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Monetary policy trade-offs amid global supply chain disruptions[☆]

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ABSTRACT

The COVID-19 pandemic led to unprecedented disruptions in global supply chains (GSC), coupled with large fiscal stimulus. This paper employs a proxy structural VAR model to examine GSC shocks, the Federal Reserve's response, and their propagation under two counterfactual policy rules. Large fiscal stimulus amplifies inflation while cushioning the downturn from GSC shocks. Historically, the Fed has looked through price surges and adopted a loose stance. The first counterfactual, which stabilises inflation, entails less accommodation and yields a more favourable inflation-output trade-off, reflecting greater price flexibility and limited output losses. The second, which minimises a dual-mandate loss function under inflation targeting (IT) or average inflation targeting (AIT), calls for greater initial easing. Relative to IT, AIT implies a looser policy that generates more persistent inflation and ultimately requires a contractionary response, worsening the trade-off.

1. Introduction

The unprecedented disruptions in global supply chains (GSC) caused by the COVID-19 pandemic, combined with strong demand supported by large U.S. government stimulus, tight labour markets, and a shift of consumption from services to goods, triggered complex inflation dynamics. Together, these factors contributed to a surge in U.S. inflation, marking the end of three decades of low and stable inflation (see, e.g., Reis, 2022; Bernanke and Blanchard, 2025, among many others). Fig. 1 displays the evolution of GSC pressures in the U.S. economy, as measured by the news-based Supply Bottleneck Index (SBI) of Burriel et al. (2024), alongside core PCE inflation. This figure illustrates an apparent positive correlation, particularly during the post-COVID period.

Against this background, a growing number of empirical studies, as documented below, have examined the aggregate effects of GSC shocks. These shocks capture sudden decreases in the supply provision or the functioning of supply chains stemming from adverse events such as natural disasters, e.g. a hurricane or earthquake, geopolitical events, strikes, and pandemics (see, e.g. Burriel et al., 2024; Gordon and Clark, 2023). The evidence so far, for both the U.S. and the Euro area, indicates that GSC shocks act as supply shocks, decreasing output and pushing up consumer prices. These studies also document the significant role of these shocks in accounting for the recent inflation surges in the U.S. and the Euro area.

A natural question arises: How should central banks respond to GSC shocks? Central banks often face a dilemma: Should they *look through* supply shocks temporarily, at the risk of de-anchoring inflation expectations? Or should they *react* by promptly

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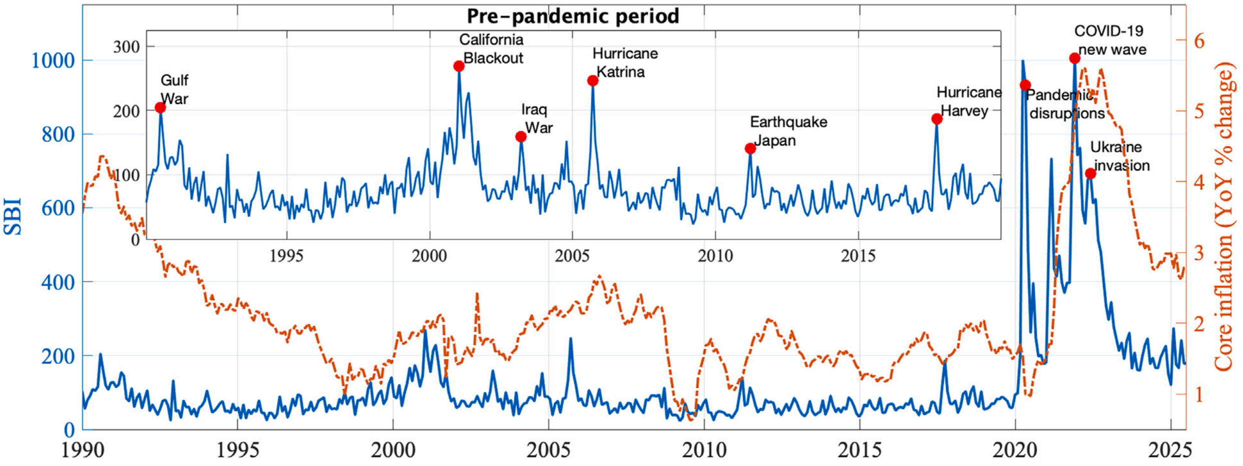

Fig. 1. Supply chain pressures and core inflation in the U.S.
Note: The figure shows the news-based Supply Bottleneck Index (SBI) for the U.S., constructed by Burriel et al. (2023), alongside U.S. core PCE inflation. The index exhibits pronounced spikes during adverse episodes, including wars, natural disasters, and the pandemic. Sample period from 1990M1–2025M6.

tightening monetary policy to maintain anchored expectations, even at the potential cost of exacerbating the economic downturn? The appropriate monetary policy response has become a focal point for policymakers, as emphasised by the Federal Reserve (Fed) Chairman Jerome Powell: *“[...] for many years, it has been generally thought that monetary policy should limit its response to, or “look through”, supply shocks to the extent that they are temporary and idiosyncratic. [...] Our experience since 2020 highlights some limits of that thinking”.*[1]

This paper contributes to this discussion by examining this dilemma empirically, focusing on the U.S. experience, estimating the monetary policy response to GSC shocks and the aggregate propagation of those shocks under two counterfactual monetary policy rules that stabilise inflation and minimise a simple dual-mandate loss function. While growing theoretical and empirical contributions, as detailed below, have explored the implications of GSC for monetary policy, little empirical evidence exists on how policymakers respond to GSC shocks and whether that matters.

Using a state-of-the-art structural vector autoregressive (SVAR) model identified with external instruments, I provide causal evidence on the effects of GSC shocks. I document that these shocks are stagflationary, leading to a contraction in output and a rise in core inflation. Inflationary pressures originate primarily in the goods sector, driven by higher imported input costs, with spillovers to services inflation. This pattern is consistent with the theoretical mechanisms emphasised by di Giovanni et al. (2022), Comin et al. (2023), and Amiti et al. (2024), whereby higher input costs raise firms' marginal costs in goods-producing sectors and propagate to services prices through production linkages. These dynamics lead to a gradual but persistent increase in inflation expectations. Financial conditions tighten, reflecting deteriorating profitability and heightened risk perceptions. In the labour market, wages increase, while employment declines temporarily, consistent with binding production constraints. Finally, I show that the Fed has historically looked through initial GSC-driven price surges and adopted an accommodative stance, presumably to stabilise output. I refer to this monetary policy reaction as the *baseline policy response*, which serves as the benchmark for the counterfactual analysis.

A defining feature of the recent inflation surge is the interplay between GSC disruptions and extraordinary fiscal stimulus. I show that fiscal stimulus reacts immediately to a GSC shock, reflecting the mechanics of automatic stabilisers. To shed light on the role of fiscal policy in the transmission of GSC shocks, I conduct a channel decomposition analysis (Vicondoa, 2019; Dées and Galesi, 2021). Absent this fiscal response, the real economy would contract more sharply, while the increase in core inflation, particularly in core goods, would be more muted, with no spillovers to services. The adjustment operates primarily through higher imported intermediate input prices rather than quantities, consistent with the presence of binding capacity constraints, as in Comin et al. (2023), whereby firms are unable to expand production and adjustment occurs mainly through prices.

Further, I study the propagation of GSC shocks under two counterfactual monetary policy rules, using the sufficient statistics approach of McKay and Wolf (2023), which is robust to the Lucas critique. The first rule, which stabilises inflation, entails a less accommodative initial response relative to the baseline and a mild economic contraction. In this counterfactual, the responses of prices and output reflect greater price flexibility and limited output losses, as predicted by theoretical models that emphasise the role of capacity constraints in explaining these effects (Bai et al., 2024; Benigno et al., 2022; Bernanke and Blanchard, 2025; Comin et al., 2023). Since goods prices tend to be more flexible than services prices (Ferrante et al., 2023), this mechanism implies that the

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[1] Jerome Powell, “Monetary Policy Challenges in a Global Economy”, IMF, November 2023. For further discussion on this subject, see also Carstens (2022a,b) and Maechler (2024).

Fed may not always face an adverse inflation-output trade-off, and that GSC-induced inflation can be effectively managed without triggering a significant economic downturn under this alternative rule.

The second counterfactual examines a policy rule that minimises a simple dual-mandate loss function. Under this loss, I recover two optimal rules that target either inflation or average inflation. The latter is motivated by the Fed's shift in 2020 from inflation targeting (IT) to average inflation targeting (AIT), which remained in place until 2025, when the Fed returned to an IT regime (see Powell, 2020, 2025). Relative to the baseline, both rules require a more accommodative initial response. The AIT rule implies a looser initial stance than IT, resulting in higher initial inflation. However, in the presence of capacity constraints, this front-loaded accommodation ultimately calls for a subsequent contractionary policy, worsening the inflation-output trade-off. As a result, policy rules that initially tolerate higher inflation may unintentionally generate more persistent inflation.

In more detail, I estimate a SVAR model using external instruments, commonly referred to as a Proxy SVAR or IV SVAR (Mertens and Ravn, 2013; Stock and Watson, 2018). For identification, I use innovations from the SBI index of Burriel et al. (2024) as the external instrument. These innovations are obtained from an auxiliary VAR model, which purges them of other supply shocks, including labour market, domestic supply, and oil-related shocks. Unlike alternative popular GSC pressure indicators that reflect both supply and demand conditions, as detailed in Online Appendix A.5, the SBI innovations provide a consistent narrative of domestic and global supply chain disruptions, supporting their use as a valid instrument. The model is estimated on monthly data from 1991M1 to 2025M6, the period over which the instrument is available, using Bayesian methods. I show that the results are robust to seven alternative proxies for GSC pressures used as instrumented variables and are qualitatively similar in the pre-pandemic sample.

I then conduct a channel decomposition by zeroing out the reduced-form coefficients associated with the fiscal stimulus channel in the VAR, isolating its marginal contribution to the propagation of GSC shocks (see, e.g., Vicondoa, 2019; Dées and Galesi, 2021). As expectations are held fixed, this exercise is not a structural counterfactual and is subject to the Lucas critique, yet it provides useful insights into the transmission of GSC shocks through binding capacity constraints in high-demand environments.

Turning to the role of monetary policy, I construct counterfactual policy scenarios in which the Fed deviates from its observed response and instead follows alternative policy rules. Following McKay and Wolf (2023), these counterfactuals are based on empirically estimated impulse response functions (IRFs) to the shocks of interest and do not require a fully specified structural model. The counterfactuals are implemented by allowing counteracting monetary policy shocks — a conventional policy shock and a forward guidance shock in this application — to materialise jointly with the GSC shock on impact. Monetary policy shocks are identified using the surprise series of Jarociński (2024), with the series of Swanson (2024) used for robustness checks. As the instruments are orthogonal, the three shocks are identified separately within the same Proxy SVAR model. The key requirement of this approach is that policy shocks occur contemporaneously on impact, with no subsequent policy surprises. Since the forward guidance shock operates through expectations, its announcement at impact makes the resulting counterfactuals robust to the Lucas critique. If a loss function is postulated, an optimal policy rule can be recovered by choosing the linear combination of monetary policy shocks that counteract as much as possible, over the entire impulse response horizon, the responses of variables of interest to the GSC shock. This corresponds to the solution of a simple quadratic loss function in a least-squares sense.

After reviewing the relevant literature, this paper is organised as follows. Section 2 outlines the empirical methodology and the identification of GSC shocks. Section 3 examines the propagation of GSC shocks, the Fed's response, and the role of fiscal stimulus. Section 4 presents the VAR-based policy counterfactuals. Section 5 concludes.

Literature review. This paper contributes to the literature on the causal effects of GSC disruptions. Studies address the challenge of measuring GSC conditions using proxies like shipping costs, PMI surveys, and indices such as the GSCPI (Benigno et al., 2022; Finck and Tillmann, 2022; Gordon and Clark, 2023). Other contributions propose new measures based on news articles, administrative firm-level data, or satellite data (Bai et al., 2024; Burriel et al., 2024; Caldara et al., 2025; Smirnyagin and Tsyvinski, 2022). Embedding these measures into VAR models and employing different identification schemes, studies focusing on the U.S. and Euro area, show that GSC shocks operate as supply shocks (e.g., Ascari et al., 2023; Banbura et al., 2023; De Santis, 2024; Finck and Tillmann, 2022; Kabaca and Tuzcuoglu, 2023). This paper complements this literature by showing how monetary and fiscal policy affect the transmission of GSC shocks.

Second, my empirical analysis speaks to the theoretical literature on the role of capacity constraints in the transmission of GSC shocks. Relevant studies emphasise spare productive capacity (Bai et al., 2024), spare labour capacity (Benigno and Eggertsson, 2023), goods market shortages (Bernanke and Blanchard, 2025), and capacity constraints (Comin et al., 2023), showing that supply chain disruptions push the economy closer to its capacity limit. My results show that fiscal stimulus can amplify these mechanisms and that a stronger price response relative to output is key to understanding output-inflation trade-offs under alternative monetary policy rules.

Finally, this work relates to studies on the monetary policy implications of GSC disruptions. Comin et al. (2023) and Amiti et al. (2024) show that, under tight capacity constraints, accommodative monetary policy can fuel inflation, while tightening helps ease supply pressures. Empirically, Laumer and Schaffer (2025) show that GSC pressures amplify monetary transmission via credit costs, and Bai et al. (2024) find that monetary policy is more effective when prices respond more strongly than output. At the firm level, Balleer and Noeller (2023) document stronger responses to monetary easing among supply-constrained firms, while Ascari et al. (2023) show that the optimal policy response to GSC shocks depends on a country's integration into global value chains. To the best of my knowledge, this is the first empirical study to evaluate monetary policy trade-offs under GSC shocks, while also considering optimal monetary policy and the Fed's temporary shift to AIT. A contemporaneous contribution by Karadi et al. (2024) shows that, following large cost-push shocks, leaning against inflation improves the inflation-output trade-off when prices are more flexible. My work provides empirical support for this mechanism in the context of GSC shocks.

2. Empirical strategy

This section outlines the identification of the GSC shock, which is the primary focus of the analysis. Brief details on the identification of the two U.S. monetary policy shocks used in the counterfactual analysis are provided in Section 4.

2.1. Bayesian Proxy Structural Vector Autoregression (SVAR)

I employ the Proxy SVAR procedure introduced by Stock and Watson (2012) and Mertens and Ravn (2013) to identify three aggregate shocks, namely a GSC shock and two distinct U.S. monetary policy shocks relying on external instruments that serve as *noisy* measures of the structural shocks of interest. In summary, the procedure consists of regressing the instrument against the residuals of a reduced-form VAR and using this information to infer the dynamic causal effects of the shocks on the macroeconomic variables. I use Bayesian techniques for estimation to handle the large number of coefficients. Posterior coverage bands for the IRFs are constructed using 1000 draws from the posterior distribution. Estimation details are delegated to Online Appendix A.1.

While Proxy-SVAR studies often use one instrument per structural shock, recent work examines cases with multiple instruments (see e.g. Arias et al., 2021, and all the references therein). Identification in such cases may require additional, potentially controversial identifying restrictions (Giacomini et al., 2022). Here, I use three orthogonal instruments to identify three distinct shocks separately. Since the instruments are orthogonal, estimating shocks individually or jointly leads to equivalent results.[2]

Pandemic treatment. To address extreme pandemic observations, I include COVID deaths as an exogenous variable in the VAR to de-COVID the data, following Ng (2021). This choice is supported by Stock and Watson (2025), who show that a single COVID factor estimated from macroeconomic data closely tracks COVID deaths and explains a substantial share of macroeconomic fluctuations during 2020–2021.[3] In Online Appendix A.5, I show that the results are robust to down-weighting extreme observations following Lenza and Primiceri (2022).

2.2. Model specification

I use the news-based shortage index of Caldara et al. (2025) as the baseline instrumented variable, for which the instrument is strongest, with results that are robust to alternative indices, as detailed below. This index captures supply constraints and exhibits pronounced spikes during economic crises and wars, and is closely related to supply chain disruptions, particularly during the pandemic and post-pandemic period.

The VAR includes the following monthly endogenous variables: (i) the shortage index, and U.S. macroeconomic and financial indicators, including (ii) industrial production, (iii) the core personal consumption expenditures (PCE) index, (iv) import prices for intermediate goods, (v) import quantities for intermediate goods, (vi) the core PCE goods index, (vii) the core PCE services index, (viii) 1-year inflation expectations, (ix) 5-year inflation expectations, (x) the real effective exchange rate, (xi) the excess bond premium (EBP) of Gilchrist and Zakrajšek (2012), (xii) S&P 500 stock prices, (xiii) wages (dollars per hour), (xiv) employment, (xv) the 1-year Treasury yield, (xvi) the 5-year Treasury yield, and (xvii) real total government expenditures (including transfer payments). All variables, except for the shortage index (scaled by its standard deviation), interest rates, and inflation expectations, are expressed in year-over-year (YoY) percentage changes. The estimation period is determined by the availability of the instrument (see below) and spans January 1991 to June 2025. The model is estimated with six lags and a constant. Additional details on data and sources are provided in Online Appendix A.2.

The VAR includes the EBP, a key variable for estimating monetary policy VARs (Caldara and Herbst, 2019). Import intermediate prices and quantities capture capacity-constraint channels associated with GSC disruptions, while wages and employment control for labour market dynamics, which played a significant role in post-COVID inflation (see, e.g., di Giovanni et al., 2022; Amiti et al., 2024). The 1-year and 5-year Treasury yields represent short- and long-term monetary policy stances, helping to instrument two distinct monetary shocks. Finally, government expenditures account for the impact of fiscal stimulus policies.

2.3. External instrument

A (negative) GSC shock can be viewed as an adverse event, unrelated to economic fundamentals, that disrupts global supply chains (see, e.g., Burriel et al., 2024; Gordon and Clark, 2023). Examples include wars, natural disasters, strikes, and pandemics. This study leverages the SBI index of Burriel et al. (2024) to construct an external instrument. Available since 1990 and shown in Fig. 1, this indicator provides a consistent narrative of domestic and global supply chain disruptions, with key events highlighted in the figure. This contrasts with other popular measures (see Online Appendix A.5), which capture both supply- and demand-side conditions. Drawing on diverse sources — including text analysis, surveys, financial and firm-level data, and shipping and satellite measures — they provide a rich information set and are well suited as alternative instrumented variables for robustness checks.

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[2] Arias et al. (2021) highlight differences between individual and joint identification when instruments lack orthogonality.

[3] This approach aims to identify structural relationships, as noted by Carriero et al. (2024), by treating the COVID episode as a distinct shock.

Diagnostic checks and instrument validity. I use SBI innovations obtained from an auxiliary VAR, estimated using a selected set of variables, as an external instrument purged of other supply shocks, including labour market, domestic supply, and oil-related shocks, which are identified using sign and zero restrictions.[4] Given their prominent role during the pandemic (Bernanke and Blanchard, 2025), isolating these shocks helps clarify the mechanisms through which GSC shocks operate. Further estimation details are provided in Online Appendix A.3, while Online Appendix A.4 shows that SBI innovations, available from 1991, are neither autocorrelated nor significantly correlated with the monetary policy surprises of Jarociński (2024) and Swanson (2024), which are used below to identify two U.S. monetary policy shocks. This orthogonality justifies treating the three shocks separately within the Proxy SVAR framework. To serve as a valid instrument, SBI innovations must satisfy relevance and exogeneity conditions. Relevance requires correlation with the true structural shock, which, although unobservable, is supported by the close alignment of the SBI index with narrative evidence on GSC disruptions (Burriel et al., 2024). Exogeneity is ensured by the instrument's lack of correlation with other relevant shocks.

Strength of the instrument. Even if the two conditions above are met, a weak correlation between the instrument and the shock can undermine the large-sample validity of standard inference (Lee et al., 2022; Montiel Olea et al., 2021). Bayesian methods, however, can mitigate these concerns by ensuring valid posterior inference (Arias et al., 2021). To assess instrument strength, I apply an F-test to the first-stage regression of the shortage index residuals on the instrument, using the conventional threshold of 10 (see Montiel Olea et al., 2021). The resulting first-stage F-statistic is 25, indicating no weak-instrument concerns.

3. The aggregate effects of GSC shocks

This section shows that GSC shocks are stagflationary and that, historically, the Fed has eased policy, presumably viewing these shocks as temporary and aiming to stabilise output, while large fiscal stimulus amplifies inflationary pressures but mitigates the downturn.

3.1. Macroeconomic aggregate responses

Fig. 2 shows the IRFs of U.S. variables following a GSC shock, normalised to induce a one-standard-deviation increase in the shortage index of Caldara et al. (2025), for the full and pre-pandemic samples. Solid blue and orange lines denote median responses for the full and pre-pandemic samples, respectively, while shaded areas and dotted lines indicate 68% and 90% posterior coverage bands. Pre-pandemic results are discussed later in the robustness section. In the full sample, the shortage index rises persistently for 24 months. Industrial production drops by 2% on impact, reaching a trough of 3% three months later, and recovers over the same period. Core inflation increases by 0.5% initially, then gradually declines within 24 months. These results are consistent with the empirical evidence reviewed above, indicating that GSC shocks act as supply shocks.

To understand the inflationary impact of GSC shocks, it is instructive to look "under the hood" of the inflation process. Imported intermediate prices spike by 2.5% on impact, reach a maximum of 5% after six months, and gradually decline over the subsequent 12 months, while quantities fall by 2% after three months and recover after one year. Regarding sectoral inflation, core goods inflation rises by 1% on impact and then decreases steadily over 24 months. In contrast, the effect on core services inflation is more limited and builds up gradually over 12 months. Interestingly, the response of core inflation closely mirrors that of core goods inflation. Turning to inflation expectations, 1-year inflation expectations rise by 1% on impact and decline within 24 months. By contrast, 5-year inflation expectations exhibit a milder but more persistent increase and decline within 36 months.

These responses align with theoretical predictions that emphasise the role of *capacity constraints* in shaping output and inflation (Benigno and Eggertsson, 2023; Bernanke and Blanchard, 2025; Comin et al., 2023; Bai et al., 2024). Capacity constraints restrict the production and supply of goods, leading to lower output and upward pressure on prices. The inflationary effect emerges from increases in the cost of imported intermediate inputs, which raise firms' marginal costs, particularly in the goods sector. Furthermore, in the model of Comin et al. (2023), while capacity constraints generate inflation in goods, they also give rise to spillovers into services inflation. This occurs because services rely on goods as inputs, so capacity constraints in goods production propagate through input–output linkages.

On the other hand, the real exchange rate gradually appreciates over the year following the shock, likely reflecting an expenditure-switching effect towards domestically produced goods as imported goods become relatively more expensive. This dynamic, however, is accompanied by significant uncertainty. While such a shift could support domestic output, its effect is offset by stagnant production due to ongoing supply chain pressures.

These cost pressures and production constraints may also affect corporate profitability and risk perceptions, as reflected in financial market indicators. Indeed, the EBP rises by 0.3% nine months following the shock, while stock prices gradually fall, declining by approximately 5% one year later. These dynamics signal growing investor concerns about firms' earnings prospects and their ability to meet debt obligations amid ongoing disruptions.

Finally, regarding labour market variables, GSC shocks generate upward wage pressures that last for about one year, peaking at around 0.5% three months after the shock. In contrast, employment declines gradually, reaching a trough of about 2%. The wage response is consistent with the *substitution* mechanism emphasised by Amiti et al. (2024), whereby higher imported input

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[4] Sign and zero restrictions are used solely to identify these supply shocks. SBI innovations are obtained by imposing a positive impact response on the SBI index. No additional restrictions are imposed on other variables, allowing the data to determine the dynamic responses within the Proxy SVAR.

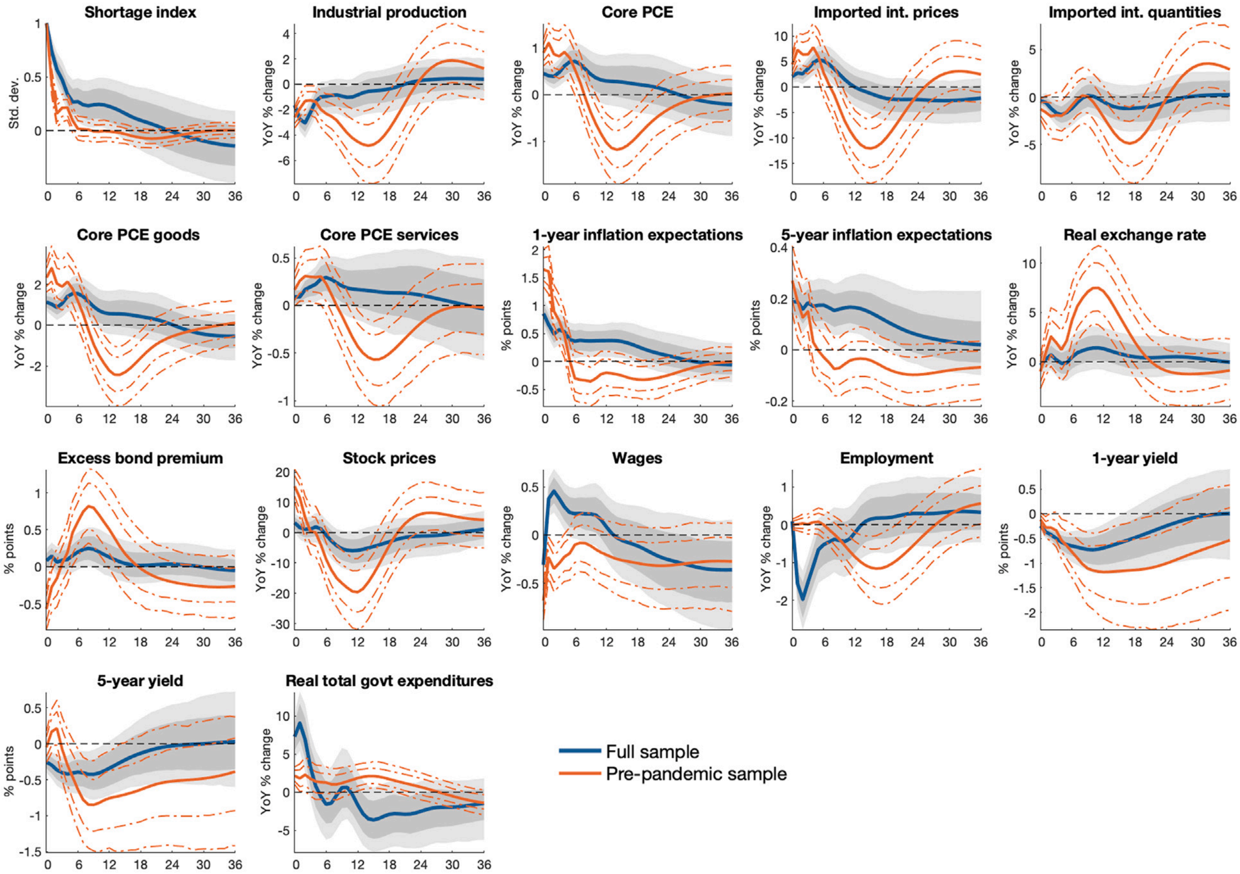

Fig. 2. IRFs to a GSC shock: Pre-pandemic vs. Full sample.
Note: The GSC shock is normalised to induce a one-standard-deviation increase in the shortage index of Caldara et al. (2025). The horizontal axis shows months. The pre-pandemic and full estimation samples cover 1991M1–2019M12 and 1991M1–2025M6, respectively. Solid blue and orange lines denote median responses for the full and pre-pandemic samples, respectively, while shaded areas and dotted lines indicate 68% and 90% posterior coverage bands. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

costs induce firms to substitute away from imported inputs towards domestic suppliers, increasing demand for domestic labour and putting upward pressure on wages. However, as production remains constrained, firms respond by laying off workers or delaying new hiring, which dominates the adjustment in employment.

3.2. Monetary policy response

The evidence shows that the Fed has eased the policy rate following a GSC shock, leading to an immediate decline of about 25 basis points in the 1-year yield, with a similar response in the 5-year yield. The Fed maintains an accommodative stance for over 36 months before gradually returning to normal. This suggests that the Fed has “looked through” increases in core inflation, likely viewing supply chain disruptions as temporary, and used monetary accommodation to mitigate the economic contraction. In the counterfactual exercises in Section 4, I refer to this response as the *baseline* policy response, which serves as the benchmark for assessing alternative policy strategies in response to GSC shocks.

3.3. The role of fiscal stimulus

As shown in Fig. 2, fiscal stimulus responds immediately to a GSC shock, with the effect persisting for over six months. This response reflects the mechanics of automatic stabilisers, as social transfers and unemployment benefits typically rise during economic downturns and fall during expansions.

During the pandemic, GSC disruptions were accompanied by unprecedented fiscal support, particularly in the U.S. (see, among others, Bernanke and Blanchard, 2025). To assess its role, I conduct a channel decomposition analysis by zeroing out the reduced-form coefficients associated with the fiscal stimulus channel in the VAR model (see, e.g., Vicondoa, 2019; Dées and Galesi, 2021).

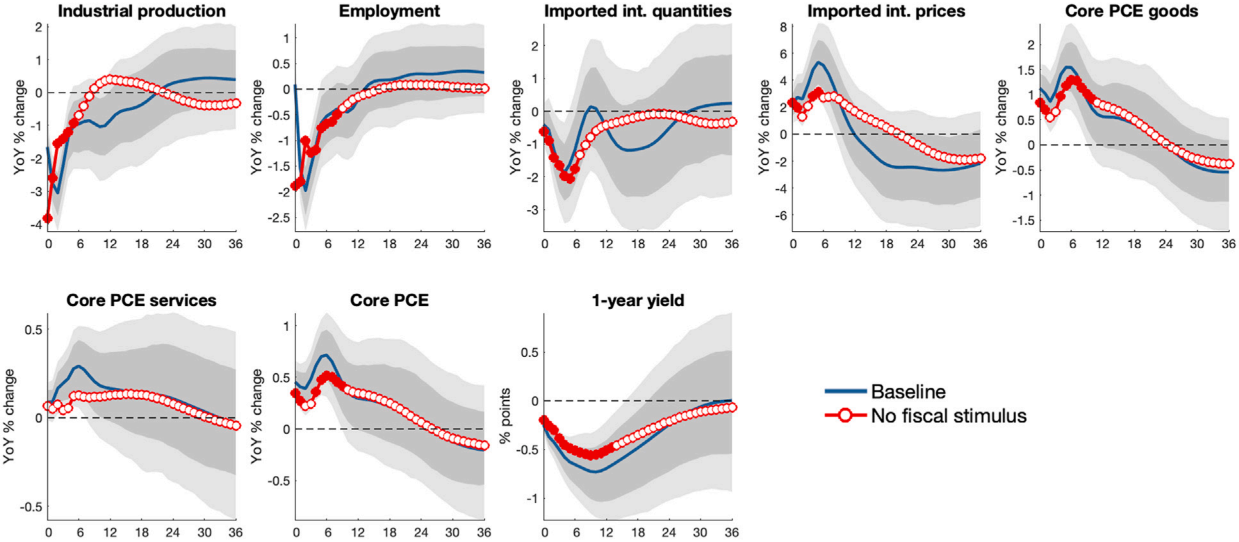

Fig. 3. Disentangling the role of fiscal stimulus.

Note: The GSC shock is normalised to induce a one-standard-deviation increase in the shortage index of Caldara et al. (2025). The horizontal axis shows months. Solid lines represent median responses, while shaded areas indicate 68% and 90% posterior coverage bands. Red-circled lines show counterfactual median responses. Filled circles indicate responses within the 90% posterior coverage bands, while empty markers denote non-significant responses. Estimation sample: 1991M1–2025M6.

As such, this exercise does not constitute a structural counterfactual, since expectations are not allowed to adjust to an alternative fiscal regime, leaving it exposed to the Lucas critique. Accordingly, the analysis provides a lower bound on the role of fiscal stimulus. With endogenous expectations and a credible announcement of no fiscal support, forward-looking agents would adjust consumption, investment, and pricing decisions more sharply, implying larger damaging effects on real activity. Despite this limitation, this exercise is informative about the transmission mechanism of GSC shocks through *binding* capacity constraints in high-demand environments.

Fig. 3 illustrates this scenario for selected variables, while the full set of responses is presented in Online Appendix A.5. Red-circled lines show counterfactual median responses. Filled circles indicate responses within the 90% posterior coverage bands, while empty markers denote non-significant responses. Shutting down fiscal stimulus weakens aggregate demand, leading to a contraction in real activity on impact. In particular, industrial production declines from −2% to −4%, while employment falls by around 2% on impact. Imported intermediate input quantities remain essentially unchanged, whereas imported intermediate prices increase by less. At the same time, goods inflation is dampened, with no statistically significant spillovers to services inflation. Core inflation is also attenuated, with the initial increase halving from 0.5% to 0.25%, closely mirroring the response of goods inflation. As a result, the central bank provides somewhat less monetary accommodation. The fact that the adjustment operates primarily through prices rather than quantities points to the presence of binding capacity constraints, in line with Comin et al. (2023) and Dynan and Elmendorf (2024). In the original scenario, despite stronger demand, firms are unable to expand production, so the adjustment occurs mainly through imported intermediate input prices. In the counterfactual, lower demand reduces the tightness of the constraint, thereby easing goods and core inflation without triggering a further decline in imported intermediate input volumes.

This evidence is consistent with de Soyres et al. (2024), who show that supply bottlenecks, binding during periods of high demand, raise inflation primarily through core goods prices, with little effect on core services. Demirel and Wilson (2023) and Fornaro (2024) provide evidence that supply constraints magnify the inflationary impact of large fiscal interventions by steepening the Phillips curve. Regarding economic activity, my findings are in line with evidence that fiscal policy helped prevent a deeper recession during the pandemic, particularly in advanced economies that implemented large-scale support measures (Chudik et al., 2021; Gourinchas et al., 2021; Deb et al., 2024).

3.4. Robustness checks

Pre-pandemic evidence. A range of robustness checks, reported in Online Appendix A.5, confirms that the results are robust across several dimensions. In particular, the first-stage F-statistic is 35 in the pre-pandemic sample, indicating no concerns regarding instrument strength. Overall, the responses in the pre-pandemic and full samples are qualitatively similar, as *GSC shocks behave like adverse supply shocks and the Fed eases policy in both cases*. At the same time, the responses differ somewhat in magnitude and persistence. In the full sample, the GSC shock is more persistent, leading to more prolonged responses in imported input prices, inflation, and inflation expectations. By contrast, in the pre-pandemic sample, inflationary effects are shorter-lived and real variables adjust more gradually. As a result, the monetary policy response also unfolds more gradually before the pandemic.

Several factors may explain these differences. First, the two samples likely capture disruptions of a different nature. As suggested by the events shown in Fig. 1, the pre-pandemic period mainly captures more domestic disruptions associated with natural disasters and localised production bottlenecks, which tend to be more transitory and less synchronised across sectors (see, e.g., Alessandria et al., 2023). By contrast, the full sample also includes the pandemic episode, a broad and highly synchronised disruption to global production networks and logistics. This distinction matters because global disruptions are more likely to affect a wider set of production linkages, keep imported input prices elevated for longer, and feed more strongly into inflation expectations and other price-related variables (see, among others, di Giovanni et al., 2022; Bai et al., 2024; Benigno et al., 2022).

Second, a key difference concerns whether capacity constraints are binding. The fiscal response is substantially weaker before the pandemic. In the pre-pandemic sample, turning off fiscal stimulus has no significant effect on the transmission (see Figure A.7 in the appendix), suggesting that capacity constraints are not binding at the scale of fiscal support observed in that period. By contrast, in the full sample, capacity constraints do bind, as discussed above, which helps explain the greater persistence of inflationary pressures. Third, this difference is also reflected in labour market responses. In the pre-pandemic sample, wages fall rather than rise, while employment declines with a delay. This points to a weaker pass-through into domestic costs, suggesting that the substitution mechanism discussed in Section 3.1 does not appear to operate, consistent with non-binding capacity constraints. This is in line with the more limited persistence of services inflation and inflation expectations. Finally, the fiscal counterfactual results are robust to using real government transfer payments instead of real total government expenditures.

Alternative instrumented variables. I examine six alternative proxies for GSC pressures commonly used in the empirical literature and show that the results are robust when instrumenting these measures, namely the PMI–ISM Supplier Deliveries Index, the Baltic Dry Index, the GSCPI of Benigno et al. (2022), the HARPEX index, the Supply Disruptions Index (SDI) of Smirnyagin and Tsyvinski (2022), and the Average Congestion Rate (ACR) index of Bai et al. (2024). The instrument is strong for the first two measures in both the pre-pandemic and full samples, whereas for the remaining proxies, which have more limited data availability, the instrument is strong only in the full sample (see Figures A.2 and A.3, as well as Table A.4 in the appendix).

4. The role of monetary policy in the transmission of GSC shocks

This section examines the propagation of GSC shocks under two counterfactual monetary policy rules: one that stabilises inflation and another that minimises a dual-mandate loss function. Based on Lucas-critique-robust counterfactuals (McKay and Wolf, 2023), stabilising inflation would require a less accommodative stance and a slightly larger contraction relative to the baseline, leading to a more favourable trade-off. By contrast, optimally pursuing the dual mandate — whether through IT or AIT — requires a looser initial policy stance. Under AIT, which tolerates higher initial inflation, stabilising inflation entails subsequent tightening, ultimately worsening the trade-off relative to IT.

4.1. Structural policy counterfactuals

VAR-based policy counterfactuals typically involve introducing unexpected policy shocks every period throughout the entire impulse-response horizon (e.g., Sims and Zha, 2006). However, as demonstrated by McKay and Wolf (2023), henceforth MW, this approach faces challenges such as the Lucas critique and generally falls short of recovering the authentic policy-rule counterfactual. This limitation stems from the assumption that, despite recurrent surprises, agents do not adjust their expectations regarding future policy paths. In essence, this approach overlooks a potential *expectations channel* through which a change in the policy rule might influence the economy.

MW propose a robust method for policy-rule counterfactuals in VAR models that addresses these issues, accurately capturing the true counterfactual across structural models, including New Keynesian ones. Their approach leverages news shocks about current and future policy to reflect the impulse responses under a counterfactual policy rule.

Environment. MW consider a linear, perfect-foresight, infinite-horizon economy in terms of deviations from the deterministic steady state for periods $t = 0, 1, 2, \ldots$. This economy is separated into two blocks: the non-policy block and the policy block, which are expressed in sequence-space notation as follows:

$$\text{Non-policy block:} \quad \mathcal{H}_x \boldsymbol{x} + \mathcal{H}_z \boldsymbol{z} + \mathcal{H}_\epsilon \boldsymbol{\epsilon} = \boldsymbol{0} \tag{1a}$$

$$\text{Policy block:} \quad \mathcal{A}_x \boldsymbol{x} + \mathcal{A}_z \boldsymbol{z} + \boldsymbol{\nu} = \boldsymbol{0}, \tag{1b}$$

where $\boldsymbol{x} \equiv (\boldsymbol{x}_1', \boldsymbol{x}_2', \ldots, \boldsymbol{x}_{n_x}')'$ stacks the time paths of the n_x endogenous variables, analogously $\boldsymbol{z}$ represents the n_z policy instruments. The linear maps $\{\mathcal{H}_x, \mathcal{H}_z, \mathcal{H}_\epsilon\}$ summarise the behaviour of agents in the non-policy block of the economy, while $\{\mathcal{A}_x, \mathcal{A}_z\}$ describe the *baseline* policy rule of interest. $\boldsymbol{\epsilon}$ denotes the n_ϵ non-policy structural shocks and $\boldsymbol{\nu}$ the n_ν policy shocks. As emphasised by MW, for $t > 0$, policy shocks should be interpreted as *news shocks*—that is, deviations from the policy rule announced at date 0 but implemented at $t > 0$. Bearing this in mind, I will refer to them as policy news shocks.

The fundamental assumption conveyed by Eqs. (1) is that $\{\mathcal{H}_x, \mathcal{H}_z, \mathcal{H}_\epsilon\}$ do not depend on the coefficients of the policy rule $\{\mathcal{A}_x, \mathcal{A}_z\}$. This implies that the impact of policy on the non-policy block's decisions occurs solely through the path of the instrument $\boldsymbol{z}$, rather than directly through the policy rule itself. MW highlight that this assumption remains valid across a general family of structural models.

From policy shocks to rule counterfactuals. Under the assumption that the solution exists and is unique, the solution to Eqs. (1) can be expressed as:

$$\begin{bmatrix} \boldsymbol{x} \\ \boldsymbol{z} \end{bmatrix} = \begin{bmatrix} \boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} & \boldsymbol{\Theta}_{x,\nu,\mathcal{A}} \\ \boldsymbol{\Theta}_{z,\epsilon,\mathcal{A}} & \boldsymbol{\Theta}_{z,\nu,\mathcal{A}} \end{bmatrix} \times \begin{bmatrix} \boldsymbol{\epsilon} \\ \boldsymbol{\nu} \end{bmatrix} = \boldsymbol{\Theta}_{\mathcal{A}} \times \begin{bmatrix} \boldsymbol{\epsilon} \\ \boldsymbol{\nu} \end{bmatrix} \tag{2}$$

where $\boldsymbol{\Theta}_{\mathcal{A}}$ collects the IRFs of the non-policy variables $\boldsymbol{x}$ and the policy instrument $\boldsymbol{z}$ under the baseline policy rule summarised by matrices $\mathcal{A}$.

In the counterfactual analysis below, I am interested in examining the IRFs to a GSC shock under alternative monetary policy rules. My objects of interest are the analogous IRFs if the policy block (1b) was replaced by the counterfactual policy rule

$$\tilde{\mathcal{A}}_x \boldsymbol{x} + \tilde{\mathcal{A}}_z \boldsymbol{z} = \boldsymbol{0}, \tag{3}$$

where $\tilde{\mathcal{A}}_x$ and $\tilde{\mathcal{A}}_z$ represent the coefficients of the counterfactual rule. MW show that having information about the impulse responses $\boldsymbol{\Theta}_{\mathcal{A}}$ under the baseline policy rule is sufficient to predict the IRFs to the structural shock of interest $\boldsymbol{\epsilon}$ under any counterfactual policy rule. This holds even without complete knowledge of all the structural equations of the model. Specifically, they establish that

$$\begin{aligned} \boldsymbol{x}_{\tilde{\mathcal{A}}}(\boldsymbol{\epsilon}) &= \boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Theta}_{x,\nu,\mathcal{A}} \times \tilde{\boldsymbol{\nu}}, \\ \boldsymbol{z}_{\tilde{\mathcal{A}}}(\boldsymbol{\epsilon}) &= \boldsymbol{\Theta}_{z,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Theta}_{z,\nu,\mathcal{A}} \times \tilde{\boldsymbol{\nu}}. \end{aligned} \tag{4}$$

Put differently, the IRFs to the structural shock $\boldsymbol{\epsilon}$ under the counterfactual policy rule is equivalent to a combination of the corresponding IRFs under the baseline policy rule $\boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon}$ and the IRFs to a specific sequence of policy news shocks $\tilde{\boldsymbol{\nu}}$. Intuitively, as long as the decisions of the non-policy block hinge on the path of the policy instrument rather than the policy rule itself, it does not matter whether the path results from the systematic conduct of policy or arises from policy news shocks. Consequently, the policy news shocks $\tilde{\boldsymbol{\nu}}$ are chosen so that the counterfactual policy rule

$$\tilde{\mathcal{A}}_x [\boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Theta}_{x,\nu,\mathcal{A}} \times \tilde{\boldsymbol{\nu}}] + \tilde{\mathcal{A}}_z [\boldsymbol{\Theta}_{z,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Theta}_{z,\nu,\mathcal{A}} \times \tilde{\boldsymbol{\nu}}] = \boldsymbol{0}, \tag{5}$$

holds. A practical challenge in implementing this approach is that policy news shocks $\tilde{\boldsymbol{\nu}}$ which convey changes in future policy across all possible horizons $t, t+1, t+2, \ldots$ are rarely available. However, MW demonstrate that, in practice, we can employ a set of standard monetary policy shocks $\boldsymbol{s}$ and their respective IRFs $\boldsymbol{\Omega}_{s,\mathcal{A}}$ from empirical studies, provided each shock entails a distinct future trajectory for the policy instrument. Furthermore, rather than requiring IRFs to *as many shocks as horizons* over which the counterfactual policy rule is assumed, using even a limited number of shocks $\boldsymbol{s}$ that minimise

$$\min_{\boldsymbol{s}} \left\| \tilde{\mathcal{A}}_x [\boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Omega}_{x,s,\mathcal{A}} \times \boldsymbol{s}] + \tilde{\mathcal{A}}_z [\boldsymbol{\Theta}_{z,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Omega}_{z,s,\mathcal{A}} \times \boldsymbol{s}] \right\|, \tag{6}$$

yields a reliable best *Lucas-critique-robust* approximation, as economic agents' expectations regarding a future policy change are already reflected in the IRFs to a policy shock path.

4.2. Implementation

In my application, I assume that the central bank relies on two instruments: the *policy rate* and *communication*. Accordingly, I implement policy counterfactuals with $n_s = 2$ distinct U.S. monetary policy shocks. Specifically, in addition to the GSC shock, I identify a conventional monetary policy (CMP) shock and a forward guidance (FG) shock using the monthly transformed monetary policy surprise series of Jarociński (2024), which account for central bank information effects. Using the *same* Bayesian VAR model already estimated in the precedent section, for each instrument, I estimate a Proxy SVAR model.[5] Since the transmission of the three shocks (GSC, CMP and FG) is estimated within a single VAR, I can draw from the posterior and compute counterfactuals for each draw, thereby accounting for joint estimation uncertainty. To implement the counterfactuals, I assume that, upon observing the GSC shock, the Fed reacts *contemporaneously* by choosing the magnitudes of the two monetary shocks to counteract, as much as possible, the responses of key variables over the entire impulse response horizon, conditional on the alternative policy rule.

I briefly describe the impulse responses, which are presented in Online Appendix B. The results are robust to the surprise series of Swanson (2024), as shown in the same appendix. A contractionary CMP shock raises shorter-horizon interest rates, while a contractionary FG shock increases medium-term interest rates. Both shocks tighten financial conditions, slowing real activity and consumer prices. However, their effects on government expenditures diverge. A CMP shock significantly increases government expenditures, due to the activation of automatic stabilisers in response to the economic contraction—an effect also documented in Breitenlechner et al. (2024). In contrast, a FG shock reduces this variable, likely reflecting fiscal discipline in anticipation of weaker economic activity.

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[5] Specifically, the IRFs to the identified CMP and FG shocks are normalised to induce a 10 basis point increase in the 1-year and 5-year yields, respectively. The first-stage F-statistics are 18 and 14, respectively. The surprise series from Jarociński (2024) and Swanson (2024) are available from 1991 onwards, but not through 2025. Given that the estimated period spans from 1991 to 2025, I follow prior work in the macro IV literature (e.g., Känzig, 2021) and set the missing values to zero.

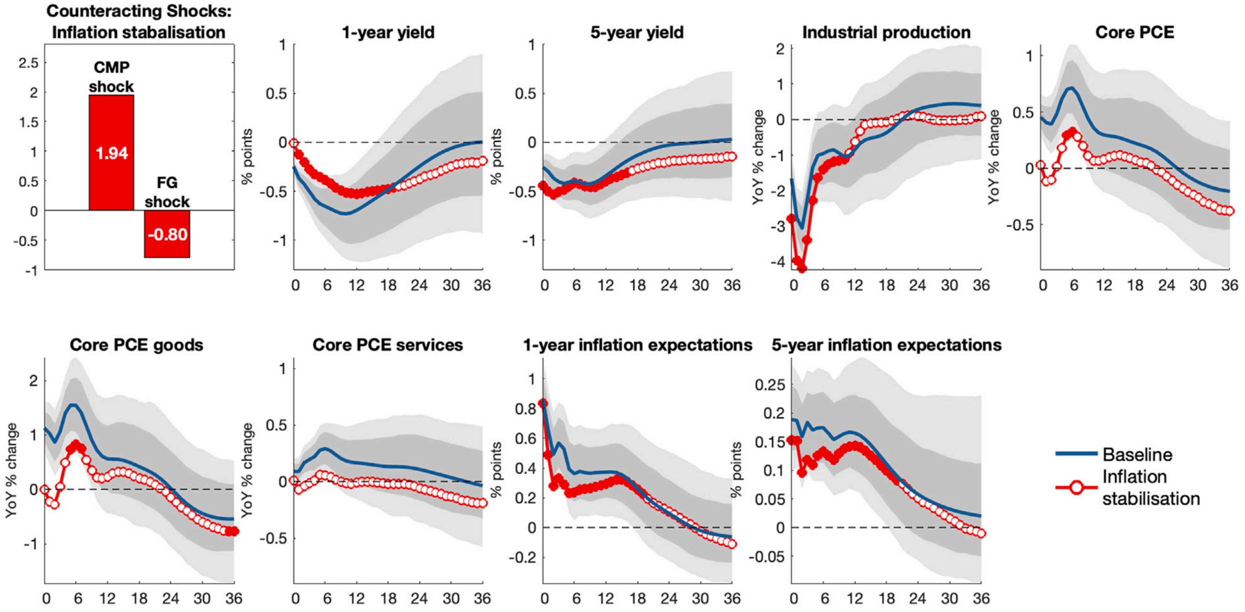

Fig. 4. IRFs to a GSC shock under the baseline policy rule and the counterfactual policy rule that stabilises inflation.
Note: The GSC shock is normalised to induce a one-standard-deviation increase in the shortage index of Caldara et al. (2025). The figure reports the median posterior magnitude of the counteracting policy shocks — namely, a conventional monetary policy (CMP) shock and a forward guidance (FG) shock — required to replicate the counterfactual policy rule. Contractionary CMP and FG shocks are normalised to induce a 10 bp increase in the 1-year and 5-year yields, respectively. The horizontal axis shows months. Solid lines represent median responses, while shaded areas indicate 68% and 90% posterior coverage bands. Red-circled lines show counterfactual median responses. Filled circles indicate responses within the 68% posterior coverage bands, while empty markers denote non-significant responses. Estimation sample: 1991M1–2025M6.

4.3. *What if the Fed stabilised inflation?*

In this section, I examine the propagation of GSC shocks under a scenario where the Fed stabilises core inflation. For this, I define the counterfactual monetary policy rule as $\boldsymbol{e}_\pi \boldsymbol{x} = \boldsymbol{0}$, where $\boldsymbol{e}_\pi$ is a $1 \times n_x$ vector of zeros with unity at the position of core inflation in $\boldsymbol{x}$. Restricting the counterfactual to periods $t = 0, 1, 2, \ldots, h$, Eq. (6) becomes

$$\min_{\boldsymbol{s}} \left\| \boldsymbol{e}_\pi [\boldsymbol{\Theta}_{x,\epsilon,\mathcal{A}} \times \boldsymbol{\epsilon} + \boldsymbol{\Omega}_{x,s,\mathcal{A}} \times \boldsymbol{s}] \right\|, \tag{7}$$

which involves solving a least-squares minimisation problem for n_s unknown period-t Fed policy shocks $\boldsymbol{s}$ in $h+1$ equations.

The results of this scenario are depicted by the red-circled lines in Fig. 4, which display the responses of selected variables. Under this counterfactual, the policy rule combines a contractionary CMP shock and an accommodative FG shock of magnitudes 1.94 and 0.8, respectively, raising the 1-year yield by 19.4 bp and lowering the 5-year yield by 8 bp, relative to the baseline on impact. The Fed contains core inflation at the cost of a larger short-run contraction by initially setting a higher policy rate which, while still accommodative, provides less stimulus than the baseline. At the same time, the decline in the 5-year yield indicates that the Fed communicates additional medium-term accommodation, potentially to mitigate a deeper contraction that could otherwise lead to an excessive decline in inflation.

The estimates indicate that, under this policy rule, the Fed is able to stabilise inflation early on. What explains this result? The answer lies in the nature of the GSC shock. As GSC-driven inflation originates mainly in the goods sector, where prices are relatively more flexible than in services (see, e.g., Pasten et al., 2020), this asymmetry implies greater flexibility in core prices (see, e.g., Ferrante et al., 2023).

As a result, stabilising GSC-driven inflation does not necessarily require large adjustments in the policy rate relative to the baseline. Instead, a suitable combination of relatively modest interest rate changes and forward guidance can replicate the desired policy rule. Finally, with a more muted response of goods prices, spillovers to services prices are more limited, and inflation expectations are somewhat lower and less persistent relative to the baseline.

Turning to broader macroeconomic responses, shown in Online Appendix C.1, government expenditures increase slightly relative to the baseline, potentially helping to cushion the economic downturn caused by reduced monetary stimulus. Financial conditions remain largely muted, reflecting the offsetting effects of the contractionary CMP shock and the accommodative FG shock. The resulting contraction in aggregate demand helps ease pressure on global supply chains in the short run, consistent with the theoretical mechanisms emphasised by Comin et al. (2023) and Amiti et al. (2024). Lower demand reduces imported intermediate input prices, which in turn dampens core goods and services inflation and ultimately lowers core inflation. Weaker demand also induces firms to slow hiring, as reflected in a mild decline in employment, while wages remain relatively unchanged.

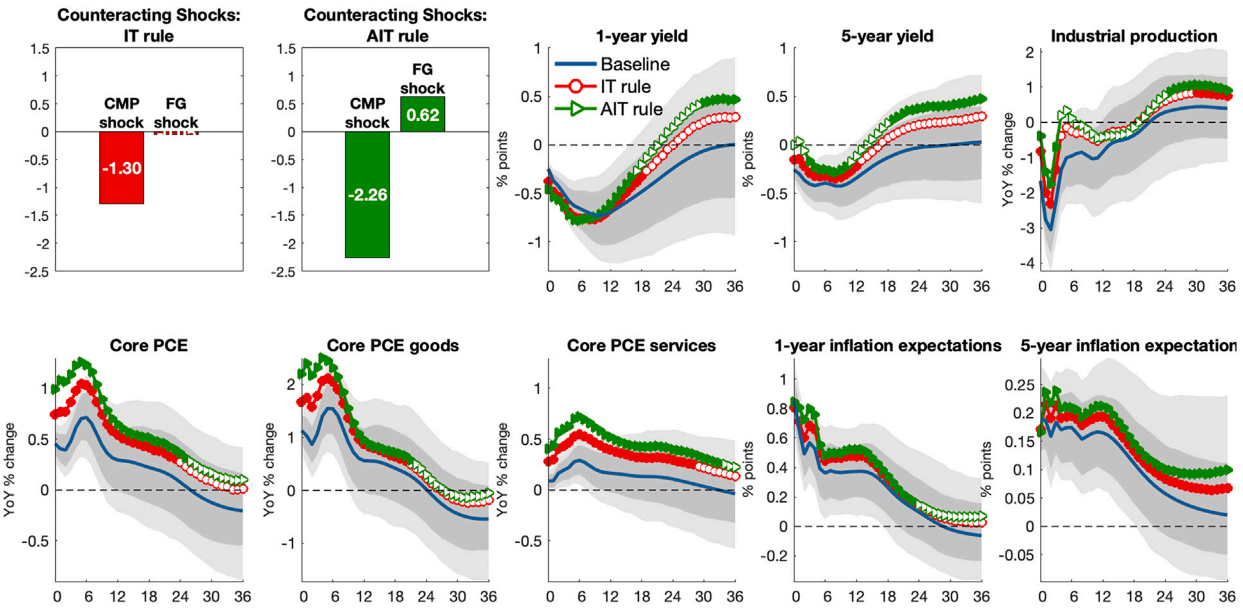

Fig. 5. IRFs to a GSC shock under the baseline policy rule and the counterfactual optimal inflation targeting (IT) and average inflation targeting (AIT) policy rules.

Note: The GSC shock is normalised to induce a one-standard-deviation increase in the shortage index of Caldara et al. (2025). The figure reports the median posterior magnitude of the counteracting policy shocks—namely, a conventional monetary policy (CMP) shock and a forward guidance (FG) shock—required to replicate the counterfactual policy rule. Contractionary CMP and FG shocks are normalised to induce a 10 bp increase in the 1-year and 5-year yields, respectively. The horizontal axis shows months. Solid lines represent median responses, while shaded areas indicate 68% and 90% posterior coverage bands. Red-circled and green-triangled lines show counterfactual median responses. Filled circles indicate responses within the 68% posterior coverage bands, while empty markers denote non-significant responses. Estimation sample: 1991M1–2025M6.

4.4. *Optimal monetary policy amid GSC disruptions*

As shown in Section 3, the Fed has historically looked through initial price rises following a GSC shock and even implemented a loose policy, presumably to stabilise output. But was this the optimal course of action for a central bank aiming to stabilise both output and inflation? If not, what measures would be necessary to optimally fulfil its dual mandate?

To address these questions, I estimate the effects of a GSC shock under an optimal policy rule corresponding to a loss function with *equal weight* on output and inflation, mirroring the dual mandate of the Fed. In what follows, I will refer to this rule as the optimal inflation targeting (IT) rule. The advantage of using MW's approach is that I can posit a pertinent loss function instead of deriving it from a welfare maximisation problem tied to a specific model and calibration. I represent such a loss function as

$$\mathcal{L} = \lambda_\pi \boldsymbol{\pi}' W \boldsymbol{\pi} + \lambda_y \boldsymbol{y}' W \boldsymbol{y}, \tag{8}$$

where $\lambda_\pi = \lambda_y = 1$. The discount factor $\beta = 1/1.01$ is set to ensure that, in a standard New Keynesian model, the corresponding annualised interest rate aligns with 2%, roughly the sample average of the Fed's policy rate, and $W = \mathrm{diag}(1, \beta, \beta^2, \dots)$ allows for discounting. MW obtain the optimal policy rule, which is expressed as

$$\lambda_\pi \boldsymbol{\Omega}'_{\pi,s,\mathcal{A}} W \boldsymbol{\pi} + \lambda_y \boldsymbol{\Omega}'_{y,s,\mathcal{A}} W \boldsymbol{y} = \mathbf{0}. \tag{9}$$

Fig. 5 shows the counterfactual responses for this scenario, highlighted by the red-circled lines. These results imply that, to fulfil the dual mandate, the optimal IT rule entails a combination of an accommodative CMP shock and a marginally accommodative FG shock, with magnitudes of 1.30 and 0.05, respectively, leading to a 13 bp decline in the 1-year yield and a 0.5 bp decline in the 5-year yield relative to the baseline. The central bank therefore eases more relative to the baseline. Under this scenario, global supply chains become more strained, reflecting stronger demand driven by the additional monetary stimulus, alongside a smaller contraction in real activity, while fiscal stimulus remains largely unchanged. Imported intermediate input prices increase and display greater persistence, exerting additional upward pressure on goods inflation, which subsequently feeds into services inflation, resulting in more persistent core inflation overall. The contraction in employment is more limited, while wage pressures remain broadly unchanged. These additional responses are reported in Online Appendix C.1. Note that these estimates do not suggest that the Fed should have eased more than it did to optimally fulfil its mandate. Rather, they indicate that the baseline policy rule was slightly more restrictive relative to the optimal policy.

Table 1
Ratio of the average median responses of core inflation and output.

Policy rule	Baseline	Inflation stabilisation	Optimal IT	Optimal AIT
Horizon	$h = 12$			
Core inflation	0.50	0.11	0.83	1.05
Output	−1.51	−2.11	−0.76	−0.39
Trade-off	−0.33	−0.05	−1.09	−2.70
Horizon	$h = 24$			
Core inflation	0.36	0.09	0.63	0.78
Output	−0.92	−1.10	−0.40	−0.23
Trade-off	−0.39	−0.08	−1.57	−3.46

Note: The inflation-output trade-offs are computed as the ratio of the average responses of core inflation and output.

4.5. A temporary shift in the Federal Reserve's policy framework

In the spirit of the change in the Fed's policy framework announced in 2020, which replaced inflation targeting with average inflation targeting (AIT) to achieve its dual mandate (see Powell, 2020), I consider a policymaker with preferences over output and *average* inflation. The AIT framework was in effect until 2025, when the Fed returned to an IT regime (see Powell, 2025).

Average inflation is denoted by $\bar{\pi}_t$, where $\bar{\pi}_t = \sum_{\ell=0}^{L} \omega_\ell \pi_{t-\ell}$. Here, L denotes the maximal (lagged) horizon that enters the inflation averaging, and ω_ℓ denotes the weight on the ℓth lag, with $\sum_\ell \omega_\ell = 1$ and $\omega_\ell \geq 0$ for all ℓ. As noted by Jia and Wu (2023), the Fed's communication was ambiguous about the AIT policy, especially its specific horizon L. For my application, I consider several cases: $L \in \{36, 48, 60\}$ months, $\omega_\ell = 1/L$ (a simple average as in Jia and Wu, 2023) and $\omega_\ell \propto \exp(-0.1 \times \ell)$ (a weighted average as in McKay and Wolf, 2023). Suitably stacking the weights $\{\omega_\ell\}$, we can define a linear map $\bar{\Pi}$ such that $\bar{\boldsymbol{\pi}} = \bar{\Pi} \times \boldsymbol{\pi}$. The loss function and the resulting optimal policy rule under AIT are identical to those under IT, except that inflation $\boldsymbol{\pi}$ is replaced by average inflation $\bar{\boldsymbol{\pi}}$ in Eqs. (8) and (9), where the parameter values remain unchanged.

The counterfactual responses under this optimal rule, based on a simple average over a 36-month horizon, are shown by the green-triangled lines in Fig. 5. First, I find no significant differences between using a simple versus a weighted average, or across L. Second, in this scenario, the policymaker accommodates further relative to the optimal IT rule through a more accommodative CMP shock of size 2.26, compared to 1.30 under the IT rule. This action leads to higher core inflation on impact and a milder real activity response relative to the optimal IT rule. These responses suggest that, under the AIT rule, the central bank tolerates higher inflation, consistent with the discussion in Reis (2022) on the potential implications of adopting the AIT framework, as the Fed did in 2020.

As this rule ultimately leads to higher and more persistent core inflation and inflation expectations in the medium term, achieving the 2% inflation target on average under the AIT rule requires subsequent tightening. When prices are more flexible, an initially looser monetary stance further stimulates demand and strains supply chains, increasing inflation persistence and the risk of inflation expectations becoming unanchored, as reflected in the counterfactual response of medium-term inflation expectations. In this case, containing inflation would eventually require more forceful monetary tightening under the AIT rule than under the IT rule, thereby worsening the inflation-output trade-off, as quantified below.

This tightening is initially communicated through a contractionary FG shock of size 0.62, which materialises in years 2–3. While the optimal IT rule also appears to tighten in the medium term, the responses of the 1-year and 5-year yields are not significant in years 2–3, reflecting the marginal role played by forward guidance under IT. As a result, policy adjustments are concentrated at the short end of the yield curve and do not generate a sufficiently persistent tightening at medium maturities. Finally, the effects on the remaining variables, as shown in Online Appendix C.1, are similar to those in the IT case but amplified by the additional monetary accommodation.

4.6. Quantifying inflation-output trade-offs

To assess inflation-output trade-offs, I compute the ratio of the average median responses of core inflation and output over two horizons, 12 and 24 months after the shock, under the baseline and the alternative monetary policy rules considered above, which are shown in Table 1. The key insight is that the Fed may not necessarily face an unfavourable trade-off under adverse GSC shocks. The evidence indicates that GSC-induced inflation can be managed effectively with an initially slightly less accommodative stance relative to the baseline, albeit at the cost of a moderate economic contraction.

Focusing on the optimal IT and AIT rules, the inflation-output trade-off is substantial and increases with the horizon. At 12 months, the ratio ranges from −1.09 under IT to −2.70 under AIT, and at 24 months from −1.57 to −3.46. Thus, under AIT, the cumulative inflation response is more than three times the associated output contraction at the two-year horizon, whereas under IT it is less than half as large. By contrast, the rule that stabilises inflation yields ratios close to zero, indicating that inflation can be contained with only modest output costs relative to the baseline. Overall, the optimal AIT rule delivers the least favourable trade-off, particularly at longer horizons, while IT performs comparatively better but still entails non-negligible inflationary costs.

Finally, these findings are consistent with the theoretical contributions of Bai et al. (2024) and Karadi et al. (2024), who argue that lowering inflation becomes less costly after large cost-push shocks due to increased price flexibility, that is, at lower sacrifice ratios. The empirical evidence in this paper illustrates a similar mechanism in the case of GSC shocks, where capacity constraints make prices, particularly in the goods sector, more flexible while limiting output losses. Consequently, under optimal policy rules that initially tolerate higher inflation, stabilising inflation later becomes more costly.

4.7. Robustness checks

Online Appendix C.2 shows that, in the pre-pandemic sample, the monetary policy actions implied by the alternative policy rules are qualitatively similar. Nonetheless, unlike the full-sample results, there are no clear differences between the counterfactuals under the IT and AIT rules. This likely reflects that the amplification mechanism that magnifies monetary stimulus when constraints bind is absent in the pre-pandemic sample. Finally, the appendix shows that the results are robust to the monetary policy surprises of Swanson (2024).

5. Conclusions

This paper has shown that central banks may not always face unfavourable inflation-output trade-offs in response to GSC shocks. The key mechanism underlying this result is that GSC shocks generate greater price flexibility and limited output effects due to capacity constraints, effects that are amplified in high-demand environments. These results have important policy implications. Lucas-critique robust counterfactual analyses suggest that stabilising inflation, even at the cost of a mild economic contraction, leads to a more balanced macroeconomic outcome in the medium term. In contrast, policy rules that tolerate higher inflation can inadvertently lead to more persistent inflation and inflation expectations, thereby exacerbating the trade-off.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author used ChatGPT in order to improve language and readability. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Supplementary material

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Data availability

Data will be made available on request.

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