THE LONG RECORD OF INFLATION SHOCKS IN GREECE: DRIVERS AND IMPACTS

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ABSTRACT

Global geopolitical tensions have increased considerably in recent years. This has affected the economies primarily via prices on commodities. As a result, global inflation has risen in the aftermath of geopolitical shocks. Given the higher energy and food price shares in the consumer basket, Greek inflation has also risen significantly. Historically speaking, Greece has repeatedly experienced periods of inflationary pressure. Over the past 50 years, global supply-side shocks have triggered cost-push inflation, which was often accommodated by expansionary policies. This paper analyses the historical trajectory of inflationary shocks in Greece, aiming to document inflation trends from the early 1970s to the present. In particular, it identifies the underlying forces that have driven inflation, which in turn entails an examination of both domestic demand and supply shocks, as well as global supply shocks. We find that there is a direct interplay between domestic demand and supply shocks, global supply shocks driven by geopolitical tensions and Greek headline inflation.

Keywords: Greece; inflation; geopolitical risks; demand shocks; supply shocks

JEL classification: C1; E3; F5

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ΠΛΗΘΩΡΙΣΤΙΚΕΣ ΔΙΑΤΑΡΑΧΕΣ ΣΤΗΝ ΕΛΛΑΔΑ: ΠΡΟΣΔΙΟΡΙΣΤΙΚΟΙ ΠΑΡΑΓΟΝΤΕΣ ΚΑΙ ΕΠΙΠΤΩΣΕΙΣ

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ΠΕΡΙΛΗΨΗ

Οι παγκόσμιες γεωπολιτικές εντάσεις έχουν αυξηθεί σημαντικά τα τελευταία χρόνια. Αυτό επηρέασε τις οικονομίες κυρίως μέσω των τιμών των εμπορευμάτων. Ως αποτέλεσμα, στον απόηχο των γεωπολιτικών κρίσεων, ο παγκόσμιος πληθωρισμός έχει αυξηθεί σημαντικά. Δεδομένης της μεγαλύτερης συμμετοχής των τιμών της ενέργειας και των τροφίμων στον εγχώριο δείκτη τιμών καταναλωτή, ο πληθωρισμός στην Ελλάδα αυξήθηκε επίσης. Με βάση τα ιστορικά στοιχεία, η ελληνική οικονομία έχει επανειλημμένα βιώσει περιόδους υψηλού και επίμονου πληθωρισμού. Τα τελευταία 50 χρόνια οι παγκόσμιες κρίσεις από την πλευρά της συνολικής προσφοράς προϊόντος προκάλεσαν επιτάχυνση του πληθωρισμού κόστους στην Ελλάδα. Εξαιτίας μάλιστα των επεκτατικών οικονομικών πολιτικών, οι οποίες διευκόλυναν την ενίσχυση των εγχώριων πληθωριστικών πιέσεων, ο πληθωρισμός κόστους συχνά εξελισσόταν σε έναν επίμονο πληθωρισμό ζήτησης. Η παρούσα μελέτη αναλύει την ιστορική διαδρομή των πληθωριστικών διαταραχών στην Ελλάδα από τις αρχές της δεκαετίας του 1970 μέχρι σήμερα με στόχο την ανίχνευση των κύριων προσδιοριστικών παραγόντων. Ειδικότερα, εξετάζει την επίδραση των διαταραχών, εγχώριων και εξωγενών, από την πλευρά τόσο της συνολικής προσφοράς προϊόντος όσο και της συνολικής ζήτησης. Τα εμπειρικά ευρήματα διαπιστώνουν την ύπαρξη άμεσης αλληλεπίδρασης μεταξύ των διαταραχών στην εγχώρια ζήτηση και προσφορά, του αυξημένου γεωπολιτικού κινδύνου και του εγχώριου πληθωρισμού.

ΜΗ ΤΕΧΝΙΚΗ ΣΥΝΟΨΗ

Οι παγκόσμιες γεωπολιτικές εντάσεις έχουν αυξηθεί σημαντικά τα τελευταία χρόνια. Αυτό επηρέασε τις οικονομίες κυρίως μέσω των τιμών των εμπορευμάτων. Ως αποτέλεσμα, στον απόηχο των γεωπολιτικών κρίσεων, ο παγκόσμιος πληθωρισμός έχει αυξηθεί σημαντικά. Δεδομένης της μεγαλύτερης συμμετοχής των τιμών της ενέργειας και των τροφίμων στον εγχώριο δείκτη τιμών καταναλωτή, ο πληθωρισμός στην Ελλάδα επίσης αυξήθηκε. Με βάση τα ιστορικά στοιχεία, η ελληνική οικονομία έχει επανειλημμένα βιώσει περιόδους υψηλού και επίμονου πληθωρισμού. Τα τελευταία 50 χρόνια οι παγκόσμιες κρίσεις από την πλευρά της συνολικής προσφοράς προϊόντος προκάλεσαν επιτάχυνση του πληθωρισμού κόστους στην Ελλάδα. Εξαιτίας μάλιστα των επεκτατικών οικονομικών πολιτικών, οι οποίες διευκόλυναν την ενίσχυση των εγχώριων πληθωριστικών πιέσεων, ο πληθωρισμός κόστους συχνά εξελισσόταν σε έναν επίμονο πληθωρισμό ζήτησης.

Η παρούσα μελέτη αναλύει την ιστορική διαδρομή των πληθωριστικών διαταραχών στην Ελλάδα από τις αρχές της δεκαετίας του 1970 μέχρι σήμερα με στόχο την ανίχνευση των κύριων προσδιοριστικών παραγόντων. Τα κύρια ερωτήματα στα οποία επιδιώκει να απαντήσει είναι τα εξής: Τι σημαίνει ο όρος "διαταραχή" για τη λειτουργία της οικονομίας; Από ποια χαρακτηριστικά καθορίζεται η πληθωριστική διαταραχή; Πώς επηρεάζουν τον πληθωρισμό παγκόσμια και εγχώρια γεγονότα; Ποιο ήταν το ιστορικό πλαίσιο του πληθωρισμού στην Ελλάδα και ποιοι οι προσδιοριστικοί παράγοντες; Ειδικότερα, εξετάζει την επίδραση των διαταραχών, εγχώριων και εξωγενών, από την πλευρά τόσο της συνολικής προσφοράς προϊόντος όσο και της συνολικής ζήτησης. Εστιάζοντας το ενδιαφέρον στις παγκόσμιες γεωπολιτικές εντάσεις, οι οποίες κατά κανόνα θεωρούνται εξωγενείς διαταραχές, αναλύει την επίπτωση μιας αύξησης του γεωπολιτικού κινδύνου στον εγχώριο πληθωρισμό και στο ρυθμό οικονομικής μεγέθυνσης με τη χρήση ενός διαρθρωτικού αυτοπαλίνδρομου σχήματος. Ο γεωπολιτικός κίνδυνος προσεγγίζεται ποσοτικά με το δείκτη GPR (Geopolitical Risk Index) των Caldara and Iacoviello (2022). Εξετάζεται επίσης η επίδραση από μια αύξηση της οικονομικής και πολιτικής αβεβαιότητας οφειλόμενη σε τοπικούς, ιδιοσυγκρασιακούς παράγοντες, η οποία προσεγγίζεται ποσοτικά με το δείκτη WUI-Greece (World Uncertainty Index-Greece) των Ahir et al. (2022).

Τα εμπειρικά ευρήματα διαπιστώνουν την ύπαρξη άμεσης αλληλεπίδρασης μεταξύ των διαταραχών στην εγχώρια ζήτηση και προσφορά, του αυξημένου γεωπολιτικού κινδύνου και του εγχώριου πληθωρισμού. Ειδικότερα, η μελέτη για την περίπτωση της Ελλάδας καταδεικνύει ότι η αβεβαιότητα που προκύπτει τόσο από εγχώρια γεγονότα όσο και από παγκόσμιες γεωπολιτικές εντάσεις ασκεί σημαντική επιρροή στον εγχώριο πληθωρισμό. Με την επέλευση ενός παγκόσμιου γεωπολιτικού γεγονότος, ο αντίκτυπος στον εγχώριο πληθωρισμό είναι μεγαλύτερος και έχει μεγαλύτερη διάρκεια σε σχέση με την εμφάνιση ενός τοπικού γεγονότος, υπό την προϋπόθεση, όμως, ότι η νομισματική πολιτική αντιδρά με στόχο τον περιορισμό των πληθωριστικών πιέσεων. Τα ευρήματα υποδηλώνουν επίσης ότι οι διαταραχές που οφείλονται στην εγχώρια ζήτηση συνεπάγονται πιο επίμονες πληθωριστικές πιέσεις σε σύγκριση με εκείνες που προκαλούνται από διαταραχές στην εγχώρια προσφορά προϊόντος.

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1 INTRODUCTION

From mid-2021 to mid-2022, global inflation surged due to a demand shock driven by pent-up consumer activity following the post-pandemic economic reopening. The fiscal measures implemented during the pandemic further increased demand for goods and services, exceeding the economy's productive capacity and destabilising private inflation expectations (Dynan and Elmendorf 2024). At the same time, global supply shocks, triggered by major geopolitical events, further compounded the impact of the initial demand shock on inflation (Seiler 2022).

Past record has shown that higher energy prices and disruptions to global supply chains consistently contributed to inflation pressures. The question of whether post-pandemic inflation was primarily driven by demand or supply shocks has been the subject of debate among both academic researchers and policy makers over recent years (Ha et al. 2022; Vorisek et al. 2022; Bernanke and Blanchard 2024). This debate has also prompted a resurgence of interest in the experience of the global economy during the period of Great Inflation in the 1970s, with a particular focus on elucidating the contribution of demand and supply shocks to the underlying causes of the inflationary process (see, inter alia, Nelson 2022 and Caldara et al. 2024). This debate is critically important for setting monetary policy. It has been argued that monetary policy should respond forcefully enough to demand-driven shocks arising from large fiscal programmes that put sustained upward pressure on inflation (Blanchard 2021; Summers 2021) and have a less forceful response to supply shocks, as inflation driven by supply shocks is likely to reverse relatively quickly (Forbes et al. 2024; Reifschneider and Wilcox 2022).

Central to this debate are questions about the transitory versus permanent nature of inflation, the origin of shocks (demand-driven versus supply-driven shocks) and the appropriate roles of fiscal and monetary policy in mitigating inflationary pressures. Bernanke and Blanchard (2024) posit that the post-pandemic inflation surge in eleven advanced economies was predominantly precipitated by energy and food price fluctuations. The absence of a substantial degree of wage indexation, coupled with the prevalence of anchoring, effectively precluded the emergence of a price-wage spiral, thereby averting the escalation of inflation to a persistent state. On the other hand, Giannone and Primiceri (2024) argue that domestic demand shocks were the most important drivers of the post-pandemic inflation.

This paper analyses the historical trajectory of inflationary shocks in Greece, aiming to document inflation trends from the early 1970s to the present. In particular, it identifies the underlying forces that have driven inflation, which in turn entails an examination of both domestic demand and supply shocks, as well as global supply shocks, and an analysis of their respective effects. As is evident from the historical data, Greece has repeatedly experienced periods of inflationary pressure. Over the past 50 years, global supply-driven shocks have triggered cost-push inflation, which was often accommodated by expansionary fiscal and monetary policies. This policy response transformed temporary supply shocks into per-

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sistent demand-pull inflation, resulting in significant output losses.[1]

The principal questions that this study seeks to address are as follows: what is meant by the term "shock" in the context of economics; what characteristics define an inflation shock; how do global and domestic shocks affect inflation; what was the historical context of inflation in Greece; and what factors have driven inflation in Greece. We find that there is a direct interplay between domestic demand and supply shocks, global supply shocks and Greek headline inflation. The evidence suggests that global geopolitical shocks and inflation have had a substantial impact. It is equally evident that domestic demand shocks have played a significant role in determining domestic inflation. These domestic demand shocks, originating from the fiscal and monetary accommodation of global supply shocks, have turned cost-push inflation into demand-pull inflation with high persistence. However, it is also evident that domestic supply shocks have also played a significant role.

The rest of the paper is organised as follows. Section 2 presents a simple definition of a shock in economics and especially of an inflation shock. It distinguishes between global and domestic shocks and discusses whether there is a link between global geopolitical shocks and inflation. Section 3 offers an overview of Greece's inflationary trends, emphasising the interplay between demand- and supply-driven shocks. Section 4 presents the empirical methodology employed to quantify the impact of shocks on inflation and reports the empirical findings. Section 5 concludes. An appendix at the end of the paper presents the definitions of the variables and the data sources used in the analysis.

2 INFLATION SHOCKS

In the field of economics, a "shock" is defined as a significant event, whether positive or negative, that is both unexpected and unpredictable and often originates from outside the economy. It is an unpredictable change in exogenous factors, which are unexplained by an economic model and may influence endogenous economic variables. Such an event has the potential to disrupt the normal functioning of the economy, leading to major changes within it. Shocks are divided into global and domestic ones. Global shocks are largely exogenously-driven events. They encompass shocks to aggregate supply, aggregate demand,[2] commodity prices (e.g. energy and food) and financial shocks, including a stock market crash, a liquidity crisis in the banking system, unpredictable changes in monetary policy or an international currency devaluation. Domestic shocks are endogenously-driven local events. They include shocks to domestic supply and demand as well as monetary policy surprises in response to domestic demand developments. Thereby, global negative supply shocks or domestic positive demand shocks are important sources of an inflation shock.

2.1 DEMAND- VERSUS SUPPLY-DRIVEN SHOCKS

An inflation shock is an unexpected or unpredictable sharp rise in inflation that has an unforeseeable large-scale impact on the economy. This is the well-known case of what is called "the Great Inflation Era" in the 1970s, a period of very high global inflation between 1973 and 1982.

Inflation shocks can be categorised as either demand- or supply-side shocks.[3] On the demand side, many factors, including monetary and fiscal policy, affect aggregate demand and, thus, inflation. On the supply side, in the long run, productivity growth determines aggregate supply and inflation. However, in the short run, abrupt and largely exogenously-driven events,

1 For the impact of the monetary accommodation regime on inflation in the years leading up to the introduction of the euro, see Lazaretou (2024).
2 Global supply shocks are intrinsically linked to global supply chains and commodity prices, including oil prices. They affect producer prices. Global demand shocks refer to an unpredicted and exogenous change in global demand for a product or service, ordinarily temporary in nature, and typically generated by a global pandemic or natural disaster.
3 For a discussion on demand and supply shocks, see Blinder and Rudd (2013).

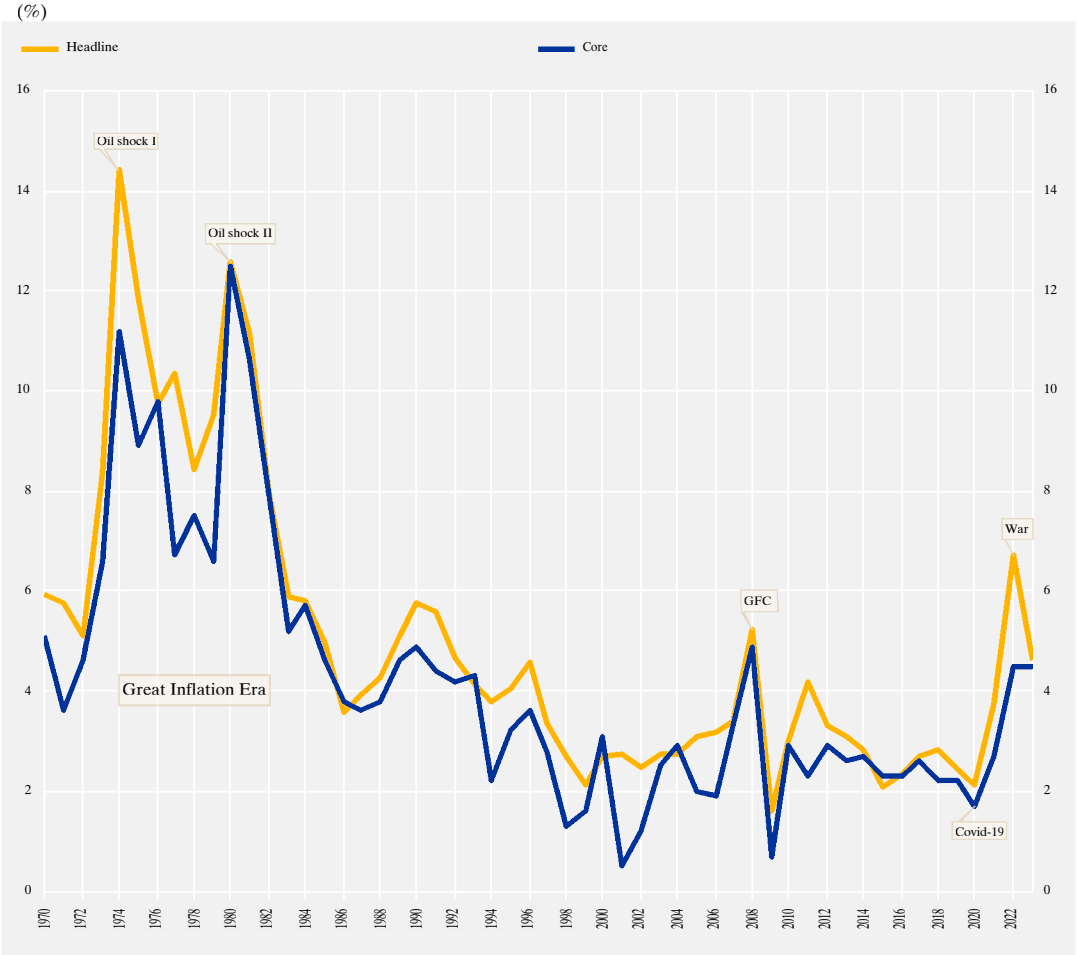
such as market or trade restrictions, supply chain disruptions due to natural disasters, pandemics, etc., major geopolitical tensions or even nominal rigidities, such as wage-price controls, can occasionally affect aggregate supply and push headline inflation above core inflation. For example, we refer to rapid increases in food and/or energy prices, which require rapid adjustments in relative prices.

At any given moment, there is a core (underlying) inflation rate toward which the headline (actual) rate tends to converge. This "equilibrium" rate is determined by the fundamentals of aggregate demand and supply. Thereby, headline inflation can markedly deviate from core inflation over short periods of time, signalling an inflation shock. Furthermore, if core inflation becomes more sensitive to increases in headline inflation, then inflation persists (Ha et al. 2019; Vorisek et al. 2022). In this case, monetary policy shocks play a crucial role, in the sense that monetary policy either accommodates the initial inflation shock and aggravates the impacts or forcefully responds to and mitigates the initial impact of an inflation shock.

2.2 GLOBAL SHOCKS AND GLOBAL INFLATION: IS THERE A LINK?

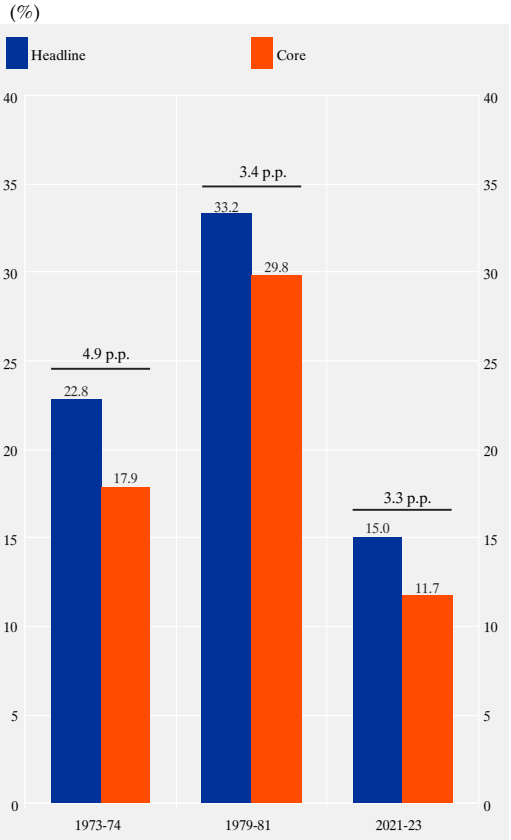
As seen in Chart 1, which plots global headline and core inflation over the past 50 years, global

Chart 1 Global inflation shocks (1970-2023)



Source: Ha et al. (2023), April 2024 update.
Notes: Headline (HCPI) and core global inflation rate, GDP-weighted average, annual averages.

Chart 2 Growing global core inflation sensitivity to an initial inflation shock



Source: Ha et al. (2023), April 2024 update.
Note: Authors' estimations: cumulative global inflation rate.

shocks reflect a continuation of a long-term trend of inflation shocks. They, thus, played a prominent role in explaining variations in global inflation on average. Explicitly, negative economic shocks may be attributed to government interventions, alongside rises in production costs. Such costs may be attributed to a number of factors, including geopolitical confrontations, pandemics, commodity price fluctuations and supply chain disruptions. These factors have been shown to increase inflation. Inflation is perceived by economic agents as a negative phenomenon, which is rarely interpreted and alters their behaviour and their decision-making process (see Binetti et al. 2024).

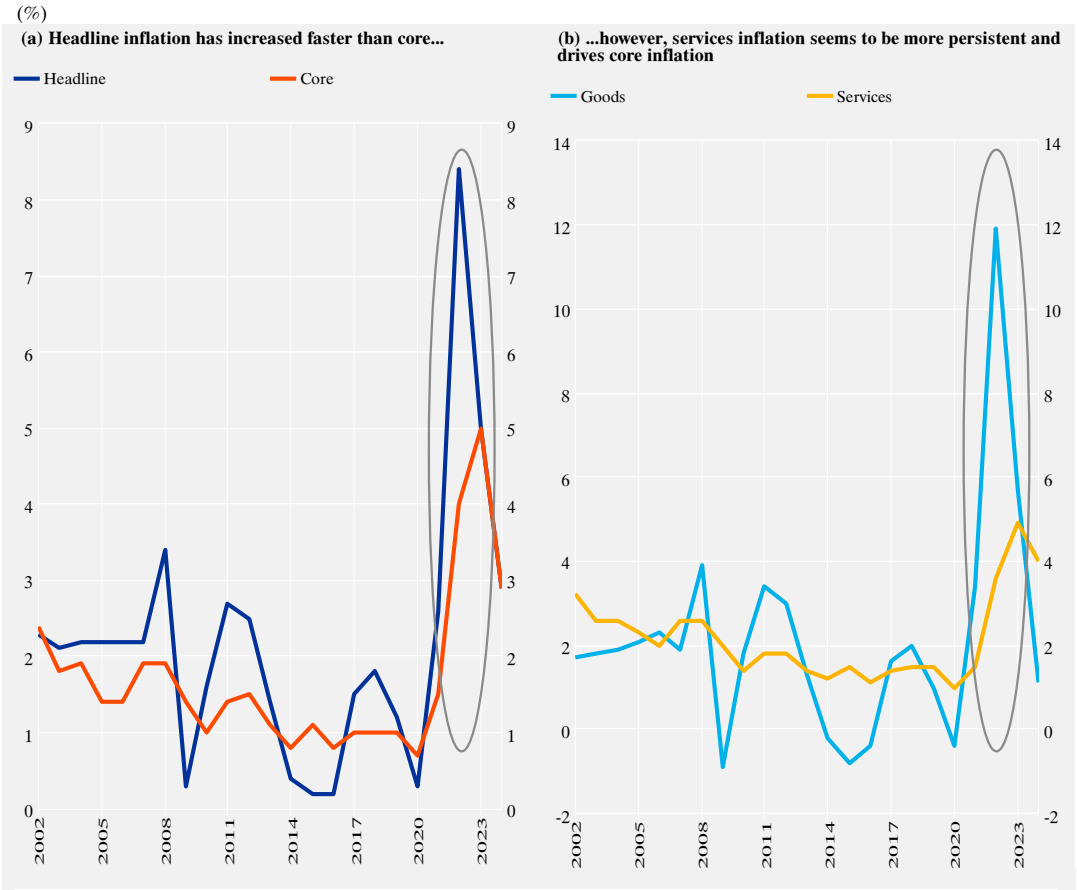
It is important to note that global shocks do not necessarily imply global supply shocks. Indeed, they frequently encompass supply shocks, as evidenced by the two oil price shocks that occurred in the 1970s and, more recently, the global pandemic of 2020-21 and the outbreak of the Russia-Ukraine war in 2022. Conversely, global demand shocks have been observed to be accommodated by loose monetary policy and inflation surprises. Examples of such demand shocks include the rise in inflation before the global financial crisis of 2007-08 and the inflation surge that occurred with the reopening of the economy after the lockdowns in the second half of 2021.

The key question is whether there is a pass-through of headline inflation to core inflation, which, if confirmed, would indicate a state of persistent inflation. As seen in Chart 2, during the 1973-74 inflation shock, the discrepancy between headline and core inflation was 5 percentage points (pps). This discrepancy was significantly smaller in subsequent inflation shocks, indicating that core inflation was becoming more sensitive to a shock in headline inflation. Concerning the euro area (see Chart 3), headline inflation increased faster than core during the more recent shock in 2021-23, signalling that inflation expectations were well anchored at least during the first phase of the global inflation shock, mostly attributed to the pandemic. Then, however, core inflation caught up with headline inflation (see Chart 3, panel a), as services inflation trended higher, while goods inflation substantially eased (see Chart 3, panel b), demonstrating that the demand shock drove core inflation over the past two years. More importantly, this development signals that structural factors in different sectors seem to drive price setting and, therefore, further monetary policy rate increases might lead to an economic slack.

2.3 GEOPOLITICAL SHOCKS AND INFLATION

Geopolitical shocks are considered a prime example of global supply shocks. They are defined as a dramatic and unanticipated event of violence, such as war conflicts, terrorist attacks and trade disputes, that results in supply chain

Chart 3 The 2022-24 inflation shock in the euro area (2002-2024)



Source: Eurostat.
Note: HICP, annual average rate of change.

disruptions and regulatory changes. These events are purely exogenously driven and largely unanticipated negative shocks that cause geopolitical uncertainty, which is distinct from other types of uncertainty, economic or political, often driven by economic or political considerations.

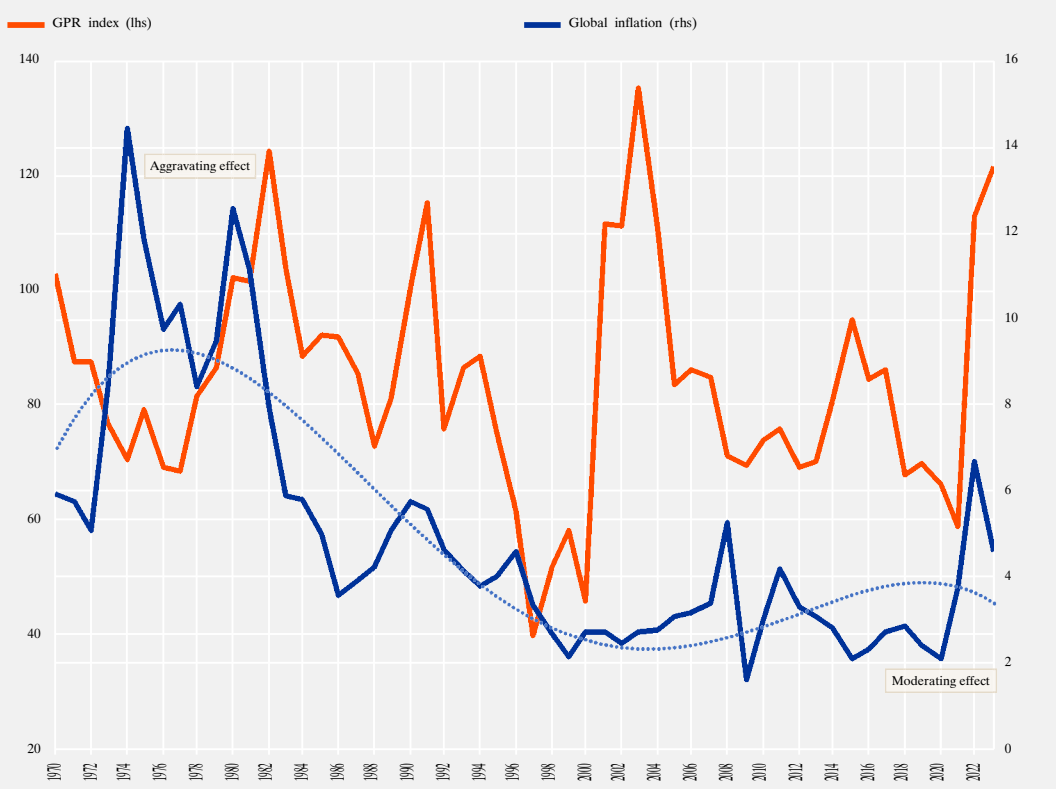
The empirical literature on the link between geopolitical uncertainty and the economy has been growing recently.[4] See, for example, Feng et al. (2023) on the negative impact of geopolitical uncertainty on capital flows, Wang et al. (2024) on corporate investment, Salisu et al. (2022) on stock market returns, Caldara and Iacoviello (2022) on real GDP growth rate and Kapopoulos et al. (2024) on foreign direct investment. Two factors have contributed to the recently increased research interest. First, the latest geopolitical tensions have led to renewed concern about the risks for economic activity. Second, the new metric of geopolitical risk, namely the global Geopolitical Risk (GPR) Index, recently constructed by Caldara and Iacoviello (2022), allows the possibility to quantify the impact of geopolitical tensions on the economy.

According to Caldara and Iacoviello (2022, p. 1197), geopolitical risk is defined as "...the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political actors that affect the peaceful course of international rela-

4 The literature, both theoretical and empirical, on how shocks originated by economic policy shifts or political changes impact economic agents' behaviour, thus affecting financial and economic variables, is well featured. See Bernanke (1983), Rodrick (1991), Bloom (2009) and Bloom et al. (2018).

Chart 4.1 Do GPR and inflation move together? (1970-2023)

(lhs: index 1900-2019=100; rhs: annual percentage changes)



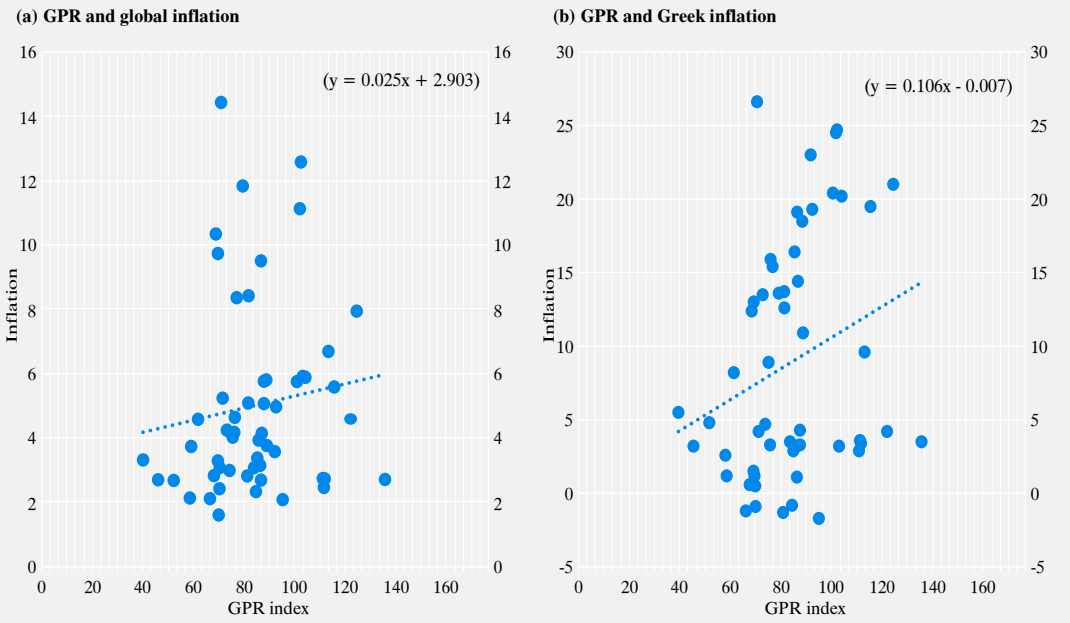
Sources: Ha et al. (2023), April 2024 update; Caldara and Iacoviello (2022), https://www.matteoiacoviello.com/gpr.htm.
Notes: GPR= global geopolitical risk index; headline CPI inflation. The blue dotted line depicts the time trend of headline CPI.

tions". In other words, geopolitical motives are viewed as situations in which the power struggles of agents over territories cannot be resolved peacefully and democratically. They constructed the GPR Index by counting the number of "risk" words in 10 leading English language newspapers' articles discussing global geopolitical events through an automated text search in the electronic archives of these newspapers. The index is the ratio of the total number of articles related to adverse geopolitical events in each newspaper for each month, divided by the total number of published articles. By construction, the GPR Index captures the risks that both threats and acts of violence materialise.[5]

In this context, we seek to examine the association between geopolitical risks and inflation. The central question guiding this inquiry is whether geopolitical shocks, defined as global supply shocks, and inflation move together. It is evident that geopolitical factors have played a significant role in the occurrence of major global inflationary pressures. As seen in Chart 4.1, which plots the GPR Index and global headline inflation, geopolitics is a common thread that runs through the three major global inflation shocks, namely the 1973-74 OPEC I shock, the 1979-80 OPEC II shock and the 2021-2023 inflation episode. Cases of a positive correlation are evidenced at the global level (see Chart 4.2, panel a) and even more so at the country level (see Chart 4.2, panel b), with Greece serving as an example.

5 These risks are the result of eight categories of external events: war threats, peace threats, military build-ups, nuclear threats, terror threats, beginning of war, escalation of war, terror acts. See https://www.matteoiacoviello.com/gpr.htm.

Chart 4.2 Is there a positive correlation between the geopolitical risk index and inflation?



Sources: Ha et al. (2023), April 2024 update; Caldara and Iacoviello (2022), https://www.matteoiacoviello.com/gpr.htm.
Notes: GPR= global geopolitical risk index; headline CPI inflation.

This simple stylised fact gives rise to a number of valuable insights. Global geopolitical shocks tend to be negative supply shocks and, thus, important drivers of cost-push inflation. In the case of monetary policy accommodation of the initial shock, cost-push inflation might end up as demand-pull inflation (aggravating effect). This was precisely the case with the surprise in global inflation well before the outbreak of the OPEC II shock, when major central banks transitioned to a loose monetary policy, thereby exacerbating the initial impact of the global supply shock on inflation (see DeLong 1997 and Orphanides 2003). On the contrary, a more responsive reaction of central banks mitigates the initial impact (moderating effect). This was exemplified by the recent episode of inflation, during which central banks adopted a policy of forceful money tightening.

Specifically, in the case of an inflation targeting regime, the response of monetary policy authorities usually depends on whether the shock is temporary or long-lasting, so as to avoid the de-anchoring of long-run inflation expectations. This can be achieved by utilising the favourable trade-off that widespread supply bottlenecks present to central banks when confronted with a demand shock. In such a scenario, the short-run Phillips curve is observed to be steeper and shift upwards, signifying that monetary tightening can be effective in curbing inflation while minimising output loss. It can be concluded that policy tightening exerts a significant effect on inflation, whilst exerting a comparatively smaller effect on economic output. This is precisely the case with the ECB's attempt to curb inflation during the recent inflation shock. However, when headline inflation is embedded in core inflation and spikes in certain sectors (e.g. services), policy tightening is not appropriate for controlling inflation anymore, since these spikes produce shifts in relative prices and resource misallocation, while interest rate rises produce output contraction (Bandera et al. 2023; Tenreyro 2023). In order to effectively address core inflation, it is essential to gain a comprehensive understanding of the structural factors that influence price setting across various sectors.

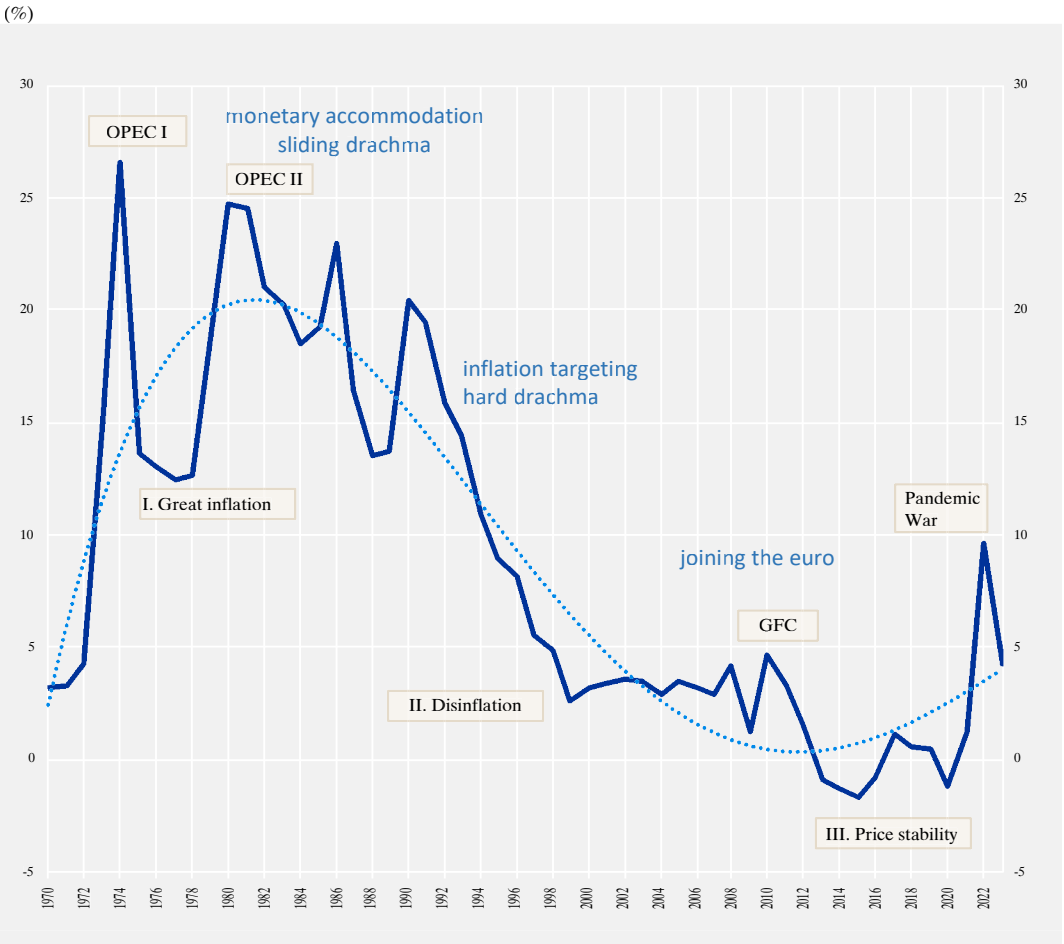
Therefore, the implementation of structural reforms is a more suitable approach to mitigating inflation persistence.

3 AN OVERVIEW OF INFLATION IN GREECE

3.1 A SNAPSHOT

Over the past 50 years, Greece has experienced three distinct phases of inflation, which have been linked not only to global supply shocks, but also to repeated domestic demand shocks. As demonstrated in Chart 5, the initial phase from the early 1970s until the early 1990s witnessed remarkably high and excessively volatile inflation. The two major global supply shocks in the 1970s as well as repeated domestic demand shocks were the primary drivers of inflation during that period. Global supply shocks were precipitated by two oil price shocks, which, in turn, were caused by two major geopolitical shocks of that time. Concurrently, domestic demand shocks emanated from the fiscal and monetary accommodation regime of the 1980s. The second phase began in 1995 and was marked by disinflation. That year, an inflation-targeting regime was introduced under which the exchange rate was used as a nominal anchor. The third phase began with the country's adoption of the euro and the submission of the domestic economy to a sin-

Chart 5 Three distinct phases of the inflation process in Greece



Source: Ha et al. (2023), April 2025 update.
Notes: Headline CPI inflation. The blue dotted line depicts the time trend of HCPI.

gle monetary policy, and was defined by low and stable inflation.

In the light of the above, we highlight two key facts. During the first phase of inflation, in addition to the global supply shocks of the 1970s, domestic monetary surprises in the 1980s also played an important role in determining domestic inflation. On the contrary, the process of inflation during the second and the third phases can be seen as an application in the Greek monetary policy of the Barro-Gordon model and the implied credibility hypothesis, according to which, when monetary policy is credible, private agents adjust their inflation expectations accordingly and, therefore, inflation actually falls with a limited loss of output.

3.2 COUNTRY-SPECIFIC SHOCKS, UNCERTAINTY AND INFLATION

The above inflation snapshot gives rise to the question how shocks drove inflation in Greece. Chart 6, panel (a) plots both headline inflation and an index of uncertainty for Greece, namely the World Uncertainty Index (WUI-Greece), which has been constructed by Ahir et al. (2022) by counting the frequency of the word "uncertainty" and its variants in the country reports for Greece of the Economist Intelligence Unit. The index is designed to identify potential risks to the Greek economy. In the absence of a country-specific geopolitical risk index, the WUI-Greece is used as a proxy for a country-specific metric with the objective of capturing the uncertainty generated by both global and idiosyncratic events. It assesses the impact of shocks arising from geopolitical, economic and political events. Despite its global focus, it is more domestic in nature and gives greater weight to domestic economic developments, political shifts or instability as well as to challenges that may be related to both global and regional developments.[6]

It can be shown that both variables exhibit a reciprocal relationship. Prior to 2002, a positive correlation was observed between headline inflation and uncertainty (see Chart 6, panel b). Conversely, after 2002, despite repeated increases in uncertainty, a negative correlation was observed, thereby suggesting that the adherence to an inflation-targeting single monetary policy, which helped to anchor long-term inflation expectations, mitigated the adverse effect of a shock, either global or domestic in nature, on inflation (see Chart 6, panel c).

4 EMPIRICAL ANALYSIS

To assess the impact of uncertainty on inflation and real output, we employ a structural modification of a Bayesian vector autoregressive (VAR) model based on quarterly Greek data from 2000Q1-2024Q2.[7] The chosen period covers three milestones impacting the domestic economy: Greece's entry into the EMU in 2001, the 2010 sovereign debt crisis and the subsequent economic crisis, the pandemic and the impact of the war in Ukraine.

The general specification is as follows:

$$Y_t = A_0 + \sum_{i=1}^{p} A_i Y_{t-i} + B_j X_t + e_t \qquad (1)$$

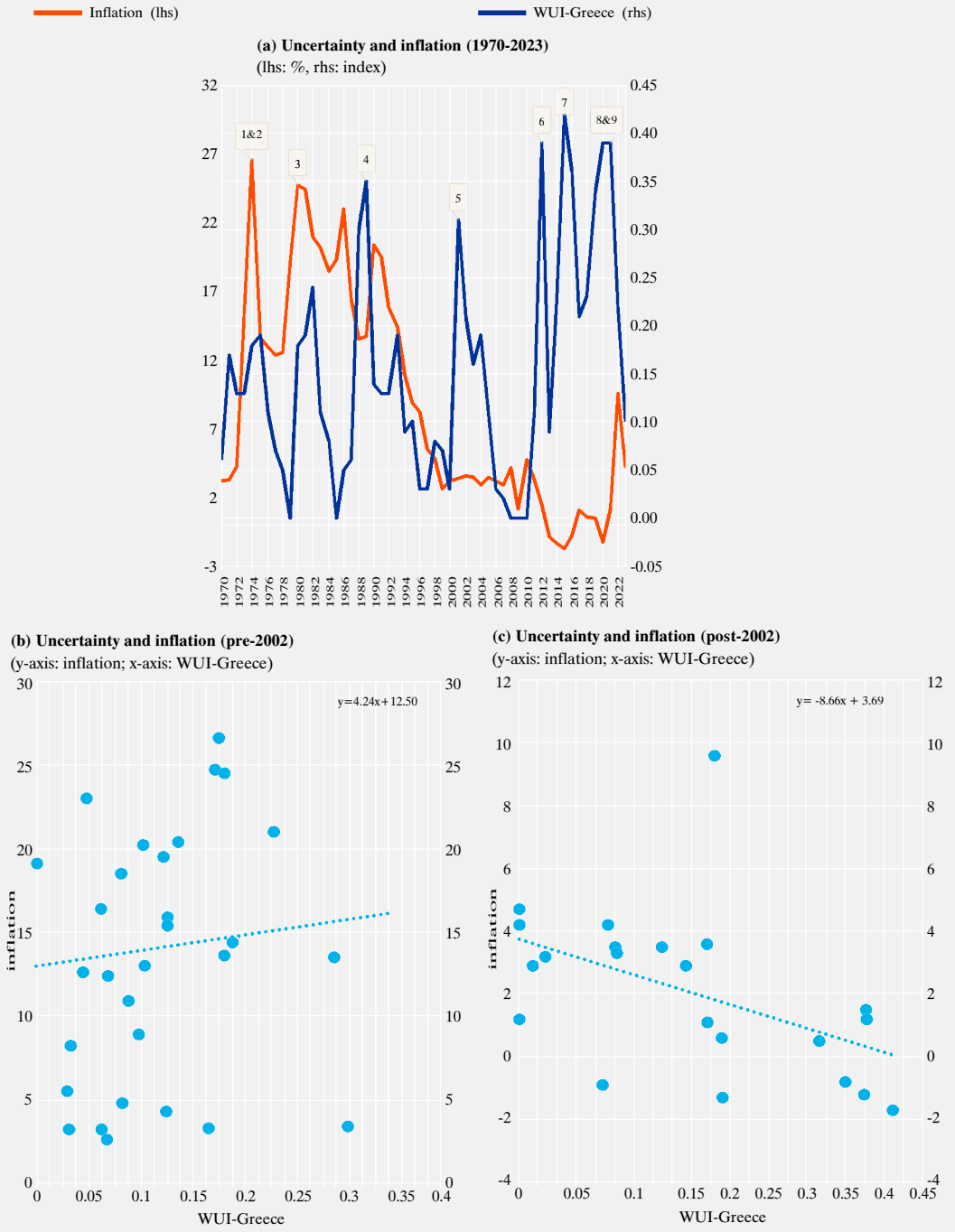
where Y_t denotes a standard structural vector of endogenous variables of our BVAR[8] model and p denotes the lag structure, with a total of four lags being utilised in the analysis, given the quarterly frequency of the data series. We assume $Y_t=(cop_t\ \pi_t\ y_t\ r_t)$ where cop_t denotes the annualised growth rate of the Brent oil price, π_t denotes the quarterly average of HICP inflation (y-o-y), y_t is the annualised quarterly real growth

6 For example, at the current juncture, the heightened uncertainty stems from the ongoing trade and tariff disputes, a purely exogenous event for the Greek economy.

7 The sample period commences in 2000, rather than on an earlier date, due to the data availability for the macroeconomic time series employed in the analysis.

8 Regarding the prior distributions for our BVAR model, we follow its simplest form and employ the Minnesota prior (Litterman 1986). In this framework, it is assumed that the VAR residual variance-covariance matrix is known in terms of its signs of effects (see also the note in the table). Moreover, we use optimal hyperparameter values from a grid search that employs the criterion of Giannone et al. (2015), who propose a procedure to select the optimal hyperparameters based on the maximisation of the value of the marginal likelihood of the model. For details, see the BEAR toolbox technical guide. To construct error bands, we perform 10,000 repetitions burning out 50% of them.

Chart 6 How do shocks drive inflation in Greece?



Sources: Headline CPI Greece: Ha et al. (2023), April 2024 update; WUI-Greece: Ahir et al. (2022), April 2024 update.
Notes: Headline inflation. Major country-specific political and economic events are depicted.
1&2: 1973 Turkish invasion of Cyprus; 1974 Athens Polytechnic uprising; 3: 1981 Political change; 4: 1989 Hung parliament, threat of a sovereign default; 5: 2000-01 Athens Stock Exchange bubble; 6: 2012 Economic and political uncertainty related to sovereign debt sustainability, bank solvency and Grexit; 7: 2015 Uncertainty related to Greece's euro area membership; 8&9: 2020 Covid-19, 2022: War in Europe.
The WUI-Greece has been computed by counting the frequency of the word "uncertainty" or its variants in the Economist Intelligence Unit country reports. The index is normalised by the total number of words and rescaled by multiplying by 1000. A higher number means higher uncertainty and vice versa.

rate of the Greek economy and r_t is the quarterly average of the 3-month Euribor. The vector of endogenous variables has been selected on the basis of their extensive utilisation in the empirical literature (see, for example, Caldara et al. 2020 and 2024; Ahir et al. 2022). The matrices A_i and B_j denote the estimated coefficients.

In order to determine the extent to which supply- and/or demand-driven inflation shocks have important implications for inflation in the Greek economy, a sign restrictions identification scheme is employed. This is pursued by means of a sign restrictions version of the Bayesian VAR, following similar identification strategies proposed by Faust (1998), Canova and De Nicoló (2002), Uhlig (2005) and Baumeister and Hamilton (2015).[9]

The adopted configuration of demand- and supply-driven shocks is predicated upon an identification strategy that aligns with a conventional textbook perspective. A demand-driven shock is defined as a shift in both prices and real output (i.e. quantities) in the same direction along an upward-sloping aggregate supply curve, while a supply-driven shock is defined as a shift in prices and real output in opposite directions along a downward-sloping aggregate demand curve.[10]

This identification scheme is utilised to differentiate between demand- and supply-driven shocks to inflation and real output growth. Supply-driven shocks may be attributed to several factors, including natural disasters such as floods or earthquakes; global supply chain disruptions primarily due to geopolitical confrontations; and changes in spending preferences, which have been impacted by the pandemic.

Concurrently, in the aftermath of the pandemic-induced lockdowns, instances of endogenously- or locally-induced demand-side shocks have been observed, including pent-up demand and increased savings that ensued from either an expansionary fiscal policy or the pandemic, ultimately resulting in elevated price inflation. Utilising the sign restrictions identification strategy in a Structural Vector Autoregression (SVAR) framework, we effectively capture the effects of supply- and demand-driven shocks to inflation. In this regard, we formulate the former as a cost-push shock, hypothesising its impact on both inflation and real output.

To better capture the effects of an external supply-side shock, we impose block exogeneity[11] to switch-off feedback loops between domestic endogenous variables π_t, y_t and cop_t assuming price determination of crude oil prices at the global level. This assumption aims to capture the relatively small size of the Greek economy compared to other economies that directly affect global supply shocks (e.g. China, US, etc.).

In order to better understand the dynamics of Greece's recent inflation experience, the model has been expanded with a set of exogenous variables represented by vector X_t, which includes the World Uncertainty Index for Greece (WUI-Greece) and the global Geopolitical Risk (GPR) Index. The incorporation of these variables into the model and their treatment as exogenous influences is aimed at better addressing inflation dynamics in the context of uncertainty stemming from both global and unanticipated country-specific events. The GPR Index is the key interest variable in this study, as it captures the impact of uncertainty resulting from geopolitical events, which are purely exogenously driven. The WUI-Greece is also treated as an exogenous variable, albeit weak, in an attempt to capture

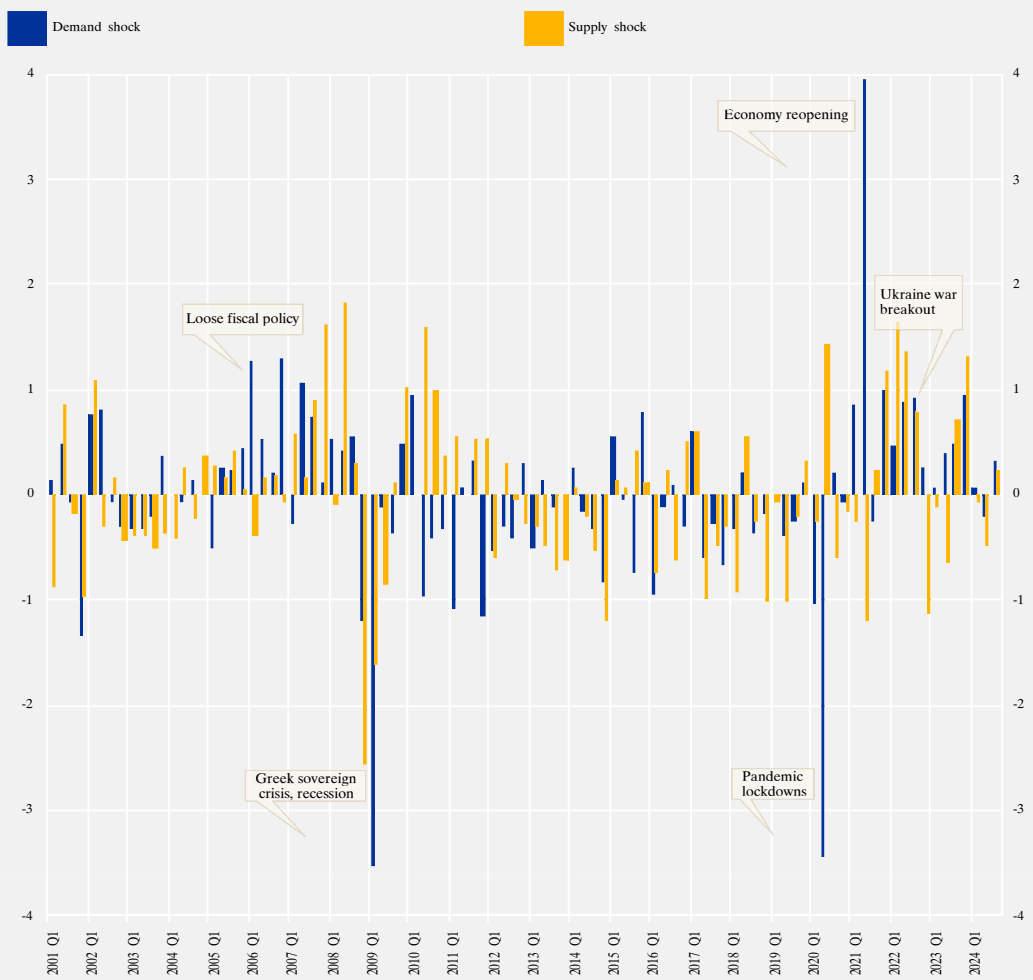
9 Other influential contributions on sign restrictions applications refer to: (i) Mountford (2005), who imposes sign restrictions in a Structural VAR model to assess the response of macroeconomic variables to monetary shocks; (ii) Mountford and Uhlig (2009), who similarly apply sign restrictions in a Structural VAR framework to analyse the effects of fiscal policy shocks on macroeconomic variables; and (iii) Arias et al. (2018), who provide a rigorous econometric framework for inference in SVARs using both sign and zero restrictions, which improves identification strategies commonly used to separate demand and supply shocks.

10 Alternative approaches to capture demand and supply shocks to inflation are employed by: (i) Ball et al. (2022), who focus on the rise in core inflation as measured by the weighted median inflation rate and deviations of headline inflation from core; and (ii) Shapiro (2024), who proposes a framework to decompose inflation into supply- and demand-driven components that generate two new data series, the supply- and demand-driven contributions to personal consumption expenditures (PCE) inflation.

11 On the formation of block exogeneity and the construction of external supply shocks, see Dieppe et al. (2016).

Chart 7 Domestic demand and supply shocks: the Greek record

(median estimate)



Source: Authors' estimations, derived from the sign restrictions identification scheme of the employed VAR model.
Note: The sample period starts in 2001 due to the data availability for the control variables in the estimated model.

the impact of economic and political uncertainty stemming from country-specific or idiosyncratic events. By construction, the WUI captures uncertainty resulting not only from political events but also from economic or financial developments. Consequently, the model may be subject to an endogenous bias. Nevertheless, from a technical standpoint, the assumed sign restrictions weaken any potential endogeneity bias stemming from the WUI, as these restrictions are predicated on economic theory. Furthermore, the results of an endogeneity test indicate that the WUI can be regarded as an exogenous variable.[12] Incorporating the WUI as a weakly exogenous variable in our analysis facilitates the identification of structural shocks emanating

12 The first core explanatory variable, namely GPR, has been shown to be purely exogenous (see Wang et al. 2024; Caldara and Iacoviello 2022). This means that the GPR Index does not systematically increase during an economic and financial crisis of global scale. Nevertheless, we employ an instrumental variable approach to deal with any endogeneity bias derived from the second explanatory variable, namely the WUI-Greece. Instrumenting the WUI-Greece with exogenous election dates helps to disentangle endogeneity between inflation and uncertainty due to economic policy developments. It is found that exogenous election dates are a robust predictor and the results from an SVAR-IV using the fitted values of the WUI-Greece suggest that the impact of innovations on inflation is similar. This means that the WUI-Greece can be considered as an exogenous variable (the results are available upon request).

from the respective variable. As illustrated in Chart 6, uncertainty in Greece has been driven by both significant global geopolitical events and domestic political events.

As outlined by Baumeister and Hamilton (2015), the sign restrictions imposed in order to decouple the two types of assumed shocks are delineated in the table. The first column incorporates a supply-side inflation shock in the form of a cost-push shock that negatively affects real output, while the demand-driven inflation shock operates in the opposite direction, affecting real output positively. Considering the prevailing context of monetary policy tightening in the euro area, it is further assumed that a reactive monetary policy is in place, whereby interest rates are increased in response to both types of shock.[13]

Following the above decomposition between a domestic demand and a supply shock, the series of demand and supply inflation shocks appear to align with the historical narrative for the Greek economy during the first two decades of the century (see Chart 7). It is observed that negative domestic demand shocks, such as the sovereign crisis, the subsequent deep recession and the pandemic lockdowns, exerted downward pressures on inflation. Conversely, the reopening of the economy has been shown to exert upward pressures. Similarly, the Ukraine war led to a global supply shock and subsequent upward pressure on domestic inflation. However, it appears that this impact was not enduring, as the initial impact was mitigated by monetary tightening.

Assumed sign restrictions for demand and supply shocks

Variable/shock	Supply-side shock (cop_t)	Demand-side shock (π_t)
π_t	+	+
r_t	+	+
y_t	–	+

Note: By definition, the variance-covariance matrix in a structural VAR context is known a priori with respect to the assumed signs, either positive or negative. No assumptions are made about the size of the shocks.

4.1 EMPIRICAL FINDINGS

We first turn to the demonstration of the impulse response functions of the exogenous variables, namely, the Geopolitical Risk (GPR) Index and the World Uncertainty Index for Greece (WUI-Greece), which are hypothesised to function as global and country-specific exogenous shocks, respectively. These effects are not captured by the dynamics of our traditional sign restrictions endogenously imposed as portrayed in the table.[14]

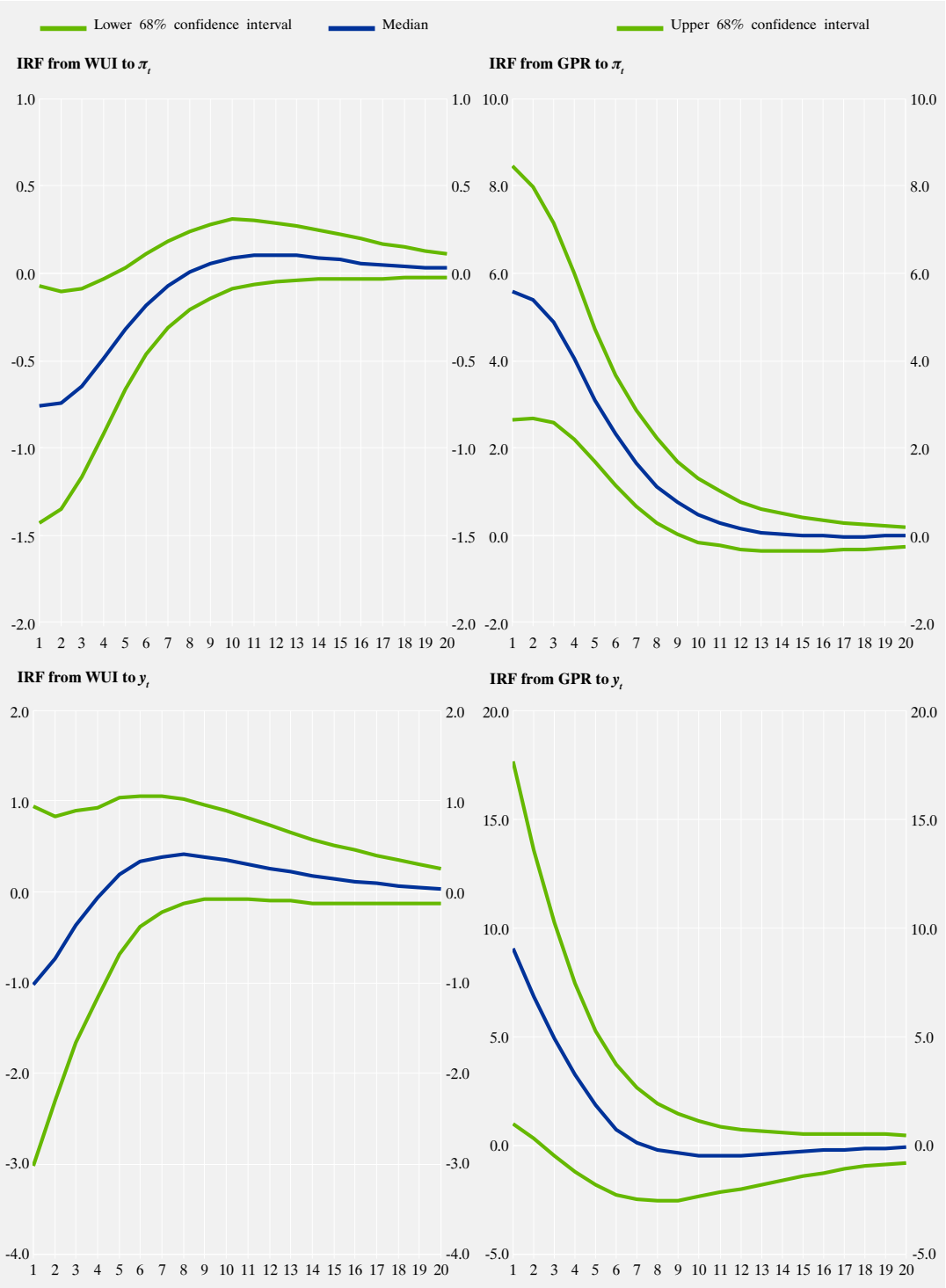
As can be seen in the context of the Greek economy, an unexpected increase (i.e. a positive shock) in the WUI-Greece stemming from a country-specific event, is estimated to have a negative effect on headline inflation in the short term (see Chart 8, top left-hand panel). Turning to the case of global geopolitical risk (GPR), the dynamic responses are opposite (see Chart 8, top right-hand panel). The estimated increase in headline inflation following a global geopolitical shock is relevant to the current rising tension. This finding is in line with previous findings in the empirical literature (see, inter alia, Caldara and Iacoviello 2022 and Caldara et al. 2024 for the global inflation; Antonnen and Lehmus 2024 for the eurozone inflation). More importantly, the estimated increase in headline inflation (at 68% confidence level) is more pronounced in comparison to the respective responses in the case of a shock in WUI. Furthermore, it is anticipated that this increase will persist for a duration of up to two years following the occurrence of the shock. This finding is consistent with the supply-side nature of the shock (see Pinchetti 2024). Furthermore, a substantial response was identified in relation to the impact of real output growth (see Chart 8, bottom right-hand panel). Multiple studies have shown a statistically significant negative correlation between

13 We make this assumption as we try to formulate a global supply shock where the ECB's monetary policy stance reacts to avoid a de-anchoring of inflation expectations.

14 In an earlier paper (Lazaretou and Palaiodimos 2023), the construction of external or global demand and supply-side shocks involved the formation of block exogeneity constraints. In this paper, we are effectively capturing these dynamics by adding the respective exogenous variables to the BVAR model.

Chart 8 Impulse response functions (IRF) in the context of uncertainty arising from country-specific and global geopolitical events to headline inflation (π_t) and real output growth rate (y_t)

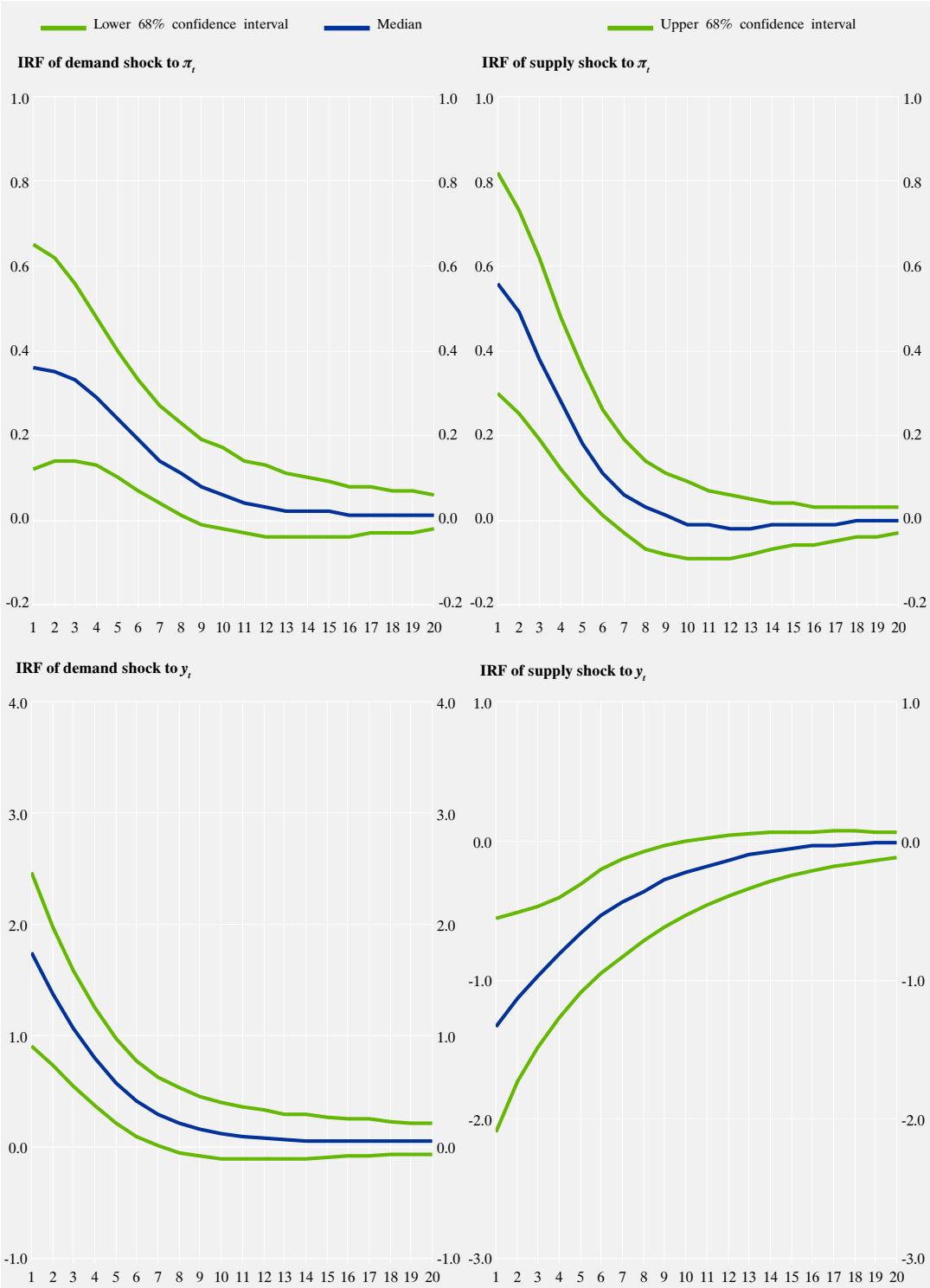
(WUI-Greece: left-hand panels; GPR index: right-hand panels)



Source: Authors' estimations.
Notes: IRF=impulse response function. Country-specific events are captured by WUI-Greece (left-hand panels). Global events are captured by the GPR index (right-hand panels). The size of the shock is equal to one standard deviation of the exogenous error process.

Chart 9 Impulse response functions from a domestic demand or supply shock to headline inflation (π_t) and real output growth rate (y_t)

(Demand shock: left-hand panels; supply shock: right-hand panels)



Source: Authors' estimations.
Note: The size of the shocks is equal to one standard deviation of the exogenous error process.

uncertainty shocks and real output (see, for example, Ahir et al. 2022 and Liu and Gao 2022 for the US; European Commission 2024 and Gieseck and Rujin 2020 for the eurozone).

In the event of a domestic demand-driven shock (e.g. a fiscal or monetary policy shock) and a domestic supply-driven shock (e.g. a natural disaster) resulting from the imposed sign restrictions outlined in the table, the findings of the impulse response function analysis are consistent with the conclusions reported in Lazaretou and Palaiodimos (2023). Specifically, domestic demand-driven shocks imply somewhat more persistent inflationary pressures compared to those produced in the case of supply-driven shocks, as seen in Chart 9 (left versus right-hand panels). These results coincide with the positive and negative implications for real output growth as imposed by the definitions of the shocks in the table.

5 CONCLUDING REMARKS

Global geopolitical tensions have increased considerably in recent years. This has affected the economies primarily via prices on commodities. As a result, global inflation has risen in the aftermath of geopolitical shocks. Given the elevated energy and food price shares in the consumer basket, Greek inflation has also risen significantly. Historically speaking, Greece has repeatedly experienced periods of inflationary pressure. Over the past 50 years, global supply-driven shocks have triggered domestic cost-push inflation, which was often accommodated by expansionary policies. This paper analyses the historical trajectory of inflationary shocks in Greece, aiming to document inflation trends from the early 1970s to the present. In particular, it identifies the underlying forces that have driven inflation, which in turn entails an examination of both domestic demand and supply shocks, as well as global supply shocks. We find that there is a direct interplay between demand and supply shocks, global supply shocks that relate to geopolitical risk and Greek headline inflation.

In particular, the case study of Greece demonstrates that uncertainty arising from both country-specific shocks and global geopolitical shocks exerts a substantial influence on domestic headline inflation. In the presence of a global geopolitical shock, the impact is more enduring and substantial. The empirical evidence also suggests that domestic demand-driven shocks imply somewhat more persistent inflationary pressures compared to those produced by domestic supply-driven shocks. Moreover, the implementation of an inflation-targeting regime (or, in other words, an implicit monetary policy reaction function or a single monetary policy) effectively mitigates the potential adverse consequences of an inflation shock, regardless of its origin. It is evident that the manner in which monetary policy responds is subject to variation depending on the nature of the inflation shock in question.

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APPENDIX

Definitions of variables and data sources

Variable	Definition	Source
Headline global CPI inflation	Official CPI inflation; GDP-weighted average; annual averages; all goods and services	Ha, J., M.A. Kose and F. Ohnsorge (2023), Version: April 2024 update. https://www.worldbank.org/en/research/brief/inflation-database
Core global CPI inflation	Official CPI inflation; GDP-weighted average; annual averages; food and energy are excluded	Ha, J., M.A. Kose and F. Ohnsorge (2023), Version: April 2024 update. https://www.worldbank.org/en/research/brief/inflation-database
Headline CPI inflation-Greece	Official CPI inflation; GDP-weighted average; annual averages; all goods and services	Ha, J., M.A. Kose and F. Ohnsorge (2023), Version: April 2024 update. https://www.worldbank.org/en/research/brief/inflation-database
Euribor	Euribor 3-month - Historical close, average of observations through period (FM.M.U2.EUR.RT.MM.EURIBOR3MD_.HSTA) - Modified value (quarterly)	ECB portal to access SDW data
Real output growth rate	Quarterly real gross domestic product growth rate - annualised (t/t-4) (seasonally adjusted)	ELSTAT
Crude oil price	Crude oil prices: Brent - Europe, USD per barrel, quarterly, not seasonally adjusted	Federal Reserve Economic Data, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org
Harmonised ICP (HICP) inflation	All goods and services, annual average rate of change	Eurostat
Core CPI inflation	Food, energy, tobacco and alcohol are excluded; annual average rate of change	Eurostat
Goods	HICP; only goods; annual average rate of change	Eurostat
Services	HICP; only services; annual average rate of change	Eurostat
GPR	Global Geopolitical Risk Index; 1900-2019=100	Caldara and Iacoviello (2022), https://www.matteoiacoviello.com/gpr.htm
WUI-Greece	World Uncertainty Index for Greece. The index is normalised by total number of words and rescaled by multiplying by 1000.	Ahir, H., N. Bloom and D. Furceri (2022), https://worlduncertaintyindex.com/data/