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Active or passive? Revisiting the role of fiscal policy during high inflation

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ABSTRACT

We investigate the interplay of the monetary–fiscal policy mix during times of crisis by drawing insights from the Great Inflation of the 1960s and 1970s. We use a Sequential Monte Carlo (SMC) algorithm to estimate a DSGE model with three distinct monetary/fiscal policy regimes. We show that, in such a model, SMC outperforms standard sampling algorithms because it is better suited to deal with multimodal posteriors, an outcome that is highly likely in a DSGE model with monetary–fiscal policy interactions. From the estimation with SMC, a differentiated perspective results: pre-Volcker macroeconomic dynamics were similarly driven by passive monetary/passive fiscal policy and fiscal dominance. We apply these insights to study the post-pandemic inflation period.

1. Introduction

In advanced economies, fiscal stimulus and rescue packages in response to the pandemic and the war in Ukraine have pushed sovereign debt levels to record highs. This has eroded the fiscal authorities' credibility in stabilizing the accumulated fiscal imbalances (Bianchi and Melosi, 2022). At the same time, inflation surged, ending decades of generally stable prices. Navigating through this complex environment requires not just coordinated fiscal and monetary policies, but also a sound understanding of macroeconomic policy interactions derived from model-based evaluations.

This paper aims to contribute to this debate along three dimensions. First, we provide methodological guidance on how to estimate DSGE models with distinct monetary–fiscal policy regimes. We show that, in such a model setup, the Sequential Monte Carlo (SMC) algorithm outperforms standard posterior sampling algorithms and should be the preferred choice. Using SMC, we revisit the still open question of the role of fiscal policy during the historical episode of the Great Inflation in the United States. Finally, we apply the pre-Volcker insights to the recent period of post-pandemic inflation and discuss appropriate monetary and fiscal policy responses.

It is well established in the literature that any discussion of potential causes of inflation and appropriate policy actions to contain them must be accompanied by an assessment of the fiscal-monetary policy mix in place.[1] For one historical episode that is very

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[1] The insight that monetary and fiscal policy are not independent from each other and must be studied jointly has a long tradition in modern macroeconomics, going back to Sargent and Wallace (1981), Leeper (1991), Sims (1994), Woodford (1996), and Cochrane (2001). Cochrane (2011), Davig and Leeper (2011) and Bianchi and Melosi (2017) study the interaction of monetary and fiscal policy in a recession. Ascari et al. (2020) call for a new taxonomy for studying the interactions of monetary and fiscal policy. Bianchi et al. (2020) propose a concrete policy that involves coordination between the monetary and fiscal authorities in response to the COVID-19 pandemic.

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instructive on all these aspects, the debate on the fiscal-monetary policy mix is still unresolved. This episode is usually referred to as the Great Inflation of the 1960s and 1970s in the U.S. In our study, we revisit the role of fiscal policy during the Great Inflation in order to gain insights for potential policy options in the post-pandemic inflation regime. We estimate a DSGE model with three distinct monetary/fiscal policy regimes using a SMC algorithm - a posterior sampler established in the DSGE literature by Herbst and Schorfheide (2014, 2015). The SMC is able to deal with multimodal posterior surfaces and enables us to estimate a fixed-regime DSGE model with distinct monetary/fiscal policy regimes over its entire parameter space.

We find that the macroeconomic dynamics during the pre-Volcker period were driven almost equally by a passive monetary/passive fiscal policy regime and a regime of fiscal dominance. From a historical standpoint, a regime of fiscal dominance emerges as a plausible explanation for several reasons. First, the fiscal authority notably operated with deficits to fund initiatives such as the "Great Society" program, initiated by President Johnson in 1964, the Vietnam War until 1973, and the tax cuts implemented by President Ford's administration in 1975. At the same time, Arthur Burns, who served as the chairman of the Federal Reserve from 1970 to 1978, interacted frequently with the White House — described by Alan Meltzer as a "junior partner" to the fiscal authority (Meltzer, 2003). Moreover, in a similar vein, research by Drechsel (2023) supports the notion that President Nixon exerted political pressure on Fed Chairman Burns. The result that regime F and indeterminacy were almost equally likely calls for a more nuanced view of the causes of the Great Inflation. Not only did non-policy shocks create inflationary pressures, but fiscal policy, especially government spending, was an equally important driver of U.S. inflation in the 1960s and 1970s.

Through the lens of the model, we analyze the current post-pandemic period. The current period is characterized by post-pandemic inflation, and a fiscal authority grappling with increased government spending to deal with the aftermath of the pandemic, to adapt to the changes brought about by climate change, and to respond to escalating global tensions that require increased military investment or expanded aid packages to countries such as Ukraine, Israel, or Taiwan. These expenditures have increasingly been financed by the issuance of government debt, leading the IMF to warn the US that its massive budget deficits have fueled inflation and pose "significant risks" to the global economy (International Monetary Fund, 2024). Against this background, we illustrate the consequences of the policy regimes by filtering U.S. data from 2020:Q1 - 2022:Q4 through the model, separately for each of the three estimated monetary–fiscal policy regimes. Although the smoothed shocks are similar in each parameterization, the contribution of each shock to inflation varies significantly across policy regimes. In a regime of monetary dominance, the main drivers of post-pandemic inflation are markup shocks. In a regime with two passive authorities, inflation is mainly driven by preference and tax shocks. In contrast, under fiscal dominance, transfers are the main source of inflation. Consequently, while fiscal policy would be the main instrument to curb inflation in the indeterminacy and fiscal-led regime, fiscal policy measures would not be effective in reducing inflation in a regime of monetary dominance. This discrepancy arises from the regime-specific effectiveness of macroeconomic policy instruments. While nominal interest rate hikes effectively dampen inflation in a monetary-led regime, they fuel inflationary pressures in fiscal-led and passive monetary/passive fiscal regimes. Thus, it is of paramount importance that policymakers are aware of the regime when formulating policy decisions.

Our analysis provides methodological guidance on how to estimate DSGE models with monetary and fiscal policy interactions, and hence different policy regimes. Models that allow for different monetary and fiscal policy interactions have played a pertinent role in the debate on escaping the efficient lower bound (Bianchi and Melosi, 2017) and, more recently, in the debate on how to deal with high public debt (Bianchi and Melosi, 2022; Bianchi et al., 2023). Estimating these models is challenging because each policy regime introduces a potential mode into the posterior distribution. As shown in Herbst and Schorfheide (2014, 2015) and Cai et al. (2020), the SMC sampler outperforms the standard RWMH algorithm in the presence of multimodal posteriors, an outcome that is highly likely in a DSGE model with monetary–fiscal policy interactions. The different policy regimes of the model exhibit different model dynamics, thus leading to discontinuous likelihood functions around the policy regimes. Compared to models with a single policy regime, this feature makes it more difficult for posterior samplers to transition between regions of the parameter space with similar fits. We contrast the RWMH's and SMC's performance in such a model and show that the choice of the posterior sampler determines the estimation outcome. While the SMC sampler can cope with the irregular posterior surface and can navigate through the entire parameter space, the RWMH produces posterior regime probabilities that are highly dependent on the initial value of the sampler.

Related literature With our finding that there was not one prevailing fiscal-monetary policy mix and, thus, no single explanation for the observed inflation dynamics in the pre-Volcker period, we can reconcile opposing strands in the literature.

One strand of the literature on the monetary policy stance during the Great Inflation estimates monetary policy functions but does not consider an explicit role for fiscal policy. More specifically, the studies either do not include a fiscal policy sector in the model or do not include observable variables such as public debt and deficits in the estimation. Therefore this strand of the literature focuses on distinguishing between determinacy of the model resulting from active monetary policy and indeterminacy resulting from passive monetary policy. It largely agrees on the latter, with some notable exceptions. Among the studies that find evidence for passive monetary policy, Clarida et al. (2000) and Mavroeidis (2010) estimate monetary policy reaction functions. In addition, Lubik and Schorfheide (2004) obtain this result for a small New Keynesian DSGE model. Boivin and Giannoni (2006) combine evidence from vector autoregressive and general equilibrium analysis to confirm these results. More recently, Nicolò (2024) re-examines the question of the policy stance during the Great Inflation using the sampling algorithm proposed by Bianchi and Nicolò (2021). This sampling algorithm allows the estimation of the multimodal posterior surfaces. His findings confirm that monetary policy was most likely passive during the Great Inflation.

In the strand of the literature that focuses solely on the role of monetary policy, a number of features have been introduced that affect the size of the indeterminacy region. First, following Ascari and Ropele (2009), several studies have shown that even an active monetary policy can be associated with indeterminacy when trend inflation is positive. These studies include Coibion and

Gorodnichenko (2011), Ascari and Sbordone (2014), and more recently Hirose et al. (2020). The latter study uses an SMC algorithm to estimate the multimodal posterior surface. Interestingly, using a similar model and sampling method, Haque et al. (2021) find that there was a unique equilibrium during the Great Inflation, i.e., monetary policy stabilized the economy. Key to their finding is not only trend inflation, but also its interaction with commodity price shocks and real wage rigidities. Their estimate of a unique equilibrium is related to the second notable feature that changes the indeterminacy properties of a model, the inclusion of hand-to-mouth consumers or limited participation in asset markets (Bilbiie and Straub, 2013). In their model, a passive monetary authority stabilizes the economy. By estimating the model, they show that this can be an explanation for a passive monetary authority. A third approach is taken by Ascari et al. (2019). Their analysis explains the Great Inflation with temporary unstable inflation dynamics due to expectations that were independent of monetary policy behavior. The study also finds evidence of passive monetary policy in the pre-Volcker period. However, not all studies have confirmed passive monetary policy during the Great Inflation. The exceptions are Orphanides (2004, 2002). Both papers argue that considering real-time data instead of ex-post data can overturn the consensus of passive monetary policy. More recently, Nicolò (2024) estimates a DSGE model with real-time data and finds that the monetary policy stance is best described as passive.

The strand of the literature that considers an explicit role for fiscal policy can be divided into studies that consider a fixed regime approach and studies that model regime switches using a Markov-switching model approach. The former approach has been taken by Bhattarai et al. (2016), who estimate a fixed-regime DSGE model with monetary and fiscal policy interactions. They find that fiscal policy was passive, confirming the result of indeterminacy. In an earlier study, Traum and Yang (2011) find no evidence of an active U.S. fiscal authority in the pre-Volcker period. Interestingly, their estimates support the evidence of active monetary policy. However, they do not consider the possibility of non-unique equilibria in their analysis. Leeper et al. (2017) estimate a medium-scale DSGE model with either monetary or fiscal dominance. Their estimation results lead them to conclude that these two regimes are equally likely. On the contrary, Kliem et al. (2024) show that the inclusion of a financial sector and the introduction of financial repression leads to a regime of fiscal dominance as the most likely one. All these studies have in common that the fixed-regime DSGE model is estimated by applying a random walk Metropolis–Hastings sampler. While the evidence on the role of fiscal policy during the Great Inflation from the estimation of fixed-regime models is mixed, the evidence from the estimation of Markov-switching models favors an active fiscal policy. Davig and Leeper (2006), Davig and Leeper (2011), Bianchi (2012), Bianchi and Ilut (2017), and Chen et al. (2022) all find evidence of active fiscal policy in the 1970s.

Our paper contributes to the literature in the following way: in line with the strand of research that considers an explicit role for fiscal policy, we incorporate a fiscal sector and fiscal variables into our analysis. However, unlike existing studies in this strand of the literature, we employ a technique that allows sampling from a multimodal posterior surface. Consistent with the findings of Bhattarai et al. (2016), we confirm that equilibrium indeterminacy did indeed play a significant role pre-Volcker. However, echoing the conclusion of regime-switching DSGE models, regime F also played a role with a posterior probability of 37%. Consequently, by re-estimating the fixed-regime model proposed by Bhattarai et al. (2016) using the more appropriate SMC posterior sampler, we reconcile the previously existing dissonance between these two model classes.

The remainder of the paper is as follows. Section 2 describes the DSGE model with monetary–fiscal policy interactions, and Section 3 outlines our empirical approach. In Section 4 we present the estimation results. In light of our findings, in Section 5 we re-examine what caused the build-up of U.S. inflation in the 1960s and 1970s and link the findings on the pre-Volcker monetary–fiscal policy mix to the post-pandemic high inflation period. The final section concludes the study.

2. A DSGE model with monetary–fiscal policy interactions

In this section, we outline the fixed-regime DSGE model with monetary–fiscal policy interactions of Bhattarai et al. (2016), our reference model, characterize its different monetary–fiscal policy regimes, and present the solution method for the model.

2.1. Model description

We use the fixed-regime DSGE model set up in Bhattarai et al. (2016). It features a complete description of fiscal policy, a time-varying inflation and debt-to-output target, partial dynamic price indexation, and external habit formation in consumption. Here, we present only the first-order approximations of the model equations that determine the equilibrium dynamics. For a detailed analysis of the model's characteristics, we refer the reader to the original study.

Consumption behavior of households is given by the consumption Euler equation:

$$\begin{aligned}\hat{C}_t = \frac{\bar{a}}{\bar{a}+\eta} E_t \hat{C}_{t+1} + \frac{\eta}{\bar{a}+\eta} \hat{C}_{t-1} - \left(\frac{\bar{a}-\eta}{\bar{a}+\eta}\right)\left(\hat{R}_t - E_t \hat{\pi}_{t+1}\right) + \frac{\bar{a}}{\bar{a}+\eta} E_t \hat{a}_{t+1} - \\ - \frac{\eta}{\bar{a}+\eta} \hat{a}_t + \left(\frac{\bar{a}-\eta}{\bar{a}+\eta}\right) \hat{d}_t,\end{aligned} \tag{1}$$

where $\hat{C}_t$ is aggregate consumption, $\hat{R}_t$ is the interest rate on government bonds, $\hat{a}_t$ is the growth rate of technology, $\hat{\pi}_t$ is the inflation rate, and $\hat{d}_t$ stands for preferences.[2] The parameters $\bar{a}$ and η denote the steady-state value of a_t and external habit formation, respectively.

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[2] We define the log-linear deviation of a detrended variable from its corresponding steady state as $\hat{X}_t = lnX_t - ln\bar{X}$. Only the fiscal variables $\hat{b}_t = b_t - \bar{b}$, $\hat{g}_t = g_t - \bar{g}$, $\hat{\tau}_t = \tau_t - \bar{\tau}$, and $\hat{s}_t = s_t - \bar{s}$ are normalized by output and linearized around their steady states.

The New Keynesian Phillips curve is denoted by

$$\hat{\pi}_t = \frac{\beta}{1+\gamma\beta}E_t\hat{\pi}_{t+1} + \frac{\gamma}{1+\gamma\beta}\hat{\pi}_{t-1} + \kappa\left[\left(\varphi + \frac{\bar{a}}{\bar{a}-\eta}\right)\hat{Y}_t - \frac{\eta}{\bar{a}-\eta}\hat{Y}_{t-1} + \frac{\eta}{\bar{a}-\eta}\hat{a}_t - \right.$$
$$\left. - \left(\frac{\bar{a}}{\bar{a}-\eta}\right)\left(\frac{1}{1-\bar{g}}\right)\hat{g}_t + \left(\frac{\eta}{\bar{a}-\eta}\right)\left(\frac{1}{1-\bar{g}}\right)\hat{g}_{t-1}\right] + \hat{u}_t, \tag{2}$$

where $\hat{Y}_t$ is aggregate output, $\hat{g}_t$ represents the government spending-to-output ratio, and $\hat{u}_t$ can be interpreted as a cost-push shock. The parameters β, γ, φ, and $\bar{g}$ are the discount factor, the degree of price indexation, the inverse of the Frisch elasticity of labor supply, and the steady-state value of government spending, respectively. Furthermore, $\kappa := \frac{(1-\alpha\beta)(1-\alpha)}{\alpha(1+\varphi\bar{\theta})(1+\gamma\beta)}$, where α is the degree of price rigidity in the economy and $\bar{\theta}$ is the steady-state value of the elasticity of substitution between intermediate goods.

Monetary policy is characterized by the following rule:

$$\hat{R}_t = \rho_R\hat{R}_{t-1} + (1-\rho_R)\left[\phi_\pi(\hat{\pi}_t - \hat{\pi}_t^*) + \phi_Y(\hat{Y}_t - \hat{Y}_t^*)\right] + \epsilon_{R,t}. \tag{3}$$

$\hat{\pi}_t^*$ is the inflation target and $\hat{Y}_t^*$ is potential output. The idiosyncratic monetary policy shock $\epsilon_{R,t}$ is assumed to evolve as i.i.d. $N(0,\sigma_R^2)$. The parameters ρ_R, ϕ_π and ϕ_Y represent interest rate smoothing, responses to deviations of inflation from its target, and responses to deviations of output from its natural level, respectively.

The fiscal authority sets lump-sum taxation by a rule:

$$\hat{\tau}_t = \rho_\tau\hat{\tau}_{t-1} + (1-\rho_\tau)\left[\psi_b(\hat{b}_{t-1} - \hat{b}_{t-1}^*) + \psi_Y(\hat{Y}_t - \hat{Y}_t^*)\right] + \epsilon_{\tau,t}. \tag{4}$$

$\hat{\tau}_t$ stands for the tax-revenue-to-output ratio, $\hat{b}_t$ is the debt-to-output ratio, and $\hat{b}_t^*$ is the debt-to-output ratio target. The non-systematic tax policy shock $\epsilon_{\tau,t}$ is assumed to evolve as i.i.d. $N(0,\sigma_\tau^2)$. The tax policy rule features tax smoothing (ρ_τ), systematic reactions of tax revenues to deviations of lagged debt from its target (ψ_b), and to deviations of output from natural output (ψ_Y).

The government spending rule is modeled as

$$\hat{g}_t = \rho_g\hat{g}_{t-1} - (1-\rho_g)\chi_Y\left(\hat{Y}_{t-1} - \hat{Y}_{t-1}^*\right) + \epsilon_{g,t}. \tag{5}$$

$\hat{g}_t$ stands for the government spending-to-output ratio. The exogenous shock to government spending $\epsilon_{g,t}$ is assumed to follow an i.i.d.-process with $N(0,\sigma_g^2)$. ρ_g represents the smoothing of government purchases and χ_Y is the response of government spending to the lagged output gap. Under the assumption of flexible prices, the natural level of government spending is:

$$\hat{g}_t^* = \rho_g\hat{g}_{t-1}^* + \epsilon_{g,t}. \tag{6}$$

The government budget constraint is given by:

$$\hat{b}_t = \frac{1}{\beta}\hat{b}_{t-1} + \frac{\bar{b}}{\beta}\left(\hat{R}_{t-1} - \hat{\pi}_t - \hat{Y}_t + \hat{Y}_{t-1} - \hat{a}_t\right) + \hat{g}_t - \hat{\tau}_t + \hat{s}_t. \tag{7}$$

$\hat{s}_t$ is the ratio of government transfers to output and the parameter $\bar{b}$ is the steady-state value of the debt-to-output ratio.

The aggregate resource constraint is given by:

$$\hat{Y}_t = \hat{C}_t + \frac{1}{1-\bar{g}}\hat{g}_t. \tag{8}$$

The natural level of output is:

$$\hat{Y}_t^* = \frac{\eta}{\varphi(\bar{a}-\eta)+\bar{a}}\hat{Y}_{t-1}^* + \frac{\bar{a}}{[\varphi(\bar{a}-\eta)+\bar{a}](1-\bar{g})}\hat{g}_t^* - \frac{\eta}{[\varphi(\bar{a}-\eta)+\bar{a}](1-\bar{g})}\hat{g}_{t-1}^* -$$
$$- \frac{\eta}{\varphi(\bar{a}-\eta)+\bar{a}}\hat{a}_t. \tag{9}$$

Finally, six additional exogenous shocks drive economic fluctuations. These are all assumed to evolve according to univariate AR(1) processes.

Preferences evolve as

$$\hat{d}_t = \rho_d\hat{d}_{t-1} + \epsilon_{d,t} \qquad \text{with } \epsilon_{d,t} \sim i.i.d.\ N(0,\sigma_d^2). \tag{10}$$

Technology evolves as

$$\hat{a}_t = \rho_a\hat{a}_{t-1} + \epsilon_{a,t} \qquad \text{with } \epsilon_{a,t} \sim i.i.d.\ N(0,\sigma_a^2). \tag{11}$$

Markup shocks are assumed to follow

$$\hat{u}_t = \rho_u\hat{u}_{t-1} + \epsilon_{u,t} \qquad \text{with } \epsilon_{u,t} \sim i.i.d.\ N(0,\sigma_u^2). \tag{12}$$

Government transfers are given by

$$\hat{s}_t = \rho_s\hat{s}_{t-1} + \epsilon_{s,t} \qquad \text{with } \epsilon_{s,t} \sim i.i.d.\ N(0,\sigma_s^2). \tag{13}$$

The inflation target evolves as

$$\hat{\pi}_t^* = \rho_\pi \hat{\pi}_{t-1}^* + \epsilon_{\pi,t} \qquad \text{with } \epsilon_{\pi,t} \sim i.i.d.\ N(0,\sigma_\pi^2). \tag{14}$$

The debt-to-output ratio target follows

$$\hat{b}_t^* = \rho_b \hat{b}_{t-1}^* + \epsilon_{b,t} \qquad \text{with } \epsilon_{b,t} \sim i.i.d.\ N(0,\sigma_b^2). \tag{15}$$

2.2. Model solution under different policy regimes

A unique equilibrium of the economy arises when either monetary policy is active while fiscal policy is passive (regime M or AMPF) or monetary policy is passive while fiscal policy is active (regime F or PMAF). If both monetary and fiscal policy are passive, there are multiple equilibria (PMPF). If both authorities are active, there is no stationary equilibrium (AMAF). The boundaries of the distinct policy regimes can be characterized analytically in Bhattarai et al. (2016)'s model. In particular, monetary policy is active if

$$\phi_\pi > 1 - \phi_Y \left(\frac{1-\tilde{\beta}}{\tilde{\kappa}} \right), \tag{16}$$

where $\tilde{\beta} = \frac{\gamma+\beta}{1+\gamma\beta}$ and $\tilde{\kappa} = \frac{(1-\alpha\beta)(1-\alpha)}{\alpha(1+\varphi\bar{\theta})(1+\gamma\beta)} \left(1 + \varphi + \frac{\chi_Y}{1-\bar{g}} \right)$, while fiscal policy is active if

$$\psi_b < \frac{1}{\beta} - 1. \tag{17}$$

We collect the parameters of the loglinearized model in the vector ϑ with domain Θ and solve the system of equations for its state-space representation.[3] Under determinacy (regime F, regime M), we employ the solution algorithm for linear rational expectations models of Sims (2002), which expresses the model solution as

$$z_t = \Gamma_1^*(\vartheta) z_{t-1} + \Psi^*(\vartheta)\epsilon_t, \tag{18}$$

where z_t is a vector of state variables, ϵ_t is a vector of exogenous variables, while both Γ_1^* and Ψ^* are coefficient matrices that depend on the model parameters collected in the vector ϑ. Under indeterminacy, we apply the generalization of this procedure suggested by Lubik and Schorfheide (2003, 2004):

$$z_t = \Gamma_1^*(\vartheta) z_{t-1} + \left[\Gamma_{0,\epsilon}^*(\vartheta) + \Gamma_{0,\zeta}^*(\vartheta)\tilde{M} \right] \epsilon_t + \Gamma_{0,\zeta}^*(\vartheta) M_\zeta \zeta_t. \tag{19}$$

Under indeterminacy, the transmission of fundamental shocks ϵ_t is no longer uniquely determined, since it depends not only on the coefficient matrix $\Gamma_{0,\epsilon}^*$, but also on the matrices $\tilde{M}$ and $\Gamma_{0,\zeta}^*$.[4] Second, an exogenous sunspot shock ζ_t, unrelated to the fundamental shocks ϵ_t, potentially affects the dynamics of the model variables z_t. This effect depends on the coefficient matrices $\Gamma_{0,\zeta}^*$ and M_ζ.

3. Empirical strategy

In this section, we present the Bayesian empirical strategy. We describe the prior distributions and the dataset. We further motivate the chosen procedures for posterior sampling to determine the monetary–fiscal policy mix in the pre-Volcker period.

Prior distributions and calibrated parameters

In line with Bhattarai et al. (2016), we fix some model parameters. We calibrate the inverse of the Frisch elasticity of labor supply to $\varphi = 1$ and the steady-state value of the elasticity of substitution between goods to $\bar{\theta} = 8$, since these cannot be identified separately from the Calvo parameter α. We also fix the parameters measuring the persistence of the time-varying policy targets to $\rho_\pi = \rho_b = 0.995$. Our prior distributions extend over a broad range of parameter values.[5] As we initialize the SMC algorithm from the prior, we used prior predictive analysis to carefully tailor a prior that leads to realistic model implications but still remains agnostic about the prevailing policy regime.[6] In the following, we discuss only the key parameters of our analysis.

Specifically, the policy parameters in the monetary and fiscal policy rules, ϕ_π and ψ_b, play a central role in our analysis as they determine the policy regime. Table 1 summarizes the details. For ϕ_π, we choose a Normal distribution restricted to the positive domain with an implied 90% probability interval from 0.14 to 1.84, while for ψ_b the interval ranges from −0.16 to 0.16. Our choice is motivated by the consideration of constructing prior distributions that yield more or less equal probabilities for regime F and the PMPF regime. In particular, since we initialize the SMC algorithm from the prior, we do not want to impose artificially a particular policy regime before confronting the model with the data. The implied prior probabilities of the policy regimes presented in Table 2 support our choice. Regime F and the PMPF regime receive almost identical support.[7]

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[3] More details on the implementation of the model solution are given in Appendix A.1.

[4] In accordance with Lubik and Schorfheide (2004), we replace $\tilde{M}$ with $\tilde{M} = M^*(\vartheta) + M$ to prevent that the transmission of fundamental shocks changes drastically when the boundary between the determinacy regimes and the indeterminacy regime is crossed. We choose $M^*(\vartheta)$ such that the impulse responses $\partial z_t / \partial \epsilon_t'(\vartheta, M)$ become continuous on the boundary and estimate the vector M. Appendix A.2 describes the approach in more detail.

[5] Table B.1 in Appendix B.1 specifies the prior distributions of all model parameters.

[6] In Appendix B.2 we show results from the prior predictive analysis. Specifically, we take 20,000 draws from the prior, simulate the model's observables and plot these simulated time series against the actual data from 1960:Q1 to 1979:Q2 that we use to estimate the model.

[7] The estimation results are sensitive to the choice of the prior distribution. For example, a prior that favors regime F will also increase the regime's share in the posterior distribution. Therefore, it is important that the two main candidate regimes have equal prior weights.

Table 1
Prior distributions of monetary and fiscal policy parameters.

Parameter	Range	Distribution	Mean	SD	90 percent int.
ϕ_π, active/passive monetary policy	$\mathbb{R}^+$	N	0.8	0.6	$[0.14, 1.84]$
ψ_b, active/passive fiscal policy	$\mathbb{R}$	N	0	0.1	$[-0.16, 0.16]$

Table 2
Prior probability of pre-Volcker policy regimes.

	AMPF	PMAF	PMPF
Probability	25.64	37.88	36.48

Note: The prior probabilities of the policy regimes are obtained from a prior predictive analysis. We drew ϑ 20,000 times from the priors specified in Table B.1, solved the model with each draw, and computed the shares of each policy regime.

A second group of parameters we want to highlight are those necessary to characterize the indeterminacy model solution. For the parameters in the vector M, representing agents' self-fulfilling beliefs, we choose, as Bhattarai et al. (2016), priors centered around zero in order to let the data decide if and how indeterminacy changes the propagation mechanism of the fundamental shocks.

Data

We use the dataset of Bhattarai et al. (2016).[8] We fit the log-linearized DSGE model to six quarterly U.S. time series and estimate the model for the pre-Volcker sample 1960:Q1 to 1979:Q2. The list of observables includes real output per capita, annualized inflation, annualized nominal interest rates, the real tax-revenue-to-output ratio, the real market value of the government debt-to-output ratio, and the real government spending-to-output ratio.

RWMH vs. SMC posterior sampling

Posterior inference in DSGE models relies on sampling techniques because the moments of the posterior cannot be characterized in closed form. Compared to Bhattarai et al. (2016), our reference study, we do not estimate each regime separately with a RWMH, but choose the SMC algorithm introduced to the DSGE literature by Creal (2007), then further enhanced and theoretically justified by Herbst and Schorfheide (2014, 2015).[9] As shown by Herbst and Schorfheide (2014, 2015), and Cai et al. (2020), the SMC algorithm outperforms the workhorse RWMH sampler in the case of multimodal posteriors, an outcome that is highly likely in the case of the DSGE model with monetary–fiscal policy interactions with a discontinuous likelihood function.[10] This feature does not require us to estimate the model separately, nor does it require us to compare model fit across regimes. Rather, we let the SMC algorithm explore the entire parameter space so that the probability of each policy regime is directly determined by the data.[11]

For comparison, we estimate the model over its unrestricted parameter space using RWMH and contrast the two samplers' findings. We choose a setup that *a priori* puts the RWMH algorithm on an equal footing. In particular, we initialize (i) two chains à ten million draws at the mode of regime F and the indeterminacy regime, respectively, and pool these draws with (ii) four chains à ten million draws starting from a random value in the parameter space region of regime F and indeterminacy. Using twice the number of draws from the randomly chosen initial values compared to the mode initialization gives the sampler a greater chance to explore the entire parameter space without getting stuck in a local mode, and thus works in favor of the RWMH sampler. From this procedure, we obtain a total of 120 million posterior draws, a number much larger than is typically computed for estimating medium-sized DSGE models.[12]

4. The monetary–fiscal policy mix in the pre-Volcker period

In this section, we separately identify the monetary–fiscal policy mix in the pre-Volcker period using the RWMH and the SMC, and then compare the performance of the two samplers. In the final discussion, we argue that the SMC, our preferred approach, is able to reconcile the empirical findings of the fixed-regime and regime-switching DSGE model literature, while also providing some intuition as to why restricting or not restricting the parameter space during estimation matters.

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[8] The dataset can be downloaded from the supplementary material of their study https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/OHUWKM. More details on the data and the corresponding measurement equations are given in Appendix C.

[9] Chopin (2002), Del Moral et al. (2006), and Creal (2012), among others, provide further details on SMC algorithms. Cai et al. (2020) advance the tuning of the algorithm in the context of DSGE model estimation.

[10] In short, the RWMH is an iterative simulator that belongs to the class of Markov chain Monte Carlo (MCMC) techniques. Herbst and Schorfheide (2015, pp. 52–99), for instance, explain the sampler in detail.

[11] The SMC algorithm generates weighted draws from a sequence of easy-to-sample proposal densities. The weighted draws are called particles. Appendix D includes a more detailed description of the SMC algorithm and our choice of tuning parameters.

[12] From each chain, we discard seven million draws as burn-in and use every eighth draw from the remainder to compute posterior results. By comparison, Bhattarai et al. (2016), our reference study, computes a total of 21.6 million draws across all regimes.

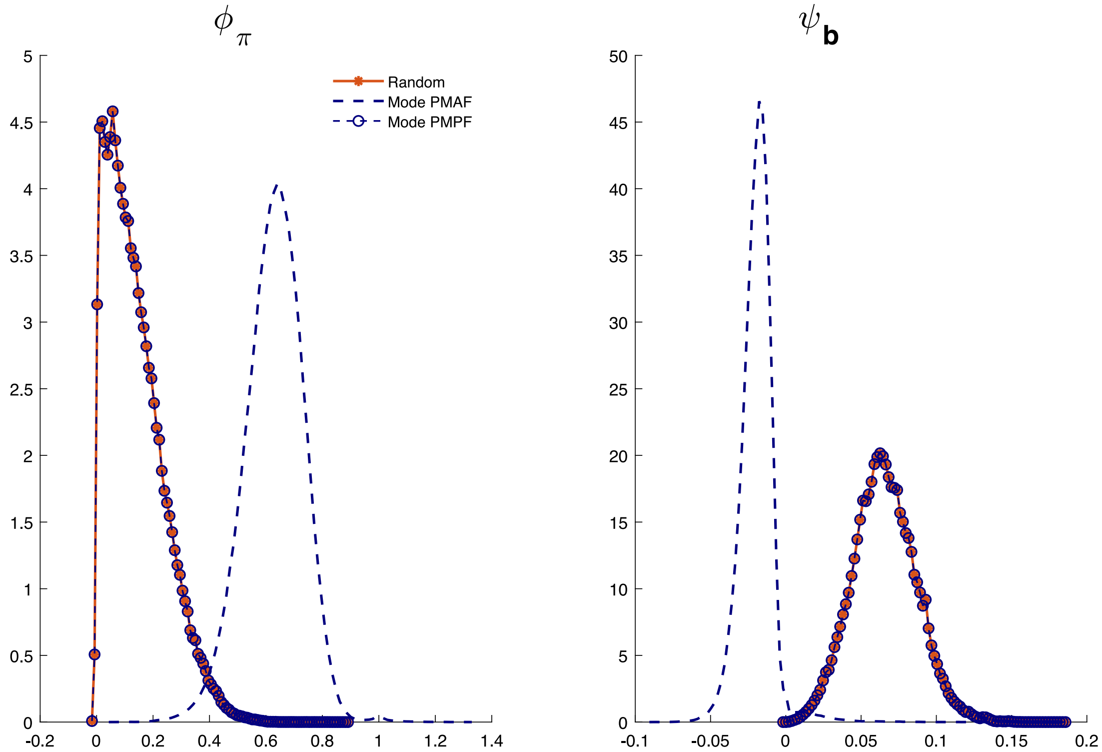

Fig. 1. Posterior densities of the policy parameters obtained from RWMH sampling. The blue dashed line depicts the posterior density obtained from initializing the sampler on the mode of regime F, the blue dashed line with circles from initializing the sampler on the mode of regime PMPF, and the red solid line with circles shows the posterior density obtained from the random initialization. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Posterior estimates

Fig. 1 presents the posterior densities of the policy parameters ϕ_π and ψ_b from the unrestricted estimation with RWMH. [13] The values of ϕ_π and ψ_b determine the monetary–fiscal policy mix. $\phi_\pi < 1 - \phi_Y \left(\frac{1-\tilde{\beta}}{\tilde{\kappa}}\right)$ corresponds to a passive monetary authority, while $\phi_\pi > 1 - \phi_Y \left(\frac{1-\tilde{\beta}}{\tilde{\kappa}}\right)$ corresponds to an active central bank. The boundary of fiscal policy lies around zero. $\psi_b < \frac{1}{\beta} - 1$ refers to an active fiscal policy, while $\psi_b > \frac{1}{\beta} - 1$ is associated with a passive fiscal authority.

To evaluate the RWMH's performance, it is instructive to distinguish the posterior draws according to the initialization method described in Section 3. The blue solid line with circles and the blue dashed line show the posterior draws obtained by initializing the RWMH at the mode of regime F and indeterminacy, respectively. The red solid line with circles depicts the marginal posterior densities obtained from runs started at random points in the parameter space of regime F and PMPF. The plot makes three points clear. First, when all the draws are considered together, the marginal posterior distribution of the policy parameters exhibits pronounced bimodalities. However, each initialization method considered individually produces a unimodal marginal posterior density corresponding to a distinct policy regime. Second, starting the sampler at the mode of regime F produces posterior estimates corresponding to regime F, while starting the sampler at the mode of the indeterminacy regime produces draws exclusively from the indeterminacy region of the parameter space. Hence, initializing the RWMH at the mode of the policy regimes leads to posterior estimates that are highly dependent on the initial value, since the sampler does not transition between regimes. Finally, all runs started at random values, whether in regime F or PMPF, let the sampler uniquely draw from the indeterminacy region. This feature could lead to the conclusion that the indeterminacy region is the dominant regime.

In Fig. 2, we compare the marginal posterior densities of ϕ_π and ψ_b across the SMC[14] and the RWMH samplers. The red dashed line corresponds to the posterior density obtained from SMC sampling, while the blue solid line is the posterior density obtained from the pooled runs of the RWMH sampler. The black line shows the marginal prior distribution. Similar to the RWMH, the posterior densities of ϕ_π and ψ_b from SMC sampling display pronounced bimodalities around the policy regimes. However, while the RWMH generates draws mainly in the immediate vicinity of the policy regimes' modes, the SMC sampler transitions more frequently between

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[13] For the RWMH, we monitored convergence by computing recursive means. Appendix E.2 provides the corresponding plots.

[14] To ensure convergence of the SMC, we follow the practical recommendations given in Herbst and Schorfheide (2014) and produced 50 independent runs with the SMC sampler. We pooled the draws over the 50 runs to compute parameter means, standard errors, and credible sets.

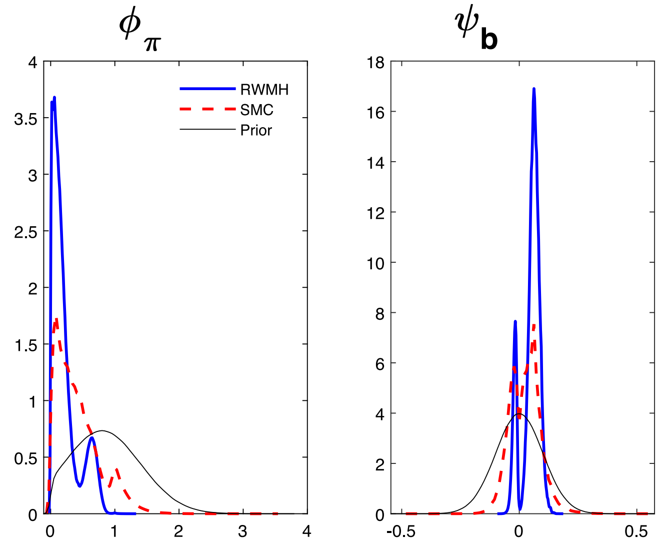

Fig. 2. Posterior densities of the policy parameters obtained from SMC and RWMH sampling and prior densities. The blue solid line depicts the RWMH posterior density, the red dashed line the SMC posterior density, and the black line the prior density. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

regimes and assigns more probability mass to parameter values between the two modes of ϕ_π and ψ_b.[15] It is also noticeable that the probability mass below each mode is unequally distributed across the samplers.

To shed more light on the estimated monetary–fiscal policy mix, we present the posterior probabilities of the policy regimes in the pre-Volcker period (Table 3). The two samplers agree that the dominant monetary–fiscal regime in the pre-Volcker period was the indeterminacy regime. However, while the RWMH assigns the PMPF a posterior probability of 83.33%, the SMC assigns the indeterminacy regime a much lower posterior probability of 43.54%. Regime F, on the other hand, receives a posterior probability of 36.81% in the SMC estimate, more than twice as high as in the RWMH estimate (16.32%). Regime M obtains for both samplers the least support from the data.

The contrasting regime probabilities for the monetary-led regime highlight once again the superior performance of the SMC algorithm compared to the RWMH in DSGE models with distinct fiscal-monetary policy regimes. While the SMC assigns regime M a posterior probability of about 20%, the RWMH assigns regime M a posterior probability of zero. This discrepancy can be attributed to the tendency of the RWMH to stick to the passive policy mode and thus not move frequently enough to the active policy regions of the parameter space. The empirical result from the SMC estimation, which indicates a positive regime probability for regime M in the pre-Volcker period, is consistent with the existing literature. Bianchi (2013) estimates a high probability of active monetary policy from 1955 to 1974. While Bianchi (2013) does not consider an explicit role for fiscal policy, Bianchi (2012) considers the interaction between the policies and estimates a sizeable probability (approximately 10%) of active monetary and passive fiscal policy from 1955 to 1965 and a low probability for this regime in the 1970s.[16]

Discussion

The comparison of the posterior estimates between the RWMH and the SMC reveals that the choice of sampler has a significant impact on the estimation results in DSGE models characterized by interactions between monetary and fiscal policies, especially in periods characterized by the coexistence of different regimes.[17]

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[15] Appendix E.1 shows posterior estimates from an estimation in which we restrict the parameter space and apply SMC sampling to estimate each policy regime sequentially. The purpose of this exercise is to show (i) that the SMC sampler is able to replicate the RWMH estimation results of Bhattarai et al. (2016), our reference study, that the PMPF regime was the dominant regime pre-Volcker, and (ii) that our prior specification does not affect the probability of policy regimes in the posterior. Appendix E.2 contains the density plots of the remaining parameters from the unrestricted estimation as well as tables with estimated means, standard deviations, and credible bands for all parameters.

[16] The literature review in the introduction summarizes empirical evidence on monetary policy's role in the Great Inflation and the specific modeling assumptions underlying previous findings. Our study, however, primarily examines the stance of fiscal policy. Consequently, the main text focuses exclusively on the still-debated role of fiscal policy, concentrating on regime F and the passive monetary/passive fiscal regime. We present a historical decomposition of pre-Volcker inflation conditional on regime M in Appendix E.4.

[17] To strengthen our argument regarding the divergent performance of the two samplers in periods characterized by different regimes, we conducted estimations using data from the post-Volcker period from 1982:Q4 to 2008:Q2, which is widely recognized in the literature as being governed by a monetary-led regime. We initialized the SMC sampler with (i) the prior outlined in Section 3 and (ii) a prior that yields equal shares of regime F, regime M, and indeterminacy. For each of these two cases, we estimated posterior probabilities using the SMC. This exercise yielded a 100% probability for regime M in both cases.

Table 3
Posterior probability of pre-Volcker policy regimes.

	AMPF	PMAF	PMPF
SMC	19.65	36.81	43.54
RWMH	0.35	16.32	83.33

Note: To obtain the posterior probabilities from SMC, we solved the model with each of the 20,000 particles obtained from the last SMC stage and computed the shares of each policy regime over 50 independent runs of the algorithm. For the RWMH, the posterior regime probabilities are computed over 4.5 million draws.

While the RWMH produces estimates that depend on the starting value and does not transition between the policy regimes, the SMC can deal with irregular-shaped posterior surfaces and explores the entire parameter space. More precisely, the RWMH sampler takes draws mainly around the mode of the dominant regime and does not transition frequently enough to other regions of the parameter space with less likelihood. In fact, restricting the parameter space and estimating the model sequentially for each regime with RWMH would force us to take a zero–one decision. As the model comparison results from the restricted estimation in Table E.1 in Appendix E.1 show, we would conclude, as Bhattarai et al. (2016), that only the PMPF regime was in place before Volcker. The other policy regimes would be ignored. The merit of the SMC approach is that it can create new perspectives in a fixed-regime model environment: although the PMPF regime receives slightly more posterior probability throughout the 1960:Q1 to 1979:Q2 sample, regime F also played a role. To summarize the comparison of the two samplers, although both agree that indeterminacy was the dominant regime in the pre-Volcker period, the RWMH overstates the posterior probability of the dominant regime and understates the probability of the other regimes. For this reason, the SMC is our preferred sampler for estimating DSGE models with monetary–fiscal policy interactions, such as the model of Bhattarai et al. (2016).

Compared to the restricted estimation in Bhattarai et al. (2016), using SMC to estimate the model over its unrestricted parameter space allows us to draw a more nuanced conclusion about the fiscal-monetary policy mix during the Great Inflation. In line with Bhattarai et al. (2016), we find that the regime with the highest posterior probability in the pre-Volcker period is the PMPF regime. However, in contrast to their analysis, we find that regime F performs only slightly worse. Based on our findings, we argue that regime F is also important for the macroeconomic dynamics in the pre-Volcker period. First, in our analysis, regime F receives, at 36.81%, considerable posterior probability that is only seven percentage points lower on average than the PMPF regime. Due to this significant empirical support, regime F should not simply be neglected. Second, our results complement a number of studies that already convincingly discuss quantitative or narrative evidence for a leading fiscal authority during specific periods in the pre-Volcker era. Sims (2011), for example, points to the emergence of primary deficits in the U.S. associated with President Ford's tax cuts and rebates in 1975. Bianchi and Ilut (2017), in a regime-switching DSGE model, even provide empirical evidence of fiscal dominance in the U.S. during the 1960s and 1970s, describing the fiscal expansion due to the Vietnam War and Lyndon B. Johnson's Great Society reforms.[18] Our results support their view that active U.S. fiscal policy played a substantial role in the buildup of pre-Volcker inflation.

5. Lessons from revisiting the great inflation

The estimation in the previous section shows that the macroeconomic dynamics in the pre-Volcker period are similarly driven by a passive monetary/passive fiscal policy regime and fiscal dominance. In light of these results, we revisit one of the most pressing macroeconomic questions of this episode, namely, what caused the Great Inflation. In a second step, we link the findings on the pre-Volcker monetary–fiscal policy mix to the post-pandemic period to gain insights into the causes and policy options for the recent inflationary surge.

Revisiting the causes of the great inflation

We use our findings to carry out a historical shock decomposition of pre-Volcker inflation and conduct a counterfactual analysis to quantify the importance of fiscal policy actions in the inflation buildup.

We partition the draws from the posterior according to the corresponding policy regimes determined by the SMC and conduct the historical decomposition separately for the PMPF regime and regime F.[19] Fig. 3 shows the results for the PMPF regime. Consistent with the findings in Bhattarai et al. (2016), we find that in the PMPF regime, pre-Volcker inflation was mainly driven by non-policy shocks, in particular preference, markup, and technology shocks. Importantly, sunspot shocks played only a minor role in pre-Volcker inflation.[20]

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[18] Other references that provide evidence of fiscal dominance in the U.S. in the pre-Volcker period include, among others, Davig and Leeper (2006), Bianchi (2012), and Chen et al. (2022). All of these studies use regime-switching model frameworks.

[19] Specifically, we focus on the 20,000 particles generated in the final stage of the SMC algorithm that represent the posterior distribution. For each of these draws, we solve the model and determine its region by computing the respective regime boundaries outlined in Eqs. (16) and (17). Using this classification, we segment the posterior draws. This process is iterated over each of the 50 algorithm runs, resulting in partitioned draws from regime F and indeterminacy from 50 different posteriors. Appendix E.4 contains the historical decomposition conditional on regime M.

[20] The fact that sunspot shocks did not play a significant role in pre-Volcker inflation is also confirmed, for example, in Nicolò (2024).

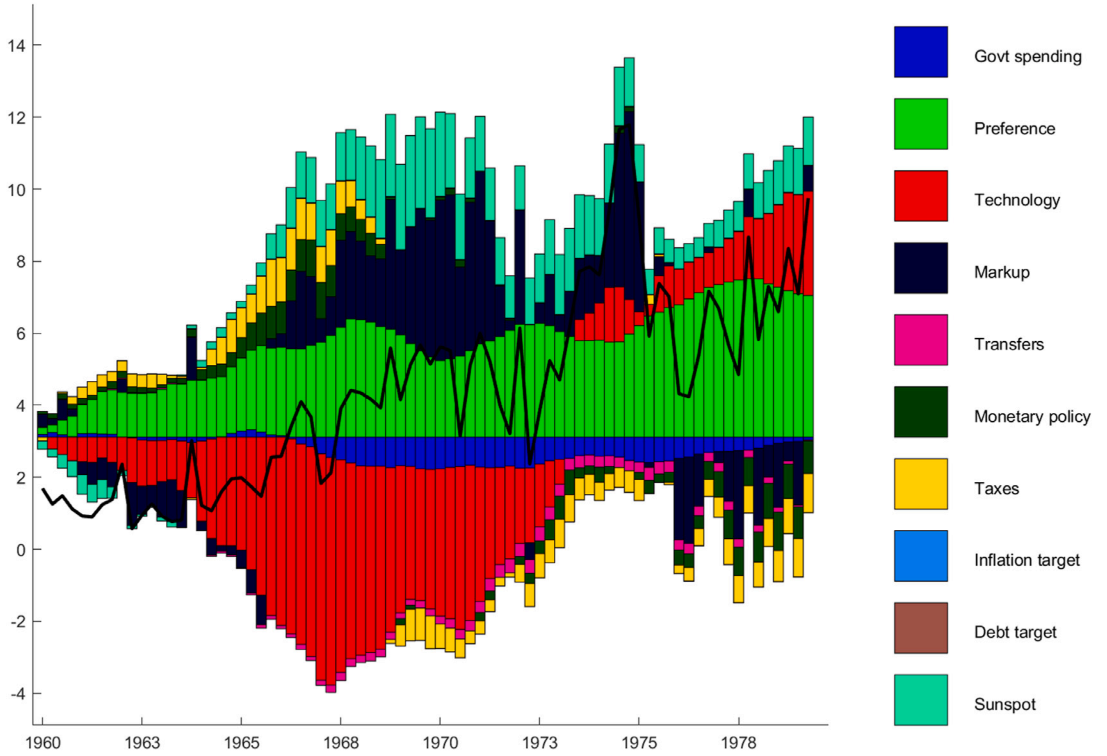

Fig. 3. Contribution of each shock to annualized inflation (percentage points) in the PMPF regime. The bold black line shows observed inflation. The historical decomposition is conducted at the posterior mean of the PMPF regime.

In regime F, the picture is different. Fig. 4 summarizes the results. Technology and demand shocks play only a minor role in Regime F. Instead, the mechanism of the Fiscal Theory of the Price Level (FTPL) is clearly present: fiscal actions, especially government spending, lead to the build-up of inflation.

To summarize our analysis, we find empirical evidence for the two most widely accepted explanations of rising U.S. inflation in the pre-Volcker period in the literature. First, fundamental non-policy shocks generated persistent inflationary pressures. Sunspot disturbances did not play a significant role. Second, fiscal policy, especially government spending, was an important driver of inflation.

To further explore the role of government spending in pre-Volcker inflation, we conduct a counterfactual analysis. We set the contribution of government spending shocks to zero in each regime and simulate inflation with the remaining shocks. Fig. 5 shows the result. In regime F, the counterfactual inflation is well below the observed time series. In the PMPF regime, on the other hand, the difference between actual and counterfactual inflation is almost negligible.

We can exclude that the trend of pre-Volcker inflation in regime F and the PMPF regime is due to the sheer size of the government spending shocks. Fig. 6 shows that, pre-Volcker, the smoothed government spending shocks of regime F and the PMPF regime are nearly congruent.[21] Hence, the differing evolution of inflation is induced by the regimes themselves.

The results of the counterfactual analysis are instructive for evaluating the policies that effectively reduced pre-Volcker inflation. The Volcker action was certainly one possible course. By raising interest rates dramatically, the central bank credibly signaled that it would take the lead. Reagan complied and supported the monetary actions. As a result, the monetary–fiscal policy mix shifted to regime M. However, conditional on the results in Fig. 5, an alternative policy response emerges. Less consumption by the fiscal authority in the 1970s would also have reduced the ratio of government spending to output, thereby counteracting rising inflation.

Lessons for today

After decades of generally stable prices, the post-pandemic period marked a turning point with a global spike in inflation. In the U.S., energy price shocks and large fiscal stimulus in response to the pandemic, most notably U.S. President Biden's $1.9 trillion in federal spending included in the American Rescue Plan Act, have evoked memories of the Great Inflation of the 1970s. In the final part of the paper, we relate our analysis of pre-Volcker inflation dynamics to the recent rise in inflation.

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[21] Appendix F shows plots of the remaining smoothed shocks for regime F and the PMPF regime, respectively.

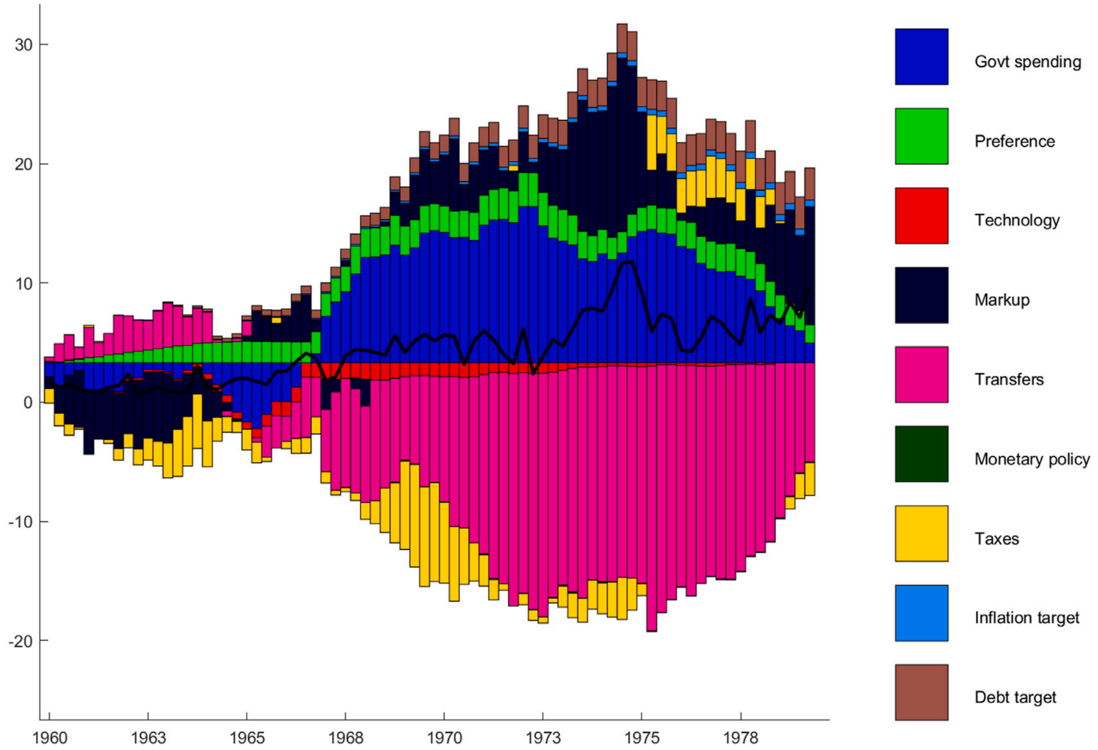


Fig. 4. Contribution of each shock to annualized inflation (percentage points) in regime F. The bold black line shows observed inflation. The historical decomposition is conducted at the posterior mean of regime F.

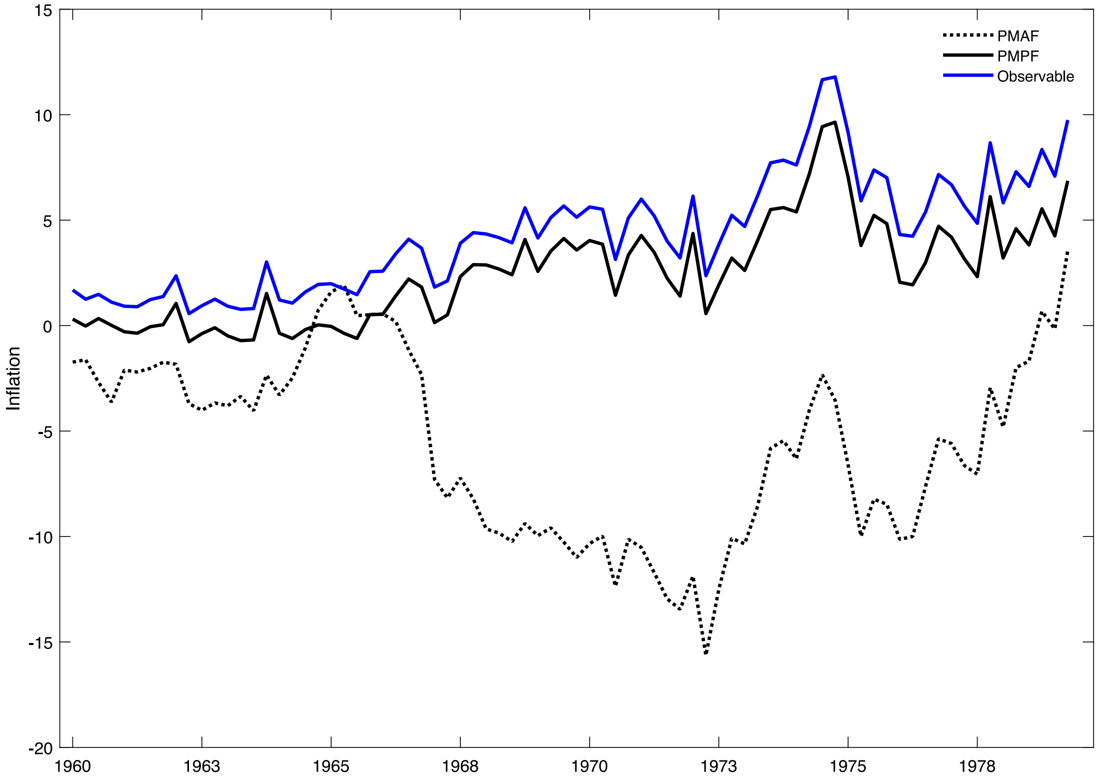


Fig. 5. Evolution of annualized inflation (in percentage points) without government spending shock in the PMPF regime and regime F. The counterfactual analysis is conducted at the posterior mean of each policy regime.

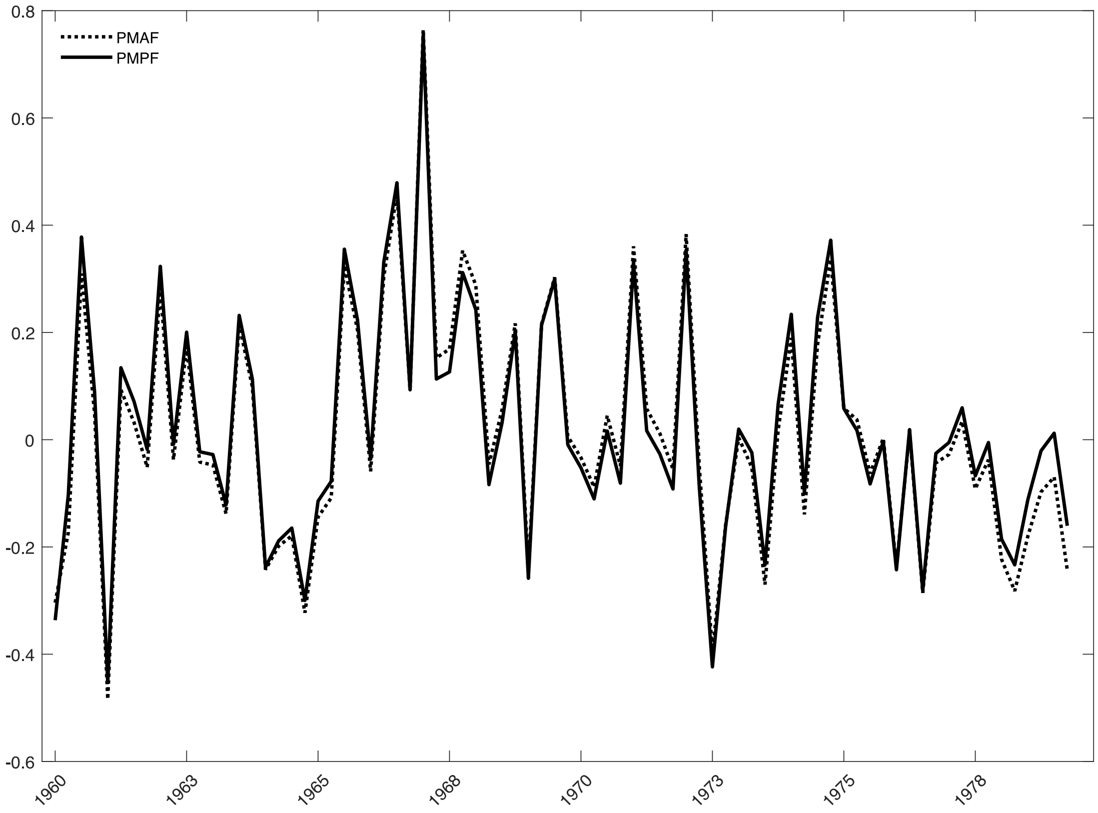


Fig. 6. Smoothed government spending shock for 1960:Q1 to 1979:Q2 for regime F and the PMPF regime. The dotted line shows the shock computed at the posterior mean of regime F. The solid line shows the shock computed at the posterior mean of the PMPF regime.

As the study of the Great Inflation has shown, it is crucial to determine the correct regime in which the economy is operating, and one could argue that there are signs that the U.S. is moving into a regime where the fiscal authority is active. Bianchi and Melosi (2022) use a Markov switching model estimated on the 1954:Q4-2022:Q1 sample. The authors conclude that a regime of fiscal dominance is more likely given the unprecedented fiscal intervention in response to the pandemic. However, the authors also point out the methodological limitations of obtaining robust predictions from models at the end of the estimation sample. This point is underscored by Bergholt et al. (2023), who note that even disentangling the systematic and stochastic components in a VAR model for this period is difficult. Therefore, we do not take a position on the likelihoods of the different regimes. Instead, we consider each regime equally likely and treat them equally in the rest of the paper.

For each regime we use the insights from the estimated model in the previous sections to analyze the causes and policy options for the inflation buildup since 2020. In particular, we construct the six observables for the period spanning from 2020Q1 to 2022Q4 in the same way as for the pre-Volcker period. We use the posterior mean of each regime from the pre-Volcker period as parameters to perform the historical decomposition of U.S. inflation from 2020:Q1 to 2022:Q4. More specifically, the observations are filtered through the model to derive the smoothed shocks for the post-pandemic period. Fig. 7 illustrates the drivers of post-pandemic inflation under an assumed regime of fiscal dominance. Over the period 2020:Q1 - 2022:Q4, positive transfer shocks are the main driver of inflation, consistent with the conclusions in Bianchi and Melosi (2022) that the recent surge in inflation is fiscal in nature. In a monetary dominance regime, fiscal shocks do not matter. Instead, Fig. 8 shows that the main driver of post-pandemic inflation are markup (i.e., cost-push) shocks. In an assumed PMPF regime, post-pandemic inflation is mainly caused by preference and tax shocks (Fig. 9). To summarize, in line with the recent narrative, the historical decomposition mainly attributes the role of driving post-pandemic inflation to cost-push and transfer and tax shocks. However, the quantitative importance of the shocks differs significantly across regimes.

It is well known in the literature that the recipe for bringing inflation back under control depends on the policy regime in place (Leeper and Leith, 2016). This is due to the different policy transmission mechanism in each regime. To illustrate the differences, we provide the effects of monetary and fiscal policy in the three different regimes. Fig. 10 shows the responses of output, annualized inflation, and the debt-to-output ratio to a monetary policy shock (panel a) and to a transfer shock (panel b). The impulse responses show the well-known pattern that both a contractionary monetary policy shock and a positive transfer shock are inflationary in regime F.

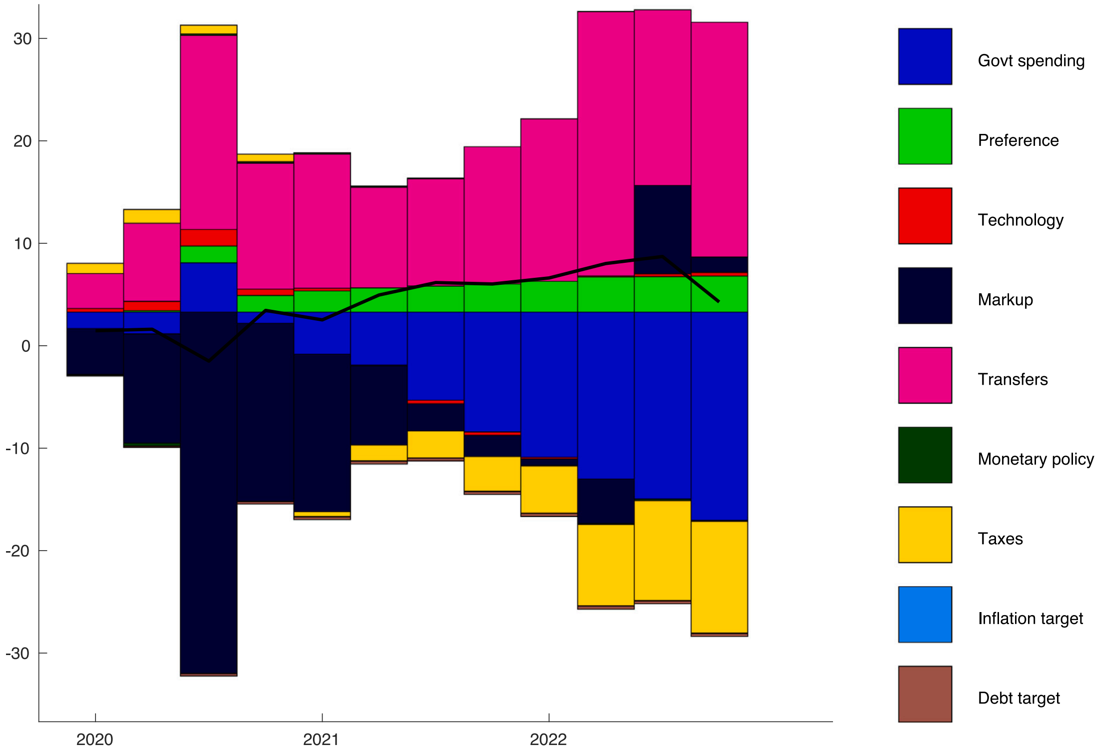


Fig. 7. Contribution of each shock to post-pandemic inflation (annualized, percentage points) in regime F. The bold black line shows observed inflation. The historical decomposition is conducted at the posterior mean of draws from regime F in the pre-Volcker estimation.

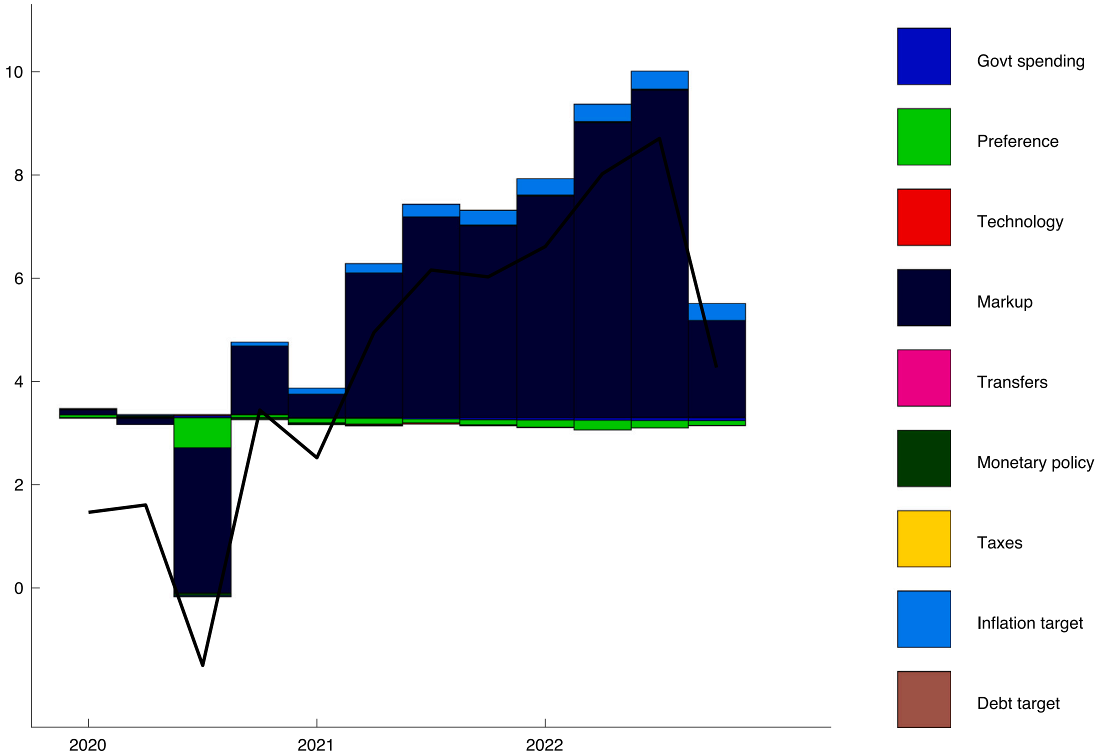


Fig. 8. Contribution of each shock to post-pandemic inflation (annualized, percentage points) in regime M. The bold black line shows observed inflation. The historical decomposition is conducted at the posterior mean of draws from regime M in the pre-Volcker estimation.

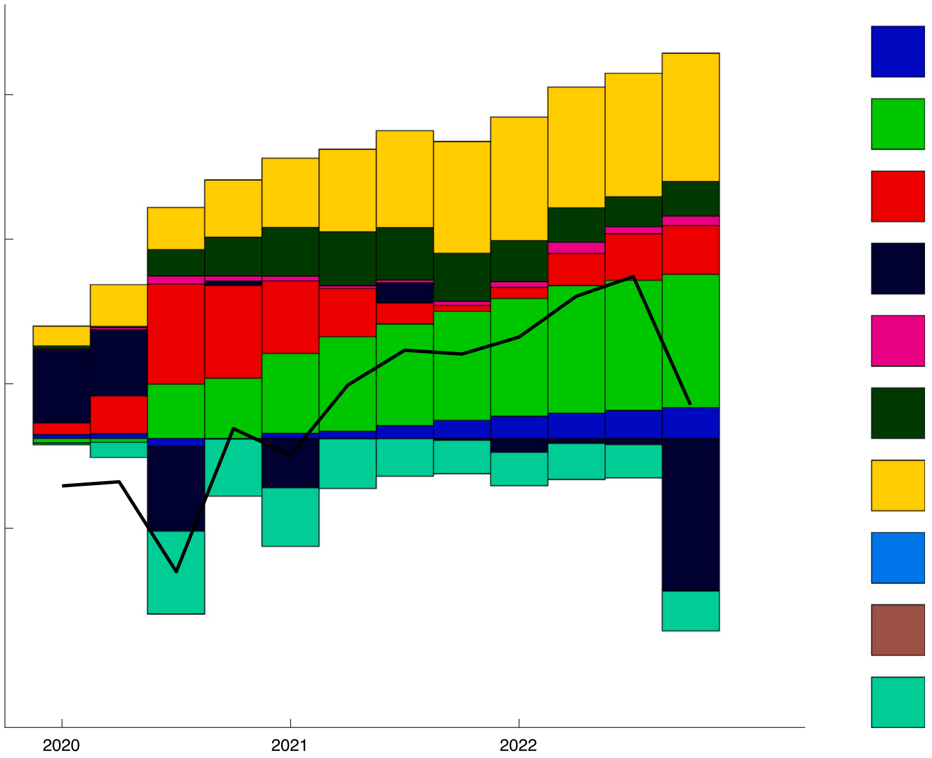
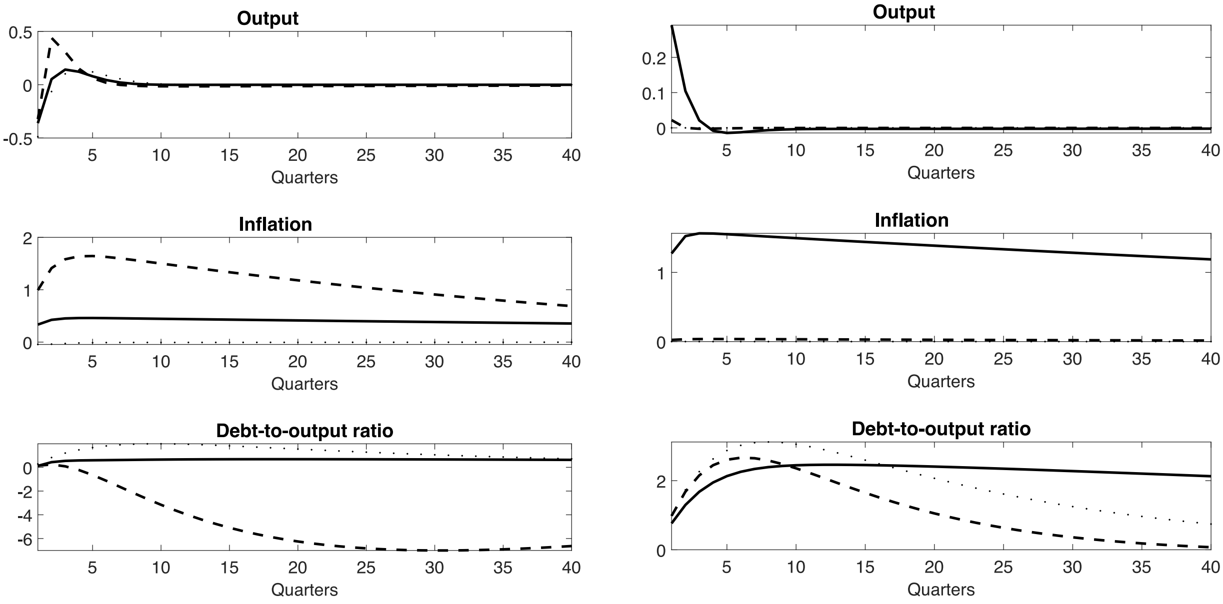


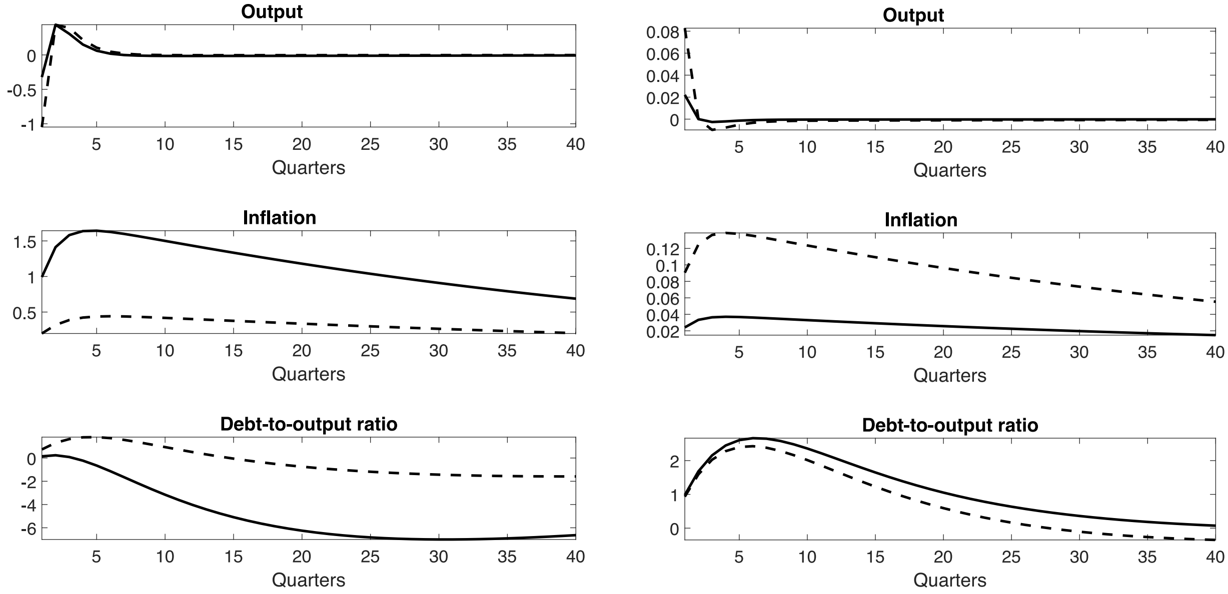
Fig. 9. Contribution of each shock to post-pandemic inflation (annualized, percentage points) in the indeterminacy regime. The bold black line shows observed inflation. The historical decomposition is conducted at the posterior mean of draws from the indeterminacy regime in the pre-Volcker estimation.



(a) Monetary policy shock

(b) Transfer shock

Fig. 10. Impulse response functions to a contractionary monetary policy and a positive transfer shock. The dashed line corresponds to the indeterminacy regime, the dotted line to regime M, and the bold line to regime F. The unit of the impulse responses is percentage deviations from the steady state for output and percentage point deviations from the steady state for inflation and the debt-to-output ratio.



(a) Monetary policy shock (b) Transfer shock

Fig. 11. Impulse response functions to a contractionary monetary policy and a positive transfer shock in the indeterminacy regime. The bold line depicts the response in the indeterminacy regime (identical to Fig. 10) as a reference. The dashed line shows how the transmission mechanism changes when all elements in M are set to zero. The unit of the impulse responses is percentage deviations from the steady state for output and percentage point deviations from the steady state for inflation and the debt-to-output ratio.

The literature has given less attention to impulse response functions in the indeterminacy regime and the role of additional parameters (M) in potentially altering the shock transmission mechanism.[22] To address this gap, Fig. 11 compares the estimated impulse response functions in the indeterminacy regime with those when all elements in M are set to zero.

In both scenarios, similar to regime F, a contractionary monetary policy shock is inflationary, consistent with Bhattarai et al. (2016). We hypothesize that this effect stems not from fiscal policy actions, but from the absence of the Taylor principle in a passive monetary/passive fiscal regime. Consequently, after a contractionary monetary policy shock, nominal interest rates increase less than inflation, lowering the expected real interest rate and even inducing a slight expansion following the initial output decline. The additional parameters in M largely determine the persistence and strength of the inflation impulse response function in the PMPF regime, as well as the response of the debt-to-output ratio. For transfer shocks, the impulse response functions more closely resemble regime M in terms of direction and effect magnitude. The indeterminacy regime's additional parameters significantly dampen the inflation response, minimally affect the output response, and slightly increase the debt-to-output ratio response while maintaining its overall shape. This comparison demonstrates that the additional parameters introduced by the indeterminacy regime play a crucial role in policy shock transmission within the PMPF regime. However, a limitation of this analysis is that the parameters in M, and consequently the differences in impulse response functions, lack a clear economic interpretation.

6. Conclusion

Guidance on managing high public debt and addressing inflationary pressures remains critical in today's economic landscape. It is widely recognized that the interplay between fiscal and monetary policies is central to addressing these issues. This paper seeks to enrich this discourse along three dimensions. First, we provide methodological insights into the estimation of DSGE models with distinct monetary–fiscal policy regimes. We show that in such a model setup, the SMC algorithm outperforms standard posterior sampling algorithms and should be the preferred choice because it is better suited to transition between different regions of the model's parameter space. Second, we use SMC to revisit the still open question of the role of fiscal policy during the historical episode of the Great Inflation in the U.S. We show that there was no single prevailing fiscal-monetary policy mix and, thus, no single explanation for the observed inflation dynamics in the pre-Volcker period. Finally, we apply the findings from the pre-Volcker period to the recent period of post-pandemic inflation and discuss appropriate monetary and fiscal policy responses.

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[22] Under indeterminacy, the transmission of fundamental shocks is no longer uniquely determined and additionally depends on the parameters in vector M that can be interpreted as capturing agents' self-fulfilling beliefs.

Data availability

All data used is made available.

Acknowledgments

We thank Khalid ElFayoumi, Sinem Hacioglu Hoke, Chi Hyun Kim, Martin Kliem, Eric Leeper, Gernot Müller, Evi Pappa, Frank Schorfheide, Moritz Schularick, and Nora Traum, as well as participants at various workshops and conferences. We also thank the HPC Service of ZEDAT, Freie Universität Berlin and the University of Bonn, for computing time. The paper was previously circulated under the title "Active or passive? Revisiting the role of fiscal policy in the Great Inflation". Ettmeier gratefully acknowledges support by the German Research Foundation (DFG) through CRC TR 224 (Project C02).

Appendix A. Supplementary data

Additional results and information on the model solution and estimation can be found in https://doi.org/10.1016/j.euroecorev.2024.104874.

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