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What is the role of perceived oil price shocks in inflation expectations? ☆

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ABSTRACT

Not much. We identify the perceived oil price shock, as well as perceived global demand and supply shocks, using sign restrictions in a factor-augmented vector autoregression model that includes forecasts for crude oil price growth, real GDP growth, and inflation across 84 economies. The perceived oil price shock explains only 10% of the fluctuations, on average, in global inflation expectations from January 2012 to December 2022, and accounts for an even smaller fraction during the COVID-19 pandemic. Allowing for the oil price noise shock – reflecting exogenous shifts in agents' optimism and pessimism – does not materially change the limited pass-through of the perceived oil price shock to inflation expectations. In contrast, perceived global supply and demand shocks dominate, especially since the onset of the pandemic. Over the first eight months, professional forecasters viewed the pandemic, on net, as a negative demand shock and lowered their short-term inflation expectations. In early 2021, professionals quickly switched their views and sharply increased their inflation expectations amid burgeoning and persistent supply chain disruptions and labor constraints.

1. Introduction

The recent spikes in global oil prices, partly due to the Russian–Ukraine war, have resulted in unprecedentedly high energy costs for firms and households. In response to these seemingly more permanent high oil prices, economic agents have sharply increased their short-term inflation expectations. The question that arises is: To what extent has the perceived oil price shock contributed to global inflation expectations?

We address this question by using monthly consensus forecasts of crude oil growth, real gross domestic product (GDP) growth, and Consumer Price Index (CPI) inflation in 84 economies from January 2012 to December 2022. Forecasts for global output growth remained stable before the pandemic, dropped by about 20% in the first two quarters of 2020, then quickly recovered to pre-pandemic levels by the end of 2020. Forecasts for global inflation showed a declining trend before the pandemic, dropped further at the onset of the pandemic, then rose sharply since early 2021 amid burgeoning and persistent supply chain disruption and labor constraints. In contrast to global output growth and inflation, forecasts for West Texas Intermediate (WTI) crude oil price growth were much more volatile over the whole sample period.

We employ a factor-augmented vector autoregression model that includes the one-year ahead forecasts for output growth, inflation, and oil price. We study how these expectations respond to perceived shocks, rather than materialized ones. Using sign restrictions, we identify three perceived shocks: global demand shock, global supply shock, and oil price shock. Our main results can be summarized as follows.

About 90% of the forecast error variance in global inflation can be attributed to perceived global demand and supply shocks, with the remaining 10% explained by the perceived oil price shock. When examining two country groups, the perceived oil price shock has a slightly larger impact on driving one-year ahead inflation expectations in emerging countries compared to advanced economies.

Zooming in on the pandemic, professionals viewed the onset of the COVID-19 largely as a negative demand shock and further lowered their short-term inflation expectations. Towards the end of 2020, professionals' one-year ahead inflation expectations rose sharply alongside their concerns about supply chain and operating capacity disruptions. Thus, the evolution of inflation forecasts was primarily driven by perceived negative demand shocks in the initial months of the pandemic and perceived negative supply shocks at the later stage, with the perceived oil price shock playing a negligible role. Allowing for oil price noise shock

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– identified as a shock to its forecast error – in the model does not materially change the limited contribution of the perceived oil price shock in driving global inflation expectations among professional forecasters.

Our paper builds on the large body of literature that explores the impact of oil prices on the macroeconomy, on actual and expected inflation (Kyrtsou and Labys, 2006; Milani, 2009; Binder, 2018; Choi et al., 2018; Nasir et al., 2020; Kilian and Zhou, 2022b; Zhang, 2022), and on the transmission of oil price shocks to inflation (Wong, 2015; Aastveit et al., 2023). In contrast to these studies, our focus is on the perceived oil price shock and its contribution across country groups. We find that the perceived oil price shock accounts for about 20% of fluctuations in expected inflation in emerging countries, compared to 10% in advanced economies. Contrary to the limited role of the perceived oil price shock, the actual oil price shock accounts for more than 30% of fluctuations in global inflation in the medium term

The present paper also adds to the growing body of literature on the impact of the COVID-19 pandemic on economic activity and agents' expectations. For example, Bartik et al. (2020), Balleer et al. (2020), Meyer et al. (2022) and Hassan et al. (2023) found that firms, on net, saw the pandemic in 2020 as a demand shock, lowering their wages, selling prices, and short-term cost expectations. However, as the pandemic unfolded and the economy began to recover from the imposed lockdowns, the supply chain disruptions, shipping bottlenecks, and labor constraints grew in breadth and intensity, impacting the ability of firms to meet the strong surge in demand (Cavallo and Kryvtsov, 2021; Santacreu and LaBelle, 2022; Benigno et al., 2022). In response to this rapid change, firms quickly increased their year-ahead cost expectations. We discover that the inflation expectations of professional forecasters align with firms' perspectives on the COVID-19 pandemic. Crucially, we quantify the respective roles of supply and demand shocks in influencing professionals' short-term inflation expectations.

Particularly relevant to our work is a recent paper by Ha et al. (2021). They explore the sources of actual global inflation fluctuations based on materialized shocks in a factor-augmented vector autoregression framework using sign restrictions. We employ the same model and identification as in their work, but differ from Ha et al. in three aspects. First, the goal is different. While they focus on actual inflation, we examine inflation expectations (together with output growth and oil price expectations). Inflation expectations are significant for households' consumption decisions, firms' pricing decisions, as well as for monetary policy makers and financial market participants. Second, we study the perception of the shock, which may or may not occur in reality. Perception matters. Fuhrer (2017) shows that intrinsic persistence in expectations, in addition to habit formation and adjustment costs, is another source of macroeconomic persistence. In a similar spirit, Binder et al. (2022) find that perceived persistence and variability of the signal and the noise are key to understanding the term structure of uncertainty.[1] Finally, we extend their framework by allowing for "oil price noise shocks". Since the introduction of "belief shocks" by Milani (2011), these shocks have been shown as important drivers of the business cycle (Chatterjee and Milani, 2020; Enders et al., 2021; Benhima and Poilly, 2021; Clements and Galvao, 2021; Barrett and Adams, 2022). We find that the oil price noise shock not only has a direct effect, explaining more than 20% of the variance in predicting global inflation in the medium term, but it also indirectly limits the influence of the perceived demand shock.

The rest of the paper proceeds as follows. Section 2 briefly discusses the forecast data set and constructs the global output growth and inflation expectations. Section 3 identifies various perceived shocks and investigates their respective contributions to driving short-term global inflation expectations. Section 4 presents additional results by allowing for oil price noise shocks. Section 5 concludes. Additional tables and graphs are relegated to the Appendix.

[1] See also Ozturk and Sheng (2018) for the perceived uncertainty measure and its impact on real economic activity, in addition to the statistical uncertainty measure (Jurado et al., 2015).

2. Data

Our primary data source is Consensus Economics, a macroeconomic survey firm based in London, England. Consensus Economics has been conducting monthly surveys since 1989, gathering professional forecasters' expectations of major macroeconomic indicators. Since 2012, they have also been collecting expectations of energy prices from professional forecasters.[2] This database offers three unique features for our analysis. First, it provides forecasts for a wide range of countries, making it suitable for studying the global economic outlook. Second, the survey is not anonymous, encouraging professional forecasters to be accurate and attentive in their responses. Third, it includes energy price forecasts for multiple time horizons, allowing us to match them with macroeconomic forecasts made at corresponding horizons.

We utilize consensus forecasts of real GDP growth, CPI inflation, and WTI crude oil price growth. Due to the availability of oil price forecasts, our data cover the period from January 2012 to December 2022, with a monthly frequency. The forecasts of GDP growth and inflation encompass 84 countries, comprising 33 advanced economies and 51 developing countries. These countries account for approximately 95% of the world's output, rendering our sample representative of the global economy.[3]

The use of GDP and inflation forecasts presents a challenge due to their fixed-event nature. Respondents report their forecasts for the current and following calendar years each month. Consequently, the forecast horizon shortens, leading to pronounced patterns over horizons. Smaller forecast errors and lower forecast dispersion are observed on average at shorter horizons. This characteristic can influence the analysis and interpretation of the data.[4] To mitigate the impact of the forecasting horizon, we adopt the approach introduced by Dovern et al. (2012). This involves transforming fixed-event forecasts for the current and following calendar years into fixed-horizon forecasts for the next 12 months as in the following equation:

$$F_{i,t+12|t} = \frac{k}{12} F_{i,t+k|t} + \frac{12-k}{12} F_{i,t+12+k|t}, \tag{1}$$

where $F_{i,t+k|t}$ and $F_{i,t+12+k|t}$ are the two fixed-event forecasts based on the information set at time t with horizons of $k \in 1, \ldots, 12$ and $k+12$ months, respectively. The fixed-horizon forecast for the next 12 months is approximated by taking the average of the two fixed-event forecasts (for the current year and the following year) and weighting them based on their shares in the forecast horizon.

Table 1 presents summary statistics for the fixed-horizon forecasts by country groups over three different sample periods. Comparisons across country groups show that forecasts of GDP growth and inflation among emerging economies are generally higher than those of advanced economies, possibly reflecting the catching-up of emerging economies. Additionally, for most countries in our sample, professionals increased their post-pandemic expectations for one-year-ahead output growth and inflation, while they lowered their oil price growth expectations. Notably, pandemic-induced uncertainty led professionals to increase their forecast disagreement significantly.

As our analysis centers on global economic outlook, we estimate global inflation forecast, denoted as f_t^{π}, and global output growth forecast, denoted as f_t^{y}, using the following dynamic factor models:

$$\pi_t^i = \beta^{\pi,i} f_t^{\pi} + \epsilon_t^{\pi,i}, \tag{2}$$

[2] This database has been frequently used in the literature to study the expectation formation process, see, for example, Dovern et al. (2012) and Baker et al. (2020), among many others.

[3] See Table A.1 for the list of countries by development stages.

[4] The evolution of forecast errors and forecast disagreement over forecasting horizons is of great interest (Lahiri and Sheng, 2008; Patton and Timmermann, 2010; Giacomini et al., 2020), but is beyond the scope of the current study.

Table 1
Summary statistics of GDP growth, inflation and oil price growth expectations.

	GDP growth (%)			Inflation (%)			Oil price growth
	All	AE	EM	All	AE	EM	(%)
A. Full sample: 2012M1 - 2022M12							
Mean	2.97	2.09	3.53	4.12	1.86	5.59	7.94
Std Dev	1.98	1.47	2.06	5.00	1.38	5.88	9.69
Obs	11 088	4356	6732	11 088	4356	6732	132
B. Pre-pandemic period: 2012M1 - 2018M12							
Mean	3.01	1.92	3.71	3.90	1.60	5.39	9.54
Std Dev	1.91	1.33	1.91	3.80	0.80	4.21	8.69
Obs	7056	2772	4284	7056	2772	4284	84
C. Post-pandemic period: 2019M1 - 2022M12							
Mean	2.90	2.39	3.23	4.51	2.31	5.94	5.13
Std Dev	2.09	1.64	2.27	6.59	1.94	7.99	10.76
Obs	4032	1584	2448	4032	1584	2448	48

Notes: This table shows summary statistics of GDP growth, inflation and oil price growth forecasts. Fixed-horizon forecasts are approximated as weighted averages of fixed-event forecasts in Eq. (1). Means and standard deviations are calculated across countries and time periods. AE: advanced economies, EM: emerging economies.

$$y_t^i = \beta^{y,i} f_t^y + \epsilon_t^{y,i}, \tag{3}$$

where π_t^i and y_t^i are the 12-month-ahead forecasts for inflation and output growth for country i in time t, weighted by the total output in U.S. dollars, respectively. The global inflation and output growth forecasts, extracted as the first common factor across 84 economies, account for approximately 56% and 44% of the variations in the corresponding inflation and output growth forecasts, respectively (Table A.2).

As depicted in Fig. 1, forecasts for global output growth remained steady before the pandemic, experienced a 20% drop from March to June 2020, rapidly rebounded to pre-pandemic levels by December 2020, and declined once more after mid-2021. The fluctuations in the global output growth forecast are primarily influenced by the dynamics in advanced economies (note that the correlation in output growth forecast between global and advanced economies is 0.98, compared with 0.48 between global and emerging economies, as shown in Table A.3).

Forecasts of global inflation exhibited a declining trend before the COVID-19 pandemic, particularly pronounced in emerging economies compared to advanced economies. At the onset of the pandemic, professionals viewed the COVID-19 as a demand shock, leading them to further lower their one-year-ahead inflation expectations. As the pandemic persisted, and with the emergence of seemingly persistent supply chain disruptions and labor constraints, professionals' one-year-ahead inflation expectations rapidly increased, reaching 40-year highs for many countries, including the U.S.

Forecasts for oil price growth exhibited much higher volatility over the entire sample period. The fluctuations from 2014 to 2016 were primarily driven by the imbalance between growing supply and changing economic growth expectations. The subsequent drop in 2020 resulted from various factors, including the failure of OPEC and non-OPEC oil producers to agree on extending production cuts, the U.S. Shale Revolution, and notably, the declining demand due to the COVID-19 pandemic.

The surge in 2021 can be attributed to the imbalance of strong, stimulus-fueled demand and reduced supply following the crude oil output cut agreement among OPEC, Russia, and other oil producers. The subsequent rise in 2022 was driven by the Russian–Ukraine war. Furthermore, as indicated in Table A.3, inflation expectations have become rather insulated from oil price fluctuations, with the correlation between forecasts of global inflation and oil price growth being only 0.09.

3. Empirical analysis

In this section, our analysis focuses on understanding the drivers of short-run global inflation expectations. We begin by identifying perceived shocks using sign restrictions and subsequently estimate the relative contributions of each shock in explaining inflation expectations. The section concludes with a comparison between actual and perceived shocks and their roles in driving inflation and inflation expectations, respectively.

3.1. Identification of perceived shocks using sign restrictions

We adopt a factor-augmented vector autoregression (FAVAR) model with sign restrictions to examine the influence of perceived shocks on driving one-year-ahead global inflation expectations. This model specification closely follows recent studies like Charnavoki and Dolado (2014) and Ha et al. (2021). However, our unique approach involves using forecasts, rather than actual data, of economic growth, inflation, and oil price. Additionally, we explore how these expectations respond to perceived, rather than materialized, shocks.

The utilization of forecast data has several advantages, including relatively high frequency, as the survey was conducted monthly. This is in contrast to quarterly and annual actual inflation and output growth data available for many developing countries. This approach helps to minimize concerns regarding endogeneity among macro variables.

The FAVAR model, in its structural form, can be specified as:

$$A_0 X_t = \sum_{p=1}^{P} A_p X_{t-p} + \epsilon_t. \tag{4}$$

The vector X_t includes forecasts, in the following order, of global output growth, oil price growth, and global inflation. The vector of orthogonal structural shocks ϵ_t consists of a shock to expected global supply, a shock to expected oil price growth, and a shock to expected global demand. We impose sign restrictions to identify these shocks. Assuming that A_0 is invertible and has a recursive structure, the reduced-form errors can be written as $u_t = A_0^{-1}\epsilon_t$, with the following sign restrictions:

$$\begin{bmatrix} u_t^{GrowthExp} \\ u_t^{OilPriceExp} \\ u_t^{InflationExp} \end{bmatrix} = \begin{bmatrix} + & - & + \\ + & + & + \\ + & + & - \end{bmatrix} \begin{bmatrix} \epsilon_t^{Perceived\,Demand} \\ \epsilon_t^{Perceived\,Oil\,Price} \\ \epsilon_t^{Perceived\,Supply} \end{bmatrix} \tag{5}$$

In our analysis, we assume that a perceived positive global demand shock will increase forecasts of global output, oil price, and global inflation. On the other hand, a perceived positive oil price shock is assumed to suppress global output forecasts but increase both oil price and global inflation forecasts. Lastly, a perceived positive global supply shock is expected to lead to forecasts of higher global output and oil price but lower global inflation.

Our identifications of perceived global demand and supply shocks are in line with the earlier literature (Kilian and Lutkepohl, 2017), and the assumption on identifying perceived oil price shock closely follows recent studies (Charnavoki and Dolado, 2014; Ha et al., 2021). Importantly, the perceived oil price shock is not driven by perceived global supply or demand shocks.[5] These assumptions serve as the basis for identifying and understanding the impact of perceived shocks on short-run global inflation expectations.[6]

[5] As an example of a perceived oil price shock, on March 8, 2020, Saudi Arabia announced the unexpected price discount of 6 to 8 USD per barrel. The announcement had a significant impact on WTI crude oil, causing it to fall by 20%. Importantly, forecasts of the spot price for June 2020 dropped by 38% in response to the announcement.

[6] In our ideal scenario, we would prefer to work with 12-month ahead forecasts at a monthly frequency. However, the Consensus Economics dataset

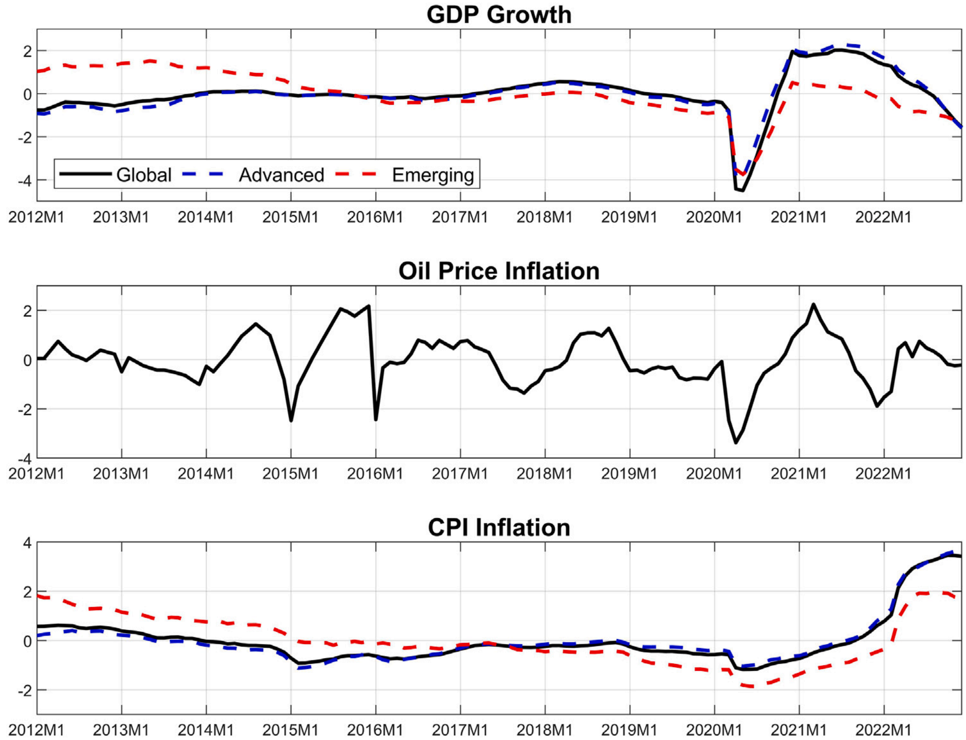

Fig. 1. Forecasts of global GDP growth, oil price growth, and global inflation. *Notes:* This figure shows the forecasts for global GDP growth, oil price growth, and global inflation. Forecast data come from the Consensus Economics covering from January 2012 to December 2022. All series are normalized to have a unit standard deviation. The global, advanced and emerging GDP growth and inflation series are estimated using dynamic factor models specified in Eqs. (2) and (3) for all, advanced economies, and emerging economies, respectively.

3.2. Drivers of global inflation expectations

In our analysis, we impose the sign restrictions for the first six months. The estimation is conducted using the standard Gibbs sampling procedure with 12 lags. We perform 5000 burn-ins and 10,000 successful draws, selecting every tenth draw for analysis. Fig. 2 illustrates the response of global inflation expectations to perceived global demand shock, oil price shock, and global supply shock for all economies, as well as by country group.

As expected, inflation expectations show a positive response to the perceived global demand shock. Surprisingly, these responses are highly persistent across all three types of shocks considered. This differs from the typically-documented short-lived impact of materialized demand shocks. Further comparisons between the two country groups reveal that the persistent impact on inflation expectations is mainly driven by the inflation outlook in advanced economies. This finding highlights the differences in inflation dynamics between advanced and emerging economies in response to perceived shocks.

Following the perceived oil price shock, global inflation expectations experience a brief increase. For all economies, the peak impact occurs in three months and fades away within about six months. This finding, based on a sample of 84 countries, is consistent with previous studies such as Kilian and Zhou (2022a,b), which document the transitory impact of gasoline price shocks on U.S. inflation and inflation expectations.

A positive perceived global supply shock generally leads to substantial declines in global inflation expectations. This outcome aligns with the sign restriction we imposed to identify the supply shock, and it is not surprising. What is intriguing is that, in comparison to the demand shock, the perceived global supply shock has a much less persistent effect on inflation expectations.

In the subsequent analysis, we delve deeper into understanding the relative importance of perceived demand versus supply shocks in driving short-term global inflation expectations. Fig. 3 presents the forecast error variance decomposition, providing valuable insights into the contributions of each shock.

The perceived oil price shock explains approximately 10% of the variance in global inflation expectations in one month, 20% in three months, and about 10% in the medium term on average. However, significant heterogeneity is observed across country groups, with the perceived oil price shock accounting for 20% of fluctuations in expected inflation in the medium term for emerging economies, compared to 10% for advanced economies.

Regarding the roles of perceived demand and supply shocks, both shocks jointly account for around 90% of fluctuations in global inflation expectations in the medium term. Notably, perceived supply shocks dominate in the short run (i.e., less than 12 months) for both advanced and emerging economies. However, in the medium term (i.e., 24 months ahead), both demand and supply shocks contribute roughly equally to fluctuations in inflation expectations.

In Fig. 4, we focus on the COVID-19 pandemic period for a closer examination. Before the pandemic, professional forecasters viewed both demand and supply shocks as positive, while considering the oil price shock as negative. The low inflation expectations during this period

only provides 12-month ahead forecasts of inflation and output growth on an annual basis. This limitation hinders us from conducting a meaningful analysis within such a short time period (2012–2022). Additionally, since agents' information sets are not directly observable, we rely on their forecast revisions as an observable proxy for information updates. However, this approach may not fully capture the possibility that changes in forecasts could be driven not solely by information updates but also by the fact that the new forecasts contain more information about the next year compared to the previous year. We cannot rule out the latter possibility and recognize the potential challenges it poses in identifying shocks with sign restrictions.

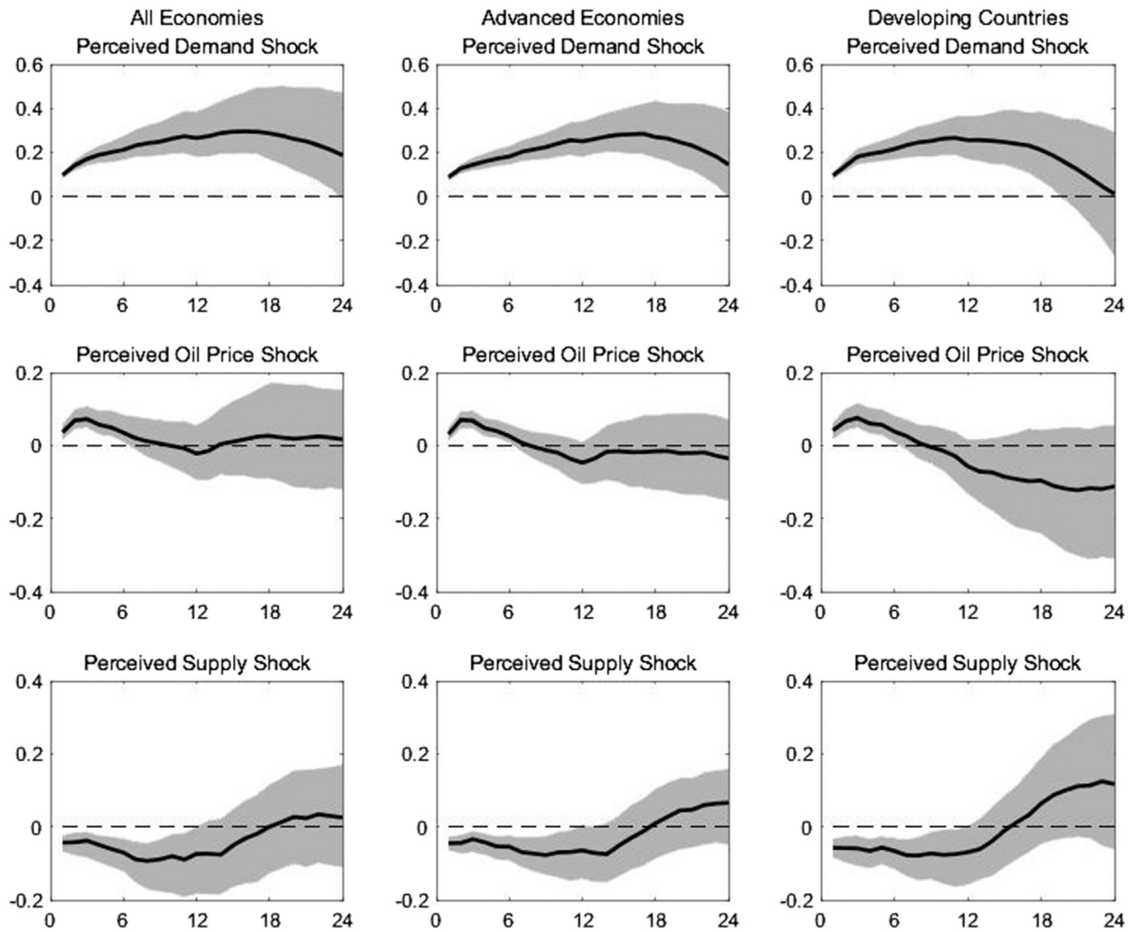

Fig. 2. Responses of global inflation expectations to perceived shocks. *Notes:* This figure shows the responses of global inflation expectations to perceived demand, oil price, and supply shocks. The responses are estimated based on the sign-restricted VAR model specified in Eqs. (4) and (5).

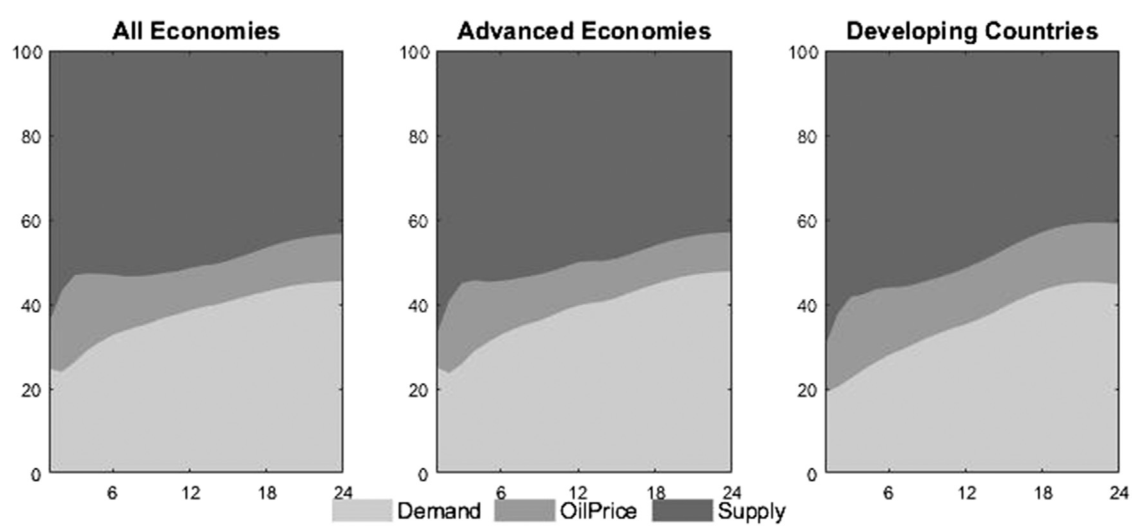

Fig. 3. Drivers of one-year-ahead global inflation expectations. *Notes:* This figure shows the forecast error variance decomposition in predicting one-year-ahead global inflation based on the sign-restricted VAR model in Eqs. (4) and (5).

were attributed to the perceived positive global supply shock and, to a lesser extent, the negative oil price shock. However, the deflationary impact of the oil price shock was partially offset by the perceived positive global demand shock.

At the beginning of the pandemic, mandated lockdowns forced the closure of numerous nonessential businesses and led to significant declines in consumer spending and business investment. In response, professional forecasters largely viewed the COVID-19 pandemic as a negative demand shock and consequently lowered their one-year-ahead inflation expectations. This observation aligns with the findings documented in recent literature, which indicate that firms also perceived the onset of the pandemic as a demand shock, resulting in reductions

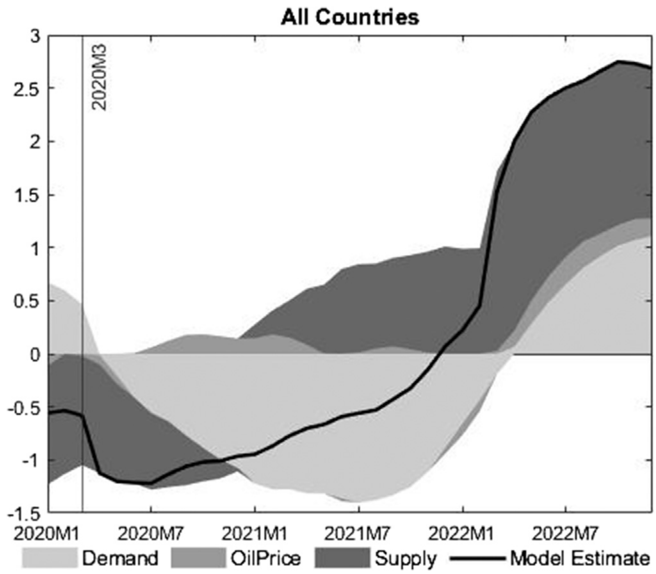

Fig. 4. Zooming in on the COVID-19 pandemic period. *Notes:* This figure shows the forecast error variance decomposition in predicting one-year-ahead global inflation during the COVID-19 pandemic period, based on the sign-restricted VAR model in Eqs. (4) and (5).

in their near-term cost expectations and selling prices; see, e.g., Bartik et al. (2020), Balleer et al. (2020), Meyer et al. (2022), and Hassan et al. (2023).

Towards the end of 2020, the broadening and intensifying supply chain disruptions had significant consequences, leading to increased costs, item stockouts (Cavallo and Kryvtsov, 2021), higher producer price index (Santacreu and LaBelle, 2022), and escalated transportation costs (Benigno et al., 2022). These supply chain disruptions, coupled with labor constraints, exerted substantial upward pressure on professionals' one-year-ahead inflation expectations.

As 2022 began, especially with the commencement of the Russian–Ukraine war, these negative supply shocks were perceived as being more enduring. Simultaneously, professionals shifted their views on the demand shock from being negative to positive. The imbalance of robust, stimulus-fueled demand and constrained supply played a significant role in driving global inflation expectations to a 40-year high. This scenario illustrates the complex interplay of perceived supply and demand shocks that influenced inflation expectations during this period.

3.3. Comparison between actual and perceived shocks

Our benchmark results are based on expectations and focus on perceived shocks. As a comparison, in this subsection, we study the role of actual shocks using the same FAVAR framework, including actual values of global output growth, oil price growth, and global inflation. We apply the same sign restrictions to identify actual global supply, oil price, and global demand shocks.

Fig. 5 presents the relative contributions of various actual shocks in driving global inflation. Contrary to the limited role of the perceived oil price shock, the actual oil price shock accounts for nearly 30% of fluctuations in global inflation in the medium term (i.e., two years ahead). Actual global supply shocks dominate in the medium term and explain approximately 40% of fluctuations in global inflation. The contribution of actual global demand shocks becomes smaller in comparison to the perceived shock (30% now vs. 45% in the baseline). Zooming in on the COVID-19 pandemic period, the evolution of actual demand and supply shocks is very similar to that of perceived shocks, except for the significant contribution of the actual oil price shock to the rising inflation during the post-pandemic recovery period.

4. Impact of the oil price noise shock

In this section, we build upon recent studies that emphasize the significance of "noise shocks" as drivers of the business cycle.[7] We extend the FAVAR framework by introducing an oil price noise shock, which captures exogenous shifts in agents' optimism and pessimism. Our primary objectives are twofold: first, to investigate the effect of the oil price noise shock on inflation expectations, and second, to study how this shock alters the impacts of the three other perceived shocks, if any.

In this extension of our analysis, we introduce the oil price forecast error as an additional variable in the VAR specification. These forecast errors are not available to professionals at the time they make their forecasts. Consequently, the oil price forecast error impacts three other variables – forecasts for output growth, inflation, and oil price growth – with at least a one-month lag. We rank the oil price forecast error as the fourth variable in the VAR model specification and identify the oil price noise shock as the shock to its forecast error.

The forecast errors, which represent the difference between actual values and forecasts, are predominantly negative for most of the sample period, indicating that professional forecasters were somewhat too pessimistic with their oil price growth expectations (Fig. A.1). However, since the onset of the COVID-19 pandemic, professionals have become overly optimistic, making positive, sizable, and persistent forecast errors. This result aligns with earlier findings documented in Alquist et al. (2013), which indicate that the Consensus Economics oil price forecast data are poor predictors during such turbulent periods. By considering the oil price noise shock, we aim to uncover the impact of these exogenous shifts in agents' optimism and pessimism on the overall dynamics of the inflation expectations and its interaction with other perceived shocks.

As illustrated in the forecast error variance decomposition in Fig. 6, the inclusion of an oil price noise shock does not have a direct impact on inflation expectations on impact. However, its contribution steadily increases over time horizons. As the forecast horizon extends from 1 month to 24 months, the oil price noise shock emerges as a significant driver of inflation expectations. This effect is even more pronounced in developing countries compared to advanced economies.

Moreover, incorporating the oil price noise shock in the model indirectly limits the role of the perceived demand shock in the medium term. In the baseline result (Fig. 3), the perceived demand shock explains about 40%–50% of the variance in predicting global inflation over the medium term. However, with the presence of the oil price noise shock, this contribution is reduced to about 20%–30%. This finding suggests that the oil price noise shock plays a substantial role in shaping inflation expectations, and its influence indirectly alters the impact of the perceived demand shock on inflation dynamics.

5. Conclusions

In this study, we utilize monthly professional forecasts of real GDP growth and CPI inflation in 33 advanced economies and 51 developing countries. By employing principal component analysis, we estimate global output growth and global inflation forecasts as the underlying common factors. Subsequently, we investigate how short-term global inflation forecasts respond to various perceived shocks, including the global demand shock, global supply shock, and oil price shock. To analyze these perceived shocks and their impact on inflation expectations,

[7] Enders et al. (2021) define belief shocks as shocks to expectations about the current situation of the economy. Benhima and Poilly (2021) identify supply noise and demand noise shocks based on survey forecast errors about output growth and inflation. Clements and Galvao (2021) use GDP data revisions to isolate expectation shocks. Barrett and Adams (2022) identify the expectation shock as that which causes measured inflation expectations to diverge from rationality.

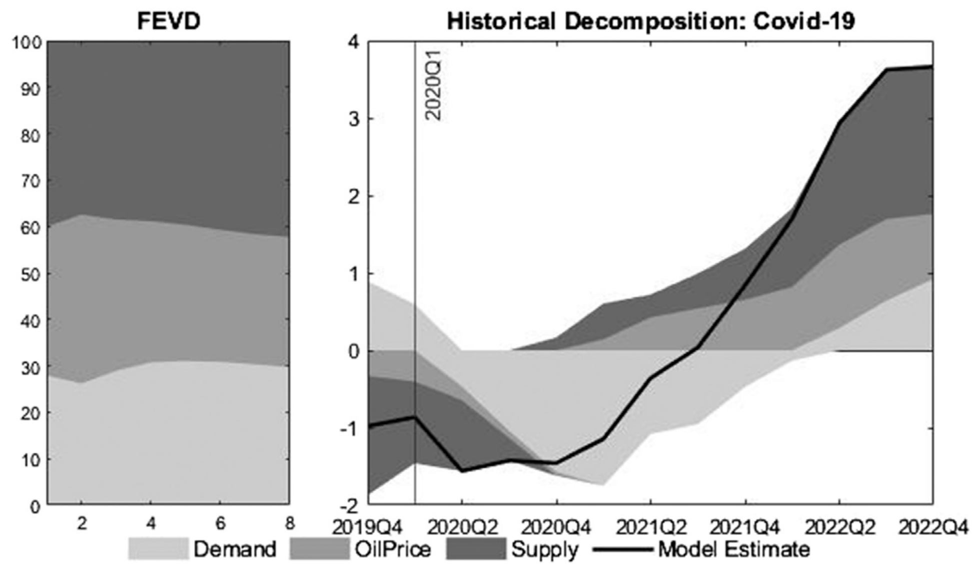

Fig. 5. Drivers of global inflation. *Notes:* The left panel shows the forecast error variance decomposition in global inflation. The right panel shows the historical decomposition during the COVID-19 pandemic period. We estimate the same FAVAR model and apply the same sign restrictions in identifying actual shocks as in Eqs. (4) and (5) based on quarterly actual values of global output growth, oil price growth, and global inflation from 2000Q1 to 2022Q4.

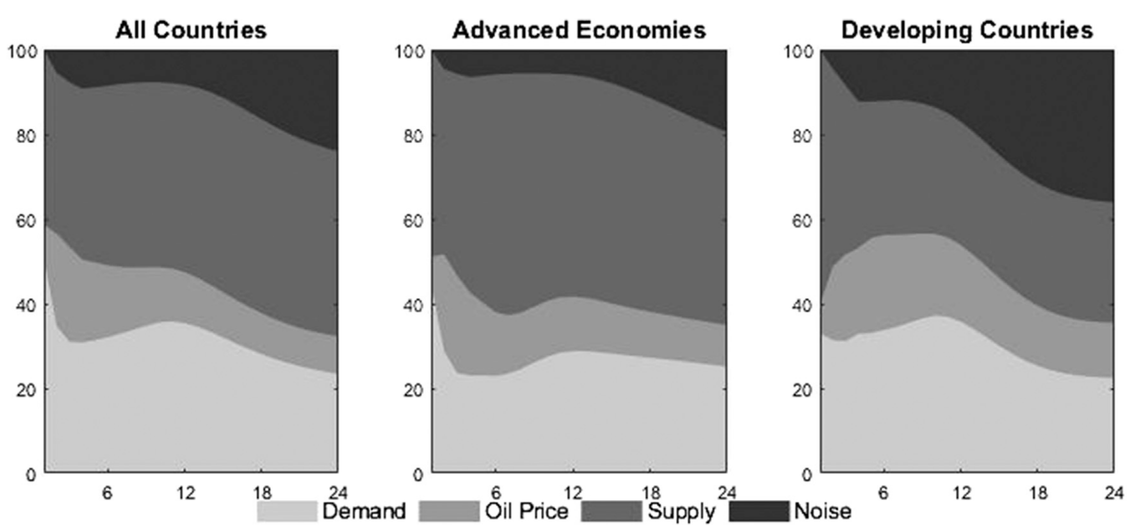

Fig. 6. Drivers of global inflation expectations by allowing for oil price noise shock. *Notes:* This figure shows the forecast error variance decomposition in predicting one-year-ahead global inflation in the VAR framework. The model includes four variables in the following order: forecasts of global output growth, oil price growth, and global inflation, as well as oil price forecast errors. The perceived global demand, oil price, and global supply shocks are identified using sign restrictions as specified in Eq. (5). The oil price noise shock is identified using Cholesky decomposition as the shock to its forecast errors.

we adopt a factor-augmented vector autoregression framework. We identify these perceived shocks using sign restrictions, which allow us to explore the dynamics and implications of these shocks on short-term global inflation expectations across different economies.

During the entire sample period from January 2012 to December 2022, the perceived oil price shock explains approximately 10% of the forecast error variance in global inflation expectations. However, its impact is minimal during the COVID-19 pandemic period, starting in March 2020. Furthermore, when we incorporate the oil price noise shock, which accounts for exogenous shifts in agents' optimism and pessimism in the VAR model, there is no substantial change in the limited pass-through of the perceived oil price shock to inflation expectations among professional forecasters. In other words, the addition of the oil price noise shock does not significantly alter the overall influence of the perceived oil price shock on inflation expectations in the professional forecasters' assessments.

In contrast to the limited role of the perceived oil price shock, the perceived global supply and demand shocks collectively account for approximately 90% of the fluctuations in global inflation expectations on average. The dynamics of these two shocks significantly influence short-term global inflation expectations.

During the first eight months of the pandemic, professional forecasters viewed the COVID-19 as a negative demand shock, leading them to lower their short-term global inflation expectations. However, towards the end of 2020, professionals quickly revised their global inflation expectations upward in response to the emerging supply chain disruptions and labor constraints, which eventually persisted. As 2022 began, professionals shifted their views on the demand shock from being negative to positive. This change, combined with the imbalance of strong demand and limited supply, contributed to the record-high global inflation expectations seen during this period. The interplay between perceived global supply and demand shocks highlights their dominant roles in shaping inflation expectations in response to the pandemic's economic impact.

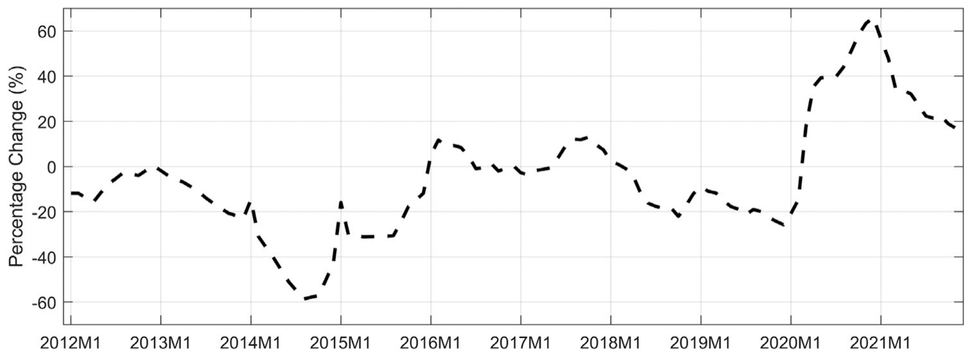

Fig. A.1. Crude oil price growth forecast error. *Notes:* This figure shows the crude oil price growth forecast error, defined as the difference between the actual value and the forecast. Fixed-horizon forecast errors are constructed following Eq. (1). Forecast data are retrieved from the Consensus Economics, and actual values are retrieved from the Organisation for Economic Co-operation and Development (OECD) database.

Table A.1
Country list.

Advanced economies	Emerging markets and developing economies	
Australia	Albania	Panama
Austria	Argentina	Paraguay
Belgium	Armenia	Peru
Canada	Azerbaijan	Philippines
Cyprus	Bangladesh	Poland
Czech Republic	Belarus	Romania
Denmark	Bolivia	Russia
Estonia	Bosnia and Herzegovina	Saudi Arabia
Finland	Brazil	Serbia
France	Bulgaria	South Africa
Germany	Chile	Sri Lanka
Greece	China	Thailand
Hong Kong SAR	Colombia	Turkey
Ireland	Costa Rica	Turkmenistan
Israel	Croatia	Ukraine
Italy	Dominican Republic	Uruguay
Japan	Ecuador	Uzbekistan
Korea	Egypt	Vietnam
Latvia	El Salvador	
Lithuania	Georgia	
Netherlands	Guatemala	
New Zealand	Honduras	
Norway	Hungary	
Portugal	India	
Singapore	Indonesia	
Slovak Republic	Kazakhstan	
Slovenia	Malaysia	
Spain	Mexico	
Sweden	Moldova	
Switzerland	Nicaragua	
Taiwan PRC	Nigeria	
United Kingdom	Macedonia	
United States	Pakistan	

Table A.2
Proportion of the variations explained by the first common factor.

	All economies	Advanced	Developing
Growth	0.44	0.68	0.38
Inflation	0.56	0.81	0.43

Notes: The global inflation and output growth forecasts are constructed based on the principal component analysis of 33 advanced economies and 51 developing countries. This table reports the proportion of variations in inflation and output forecasts explained by global inflation and output forecasts, respectively.

Table A.3
Correlation among forecasts of real GDP growth, inflation, and oil price growth.

	Real GDP growth			CPI inflation			Oil price
	All	AE	EM	All	AE	EM	growth
Real GDP growth							
All	1						
AE	0.98	1					
EM	0.48	0.34	1				
CPI inflation							
All	0.14	−0.01	0.81	1			
AE	0.30	0.21	0.53	0.83	1		
EM	−0.05	−0.20	0.81	0.85	0.41	1	
Oil price growth							
Oil	0.44	0.40	0.35	0.09	0.01	0.17	1

Notes: This table shows correlations among real GDP growth, inflation, and oil price growth forecasts. Fixed-horizon forecasts are approximated as weighted averages of fixed-event forecasts in Eq. (1). AE: advanced economies, EM: emerging economies.

CRediT authorship contribution statement

Zidong An: Proposing the research idea, Performing the analysis, Drafting the manuscript, Editing the manuscript, Responding to the editor/referees. **Xuguang Simon Sheng:** Proposing the research idea, Performing the analysis, Drafting the manuscript, Editing the manuscript, Responding to the editor/referees. **Xinye Zheng:** Proposing the research idea, Performing the analysis, Drafting the manuscript, Editing the manuscript, Responding to the editor/referees.

Appendix

See Fig. A.1 and Tables A.1–A.3.

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