.8***	***74.2***	***66.1***
Domestic Supply	28.5	23.8	31.6	28.7
Domestic Demand	21.9	19.9	21.7	20.3
Domestic Monetary Policy	22.3	19.1	20.9	17.1

C. Output

Shocks	1970-2024	1970-1998	1999-2019	2020-24
Total Global Shocks	***22.8***	***15.2***	***21.8***	***36.5***
Oil Price	5.0	4.1	5.4	6.4
Global Supply	5.1	3.3	5.1	8.6
Global Demand	7.1	4.1	6.5	10.2
Global Monetary Policy	5.6	3.7	4.9	11.2
Total Domestic Shocks	***77.2***	***84.8***	***78.2***	***63.5***
Domestic Supply	33.0	34.5	33.0	26.6
Domestic Demand	22.3	25.1	22.9	18.7
Domestic Monetary Policy	21.9	25.2	22.3	18.3

Note: Table shows the forecast error variance decompositions of interest rates (panel A), inflation (panel B), and output growth (panel C) over a 40-month horizon based on country-specific FAVAR models that consist of four global variables (inflation, output growth, interest rates, and oil prices) and three domestic variables (inflation, output growth, and interest rates). Sample is 13 advanced economies with monthly data over the time period indicated at the top of each column. See Appendix A for variable definitions and Section II.1 for estimation details.

IV. Characteristics of the Global versus Domestic Shocks Driving Interest Rates

The role of "heaven"—of global shocks and the global factor—in explaining the variation in interest rates has increased markedly over the last 55 years. If these global shocks are different than domestic shocks, they could have different effects on domestic economies and merit different policy responses. Therefore, this section explores if global and domestic shocks vary in their characteristics and effects across six dimensions. First, it assesses differences in the underlying sources of the shocks (e.g., whether they are driven more by supply or demand). Second, it evaluates differences in the size and volatility of global versus domestic shocks (controlling for the source of the shock). Third, it analyzes the sensitivity of interest rates to each type of shock (controlling for the shock source and size). Fourth, it tests for any differences in the persistence of global versus domestic shocks on inflation (continuing to control for the source and size). Fifth, it considers whether global and domestic shocks have asymmetric effects, i.e., are more important for periods of monetary policy tightening versus easing.

Finally, it compares the role of these global shocks in explaining the variation in inflation and output growth to that for interest rates in order to better understand when different types of shocks are more likely to be "looked through". For each of these tests for differences between the global and domestic shocks, we focus on the period from 1999-2019—the era closest to today and excluding the unusual volatility around the pandemic. For each test, we also compare results to the earlier window (1970-98) as well as the pandemic window (2020-24)—with the caveat that any different patterns during those periods may be less relevant for today.

IV.1. Sources of Global and Domestic Shocks

To assess if there are differences between global and domestic shocks and how they have evolved over time, we repeat the analysis in Section III using the FAVAR model to explain the variance of national policy interest rates, except now report more detailed decompositions into seven shocks: global demand, global supply, global monetary policy, oil prices, domestic demand, domestic supply, and domestic monetary policy. The first four constitute global shocks (i.e., shocks from heaven), and the last three domestic shocks. We continue to focus on the averages across our sample of 13 advanced economies, with more information on results for individual economies in Section V.1 and Appendix C.[19]

Table 1 (Panel A) shows the resulting decompositions over the full sample period from 1970-2024 and three shorter sub-periods: 1970-98, 1999-2019, and 2020-24. Each line in the table shows the total contribution of each type of shock to the total variation in interest rates. Before analyzing the differences between the global and domestic shocks, it is worth examining the patterns for the different sources of shocks. Demand shocks (both global and domestic) accounted for the largest share of the variation in interest rates over the full period (43%), followed by monetary policy shocks (39%) and a more modest role for supply shocks (18%). As highlighted in the last section, however, the contributions of these different sources of shocks have changed meaningfully over time. The role of each of the individual global shocks roughly doubled over 1999-2019 and tripled over 2020-24 (both compared to the earlier window over 1970-98)—similar to the increased role of global shocks in aggregate (Section III). It is noteworthy

[19] The analyses in Sections IV and V continue to include the euro area as one entity. Empirical results do not change materially if we focus on a larger group of 24 economies that treats each member of the euro area as a separate entity.

that the contribution of global supply (including oil) shocks reached a high of 21% in 2020-24[20]—much higher than the 7% during the well-known oil price shocks over 1970-84.[21] In contrast, but also consistent with the decreasing role of domestic shocks in aggregate, the contribution of each of the domestic shocks has also fallen over time, with a particularly large decline in the contribution of domestic monetary policy shocks.

But does the relative importance of these different shock sources differ across global versus domestic shocks? To answer this question, **Figure 3** decomposes just the global shocks and then just the domestic shocks for each subperiod into the contributions of supply, demand and monetary policy shocks (with oil price shocks broken out but included as global supply shocks in this discussion). This decomposition shows that global shocks are driven primarily by demand and supply shocks over our main period of interest (1999-2019), accounting for 45% and 34% of the global shocks, respectively, and a more modest role for monetary policy shocks (21%). Shifting to the domestic shocks, demand shocks continue to play the largest role, but supply shocks are less important and monetary policy shocks more so. More specifically, demand and monetary policy account for 48% and 38% of the domestic shocks, respectively, while domestic supply shocks only contribute 14%.

The right side of **Figure 3** reports the same decompositions over the earlier window (from 1970-98) and for the period around the pandemic (2020-24). The patterns on the relative importance of the different shocks are consistent across time, although the exact shares vary based on the window. Supply shocks constitute a larger share of global shocks than the domestic shocks in each window—contributing 41%-42% to global shocks in these additional periods—but only contributing 16% to domestic shocks. Monetary policy shocks continue to play a larger role (and are nearly twice as large) for the domestic shocks than global shocks in each of the additional windows. Demand shocks are the largest source of both global and domestic shocks in most periods—although supply shocks play a larger role than demand for global shocks over 2020-24 and monetary policy shocks play a comparable role for domestic shocks over 1970-98.

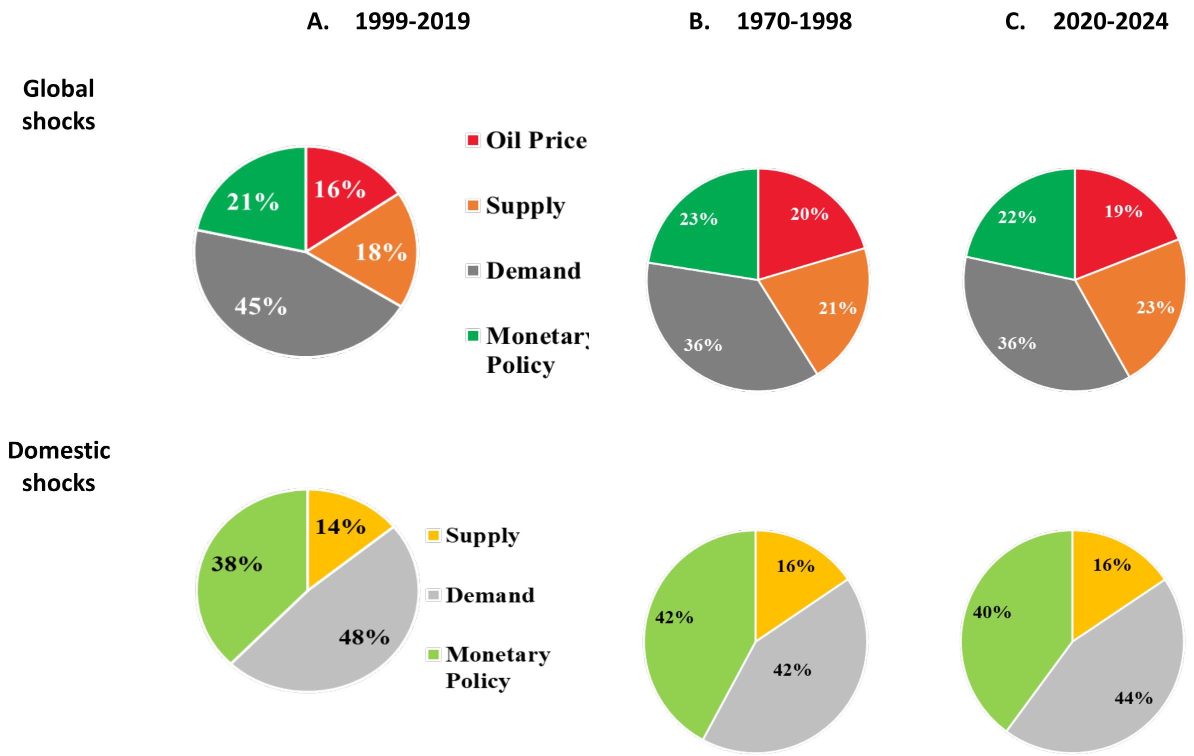
Overall, this analysis highlights important, and fairly persistent, differences in the sources of global and domestic shocks. Supply shocks are more important sources of global shocks than domestic shocks, while monetary policy shocks are more important sources of domestic shocks than global shocks. It is not surprising that the increased role of global shocks overall (i.e., when not disaggregated by the source of the shock) as documented in Section III corresponds to an increased role of supply shocks (which constitute a relatively larger share of global than domestic shocks).

[20] Estimates broken out for the shorter window around the oil prices shocks 1970-84 reported in earlier versions of this paper. The larger share of global supply and oil price shocks over 2020-24 also reflects the effects from other commodity prices, such as gas and food prices, particularly after the Russian invasion of Ukraine in 2022. Depending on their contemporaneous correlation with oil prices, these non-oil commodity price shocks will be counted as either oil price shocks or global supply shocks in the FAVAR framework.

[21] Despite large oil price movements in the 1970s and 1980s, the contribution of oil price shocks to interest rates is rather muted compared to that for inflation and output (as documented in Section IV.6). This may partly reflect less responsiveness by central banks to supply shocks during this earlier period, or different monetary policy tools and frameworks (such as less focus on inflation targets).

Figure 3 Contributions of Seven Shocks to Variation in Domestic Interest Rates

(Percent, averages across 13 advanced economies)



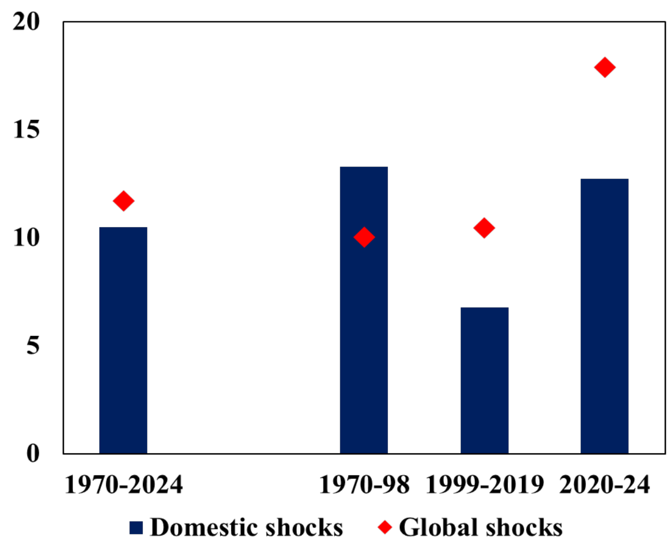
Sources: Authors' calculations based on monthly data from 1970 through 2024 for sample of 13 advanced economies. Notes: This chart shows the share of just the global shocks or share of just the domestic shocks by shock source. The results are based on forecast error variance decompositions of domestic policy interest rates over a 40-month horizon based on the FAVAR model developed in Section II that consists of four global variables (output growth, inflation, interest rates, and oil prices) and three domestic variables (output growth, inflation, and interest rates).

IV.2. Volatility of Global and Domestic Shocks

Global and domestic shocks could vary not only due to their underlying sources, but also in their underlying volatility. To evaluate if global or domestic shocks tend to reflect larger or more volatile sources of shocks, we begin by examining the share of large shocks (as a percentage of total shocks) that are either global or domestic, with large defined as greater than one standard deviation. **Figure 4** shows the results, with the share of large shocks that are of domestic origin in blue (i.e., domestic demand, supply or monetary policy) and of foreign origin in red (i.e., global demand, supply, monetary policy or oil prices). Focusing on the results for 1999-2019, 10.4 percent of shocks are large global shocks, while only 6.8 percent are large domestic shocks. This suggests that global shocks are more often large. Over the pandemic window from 2020-24, there are more large shocks of each type (global and domestic), but large shocks still occur about 5 percentage points more often when of global instead of domestic origin. In contrast, in the earlier window, a higher share of large shocks is domestic instead of global, a pattern which seems to have reversed since 1999.

Figure 4 Share of Large Shocks that are Global versus Domestic

(Percent of large shocks out of total number of shocks, averages across 13 advanced economies)



Sources: Authors' calculations based on monthly data from 1970 through 2024 for sample of 13 advanced economies.
Notes: Chart shows the share of large shocks--defined as a greater or smaller than one standard deviation over the corresponding period. Domestic shocks are the average of all domestic demand, monetary policy, and supply shocks, and global shocks are the average of all global demand, monetary policy, supply and oil prices shocks.

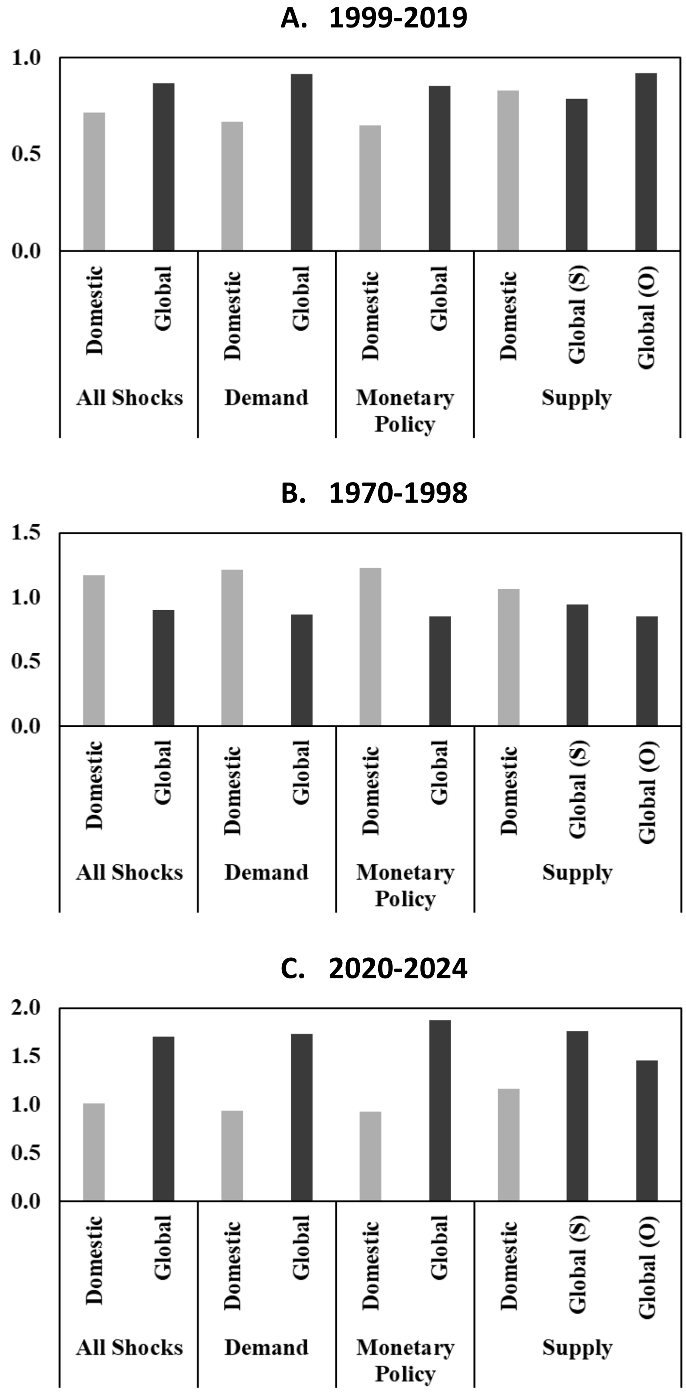
To examine differences in the volatility of global and domestic shocks more closely, we next use the detailed variance decompositions from Section IV.1, but now report the volatility of the different shocks over each subperiod. We focus on decompositions controlling for the source of the shock (e.g. supply, demand and monetary policy) as well as if the shock was global or domestic, to evaluate if changes in the volatility of different groups of shocks reflect changes in where the shock originates (i.e., global versus domestic) or the composition of each type of shock. For example, an increase in the volatility of global shocks over 2020-24 could reflect an increase in the volatility of global supply shocks during this period, or an increased share of global shocks explained by supply shocks if supply shocks are more volatile than other types of shocks during the period.

Figure 5 (Panel A) shows the volatility (i.e., standard deviation) of all shocks over 1999-2019, and then for demand, monetary and supply shocks, each broken into their domestic and global components.[22] These comparisons show a striking pattern: the volatility of global shocks is higher than that for all domestic shocks on average across our sample. The volatility of the global shocks is also higher in 12 of the 13 economies in the sample. Moreover, this greater volatility of global shocks does not just reflect the different composition of global shocks and greater prevalence of supply shocks (as documented above). Instead, the volatility of each type of shock—whether demand, monetary policy or supply (including oil)—is greater for the global than the comparable domestic shock. The only caveat is that if oil prices are not included as a global supply shock, then the volatility of domestic supply shocks tends to be larger than for global supply shocks.

[22] For each of the calculations, we normalize long-term volatility (over 1970-2024) to one.

Figure 5 Shock Volatility by Source of Shock

(Averages across 13 advanced economies, long-term volatility = 1)



Sources: Authors' calculations based on monthly data for sample of 13 advanced economies.

Note: Figures show the volatility (standard deviation) of each structural shock based on the country-specific FAVAR model that consists of four global variables (inflation, output growth, interest rates, and oil prices) and three domestic variables (inflation, output growth, and interest rates). Long-term (1970-2024) volatility is normalized to be one. Global (S) and Global (O) indicate global supply and oil price shocks, respectively.

Panels B and C of **Figure 5** show the same comparison of the volatility of domestic and global shocks over the earlier window (1970-1998) and around the pandemic (2020-24). This comparison supports the earlier results that there was a change in the nature of shocks around 1999 that has not only persisted since then, but was accentuated around the pandemic. More specifically, in the pre-1999 period, domestic shocks were more volatile than global shocks overall, as well as when controlling for the source of the global and domestic shocks. These patterns not only reversed over the 1999-2019 window, but the differential grew over 2020-24 as the volatility of each of the global shocks increased sharply (with the scale of the y-axis twice as big for the latter period).

These results are consistent with the patterns documented in Section III. The increased volatility of the global shocks over each period, likely contributed to their increased role in explaining the variation in interest rates over 1999-2019 and again over 2020-24.

IV.3. Sensitivity of Interest Rates to Global and Domestic Shocks

The role of different shocks in driving the variation in interest rates reflects not only the magnitude and volatility of the shocks, but also the sensitivity of interest rates to these shocks. For example, movements in oil prices were larger in the mid-1970s and early 1980s than in recent decades, but if economies have become more sensitive to oil price movements, then the variation in interest rates explained by oil price shocks could still have increased over time. Therefore, to understand the differences between global and domestic shocks and how they have evolved over time, we next evaluate if domestic interest rates are more or less sensitive to a given change in the global and domestic shocks decomposed above.

Theory provides no clear prediction on whether the sensitivity of interest rates differs for global versus domestic shocks and/or how this may have evolved over time. As economies have become more closely linked through trade and capital flows, the impact of a global shock on one country could be magnified due to simultaneous effects on neighbors and trading partners. On the other hand, as central banks have become more independent and shifted to inflation-targeting regimes, both of which contributed to a stronger anchoring of inflation expectations, this could give central banks more flexibility to look through the global supply shocks that have become more prominent (especially if they are believed to be temporary), thereby reducing the impact of global shocks on interest rates.

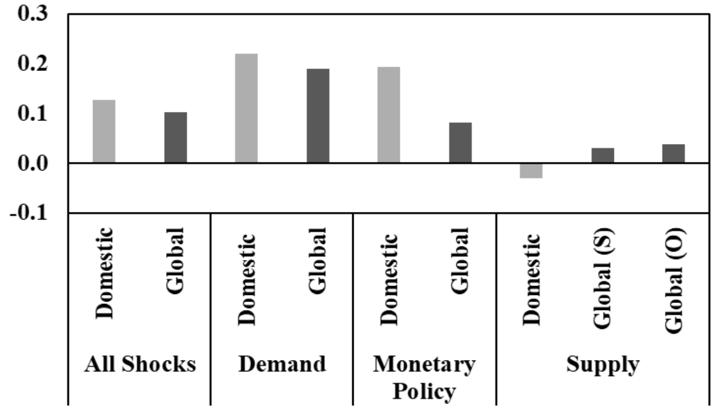
To test if interest rates are more sensitive to global shocks than domestic shocks and if this has changed over time, **Figure 6** (panel A) shows the impulse responses of interest rates from the FAVAR model of one standard deviation movements in each of our seven global and domestic shocks over 1999-2019.[23] The impulse responses show that interest rates tend to be less sensitive to global than domestic shocks—whether evaluating aggregate global or domestic shocks, or focusing only on demand or monetary policy shocks. Supply shocks are the only shock to which interest rates are more sensitive when of global versus domestic origin (likely reflecting more difficult tradeoffs, as discussed in more detail in Section IV.6).

[23] The forecast horizons for the impulse responses are selected to yield the maximum (or minimum) impact on interest rates depending on each structural shock.

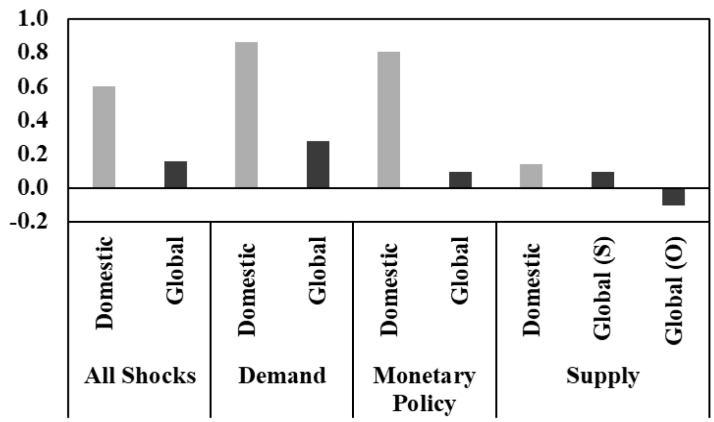
Figure 6 Sensitivity of Interest Rates to Different Sources of Shocks

(Averages across 13 advanced economies)

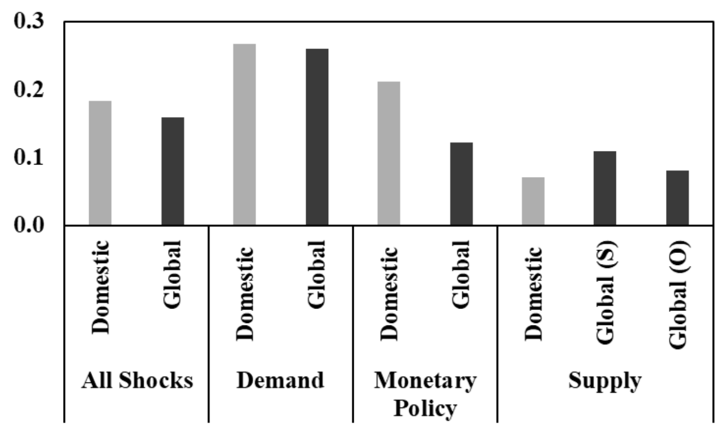
A. 1999-2019



B. 1970-1998



C. 2020-2024



Source: Authors' calculations based on monthly data for sample of 13 advanced economies.
Note: The figures show the average sensitivity of domestic interest rates to one standard deviation shocks over each sub-sample period, based on country-specific FAVAR models that consist of four global variables (inflation, output growth, interest rates, and oil prices) and three domestic variables (inflation, output growth, and interest rates). Global (S) and Global (O) indicate global supply and oil price shocks, respectively.

Next, we explore if the sensitivity of interest rates to global versus domestic shocks has changed over time. Panels B and C of **Figure 6** repeat the same analysis as above for the earlier window (1970-98) and pandemic window (2020-24). The most striking result is the lower sensitivity of interest rates to domestic shocks over time (as seen by the larger y-axis for the 1970-98 period). Over the earlier window, interest rates are much more sensitive to domestic shocks than global shocks in aggregate and for each source of the shock. In the pandemic period, however, interest rates are relatively more sensitive to global shocks than domestic shocks, not only in aggregate, but for each source of the shock. This shift primarily reflects a decreased sensitivity of interest rates to domestic shocks, although economies were more sensitive to these individual global shocks during the pandemic than during any of the historical periods in our sample.[24]

Another notable change over time is how interest rates respond to oil price shocks. During the earlier window over 1970-98, interest rates were generally lowered in response to oil shocks, while since 1999 central banks generally increased interest rates. This shift is consistent with central banks placing more weight on mitigating the adverse impact of oil shocks on output in the earlier periods and then placing more weight on stabilizing inflation in later periods, a shift that aligns with the widespread adoption of inflation-targeting frameworks.

Finally, it is important to highlight the difference in the relative sensitivities of interest rates to demand and supply shocks in each period, whether global or domestic. On average, the sensitivity to supply-side shocks (including global and domestic supply shocks, as well as oil prices) is meaningfully smaller than for demand shocks. This reflects a significant variation across individual economies, however, as explored in more detail in Section V.1 and Appendix C**.** This also suggests, however, that the greater role of supply shocks in aggregate shocks over time would, all else equal, correspond to a smaller impact on the variation in interest rates. Section III shows this is not what occurred, highlighting the importance of evaluating a range of characteristics of the underlying shocks (including if the shocks are global or domestic) in order to understand their impact.

IV.4. Persistence of Global and Domestic Shocks

Global and domestic shocks could also vary in the persistence of their effects on different macroeconomic variables. Therefore, we next examine whether there are differences in the duration of the impact of different types of shocks, focusing on the effects on domestic inflation given its central role in shaping monetary policy decisions.[25]

Although theoretical models generally do not predict differences in the persistence of global versus domestic shocks, recent empirical evidence suggests that the impact of domestic demand, supply, and monetary policy shocks tends to fade relatively quickly, while some external shocks can have longer lasting effects on inflation. For example, Ascari et al. (2024) and Bai et al. (2024) demonstrate that shocks to the global supply chain elicit a more persistent, hump-shaped response in inflation, peaking several years after the initial shock and decaying only gradually, whereas domestic cost-push shocks dissipate within a few

[24] The greater sensitivity of interest rates over 2020-24 relative to earlier periods applies for shorter windows analyzed in earlier versions of this paper.

[25] Global shocks also display greater persistence than domestic shocks in their effects on output growth, although for both types of shocks, the impact on output growth is less persistent than that on inflation.

months. Similarly, Alvarez and Kroën (2025) finds that upstream energy price shocks create entrenched inflationary pressures, particularly when transmitted through global trade and production networks.[26]

In order to test if global shocks tend to have more persistent effects on inflation, **Figure 7** shows the average cumulative effects of global and domestic shocks across 13 advanced economies over 1999-2019, with the shocks normalized to equal a one percentage point increase in inflation at the six month horizon.[27] It begins with our aggregated measures of global and domestic shocks and then reports the same results when controlling for the source of the shock. The inflationary impact of domestic shocks—in aggregate or just for demand, supply, or monetary policy—typically dissipates within a year, whereas the effects of the corresponding global shocks tend to persist for more than three years. These differences in persistence occur for all sources of global and domestic shocks (i.e., demand, supply, or monetary policy). Among the global shocks, global demand shocks—often associated with output collapses during global recessions and their scarring effects—have a larger and more protracted impact on inflation than global supply (including oil price) shocks, which generally reflect global supply disruptions and adverse developments in oil markets. All in all, these results are consistent with recent empirical evidence that global shocks have more persistent effects on macroeconomic variables than domestic shocks (when controlling for the initial size of the shock).

We have also repeated this analysis for two other windows—from 1970-98 and for the full period from 1970-2024. (The period from 2020-24 is too short for meaningful estimation). The resulting impulse responses are consistent with the results above; global shocks are more persistent than domestic shocks, in aggregate as well as when controlling for the source of the shock. The differences are slightly more muted for the earlier window and full period, consistent with results reported above that global shocks were more muted (i.e., less volatile and less likely to be large) before 1999, which would likely contribute to less persistent effects on inflation.

IV.5. Direction of Global and Domestic Shocks

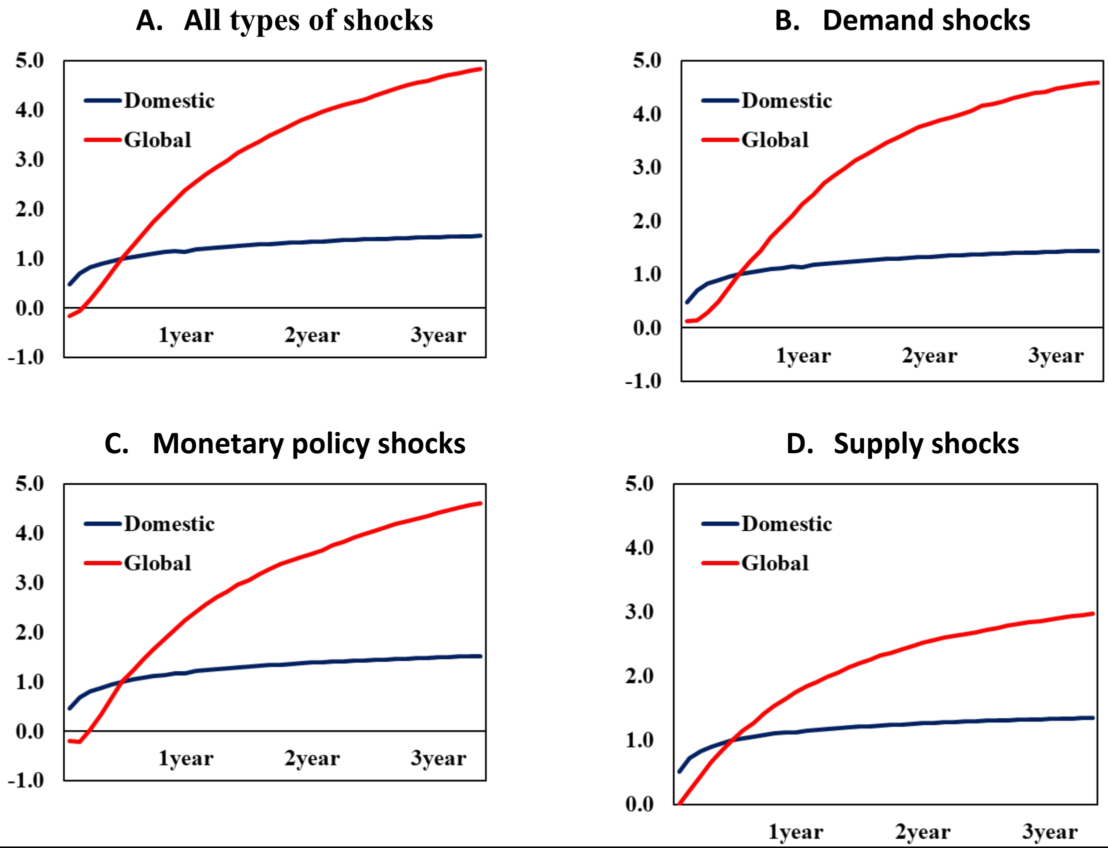
The analysis throughout this paper has aggregated across interest rate movements in both directions, assuming the effects of positive shocks are the same as for negative shocks (with the sign reversed). The effects of certain types of shocks, however, may be asymmetric. For example, Ball and Mankiw (1994) develops a model in which shocks that raise firms' desired prices generate larger price responses than shocks that lower desired prices. Weber and Wasner (2023) and Kharroubi et al. (2023) show that firms are more likely to increase prices after supply-chain bottlenecks and other positive cost shocks, as these shocks temporarily increase market power (as occurred after the pandemic). Karadi et al. (2024) and Ascari et al. (2025) model how monetary policy should respond more aggressively to inflation increases in the presence of a nonlinear (and state-dependent) Phillips curve.

[26] Brandão-Marques, Meeks, and Nguyen (2024) also highlights another channel that could extend the impact of global shocks on inflation; exposure to global disturbances increases uncertainty around inflation persistence, thereby complicating the calibration of monetary policy and corresponding response.

[27] It is worth highlighting that this does not imply that the cumulative effects of global shocks are larger than those of domestic shocks, or that all shocks have a positive effect on inflation, as the analysis normalizes the initial impact of each shock to a one percentage point increase in inflation in order to focus on differences in persistence.

Figure 7 Persistence of Shock Transmission to Inflation, 1999-2019

(Impact of shocks normalized to increase inflation by 1pp at 6-month horizon, averages across 13 AEs)



Sources: Authors' calculations based on monthly data for sample of 13 advanced economies.

Note: Figures show the average persistence of the cumulative impulse response on domestic inflation of the shock (or combination of shocks) listed at the top. To compare the persistence of the shock transmission, the IRF at the 6-month horizon is normalized to a positive one percentage point impact on inflation for each shock. The results are based on the country-specific FAVAR models that consist of four global variables (inflation, output growth, interest rates, and oil prices) and three domestic variables (inflation, output growth, and interest rates). Panel A is the average of demand, monetary policy, and supply shocks (including oil prices). Panel D includes oil prices as part of global supply shocks.

To test if the impact of global and domestic shocks varies for increases versus decreases in interest rates, we estimate the baseline FAVAR model developed in Section II separately for economy-specific tightening and easing phases for monetary policy.[28] The monetary policy phases are identified using the dates of "Rate Cycles" in Forbes, Ha, and Kose (2024, 2025).

[28] While our analysis of interest rate fluctuations focuses on the decomposition of forecast error variances (second moments) throughout the paper, this subsection focuses on historical decompositions of the levels of interest rates (first moments). This is due to the limited sample size available for tightening and easing phases during some interest rate cycles (such as limited examples of tightening phases for monetary policy after the 2008 Global Financial Crisis and before the pandemic).

Figure 8 (panel A) shows the variation in interest rates during tightening and easing phases resulting from each type of shock over 1999-2019. The global shocks are in darker colors (and outlined with thick black lines), while the corresponding domestic shocks are a lighter shade. Global shocks play a more prominent role during tightening phases for monetary policy (explaining 58% of the variation in interest rates) than in easing phases (when they explain 47%). The biggest distinction between the global and domestic shocks across easing and tightening phases, however, is the relative importance of the sources of each of these shocks.

For the global shocks, the sources are fairly similar across both tightening and easing phases. Global demand shocks are the dominant global driver of both tightening and easing policy (explaining 22% or 21%, respectively). Global supply shocks (and particularly oil price shocks) have also played a meaningful role and roughly similar role in explaining both increases and decreases in interest rates (18% and 19%, respectively). Global monetary policy shocks are the one type of global shock that has more meaningful differences across tightening and easing phases over this period, explaining about twice as much of interest rate movements during tightening phases (18%) than easing phases (7%).

In contrast, the sources of the domestic shocks vary notably across tightening and easing phases—as well as differing from that of the global shocks. Demand shocks are the dominant domestic drivers of tightening phases (as found for global shocks) and explain a sizeable portion of interest rate increases (37%), but play a much more muted role in easing phases (only 6%). Instead, monetary policy shocks are the dominant domestic driver of easing phases (explaining 41%) and play virtually no role in explaining tightening phases. This dominant role of domestic monetary policy shocks in driving the reductions in interest rates—even when controlling for other shocks—indicates a greater willingness of central banks to lower rates than suggested endogenously by the other variables in our model. Also, in contrast to the important role of global supply shocks, domestic supply shocks play only a minor role in interest rate increases (5%) and interest rate decreases (7%).

These graphs in panel A of **Figure 8** show the relative importance of each shock type in explaining the variation of interest rates, but not the absolute impact. Therefore, panel B of **Figure 8** uses the same decomposition but reports the total importance of the global and domestic shocks in explaining the total increase or decrease in interest rates during tightening and easing phases, respectively, over our three historical windows. Over 1999-2019, interest rates increased by 2.8 pp, of which 1.6 pp is explained by global shocks, and rates were decreased by 5.4pp, of which 2.5pp was explained by global shocks. During the pandemic window over 2020-24, interest rates were increased by more (5.6 pp), of which global shocks explained about two-thirds, while they were decreased by less during easing phases, but global shocks still explain about half. During the earlier window over 1970-99, global shocks explain about 3pp of the rate changes in each phase, which is not only similar across easing and tightening phases, but a smaller share of overall rate changes (which were larger), consistent with the smaller role of global shocks over this earlier period.

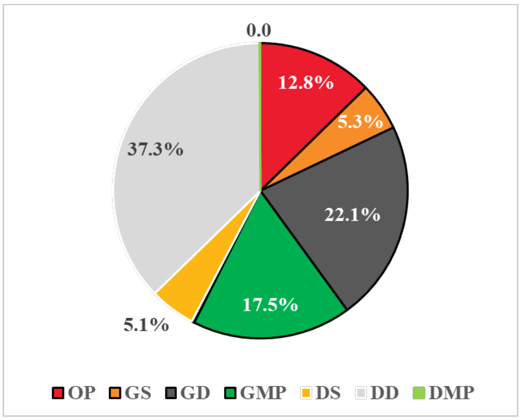
These results in **Figure 8** (Panel B) can also be extended with the global and domestic shocks broken down into the seven structural shocks. These results (not reported here) are consistent with the decompositions in panel A of **Figure 8**, but also show a larger role for global supply shocks (including oil) in the 2020-24 period for tightening episodes and in the 1970-99 period for easing episodes. In fact, during the pandemic period, about 2pp of the 6pp increase in interest rates reflects the contribution of global supply and oil price shocks, while in the 1970-98 window (which also includes a period of oil shocks), global supply and oil price shocks contributed less than 1 percentage points to the even larger average tightening. This suggests that central banks were more willing to “look through” the impact of global supply shocks in the 1970s and 1980s than over 2020-24, an issue explored in more detail in the next section.

Figure 8 Contributions of Shocks to Changes in the Levels of Interest Rates During Tightening and Easing Episodes for Monetary Policy

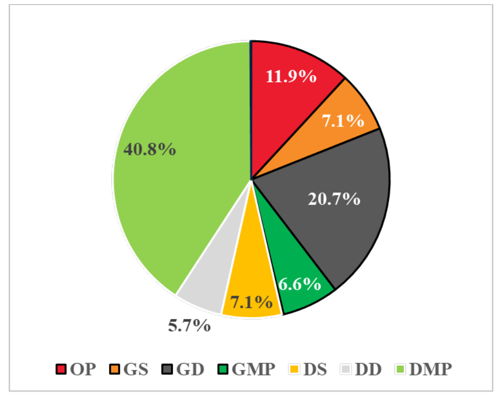
(Averages across 13 advanced economies, in percent or percentage points, 1999-2019)

A. By Shock Type

Tightening episodes

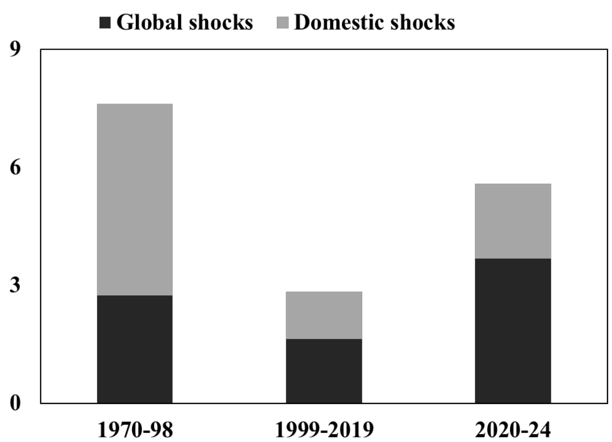


Easing episodes

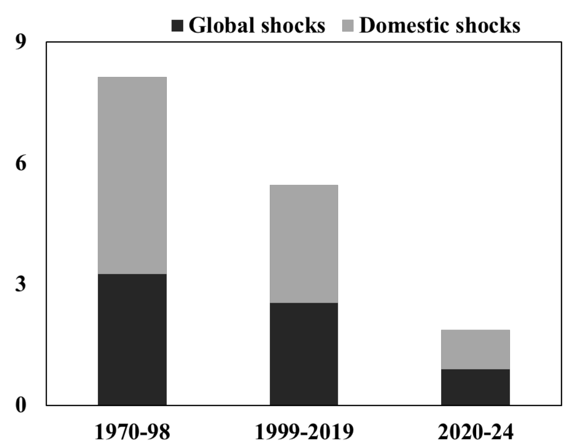


B. By Global and Domestic Shocks

Tightening episodes



Easing episodes



Sources: Authors' calculations based on monthly data for a sample of 13 advanced economies.

Notes: Figures show the historical decompositions of the level of domestic policy interest rates during tightening and easing phases for monetary policy. The dates for the monetary policy phases are from Forbes, Ha and Kose (2024, 2025). The estimates are based on the FAVAR model described in Section II that consists of four global variables (output growth, inflation, interest rates and oil prices) and three domestic variables (output growth, inflation, and interest rates). "OP" = oil price shock, "GS" = global supply shock, "GD" = global demand shock, "GMP" = global monetary policy shock, "DS" = domestic supply shock, "DD" = domestic demand shock, "DMP" =domestic monetary policy shock. A. The contribution of domestic monetary policy shock (light green) is moderately negative but is displayed as zero for presentation purposes.

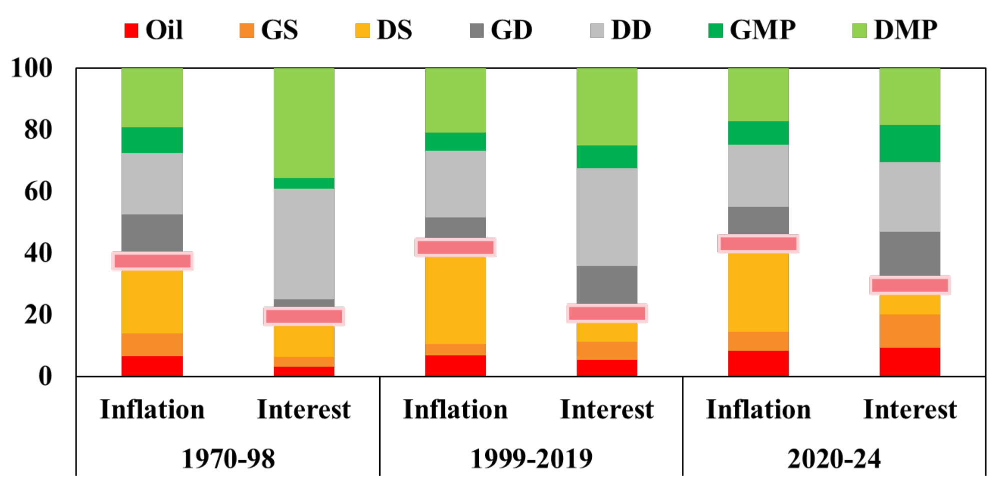
IV.6. Looking Through: Global and Domestic Shocks to Interest Rates Inflation and Growth

Several pieces of the analysis above have highlighted the role of supply shocks, and particularly global supply shocks. For example, supply shocks are a larger share of the contribution of global shocks (than domestic shocks) to the variation in interest rates, and the role of these global supply shocks increased sharply over 2020-24. Standard models of optimal monetary policy suggest that, in some circumstances, monetary policy can "look through" supply shocks, i.e., respond less forcefully to changes in inflation that are expected to be "transitory" and short-lived. If so, a decomposition of the drivers of fluctuations in inflation and output growth should find a larger role for supply shocks (both global and domestic) in explaining the variation in these macroeconomic variables than for the same decompositions explaining the variation in interest rates. Moreover, just as global shocks differ from comparable domestic shocks along several dimensions, there may also be differences in the extent to which central banks "look through" the impact of global versus domestic supply shocks on inflation.

To better understand these issues, we return to our baseline FAVAR model described in Section II and estimate the average variance decompositions for inflation as well as interest rates (as previously done) over the full period (1970-2024) and the three sub-periods. The full set of results are reported in **Table 1,** and the subset of results focused on the decompositions into the seven structural shocks for interest rates and inflation are shown in **Figure 9**. In the figure, the supply shocks (both global and domestic and including oil price shocks) are at the bottom of each bar, with the thick pink line differentiating between the supply shocks and other types of shocks.

Figure 9 Contributions of Seven Shocks to the Variation in Domestic Interest Rates and Inflation

(Percent of total variation, averages across advanced economies)



Sources: Authors' calculations based on monthly data from 1970 through 2024 for sample of 13 advanced economies. Notes: "Oil" = oil price shock, "GS" = global supply shock, "GD" = global demand shock, "GMP" = global monetary policy shock, "DS" = domestic supply shock, "DD" = domestic demand shock, "DMP" = domestic monetary policy shock. The figure shows the forecast error variance decompositions of domestic inflation (left columns) and policy interest rates (right columns) over a 40-month horizon based on the FAVAR model developed in Section II.1 that consists of four global variables (output growth, inflation, interest rates, and oil prices) and three domestic variables (output growth, inflation, and interest rates). The pink horizontal lines indicate the sum of the contributions of global and domestic supply shocks and oil price shocks.

This set of results shows several noteworthy patterns. First, the aggregate role of supply shocks (both global and domestic) is larger in explaining the variation in inflation than for interest rates in each period. This is consistent with models suggesting that at least some of the impact of supply shocks on inflation (and output) can be looked through. Supply shocks explain 18% of the variation in interest rates over the full period, versus 41% and 43% for inflation and output, respectively. The role of supply shocks increased over time for interest rates, with a peak contribution of 30% over 2020-24, but this contribution was still lower than the contribution of supply shocks to inflation and output growth during each period. In contrast, demand shocks (both global and domestic) play a relatively more important role for interest rates, explaining 43% of the variation of interest rates over 1970-2024, as compared to 32% and 29% of the variation in inflation and output growth, respectively. These patterns are consistent with monetary policy being more responsive to demand shocks (for which there are no tradeoffs between supporting activity and price stability), while monetary policy does not need to fully respond to the effects of supply shocks on inflation and output (and may need to balance tradeoffs in the impact on different macroeconomic variables).[29]

Finally, decomposing these supply shocks into their global and domestic components highlights how the role of global supply shocks differs meaningfully from that of domestic supply shocks for the macroeconomic variables. The primary source of supply shocks for inflation and output growth is domestic, while the primary source of supply shocks for interest rates over 1999-2019 and 2020-24 is global. The increased influence of supply shocks on interest rates over time is entirely driven by the growing impact of global supply shocks—but this increased role does not occur to the same extent for inflation or output growth. This larger role of global supply shocks on interest rates than inflation and growth is the opposite pattern from that of domestic supply shocks (and supply shocks overall). Monetary policy appears to have looked through some of the effects of domestic supply shocks, but not looked through the impact of global supply shocks since 1999 to the same degree.

This series of results suggests that monetary policy is not mechanically adjusted in response to changes in inflation and output. Instead, the sources behind the variation in inflation and output appear to affect any corresponding adjustment in interest rates, with less responsiveness to domestic supply shocks than demand shocks, but more responsiveness to global supply shocks than domestic supply shocks. These patterns are also consistent with the results in Section II.3 and Appendix B discussing the global factors in interest rates, inflation, and growth. These results show a greater increase in the global factor in interest rates than for the other macroeconomic variables, suggesting interest rates had become more "globalized" than inflation and growth. The more detailed shock decompositions in this section explain why: the increased role of global supply shocks, which have a larger impact on interest rates than inflation and output and also a larger impact on interest rates than domestic supply shocks.

V. Extensions and Robustness Exercises

This section reports a series of exercises examining extensions and the robustness of the headline results reported above. We focus on four sets of analyses: differences in key results across countries (instead of the averages that are the focus of the rest of the analysis), alternative definitions for key global and domestic variables, excluding the largest economies, and alternative modelling specifications and

[29] For a more detailed discussion of these types of tradeoffs for monetary policy, see Forbes, Ha and Kose (2025).

identification schemes.[30] We focus on the baseline FAVAR estimates decomposing the variation in interest rates into global and domestic shocks, as well as the more disaggregated set of seven shocks, for our sample of 13 advanced economies from 1999-2019. A subset of these results is summarized in **Table 2,** with the key results robust to each of these exercises. Appendix D reports the same series of robustness tests for the longer period (1970-2024) or just around the pandemic (2020-24).

V.1. Importance of Shocks Across Individual Economies

Most of the results reported throughout this paper are the averages across the advanced economies in our sample. These averages, however, can mask important differences in these relationships across economies. For example, interest rates, inflation and output growth in some economies may be more sensitive to global shocks if the countries are more interconnected with the global economy through trade or financial flows, or more vulnerable to specific types of global shocks (such as oil price fluctuations) based on their economic structure. Therefore, it is also useful to examine the disaggregated results for individual economies.

Figure 10 shows the results from estimating our FAVAR model for the G-5 economies (Canada, the euro area, Japan, the United Kingdom, and the United States), when the shocks explaining the variation in interest rates are decomposed into global and domestic components (left) and then the full seven shocks (right). Results for the benchmark period (1999-2019) are in Panel A and then just the pandemic period in Panel B. Additional details for this group of countries, as well as results for the other eight advanced economies in our sample are in Appendix C. For each of the 13 economies in our sample, global shocks explain a sizable portion of the variation in interest rates (36%-68%) and the role of these global shocks increased in 2020-24, particularly for global supply shocks, as found for the sample average (in Sections III and IV).

Within the G-5 economies, the most notable differences are between the euro area and the other advanced economies. In the euro area, global shocks explain 68 percent of the total variation in interest rates over 1999-2019—the largest in the sample. This more prominent role of global shocks for the euro area likely reflects the region's stronger international trade and financial linkages and deeper integration with global supply chains.[31] The differences since 1999 may also reflect institutional features of the European Central Bank, including its greater commitment to inflation targeting as a relatively younger central bank; its asymmetric inflation target for part of this period (i.e., inflation below 2% for much of the sample instead of the symmetric target for central banks such as the Bank of England and Federal Reserve Board); and heightened sensitivity to regional fragmentation risks resulting from external shocks.

There are also noteworthy differences in the role of supply shocks between the euro area and the United States (and other G-5 economies). For example, supply shocks (both global and domestic) explain 28 percent of the variation in the euro area, but only 18 percent for the United States. The composition of demand and supply shocks is also different for the euro area, with larger shares of each shock coming from global instead of domestic sources. Finally, many of these differences between the euro area and other G-5 economies are accentuated during the 2020-24 period. More specifically, the role of global

[30] In previous versions of this paper, we also did robustness tests excluding periods of heightened volatility during the oil shocks in the 1970s and during the early stages of the pandemic. The key results are unchanged.

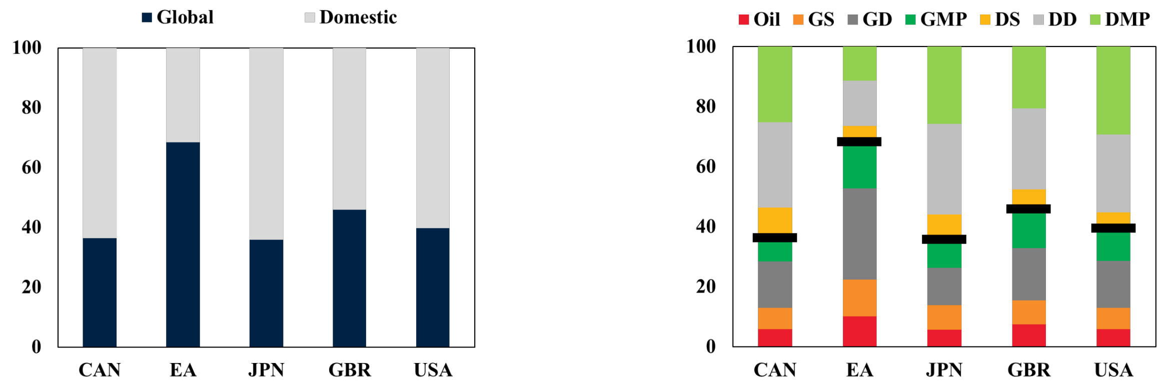
[31] The dominant role of the global shocks in euro area interest rate cycles is consistent with other studies in the global business cycle literature, such as Ha et al. (2025), which reports a larger share of the global factor or global output factor in the euro area than other economies

shocks increased sharply to explain almost all the variation in interest rates in the euro area (89 percent) in the latest window—much more than in any of the other G-5 economies. In other words, monetary policy in the euro area was largely a response to shocks "from heaven".

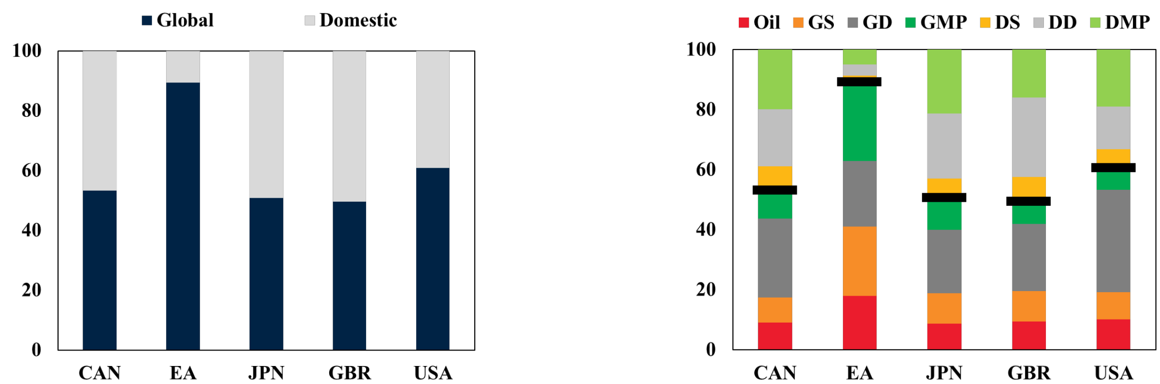
Figure 10 Contributions of Shocks to Variation in Interest Rates: G-5 economies

(Percent of total variation, Averages across advanced economies for the relevant periods)

A. 1999-2019



B. 2020-2024



Sources: Authors' calculations based on monthly data from 1970 through 2024.
Notes: Forecast error variance decompositions of interest rates based on the FAVAR model that consists of four global variables (global output growth, inflation, interest rates, and oil prices) and three domestic variables (domestic output growth, inflation, and interest rates). "Oil" = oil price, "GS" = global supply, "GD" = global demand, "GMP" = global monetary policy, "DS" = domestic supply, "DD" = domestic demand, "DMP" =domestic monetary policy. Horizontal lines (right charts) indicate the sum of global shocks.

V.2. Alternative Measures of Key Global and Domestic Variables

Next, we explore whether these results are sensitive to how we measure global and domestic variables that are central to the analysis. First, instead of focusing on nominal oil prices, we use real oil prices (nominal oil prices adjusted for US CPI). Second, instead of estimating the global factor for output growth based on the growth in industrial production for each of the economies in our sample, we simply use the global economic activity index estimated by Kilian (2009)—thereby capturing a broader measure of global growth than for just the advanced economies in our sample. Third, instead of estimating the global factors for interest rates, inflation and output growth using our dynamic factor model (discussed in Section II.3), we calculate each of the global variables using simple weighted averages for each of the respective variables for the economies in our sample (based on nominal US dollar GDP weights). Fourth, instead of using headline CPI inflation, we use core CPI inflation (to measure inflation in each economy as well as to calculate the global inflation factor). Finally, instead of measuring interest rates using domestic shadow interest rates or short-term market rates, we use domestic policy interest rates (for each economy as well as to calculate the global interest rate factor). As noted above, the policy rate has smaller variations than shadow or market rates, particularly during the period when interest rates were at lower bounds in many advanced economies.[32]

Table 2 (top set of rows) reports key coefficients for a subset of these results using alternative definitions for the global and domestic variables, with the baseline results reported in the top line for comparison. Results for the benchmark window (1999-2019) are reported in the table, while comparable estimates for the full-sample period (1970-2024) and pandemic period (2020–24) are in Appendix D.

Key results, particularly on the role of the global shocks and the contributions of the different sources of the global shocks, remain broadly consistent across the different variable definitions.[33] In fact, in some of these extensions, and particularly for the 2020-24 period, the contribution of the global shocks is estimated to be even larger than in our baseline. The only modification that produces a meaningful fall in the contribution of the global shocks is when interest rates are measured using policy rates (instead of shadow or market rates). This is not surprising, as using the policy rate misses key adjustments in monetary policy when rates were around lower bounds and central banks relied on tools other than adjustments in the policy rate to ease monetary policy.

V.3. Excluding Large Economies

We evaluate the extent to which our results are affected by developments in the two largest economies—the United States and the euro area. Given the size of these economies, macroeconomic developments could quickly and meaningfully affect the global variables and estimates of the global factor. As discussed in Section II.1, our FAVAR model does not impose any restrictions on the relationships between the global and domestic variables other than within a given month, thereby allowing for possible spill-back effects from each economy to global variables. The only restrictions are zero contemporaneous relationships (i.e., within a month). This assumption may not be valid, however, if there is a rapid spillover within a month.

[32] The interest rate that the central bank identifies as the policy rate has changed over time in most countries, and we use the rate identified as the policy rate by the BIS in each year. Also, in earlier periods many central banks had different operating frameworks and targets other than inflation, leading to substantially more volatility in the policy rate when this was not the central bank's primary operating tool.

[33] That said, we observe some sensitivity in the country-specific results. For instance, in the sensitivity tests using the weighted averages for the global variables, the contribution of global shocks to interest rates increases for the U.S. and Canada and declines for the euro area.

Since these types of spillovers are more likely to occur from the largest economies, we repeat the baseline analysis but exclude the United States and/or the euro area.

Results are shown in the middle rows of **Table 2.** The variance contributions of the shocks to interest rates remain similar to the baseline estimates for both the benchmark period (1999–2019) and the pandemic period (2020–24). That said, excluding the euro area results in a moderate decline in the variance contribution of global shocks in both windows. This is expected as the role of the global shocks is substantially larger for the euro area than the other economies (as discussed in Section V.1), so removing this observation would mechanically cause the averages (that are the focus of the discussion above) to decline.

Also, it is worth noting that the results of the dynamic factor model (discussed in Section II.3 and Appendix B) are basically unchanged when the United States or the euro area is excluded from the analysis. In other words, the estimated global factors do not appear to primarily reflect dynamics in the United States or euro area.

V.4. Alternative Model Specifications and Identification Approaches

As a final set of robustness exercises, we estimate alternative model specifications for our baseline FAVAR model, including different formulations to capture global supply shocks.

We begin with the baseline model and estimate two different specifications: incorporating time-varying coefficients (instead of time-fixed coefficients) and alternative sign restrictions which require a longer (two-month) period of sign constraints (instead of the one-month in the baseline). These results are reported at the bottom of **Table 2.** There is no meaningful change in the headline findings, and the contribution of the global shocks to the variation in interest rates is slightly larger than in the baseline (over most windows).

Next, in a series of additional tests, we use more detailed measures of different global supply shocks, including not only oil price shocks, but also geopolitical risk (measured using the GPR index from Caldara and Iacoviello 2022), supply chain disruptions (measured using the GSPCI index from the Federal Reserve Bank of New York), and economic shortages (measured using the shortage index from Caldara et al. 2025). We use several different Cholesky identification schemes to attempt to better understand the relative importance of these shocks. The main results are consistent with the key results highlighted throughout the paper, but also suggest that the drivers of the global supply shocks vary meaningfully over time. Comparisons across the 55 years in the baseline sample are difficult as some of the more detailed measures of supply shocks are not available for earlier in this window. With this caveat, the results available suggest that supply chain disruptions are the dominant source of global supply shocks over 2020-24, with some contribution from geopolitical risk (whose role has been increasing gradually over time), plus some contribution from oil price volatility (which makes more intermittent contributions during specific windows since 1970).

Table 2 Robustness Exercises: Contributions of Shocks to Variation in Interest Rates over Benchmark Period (1999-2019)

(Percent of total variation, averages across advanced economies)

Description of Each Sensitivity Test			Structural Shocks								
			Global					Domestic			
			Total	Oil Price	Supply	Demand	Monetary policy	Total	Supply	Demand	Monetary policy
Baseline			***33.7***	***5.3***	***6.1***	***15.1***	***7.3***	***66.3***	***9.4***	***31.9***	***25.1***
Alternate measures of global and domestic variables	**Commodity Prices**	**Real oil price**	**35.9**	5.3	5.8	17.3	7.5	**64.1**	8.5	32.2	23.4
	Global Output	**Global economic activity index**	**35.5**	6.3	6.6	15.6	7.1	**64.5**	9.0	30.9	24.5
	Global Interest Rates	**Weighted average of interest rates**	**35.8**	5.3	6.1	17.1	7.3	**64.2**	10.1	30.0	24.1
	Global Factors	**Weighted average of output, inflation, interest rates**	**36.3**	4.7	6.6	16.8	8.3	**63.7**	10.0	31.9	21.8
	Domestic inflation	**Core CPI**	**35.4**	6.5	5.8	13.1	10.0	**64.6**	9.5	29.4	25.7
	Domestic interest rates	**Policy rates**	**24.3**	3.8	3.9	13.1	3.4	**75.7**	10.7	35.1	29.8
Alternative sample	**Exclude large economies**	**Exclude US**	**33.2**	5.2	6.0	15.0	7.0	**66.8**	9.7	32.4	24.7
		Exclude EA	**30.8**	4.9	5.6	13.8	6.6	**69.2**	9.7	33.3	26.2
Alternative modelling frameworks	**Identification scheme**	**Sign restriction**	**35.2**	5.4	6.5	16.1	7.2	**64.8**	9.0	32.6	23.3
	Model specification	**Time-varying coefficients**	**34.5**	5.5	5.9	15.1	8.0	**65.5**	9.6	30.6	25.3

Note: Table shows the forecast error variance decompositions of interest rates (in percent of total variation). The top row repeats the baseline estimates from Table 1; see notes to this table for details on this baseline model, sample and data. Each subsequent row reports a robustness test with the change from the baseline described in the left columns and discussed in detail in Section V.

VI. Conclusions

This paper provides an in-depth analysis of the sources and characteristics of the global and domestic shocks driving interest rate fluctuations over the past 55 years in 13 advanced economies. A key result throughout the paper is that the shocks behind interest rates have changed meaningfully over time—with a much larger role for global shocks. Moreover, the characteristics of these global shocks are fundamentally different from domestic shocks along several key dimensions (even when only focusing on shocks from the same source, such as demand or supply). The global shocks that now play a greater role, particularly global supply shocks, also appear to generate stronger monetary policy responses and are less likely to be "looked through" than comparable domestic shocks, particularly when the shocks correspond to higher inflation.

These developments present a challenge for central banks, as many of their core models, frameworks, and communication strategies were developed based on the characteristics of the previously dominant domestic shocks. More specifically, this evolving role of the types of shocks affecting interest rates and the economy more broadly may require adjusting the standard New Keynesian models that are the workhorse for central banks. Global shocks have a larger supply component, greater volatility, more persistent effects on inflation (even after controlling for their variance and source), and asymmetric effects (in terms of contributing more to increases than decreases in interest rates).

The implication is that monetary policy models may need to move away from assumptions that shocks are temporary, linear, and symmetric, and instead allow for a more prominent role of global shocks (Justiniano and Preston, 2010) as well as for a larger, longer lasting, and nonlinear effects of these global shocks (Bandera et al. 2023; Cavallo et al. 2023; Karadi et al. 2024; Nuno et al. 2024; Ascari et al. 2025).[1] This will likely imply more difficult tradeoffs for monetary policy in the future. If global supply shocks are modelled as nonlinear and more persistent, any impact on inflation could be more difficult to look through, requiring central banks to assess how to balance conflicting effects of policy adjustments on inflation and employment goals. Our results provide some evidence that this is already occurring—as central banks have been less willing to "look through" the recent impact of global supply shocks on inflation (as compared to a more muted response to domestic supply shocks).

Our analysis also has important implications for ongoing framework reviews. In an environment where global shocks—often beyond the control of national authorities—play an increasingly dominant role, policymakers will find it more difficult to meet domestic targets. They should evaluate whether different response functions are optimal for the more frequent, larger, and more persistent shocks, such as whether they should respond more "forcefully" to larger shocks in both directions (as recently adopted by the ECB and U.S. Federal Reserve Board). Central banks may also consider whether it remains realistic to focus on narrow numerical targets for inflation and explore the potential benefits of approaches with more flexibility (such as ranges for inflation targets) or place greater emphasis on variables less sensitive to global shocks (such as core inflation).

Finally, and closely related, the evolving role of global shocks may present challenges for forecasting and communicating monetary policy. Global shocks are outside the control of domestic policymakers (i.e., from "heaven"), often harder to predict, and may involve non-economic origins (such as military conflict) that central banks would generally prefer to avoid including in their forecasts unless the risks materialize.

[1] Federle et al. (2024) shows that war can significantly affect the output of nearby countries for over 8 years.

These global shocks also often correspond to larger effects on domestic economies with more difficult policy tradeoffs. All of these factors will increase uncertainty about future inflation, in turn generating a range of negative effects (such as lower investment and consumer spending, as documented in Coibion and Gorodnichenko 2025). Central banks may want to consider adjusting their strategies for forecasting and communication to take into account these challenges. For example, instead of emphasizing a central forecast with wide error bands (which often receive little attention), central banks may benefit from using scenarios more often to capture the impact of specific global shocks. Scenario-based forecasts and guidance could better capture uncertainty and tradeoffs, providing more clarity on how policy might respond under different types of shocks.

While the analysis in this paper improves our understanding of the evolving role of global and domestic shocks, it also leaves many unanswered questions for future research. First, while we analyze the role of global supply shocks, more granular data could allow for a deeper examination of the sources and transmission channels—such as the role of supply chains, trade networks, geopolitical tensions, and specific sectors in amplifying or dampening their domestic effects. This could be important to understand why central banks are less likely to look through the effects of global supply shocks than domestic supply shocks. Second, while our analysis focused on advanced economies, the framework could be extended to emerging markets to evaluate if there are differences in their exposure and sensitivity to global shocks. Third (and related), our discussion focuses on common patterns and averages across our sample; a more detailed analysis of heterogeneous results across countries could provide insights into differences in countries' sensitivity to these global shocks, such as the role of a country's financial and trade integration or policy frameworks. Finally, given the increasing role of global shocks and the multiple dimensions by which they differ from domestic shocks, future research could assess how these shocks are best captured in structural models and how their growing prevalence might affect optimal monetary policy design and communication. As Sun Tzu taught over 2500 years ago, it is critically important to *"know Heaven and know Earth…"*.

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Heaven or Earth?
The Evolving Role of Global Shocks for Domestic Monetary Policy

Kristin Forbes, Jongrim Ha, and M. Ayhan Kose[*]

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<u>Supplemental Appendix (NOT FOR PUBLICATION)</u>

This appendix contains:

Appendix A. Data Information

Appendix B. Dynamic Factor Model and Estimation

Appendix C. Results for Individual Economies: The Role of Global and Domestic Shocks

Appendix D. Robustness Exercises: Contributions of Shocks to Variation in Interest Rates in Longer and Pandemic Windows

Appendix A: Data information

Appendix Table A1 Data Appendix

Variable	Description	Source
Inflation	Headline Consumer Price Index. Inflation rates (in percent) are calculated on a month-over-month basis.	OECD, Haver Analytics
Interest rates	We use the shadow policy interest rate as estimated in Krippner (2013) if available. Data on shadow rates are available for seven economies (Australia, Canada, euro area, Japan, New Zealand, United Kingdom, United States) over 1995-2024. If not available, we use the overnight market rate, and if not available the 3-month Treasury bill yield (both from Haver Analytics). If none of these are available, we use the nominal policy interest rate used by the central bank for monetary policy from the BIS or OECD. Euro area policy rates before 1999 are GDP-weighted averages of policy rates in member countries. For each measure the rate is monthly and expressed in percent.	LJK Limited; Krippner (2013) Haver Analytics, BIS, OECD
Oil prices	Nominal oil prices (average of Dubai, WTI, and Brent oil prices). Oil price growth rates (in percent) are calculated on a month-over-month basis.	World Bank (Pink sheet database)
Output Growth	Output is measured by the industrial production (IP) index, which includes the volume of production in sectors such as mining, manufacturing, electricity, gas, steam, and air conditioning. The reference year is 2015 (OECD) unless specified otherwise. Growth rates of IP (in percent) are calculated on a month-over-month basis.	OECD, Haver Analytics

Notes: All data is at a monthly frequency and sample period is from January 1970 through September 2024. Economies included for analysis of the G-5 are: Canada, euro area, Japan, United Kingdom and United States. The majority of the analysis in the paper is for a sample of 13 advanced economies, which includes the G-5 as well as: Australia, Denmark, Israel, Korea, New Zealand, Norway, Sweden and Switzerland. If data for the euro area as a single entity is not available (including for interest rates before the ECB began setting rates for the group in 1999), we use a GDP-weighted average of member economies, which includes: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.

Appendix B: Dynamic Factor Model and Estimation

As discussed in Section II.3, we use a dynamic factor model to estimate the global factors for interest rates, inflation, and output that are then used in the FAVAR model.[1] This analysis allows us to calculate the share of the variance of national interest rates explained by the global factor, how this has evolved over time, as well as how it compares to the evolution of the global factors for inflation and output.

B.1 The Dynamic Factor Model and Variance Decompositions

We use a simple dynamic factor framework to estimate the following model of the global factors for interest rates, inflation, and output growth (originally developed in Ha et al. 2024):

$$R_t^i = \beta_{global}^{R,i} f_t^{R,global} + e_t^{R,i}$$

$$\pi_t^i = \beta_{global}^{\pi,i} f_t^{\pi,global} + e_t^{\pi,i}$$

$$Y_t^i = \beta_{global}^{\pi,i} f_t^{Y,global} + e_t^{Y,i} \, ,$$

where R_t^i, π_t^i, and Y_t^i refer to interest rates, inflation, and output growth in country *i* in month *t*, respectively. The $f_t^{R,global}$, $f_t^{\pi,global}$ and $f_t^{Y,global}$ are the global factors for interest rates, inflation, and output growth in month *t*, respectively. As is standard in this literature, the factors and error terms follow independent autoregressive processes. The error terms are assumed to be uncorrelated across countries at all leads and lags. We estimate the model using standard Bayesian techniques, as described in Kose, Otrok, and Whiteman (2003, 2008).

Next we use the data discussed in Section II.2 from January 1970 through September 2024 to estimate the contributions of each of the three global factors to the variances of each of the macroeconomic and financial variables. [2] The resulting estimates of the contribution of the global factors to the variance of national interest rates, inflation and output are shown in **Appendix Figure B1** (with underlying data in **Appendix Table A1**). Section II.3 discusses key insights from averages across the sample, highlighting how the importance of the global interest rate factor has increased significantly over time, and particularly since the end of the 1990s, consistent with the results of the FAVAR estimates.[3] Over the full period, the global interest rate factor accounted for the largest share of variation in the euro area (47%), followed by Switzerland (32%), Japan (17%), and Canada (12%). In the post-1999 period, the role of the global rate factor became more pronounced in almost all economies and was particularly important in explaining the interest rate variation in the United States (59%), the euro area (57%), Canada (53%), and Australia (47%), but much smaller in Japan (19%).

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[1] Other studies analyzing the global factor in interest rates include: Ha et al. (2025), Chatterjee (2016), and Crucini, Kose and Otrok (2011).

[2] Due to the availability of a balanced dataset, the FAVAR estimation results for the 1970–84 period are based on 11 of the 13 advanced economies in our baseline sample. During this period, when monthly data for output growth or inflation are not available (which is more common in the non-G5 economies), quarterly data are used for interpolation. For the full sample period (1970–2024), the results include all countries, with the sample period for a few economies beginning from the earliest point at which all relevant data are available.

[3] We calculate the variance contribution of the global rate factor using other sub-sample periods (which are not based on when the ECB began setting interest rates for the euro area) or excluding some large economies (such as the United States or the euro area). The key patterns reported above on how the importance of the global rate factor has evolved over time are unchanged.

Appendix Figure B2 shows the corresponding variance shares when they are estimated for shorter five-year windows (as compared to the longer windows in the baseline analysis. This exercise is possible for the factor decompositions, but not the FAVAR model. These estimates over shorter windows show an even more pronounced increase in the importance of the global interest rate factor starting in 1999. Interest rate cycles have become much more synchronized over the past quarter century.

B.2 Behavior of the Global Factors

Appendix Figure B3 shows the higher frequency evolution of these global factors over time for interest rates, inflation, and output growth, all estimated using the same dynamic factor model and data. These three factors display movements that are broadly consistent with well-known fluctuations in the respective variables and that correspond to the highly synchronized periods since 1970 of interest rate adjustments, above- or below-target inflation, and weak growth.

The global interest rate factor exhibits pronounced fluctuations, typically declining sharply during global recessions and downturns (highlighted in grey) such as those in 1975, 1982, 1991, 1998, 2000–01, 2009, and 2020. These episodes often coincide with highly synchronized monetary easing across countries. In contrast, the global interest rate factor rises notably during periods of elevated inflation, which are often associated with major disruptions in oil markets, disturbances in cross-border supply chains, and strong demand pressures from rapid output growth—as seen in 1973–74, 1979–80, 1988–90, and 2021–23. The global interest rate factor spikes in 2021–22, reaching its highest level since 1979–80, and reflecting aggressive rate hikes by central banks worldwide in response to soaring inflation. Not surprisingly, the global inflation factor also jumps during these two peaks in the global interest rate factor.

The global interest rate factor also displays larger swings from the start of the sample in 1970 until the mid-1980s. This partly reflects sharper fluctuations in nominal interest rates (Cook and Hahn 1989) during periods of high inflation. It also stems from differing monetary policy frameworks across advanced economies at the time. For instance, some countries—such as the United States—emphasized money supply targets (Friedman 1982), while others—including members of the ERM—prioritized exchange rate stability. As a result, volatility in the global interest rate factor and underlying policy rates in this earlier period also reflects the impact of financial markets on interest rates, and not just central banks' decisions to adjust policy rates. The global interest rate factor was relatively stable in the 1990s and early 2000s during the "Great Moderation" (Bernanke 2004), before becoming more volatile again around the 2008-09 Global Financial Crisis and corresponding global recession. The volatility of the global rate factor also increases sharply around the COVID-19 pandemic and subsequent spike in inflation.

The behavior of the global factors for inflation and output (in the bottom two panels of **Appendix Figure B3**) also aligns closely with well-known global events. For example, the global inflation factor declines sharply around global recessions, especially those associated with the 2008-09 Global Financial Crisis and the COVID-19 pandemic, but also around the 1975 and 1982 global recessions. In addition, the global inflation factor falls during periods when oil prices decline sharply (1986, 1990-91, 1997-98, 2001, 2008, 2014-16, and 2020). The global output factor (measured by the highly volatile monthly industrial production series) shows even more short-term volatility, marked by notable plunges during global recessions and sharp rebounds during subsequent recoveries. The collapse and subsequent spike in output around the COVID-19 pandemic is particularly noteworthy and much more extreme than any other period in the sample of 55 years.

Appendix Table B1 Variance Contributions of the Global Factors

(Percent of total variation, averages across 13 advanced economies)

A. By variables

Global factors	70-24	70-84	85-98	99-07	08-19	20-24
Interest Rates	13.4	9.6	10.7	30.8	29.3	37.7
Inflation	26.1	13.1	11.2	22.0	23.7	29.6
Output growth	23.5	7.1	10.7	15.7	13.2	48.4

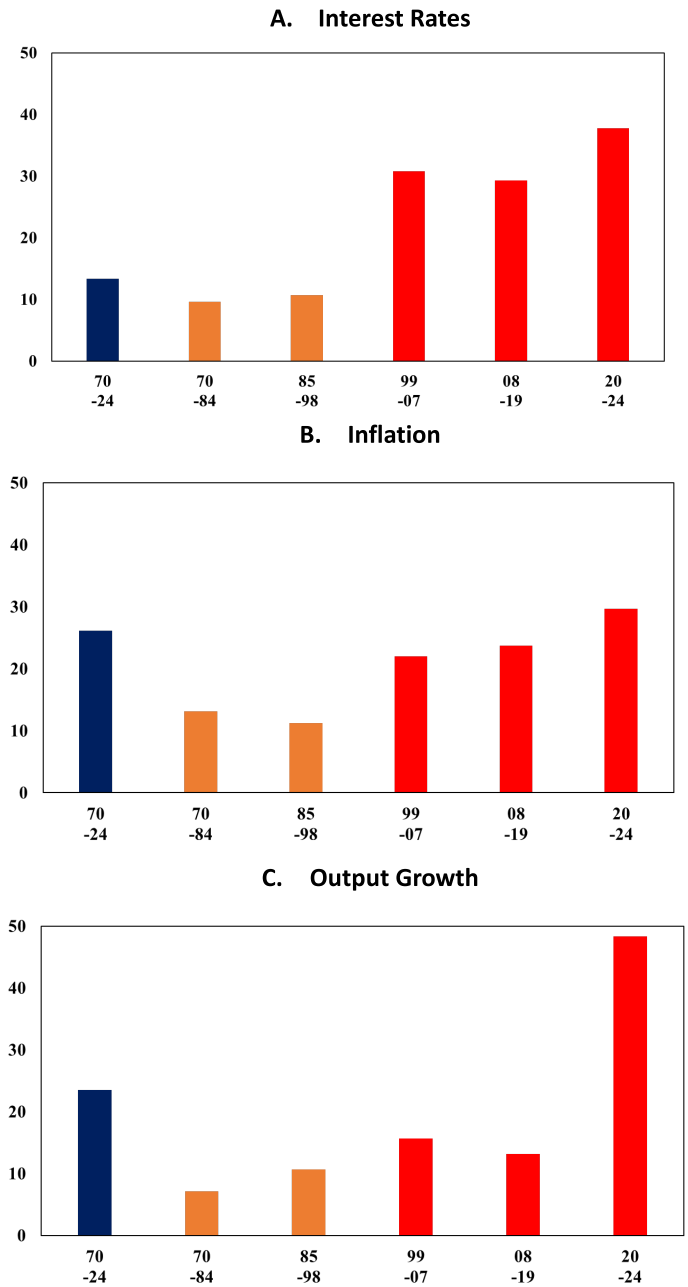
B. Robustness: excluding selected large economies

Global factors	70-24	70-84	85-98	99-07	08-19	20-24
Interest Rates (All countries)	13.4	9.6	10.7	30.8	29.3	37.7
Except United States	14.1	10.2	10.5	32.9	31.4	34.6
Except euro area	13.1	12.3	11.0	22.3	29.8	35.7

Notes: The table presents the average contributions of the global rate factor, the global output factor, and the global inflation factor to the variance of country-specific interest rates, inflation, and output growth, respectively, over the periods noted. See **Appendix Table A1** for variable definitions.

Appendix Figure B1 Variance Contributions of the Global Factors

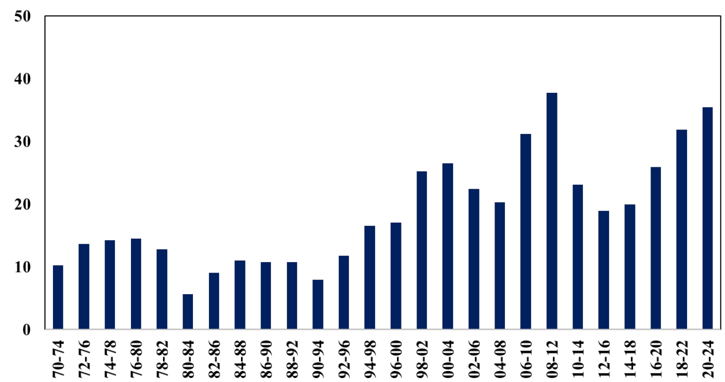
(Percent of total variation, averages across advanced economies)



Sources: Authors' calculations based on monthly data from 1970 to 2024 for 13 advanced economies.
Note: The figure presents the average variance contribution of the global factor to the variations in country-specific interest rates, inflation, and output growth. See **Appendix Tables A1** for sample and variable definitions.

Appendix Figure B2 Variance Contribution of the Global Interest Rate Factor: 5-year Rolling Windows

(Percent of total variation)

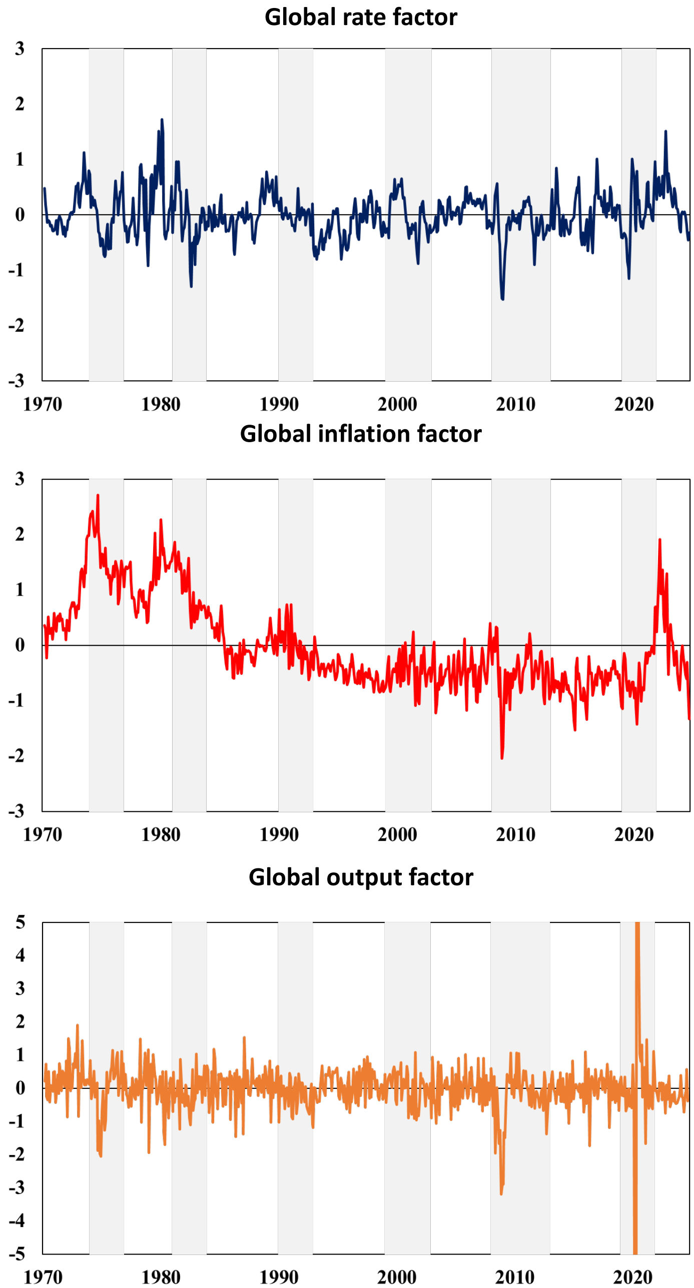


Sources: Authors' calculations based on monthly data from 1970 to 2024 for 13 advanced economies

Notes: The chart presents the average variance contribution of the global interest rate factor to the variations in country-specific interest rates over five-year windows as indicated in each column. See **Appendix Tables A1** for sample and variable definitions.

Appendix Figure B3 The Evolution of Global Factors over Time

(Percent)



Sources: Authors' calculations based on monthly data from 1970 to 2024 for 13 advanced economies

Notes: Global factors for interest rates, inflation, and output growth are estimated using a one-factor dynamic factor model for cross-country data on interest rates, inflation, and output growth (measured based on industrial production) over 1970-2024. Shaded areas indicate global recessions and downturns as defined in Kose, Sugawara, and Terrones (2020). See **Appendix Tables A1** for sample and variable definitions.

Appendix C: Results for Individual Economies: The Role of Global and Domestic Shocks

This paper primarily focuses on the average drivers of interest rates, inflation and output growth over time for a panel of 13 advanced economies. This approach allows us to identify patterns that are typical across these economies, but this focus on averages (or medians, which yield similar results) can mask important differences in these relationships across economies. For example, inflation and output in some economies may be more sensitive to global shocks if they are more interconnected with the global economy through trade or financial flows or more vulnerable to specific types of global shocks (such as oil price fluctuations).

This appendix takes a more disaggregated approach, reporting results for individual economies and highlighting results during the pandemic period from 2020-24. The empirical findings indicate that global and domestic shocks play distinct roles across individual economies, differences which can help explain differences in their monetary stances at certain points in time.

Section V.1. of the paper discusses the results for individual economies in the G-5 (Canada, the euro area, Japan, the United Kingdom and the United States)**,** with key results shown in **Figure 10**. Global shocks explained 36-46 percent of the total interest rate variation over 1999-2019 in the United States, the United Kingdom, Canada, and Japan. In the euro area, global shocks accounted for 68 percent of the variation, overshadowing the role of domestic shocks. Over 2020-24, the role of global shocks increased in each of the G-5 economy to explain over 50 percent of the variation in interest rates and 89 percent in the euro area. This larger role of global shocks for the euro area likely reflects the region's stronger international trade and financial linkages and much deeper integration with global supply chains. It is also consistent with other studies in the global business cycle literature.[4]

This set of results for the G-5 also highlights a much larger role of supply (versus demand) shocks, not differentiating by their global versus domestic nature, for the euro area as compared to the United States (and other G-5 economies). The more substantial role of supply shocks in the euro area is also apparent in the decompositions of the shocks explaining inflation and output and increases around the pandemic and post-pandemic inflation surge. For example, in the euro area, supply shocks drive a majority of the variation in inflation over 2020-24 (51 percent), while demand shocks contributed only 24 percent. In contrast, in the United States, supply shocks explain only slightly more of the variation in inflation than demand shocks (40 percent versus 38 percent) during this period. These differences are intuitive. The euro area was more reliant on oil, natural gas, and food imports from Russia and Ukraine, while the United States is a net exporter of both food and energy, and benefited from a greater demand boost due to multiple large fiscal packages. The inflation decompositions in the other G-5 economies fall between those of the euro area and the U.S., with supply shocks contributing around 46 percent over 2020-24, compared to 28-33 percent for demand shocks, with a larger role of domestic supply shocks in Japan and the United Kingdom.

Next, we shift to the results for the other advanced economies in our sample that are not in the G-5, with a subset of results reported in **Appendix Figure C1**. There is substantial variation in the role of the global shocks in explaining the variation in interest rates in this larger sample, but in each case the role of the global shocks has increased over time, particularly over 2020-24. The relative differences in the importance of global versus shocks across countries, however, is fairly consistent across time; in other

[4] For example, Ha et al. (2025) reports a larger share of the global factor or global output factor in the euro area than other economies.

words, even as the role of global shocks increased across all economies, countries more sensitive to global shocks continued to be more sensitive in the different subperiods.[5] This suggests that structural factors—such as the monetary policy framework, share of commodity imports, or financial and economic openness—play a role in explaining these cross-country differences.

Among the non-G5 economies, interest rate fluctuations in Switzerland are far more sensitive to global shocks than the other advanced economies over each sample period. For example, global shocks explained almost all of the variation in interest rates in Switzerland over 2020-24 (at 85 percent), suggesting that monetary policy in this economy was largely a response to shocks “from heaven” (as also found for the euro area).

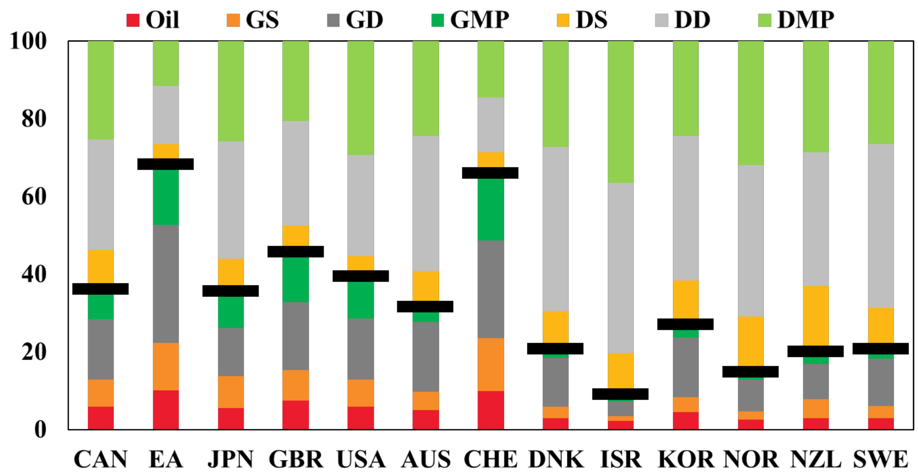
For most economies, the contributions of different types of shocks to the variation in interest rates are consistent with the relative shares explaining the variation in inflation and output growth. This is not surprising; economies for which inflation or output growth are more sensitive to global shocks are more likely to adjust interest rates in response to these global shocks. Monetary policy reaction functions typically depend on both future and past inflation and output growth. There are, however, a few exceptions for which the role of different shocks varies across macroeconomic variables. For example, in Switzerland, the role of global shocks is substantially larger in explaining the variation in interest rates than inflation or output growth—likely reflecting the important role of Switzerland in the global financial system.

[5] This is supported by scatter plots of the relative share of global shocks in the variation in interest rates for each country across different sub-samples. The correlation of these shares across samples is 80 percent.

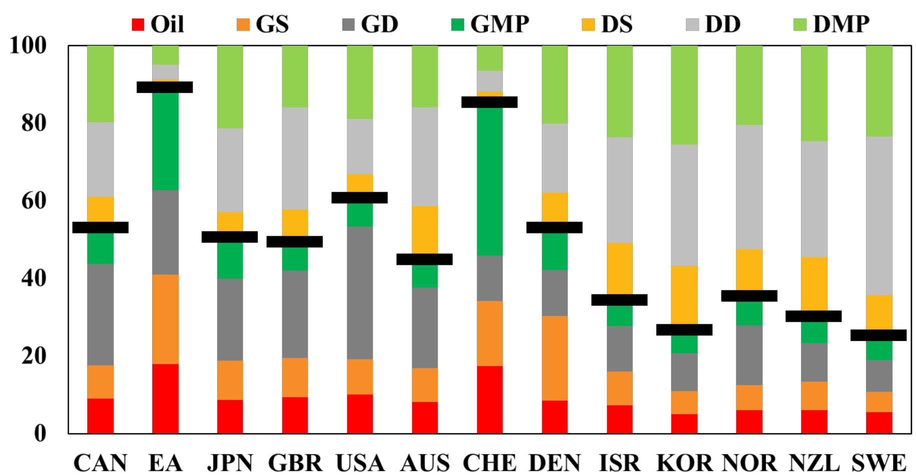
Appendix Figure C1 Contributions of Shocks to Interest Rates in Individual Advanced Economies

(Percent of total variation)

A. 1999-2019



B. 2020-2024



Sources: Authors' calculations based on monthly data over time period listed at top of each panel.

Notes: Forecast error variance decompositions of domestic interest rates based on the FAVAR model that consists of four global variables (global output growth, inflation, monetary and oil prices) and three domestic variables (domestic output growth, inflation, and interest rates). "Oil"= oil price shock, "GS" = global supply shock, "GD" = global demand shock, "GMP" = global monetary policy shock, "DS" = domestic supply shock, "DD" = domestic demand shock, "MP" =domestic monetary policy shock. The dark horizontal lines indicate the total contribution of global shocks.

Appendix D: Robustness Exercises: Contributions of Shocks to Variation in Interest Rates in Longer and Pandemic Windows

(Percent of total variation, averages across 13 advanced economies)

A. Full Sample Period (1970-2024)

Description of Each Sensitivity Test			Structural Shocks								
			Global					Domestic			
			Total	Oil Price	Supply	Demand	Monetary policy	Total	Supply	Demand	Monetary policy
Baseline			***16.1***	***2.8***	***3.3***	***6.1***	***3.9***	***83.9***	***11.8***	***37.0***	***35.1***
Alternate measures of global and domestic variables	**Commodity Prices**	**Real oil price**	**16.4**	2.7	4.1	5.7	3.8	**83.6**	10.8	36.1	36.8
	Global Output	**Global economic activity index**	**15.9**	2.4	3.4	6.1	4.0	**84.1**	11.5	37.1	35.5
	Global Interest Rates	**Weighted average of interest rates**	**15.2**	3.1	2.9	5.8	3.5	**84.8**	12.3	37.9	34.6
	Global Factors	**Weighted average of output, inflation, interest rates**	**15.0**	3.3	3.3	4.8	3.6	**85.0**	12.4	38.2	34.3
	Domestic inflation	**Core CPI**	**16.2**	3.1	2.8	5.3	5.0	**83.8**	11.3	38.8	33.7
	Domestic interest rates	**Policy rates**	**14.5**	2.5	2.4	5.3	4.3	**85.5**	11.1	37.3	37.0
Exclude specific countries or periods	**Exclude large economies**	**Exclude US**	**16.6**	2.8	3.5	6.1	4.1	**83.4**	12.2	36.2	35.0
		Exclude EA	**16.0**	2.8	3.4	5.7	4.1	**84.0**	12.0	36.5	35.5
	Exclude periods of heightened volatility	**1970-2019**	**15.9**	2.8	3.0	7.0	3.1	**84.1**	14.1	38.8	31.2
		1985-2024	**25.3**	4.3	5.3	9.7	6.1	**74.7**	11.9	34.6	28.1
Alternative modelling frameworks	**Identification scheme**	**Sign restriction**	**16.8**	2.5	3.7	6.7	4.0	**83.2**	11.2	36.8	35.1
	Model specification	**Time-varying coefficients**	**17.8**	3.4	3.9	6.3	4.2	**82.2**	11.7	35.0	35.5

B. Pandemic Period (2020-24)

Description of Each Sensitivity Test			Structural Shocks: Global Total	Oil Price	Supply	Demand	Monetary policy	Domestic Total	Supply	Demand	Monetary policy
Baseline			***49.2***	***9.2***	***10.9***	***17.3***	***11.8***	***50.8***	***9.5***	***22.7***	***18.5***
Alternate measures of global and domestic variables	**Commodity Prices**	**Real oil price**	**51.0**	9.6	10.3	17.8	13.4	**49.0**	8.7	23.2	17.1
	Global Output	**Global economic activities index**	**48.8**	9.1	10.9	18.1	10.7	**51.2**	7.6	24.4	19.2
	Global Interest Rates	**Weighted average of interest rates**	**52.4**	9.1	11.1	19.7	12.6	**47.6**	8.1	22.2	17.4
	Global Factors	**Weighted average of output, inflation, interest rates**	**52.7**	10.3	9.8	19.9	12.7	**47.3**	8.5	21.7	17.2
	Domestic inflation	**Core CPI**	**47.6**	8.4	8.9	14.2	16.0	**52.4**	9.1	24.8	18.5
	Domestic interest rates	**Policy rates**	**38.4**	7.8	7.2	15.7	7.7	**61.6**	8.3	28.5	24.8
Exclude specific countries or years	**Exclude large economies**	**Exclude US**	**47.6**	8.8	10.6	16.1	12.1	**52.4**	9.3	23.9	19.2
		Exclude EA	**45.3**	8.1	9.5	17.2	10.5	**54.7**	9.6	24.7	20.4
	Exclude 2020	**2021-24**	**54.6**	10.2	11.7	22.8	9.9	**45.4**	8.4	21.8	15.2
Alternative modelling frameworks	**Identification scheme**	**Sign restriction**	**52.4**	8.9	10.2	20.7	12.7	**47.6**	8.6	21.8	17.2
	Model specifications	**Time-varying coefficients**	**50.7**	9.2	9.8	20.3	11.3	**49.3**	9.3	21.8	18.2

Note: Table shows the forecast error variance decompositions of interest rates (in percent of total variation). The top row repeats the baseline estimates from **Table 1**; see notes to this table for details on this baseline model, sample and data. Each subsequent row reports a robustness test with the change from the baseline described in the left columns and discussed in detail in Section V.