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Unveiling inflation: Oil Shocks, Supply Chain Pressures, and Expectations

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CAMA Working Paper 68/2024
November 2024

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Abstract

After decades of a stable environment with low inflation in most advanced economies, global inflation rates surged unexpectedly during the pandemic and have remained elevated since. This paper demonstrates that inflation expectations have significantly amplified the global demand and supply shocks triggered by the pandemic, playing a crucial role in sustaining elevated inflation in the post-pandemic regime. We establish this finding by applying a structural vector autoregression model that includes various shocks to global demand and supply, along with domestic inflation and inflation expectations, across six economies: the United States, Canada, New Zealand, the Euro area, the United Kingdom, and Norway. First, we document that global demand and supply shocks in the oil market, as well as disruptions in global supply chains, have been major drivers of the recent inflation surge in all these economies. Then, through various counterfactual exercises, we demonstrate that inflation expectations generally amplify the transmission of global shocks to inflation — particularly in Canada, New Zealand, and the US during the post-pandemic period. As a result, managing inflation expectations should remain a crucial policy objective to mitigate their amplifying effects on inflation.

Keywords

post-pandemic regime, inflationary expectations, elevated inflation, oil prices, supply chain pressures

JEL Classification

E31, C11, C32, D84, Q41, Q43

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ISSN 2206-0332

Unveiling inflation: Oil Shocks, Supply Chain Pressures, and Expectations*

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November 14, 2024

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*This paper should not be reported as representing the views of Norges Bank. The views expressed are those of the authors and do not necessarily reflect those of the Norges Bank. We thank Christiane Baumeister, Dario Caldara, Roberto Casarin, Francesco Furlanetto, Domenico Giannone, Ivan Petrella, Giorgio Primiceri, Francesco Ravazzolo, Benjamin Wong and conference participants at the EIA 2024 virtual financial market workshop, the Women in Macroeconomic Workshop II in Melbourne, the SNDE 2024 Symposium in Padova, the FEEM 2024 workshop on Energy Transition in Milan, the Dolomiti Macro Meeting 2024 in Kastelruth and seminar participants at the Federal Reserve Board and Norges Bank for useful comments and suggestions. This paper is part of the research activities at the Centre for Applied Macro and commodity Prices (CAMP) at the BI Norwegian Business School.

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1 Introduction

After more than a decade of low inflation in most advanced economies, global inflation rates surged unexpectedly in 2021 and have remained elevated since. This recent escalation occurred against a backdrop of significant global supply-side factors triggered by the COVID-19 pandemic and the Russian invasion of Ukraine, both of which have exerted sharp upward pressure on prices. Recent research has also highlighted the impact of various supply factors for the current inflation surge, see for instance Ascari, Bonam, and Smadu (2024), Benigno, di Giovanni, Groen, and Noble (2022), Celasun, Hansen, Mineshima, Spector, and Zhou (2022), Crump, Eusepi, Giannoni, and Şahin (2024) and Bai, Fernández-Villaverde, Li, and Zanetti (2024) for the role of global supply chain pressures, or Baumeister (2023), Casoli, Manera, and Valenti (Casoli et al.), Gagliardone and Gertler (2023), and Bernanke and Blanchard (2024a,b) for the significance of energy market shocks.[1] Furthermore, the recovery in demand following the pandemic-induced economic downturn has also likely contributed to upward price pressures, as emphasized by Ascari, Bonomolo, Hoeberichts, and Trezzi (2023), Ball, Leigh, and Mishra (2022), Benigno and Eggertsson (2023), Bergholt, Canova, Furlanetto, Maffei-Faccioli, and Ulvedal (2024), Eickmeier and Hofmann (2022), Giannone and Primiceri (2024) and Rubbo (2023) among others.

Beyond these supply and demand factors, the role of inflation expectations in exacerbating price pressures is critical. As economic agents anticipate higher future prices, their behavior changes in ways that can drive prices up further. For instance, in a model with imperfect information and bounded rationality, Beaudry, Hou, and Portier (2024) show that when supply shocks affect many sectors, agents infer that the common component of inflation has increased, which drives persistent inflation dynamics through their effect on expectations. This self-fulfilling prophecy can entrench inflation expectations, making it more challenging for policymakers to stabilize prices.

[1] See also: Aastveit, Bjørnland, and Cross (2023) for a structural analysis of the role of oil market shocks for inflation prior to the COVID-19 pandemic and Garratt and Petrella (2022) for a recent analysis of predictive ability of commodity prices for inflation pre-covid.

In this paper, we propose a novel empirical framework to investigate the drivers of inflation by integrating global demand and supply shocks with domestic inflation expectations. By examining these elements together, we contribute to a more nuanced understanding of inflationary dynamics in the post-pandemic regime. Understanding the role of inflation expectations is also essential for formulating effective policy responses, as policymakers must manage and anchor these expectations to prevent a prolonged period of high inflation.[2]

To address these issues, we employ a structural Bayesian VAR model based on the global oil market VAR model proposed by Baumeister and Hamilton (2019), extended to incorporate a local inflation block as in Aastveit et al. (2023), and global supply chain pressures measured by the Federal Reserve Bank of New York (Benigno et al., 2022). Our analysis focuses on the recent inflation surge and the role of inflation expectations across six inflation-targeting economies: the United States (US), Canada, the United Kingdom (UK), the Euro area, Norway, and New Zealand. These countries are diverse, spanning three different continents, including both commodity exporters and importers, and varying in their degree of openness. This approach allows us to examine the responses of both expected and actual inflation across different geographical regions to various shocks, including global oil supply shocks, global supply chain shocks, global activity shocks, and oil demand shocks.

Our study yields four main findings. First, using data from 1998Q1 to 2023Q4, we find that inflation and inflation expectations in all six economies respond significantly to most of the identified shocks, although with some heterogeneity. Notably, for global activity, oil demand and oil supply shocks, the strongest responses are observed in the US and the weakest in Norway. Responses to global supply chain shocks are relatively consistent across economies. However, unlike responses to the demand and oil shocks, the peak impact on both inflation and inflation expectations occurs with a delay of about two years after the global supply chain shock.

[2]Using different frameworks, Conrad, Enders, and Glas (2022), Neri (2023), and Ascari and Fosso (2024) independently study inflation expectations in prepandemic samples, while Weber, Gorodnichenko, and Coibion (2023) use micro-data on daily shopping and expected inflation to show an increase in disagreement about inflation expectations among US households during the pandemic.

Second, a historical decomposition analysis for the entire period analyzed reveals that demand shocks have been the primary driver of inflation in most economies. However, during the recent inflation spike from 2020 to 2021, supply shocks have become increasingly important. In fact, all of the global supply chain shocks, oil supply shocks and global demand shocks have contributed significantly to the recent inflation surge.

Third, using counterfactual exercises where we hold inflation expectations constant, we demonstrate that inflation expectations generally amplify the transmission of global shocks to inflation. The effect is most pronounced in the US. Zooming in on the period since 2021, we show that inflation would have been considerably lower in all six economies had inflation expectations been held steady at their 2021Q1 levels. Thus, our exercise underscores that inflation expectations have played a critical role in sustaining elevated inflation rates in recent years, particularly in the US, Canada, and New Zealand.

Finally, we conduct several robustness exercises, including showing that reduced-form conditional forecasts indicate post-pandemic inflation would have been substantially lower than observed if inflation expectations had remained constant throughout this period. Interestingly, we also find that if agents had perfect foresight,[3] inflation expectations would better predict the inflation surge in all economies except Norway.

Taken together, these results indicate that policymakers should continue to prioritize the management of inflation expectations in order to mitigate their amplifying effects on inflation. Additionally, strengthening the resilience of supply chains and fostering energy independence can reduce vulnerability to supply shocks and support long-term price stability.

Our paper contributes to the recent debate on the drivers of the post-pandemic inflation surge. While most other recent studies tend to focus either on the importance of a single shock (see, e.g., Benigno et al. (2022) and Celasun et al. (2022)) or on distinguishing between aggregate demand and aggregate supply shocks as drivers (see, e.g., Eickmeier and Hofmann (2022), Bergholt et al. (2024), and Giannone and Primiceri (2024)), we examine the impor-

[3]To create a scenario of perfect foresight, we forecast the variables in the system conditioning on inflation expectations equaling the observed data over this period.

tance of various types of global demand and global supply shocks and their interaction with domestic (country-specific) inflation expectations.[4] Applied to six advanced economies, we find that inflation expectations act as a significant amplifier of global shocks and have played a crucial role in maintaining inflation at relatively high levels. This mechanism has not been emphasized much in explaining the recent inflation surge, and possible implications for the post-pandemic regime.

The paper is organized as follows. In Section 2 we present the data and the empirical methodology. Section 3 presents the empirical results related to the identified shocks, while in Section 4 we detail the drivers of inflation during the pandemic and post-Covid period. Section 5 provides a robustness exercise while Section 6 concludes.

2 Empirical Methodology

To analyze the interaction between global supply and demand shocks and domestic inflation expectations, we employ a structural Bayesian VAR model based on the global oil market VAR model proposed by Baumeister and Hamilton (2019), extended to incorporate a local inflation block as in Aastveit et al. (2023), and global supply chain pressures measured by the Federal Reserve Bank of New York (Benigno et al., 2022). Details on the model, estimation and data are provided below.

2.1 Structural VAR Model

Let $\mathbf{y}_t = (\mathbf{y}_t^{0\prime}, \mathbf{y}_t^{\pi\prime}, \mathbf{y}_t^{G\prime})'$ denote an $(n^0 + n^\pi + 1) \times 1$ vector where $\mathbf{y}_t^0$ is an $n^0 \times 1$ vector of variables associated with the global market for crude oil, $\mathbf{y}_t^\pi$ is an $n^\pi \times 1$ vector of country-specific inflation variables, and $\mathbf{y}_t^G$ contains the GSCPI variable. Following Baumeister and Hamilton (2019), we specify $\mathbf{y}_t^0 = (q_t, y_t, p_t, i_t)'$, in which q_t is the percentage change in global crude oil production, y_t is the percentage change in global real economic activity (here proxied

[4] One notable exception is Ascari et al. (2023), they examine the impact of global supply chain pressures for the Euro area, but also include other types of shocks, such as a demand shock and an oil shock.

by the world industrial production index as in Baumeister and Hamilton (2019)), p_t is the percentage change in the global real price of oil, and i_t is the observable change in above-ground global crude oil inventories as a percent of the previous month's world production. The global market for crude oil is then modeled through the following five equations:

$$q_t = c_1 + \alpha_{q,p} p_t + \mathbf{b_1'} \mathbf{x_{t-1}} + u_{1t}^*, \tag{1}$$

$$y_t = c_2 + \alpha_{y,p} p_t + \mathbf{b_2'} \mathbf{x_{t-1}} + u_{2t}^*, \tag{2}$$

$$q_t = c_3 + \beta_{q,p} p_t + \beta_{q,y} y_t + i_t^* + \mathbf{b_3'} \mathbf{x_{t-1}} + u_{3t}^*, \tag{3}$$

$$i_t^* = c_4 + \Psi_{1t}^q + \Psi_{2t}^y + \Psi_{3t}^p + \mathbf{b_4'} \mathbf{x_{t-1}} + u_{4t}^*, \tag{4}$$

$$i_t = \chi i_t^* + e_t, \tag{5}$$

where $c_j,\ j = 1, 2, 3, 4$ are intercept terms, and $\mathbf{x}_{t-1} = \left(\mathbf{y}_{t-1}^{'}, \ldots, \mathbf{y}_{t-4}^{'}\right)'$ is a vector of lagged observations of the variables over the past year.

Equation (1) is the oil supply curve in which $\alpha_{q,p}$ is the short-run price elasticity of supply and u_{1t}^* is an *oil supply shock*. Equation (2) specifies that global real economic activity depends contemporaneously on oil prices through $\alpha_{y,p}$, and u_{2t}^* is an *global activity shock* associated with changes in the global business cycle. Equation (3) is the oil demand curve in which $\beta_{q,p}$ is the short-run price elasticity of demand, $\beta_{q,y}$ captures contemporaneous links with global real economic activity, i_t^* denotes the change in global crude-oil inventories as a percent of the previous month's world production, and u_{3t}^* is a *oil demand shock*. Equation (4) models the dynamics in above-ground crude oil inventories, which depends contemporaneously on oil production, global real economic activity, and the price of oil, respectively through Ψ_1, Ψ_2, and Ψ_3, and u_{4t}^* an *inventory demand shock*. Finally, equation (5) accounts for measurement-error in the available data on global crude-oil inventories, in which $\chi < 1$ captures the fact that observable inventories are a proportion of the true total quantity of inventories, and e_t captures the measurement error between true and measured inventories. This specification assumes that oil market is contemporaneously effected by variables in $\mathbf{y}_t^{0'}$, but can only be effected by the inflation and GSCPI variables with a lag of one quarter. This is a reasonable assumption, as the dynamics of the oil market are primarily driven by immediate changes in the oil market shocks. The influence of global supply chain pressures on the oil market materializes with a delay, reflecting the time it takes for changes in supply chain conditions to permeate and influence oil-related activities and transactions. Additionally, inflation and inflation expectations affect the oil block with a delay of one quarter, due to the gradual adjustments in pricing and consumption behaviors at the national level. These assumptions ensure that only the most direct and immediate factors are considered in the oil block's impact analysis, preserving the integrity of the model's causal structure.

Next, following Aastveit et al. (2023) we specify $\mathbf{y}_t^{\pi'} = (\pi_t^e, \pi_t)'$, in which π_t^e and π_t denote expected an actual inflation in a given country. The domestic inflation block for a given country is given by:

$$\pi_t^e = c_5 + \lambda_{\pi^e,q} q_t + \lambda_{\pi^e,y} y_t + \lambda_{\pi^e,p} p_t + \lambda_{\pi^e,\pi} \pi_t + \lambda_{\pi^e,g} g_t + \mathbf{b_5' x_{t-1}} + u_{5t}^*, \tag{6}$$

$$\pi_t = c_6 + \gamma_{\pi,q} q_t + \gamma_{\pi,y} y_t + \gamma_{\pi,p} p_t + \gamma_{\pi,\pi^e} \pi_t^e + \gamma_{\pi,g} g_t + \mathbf{b_6' x_{t-1}} + u_{6t}^*, \tag{7}$$

in which g_t denotes the GSCPI variable, u_{5t}^* and u_{6t}^* respectively denote the domestic *expected inflation shock* and *actual inflation shock*. As in Aastveit et al. (2023), this specification allows for contemporaneous links between actual and expected inflation, as well as with all oil market variables except for inventories. To capture the recent effects of global supply chain pressures, we incorporate contemporaneous links with the GSCPI variable through $\lambda_{\pi^e,g}$ and $\gamma_{\pi,g}$.

Finally, given that relatively little is known about the effects of these variables on global supply pressures, we remain agnostic and allow all variables, apart from oil inventories, to contemporaneously impact the global supply chain through the equation:

$$g_t = c_7 + \delta_{g,q} q_t + \delta_{g,y} y_t + \delta_{g,p} p_t + \delta_{g,\pi^e} \pi_t^e + \delta_{g,\pi} \pi_t + \mathbf{b_7 x_{t-1}} + u_{7t}^*, \tag{8}$$

in which u^*_{7t} is an idiosyncratic *global supply chain shock*.

Substituting (5) into (3) and (4), and combining (1)-(8) allows us to express this system of equations more compactly as:

$$\tilde{\mathbf{A}} y_t = \tilde{\mathbf{B}} \mathbf{x}_{t-1} + \tilde{\mathbf{u}}_\mathbf{t} \tag{9}$$

where $\mathbf{x}_{t-1} = (\mathbf{y}'_{t-1}, \ldots, \mathbf{y}'_{t-4}, 1)'$,

$$\tilde{\mathbf{B}} = \begin{bmatrix} b'_1 & c_1 \\ b'_2 & c_2 \\ b'_3 & c_3 \\ b'_4 & c_4 \\ b'_5 & c_5 \\ b'_6 & c_6 \\ b'_7 & c_7 \end{bmatrix}, \tilde{\mathbf{A}} = \begin{bmatrix} 1 & 0 & -\alpha_{q,p} & 0 & 0 & 0 & 0 \\ 0 & 1 & -\alpha_{y,p} & 0 & 0 & 0 & 0 \\ 1 & -\beta_{q,y} & -\beta_{q,p} & -\chi^{-1} & 0 & 0 & 0 \\ -\Psi_1 & -\Psi_2 & -\Psi_3 & 1 & 0 & 0 & 0 \\ -\lambda_{\pi^e,q} & -\lambda_{\pi^e,y} & -\lambda_{\pi^e,p} & 0 & 1 & -\lambda_{\pi^e,\pi} & -\lambda_{\pi^e,g} \\ -\gamma_{\pi,q} & -\gamma_{\pi,y} & -\gamma_{\pi,p} & 0 & -\gamma_{\pi,\pi^e} & 1 & -\gamma_{\pi,g} \\ -\delta_{g,q} & -\delta_{g,y} & -\delta_{g,p} & 0 & -\delta_{g,\pi^e} & -\delta_{g,\pi} & 1 \end{bmatrix},$$

$$\tilde{\mathbf{u}}_\mathbf{t} = \begin{bmatrix} u^*_{1t} \\ u^*_{2t} \\ u^*_{3t} - \chi^{-1} e_t \\ \chi u^*_{4t} + e_t \\ u^*_{5t} \\ u^*_{6t} \\ u^*_{7t} \end{bmatrix}.$$

To overcome the fact that u^*_{3t} and u^*_{4t} are correlated, we pre-multiply the system in (9) by:

$$\Gamma = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & \rho & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

in which $\rho = \frac{\chi^{-1}\sigma_e^2}{d_{33}^* + \chi^{-2}\sigma_e^2}$, and d_{33}^* comes from the covariance of the structural vector autoregression (SVAR) representation:

$$\mathbf{A}\mathbf{y}_t = \mathbf{B}\mathbf{x}_{t-1} + \mathbf{u}_t, \quad \mathbb{N}(0, \mathbf{D}), \tag{10}$$

where $\mathbf{A} = \Gamma\tilde{\mathbf{A}}$, $\mathbf{B} = \Gamma\tilde{\mathbf{B}}$, $\mathbf{u}_t = \Gamma\tilde{\mathbf{u}}_t$, and $\mathbf{D}$ is given by

$$\mathbf{D} = E(\tilde{\mathbf{u}}_t^* \tilde{\mathbf{u}}_t^{*'}) = \begin{bmatrix} d_{11}^* & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & d_{22}^* & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & d_{33}^* + \chi^{-2}\sigma_e^2 & -\chi^{-1}\sigma_e^2 & 0 & 0 & 0 \\ 0 & 0 & -\chi^{-1}\sigma_e^2 & \chi^2 d_{44}^* + \sigma_e^2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & d_{55}^* & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & d_{66}^* & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & d_{77}^* \end{bmatrix}. \tag{11}$$

Written in this manner, the SVAR model can be estimated using Bayesian methods, as described in the next section.

2.2 Bayesian Estimation

The SVAR model in (10) is estimated using Bayesian methods as outlined in Baumeister and Hamilton (2015) and Baumeister and Hamilton (2019). The priors on all autoregressive and variance parameters in the SVAR system, as well as the contemporaneous parameters in the oil market block, are the same as those in Table 1 of Baumeister and Hamilton (2019). This includes specifying the asymmetric t-distribution prior of Baumeister and Hamilton (2018) on the determinant of $\tilde{\mathbf{A}}$ such that $h_1 = \det(\tilde{\mathbf{A}}) > 0$, a prior placed on the equilibrium feedback effects on the $(2, 2)$ element in $\tilde{\mathbf{A}}^{-1}$, denoted h_2 to align with their notation, such that $h_2 > 0$, and a Minnesota prior (Doan, Litterman, and Sims, 1984) on the lagged structural coefficients in $\mathbf{B}$. Similarly, the priors for the effects of the oil block on the variables in the inflation block align with those in Section 2.2 of Aastveit et al. (2023). Since the parameters concerning the GSCPI are new to this paper, the remaining priors are also new. These priors are detailed in Table 1. All of the distributions in this table are (truncated) Student's t. Thus, DoF is the degree of freedom parameter, and the sign reflects the support after truncation.

First, regarding the effects of GSCPI shocks in the inflation block, the contemporaneous effect of the GSCPI on both inflation and inflation expectations are assumed to follow independent unrestricted Student's t-distribution's, both of which are located at zero, with scale 0.1, and 3 degrees of freedom. This decision reflects the idea that such disruptions take time to impact inflation due to time lags in the production process, contractual agreements, and general price stickiness. These ideas are also generally consistent with those in Benigno et al. (2022) and empirical results in Finck and Tillmann (2023). For instance, Finck and Tillmann (2023) finds that inflation does not exhibit a significant reaction to the GSCPI shock in the first period.

Next, for the global supply constraint equation, we specify three types of independent Student's t-distribution's, each with scale 0.5, and 3 degrees of freedom. First, for the effect of oil production on supply chain pressures, $\delta_{g,q}$, we specify a negatively truncated distribution

Parameter	Location	Scale	DoF	Sign
$\lambda_{\pi^e,g}$	0	0.1	3	no
$\gamma_{\pi,g}$	0	0.1	3	no
$\delta_{g,q}$	-0.1	0.5	3	negative
$\delta_{g,y}$	0	0.5	3	no
$\delta_{g,p}$	0.1	0.5	3	positive
δ_{g,π^e}	0	0.5	3	no
$\delta_{g,\pi}$	0.1	0.5	3	positive

Table 1: Student's t prior distributions for structural parameters concerning the GSCPI.

Notes: The parameters in the table capture various effects on expected inflation, inflation, and supply chain pressures. These include: The impact of the effect of the GSPCI on expected inflation ($\lambda_{\pi^e,g}$) and inflation ($\gamma_{\pi,g}$); and the effect of oil production ($\delta_{g,q}$), real economic activity ($\delta_{g,y}$), real oil price ($\delta_{g,p}$), inventories ($\delta_{g,q}$), expected inflation (δ_{g,π^e}) and inflation ($\delta_{g,\pi}$) on the GSPCI.

located at -0.1. This captures the idea that an increase in global oil production is likely to result in higher oil availability, which, due to its crucial role in the production process and transportation activities, can alleviate overall supply chain pressures. Conversely, higher oil prices typically lead to increased production costs and transportation expenses, which we expect will elevate global supply chain pressures. This is captured by specifying a positively truncated distribution for $\delta_{g,p}$, that is located at 0.1. A similar positive truncation and location is used for the effect of inflation on supply chain pressures, $\delta_{g,\pi}$. This is motivated by potential cost pass-through, input price volatility, and the impact of demand and consumer behavior. These factors suggest that inflation shocks can lead to higher costs, disruptions in supply chain dynamics, and shifts in consumer demand, all contributing to increased global supply chain pressures. Finally, we do not restrict the sign of the effect of economic activity, $\delta_{g,y}$, or inflation expectations, δ_{g,π^e}, on supply chain pressures, and locate each of these distributions at zero.

2.3 Data

Our analysis includes six inflation-targeting economies, two from North America, three from Europe, and one from Oceania: US, Canada, Euro area, UK, Norway and New Zealand, spanning from the first quarter of 1998 to the fourth quarter of 2023. In addition to representing various geographic regions, these countries are diverse in that they include both commodity exporters and importers and vary in their degree of openness.[5] The start of the analysis varies due to the availability of inflation expectations data: 1998Q1 for the US, the Euro area, and New Zealand; 1999Q4 for the UK; 2001Q2 for Canada; and 2002Q3 for Norway. The oil market data, adapted from Baumeister and Hamilton (2019) to a quarterly frequency, comprises: the percentage change in global crude oil production, the OECD+6 industrial production index representing global real economic activity, changes in global above-ground oil inventories, and the percentage change in the global real price of oil. This last measure is calculated using the US refiners' acquisition cost for imported crude oil (IRAC), deflated by the US consumer price index. Inflation expectations and actual inflation data vary by source and method across the economies. In the US, the data includes mean expectations among households regarding next year's inflation levels, sourced from the Michigan Survey and converted from monthly to quarterly data by using the last month's observation of each quarter. In the UK, data consists of median expectations among households about 12-month inflation changes, reported quarterly by the Bank of England. For Norway, the data comprises mean expectations from Norges Bank's quarterly expectations survey. In the Euro area, a proxy from the Consumer Opinion Surveys Future Tendency reported by FRED is used, normalized to match the US mean and standard deviation, to be on comparable scale to the other economies. For Canada, the inflation expectations data is firm's expectations about two year ahead inflation, and the data is only available by distribution. We therefore use the distributions to construct the Inflation Expectations Index (IEI) using a weighted average method proposed by Martin and Papile (2004). This involves assigning weights to the different inflation expectation bins, where we put a higher reference point for the highest category compared to Martin and Papile (2004), reflecting the high inflation levels we have seen lately. Finally, for New Zealand we use the mean 1 year ahead inflation expectations. Actual inflation for each economy is calculated based on the seasonally adjusted consumer

[5] Note that the availability of high-quality inflation expectations data over an extended period has also been an important factor in the selection of these six economies.

price index using local sources. The analysis also includes the Global Supply Chain Pressure Index (GSCPI), developed by the New York Federal Reserve. This index combines metrics such as transportation costs and survey data from manufacturing firms, offering insights into the impact of supply chain disruptions on global economic outcomes. We refer to Benigno et al. (2022) for detailed information about this index.

3 Results

Below we present the posterior distributions of the contemporaneous coefficients in the inflation block in Section 3.1, while Section 3.2 presents impulse responses and discuss the role of inflation expectations in amplifying the effects of the shock for inflation across the whole sample.[6] Having focused on average responses, we will detail the drivers of inflation in the post-covid period in Section 4.

3.1 Posterior Distributions

We find that the posterior distributions for the structural parameters in the oil market block are broadly consistent with results in Baumeister and Hamilton (2019), and are also consistent across specifications for each country. To conserve space, we therefore defer them, to the Online Appendix.

Figure 1 shows the posterior distributions of the contemporaneous coefficients in the inflation block and GSCPI for the US. The lines represent the prior distributions, and the histograms are the set of retained draws from the posterior distribution after burn-in.

In most cases we find that the posterior distributions have shifted far away from the

[6]To compute the results, we used the MCMC algorithm, generating 6 million posterior draws and discarding the first 1 million as burn-in. To reduce autocorrelation, we thinned the remaining sample by retaining every 50th draw, resulting in a final set of 100,000 posterior draws. Convergence was assessed through visual inspection of the trace plots and formally tested using a widely recognized test for equal means (Geweke, 1992), which compares the posterior means from the first and last 10% of the retained draws for each parameter. To conserve space, the results of the convergence diagnostics are provided in the Online Appendix.

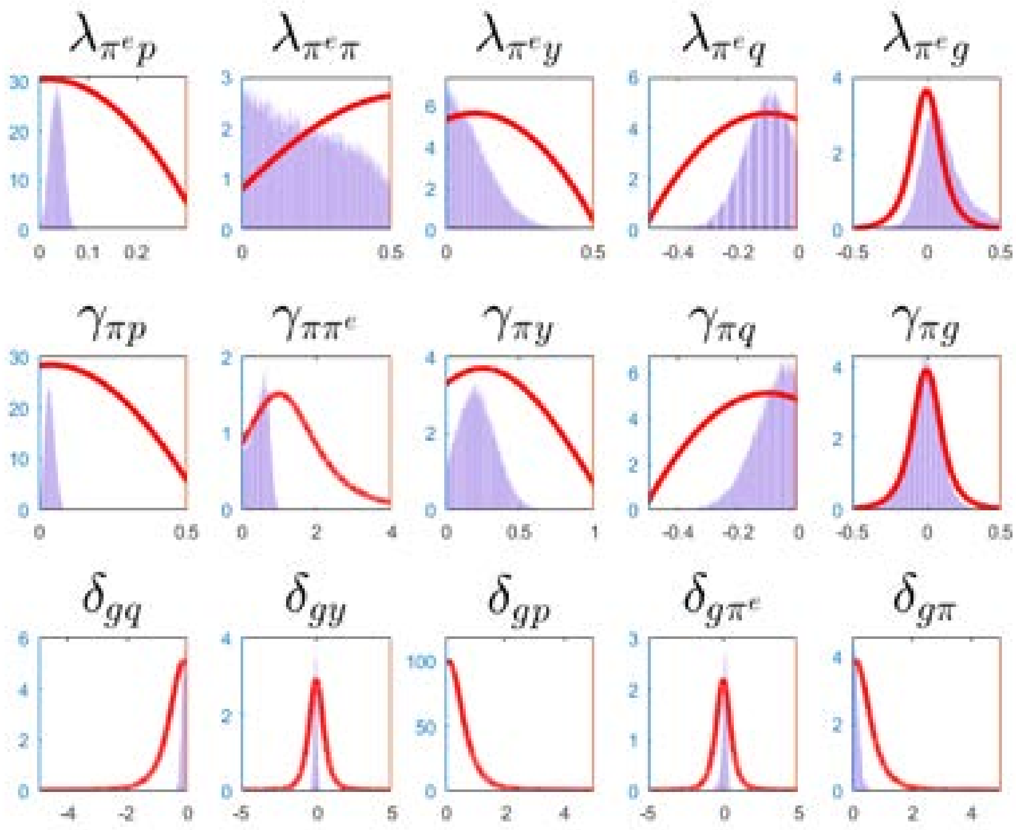

Figure 1: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks for the United States

Notes: The parameters in the figure capture various effects on expected inflation, inflation, and supply chain pressures. These include: The impact of oil production ($\delta_{\pi^e,q}$, $\delta_{\pi,q}$, $\delta_{g,q}$), real economic activity ($\delta_{\pi^e,q}$, $\delta_{\pi,q}$, $\delta_{g,q}$), and the real oil price ($\delta_{\pi^e,p}$, $\delta_{\pi,p}$, $\delta_{g,p}$); The influence of expected inflation on both expected inflation (δ_{π^e,π^e}) and inflation (δ_{π,π^e}), as well as the effect of inflation on both expected inflation ($\delta_{\pi^e,\pi}$) and inflation itself ($\delta_{\pi,\pi}$); And the effects of expected inflation (δ_{g,π^e}) and inflation ($\delta_{g,\pi}$) on supply chain pressures.

prior distributions, and are relatively concentrated at specific values. This suggests a high degree of likelihood information about such parameters is present in the data, however, some parameters exhibit substantial uncertainty as seen from the spread of their posterior distributions, and some parameters, notably the impact of the global supply chain index on actual inflation, are not too different from the prior.

Looking first at the inflation expectation equation (top row), we find that the posterior distributions have a wider range than those found in Aastveit et al. (2023), who use a similar

SVAR model to examine the effects of oil prices on expected and realized inflation. Since their investigation ended in December 2019, this result suggests that inflation expectations have become more sensitive to events in the oil market since 2020. Moreover, in addition to these results, we find that accounting for the global supply chain index is more important for inflation expectations than actual inflation, as evidenced by the posterior distribution for the former being shifted further to the right than the latter. Finally, the posterior distributions for parameters in the global supply chain equation (bottom row) are predominantly close to zero. This indicates that the supply chain index is not significantly influenced by the international oil market or domestic inflation conditions in the US. For instance, the range of the posterior density of δ_{gp} in panel (3,3) of Figure 1 is $(0, 0.025)$), providing evidence that it is very close to zero, and making the posterior appear as a vertical line at 0.

Similar figures for the five other economies are provided in the Online Appendix. A comparison of posterior distributions across economies reveals that inflation expectations in the US are more sensitive to global variables than in the other economies. For instance, fluctuations in global oil prices, supply chain pressures, and real global economic activity have a more pronounced influence on US consumers' inflation expectations. This may indicate that US households are more attuned to international economic factors when forming their expectations. Related to this, it could, for instance, suggest that these global shocks directly impact oil and gasoline prices, which are frequently updated, making information acquisition costs very low. Since gasoline represents a relatively larger portion of household consumption in the US compared to other economies, US households may be more inclined to adjust their inflation expectations accordingly.

3.2 The effect of oil market and global supply chain shocks

Figure 2 graphs the impulse responses to four of the most important shocks identified: oil supply, global activity, oil demand and global supply chain for inflation expectations in the US, Canada, New Zealand, the Euro area, the UK and Norway. Figure 3 shows the effect

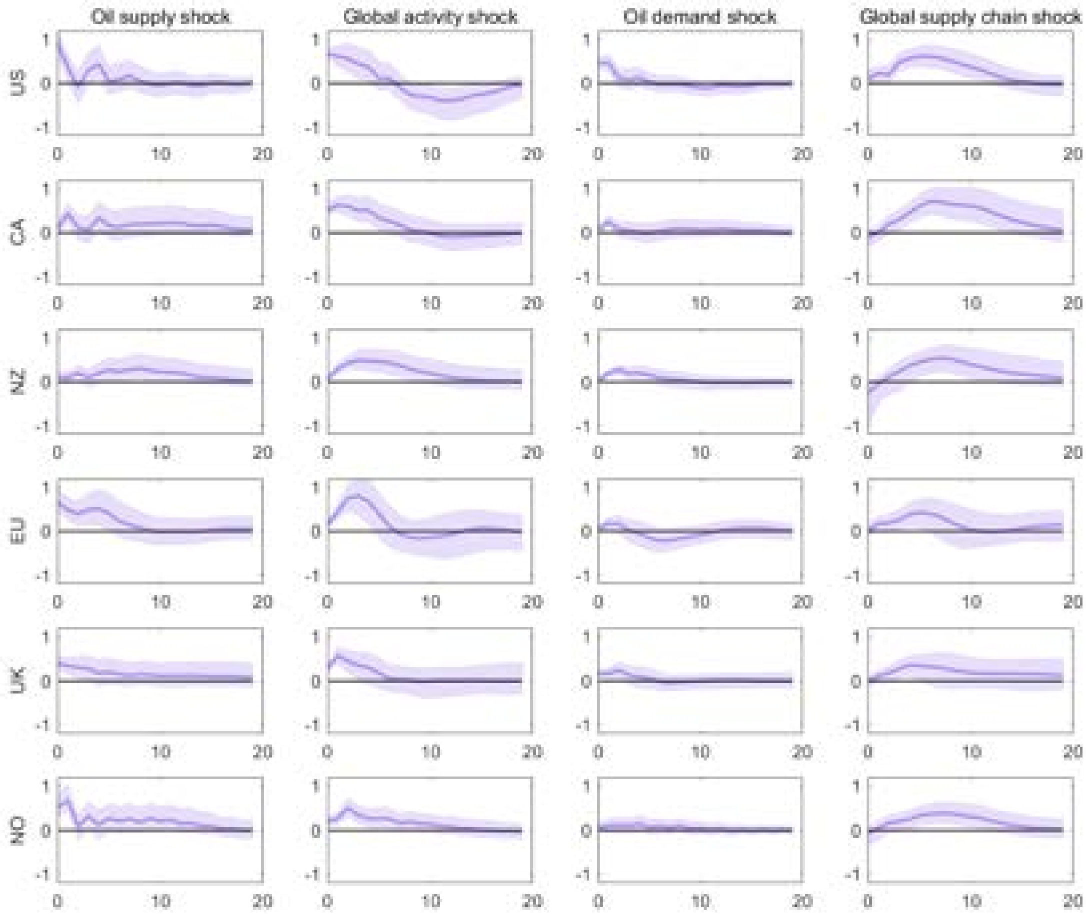

Figure 2: Impulse responses for Inflation Expectations.
Notes: The three oil market shocks: oil supply, global activity and oil demand, have been normalized to elicit a 10% increase in the real price of oil, while the global supply chain shock is normalised to increase GSCPI with a standard deviation. The posterior median is shown in boldface and the shaded area is the 95% joint credible set obtained from the posterior distribution of 100,000 structural model. The countries studied are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

of the same four shocks for inflation across the same six economies. In the figures, we have normalized the oil market shocks so that each increases the oil price with 10% on impact. The GSCPI shock is normalized so it increases GSCPI with one standard deviation on impact.

Starting with the effect of oil supply shocks, Figure 2 illustrates that in the US, a positive oil supply shock initially increases inflation expectations, but this initial increase quickly dies out. Conversely, the impact on actual US inflation is more persistent, lasting for approximately one year, c.f. Figure 3. These responses may suggest that while households initially anticipate an increase in inflation, the actual effects on the broader economy take some time to fully materialize. In the other economies, the oil supply shock also raises expected inflation, but by less than for the US, and the effect on inflation is not significant in the Euro area, the UK and Norway. This suggests that while households might briefly adjust their expectations, the shock does not leave a lasting imprint on the actual inflation rate in the European economies.

As with the oil supply shock, the global activity shock has a stronger effect on US variables, increasing expected inflation for approximately one year, c.f. Figure 2. This response is mirrored in actual inflation, c.f. Figure 3, which experiences an increase that is more persistent and larger in magnitude than the response of inflation expectations. The inflation rates in Canada, the Euro area, New Zealand and the UK also demonstrate a significant response to global activity shocks, with both expected and actual inflation increasing. This indicates that households swiftly adjust their expectations, reflecting the real impact of changes in economic activity on prices. In Norway, the response of inflation expectations to the global activity shock is milder, and we find no significant effect on actual inflation.

The oil demand shocks have similar effects as the global activity shocks, although somewhat more muted response in both expected and actual inflation. Again, the response is strongest in the US, while for Norway and the UK, the effect for expected inflation is barely significant, resulting in a more muted response for actual inflation.

For all economies, we find that inflation reacts to the global supply chain shock with a lag of 1-2 quarters and the effect peaks after about 2 years, c.f. Figure 3. Ascari et al. (2024) also find similar results for the Euro area using a SVAR with different identifying restrictions. This dynamics is consistent with the fact that it takes time for supply chain issues to materialize to the real economy. After this, inflation increases gradually in all economies, exhibiting a more persistent response than to the oil market shocks, with the increase lasting for 2 to 3 years. Although the shock increases inflation in all four economies,

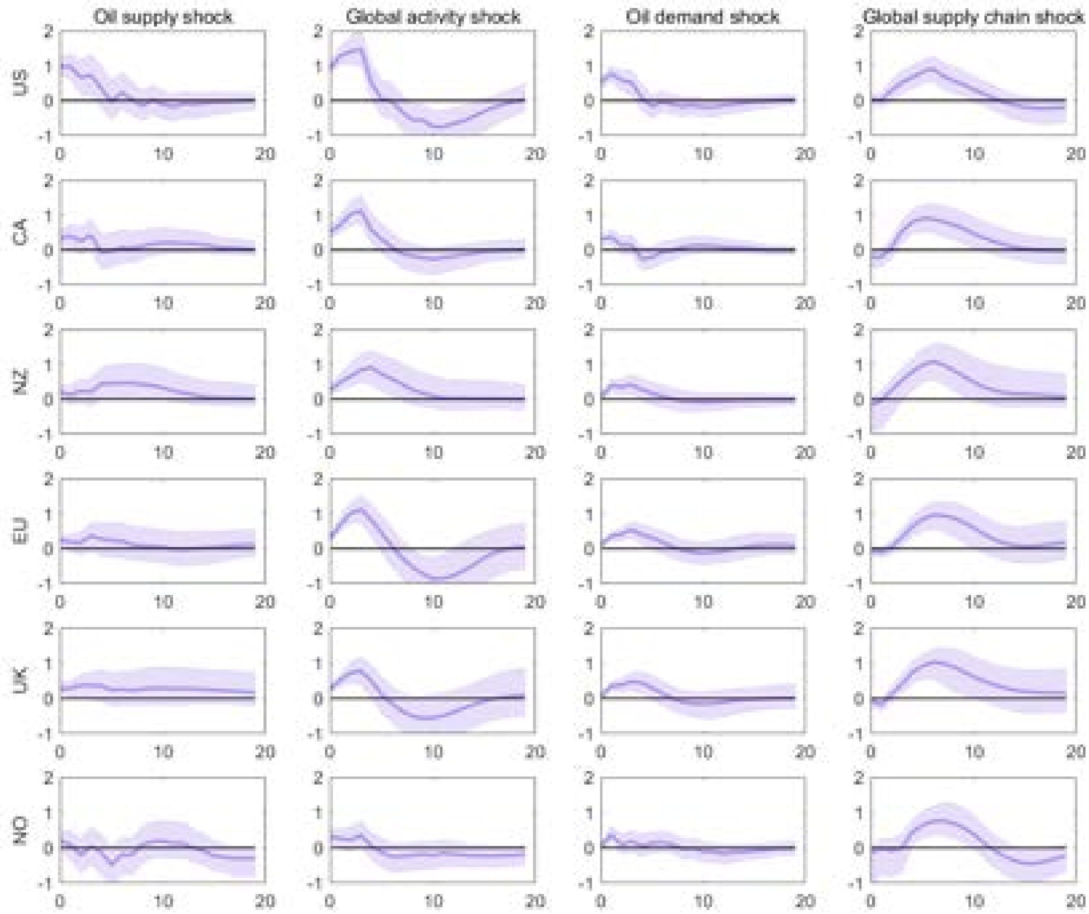

Figure 3: Impulse responses for Inflation.
Notes: The three oil market shocks: oil supply, global activity and oil demand, have been normalized to elicit a 10% increase in the real price of oil, while the global supply chain shock is normalised to increase GSCPI with a standard deviation. The posterior median is shown in boldface and the shaded area is the 95% joint credible set obtained from the posterior distribution of 100,000 structural models. The countries studied are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

the increase is the lowest in Norway compared to the others. Interestingly, we find that inflation expectations increase more rapidly and significantly in most economies, suggesting they can play a role in amplifying the effects of global supply chain shocks, c.f. Figure 2.

To dig more into the role of inflation expectation for transmitting the shocks, Figure 4 presents a comparative analysis of the median inflation impulse response functions from

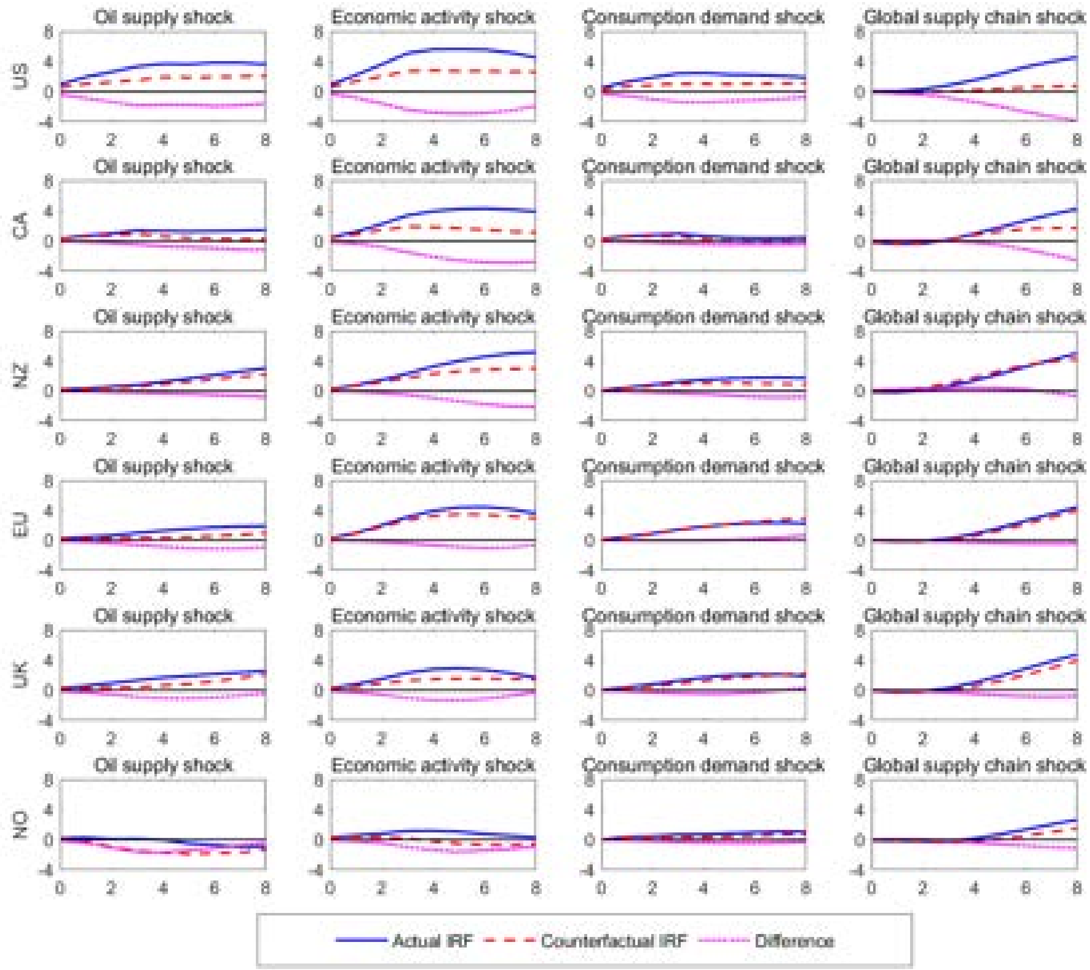

Figure 4: Actual and counterfactual: Holding inflation expectations constant.
Notes: The countries studied are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

two scenarios: one actual and one counterfactual.[7] In the counterfactual scenario, inflation expectations are held constant, allowing the figure to specifically illustrate the effects of shocks on inflation. This setup helps isolate the direct impact of oil price and global supply chain shocks on inflation by removing any influence from changing inflation expectations. The observed differences between actual and counterfactual IRFs indicate the extent to which inflation expectations themselves propagate the inflationary effects of oil price and GSCPI

[7]A similar exercise was performed in Wong (2015) and Aastveit et al. (2023) analysing the effect of oil shocks on the US economy.

shocks. As with Figures 2 and 3, each shock modeled is assumed to increase the real price of oil by 10 percent, while a global supply chain shock increases GSCPI with a standard deviation. The figure shows that the effects of the oil market shocks on actual inflation in the US would have been lower, but of similar sign, had inflation expectations been constant throughout the sample. Even more notable is the results for the global supply chain shock, where we find that had inflation expectations been constant, the supply chain shock would not have had significant effects on US inflation. Similar, although somewhat smaller, effects are found for Canada and New Zealand, while for the three European economies (Norway, the Euro area and UK), inflation expectations mostly matters in the propagation of the global demand shocks.

In summary, we find that inflation and inflation expectations in all six economies respond significantly to most of the identified shocks, though with some variation across countries. Notably, the strongest responses to global activity, oil demand, and oil supply shocks are observed in the US, while the weakest are seen in the European economies. Why is this the case? One possible explanation is that these shocks directly impact oil prices and, consequently, gasoline prices. Since gasoline represents a significantly larger portion of household consumption in the US—and, to some extent, in Canada and New Zealand—compared to European countries, households in these regions may be more likely to adjust their inflation expectations. It is also worth noting that gasoline is more expensive, partly due to taxes and regulations, in European countries, making it less volatile relatively to, for example, the US.[8] Finally, all economies respond significantly to global supply chain shocks, though these responses are much more delayed compared to those from the oil market demand and supply shocks.

[8] See `https://www.globalpetrolprices.com/gasoline_prices/` for a comparison of global gasoline prices.

4 What drove inflation during Covid and beyond?

We now turn to analyze the driving forces of the recent inflation surge over the period 2020Q1-2023Q4. Two exercises are conducted. First, we use historical decomposition to identify the main drivers of inflation. Second, we examine the role of inflation expectations as a driver of actual inflation using a structural counterfactual exercise.

4.1 Historical Decomposition

We first analyze the driving forces behind the recent increase in inflation by examining the historical decomposition for inflation from 2020Q1-2023Q4 in Figure 5. For clarity, we have aggregated the shocks into three categories: global supply (oil supply and global supply chain shocks), global demand (global economic activity and oil demand shocks), and domestic shocks (domestic shocks to inflation and expected inflation). In the Online Appendix, we provide the historical decomposition for all shocks over the entire sample period.

Figure 5 illustrates that both global demand and supply shocks have contributed to the recent inflation surge. First, as the pandemic hit the world in early 2020, global demand shocks contributed to reducing inflation across the board. During 2020, global demand pressures worked to push inflation rates down in all six economies. Conversely, domestic inflationary shocks worked to increase inflation, especially in the US. Although the specific domestic shocks are not explicitly identified, they correspond well with the expansionary policies implemented in most economies at the time, suggesting domestic demand shocks may have also been important in this period.

Second, from 2021, inflation starts to increase, driven by a mix of global demand, supply, and domestic shocks. For the US, approximately one-third of the increased inflation can be attributed to global supply shocks, another third to global demand, and the remaining third to domestic shocks. For the other economies, the proportions vary slightly, with the Euro area and the UK showing the most influence from global demand, and New Zealand showing

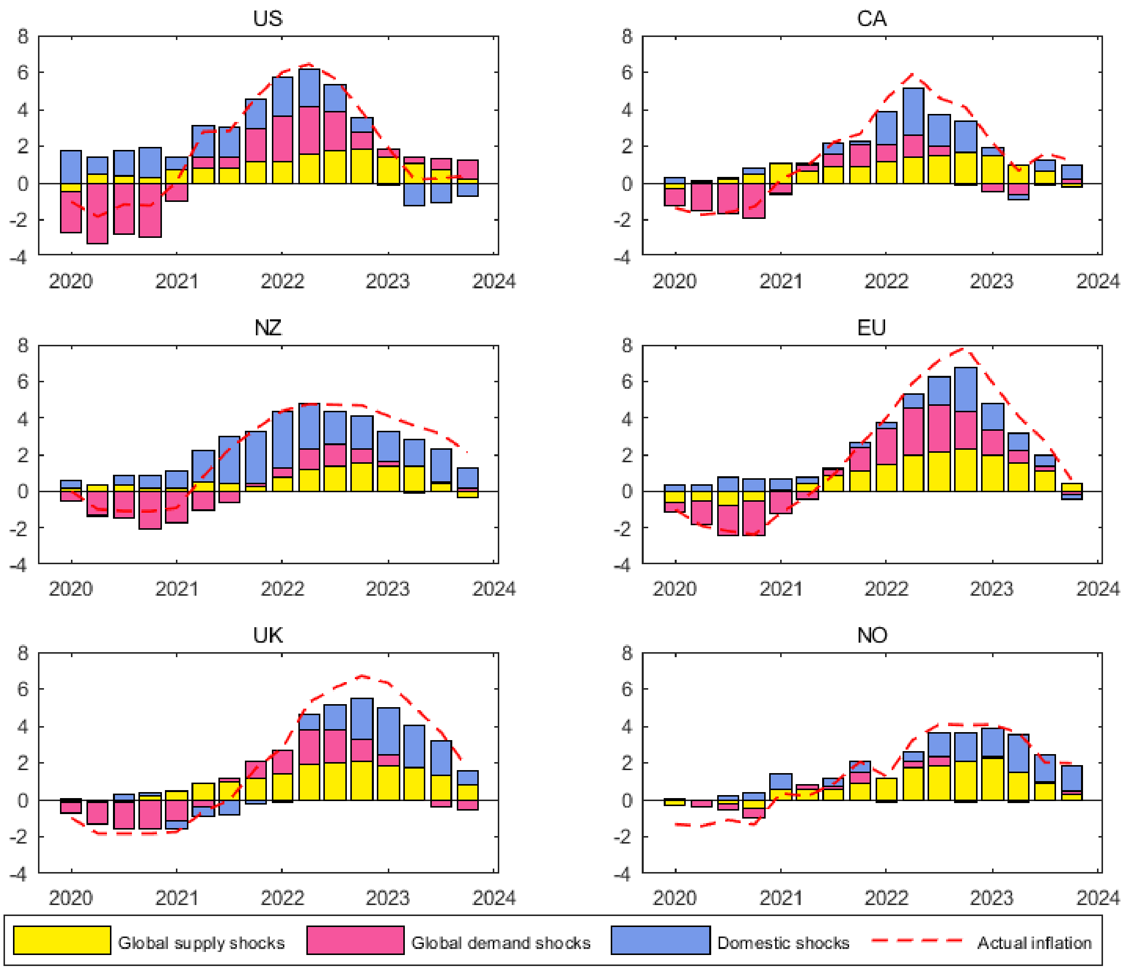

Figure 5: Historical Decomposition CPI (demeaned) from 2020. The countries studied are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

the least influence from global demand.

Third, the decline in inflation from 2022 to 2023 is primarily due to a reduction in domestic and global demand shocks across all economies, although supply factors continue to contribute to increased inflation rates.

4.2 Counterfactual Exercise

To understand the role of inflation expectations in a historical context, we perform a counterfactual exercise. In the exercise, we use the identified structural model to generate a

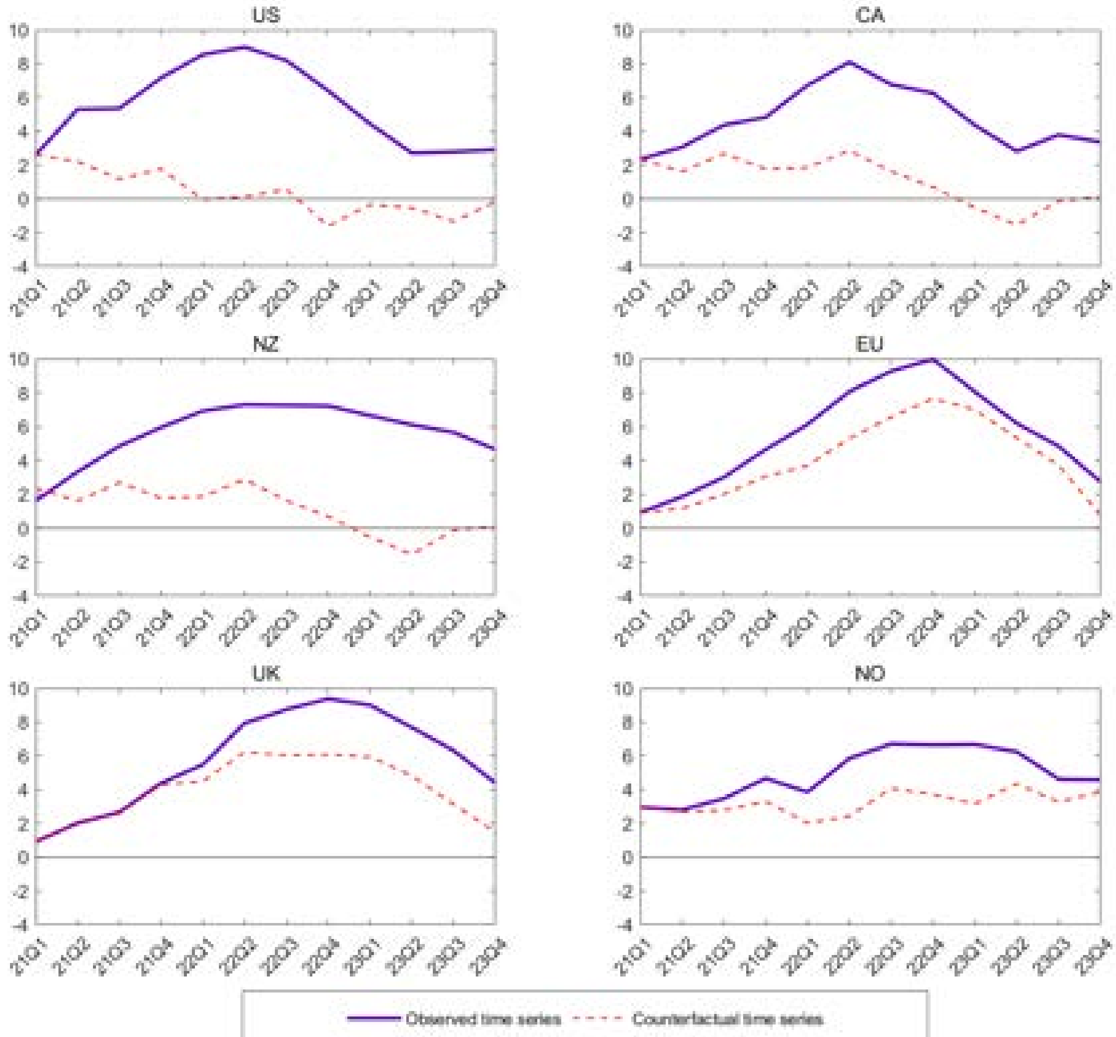

Figure 6: Counterfactual exercise - holding inflation expectations constant from 2021Q1.
Notes: The countries studied are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

sequence of inflation expectations shocks that mute the inflation expectations response after shocks to the other variables in the system, thus holding inflation expectations flat since 2021Q1.[9] Similar counterfactuals have been used in, for example, Sims and Zha (2006) to understand the role of the systematic component of monetary policy in the transmission of

[9]To create these counterfactuals, we generate a sequence of structural shocks to inflation expectations in order to maintain a flat trajectory for inflation expectations in response to shocks to the other variables in the system. We emphasize that this route is taken to account for the identified endogenous interactions of the variables in the system. In contrast, calculating such counterfactuals using reduced-form shocks, or setting all structural coefficients within the inflation expectation equation to zero, would fail to account for such relationships between the variables.

other shocks, Bachmann and Sims (2012) to examine the effects of government spending holding consumer confidence fixed, and both Aastveit et al. (2023) and Wong (2015) to determine the importance of inflation expectations in driving actual inflation during the Great Recession, among others.

Compared to Figure 4, where we shut down inflation expectations to examine impulse responses, this exercise investigates how inflation would have evolved in the pandemic period had inflation expectations not responded to any of the structural shocks in this time.

The results are shown in Figure 6. The general result is that inflation would have been lower if inflation expectations were unchanged during this period. However, there is notable heterogeneity in the magnitude of these differences across the economies.

In the US, Canada and New Zealand, we find that inflation would have been much more stable, and even reduced, if inflation expectations were fixed during this period. In contrast, inflation in the Euro area, UK, and Norway would have still increased, but not as much as if inflation expectations had changed during this period. This result is also broadly consistent with the results in Section 3.2, where we find that inflation expectations matter less in the European economies compared to the other economies. Despite these differences, the main takeaway from this exercise is that inflation expectations played a key role in propagating the inflationary outcomes observed during this period.

5 Robustness

We analyze robustness using a different framework by investigating the role of inflation expectations in shaping inflation during the pandemic period and beyond using (reduced-form) multi-horizon conditional forecasts—a popular tool for macroeconomic forecasters and policymakers (see, e.g., Waggoner and Zha (1999); Giannone, Lenza, Pill, and Reichlin (2012); Bańbura, Giannone, and Lenza (2015); Giannone, Lenza, and Reichlinc (2019); Chan, Pettenuzzo, Poon, and Zhu (2023)). These forecasts are constructed using the reduced-form

BVAR implied by inverting **A** in (10) and the conditional forecast methodology in Bańbura et al. (2015). In short, this approach fixes the future path of given variables, such as inflation expectations, and then treats the remaining variables in the BVAR as time series with missing data. These missing observations are then forecasted using standard Kalman-Filter-based methods.

Two conditional forecast exercises are conducted. First, in the spirit of the counterfactual exercise presented in Section 4, we forecast the variables in the system conditioning on inflation expectations remaining constant throughout the post-pandemic period. In the second exercise, we forecast the variables in the system conditioning on inflation expectations equaling the observed data over this period. In this setup, the first exercise represents a scenario in which agents have adaptive expectations (equivalent to a random walk forecast for expected inflation), while the second exercise represents a scenario in which agents have perfect foresight. As a benchmark, we also consider an unconditional forecast, where the future path of inflation expectations is predicted alongside the other variables in the model. In both exercises we estimate the BVAR on the period of data ending in 2019Q4. Forecasts are then conducted for the pandemic period 2020Q1-2023Q4.

Results from these forecasts for actual and expected inflation, as well as for the other variables, are provided in Appendix D. Several observations can be made. First, the forecasts from the first exercise, where we condition on inflation expectations remaining constant, are very similar to the unconditional forecasts. This suggests that the pandemic period was difficult to predict given the economic conditions leading up to 2020. Second, we find that if inflation expectations had been held constant throughout this period, actual inflation would have been substantially lower than observed. Thus, the results from the first exercise align broadly with the previous counterfactual exercise.[10] Finally, with the exception of Norway, the forecasts from the second exercise, where we condition on inflation expectations matching

[10]We note that the predicted magnitude of actual inflation in the conditional forecast is much smaller than the counterfactual exercise in Section 4, because the former is reduced form and does not account for the structural shocks from other variables in the pandemic period.

the observed path over the pandemic period, are much closer to the observed path of actual inflation. This suggests that if agents had perfect foresight, inflation expectations would better predict the inflation surge in this period.

6 Conclusion

Our study provides a thorough analysis of current inflation drivers, focusing on the interaction between global supply and demand shocks and domestic inflation expectations across the US, Canada, New Zealand, the Euro area, the UK and Norway. Using a structural Bayesian VAR model, we find significant responses of inflation and inflation expectations to both global demand and supply shocks, with notable variations across economies. Demand shocks have been the primary drivers historically, but various supply shocks from the oil market and global supply chains have gained importance during the recent inflation spike.

Reduced form and structural analyses demonstrate the inflation expectations matter for the future path of inflation. In particular, holding inflation expectations constant since 2021 would have resulted in considerably lower inflation in all six economies studied. Managing inflation expectations should therefore remain a crucial policy objective for mitigating their amplifying effects on inflation.

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—Online Appendix—

Not for publication

A Convergence Diagnostics

A.1 Trace Plots

The trace plots for each parameter, based on 100,000 MCMC draws used in the main analysis for each country, are provided below. They generally exhibit clear signs of convergence, including: (1) stable oscillations around a constant mean without long-term trends; (2) good mixing; (3) effective exploration of the parameter space without getting stuck in any region; and (4) no periodic patterns. These observations provide confidence that the MCMC simulations are producing reliable samples from the posterior distribution.

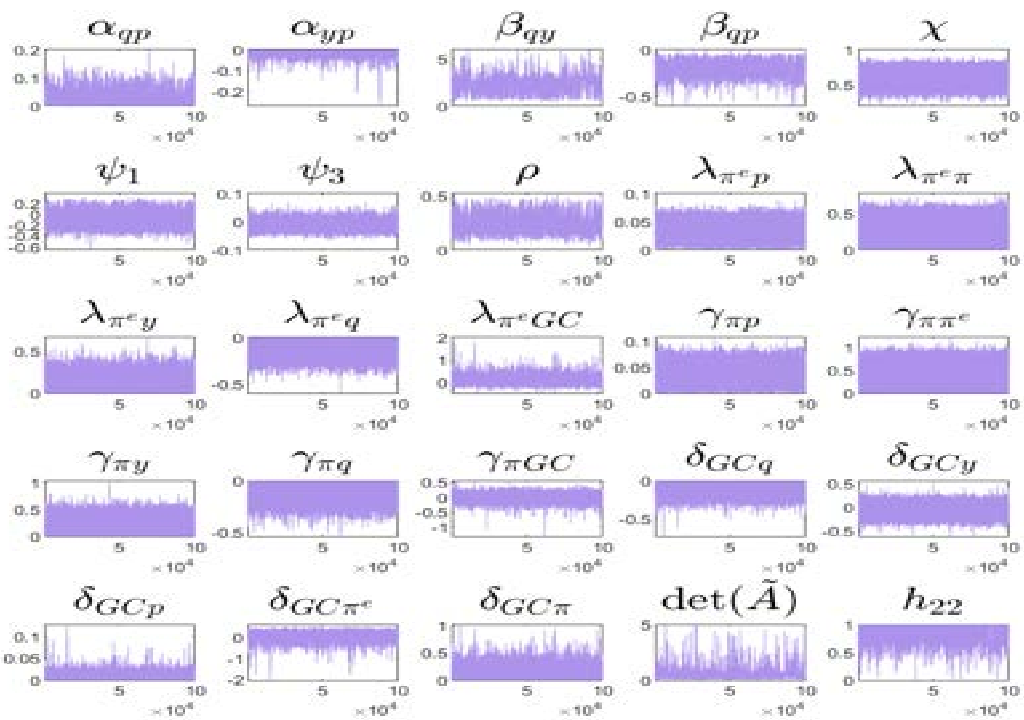

Figure 7: United States: Trace plot of 100,000 MCMC draws used in the main analysis.

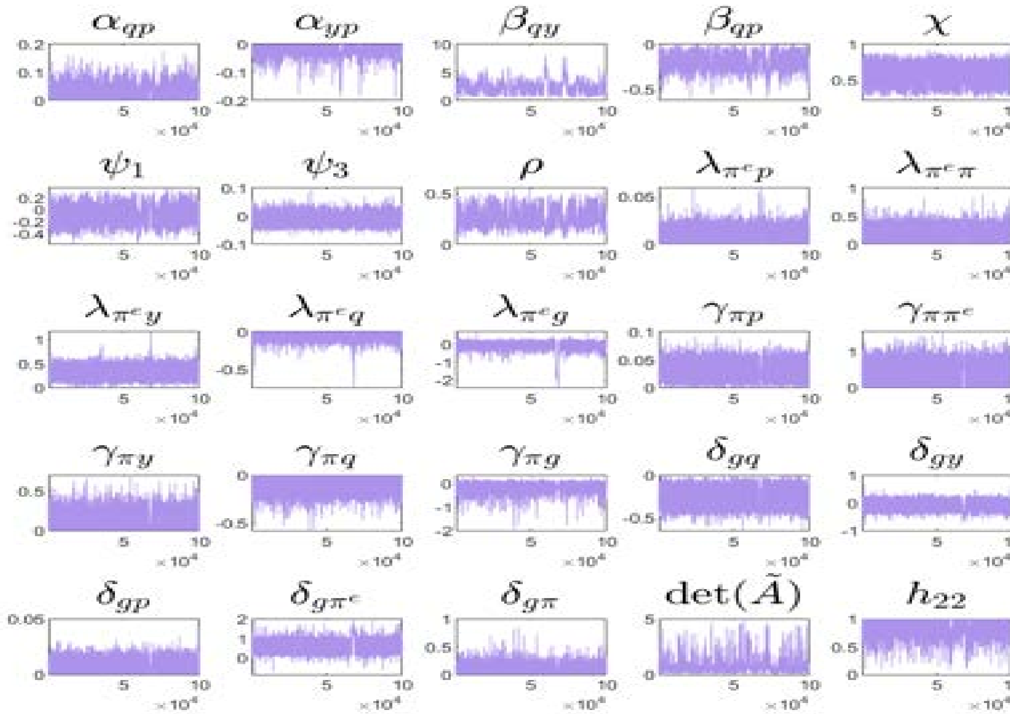

Figure 8: Canada: Trace plot of 100,000 MCMC draws used in the main analysis.

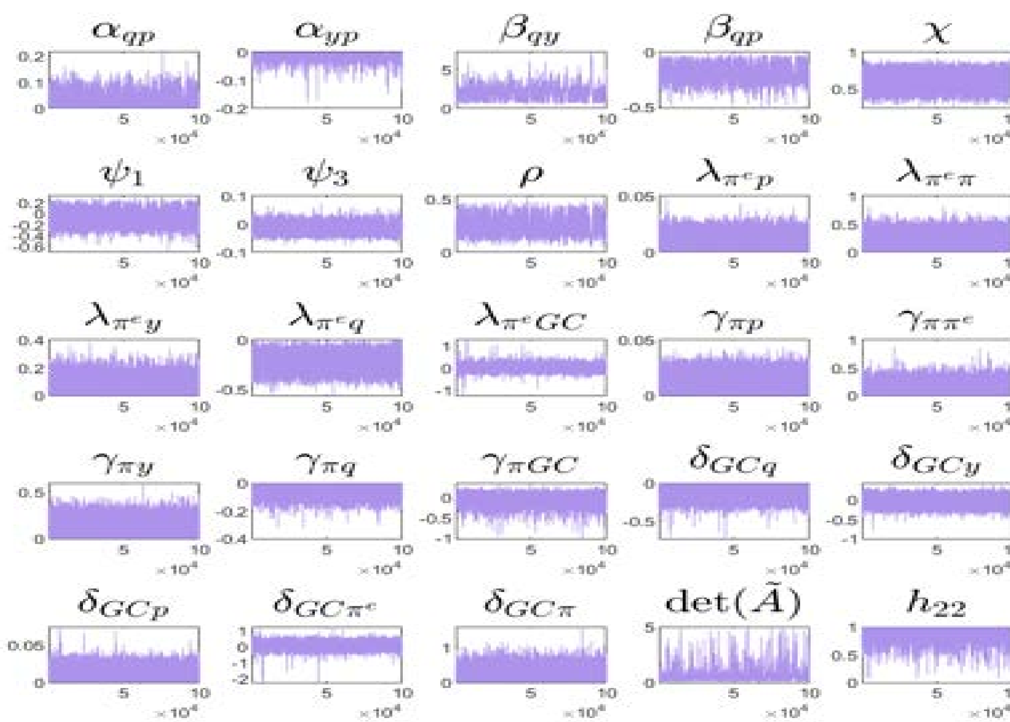

Figure 9: Euro Area: Trace plot of 100,000 MCMC draws used in the main analysis.

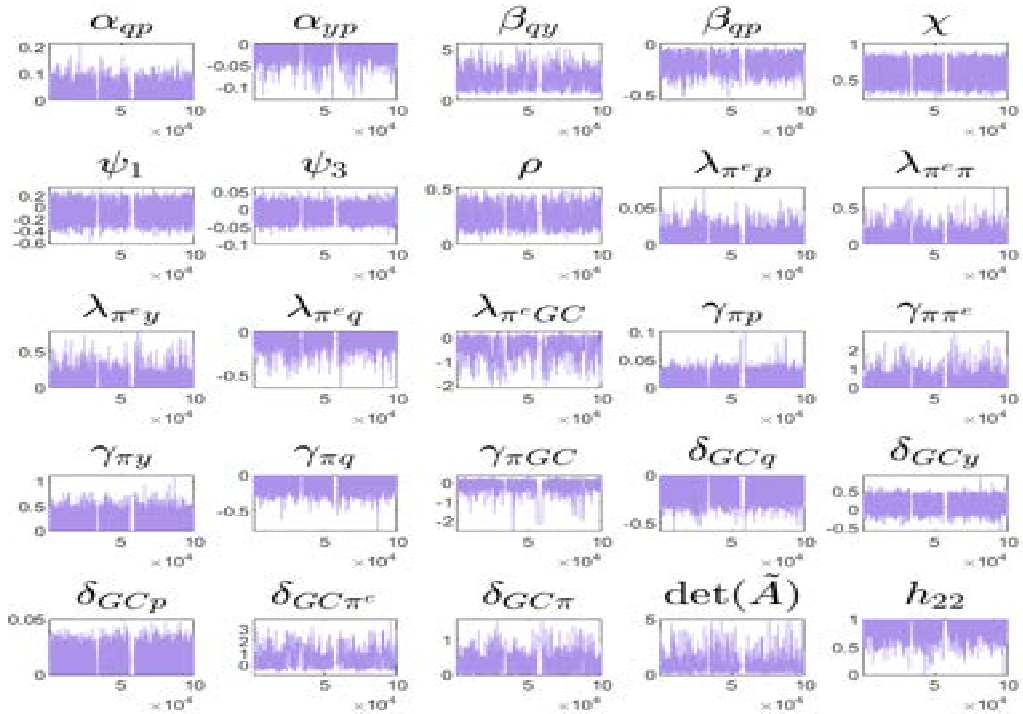

Figure 10: New Zealand: Trace plot of 100,000 MCMC draws used in the main analysis.

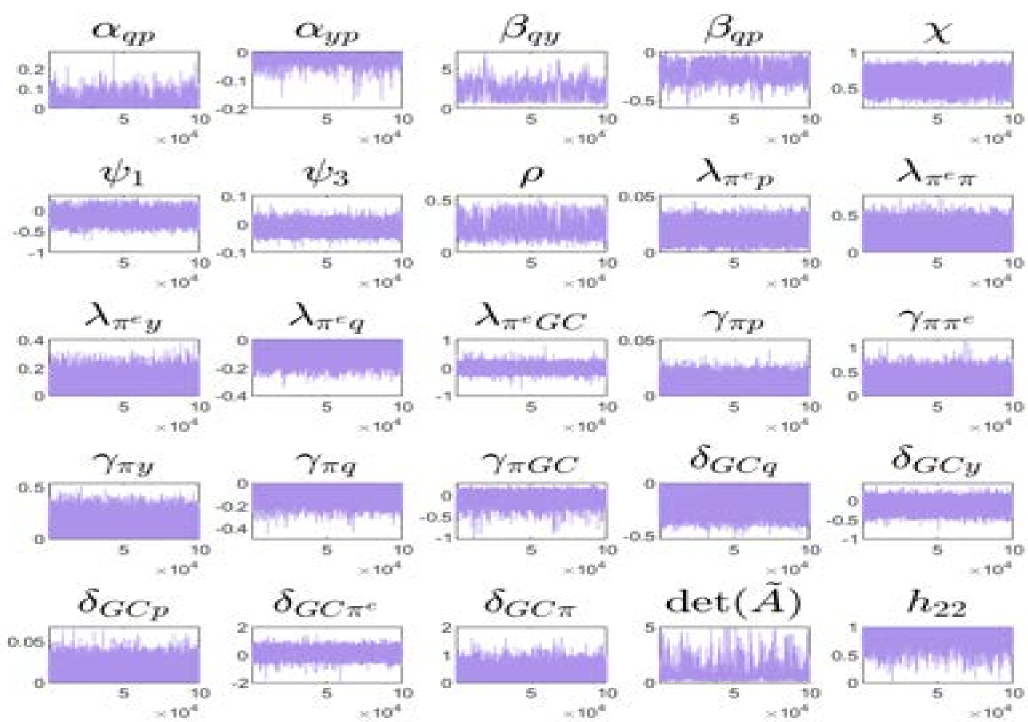

Figure 11: UK: Trace plot of 100,000 MCMC draws used in the main analysis.

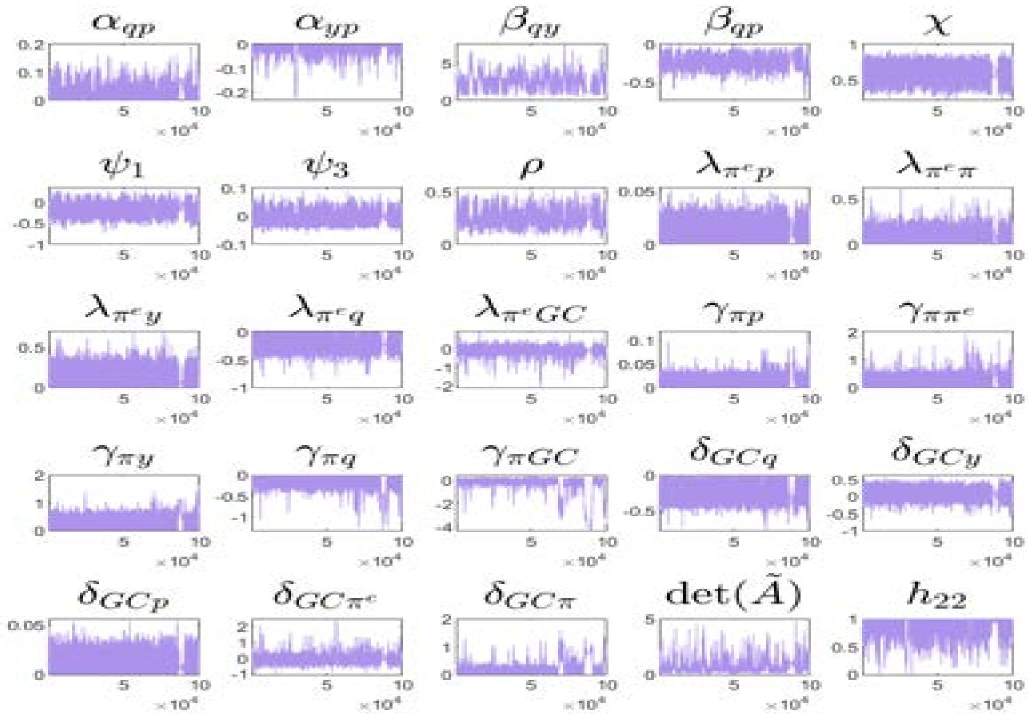

Figure 12: Norway: Trace plot of 100,000 MCMC draws used in the main analysis.

A.2 Geweke's Chi-squared Test for Equal Means

The convergence test of Geweke (1992) is widely used to assess the convergence of Markov Chain Monte Carlo (MCMC) simulations. The test compares the means of two non-overlapping sub-samples from different parts of the Markov chain, typically one from the early part of the chain and one from the latter part. The logic behind the test is that if the MCMC chain has reached its stationary distribution, then the means of these sub-samples should be statistically indistinguishable. Formally, the null hypothesis of Geweke's test states that the means of the two sub-samples are equal ($H_0 : \mu_1 = \mu_2$), indicating that the chain has converged to the target distribution. In contrast, the alternative hypothesis posits that the means of the two sub-samples are not equal ($H_0 : \mu_1 \neq \mu_2$), which would suggest that the chain has not yet converged. Here we use the first 10% of the draws as the first sample, and the last 10% of the draws as the second sample. We also used a relatively small taper of 4% to account for possible boundary effects. Since the p-values are all greater than or equal to 0.01, we are generally unable to reject the null hypothesis of equal means at the 99% significance level. We therefore conclude that the chain has converged.

Parameter	United States	Canada	New Zealand	Euro Area	United Kingdom	Norway
α_{qp}	0.83	0.06	0.74	0.96	0.74	0.27
α_{yp}	0.42	0.21	0.90	0.12	0.90	0.78
β_{qy}	0.97	0.17	0.54	0.54	0.54	0.40
β_{qp}	0.81	0.48	0.82	0.88	0.82	0.35
χ	0.87	0.92	0.42	0.76	0.42	0.71
ψ_1	0.81	0.03	0.71	0.51	0.71	0.43
ψ_3	0.40	0.06	0.41	0.20	0.41	0.45
ψ_4	0.74	0.25	0.36	0.70	0.36	0.39
ρ	0.06	0.02	0.11	0.62	0.11	0.79
$\lambda_{\pi^e p}$	0.90	0.54	0.07	0.50	0.07	0.78
$\lambda_{\pi^e \pi}$	0.24	0.62	0.14	0.02	0.14	0.43
$\lambda_{\pi^e y}$	0.09	0.86	0.16	0.29	0.16	0.73
$\lambda_{\pi^e q}$	0.22	0.49	0.14	0.38	0.14	0.67
$\lambda_{\pi^e GC}$	0.79	0.11	0.20	0.33	0.20	0.02
$\gamma_{\pi p}$	0.41	0.41	0.44	0.28	0.44	0.10
$\gamma_{\pi\pi^e}$	0.18	0.54	0.57	0.06	0.57	0.02
$\gamma_{\pi y}$	0.27	0.72	0.16	0.66	0.16	0.02
$\gamma_{\pi q}$	0.07	0.76	0.61	0.02	0.61	0.02
$\gamma_{\pi GC}$	0.72	0.89	0.73	0.14	0.73	0.29
δ_{GCq}	0.21	0.76	0.20	0.84	0.20	0.05
δ_{GCy}	0.17	0.82	0.40	0.27	0.40	0.15
δ_{GCp}	0.22	0.86	0.17	0.24	0.17	0.58
$\delta_{GC\pi^e}$	0.65	0.70	0.80	0.41	0.80	0.04
$\delta_{GC\pi}$	0.58	0.45	0.27	0.58	0.27	0.03
$\det(\tilde{A})$	0.55	0.08	0.88	0.16	0.88	0.70
h_{22}	0.55	0.56	0.93	0.58	0.93	0.58

Table 2: Results from Geweke's Chi-squared Test for Equal Means.

Notes: The test compares the means from the first and last 10% of the draws after a 4% taper.

B Priors and Posteriors

B.1 Oil market block

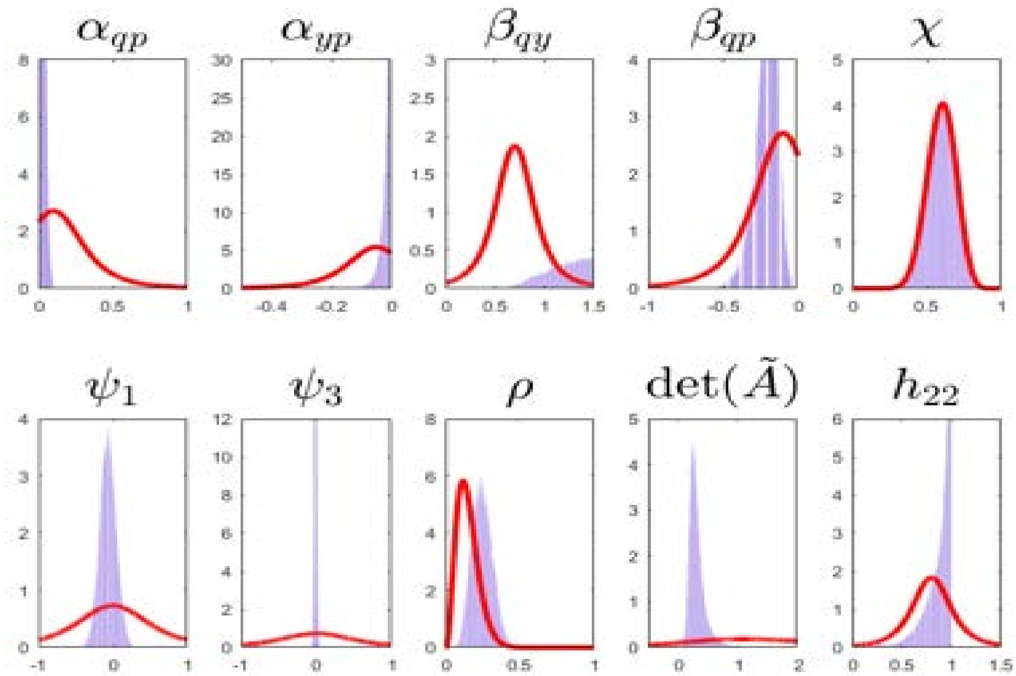

Figure 13: United States: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

B.2 Oil market block

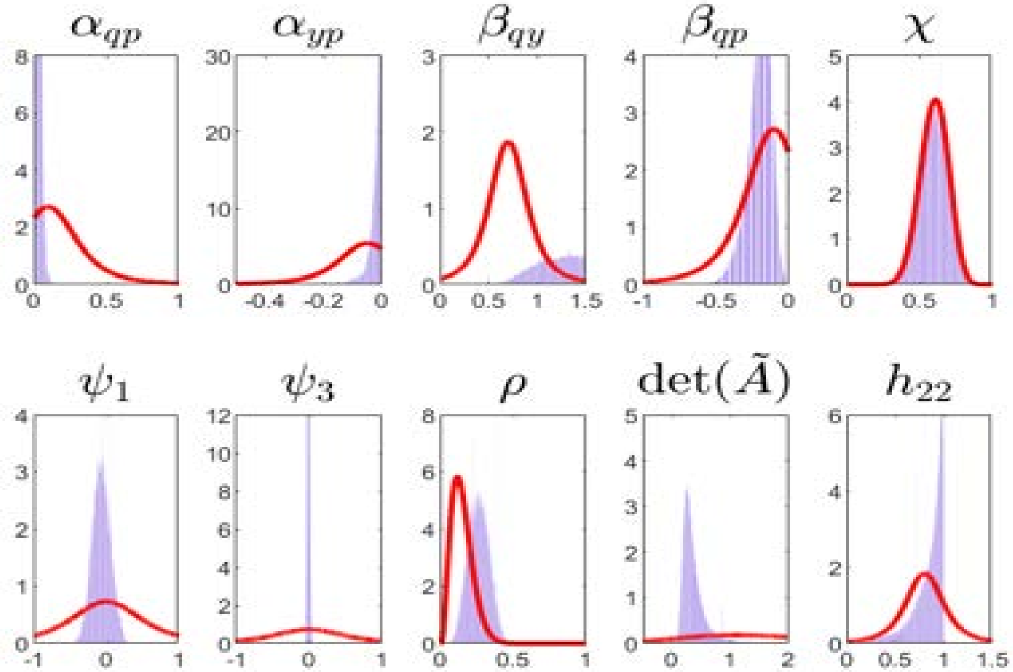

Figure 14: Canada: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

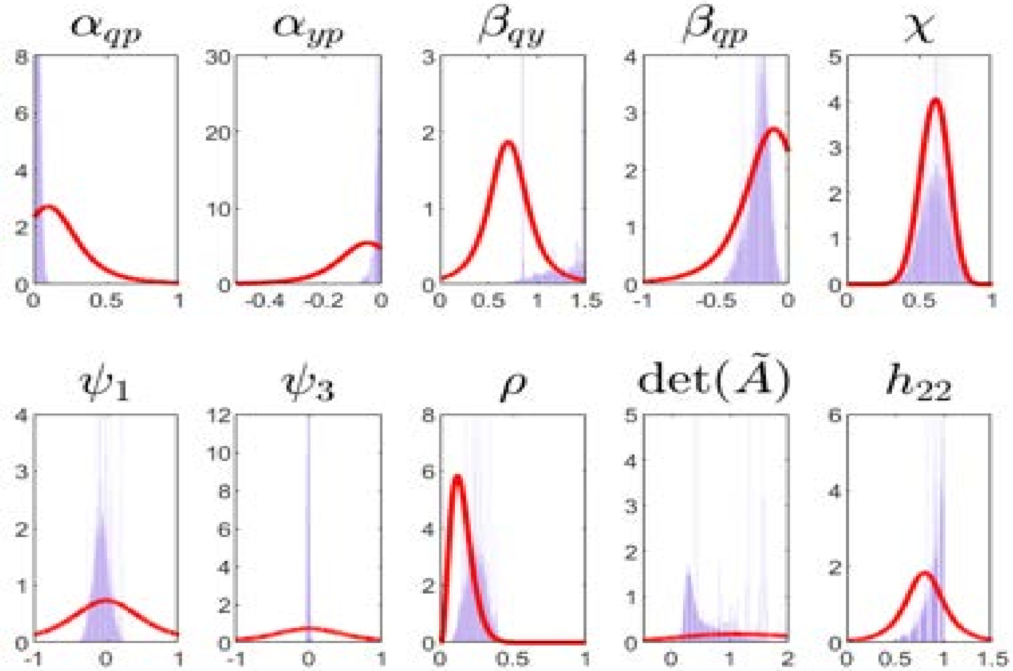

Figure 15: New Zealand: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

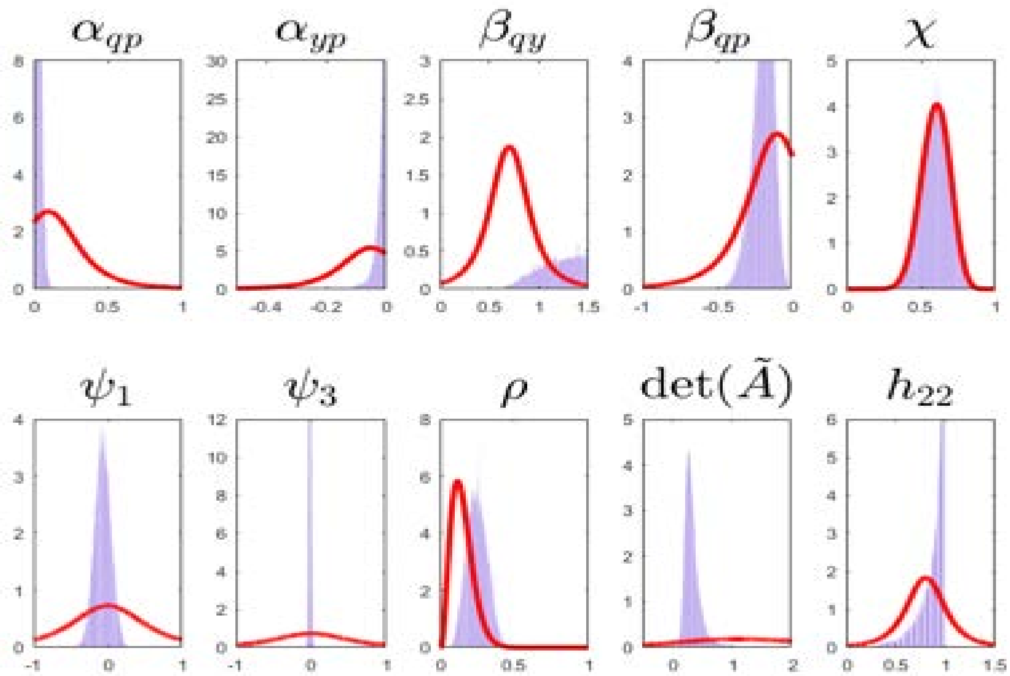

Figure 16: Euro Area: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

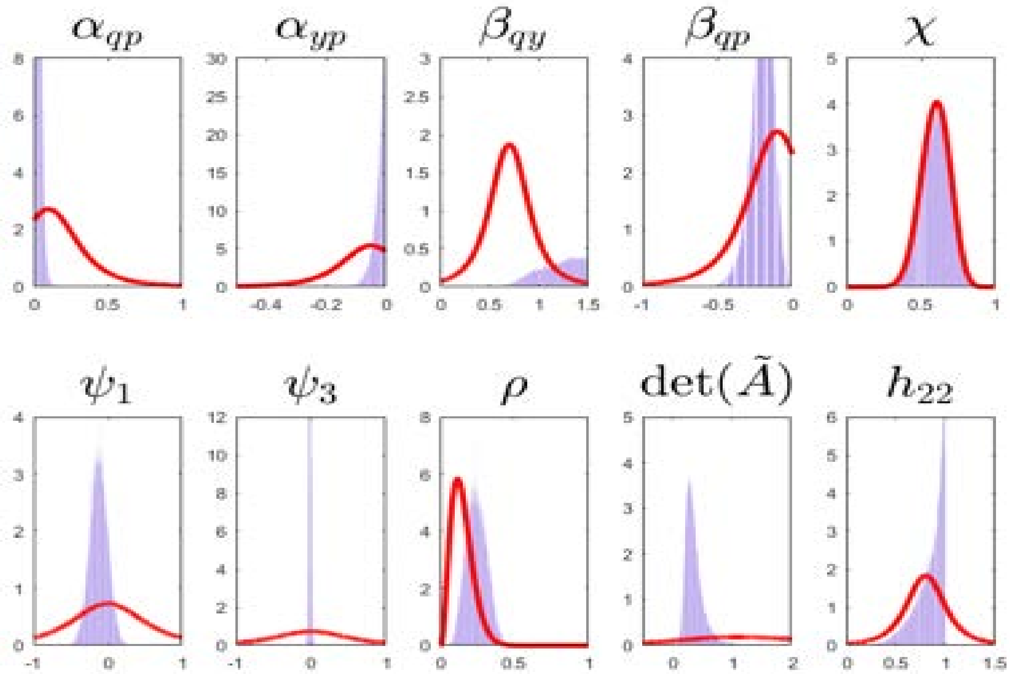

Figure 17: United Kingdom: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

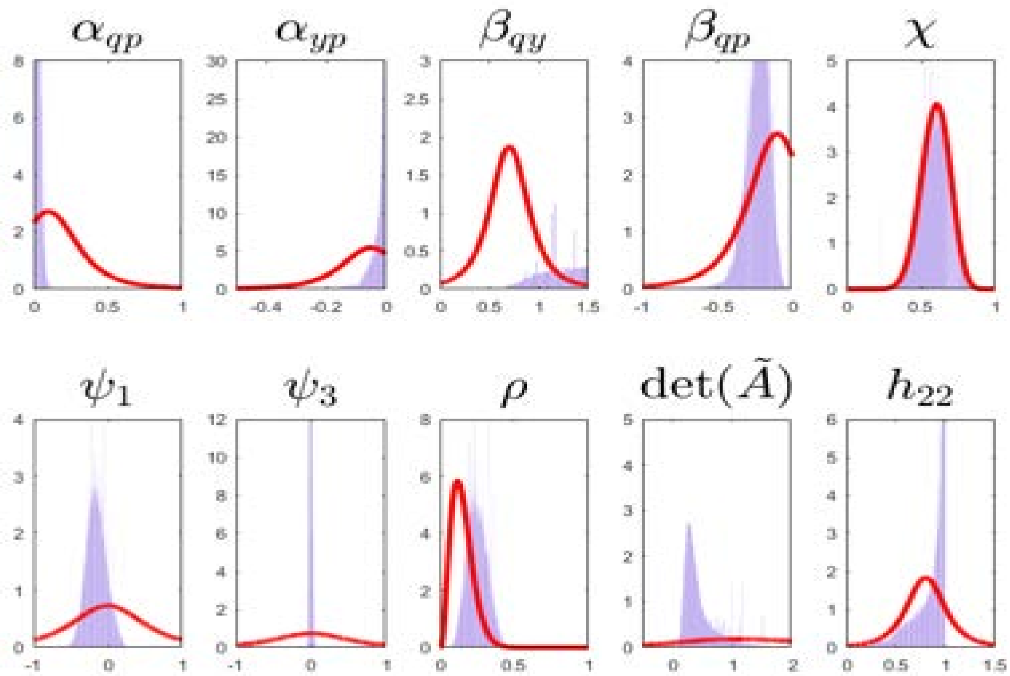

Figure 18: Norway: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the oil market block.

B.3 Inflation, inflation expectations, and GSCPI block

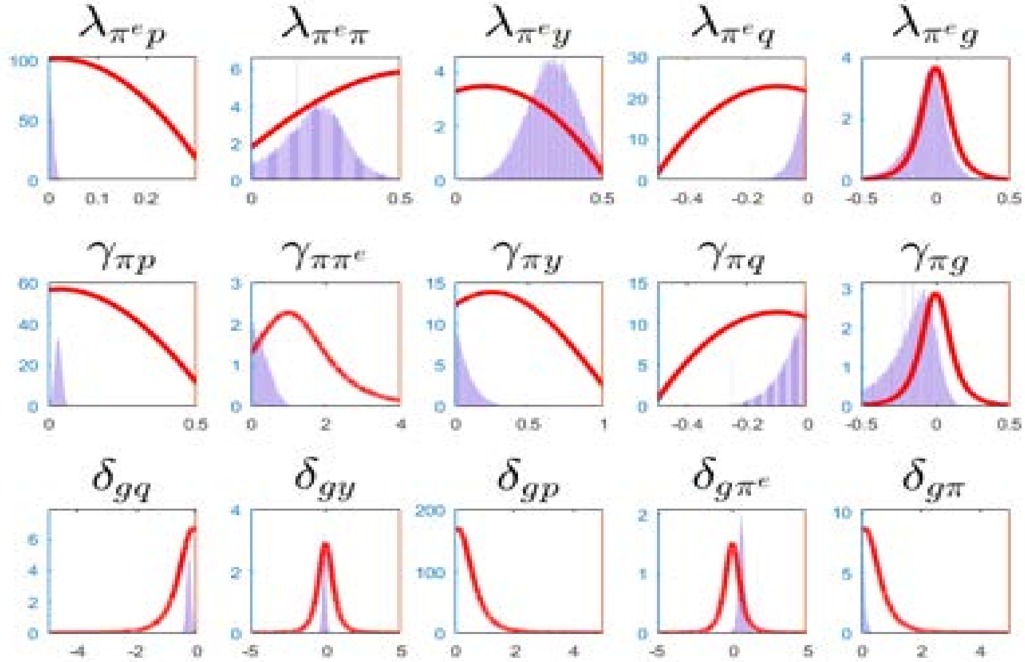

Figure 19: Canada: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks.

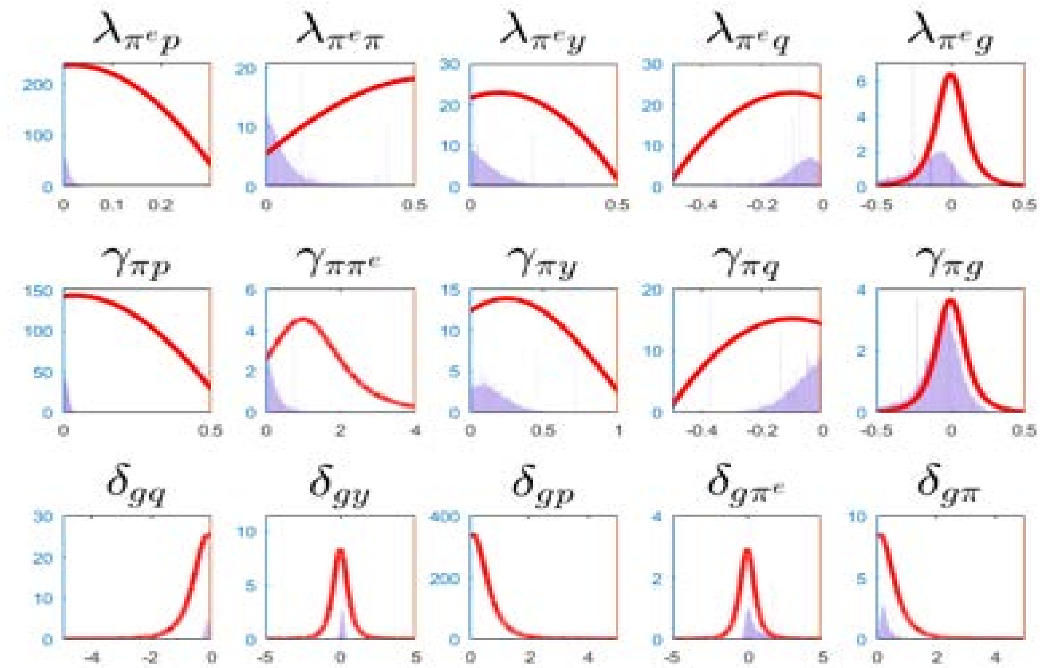

Figure 20: New Zealand: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks.

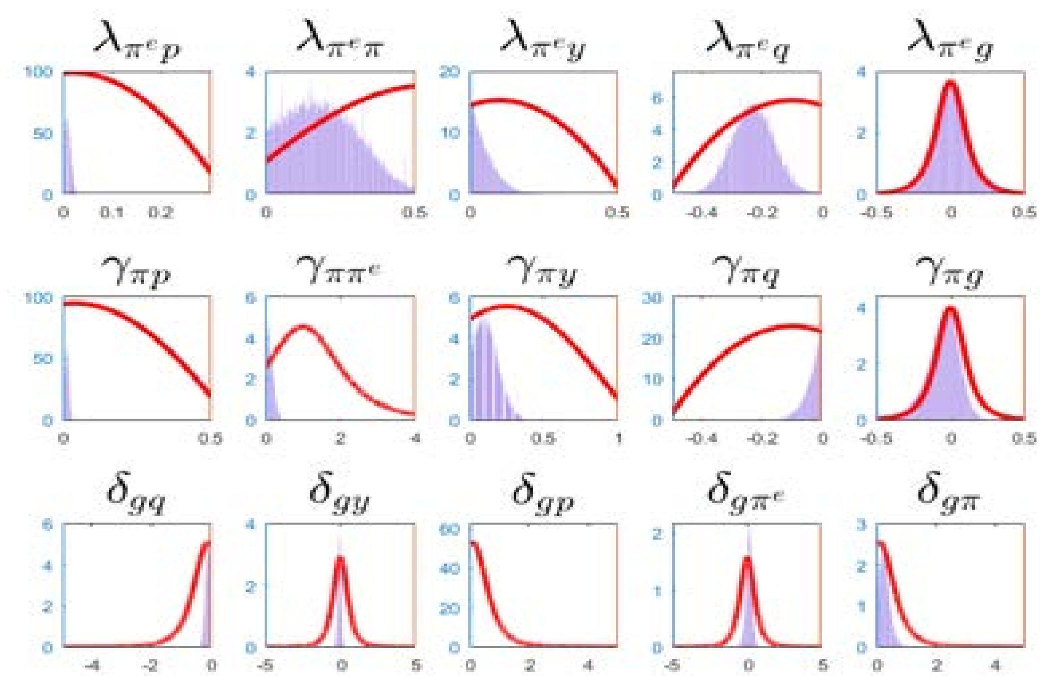

Figure 21: Euro Area: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks.

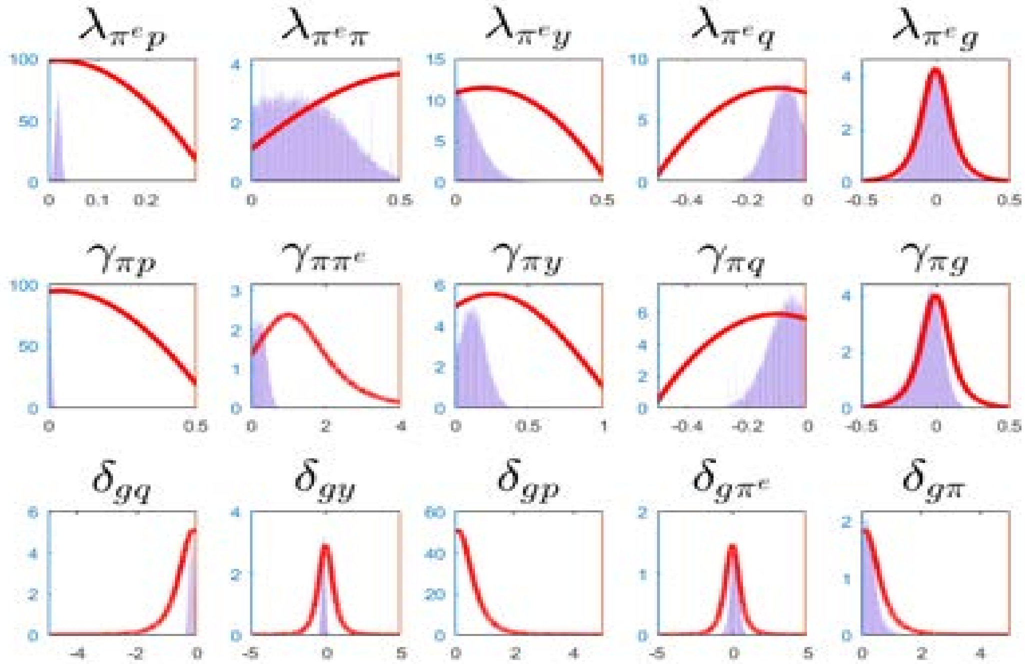

Figure 22: United Kingdom: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks.

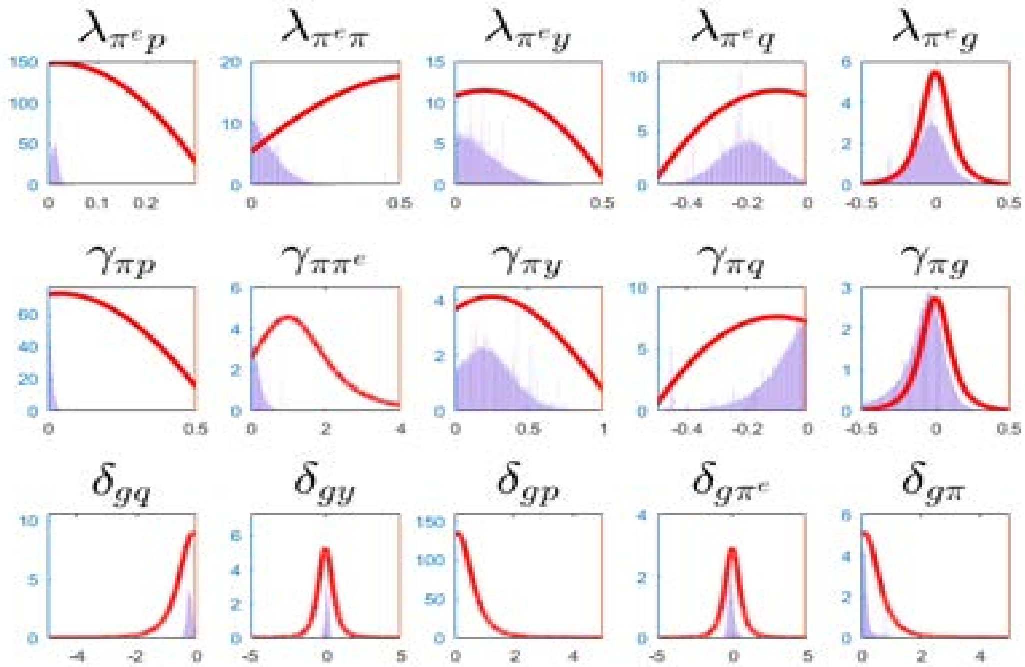

Figure 23: Norway: Prior (solid red curves) and posterior (purple histograms) distributions of structural parameters in the inflation and GSCPI blocks.

C Historical Decomposition

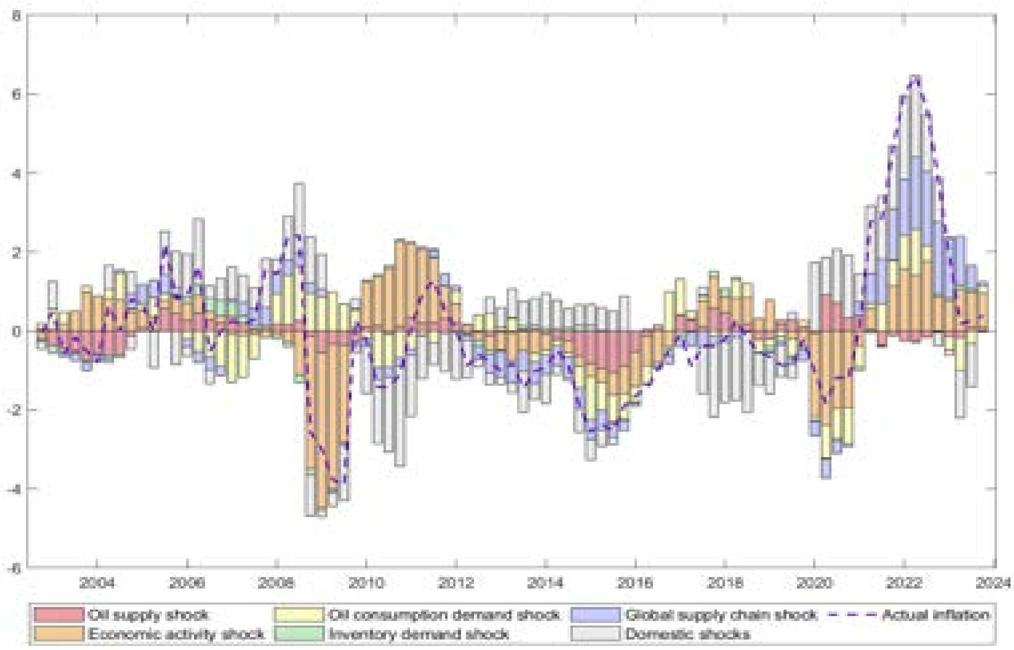

Figure 24: US: Historical decomposition for CPI (demeaned) full sample

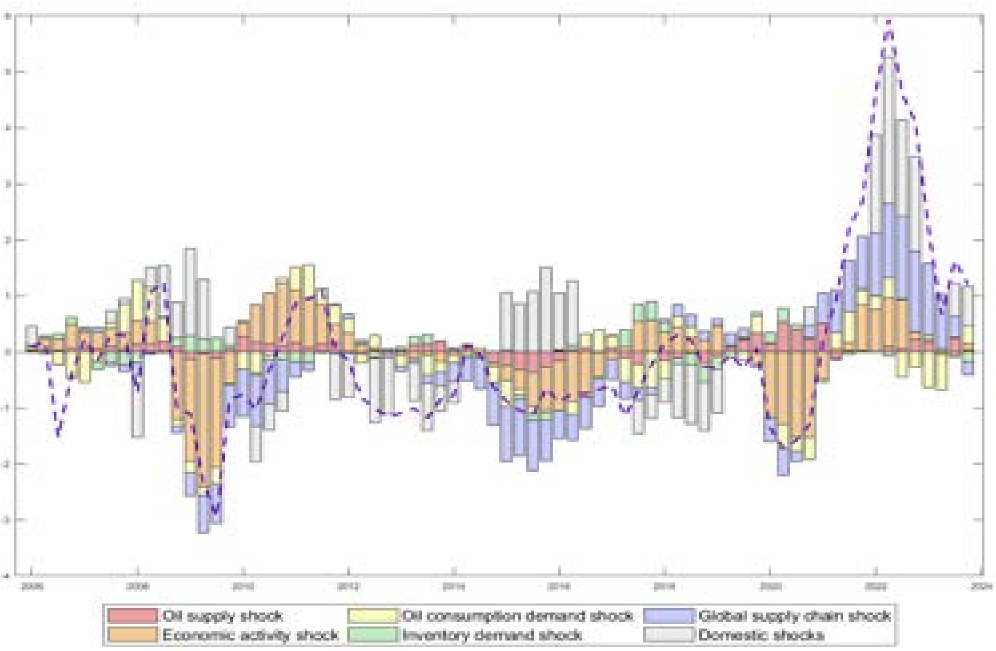

Figure 25: Canada: Historical decomposition for CPI (demeaned) full sample

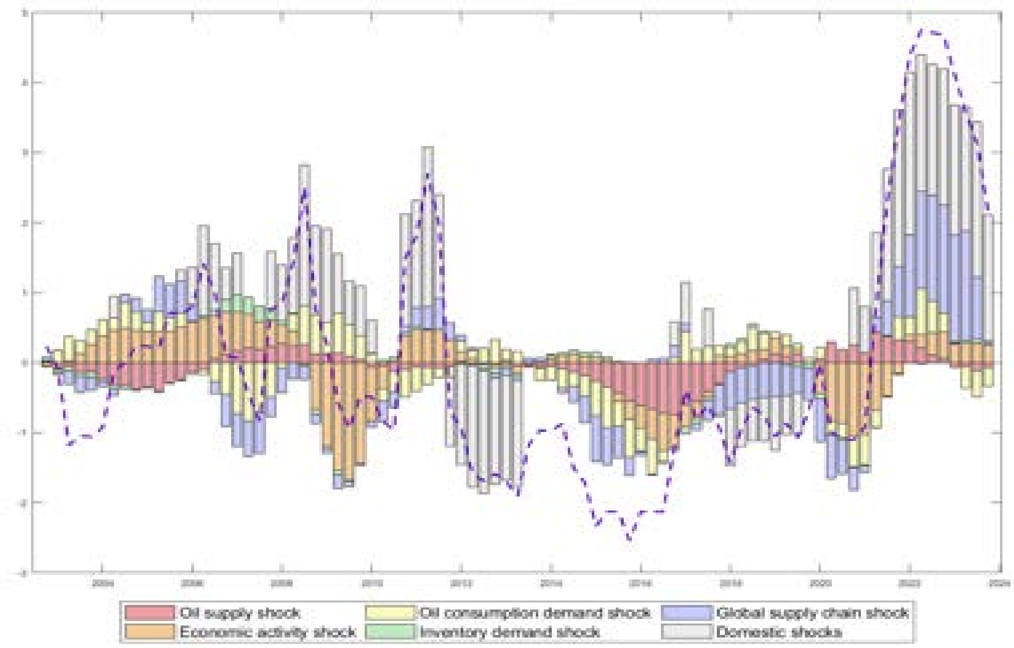

Figure 26: New Zealand: Historical decomposition for CPI (demeaned) full sample

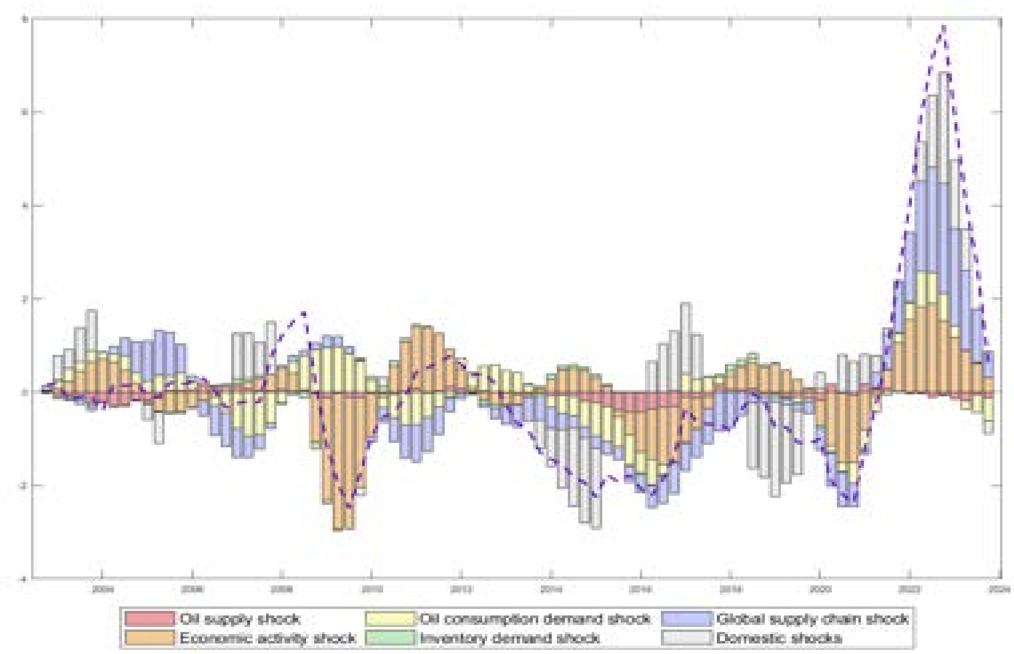

Figure 27: Euro area: Historical decomposition for CPI (demeaned) full sample

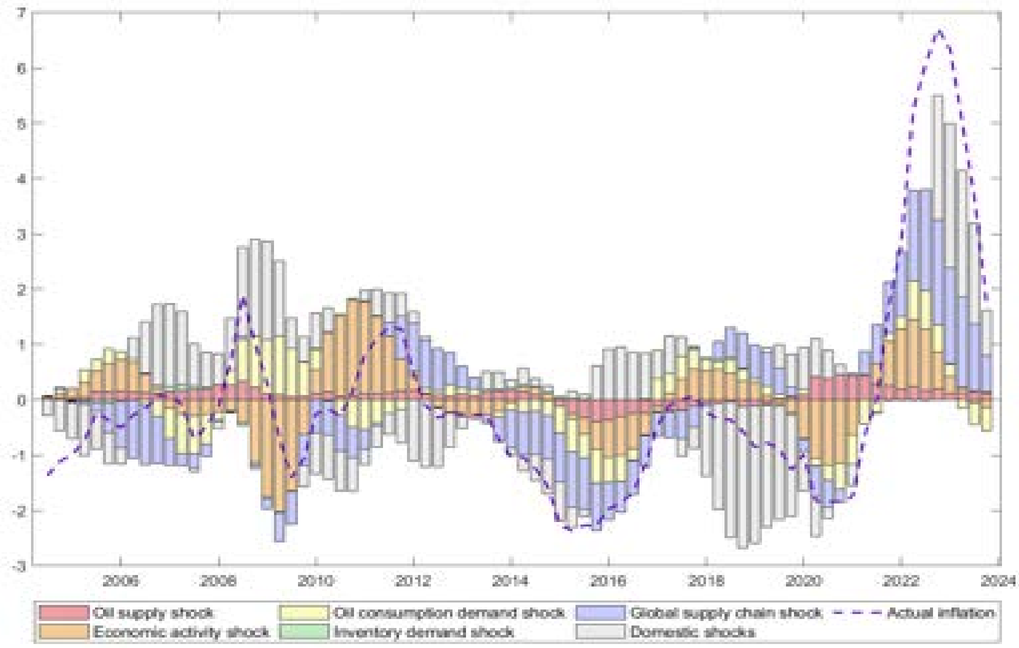

Figure 28: UK: Historical decomposition for CPI (demeaned) full sample

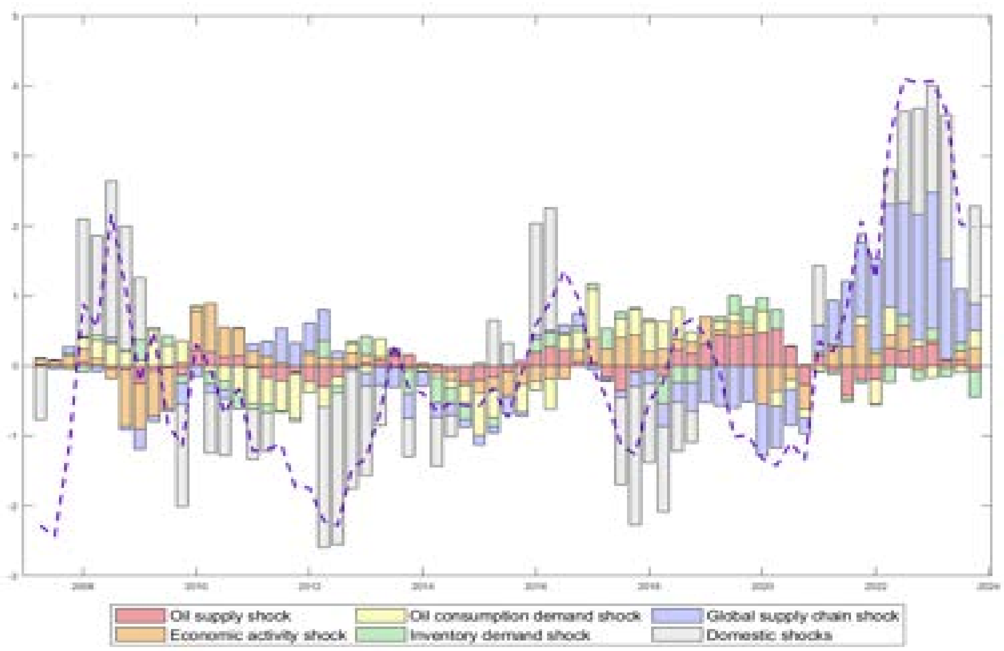

Figure 29: Norway: Historical decomposition for CPI (demeaned) full sample

D Conditional Forecasts

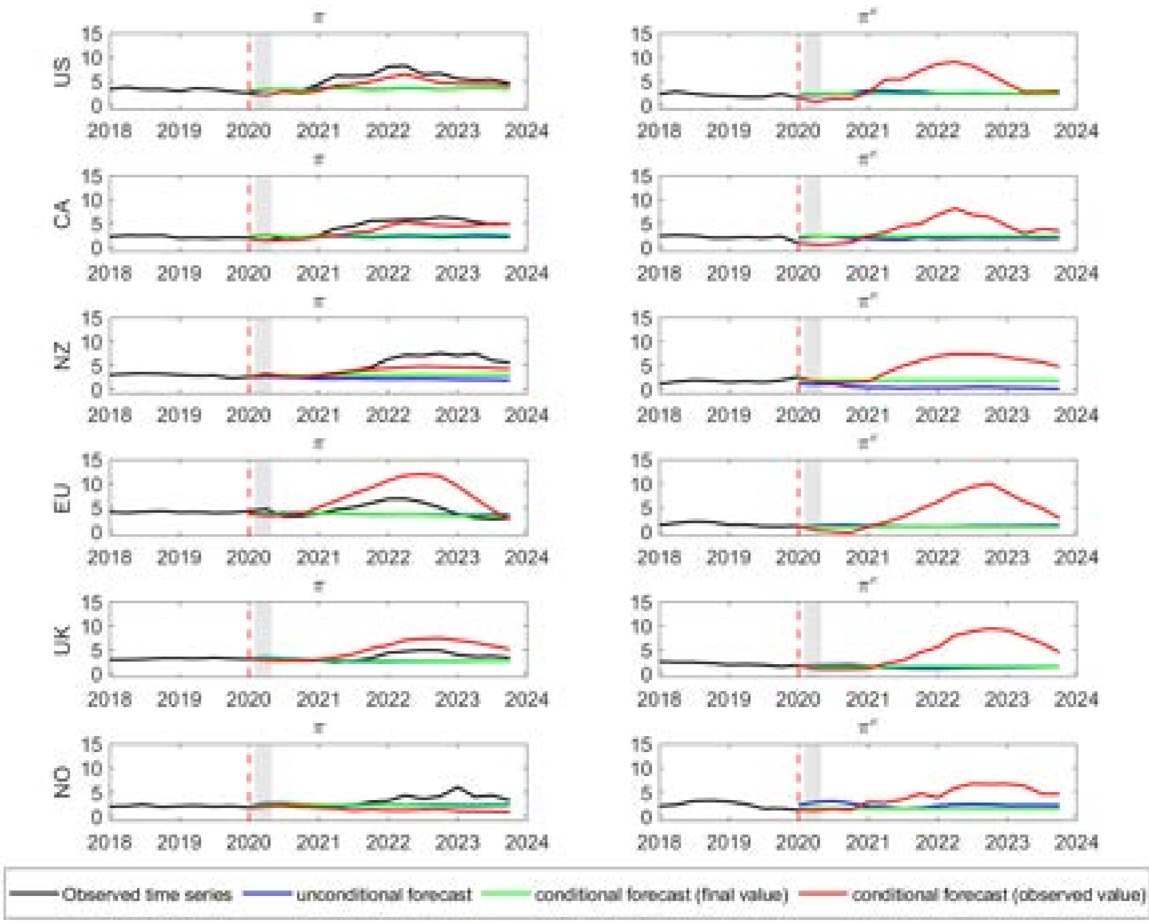

Figure 30: Conditional Forecasts. The countries under study are the US, Canada (CA), New Zealand (NZ), the Euro area (EU), the UK and Norway (NO).

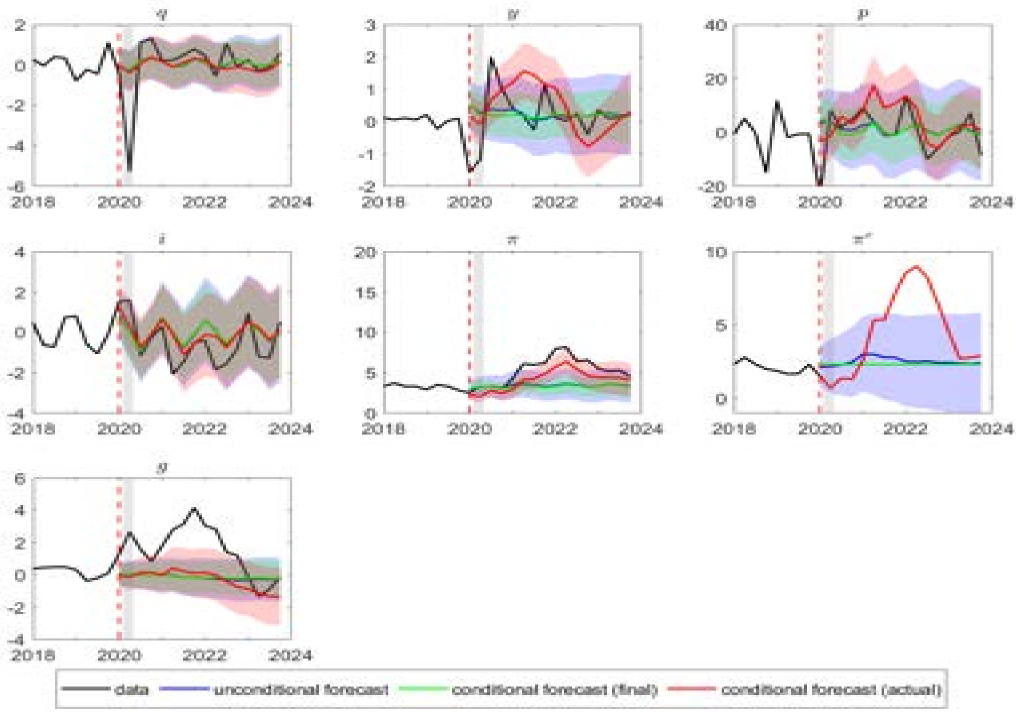

Figure 31: US: Coditional forecasts in the pandemic period.

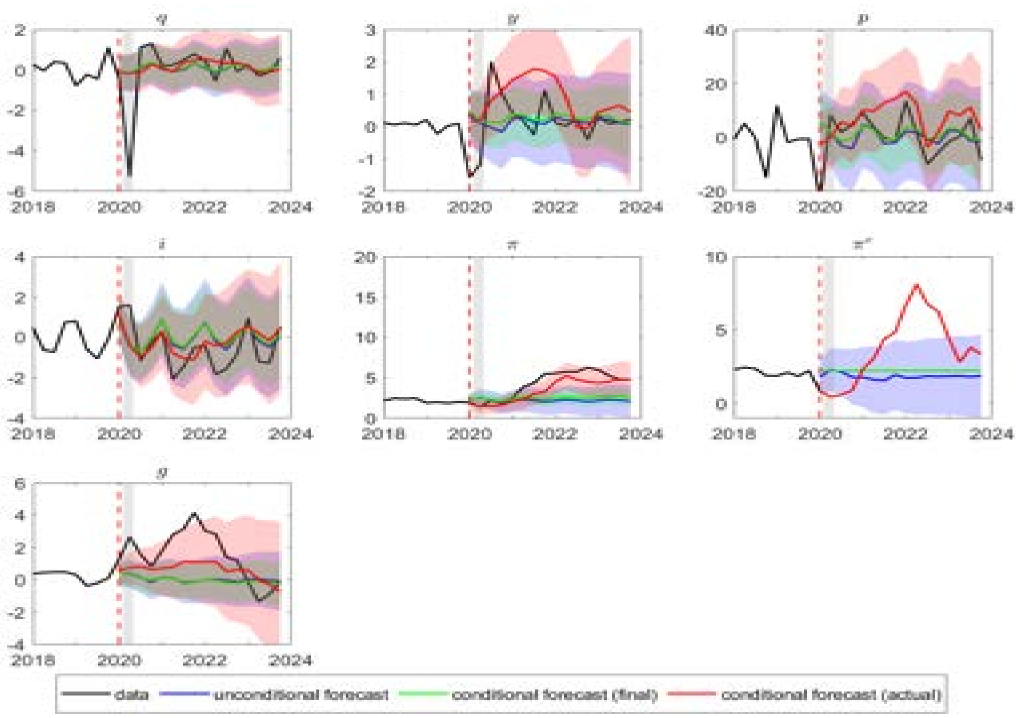

Figure 32: Canada: Conditional forecasts in the pandemic period.

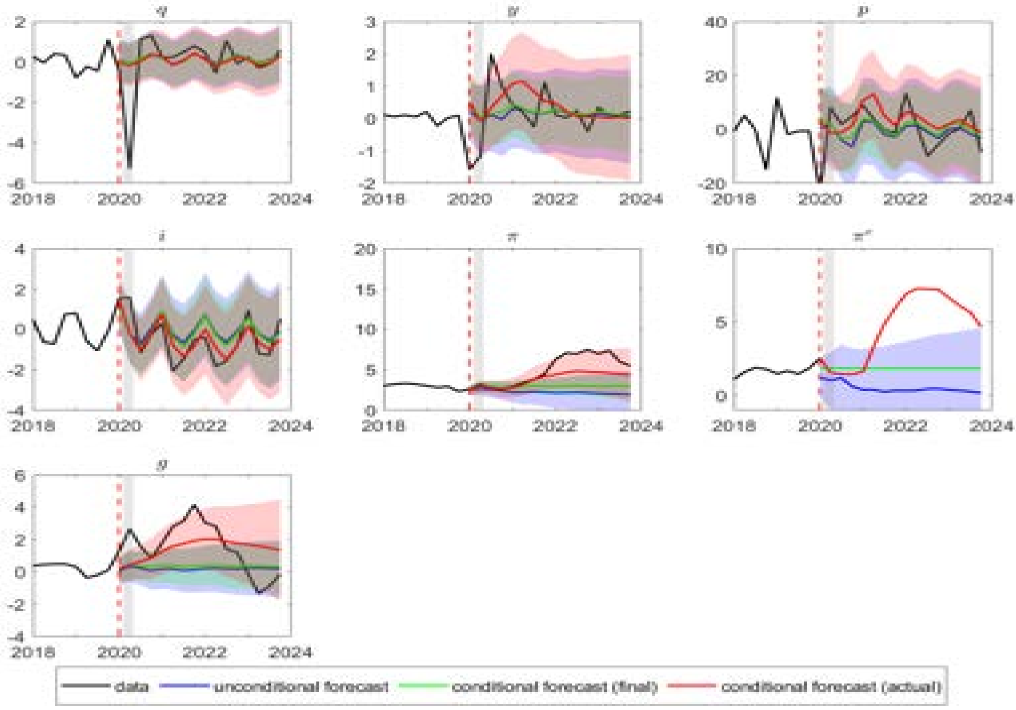

Figure 33: New Zealand: Conditional forecasts in the pandemic period.

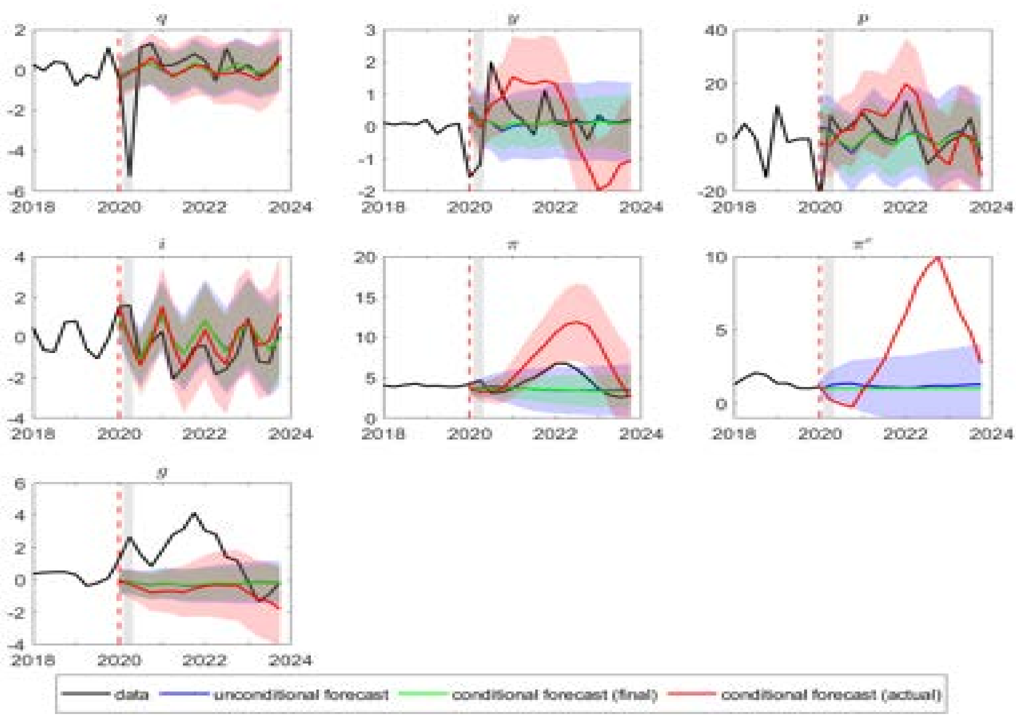

Figure 34: Euro area: Conditional forecasts in the pandemic period.

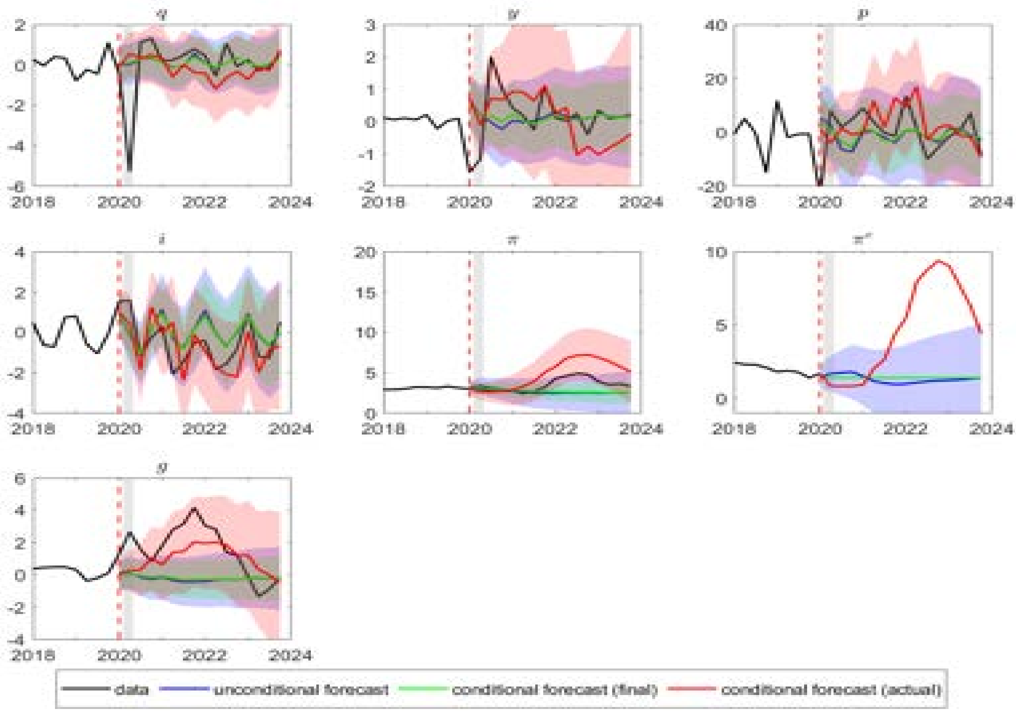

Figure 35: UK: Conditional forecasts in the pandemic period.

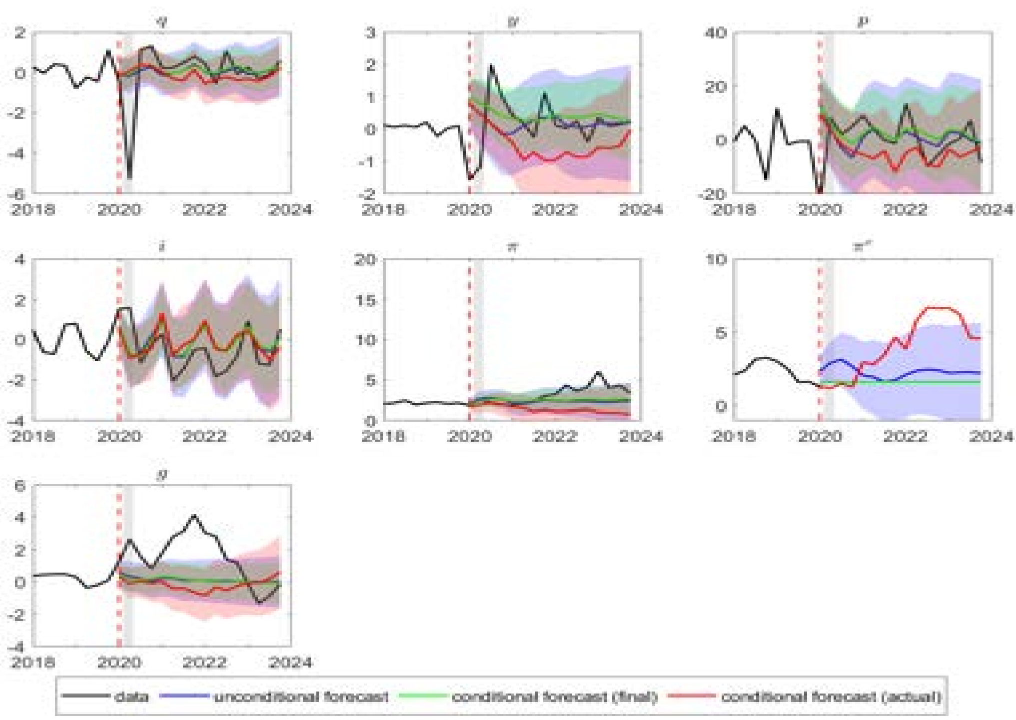

Figure 36: Norway: Conditional forecasts in the pandemic period.