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Geopolitical Risk, Supply Chains, and Global Inflation[1]

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Abstract: This paper investigates the effects of global geopolitical risks and global supply chain pressures on global inflation for the monthly period of 1999M1-2022M12. The investigation is based on a structural vector autoregression model, where the effects of global oil prices and global monetary policy are controlled for. Four alternative measures of inflation are used, including headline, core, food, and energy inflation. The empirical results show that disruptions in global supply chains are the main drivers of global inflation in the long run as the corresponding shocks explain the lion's share of volatilities in headline inflation (by 32%), core inflation (by 30%) and food inflation (by 22%), followed by oil price shocks and policy rate shocks. In comparison, energy inflation is explained the most by oil price shocks (by 55%) followed by supply chain shocks and policy rate shocks. Positive supply chain pressure and oil price shocks have positive and statistically significant effects on headline inflation even after five years, whereas positive policy rate shocks have negative and statistically significant effects on headline inflation in the long run. In contrast, positive shocks to geopolitical risk result in higher headline inflation only up to one year, with insignificant effects in the long run. Several policy implications follow.

JEL Codes: E31, E52, E58, F62

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1 Introduction

The effects of global inflation on the domestic inflation of countries have been increasing over time. As an example, the seminal work by Ciccarelli and Mojon (2010) indicates that up to 70% of advanced countries' inflation may stem from global factors. Therefore, it is essential to understand the factors contributing to the global inflation to conduct optimal monetary policy at the domestic economy level as well as to have monetary policy coordination across central bankers (e.g., see Calza, 2009). Understanding these factors has become even more important following the global supply chain problems created by the COVID-19 pandemic and increasing geopolitical risks after the Russo-Ukrainian War (e.g., see Istiak et al., 2021).

Based on this background, this paper investigates the effects of global geopolitical risks and global supply chain pressures on the global inflation (measured as the GDP-weighted average of inflation rates across countries) by using a time-series approach, where the developments in global oil prices and global policy rates are controlled for. Geopolitical risks can have impacts not only on the domestic inflation of countries directly affected by such risks, but also on other economies (and thus global inflation) through international trade and finance linkages (e.g., see Bouri et al., 2023). In addition, geopolitical risks can foster an imbalance between consumer demand and industrial supply that can spill over to other countries (e.g., see Yang et al., 2023). Similarly, supply chain pressure disruptions may affect inflation through the transportation cost channel, where process of delays in shipping or higher cost are passed on to the consumer as higher prices (e.g., see Benigno et al., 2022). Moreover, the disruption in the supply chain may lead to higher inflation through aggregate demand shocks according to Di Giovanni et al. (2022) who suggest that consumers pay more because of an imbalance between supply and demand, resulting in higher global prices.

The empirical investigation in this paper is achieved by using a structural vector autoregression model for the monthly period of 1999M1-2022M12, where global geopolitical risks and global supply chain disruptions represent the main variables affecting the global inflation. The investigation also controls for the developments in global oil prices and global policy rates. To shed light on the decomposition effects, four alternative measures of global inflation are used, namely headline inflation, core inflation, food inflation, and energy inflation.

The empirical results suggest that about 32% of the volatility in global headline inflation is explained by supply chain shocks in the long run (after five years), followed by oil prices (by 29%) and policy rates (by 15%). The contribution of geopolitical risks is relatively minor about 2%. Overall, the selected shocks in this paper explain about 78% of the global headline inflation. Regarding the response of headline inflation, one standard deviation of a shock in the supply chain pressure (oil prices) results in about 2% (1.1%) of an increase in headline inflation in the long run, whereas the same size of a shock in policy rates reduces headline inflation by about 1.1%. The effects of geopolitical risks on headline inflation exist only up to one year, whereas they are insignificant in the long run. In sum, supply chains are the main drivers of global headline inflation in the long run, followed by oil prices and policy rates.

The volatility in global core inflation is also explained the most by global supply chains with a contribution of about 30%, followed by policy rates (by 13%), oil prices (by 12%), and geopolitical risk (by 1%). Hence, oil prices not only affect energy prices, but they also affect the prices of other goods and services on a global scale. Overall, about 56% of the global core inflation is explained by the shocks considered in this paper. Regarding the response of core inflation, one standard deviation of a shock in supply chain pressure (policy rate) increases (decreases) core inflation by about 2.1% (1.8%) in the long run, whereas the effects of geopolitical risk and oil prices are statistically insignificant. In sum, supply chains and policy rates are the main drivers of global core inflation in the long run.

In comparison, supply chains explain only 22% of volatility in global food inflation, followed by oil prices (by 11%), policy rates (by 8%), and geopolitical risk (by 2%). In sum, only 43% of food inflation can be explained by the shocks considered in this paper. Regarding the response of food inflation in the long run, one standard deviation of a shock in supply chain pressure increases food inflation by 3.3%, whereas the same size of a shock in oil prices increase food inflation by 1.2%. The effects of geopolitical risk and policy rates on food inflation are insignificant at all horizons. Overall, supply chains and oil prices are the main drivers of global food inflation in the long run.

The volatilities in global energy inflation are explained the most by oil prices (by 55%), followed by supply chains (by 20%), policy rates (by 12%) and geopolitical risk (by 2%). It is implied that about 90% of the global energy inflation is explained by the shocks considered in this paper. Regarding the response of food inflation in the long run, one standard deviation of a shock in oil prices (supply chain pressure) results in about 11% (12%) of an increase in global energy inflation, whereas the effects of geopolitical risk and policy rates are insignificant. Therefore, oil prices and supply chains are the main drivers of global energy inflation in the long run.

When all inflation measures are considered at the same time, supply chains are the main drivers of global inflation in the long run. Oil price shocks have significant effects only on the headline, food and energy prices, whereas they are relatively silent for explaining the core inflation. Policy rates are effective in explaining only headline and core prices, whereas geopolitical risks have negligible effects on all inflation measures.

It is implied that government policies to reduce supply chain disruptions are essential to fight against inflation at the global scale. These policies may include providing financial assistance to businesses that are affected by supply chain shocks, investing in ports and transportation infrastructure to improve the flow of goods, diversifying supply chains by reducing reliance on a single supplier or country, investing in technology to improve supply chain efficiency, developing supply chains for critical goods and services, and coordinating with other countries to develop global standards and regulations for supply chains.

Overall, this paper contributes to the literature in three main ways. First, to the best of our knowledge, this is the first paper considering all important shock variables, namely global geopolitical risk, global supply chain pressure, global oil price shocks and global policy rate shocks while studying the determinants of global inflation. In contrast, most studies in the literature focus on a limited number of shock variables. Among these, Caldara et al. (2022), Yang et al. (2023), and Caldara et al. (2024) investigate the relationship between geopolitical risks and inflation, but they ignore the role of global supply chain pressures; Di Giovanni et al. (2022), Diaz et al. (2023) and Ascari et al. (2024) study the effects of global supply chain pressures on inflation, but they ignore the role of geopolitical risks; Cunado and de Gracia (2003), Cunado and de Gracia (2005), Yilmazkuday (2022), Ha et al. (2023a) and Ha et al. (2023b) investigate the effects of oil prices on inflation, but they ignore the effects of global geopolitical risks and global supply chain pressures. Using all important shock variables in this paper results in explaining the global headline inflation by 78%, the global core inflation by 56%, the global food inflation by 43%, and the global energy inflation by 90%, which is essential to identify different channels of transmission for policy makers.

The second contribution of this paper is considering four alternative global inflation variables, whereas studies in the literature mainly focus on the headline inflation measure (e.g., Caldara et al., 2022; Yang et al. (2023); Caldara et al., 2024)). This strategy is important to account for global inflation through the decomposition effects, so that policy makers can decide on which inflation measure to consider while evaluating the effects of global inflation on their potential policies.

The third contribution of this paper is focusing on the drivers of global inflation measures, whereas most studies in the literature focus on the drivers of a limited number of country-specific inflation rates (e.g., Lee et al., 2021; Lee et al., 2023). Such an approach is essential for domestic policy makers as up to 70% of inflation in advanced economies may stem from global factors according to Ciccarelli and Mojon (2010). This approach is also supported by Ha et al. (2023a) who show that about 57% (24%) of domestic inflation volatility in advanced economies (emerging markets and developing economies) are explained by global factors during the last two decades. Overall, by understanding the global drivers of their inflation, domestic policy makers can not only understand the nature of inflation (e.g., demand-pull versus cost-push inflation) but also assess its impact on consumers versus specific sectors.

The rest of the paper is organized as follows. The next section reviews the literature by discussing the channels of transmission from the shocks used in this paper to the global inflation. Section 3 introduces the data and the corresponding descriptive statistics. Section 4 introduces the estimation methodology based on a structural vector autoregression model. Section 5 depicts the empirical results by discussing the drivers of global inflation, where alternative inflation measures are considered. Section 6 depicts supplementary results to investigate the interactions between other variables used in the estimations. Section 7 provides a discussion of the results with the corresponding policy implications, whereas Section 8 concludes the paper.

2 Literature Review on Global Inflation

Numerous researchers have studied the global factors which influence inflation within various countries, including Parker (2018) and Feldkircher and Siklos (2019), whereas fewer studies attempt to construct a measure of global inflation and study its sources. Ciccarelli and Mojon (2010) contribute significantly to this field of research. They study the dynamics of global inflation using a cross-country average and the aggregate OECD inflation, as well as an inflation measure based on simulation. Their seminal work indicates that up to 70% of advanced countries' inflation may stem from global factors, including long term global trends and international business cycles. They further find a tendency for national inflation rates to converge back to the global inflation rate, on those instances when a domestic factor fosters a gap between the national economic environment and the global economy.

As this paper contributes to this literature by investigating the effects of geopolitical risk and global supply chains, the following subsections survey the existing studies focusing on these factors, where the corresponding channels of transmission are discussed to motivate the empirical investigation of the paper.

2.1 Effects of Geopolitical Risk

Economists have long known that geopolitical risks, such as wars, natural disasters, and health pandemics, can have profound effects on the global economy, including the rates of inflation and economic growth. However, empirical studies have found estimating the contribution of these risks to the rate of global inflation difficult, due to data limitations. Recently, Caldara and

Iacoviello (2022) have developed an index of geopolitical risk, measuring the frequency of the occurrence of key words in the news media. They publish monthly data for global geopolitical risk, as well as similar indices for key nations. Caldara et al. (2022) use this index to estimate the effects of the Russo-Ukrainian War and the pandemic on global inflation and global economic activity. Their research indicates that the Russo-Ukrainian War boosted inflation, causing an increase in global inflation of 1.3 percentage points by the second half of 2022. Caldara et al. (2022) expand their findings, noting that geopolitical risk adversely affects many aspects of the economy beyond the inflation rate, slowing economic activity, raising military spending and public debt, bringing sluggishness in trade, and surging money growth. They further document the heterogeneity of the impact: inflationary pressure from higher commodity prices and currency devaluation causes stronger and more persistent global inflation as compared to deflationary pressure from suppressed consumer demand and distressed financial conditions.

Regarding the channels of transmission, geopolitical risk has a very immediate effect on the domestic inflation of the countries directly affected by the risk. In addition, it increases the degree of synchronization and inflation spillovers between countries, increasing the rate of global inflation particularly among the major economies (Bouri et al., 2023). Historical examples include the increased inflation in the 1970s with the first and second oil crisis in 1973 and 1979, as well as the Financial Crisis and Great Recession beginning in 2008 (Yang et al., 2023). In addition, geopolitical risks can foster an imbalance between consumer demand and industrial supply. This can exacerbate the effects of fluctuating oil prices, as occurred following the COVID-19 pandemic.

2.2 Effects of Supply Chains

In recent years, many studies have investigated the relationship between supply chain pressures and inflation, especially after the COVID-19 era. Using the supply chain pressure index (see the data section for details), Ye et al. (2023) find that higher supply chain pressure leads to increased inflation rates in both advanced and developing countries. Regarding the magnitudes, Liu and Nguyen (2023) estimate that around 60% of US inflation is attributed to the supply chain pressure index, whereas inflation declined following an easing of the supply chain pressure index in mid-2022. Similarly, Diaz et al. (2023) show that the U.S. inflation rate has responded to supply chain disruptions during the crisis caused by the COVID-19 pandemic.

Laumer (2023) investigates how a global supply chain shock increased the consumer price indices in the US, UK, and Euro Area. He finds that supply chain pressure shocks could explain between 15% and 30% of inflation. On the other hand, Michail et al. (2022) study the effect of an increase in shipping costs generated by the COVID-19 outbreak on the inflation rate in the euro area, where they determine that a rise in shipping costs contributed to a higher inflation rate. Similarly, Malakhail et al. (2023) analyze food inflation in North America, where they document that the global supply chain pressure and transfers due to COVID-19 contributed to higher food inflation in North America. Di Giovanni et al. (2022) also observe that inflation in the US and Europe is affected by the fluctuation in global supply chain pressure.

Regarding the channels of transmission, supply chain pressure disruptions may affect inflation through the transportation cost channel. The process of delays in shipping or higher cost are passed on to the consumer as higher prices (Benigno et al., 2022). In addition, the disruption in the supply chain leads to higher inflation through aggregate demand shocks according to Di Giovanni et al. (2022) who suggest that consumers pay more because of an imbalance between supply and demand, resulting in higher prices.

2.3 Effects of Oil Prices

One of the most frequently studied factors that influences global inflation is the price of energy, specifically oil prices. Cunado and de Gracia (2003) show that oil prices have permanent effects on European inflation, whereas Cunado and de Gracia (2005) show that oil prices are effective on the inflation of Asian countries mostly in the short run. Baffes et al. (2015) estimate that a 10% decline in oil prices leads, on average, to a 0.3 percentage point decline in global inflation. Their study, which focuses on the plunge in oil prices during the Great Recession, finds that the effect varied within certain regions. The effect generally peaks 3 to 5 months after the change in oil prices before gradually fading. Ye et al. (2023) find that a $10 increase in the price of oil would lead to a temporary 0.1% to 0.6% rise in the inflation rate.

Sussman and Zohar (2022) observe a higher correlation between oil prices and global inflation in the years following the onset of the Great Recession. In their study, they also explore the endogenous characteristic of oil prices. By estimating expected inflation from the break-even inflation reflected in bond yields, they find that oil prices themselves reflect the current expectations of inflation and real economic activity, in addition to the oil supply forecasts. Elsayed et al. (2021) study the spillover effect of oil price changes and CPI inflation rates among the G7 and China. They note that even though price fluctuation can result from supply disruptions in one market, the three key oil price indices display a spillover effect which reaches to 90% in the medium term. Further, the spillover effects of inflation between these economies have risen since 2000, from estimated levels of around 35% to nearly 55% as improved communication and globalization intensify the synchronization of the dynamics of inflation.

Regarding the channels of transmission, crude oil prices play a major role in causing inflation, and rising oil costs can impose inflationary pressures globally (Chen, 2009). Oil is used in production, industry, and transportation. The cost-push channel provides a mechanism through which oil prices drive up the production cost and price of resources (Xiang et al. 2021). Oil prices can impact inflation through exchange rates as well (Ding et al., 2023). They further explain that by increasing the oil price, the currencies of oil-exporter countries like Canada appreciate. Therefore, imports will be more expensive for oil-importer countries like China and the US.

Research has shown that most of the rise in the price of oil is passed on to consumers in the form of higher prices for nearly all goods and services. While some goods are directly affected by the price of petroleum, like gasoline and travel, others are affected by the downward shift in the supply curve due to higher production costs. The inflationary effect of higher oil prices may be most prevalent in the short term but may have much less of an effect in the medium and long terms. (Wang and Wen, 2007). For example, high oil prices drove up inflation in the US and Europe in 2008, but that inflation quickly fell to near zero, or even negative levels, in 2009 with the advent of the global financial crisis.

2.4 Effects of Policy Rate

While many studies focus on the relationship between national inflation rates and national monetary policies, relatively few investigate the relationship on a global level. Studies note the complexity of examining the role of various national monetary policies and their effects on the global business conditions. Bordo and Taylor (2017) and Guirguis and Suen (2022) estimate the Phillips Curve and the effectiveness of monetary policy. Their studies focused on the effects of monetary policy on the domestic economies. Guirguis and Suen (2022) detect a strong sensitivity of price inflation to labor market tightness, particularly over the last 20 years, when the Phillips curve's endogeneity and nonlinearity are taken into consideration. They conclude that the convex Phillips curve successfully explains and forecasts more than 90% of core inflation.

Beckworth and Crowe (2017) study the international impact of the Fed on other countries, as it serves as the "Banker to the World". They conclude that when setting monetary policy to target inflation, the Fed needs to consider not only the domestic economic conditions but also the reverberations of this policy in the global economy. In both the housing boom of the early 2000's and the subsequent crisis of 2008, the Fed's monetary policy got "recycled back" into the US economy via its role as the banker to the world, creating a stronger boom and a tighter monetary policy than envisioned when the monetary policy was determined.

The global channel of interest rate policy needs to consider the domestic nature of setting policy rates. Though it is a common monetary policy to curb inflation by raising the policy interest rates, when discussing global inflation, this becomes more complex, as multiple governments, including the European Central Bank, make policy independently. However, international capital flows in the increasingly integrated financial markets have led the Federal Reserve Bank to have a growing influence, as it plays a role as the "banker to the world," and many policymakers consider its recent moves (and expected future moves) when choosing their domestic policies (Beckworth and Crowe, 2017). In addition, the global influence of domestic indicators is considered by policy making bodies. Central banks consider key economic indicators in other countries when determining their policies (Feldkircher and Tondl, 2020), thus adding to the synchronization of world policies in fighting global inflation.

3 Data and Descriptive Statistics

This article intends to examine the factors that influence global inflation rates, considering shocks to global geopolitical risk, the global supply chain, oil prices, and the global policy rate. Monthly data covering the sample period of 1999M1-2022M12 are used in the estimations.[6] The details of

[6] The starting period is chosen based on the availability of the euro area's policy rate.

each variable are discussed next, whereas further technical details are provided in the Appendix Table A.1.

The monthly global geopolitical risk index (GPR) is obtained from Caldara and Iacoviello (2022). GPR is developed to capture geopolitical tensions events and associated risks based on war, threat, and adverse settings; this information is summarized from ten newspapers. When represented in year-on-year percentage changes (for estimation purposes), Figure 1 reveals several spikes in the index caused by significant negative geopolitical events in the last two decades, including the September 11 attacks of 2001, the Iraq invasion in 2003, and the Russian invasion of Ukraine in 2022.

The monthly global supply chain pressure index (GSC) is obtained from the Federal Reserve Bank of New York to measure global supply chain distortions using global transportation costs and supply chain-related factors from the manufacturing sectors. As it is represented as the standard deviation from its average, GSC has experienced a greater disturbance from its steady state during 2020-2022, as shown Figure 1, mainly due to the COVID-19 outbreak.

The monthly global oil prices (West Texas Intermediate) are obtained from the Federal Reserve Economic Data (FRED). The year-on-year growth rate of oil prices is shown in Figure 1, where the Russo-Ukrainian War of 2022 has resulted in a recent surge in global oil prices.

The monthly GDP-weighted global central bank policy rate is constructed using the central bank policy rates provided by the Bank for International Settlements (BIS), where GDP measures are obtained from the World Development Indicators. The recent hike in global policy rates as of 2022 can be observed in Figure 1.

This study includes four monthly measures of global inflation rate (measured as the GDP-weighted average of inflation rates across countries), namely the global headline inflation rate, the global core inflation rate, the global food inflation rate, and the global energy inflation rate. The corresponding price indices have been obtained from the global inflation database of Ha et al. (2023c) for different numbers of countries (as detailed in the Appendix). Once country-specific price indices are obtained, they are first converted into year-on-year percentage changes (to have country-specific inflation measures), and then, the global inflation measures are obtained as the GDP-weighted average of inflation rates across countries for each inflation measure (where GDP measures are obtained from the World Development Indicators). Figure 1 shows the trends of different global inflation rates, where the recent surge coincides with the COVID-19 pandemic era and the following Russo-Ukrainian War in 2022.

4 Empirical Methodology

Using the monthly data described in the previous section, the estimation is achieved by using a structural vector autoregression (SVAR) model with alternative measures of global inflation. The SVAR model is defined as $z_t = (gpr_t, gsc_t, oil_t, policy_t, inf_t)'$, where gpr_t is the year-on-year percentage changes in the global geopolitical risk, gsc_t is the standard deviation of global supply chain pressure index from its average value, oil_t represents the year-on-year percentage changes in oil prices, $policy_t$ represents the global policy rates, and inf_t is the global inflation measure used. The formal investigation is based on the following expression:

$$A_o z_t = a + \sum_{k=1}^{12} A_k z_{t-k} + u_t \tag{1}$$

where u_t is the vector of serially and mutually uncorrelated structural innovations. For estimation purposes, the model is expressed in reduced form as $z_t = b + \sum_{k=1}^{12} B_k z_{t-k} + e_t$, where $b = A_o^{-1}a$ and $B_k = A_o^{-1}A_k$ for all k. The number of lags (of 12) has been determined by minimizing the Deviance Information Criterion across alternative lags (between 1 and 24) as shown in the Appendix Figure A.1. It is postulated that the structural impact multiplier matrix A_o^{-1} has a recursive structure such that the reduced form errors e_t can be decomposed according to $e_t = A_o^{-1}u_t$, where shock sizes are standardized to one standard deviation.

The recursive structure imposed on A_o^{-1} requires an ordering of the variables used in the estimation for which we utilize the ordering in $z_t = (gpr_t, gsc_t, oil_t, policy_t, inf_t)'$, although the results are very similar when alternative ordering of variables are considered.[7] Specifically, as in Caldara et al. (2022), the geopolitical risk gpr_t is ordered first as it is assumed to be independent of current economic developments, although it can be affected by any other shock following the contemporaneous period. As in Caldara et al. (2024), the supply chain index gsc_t is ordered after the geopolitical risk, implying that it can be affected by the geopolitical risk contemporaneously, but it does not have a contemporaneous effect on the geopolitical risk. Oil prices are ordered before inflation as in Yilmazkuday (2021) and Yilmazkuday (2024), and they are ordered after the geopolitical risk and the supply chain index as they can be affected contemporaneously by both the geopolitical risk and supply chains, whereas they can affect all variables after the contemporaneous period. Similar to Ciccarelli et al. (2015), policy rate is ordered after the geopolitical risk, supply chain index, and oil prices, implying that it can be affected by these variables contemporaneously. Finally, as in Diaz et al. (2023), the global inflation measure used is ordered the last as it is the variable of interest in this paper.

[7] The results of such robustness checks are available upon request.

The estimation is achieved by a Bayesian approach with independent normal-Wishart priors. This corresponds to generating posterior draws for the structural model parameters by transforming each reduced-form posterior draw. In particular, for each draw of the covariance matrix from its posterior distribution, the corresponding posterior draw for A_o^{-1} is constructed by using by Cholesky factorization, where shock sizes are standardized to one standard deviation. In the Bayesian framework, a total of 2,000 samples are drawn, where a burn-in sample of 1,000 draws is discarded. The remaining 1,000 draws are used to determine the structural impulse responses and forecast error variance decomposition measures. While the median of each distribution is considered as the Bayesian estimator, the 16th and 84th quantiles of distributions are used to construct the 68% credible intervals (which is the standard measure considered in the Bayesian literature).

5 Estimation Results

This section depicts the drivers of global inflation based on the SVAR model introduced in the previous section, where alternative measures of global inflation are considered.

5.1 Drivers of Headline Inflation

Cumulative impulse responses of headline inflation to various shocks are given in Figure 2 for the full sample (1999-2022). Headline inflation is affected positively by all shocks in the short run, whereas only supply chain and oil price shocks are effective in a continuous way.

Regarding the magnitude, as shown in Table 1, one standard deviation of a shock in the geopolitical risk increases the headline inflation by about 0.06% after one quarter, whereas this positive response increases to 0.23% after one year. In the long run, which is after five years, the effect of geopolitical risk becomes statistically insignificant. This result is consistent with earlier studies such as by Caldara et al. (2022) who have shown evidence for positive effects of geopolitical risk on global inflation.

Table 1 also shows the magnitude of the effects of global supply chain pressure on global headline inflation. One standard deviation of a shock in the global supply chain pressure raises headline inflation by approximately 0.11% after one quarter. The degree of this positive response intensifies to 1.03% after one year and reaches to 2.01% after five years. This is consistent with earlier studies such as by Hall et al. (2023) who have found that supply chain disruptions are the main driver of inflation in the euro area in 2021 and 2022.

In terms of magnitude, the oil prices display very strong influences on the global inflation in the short and medium terms, with the magnitude dipping slightly in the long term (over five years). Table 1 shows that one standard deviation of a shock in oil prices increases the headline inflation by about 0.49% after one quarter. This positive response expands to 1.57% after one year. In the long run, though, the effects of oil prices sink back to a 1.14% positive rate. Our model indicates a peak effect after approximately one year and a lingering effect even after five years. This result is in line with studies such as by Baffes et al. (2015) who show a positive relationship between oil prices and global inflation.

Regarding the global policy rate, Table 1 illustrates that a one-standard deviation of an increase in the global policy rate influences headline inflation by approximately 0.06% after one quarter. Over the course of a year, this effect increases to 0.41% in the medium run. However, the response of the global inflation rate to the shock in policy rate becomes significantly negative in the long run. We investigate this inconsistency more while focusing on the subsample analyses, which we present next.

When the period is divided into two separate subperiods, the influence of global geopolitical risk on global headline inflation becomes distinct between the two periods (Table 2 and Table 3). For the period of 1999-2010 in Table 2, a one standard deviation of a shock in geopolitical risk is shown to reduce global headline inflation in all three cases, i.e., after one quarter, one year, and five years. Nonetheless, during the sample period of 2011-2022 in Table 3, the global geopolitical risk is more similar to the full sample case, increasing the global headline inflation by about 0.13% in the short run and 0.45% after one year, respectively, while the direction of the long-term response to geopolitical risk is less decisive.

It is implied that the two subsamples correspond to different effects of the geopolitical risk on global inflation. This can be explained by the first subsample of 1999-2010 corresponding to an era, when higher geopolitical risk has potentially resulted in lower global demand due to the involvement of the U.S. in the corresponding risks as the biggest economy (e.g., the September 11 attacks of 2001 and the Iraq invasion in 2003). In contrast, the second subsample of 2011-2022 corresponds to an era, when higher geopolitical risk has potentially resulted in lower global supply (e.g., food supply problems due to the Russian invasion of Ukraine in 2022).

The response of headline inflation, as represented in Table 2, due to one standard deviation shock in global supply chain pressure is positive and statistically significant in the first subsample period of 1999-2010, where the degree of the positive response is lower as compared to the full sample. In contrast, as shown in Figure 2, headline inflation is positively affected by supply chains only after one year to slightly beyond four years in the second subsample period of 2011–2022.

The influence of oil prices on global headline inflation is very different between the two periods. During the period from 1999 to 2010, one standard deviation of a shock in oil prices increased headline inflation in the short run by about 0.42% after one quarter. The influence rises to 1.0% in the medium run and 0.77% in the longer run (Table 2). In contrast, during the period from 2011 to 2022, one standard deviation of a shock in oil prices increased headline inflation by about 0.3% after one quarter. While global inflation rises to 1.15% in the medium run, the oil prices effect on global inflation is insignificant in the long run (Table 3).

A contradictory result from the existing economic theory for the response of global policy rate shocks to global headline inflation is observed for the period between 1999 and 2010 in Figure 2 and Table 3, where one standard deviation of a shock in the global policy rate increases headline inflation by 0.02% after one quarter, 0.29% in the medium run, and 0.74% in the long run, respectively. The plausible explanation for this response is that many advanced countries expanded their money supply aggressively (quantitative easing) during the period of the global financial crisis in 2008, which overshadowed the effectiveness of the global policy rate in curbing inflation. On the other hand, the global policy rate was effective in reducing the inflationary pressure during the subsample period of 2011-2022. Specifically, Table 3 shows that one standard deviation of a shock in the global policy rate lowers global headline inflation by about 0.45% after one year.

The forecast error variance decomposition of headline inflation, as shown in Table 4, reveals that only 2.0% of headline inflation is explained by the geopolitical risk in the long run, which is about 6.9% for the subsample period of 1999–2010 and about 2.5% for subsample period of 2011–2022.

The global supply chain pressure shock can explain 21.6% variation of the global headline inflation in the medium run, which is persistently increased to 32.4% in the long run. According to Table 4, this corresponds to the highest contribution to headline inflation, suggesting that the global supply chain pressure is the main driver of the volatility in the global headline inflation according to the full sample period. In the corresponding literature, Laumer (2023) has obtained similar results for the euro area, the US, and the UK suggesting that this shock could explain the variation in inflation between 15% and 30%.

In the short run, 40.1% of global headline inflation can be explained by oil prices, whereas this percent increases slightly to 41.4% in the medium run before falling back to 28.7% in the long run. The contribution of oil prices to the global headline inflation is much higher during the first subsample period of 1999-2010 compared to the second subsample period of 2011-2022.

The global policy rate can determine 0.8%, 3.3%, and 14.5% of fluctuation in the global headline inflation after one quarter, one year, and five years, respectively. About 0.4%, 5.4%, and 11.6% of inflation after one quarter, one year, and five years, respectively, can be explained by the global policy rate over the subsample period of 1999-2010. Nevertheless, during the second subsample period of 2011-2022, shock to the global policy rate contributes the most to the volatility of global headline inflation.

5.2 Drivers of Core Inflation

Figure 3 shows the cumulative impulse responses of global core inflation to various shocks in the full sample (1999–2022). Shocks to geopolitical risk do not have any statistically significant impact on core inflation, whereas one standard deviation of a shock to global supply chain pressure raises global core inflation by about 0.42% after one year, whereas the degree of this positive effect expands to 2.10% after five years as shown in Table 5. This result is consistent with Carrière-Swallow et al. (2023) who has shown that the response of core inflation to a global shipping cost shock, as a proxy of supply chain constraint, is statistically significant after two quarters.

Core inflation also increases with shocks to oil prices, although such effects become statistically insignificant in the long run. Specifically, Table 5 shows that one standard deviation of a shock in oil prices increases core inflation by just 0.09% after one quarter, whereas this positive response expands to 0.53% after one year. It is implied that oil price shocks not only affect energy prices but also the prices of other goods and services up to a certain degree.

The response of global core inflation to global policy rate shocks is statistically insignificant both after one quarter and one year. The response, on the other hand, becomes significantly negative after five years. One standard deviation of a shock to the global policy rate reduces global core inflation by approximately 1.82% in the long run, consistent with the expectations of higher policy rates reducing global demand and thus global inflation.

The global geopolitical risk shock has no significant effect on core inflation, even in two subsample periods. Similar to the full sample, the response of core inflation to one standard deviation shock in global supply chain pressure is insignificant in the sub-sample period of 1999–2010 (Table 6). In contrast, one standard deviation of a shock in global supply chain pressure increases core inflation by about 0.19% in the long run, although the magnitude is lower as compared to the full sample period. The impact of supply chain pressure on core inflation is insignificant, which aligns with the headline inflation for the sample period of 2011–2022 (Table 7). However, Figure 3 reveals that core inflation is profoundly affected by the global supply chain pressure shock, from beyond one year to slightly beyond four years.

According to Table 6, the influence of oil prices on global core inflation is positive in the short run and medium in two subsample periods. The core inflation increases by about 0.05% after one quarter due to a one-standard deviation shock in oil prices, which rises further to 0.19% after one year and 0.39% in the long run for the subsample period of 1999–2010. During the period from 2011 to 2022, the impact of oil prices on core inflation is analogous to the sample periods of 1999–2010 for the short and medium run; however, it significantly reduces core inflation by about 1.47% in the longer term (Table 7).

Analogous to the full sample, the association, as shown in Table 6, between core inflation and policy rates is insignificant after one quarter in both subsamples. However, the impact is significant in the medium and long run for the sample periods of 1999–2010. In the medium run, following one standard deviation of a positive policy rate shock, core inflation escalates by about 0.18%; the degree of this escalation is large (about 1.07%) in the long run. On the contrary, shocks to the global policy rate are effective in reducing core inflation in the medium run during 2011–2022. One standard deviation of a shock to the policy rate diminishes core inflation by about 0.58% after one year according to Table 7, where the effect of global policy rate shocks is insignificant in the short run and the long run.

Table 8 shows that only a slight variation in core inflation is explained by the global geopolitical risk shock. In contrast, the global supply chain pressure can explain only 0.6% of core inflation after one quarter, which persistently increases to 9.7% in the medium run, and 30% in the long run. However, the global supply chain pressure cannot explain the large variation in core inflation while considering the sample period of 1999–2010. Nevertheless, this shock still explains about 8.4% of core inflation after five years for the subsample period of 2011–2022. Only 5.4% of the global core inflation can be explained by oil prices in the short run, which reflects the effects of oil price shocks on prices of other goods and services. This influence increases to 11.4% in the medium run and to 12.0% in the long run.

Table 8 also shows that the global policy rate can only explain 0.2% of the variation in core inflation in the short run. However, this rises over the period and reaches 13.1% in the long run. Similarly, the variance decomposition demonstrates that the global policy rate can determine a smaller portion of core inflation after one quarter and one year, respectively, in the subsample period of 1999–2010. Nevertheless, in the long run, about 28.1% of the variability of core inflation is explained by the global policy rate, which is even more substantial (about 47.8%) in the sample periods of 2011–2022. Overall, supply chain shocks are the main drivers of core inflation according to the full sample, whereas policy rate shocks replace them when subsamples are considered, suggesting potential evidence for structural changes between the two subsamples.

5.3 Drivers of Food Inflation

The cumulative impulse responses of global food inflation to various shocks in the full sample (1999–2022) are shown in Figure 4. Food inflation is positively affected mainly by global supply chain pressure and oil prices shocks, and the magnitude of the global supply chain shock heightens even after five years. The responses of global food inflation to shocks of geopolitical risk and policy rates both are statistically insignificant in all horizons.

Regarding magnitudes in Table 9, one standard deviation of a shock in global supply chain pressure raises food inflation by about 0.14% after one quarter, which increases to 1.35% in the medium run. In the long run, the significant effect continues and reaches 3.29%. The response of food inflation to oil prices is insignificant in the short run. However, food inflation hikes occur by about 1.08% and 1.18%, respectively, after one year and five years, due to one standard deviation shock on global oil prices.

Like the global headline inflation, global food inflation is negatively affected, as shown in Table 10, by the global geopolitical risk shocks in the subsample period of 1999–2010. One standard deviation of a shock to political risk is associated with a reduction in food inflation by about 0.19% after one quarter, whereas this reduction reaches 0.96% after one year. The negative response to food inflation persists by approximately 0.93% even after five years. On the contrary, food inflation surges significantly due to the geopolitical risks shock both in the short run and in the long run in the sample period of 2011–2022.

The global supply chain pressure affects food inflation significantly (by about 0.81%) only in the long run in the subsample period of 1999–2010 according to Table 10. While this positive response exists (by approximately 0.19% and 1.14%, respectively) both after one quarter and after one year in the sample period of 2011–2022 according to Table 11. The response is insignificant in the long run.

Shock to oil prices persistently increase the food inflation in the sample periods of 1999-2010. According to Table 10, one standard deviation of a shock in oil prices causes a rise of food inflation by about 0.13% after one quarter, 0.96% after one year, and 1.02% after five years, respectively. On the contrary, shock in oil prices decreases the global food inflation by about 0.13% in the short run and 1.83% in the long run (Table 11) during 2011-2022. However, the cumulative impulse response of global food inflation to oil prices shows that food inflation responds positively beyond one year to beyond three years in the subsample period of 2011-2022 (Figure 4).

The global food inflation responses due to a shock in global policy rate displays different dynamics for the two sub-periods. For the subsample period of 1999-2010, only the long-term response is significant, and it is positive (Table 10). This contrasts with the full period response which was not significant for any of the timeframes. Meanwhile, the responses in the sample period of 2011-2022 were all significant. Specifically, Table 11 shows that rising global policy rates causes food inflation to increase by 0.19% at first. One standard deviation of a shock in global policy rate escalates the food inflation by 1.18% in medium run, whereas the same reduces it profoundly by about 6.96% after five years.

According to Table 12, the global geopolitical risk has virtually no effect on explaining variation in global food prices. The overall influence, based on the variance decomposition, is estimated at 0.4%, 1.3%, and 2.1% in the short, medium, and long runs, respectively. However, this variable can explain more variation in global food inflation when the sample is split into two subsamples. The supply chain pressures have a more noticeable effect, with the overall influence, based on the variance decomposition, estimated at 1.4%, 10.7%, and 21.7% in the short, medium, and long terms, respectively.

The degree of influence of supply chain pressure in explaining food inflation is lower while splitting the sample into two sub-periods as shown in Table 12. Oil prices have a relatively minimal effect and can explain only 0.7%, 7.4%, and 10.8% of global food inflation after one quarter, one year, and five years, respectively. The global oil prices can only determine a smaller portion of global food inflation, even if the sample is divided into two sub-periods.

Food inflation is explained by 0.3% after one quarter due to the shock in the global policy rate in the full sample, which increases to 1.5% and 8.4%, respectively, after one year and five years according to Table 12. The global policy rate can explain similar variability in food inflation in the subsample period of 1999–2010. Nevertheless, a large percentage of food inflation is explained by the global policy rate (i.e., 58.3% after five years) in the subsample period of 2011–2022, suggesting potential evidence for structural changes between the two subsamples once again.

5.4 Drivers of Energy Inflation

Figure 5 represents the cumulative impulse responses of global energy inflation to various shocks in the full sample, where the global geopolitical risk shock has no significant effect on global energy inflation. However, supply chain pressure and oil prices have persistently positive effects on energy prices, even after five years.

Table 13 reveals that one standard deviation of a shock to global supply chain pressure raises global energy inflation by about 0.67% after one quarter, which increases to 6.06% after one year and 11.54% in the long run. Responses of energy prices to oil prices are even bigger in all three horizons, i.e., 5.49%, 14.90%, and 11.23%, respectively. The effect of a one-standard deviation shock to the global policy rate on energy prices is positive both in the short run and medium run, while this response is statistically insignificant in the long run.

In the subsample period of 1999–2010, the geopolitical risk shock has a negative effect on global energy prices according to Table 14. One standard deviation of a shock to geopolitical risk reduces energy prices by 0.69% in the short run. This negative response becomes significantly larger in the medium and long runs. Global geopolitical risk shocks push up energy prices, but the effect is statistically insignificant in the period 2011–2022 according to Table 15.

The supply chain pressures have no significant effect on determining energy inflation in the subsample period of 1999-2010 according to Table 14. While the response of energy prices to supply chain shocks declines by about 0.51% after one quarter in the subsample period of 2011–2022 according to Table 15, the influence of this shock on energy prices is insignificant both in the medium and in the long run.

In Table 14, one standard deviation of a shock to oil prices augments energy prices by about 4.07% after one quarter, 8.74% after one year, and 6.20% after five years, respectively, in the subsample period of 1999-2010. Whereas oil price shocks led to significant rises in energy inflation in the short run and in the medium run, this was not observed in the long run in the period of 2011–2022 according to Table 15.

Table 14 shows that, from 1999 to 2010, an increase in global policy rate of one standard deviation expands the energy inflation by 0.47% in just one quarter. In the medium run, its response increases by about 4.27%, while the long-run effect is insignificant. The rising global policy rate causes energy inflation to shrink by about 6.27% after one year (Table 15) during 2011-2022. Though the long-run effect is statistically insignificant, the cumulative impulse response graph shows that the global policy rate has profound negative effects on reducing energy prices up until beyond four years (Figure 5).

Shocks to geopolitical risk show a negligent effect on global energy inflation, based on the variance decomposition, estimated at 0.6%, 1.4% and 1.9% in the short, medium, and long runs, respectively (Table 16). Supply chain shock demonstrate a more substantial effect on global energy inflation, particularly in the medium and long runs. Oil prices have, virtually by definition, a relatively large effect on energy inflation, with the overall influence, based on the variance decomposition, estimated at 69.1%, 68.0% and 55.4% in the short, medium, and long runs, respectively. About only 1.2% variation of energy inflation can be explained by the global policy rate in the short run. The magnitude increases to 5% and 12.3% after one year and five years, respectively during 1999-2022.

Although oil prices are main determinants of the variation in global energy inflation, the global policy rate can explain a substantial portion (about 74.6%) of energy inflation in the long run for the subsample period of 2011-2022. Overall, oil price shocks are the main drivers of energy inflation according to the full sample and the first subsample, whereas policy rate shocks replace them for the second subsample, suggesting potential evidence for structural changes between the two subsamples one more time.

6 Interaction between Other Variables

We have so far focused on the responses of global inflation by considering alternative inflation measures. For completeness, this section provides supplementary results based on the interaction of other variables used in estimations.

The cumulative impulse response of global supply chain pressure to a global geopolitical risk shock is shown to be statistically insignificant for all horizons in Figure 6. Although ongoing studies on global geopolitical risk shocks and supply chain pressure index are still limited, this result contrasts with Khan et al. (2021) who argue that geopolitical risk shocks lead to increased supply chain disruptions via a positive effect on oil prices.

The cumulative impulse response of global oil prices to global geopolitical risk shock is also shown in Figure 6. The response is significantly negative. A plausible argument for the reduction of oil prices is that presumably aggregate demand by the economies dampens due to the uncertainty induced from the global geopolitical risk shock. An extant of literature found a controversial result for the association between geopolitical risk shocks and oil prices. Oil prices react positively when geopolitical risk events cross a certain threshold; the effect becomes insignificant when the threat's severity is minimal (Jamal Bouoiyour, et al., 2019; Cheikh and

Zaied, 2023). Some studies, like Smales (2021) demonstrate that the energy supply is disrupted in times of adverse geopolitical events, which directly increases oil prices. On the other hand, some earlier studies found a negative effect of geopolitical risk shocks on the crude oil market (Antonakakis et al., 2017; Mei et al., 2020; Cunado et al., 2020; Lee et al., 2021).

Our estimates show that a one standard deviation shock on global supply chain pressure raises oil prices by about 15.68% after one year; however, the response is insignificant after one quarter and five years (Table 17). The cumulative impulse response graph indicates that the global supply chain shock significantly affects global oil prices between the periods of beyond one quarter to two years. This is in line with earlier studies such as by Kim et al. (2023) who show that global supply chain pressure increases oil prices, potentially due to a hike in oil delivery costs arising from supply chain disruptions.

Table 17 shows that the impact of global geopolitical risk shock on global policy rate is insignificant. In the short run, the global policy rate is also unaffected by global supply chain pressure; however, their interaction is positive and statistically significant in the medium and long run. One standard deviation of a shock on global supply chain pressure leads to an increase in the policy rate of 0.27% and 2.21% after one and five years, respectively. Similarly, the response of the policy rate due to a one-standard deviation shock to oil prices is positive in all three terms. This result is expected, as discussed earlier, because both the global supply chain and oil prices have a positive effect on inflation.

7 Discussion and Policy Suggestions

The main result of this paper is that disruptions in supply chains and oil prices are the key drivers of global inflation. The contribution of supply chain disruptions is consistent with the view that they affect inflation through the transportation cost channel, where process of delays in shipping or higher cost are passed on to the consumer as higher prices (e.g., see Benigno et al., 2022). Moreover, the disruption in the supply chain may lead to higher inflation through aggregate demand shocks according to Di Giovanni et al. (2022) who suggest that consumers pay more because of an imbalance between supply and demand, resulting in higher global prices. In comparison, oil price shocks have significant effects only on the headline, food and energy prices, whereas they are relatively silent for explaining the core inflation. Policy rates are effective in explaining only headline and core prices, whereas geopolitical risks have minor effects on all inflation measures. Overall, supply chain disruptions and oil price shocks are the main drivers of the volatility in four alternative measures of global inflation.

As the main focus of this paper is about understanding the drivers of global inflation, country-specific implications for policy makers should be considered based on the effects of global inflation on country-specific inflation rates. This is due to Ciccarelli and Mojon (2010) who show that up to 70% of inflation in advanced economies stem from global factors and due to Ha et al. (2023a) who show that about 57% (24%) of domestic inflation volatility in advanced economies (emerging markets and developing economies) are explained by global factors during the last two decades.

Specifically, when increased supply chain disruptions result in elevated global inflation, domestic policy makers can implement certain policies to tackle the issue such as raising interest rates or adjusting money supply to reduce inflation by discouraging borrowing and spending. Policy makers can also implement fiscal policies such as increased taxation and reduced government spending to control inflation. Investing in infrastructure, logistics, and transportation networks can enhance supply chain resilience. Governments can regulate the prices of essential goods and services during periods of significant supply chain disruptions. Governments may review and adjust trade policies, such as reducing tariffs and quotas. Ultimately, countries can collaborate with international partners and implement necessary policies to address inflation.

As country-specific inflation rates highly depend on global inflation, additional policy suggestions include governments working with businesses to identify the corresponding supply chain bottlenecks. Moreover, financial assistance can be provided to businesses being affected by supply chain disruptions, and investment in ports and transportation infrastructure can facilitate the flow of goods not only internationally but also within countries. Furthermore, supply chains can be diversified across different suppliers or countries through government policies, and investing in new technologies to improve the efficiency of supply chains can be subsidized. Finally, supply chains for critical goods and services can be developed for future potential supply chain disruptions, and governments can coordinate with other countries to develop global standards and regulations for supply chains.

8 Concluding Remarks

This paper has investigated the effects of global geopolitical risks and global supply chains on the global inflation by considering four alternative measures of inflation, namely headline inflation, core inflation, food inflation, and energy inflation. The empirical analysis has been achieved by using a structural vector autoregression model, where a monthly global data set covering the period of 1999M1-2022M12 has been employed.

The empirical results suggest that supply chains are the main drivers of global inflation as they explain about 32% of headline inflation volatilities, 30% of core inflation volatilities, 22%

of food inflation volatilities, and 20% of energy inflation volatilities. In comparison, oil price shocks have significant effects only on the headline, food and energy prices, whereas they are relatively silent for explaining the core inflation. Policy rates are effective in explaining only headline and core prices, whereas geopolitical risks have negligible effects on all inflation measures.

As country-specific inflation rates highly depend on the global inflation in advanced economies as well as emerging markets and developing countries (e.g., see Ciccarelli and Mojon, 2010; Ha et al., 2023a), several country-specific policy implications follow as discussed in detail in the previous section. For future work, an economic model with optimizing agents (e.g., see Ha et al., 2023b) can be introduced to further identify the supply and demand channels that drive both global and country-specific inflation rates.

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Table 1 – Response of Headline Inflation: 1999-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	0.061*	0.009	0.115
Supply Chain	0.112*	0.060	0.163
Oil Prices	0.490*	0.450	0.534
Policy Rate	0.062*	0.019	0.102
		Medium-Term (One Year)	
Geopolitical Risk	0.231*	0.018	0.472
Supply Chain	1.028*	0.784	1.275
Oil Prices	1.571*	1.376	1.792
Policy Rate	0.415*	0.177	0.636
		Long-Term (Five Years)	
Geopolitical Risk	0.025	-0.369	0.434
Supply Chain	2.006*	1.344	2.974
Oil Prices	1.141*	0.702	1.593
Policy Rate	-1.114*	-2.006	-0.302

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 2 – Response of Headline Inflation: 1999-2010

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	-0.100*	-0.163	-0.033
Supply Chain	0.087*	0.028	0.152
Oil Prices	0.419*	0.373	0.469
Policy Rate	0.021	-0.020	0.068
		Medium-Term (One Year)	
Geopolitical Risk	-0.372*	-0.572	-0.188
Supply Chain	0.239*	0.059	0.430
Oil Prices	1.002*	0.853	1.162
Policy Rate	0.294*	0.129	0.470
		Long-Term (Five Years)	
Geopolitical Risk	-0.245*	-0.456	-0.030
Supply Chain	0.364*	0.182	0.617
Oil Prices	0.766*	0.614	0.950
Policy Rate	0.739*	0.389	1.191

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 3 – Response of Headline Inflation: 2011-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
	Short-Term (One Quarter)		
Geopolitical Risk	0.126*	0.070	0.185
Supply Chain	-0.041	-0.092	0.019
Oil Prices	0.300*	0.250	0.353
Policy Rate	0.025	-0.032	0.086
	Medium-Term (One Year)		
Geopolitical Risk	0.452*	0.244	0.653
Supply Chain	0.211	-0.041	0.453
Oil Prices	1.154*	0.937	1.377
Policy Rate	-0.451*	-0.825	-0.073
	Long-Term (Five Years)		
Geopolitical Risk	-0.114	-0.683	0.304
Supply Chain	-0.235	-1.254	0.711
Oil Prices	-0.789	-2.562	0.233
Policy Rate	-0.104	-2.254	2.497

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 4 – Variance Decomposition of Headline Inflation

Contribution of:	Short-Term (One Quarter)	Medium-Term (One Year)	Long-Term (Five Years)
		1999-2022	
Geopolitical Risk	0.8%	1.3%	2.0%
Supply Chain	2.6%	21.6%	32.4%
Oil Prices	40.1%	41.4%	28.7%
Policy Rate	0.8%	3.3%	14.5%
Headline Inflation	55.6%	32.3%	22.3%
		1999-2010	
Geopolitical Risk	2.7%	6.6%	6.9%
Supply Chain	1.9%	3.0%	4.0%
Oil Prices	43.0%	48.4%	41.9%
Policy Rate	0.4%	5.4%	11.6%
Headline Inflation	52.0%	36.5%	35.6%
		2011-2022	
Geopolitical Risk	4.3%	5.1%	2.5%
Supply Chain	0.8%	3.2%	8.9%
Oil Prices	23.1%	31.8%	15.5%
Policy Rate	0.7%	11.1%	52.7%
Headline Inflation	71.0%	48.8%	20.5%

Notes: The estimates represent the median forecast error variance decomposition across 1,000 draws. Short-term, medium-term, and long-term represent the variance decompositions after one quarter, one year, and five years, respectively.

Table 5 – Response of Core Inflation: 1999-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
	Short-Term (One Quarter)		
Geopolitical Risk	0.014	-0.014	0.042
Supply Chain	0.018	-0.011	0.044
Oil Prices	0.089*	0.063	0.114
Policy Rate	0.005	-0.019	0.031
	Medium-Term (One Year)		
Geopolitical Risk	0.080	-0.063	0.235
Supply Chain	0.419*	0.259	0.591
Oil Prices	0.526*	0.379	0.679
Policy Rate	-0.006	-0.149	0.140
	Long-Term (Five Years)		
Geopolitical Risk	0.111	-0.321	0.570
Supply Chain	2.102*	0.949	3.764
Oil Prices	0.352	-0.304	1.222
Policy Rate	-1.818*	-3.001	-0.946

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 6 – Response of Core Inflation: 1999-2010

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	-0.007	-0.037	0.025
Supply Chain	-0.011	-0.042	0.021
Oil Prices	0.054*	0.022	0.083
Policy Rate	0.019	-0.010	0.047
		Medium-Term (One Year)	
Geopolitical Risk	-0.015	-0.112	0.079
Supply Chain	-0.013	-0.107	0.082
Oil Prices	0.190*	0.099	0.288
Policy Rate	0.177*	0.087	0.282
		Long-Term (Five Years)	
Geopolitical Risk	-0.007	-0.193	0.176
Supply Chain	0.189*	0.011	0.404
Oil Prices	0.391*	0.211	0.651
Policy Rate	1.066*	0.729	1.574

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 7 – Response of Core Inflation: 2011-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	-0.011	-0.049	0.027
Supply Chain	-0.011	-0.050	0.029
Oil Prices	0.084*	0.048	0.123
Policy Rate	-0.035	-0.079	0.004
		Medium-Term (One Year)	
Geopolitical Risk	-0.010	-0.178	0.156
Supply Chain	0.138	-0.071	0.334
Oil Prices	0.482*	0.304	0.680
Policy Rate	-0.583*	-0.850	-0.314
		Long-Term (Five Years)	
Geopolitical Risk	0.058	-0.523	0.659
Supply Chain	-0.485	-1.784	0.705
Oil Prices	-1.472*	-3.073	-0.387
Policy Rate	1.283	-1.224	4.544

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 8 – Variance Decomposition of Core Inflation

Contribution of:	Short-Term (One Quarter)	Medium-Term (One Year)	Long-Term (Five Years)
		1999-2022	
Geopolitical Risk	0.3%	0.6%	1.1%
Supply Chain	0.6%	9.6%	30.0%
Oil Prices	5.4%	11.4%	12.0%
Policy Rate	0.2%	0.5%	13.1%
Core Inflation	93.5%	77.9%	43.9%
		1999-2010	
Geopolitical Risk	0.5%	0.8%	1.2%
Supply Chain	0.5%	0.8%	2.1%
Oil Prices	2.5%	4.8%	5.4%
Policy Rate	0.5%	6.0%	28.1%
Core Inflation	96.0%	87.6%	63.3%
		2011-2022	
Geopolitical Risk	0.4%	0.5%	1.0%
Supply Chain	0.5%	1.8%	8.4%
Oil Prices	4.1%	8.1%	7.6%
Policy Rate	1.1%	16.0%	47.8%
Core Inflation	93.9%	73.6%	35.2%

Notes: The estimates represent the median forecast error variance decomposition across 1,000 draws. Short-term, medium-term, and long-term represent the variance decompositions after one quarter, one year, and five years, respectively.

Table 9 – Response of Food Inflation: 1999-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
	Short-Term (One Quarter)		
Geopolitical Risk	0.023	-0.067	0.125
Supply Chain	0.142*	0.047	0.231
Oil Prices	0.056	-0.034	0.146
Policy Rate	0.033	-0.052	0.121
	Medium-Term (One Year)		
Geopolitical Risk	0.372	-0.069	0.872
Supply Chain	1.348*	0.858	1.826
Oil Prices	1.078*	0.661	1.533
Policy Rate	0.434	-0.041	0.897
	Long-Term (Five Years)		
Geopolitical Risk	0.227	-0.538	0.960
Supply Chain	3.286*	2.115	5.026
Oil Prices	1.180*	0.435	2.043
Policy Rate	-1.254	-2.900	0.145

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 10 – Response of Food Inflation: 1999-2010

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	-0.186*	-0.272	-0.098
Supply Chain	0.079	-0.020	0.172
Oil Prices	0.126*	0.045	0.209
Policy Rate	-0.032	-0.111	0.051
		Medium-Term (One Year)	
Geopolitical Risk	-0.964*	-1.385	-0.566
Supply Chain	0.447	-0.033	0.893
Oil Prices	0.964*	0.617	1.374
Policy Rate	0.228	-0.153	0.604
		Long-Term (Five Years)	
Geopolitical Risk	-0.926*	-1.465	-0.436
Supply Chain	0.814*	0.297	1.355
Oil Prices	1.015*	0.592	1.471
Policy Rate	1.044*	0.195	1.937

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 11 – Response of Food Inflation: 2011-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	0.252*	0.142	0.377
Supply Chain	0.191*	0.081	0.302
Oil Prices	-0.125*	-0.231	-0.014
Policy Rate	0.190*	0.076	0.305
		Medium-Term (One Year)	
Geopolitical Risk	1.136*	0.685	1.595
Supply Chain	1.138*	0.586	1.686
Oil Prices	0.330	-0.137	0.776
Policy Rate	1.176*	0.432	1.899
		Long-Term (Five Years)	
Geopolitical Risk	-0.165	-1.815	0.892
Supply Chain	1.054	-1.637	3.851
Oil Prices	-1.828*	-4.860	-0.019
Policy Rate	-6.962*	-15.936	-1.948

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 12 – Variance Decomposition of Food Inflation

Contribution of:	Short-Term (One Quarter)	Medium-Term (One Year)	Long-Term (Five Years)
		1999-2022	
Geopolitical Risk	0.4%	1.3%	2.1%
Supply Chain	1.4%	10.7%	21.7%
Oil Prices	0.7%	7.4%	10.8%
Policy Rate	0.3%	1.5%	8.4%
Food Inflation	97.2%	79.1%	56.9%
		1999-2010	
Geopolitical Risk	4.1%	10.1%	10.9%
Supply Chain	1.0%	2.7%	4.5%
Oil Prices	2.6%	10.8%	11.2%
Policy Rate	0.5%	2.0%	8.4%
Food Inflation	91.8%	74.4%	65.0%
		2011-2022	
Geopolitical Risk	4.8%	7.8%	3.2%
Supply Chain	2.7%	8.4%	9.2%
Oil Prices	1.2%	3.4%	8.4%
Policy Rate	2.7%	9.4%	58.3%
Food Inflation	88.6%	71.0%	21.0%

Notes: The estimates represent the median forecast error variance decomposition across 1,000 draws. Short-term, medium-term, and long-term represent the variance decompositions after one quarter, one year, and five years, respectively.

Table 13 – Response of Energy Inflation: 1999-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	0.403	-0.053	0.843
Supply Chain	0.669*	0.230	1.079
Oil Prices	5.487*	5.153	5.824
Policy Rate	0.640*	0.369	0.901
		Medium-Term (One Year)	
Geopolitical Risk	-0.798	-2.623	0.989
Supply Chain	6.064*	4.165	7.952
Oil Prices	14.895*	13.532	16.591
Policy Rate	3.859*	2.281	5.577
		Long-Term (Five Years)	
Geopolitical Risk	-2.092	-4.751	0.456
Supply Chain	11.540*	6.951	17.963
Oil Prices	11.230*	8.605	14.187
Policy Rate	-4.020	-9.638	1.167

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 14 – Response of Energy Inflation: 1999-2010

Shock Variable	Estimate	Lower Bound	Upper Bound
		Short-Term (One Quarter)	
Geopolitical Risk	-0.685*	-1.154	-0.196
Supply Chain	0.220	-0.280	0.713
Oil Prices	4.072*	3.760	4.395
Policy Rate	0.473*	0.225	0.755
		Medium-Term (One Year)	
Geopolitical Risk	-3.867*	-5.435	-2.365
Supply Chain	1.328	-0.188	2.959
Oil Prices	8.736*	7.765	9.901
Policy Rate	4.271*	3.011	5.714
		Long-Term (Five Years)	
Geopolitical Risk	-2.900*	-4.352	-1.563
Supply Chain	0.919	-0.538	2.522
Oil Prices	6.202*	5.357	7.444
Policy Rate	1.712	-0.889	5.187

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 15 – Response of Energy Inflation: 2011-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
	Short-Term (One Quarter)		
Geopolitical Risk	0.415	-0.007	0.890
Supply Chain	-0.511*	-0.979	-0.066
Oil Prices	3.937*	3.605	4.305
Policy Rate	-0.228	-0.577	0.132
	Medium-Term (One Year)		
Geopolitical Risk	0.332	-1.144	2.006
Supply Chain	0.884	-0.923	2.816
Oil Prices	11.109*	9.816	12.636
Policy Rate	-6.273*	-9.639	-3.576
	Long-Term (Five Years)		
Geopolitical Risk	0.113	-2.564	3.338
Supply Chain	-3.586	-13.793	2.451
Oil Prices	1.705	-13.601	8.509
Policy Rate	-3.788	-31.099	17.852

Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively.

Table 16 – Variance Decomposition of Energy Inflation

Contribution of:	Short-Term (One Quarter)	Medium-Term (One Year)	Long-Term (Five Years)
		1999-2022	
Geopolitical Risk	0.6%	1.4%	1.9%
Supply Chain	1.5%	13.2%	20.1%
Oil Prices	69.1%	68.0%	55.4%
Policy Rate	1.2%	5.0%	12.3%
Energy Inflation	27.6%	12.5%	10.3%
		1999-2010	
Geopolitical Risk	2.6%	11.4%	11.2%
Supply Chain	0.9%	3.3%	5.0%
Oil Prices	69.6%	58.2%	53.2%
Policy Rate	1.5%	14.0%	19.1%
Energy Inflation	25.4%	13.0%	11.4%
		2011-2022	
Geopolitical Risk	0.9%	1.2%	1.0%
Supply Chain	1.4%	2.9%	5.2%
Oil Prices	68.4%	55.2%	15.8%
Policy Rate	0.7%	28.9%	74.6%
Energy Inflation	28.5%	11.8%	3.4%

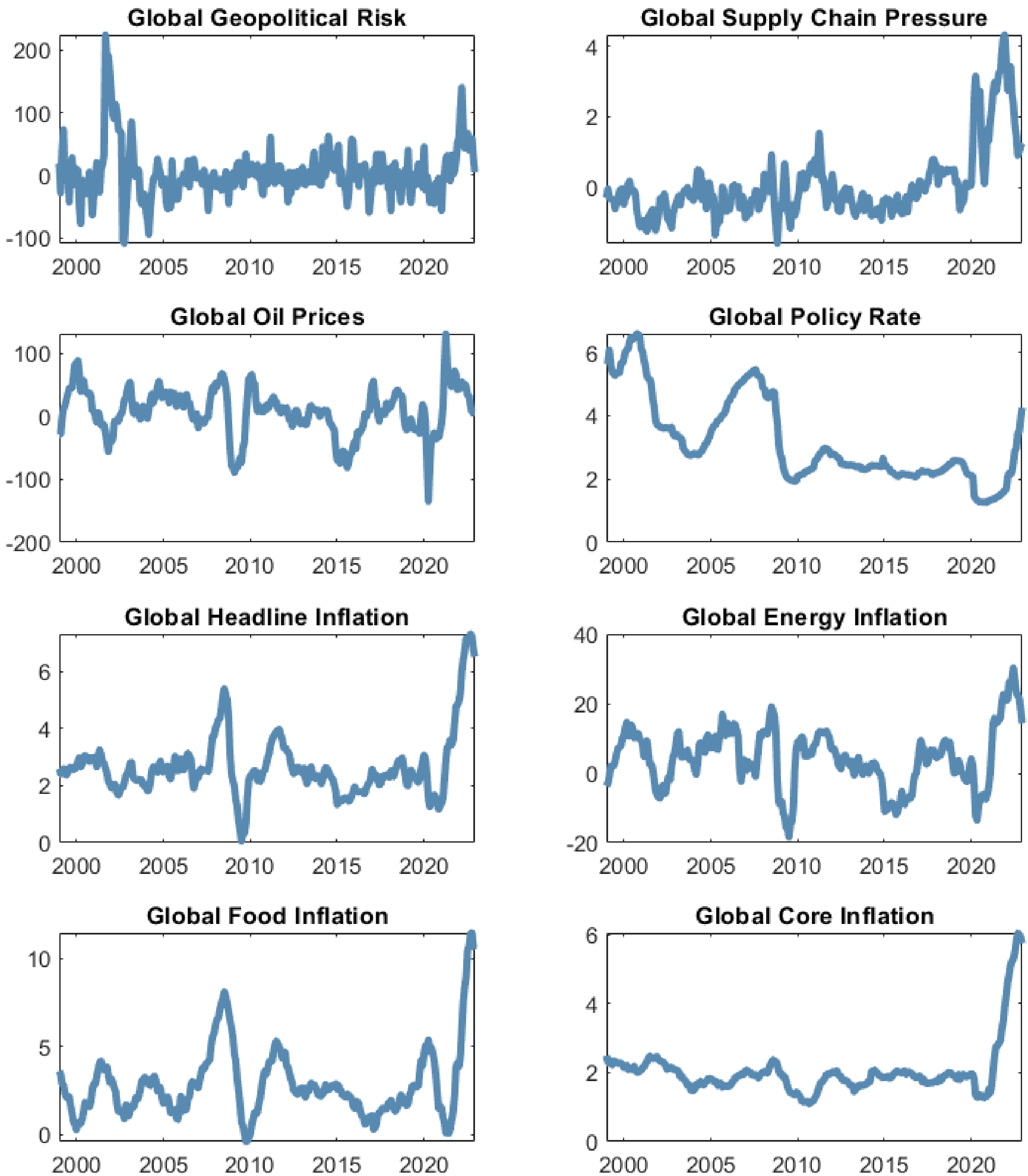
Notes: The estimates represent the median forecast error variance decomposition across 1,000 draws. Short-term, medium-term, and long-term represent the variance decompositions after one quarter, one year, and five years, respectively.

Table 17 – Response of Other Variables: 1999-2022

Shock Variable	Estimate	Lower Bound	Upper Bound
	Short-Term (One Quarter)		
GSC to GPR	0.026	-0.049	0.107
Oil to GPR	-1.844	-4.471	0.847
Policy to GPR	-0.019	-0.056	0.020
Oil to GSC	1.251	-1.463	3.557
Policy to GSC	0.005	-0.031	0.038
Policy to Oil	0.097*	0.062	0.133
	Medium-Term (One Year)		
GSC to GPR	-0.035	-0.275	0.227
Oil to GPR	-9.609*	-18.584	-1.312
Policy to GPR	0.024	-0.196	0.249
Oil to GSC	15.676*	6.450	25.181
Policy to GSC	0.273*	0.038	0.489
Policy to Oil	0.544*	0.352	0.759
	Long-Term (Five Years)		
GSC to GPR	-0.287	-0.808	0.197
Oil to GPR	-13.405*	-23.993	-4.232
Policy to GPR	0.086	-0.896	0.985
Oil to GSC	4.027	-13.748	22.727
Policy to GSC	2.207*	0.684	3.833
Policy to Oil	1.366*	0.518	2.366

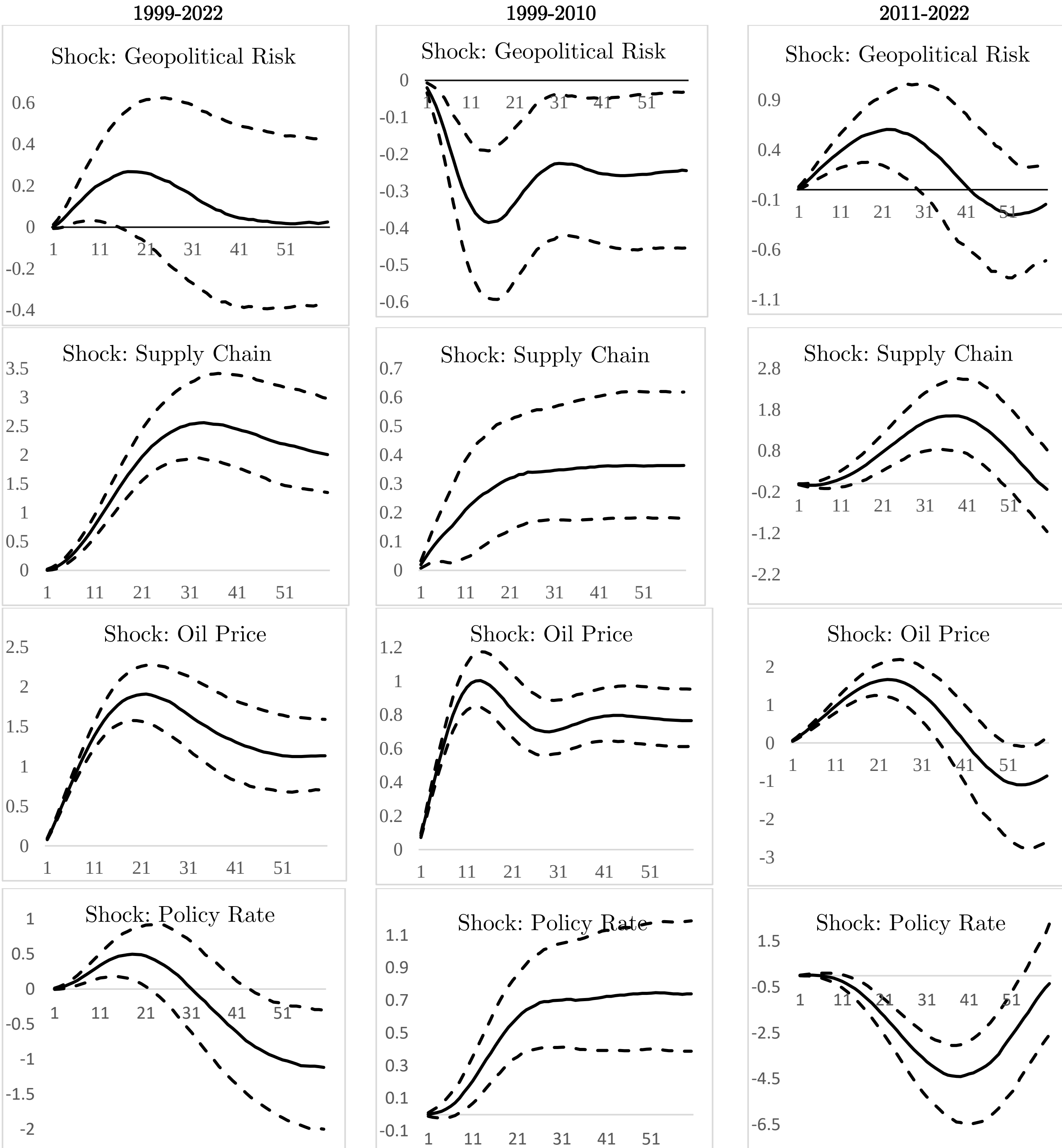
Notes: The estimates represent the median cumulative impulse responses following one standard deviation of a shock across 1,000 draws, whereas lower and upper bounds represent the 68% credible intervals, with * representing significance based on these intervals. Short-term, medium-term, and long-term represent the cumulative impulse responses after one quarter, one year, and five years, respectively. GSC: Global Supply Chain Pressure Index; GPR: Global Geopolitical Risk; Oil: Oil Prices; Policy: Global Policy Rates.

Figure 1 – Descriptive Statistics



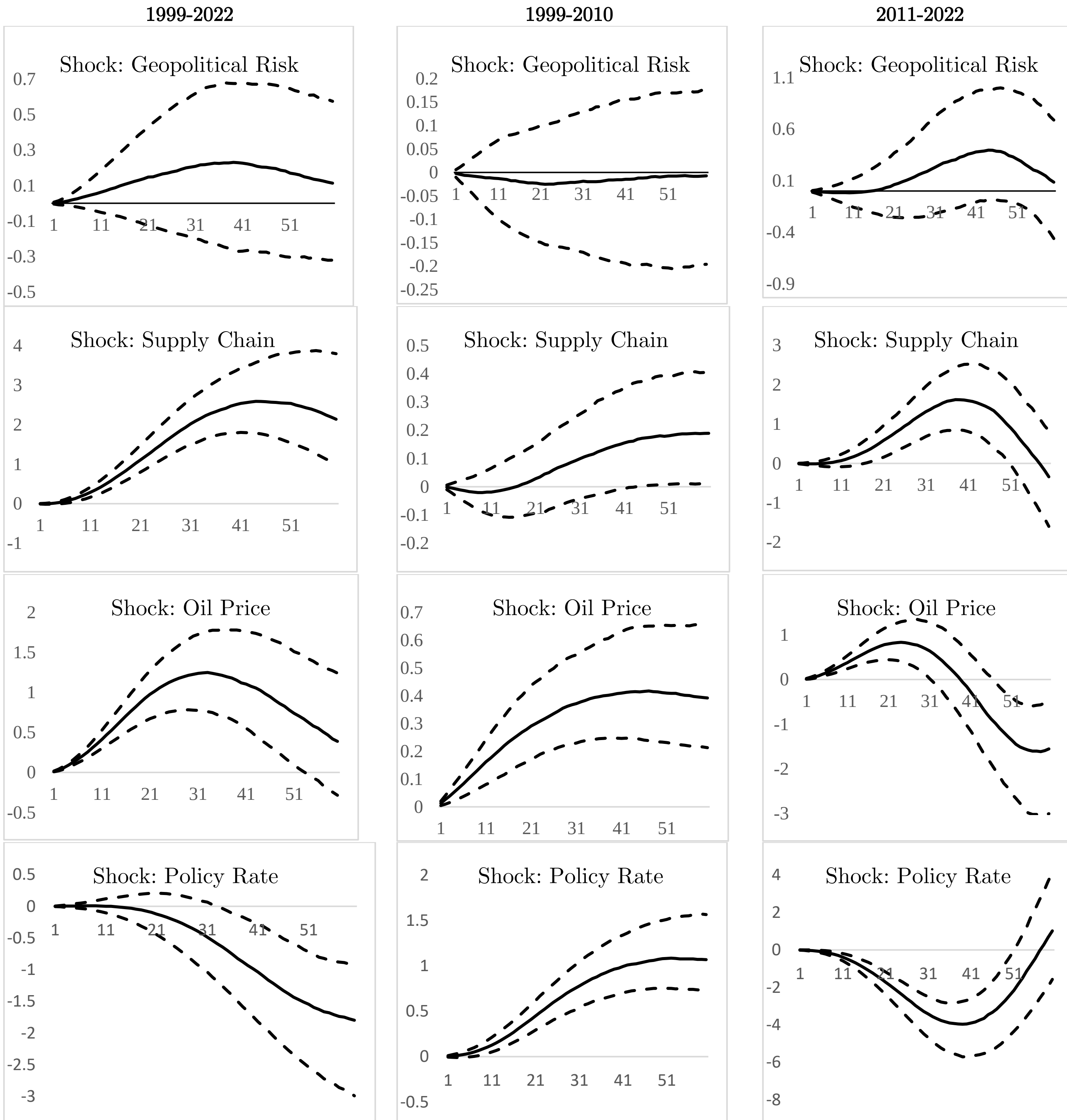
Notes: The series represent the year-on-year percentage changes for inflation measures and oil prices, whereas policy rate is represented in annual percentage terms. Global geopolitical risk is measured as year-on-year changes, whereas global supply chain pressure index is measured as the standard deviation from its average value.

Figure 2 –Response of Global Headline Inflation



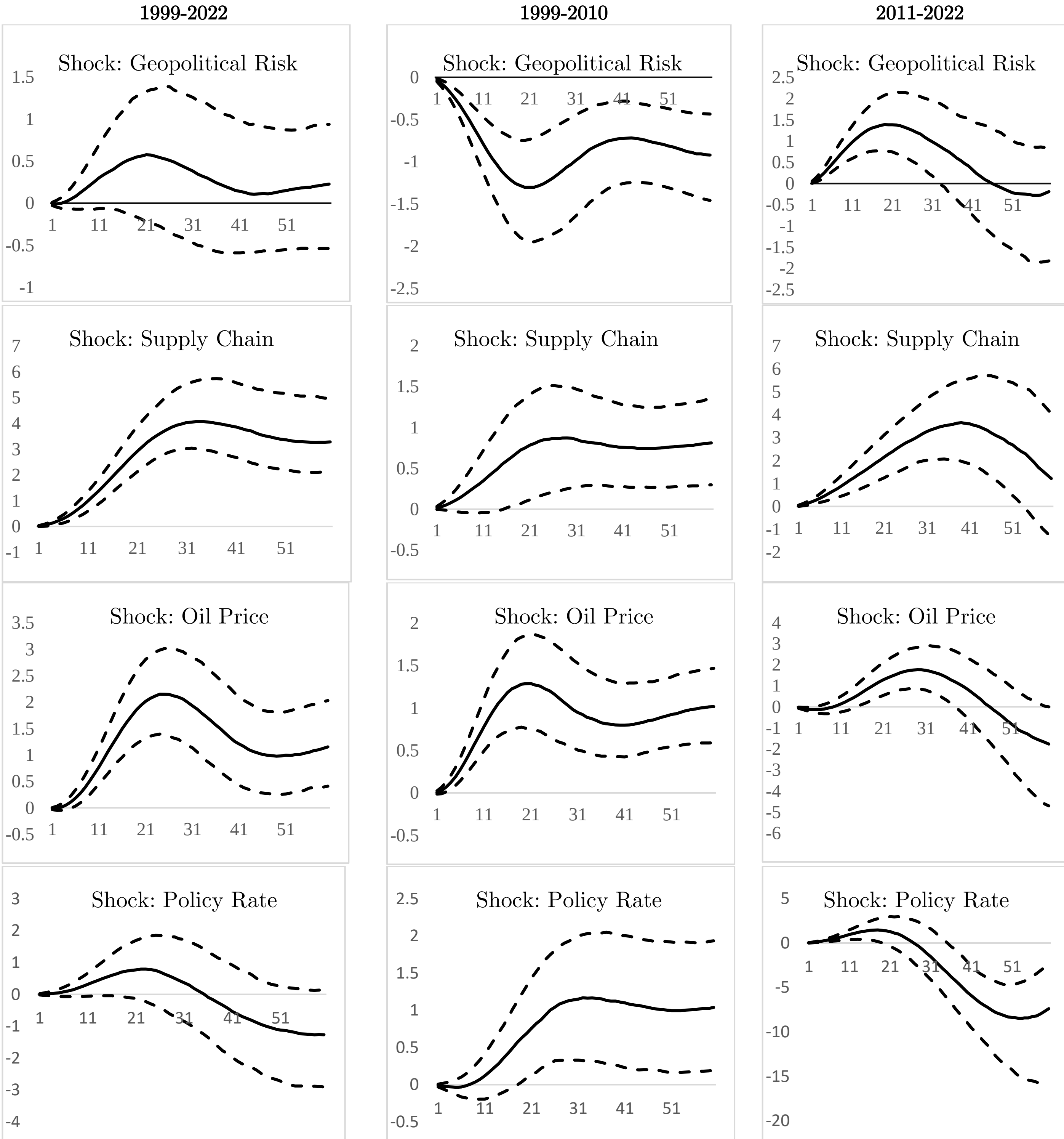
Notes: Figures represent cumulative impulse responses to one standard deviation of a shock. Solid lines represent the median across 1,000 draws, whereas dotted lines represent the 68% credible intervals.

Figure 3 – Response of Global Core Inflation



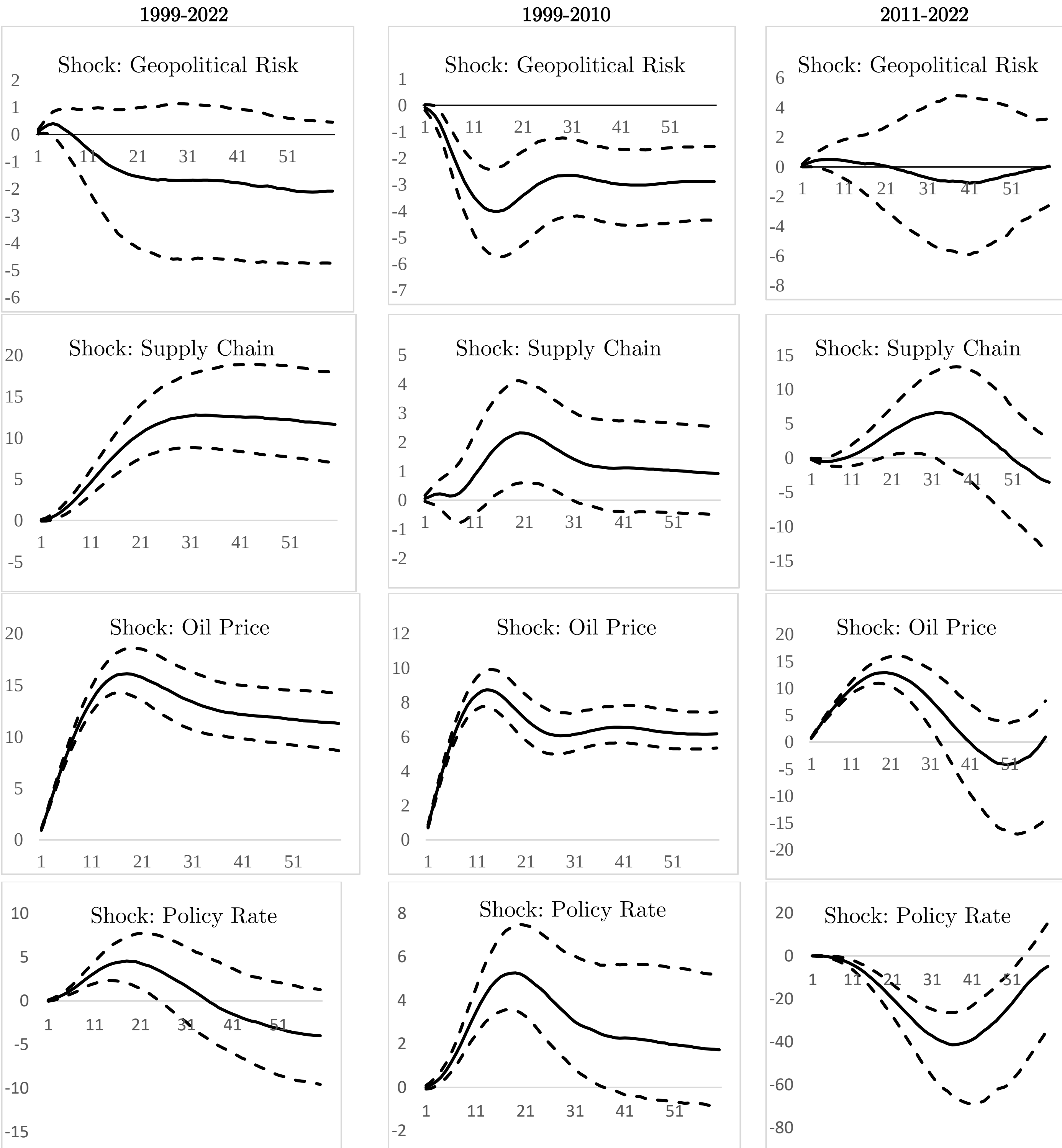
Notes: Figures represent cumulative impulse responses to one standard deviation of a shock. Solid lines represent the median across 1,000 draws, whereas dotted lines represent the 68% credible intervals.

Figure 4 –Response of Global Food Inflation



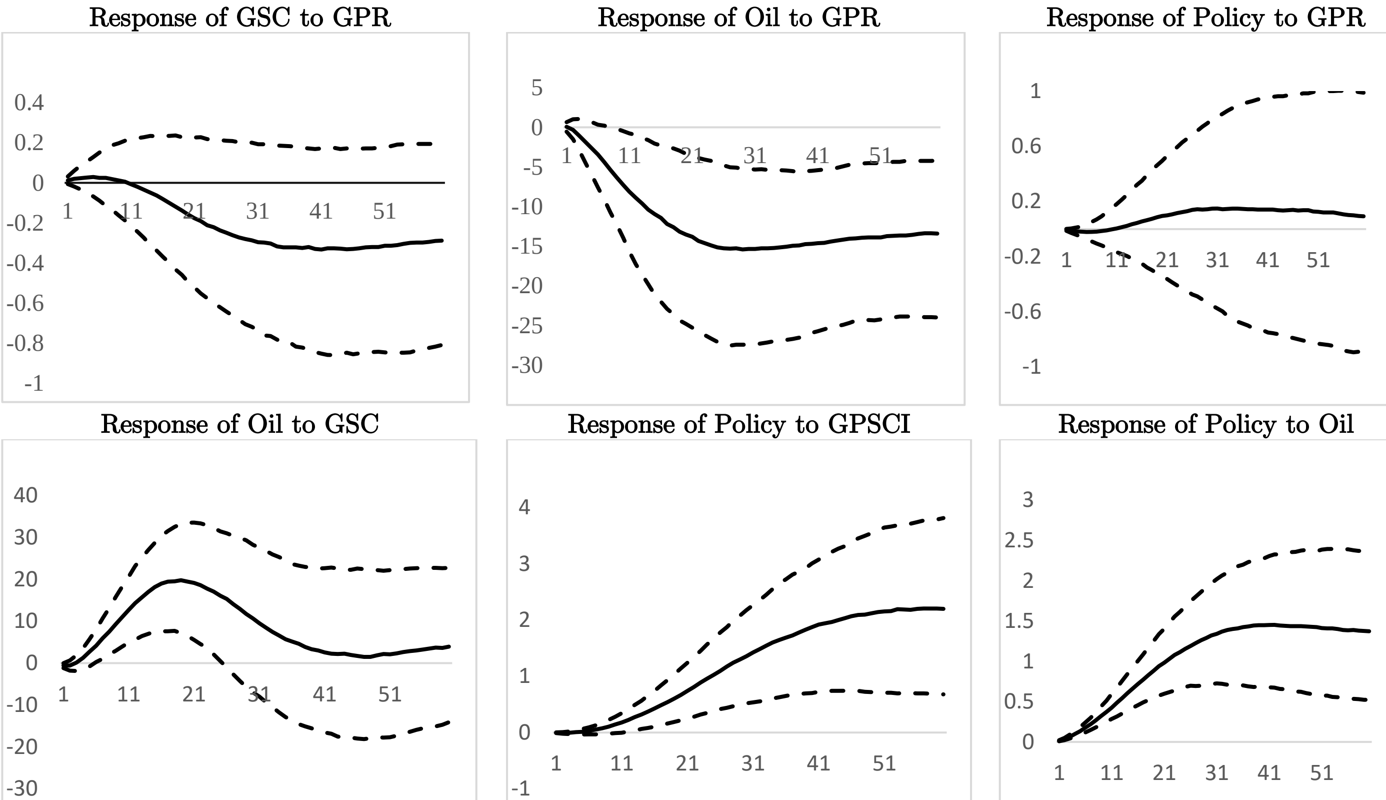
Notes: Figures represent cumulative impulse responses to one standard deviation of a shock. Solid lines represent the median across 1,000 draws, whereas dotted lines represent the 68% credible intervals.

Figure 5 – Response of Global Energy Inflation



Notes: Figures represent cumulative impulse responses to one standard deviation of a shock. Solid lines represent the median across 1,000 draws, whereas dotted lines represent the 68% credible intervals.

Figure 6 – Responses of Other Variables: 1999-2022



Notes: Figures represent cumulative impulse responses to one standard deviation of a shock. Solid lines represent the median across 1,000 draws, whereas dotted lines represent the 68% credible intervals. GSC: Global Supply Chain Pressure Index; GPR: Global Geopolitical Risk; Oil: Oil Prices; Policy: Global Policy Rates.

Appendix Table A.1 – Data Sources and Definition of Variables

Variable Name	Description	Sources
Global Geopolitical Risk (GPR)	The global geopolitical index is calculated considering a news-based measure of adverse geopolitical events and associated risks. News is collected from electronic archives of 10 (Ten) newspapers of three countries such as the United State (Six), United Kingdom (Three), and Canada (One).	Caldara and Iacoviello (2022)
Global Supply Chain Pressure Index (GSC)	The Global Supply Chain Pressure Index is constructed to measure the potential supply chain disruptions. This index includes global transportation costs, which are calculated from the Baltic Dry Index and Harpex index, airfreight cost indices from the U.S. Bureau of Labor Statistics, and includes several supply chain-related components from Purchasing Managers Index (PMI) surveys.	Federal Reserve Bank of New York, Global Supply Chain Pressure Index,
Oil Prices	Monthly period average Crude Oil Prices: West Texas Intermediate (WTI), Cushing, Oklahoma, Dollars per Barrel.	Federal Reserve Economic Data
Policy Rate	Central bank policy rates. Monthly - End of period.	Bank for International Settlements
Headline Price Index	Measure to calculate headline inflation rate.	Ha et al. (2023c)
Core Price Index	Measure to calculate core inflation rate.	Ha et al. (2023c)
Energy Price Index	Measure to calculate energy inflation rate.	Ha et al. (2023c)
Food Price Index	Measure to calculate food inflation rate.	Ha et al. (2023c)

Appendix Table A.2 – List of Countries for Headline Inflation

Albania	Ecuador	Kenya	Portugal
Armenia	Egypt, Arab Rep.	Cambodia	Paraguay
Antigua and Barbuda	Spain	St. Kitts and Nevis	West Bank and Gaza
Austria	Estonia	Korea, Rep.	Romania
Azerbaijan	Ethiopia	Kuwait	Rwanda
Burundi	Finland	Lao, PDR	Saudi Arabia
Belgium	Fiji	St. Lucia	Sudan
Benin	France	Lithuania	Senegal
Burkina Faso	Gabon	Luxembourg	Singapore
Bangladesh	United Kingdom	Latvia	Solomon Islands
Bulgaria	Georgia	Macao SAR, China	El Salvador
Bahamas	Ghana	Morocco	Serbia
Belarus	Gambia, The	Moldova, Rep.	Slovakia
Bolivia	Guinea-Bissau	Madagascar	Slovenia
Brazil	Equatorial Guinea	Maldives	Sweden
Botswana	Greece	Mexico	Chad
Central African Republic	Guatemala	North Macedonia	Togo
Canada	Guyana	Mali	Thailand
Switzerland	Hong Kong	Malta	Tonga
Chile	Honduras	Mongolia	Trinidad and Tobago
China	Croatia	Mauritania	Tunisia
Côte d Ivoire	Haiti	Mauritius	Turkey
Cameroon	Hungary	Malawi	Tanzania
Congo, Rep.	Indonesia	Malaysia	Uganda
Colombia	India	New Caledonia	Ukraine
Cabo Verde	Ireland	Niger	Uruguay
Costa Rica	Iceland	Nigeria	United States
Cyprus	Israel	Netherlands	Vietnam
Czech Republic	Italy	Norway	Samoa
Germany	Jamaica	Pakistan	South Africa
Denmark	Jordan	Peru	Zambia
Dominican Republic	Japan	Philippines	
Algeria	Kazakhstan	Poland	

Notes: These 130 countries are chosen based on the availability of headline consumer price index.

Appendix Table A.3 – List of Countries for Core Inflation

Austria	Estonia	Korea, Rep.	Poland
Belgium	Finland	Lithuania	Portugal
Bulgaria	France	Luxembourg	Paraguay
Brazil	United Kingdom	Latvia	Singapore
Canada	Greece	Moldova, Rep.	Slovakia
Switzerland	Croatia	Mexico	Sweden
Colombia	Hungary	Malta	Thailand
Cyprus	Ireland	Nigeria	Trinidad and Tobago
Czech Republic	Iceland	Netherlands	Turkey
Germany	Israel	Norway	United States
Denmark	Italy	Nepal	
Spain	Japan	Peru	

Notes: These 46 countries are chosen based on the availability of core consumer price index.

Appendix Table A.4 – List of Countries for Food Inflation

Austria	Finland	Lithuania	Russian Federation
Belgium	France	Luxembourg	Singapore
Bulgaria	United Kingdom	Latvia	Slovakia
Canada	Ghana	Macao SAR, China	Slovenia
Switzerland	Greece	Mexico	Sweden
China	Haiti	Niger	Togo
Côte d Ivoire	Hungary	Nigeria	Thailand
Colombia	Indonesia	Netherlands	Trinidad and Tobago
Costa Rica	Ireland	Norway	Turkey
Czech Republic	Iceland	Philippines	Uruguay
Germany	Israel	Poland	United States
Denmark	Italy	Portugal	South Africa
Spain	Japan	Paraguay	
Estonia	Korea, Rep.	Romania	

Notes: These 54 countries are chosen based on the availability of food price index.

Appendix Table A.5 – List of Countries for Energy Inflation

Austria	Finland	Jordan	Paraguay
Belgium	France	Japan	West Bank and Gaza
Bulgaria	United Kingdom	Korea, Rep.	Saudi Arabia
Canada	Greece	Lithuania	Sudan
Switzerland	Croatia	Luxembourg	Senegal
Côte d Ivoire	Haiti	Latvia	Slovakia
Colombia	Hungary	Mexico	Slovenia
Cyprus	Indonesia	Malta	Sweden
Czech Republic	India	Netherlands	Togo
Germany	Ireland	Norway	Thailand
Denmark	Iceland	Philippines	Turkey
Spain	Israel	Poland	Uganda
Estonia	Italy	Portugal	United States

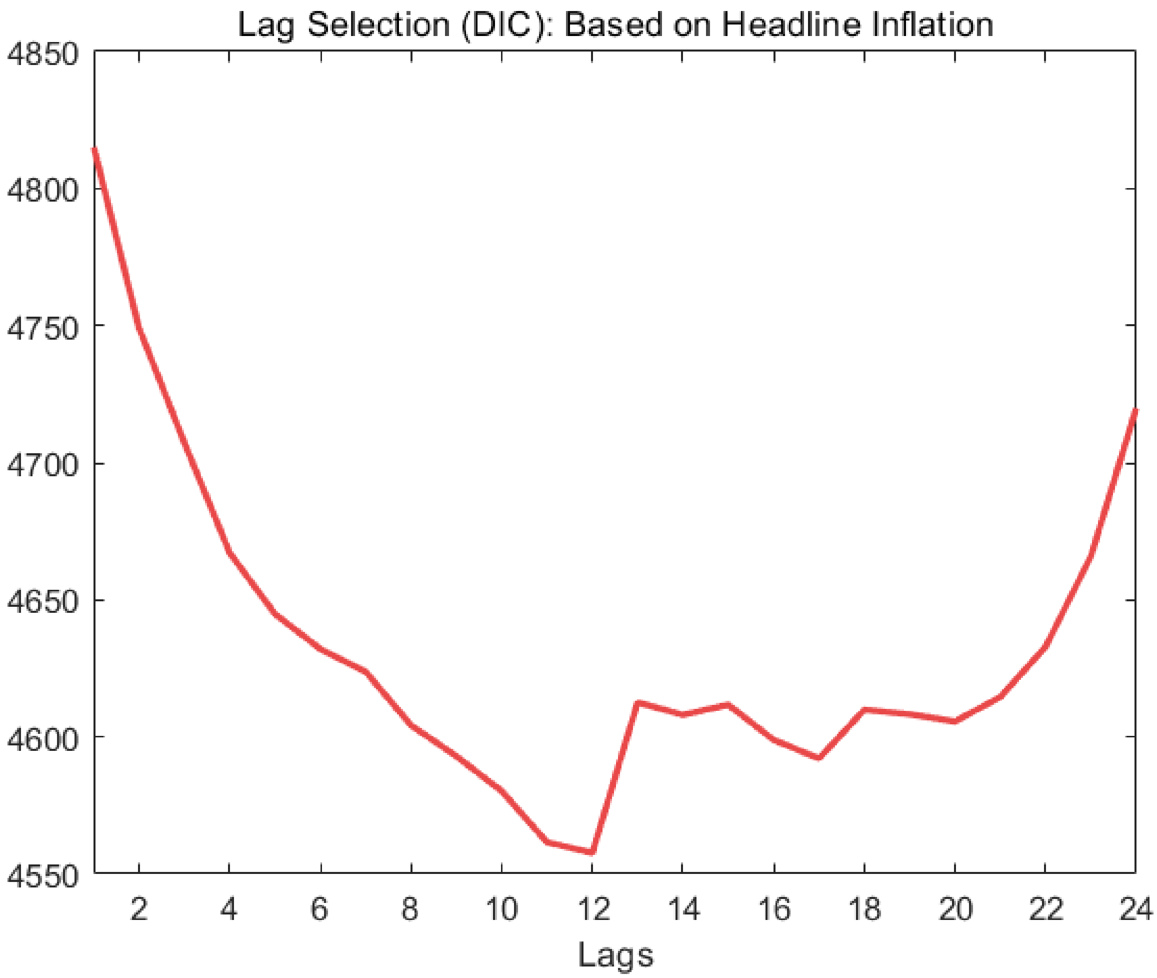
Notes: These 52 countries are chosen based on the availability of energy price index.

Appendix Table A.6 – List of Countries for Policy Rate

Australia	Czechia	Iceland	Serbia
Brazil	Denmark	Mexico	Russia
Canada	United Kingdom	Malaysia	Sweden
Switzerland	Hong Kong	Norway	United States
Chile	Hungary	New Zealand	Euro area
China	Israel	Philippines	South Africa
Colombia	India	Poland	

Notes: These 27 countries and area are chosen based on the availability of central bank policy rate.

Appendix Figure A.1. – Lag Selection



Notes: The figure shows the Deviance Information Criterion (DIC) based on alternative lags represented in the horizontal axis when headline inflation is used. DIC is minimized when the number of lags is equal to 12, which is used in the estimations.