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Abstract

This paper revisits the U.S. fiscal-monetary policy mix using econometric methods that are robust to weak identification and sensitive to structural changes. We find that the pre-Volcker period was predominantly characterised by a passive monetary-passive fiscal regime, consistent with indeterminacy and the presence of self-fulfilling inflationary expectations. However, we cannot rule out the possibility of a passive monetary-active fiscal configuration during the 1960s and 1970s, in line with the Fiscal Theory of the Price Level. In contrast, the post-Volcker period exhibits strong evidence of an active monetary-passive fiscal regime, reflecting greater inflation control and fiscal discipline.

Keywords: Fiscal-monetary interactions; Weak identification.
JEL Classification: E63, E61, C63, E32, E31, E52

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1 INTRODUCTION

What led to the economic instability in the US during the Great Inflation? A large literature blames poor macroeconomic management for the high and volatile inflationary episode in the 1970s. However, empirical evidence on the nature of this macroeconomic mismanagement is mixed at best.

On one hand, a large literature argues that monetary policy during the pre-Volcker period was passive and hence led to self-fulfilling inflationary expectations (Clarida et al., 2000; Lubik & Schorfheide, 2004). However, this verdict is not unequivocal as recent studies find alternative evidence that monetary policy was aggressive enough to rule out sunspot fluctuations during the 1970s (Haque et al., 2021; Haque, 2022).

On the other hand, an extant literature blames fiscal policy for the macroeconomic instability in the 1970s. Several studies attribute a leading role to fiscal dominance owing to a weak response of taxes to debt in the face of increased government spending accompanied by weak response of interest rates to inflation (Davig & Leeper, 2007; Bianchi, 2012; Bianchi & Ilut, 2017). In this scenario, fiscal policy determines the price level and monetary policy stabilises the debt, a concept that follows from the fiscal theory of the price level (FTPL). However, once again the evidence is mixed. For instance, Bhattarai et al. (2016) find evidence of passive monetary policy but no evidence of fiscal mismanagement, while Ettmeier and Kriwoluzky (2024) find support for both sunspot fluctuations due to indeterminacy and fiscal dominance in driving the high inflation in the 1970s.

In light of these alternative views regarding the drivers of the Great Inflation (and therefore the subsequent switch to the Great Moderation), we revisit the monetary-fiscal policy interactions and its implications for macroeconomic dynamics. To do so, we estimate monetary and fiscal policy rules using weak-identification robust GMM methods, in light of concerns over the identifiability of model parameters in DSGE models (Canova & Sala, 2009; Mavroeidis, 2004). Several studies demonstrate the importance of using econometric methods robust to weak identification, e.g., New Keynesian Phillips curve (Kleibergen & Mavroeidis, 2009), Consumption Euler equation (Yogo, 2004; Ascari et al., 2021; Haque & Magnusson, 2023), Investment Euler equation (Ascari et al., 2023), Taylor rule (Mavroeidis, 2010).

We use the econometric methods in Magnusson and Mavroeidis (2014), which builds on the work of Stock and Wright (2000) to deal with weak identification. The method incorporates subsample information in the data arising from structural changes in the economy, such as policy regime shifts. In an environment with changing monetary and fiscal policies, Bianchi and Ilut (2017) show that regime switching was a possibility even before the appointment of Volcker.[1] Regime switching can aid in our identification approach as they generate variation in the data that can be exploited to identify the parameters using the method developed by Magnusson and Mavroeidis (2014). The limited-information approach also has the advantage of making minimal assumptions about the structure of the economy, and therefore avoiding the possibility of getting biased estimates whenever some parts of the system are misspecified.

Our analysis indicates that the pre-Volcker period was predominantly characterised by a passive monetary-passive fiscal policy regime, which led to self-fulfilling expectations as key drivers of inflation. However, we cannot entirely rule out the possibility of a passive monetary-active fiscal policy configuration during this period, though the evidence remains limited. In contrast, for the post-Volcker era, we find clear evidence of an active monetary-passive fiscal policy mix, consistent with the prevailing consensus in the literature. These findings provide some support for the Fiscal Theory of the Price Level during the Great Inflation episode, but no evidence of indeterminacy or self-fulfilling sunspot fluctuations in the post-Volcker period.

2 EMPIRICAL FRAMEWORK

2.1 Monetary and fiscal policy rules

Monetary policy sets the nominal interest rate R_t with respect to inflation π_t and output gap x_t following the rule:

$$R_t = \alpha_1 + \rho_R R_{t-1} + (1 - \rho_R) [\phi_\pi \pi_t + \phi_x x_t] + \varepsilon_{R,t}, \tag{1}$$

with $\alpha_1 = (1 - \rho_R) (R^* - \phi_\pi \pi^*)$ where R^*, π^* are the target nominal interest rate and inflation target, ρ_R measures the degree of policy inertia, ϕ_π and ϕ_x govern the responsiveness to inflation and the output gap and $\varepsilon_{R,t}$ is a monetary policy shock, assumed to be an innovation with

[1] Ascari et al. (2020) consider the role of expected regime changes and highlight that monetary and fiscal authorities should coordinate not only within regimes but also across regimes by choosing the extent of activity or passivity in order to render a unique equilibrium.

respect to the set of available information at time $t-1$, Ω_{t-1}, that is, $E\left[\varepsilon_{R,t}|\Omega_{t-1}\right] = E_{t-1}\left[\varepsilon_{R,t}\right] = 0$.

The fiscal authority sets lump-sum taxation, τ_t, which corresponds to the tax-revenue-to-output ratio responding to b_t and x_t, the debt-to-output ratio and the output gap, respectively, following the rule:

$$\tau_t = \beta_1 + \rho_\tau \tau_{t-1} + (1-\rho_\tau)\left[\psi_b b_{t-1} + \psi_x x_t\right] + \varepsilon_{\tau,t}, \tag{2}$$

with $\beta_1 = (1-\rho_\tau)(\tau^* - \psi_b b^*)$, where τ^* and b^* are the targets on the tax revenue-to-output ratio and the debt-to-output ratio; ρ_τ measures the degree of policy inertia and $\varepsilon_{\tau,t}$ is a fiscal policy shock, assumed to be an innovation with respect to the available information at time $t-1$, that is, $E_{t-1}\varepsilon_{\tau,t} = 0$, , and ψ_b and ψ_x govern the responsiveness to the deviation of lagged debt-to-output ratio and the output gap.

2.2 Properties of equilibria

To understand the implications of policy rules for macroeconomic fluctuations and equilibrium properties, we adopt the New Keynesian framework of Bhattarai et al. (2016), which explicitly incorporates both monetary and fiscal policy interactions. Under a fully credible fixed regime, Leeper (1991) demonstrates that the economy yields a unique equilibrium if either monetary policy is active and fiscal policy is passive (AMPF), or if monetary policy is passive and fiscal policy is active (PMAF). In contrast, multiple equilibria arise when both policies are passive (PMPF), while no stationary equilibrium exists if both are active (AMAF). Broadly speaking, an active monetary policy is characterised by $\phi_\pi > 1$, whereas an active fiscal policy is defined by $\psi_b < 0$.[2]

In this framework, inflation dynamics emerge as a joint outcome of monetary and fiscal policy interactions. Monetary policy can effectively control inflation only when the equilibrium is both unique and Ricardian, as in the AMPF regime. A unique equilibrium eliminates the possibility of endogenous fluctuations driven by self-fulfilling expectations or multiple equilibria, while a Ricardian equilibrium rules out wealth effects arising from the dynamics of public debt. By contrast, under a PMAF regime, although the equilibrium remains unique, it is fiscal policy

[2]See Online Appendix for the analytical characterization of the boundary.

that anchors the price level. In this case, inflation adjusts to ensure that the real value of government debt is consistent with the intertemporal budget constraint, consistent with the fiscal theory of the price level (FTPL), wherein changes in public debt lead to wealth effects that influence inflation. Finally, the PMPF regime gives rise to multiple equilibria, allowing for endogenous fluctuations driven by self-fulfilling expectations.

2.3 Econometric methodology

The structural shocks derived from the monetary and fiscal policy rules in equations (1) and (2) satisfy the following:

$$\mathbb{E}_{t-1}\begin{bmatrix}\varepsilon_{R,t}(\alpha_1,\rho_R,\phi_\pi,\phi_x)\\ \varepsilon_{\tau,t}(\beta_1,\rho_\tau,\psi_b,\psi_x)\end{bmatrix}=\mathbb{E}_{t-1}\begin{bmatrix}R_t-\alpha_1-\rho_R R_{t-1}-(1-\rho_R)\phi_\pi\pi_t-(1-\rho_R)\phi_x x_t\\ \tau_t-\beta_1-\rho_\tau\tau_{t-1}-(1-\rho_\tau)\psi_b b_{t-1}-(1-\rho_\tau)\psi_x x_t\end{bmatrix}=\mathbf{0}.$$

Let $\boldsymbol{Z}_{R,t}$ and $\boldsymbol{Z}_{\tau,t}$ denote the vectors of predetermined variables at time t. Then, the orthogonality conditions imply the following moment restrictions:

$$\mathbb{E}\left[\boldsymbol{Z}'_{R,t}\varepsilon_{R,t}(\alpha_1,\rho_R,\phi_\pi,\phi_x)\right]=0 \text{ and } \mathbb{E}\left[\boldsymbol{Z}'_{\tau,t}\,\varepsilon_{\tau,t}(\beta_1,\rho_\tau,\psi_b,\psi_x)\right]=0. \tag{3}$$

We divide the parameters into two groups: the policy coefficients $\boldsymbol{\theta}=[\phi_\pi\ \ \phi_x\ \ \psi_b\ \ \psi_x]'$, and the remaining coefficients $\boldsymbol{\lambda}=[\alpha_1\ \ \rho_R\ \ \beta_1\ \ \rho_x]'$. The sample counterparts of the moment conditions are

$$\boldsymbol{F}_T(\boldsymbol{\lambda},\boldsymbol{\theta})=\sum_{t=1}^{T}\boldsymbol{f}_t(\boldsymbol{\lambda},\boldsymbol{\theta})=\sum_{t=1}^{T}\begin{bmatrix}\boldsymbol{Z}'_{R,t}\,\varepsilon_{R,t}(\alpha_1,\rho_R,\phi_\pi,\phi_x)\\ \boldsymbol{Z}'_{\tau,t}\,\varepsilon_{\tau,t}(\beta_1,\rho_\tau,\psi_b,\psi_x)\end{bmatrix}, \tag{4}$$

The S statistic proposed by Stock and Wright (2000) tests the null $H_0:\boldsymbol{\theta}=\boldsymbol{\theta}_0$ indirectly by testing $H_0: E[\boldsymbol{F}_T(\boldsymbol{\lambda}_0,\boldsymbol{\theta}_0)]=0$, that is, by evaluating whether the moment conditions are satisfied at the hypothesized parameter θ_0. The statistic is

$$S_T(\boldsymbol{\theta_0})=T^{-1}\boldsymbol{F}_T(\hat{\boldsymbol{\lambda}}(\boldsymbol{\theta_0}),\boldsymbol{\theta_0})'\left[\hat{V}_{ff}(\hat{\boldsymbol{\lambda}}(\boldsymbol{\theta_0}),\boldsymbol{\theta_0})\right]^{-1}\boldsymbol{F}_T(\hat{\boldsymbol{\lambda}}(\boldsymbol{\theta_0}),\boldsymbol{\theta_0}), \tag{5}$$

where $\hat{\boldsymbol{\lambda}}(\boldsymbol{\theta_0})$ is an estimator of λ under $H_0:\boldsymbol{\theta}=\boldsymbol{\theta}_0$, and $\hat{V}_{ff}(\hat{\boldsymbol{\lambda}}(\boldsymbol{\theta_0}),\boldsymbol{\theta_0})$ is a Newey-West estimator of the long-run variance of $T^{-1/2}\boldsymbol{F}_T(\boldsymbol{\lambda},\boldsymbol{\theta})$. The above S test is approximately χ^2-distributed with $k-4$ degrees of freedom, where k is the number of predetermined variables.

Let the partial sum of the moments be $\boldsymbol{F}_{[sT]}(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \sum_{t=1}^{[sT]} \boldsymbol{f}_t(\boldsymbol{\lambda}, \boldsymbol{\theta})$, where $s \in [0, 1]$ and $[sT]$ is the integer part of sT. Define also $\tilde{\boldsymbol{F}}_{[sT]}(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \boldsymbol{F}_{[sT]}(\boldsymbol{\lambda}, \boldsymbol{\theta}) - s\boldsymbol{F}_{[T]}(\boldsymbol{\lambda}, \boldsymbol{\theta})$, the statistic that captures deviations of subsample moments from the sample moments. Magnusson and Mavroeidis (2014) suggest complementing the S-test by testing $H_0 : E[\tilde{\boldsymbol{F}}_{[sT]}(\boldsymbol{\lambda}_0, \boldsymbol{\theta}_0)] = 0$ for $s \in (0, 1)$, that is, by testing if all subsample moments are stable over time. Their test, labeled $qLL\text{-}\widetilde{S}$[3] can detect breaks in the structural parameter θ (e.g., due to policy regime changes) or violations of the moments conditions caused by other shocks. In both cases, $qLL\text{-}\widetilde{S}$ complements the S-test by offering additional power. To jointly test the structural parameters and their stability over time, Magnusson and Mavroeidis (2014) propose the qLL-S test, which combines the information of the S- and the $qLL\text{-}\widetilde{S}$-tests, which we use to conduct inference about θ

$$\text{qLL}(\boldsymbol{\theta}_0) = \text{qLL-}\widetilde{S}(\boldsymbol{\theta}_0) + \frac{10}{11}\text{S}(\boldsymbol{\theta}_0).$$

We estimate $\boldsymbol{\lambda}$ under $H_0 : \boldsymbol{\theta} = \boldsymbol{\theta}_0$ and conduct a grid search over θ, the vector of policy parameters. The 90% confidence sets consist of all values of $\boldsymbol{\theta}_0$ for which the null assumption is not rejected according to the S– and qLL-tests at 10% significance level. Further computational details and the parameter grid are provided in Section 3 of the Supplementary Material.

2.4 Data

We use quarterly U.S. time-series data spanning the period 1960Q1 to 2008Q4.[4] The nominal interest rate is proxied by the effective federal funds rate, while output is measured by gross domestic product (GDP). Inflation is computed using the consumer price index (CPI). Tax revenues are defined as the sum of current tax receipts and contributions for government social insurance. Government debt refers to the market value of privately held gross federal debt. The output gap is measured using the series constructed by the Congressional Budget Office (CBO). All data were obtained from the Federal Reserve Bank of St. Louis FRED database. Further details and data sources are provided in Section 2 of the Supplementary Material.

[3]qLL, stands for quasi-local level, which is a persistent time-varying process.

[4]The sample ends in 2008Q4 to exclude periods when interest rates were at the zero lower bound and the Fed relied on unconventional policies, making a Taylor-type rule unsuitable.

3 EMPIRICAL RESULTS

We estimate the policy rules over two sub-samples: the pre-Volcker period (1960Q1-1979Q2) and the post-Volcker period (1984Q1-2008Q4).[5] Instruments include a constant and two lags of the endogenous variables. For monetary policy, these are lags of R_t, π_t, and x_t; for fiscal policy, lags of τ_t, b_t, and x_t. Figure 1 presents baseline confidence sets for the structural parameters ϕ_π and ψ_b, classified into regimes using the boundaries in Bhattarai et al. (2016).

A first key result is that none of the confidence sets are empty. For the S sets (Panel A), this implies no violation of overidentifying restrictions, while for the qLL-S sets (Panel B), it also suggests stability in the structural parameters over time.[6]

Second, the pre- and post-Volcker sets occupy distinct regions of the parameter space, reflecting a clear policy shift. The pre-Volcker set spans the indeterminacy (PMPF) and fiscal dominance (PMAF) regimes, while the post-Volcker set lies entirely in the monetary dominance (AMPF) regime. Panel B shows a sharp increase in the inflation response coefficient, consistent with Lubik and Schorfheide (2004).

Panel A further indicates weak identification of ϕ_π in the pre-Volcker period, with the S set spanning all regimes. In contrast, the qLL-S test delivers tighter bounds by leveraging time variation in the moment conditions, which improves precision. For the post-Volcker period, the confidence set remains relatively wider, as identification weakens when the true regime lies in the determinacy region, as argued by Mavroeidis (2010).

Given the alignment of our post-Volcker results with the existing literature, we focus our robustness checks on the pre-Volcker period. The corresponding confidence sets are presented in Section 4 of the Supplementary Material.

We explore two alternative specifications of the monetary policy rule: one that incorporates second-order interest rate smoothing, and another where the central bank responds to expected rather than actual inflation. We also assess the robustness of an alternative inflation measure, namely, the PCE deflator, and consider different choices of instruments and estimators for the variance-covariance matrix V_{ff}. Across these exercises, the qLL-S confidence sets consistently lie in both the indeterminacy and fiscal dominance regions.

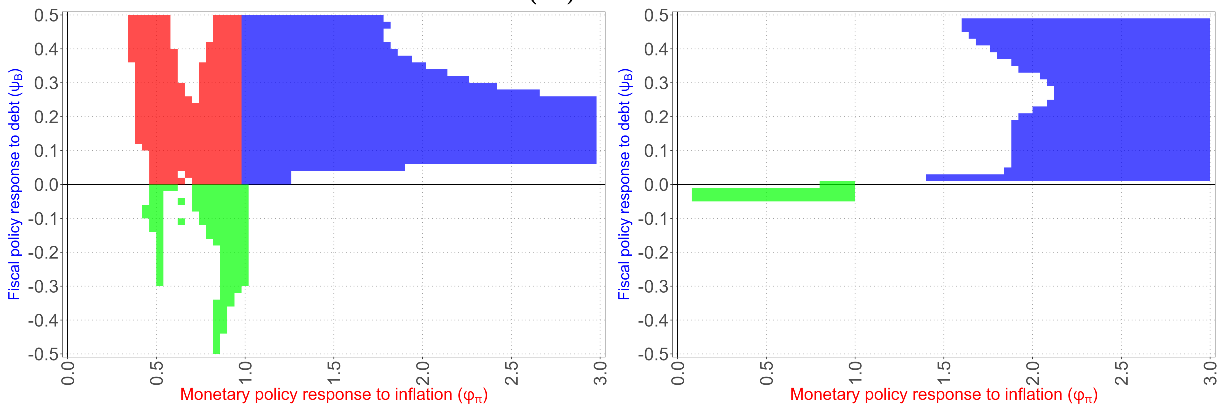
[5]This split follows the structural break widely documented around Paul Volckers appointment as Federal Reserve Chair.

[6]A non-empty qLL-S set does not rule out short-lived deviations in policy behavior, but it does reject permanent shifts; see Magnusson and Mavroeidis (2014).

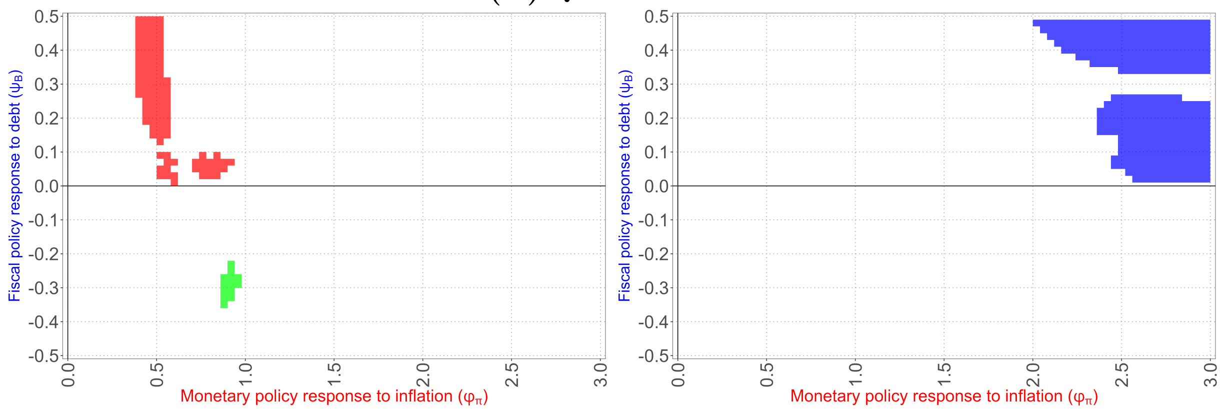
Figure 1 – BASELINE CONFIDENCE SETS. Baseline specification with 2 lags of endogenous variables and constants as instruments. Newey-West estimator of the variance-covariance matrix with automatic bandwidth selection. Blue represents AMPF regime, red is PMPF regime, and green is PMAF regime. Points in the explosive region are excluded. Confidence level is 90%.

Pre-Volcker (1960Q1-1979Q2)	Post-Volcker (1984Q1-2008Q4)

(A) S SET



(B) QLL-S SET



Overall, our results suggest that the pre-Volcker period was characterised by a passive monetary-passive fiscal regime, consistent with indeterminacy, though we cannot exclude a passive monetary-active fiscal configuration consistent with the Fiscal Theory of the Price Level. Post-Volcker, we find strong support for an active monetary-passive fiscal regime, marked by a robust inflation response and fiscal discipline (Ettmeier & Kriwoluzky, 2024; Bhattarai et al., 2016).

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Supplement to “Empirical evidence on the U.S. monetary-fiscal policy mix”

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4 EQUILIBRIUM PROPERTIES

Following Bhattarai et al. (2016), the boundaries of the four distinct policy regimes can be characterised analytically. In particular, monetary policy is active if

$$\phi_\pi > 1 - \phi_X \left(\frac{1-\tilde{\beta}}{\tilde{\kappa}} \right) \approx 1 \tag{6}$$

while fiscal policy is active if

$$\psi_b < \frac{1}{\beta} - 1 \approx 0, \tag{7}$$

where $\tilde{\beta}$ and $\tilde{\kappa}$ are functions of deep parameters as defined below:

$$\tilde{\beta} = \frac{\gamma + \beta}{1 + \gamma\beta}$$

$$\tilde{\kappa} = \frac{(1-\alpha\beta)(1-\alpha)}{\alpha(1+\varphi\theta)(1+\gamma\beta)} \left(1 + \varphi + \frac{\chi_Y}{1-\bar{g}} \right)$$

Here β is the discount factor, γ measures the extent of price indexation, φ is the inverse of the Frisch elasticity of labour supply, α is the fraction of firms whose prices remain unchanged, χ_Y captures the response of government spending to the output gap, $\bar{g}$ is the steady state level of government spending, θ captures the steady-state value of elasticity of substitution between intermediate goods.

We fix the regime boundaries in equations (6) and (7) using standard parameter values commonly employed in the literature; see Bhattarai et al., 2016, Appendix, p. 10. Broadly, active monetary policy is characterized by $\phi_\pi > 1$, while active fiscal policy corresponds to $\psi_b < 0$. Importantly, our estimation strategy does not depend on this specific calibration.

5 DATA

Gross Domestic Product, Billions of Dollars, Seasonally Adjusted, Source: U.S. Bureau of Economic Analysis; FRED. https://fred.stlouisfed.org/series/GDP#0.

CBO Output Gap, Source: U.S. Bureau of Economic Analysis; FRED. https://fred.

Table 1 – CALIBRATED PARAMETERS.

Parameter	Value
γ	0.6
β	0.997
α	0.5
φ	1
χ_Y	0.4
θ	8
$\bar{g}$	0.25

stlouisfed.org/graph/?g=f1cZ.

Effective Federal Funds Rate, Percent, Not Seasonally Adjusted, Source: Board of Governors of the Federal Reserve System; FRED. https://fred.stlouisfed.org/series/FEDFUNDS#0.

Federal government current tax receipts, Billions of Dollars, Seasonally Adjusted Annual Rate, Source: U.S. Bureau of Economic Analysis; FRED. https://fred.stlouisfed.org/series/W006RC1Q027SBEA.

Federal government current receipts: Contributions for government social insurance, Billions of Dollars, Seasonally Adjusted Annual Rate, Source: U.S. Bureau of Economic Analysis; FRED. https://fred.stlouisfed.org/series/W780RC1Q027SBEA.

Market Value of Gross Federal Debt, Billions of Dollars, Not Seasonally Adjusted, Source: Federal Reserve Bank of Dallas; FRED. https://fred.stlouisfed.org/series/MVGFD027MNFRBDAL#0.

6 COMPUTATION OF THE TESTS

Let T be the sample size. The sample counterparts of the moment conditions are

$$\boldsymbol{F}_T(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \sum_{t=1}^{T} \boldsymbol{f}_t(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \sum_{t=1}^{T} \begin{bmatrix} \boldsymbol{Z}'_{R,t}\, \varepsilon_{R,t}(\alpha_1, \rho_R, \phi_\pi, \phi_x) \\ \boldsymbol{Z}'_{\tau,t}\, \varepsilon_{\tau,t}(\beta_1, \rho_\tau, \psi_b, \psi_x) \end{bmatrix}, \tag{8}$$

where $\boldsymbol{\theta} = [\phi_\pi \quad \phi_x \quad \psi_b \quad \psi_x]'$ represents the policy coefficients, $\boldsymbol{\lambda} = [\alpha_1 \quad \rho_R \quad \beta_1 \quad \rho_x]'$ represents the remaining parameters.

Define the matrices $\boldsymbol{Y}^R = [\boldsymbol{R}\ \boldsymbol{\pi}\ \boldsymbol{x}]$, $\boldsymbol{Y}^\tau = [\boldsymbol{\tau}\ \boldsymbol{b}_{-1}\ \boldsymbol{x}]$, $\boldsymbol{X}^R(\theta) = [\boldsymbol{1}\ \tilde{\boldsymbol{R}}_{-1}(\theta)]$, where $\tilde{\boldsymbol{R}}_{-1}(\theta) = \boldsymbol{R}_{-1} - \boldsymbol{\pi}\phi_\pi - \boldsymbol{x}\phi_x$, and $\boldsymbol{X}^\tau(\theta) = [\boldsymbol{1}\ \tilde{\tau}_{-1}(\theta)]$, where $\tilde{\boldsymbol{\tau}}_{-1}(\theta) = \boldsymbol{\tau}_{-1} - \boldsymbol{b}_{-1}\psi_b - \boldsymbol{x}\psi_x$. Define also the matrices of instruments $\boldsymbol{Z}^{(R)}$ and $\boldsymbol{Z}^{(\tau)}$ as

$$\boldsymbol{Z}^{(R)} = [\boldsymbol{1}\ \boldsymbol{\pi}_{-1}\ \boldsymbol{\pi}_{-2}\ \boldsymbol{R}_{-1}\ \boldsymbol{R}_{t-2}\ \boldsymbol{x}_{-1}\ \boldsymbol{x}_{-2}]' \text{ and } \boldsymbol{Z}^{(\tau)} = [\boldsymbol{1}\ \boldsymbol{\tau}_{-1}\ \boldsymbol{\tau}_{-2}\ \boldsymbol{b}_{-1}\ \boldsymbol{b}_{-2}\ \boldsymbol{x}_{-1}\ \boldsymbol{x}_{-2}].$$

We can vertically stack all moment conditions from both equations and compactly write

$$\boldsymbol{F}_T(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \boldsymbol{Z}'\boldsymbol{\varepsilon}(\boldsymbol{\lambda}, \boldsymbol{\theta}) = \boldsymbol{Z}'(\boldsymbol{Y}\boldsymbol{b}(\boldsymbol{\theta}) - \boldsymbol{X}(\theta)\boldsymbol{\lambda})$$

where $\mathbf{b}(\theta) = [1\ -\phi_\pi\ -\phi_x\ 1\ -\psi_b\ -\psi_x]'$,

$$\boldsymbol{Y} = \begin{bmatrix} \boldsymbol{Y}^{(R)} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{Y}^{(\tau)} \end{bmatrix}, \boldsymbol{X}(\theta) = \begin{bmatrix} \boldsymbol{X}^{(R)}(\theta) & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{X}^{(\tau)}(\theta) \end{bmatrix}, \text{and } \boldsymbol{Z} = \begin{bmatrix} \boldsymbol{Z}^{(R)} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{Z}^{(\tau)} \end{bmatrix},$$

Under $H_0 : \theta = \theta_0$, $\boldsymbol{b}(\theta_0)$, $\boldsymbol{X}^{(R)}(\theta_0)$, and $\boldsymbol{X}^{(\tau)}(\theta_0)$ are fixed. The estimator for the untested parameter $\boldsymbol{\lambda}$ is obtained by minimizing the following objective function:

$$\hat{\boldsymbol{\lambda}}(\theta_0) = \arg\min_{\lambda} \frac{1}{T}\boldsymbol{\varepsilon}(\boldsymbol{\lambda}, \theta_0)' \boldsymbol{Z}\widehat{\boldsymbol{V}}(\boldsymbol{\lambda}, \theta_0)^{-1} \boldsymbol{Z}'\boldsymbol{\varepsilon}(\boldsymbol{\lambda}, \theta_0) \tag{9}$$

that is, $\hat{\boldsymbol{\lambda}}(\theta_0)$ is the efficient two-step estimator for $\boldsymbol{\lambda}$ under H_0. The variance estimator $\widehat{\boldsymbol{V}}(\theta_0, \boldsymbol{\lambda})$ is the heteroskedastic and autocorrelation consistent (HAC) estimator of Var $\left(\frac{1}{\sqrt{T}}\boldsymbol{Z}'\boldsymbol{\varepsilon}(\theta_0, \boldsymbol{\lambda})\right)$

$$\widehat{\boldsymbol{V}}(\boldsymbol{\lambda}, \theta_0) = \widehat{\Gamma}_0 + \sum_{j=1}^{T} \omega_j \left(\widehat{\Gamma}_j + \widehat{\Gamma}_j'\right), \tag{10}$$

where

$$\widehat{\Gamma}_j = \frac{1}{T}\sum_{t=j+1}^{T} \widehat{\gamma}_t\widehat{\gamma}_t',$$

$\widehat{\gamma}_t = \boldsymbol{f}_t\left(\hat{\boldsymbol{\lambda}}(\theta_0), \theta_0\right) - \bar{\boldsymbol{f}}_T\left(\hat{\boldsymbol{\lambda}}(\theta_0), \theta_0\right)$, and $\bar{\boldsymbol{f}}_T\left(\hat{\boldsymbol{\lambda}}(\theta_0), \theta_0\right) = \frac{1}{T}\sum_{t=1}^{T} \boldsymbol{f}_t\left(\hat{\boldsymbol{\lambda}}(\theta_0), \theta_0\right)$. The parameter ω_j represents the Barlett kernel. The shocks are contemporaneously uncorrelated in the baseline specification, that is, $\widehat{\boldsymbol{V}}(\boldsymbol{\lambda}, \theta_0)$ is a block diagonal matrix.

The S statistic is obtained by plugging in $\hat{\boldsymbol{\lambda}}(\theta_0)$ into the objective function (9). The S statistic follows a chi-squared distribution with $k_z - k_x$ degrees of freedom, where k_z is the number of columns of $\boldsymbol{Z}$, whereas k_x is the number of columns of $\boldsymbol{X}(\theta_0)$.

The qLL–S test rejects for large values of the statistic

$$\text{qLL-S}(\theta_0) \equiv \text{qLL-}\widetilde{S}(\theta_0) + \frac{10}{11}S(\theta_0) \tag{11}$$

where $\mathrm{S}(\theta_0)$ is the S statistic evaluated at $\theta = \theta_0$, and $qLL\text{-}\widetilde{S}(\theta_0)$ is the statistic that detects violations of the moment conditions in subsamples. The algorithm for computing the $qLL\text{-}\widetilde{S}$ is detailed in Magnusson and Mavroeidis, 2014, where one can also find tables of critical values.

The confidence sets derived from the tests are obtained by performing a grid search over the parameter space. The 90% confidence sets are formed by the collection of points that do not reject $H_0 : \theta = \theta_0$ at 10% significance level.

6.1 Properties of the parameter space

We obtain our baseline results doing a global search over the entire grid of the parameter space as in Table 2.

Table 2 – DISCRETISATION OF THE PARAMETER SPACE.

Parameter	Step size	Minimum	Maximum
ϕ_π	0.10	0	6
ϕ_x	0.05	0	2
ψ_b	0.10	-1	1
ψ_x	0.10	-1	1

7 ROBUSTNESS ANALYSIS - PRE-VOLCKER SAMPLE

7.1 Alternative monetary policy rules

We consider two alternative specifications of the monetary policy rule. The first introduces second-order interest rate smoothing, motivated by empirical evidence in Brault and Phaneuf (2021). We re-estimate the confidence sets assuming an AR(2) monetary policy rule,[1] with results shown in Figure 2. Under this specification, the S set contracts slightly within the

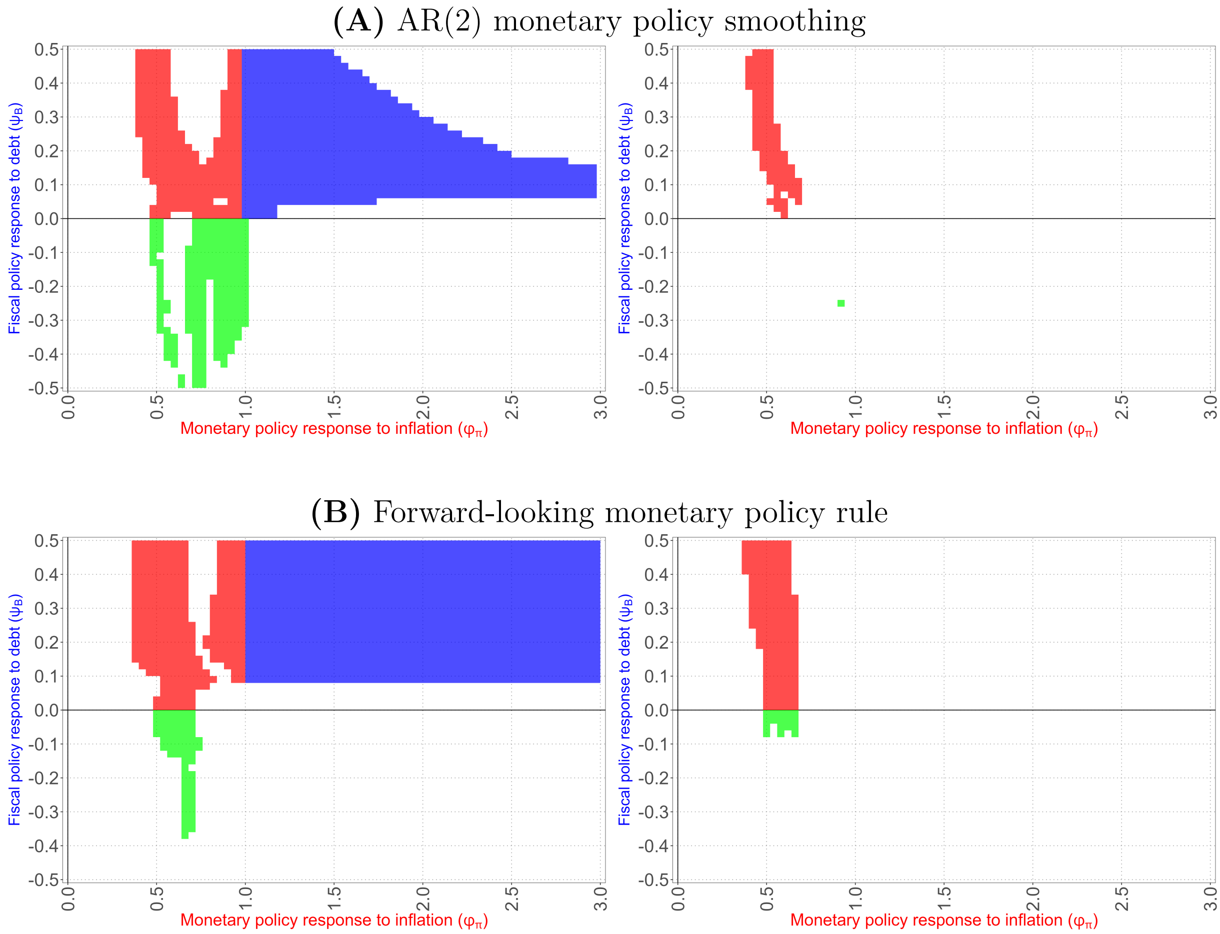
[1]As in the baseline case, we exclude parameter combinations that lead to explosive AR(2) dynamics.

monetary regime but expands in the fiscal regime. The *qLL-S* set becomes more concentrated overall, shrinking across both the indeterminacy and fiscal regions, though both regimes remain within the 90% confidence set.

The second rule replaces current inflation π_t with expected future inflation $E_t\pi_{t+1}$ in the baseline monetary policy rule. Under this forward-looking rule, the S set becomes uninformative, with weak identification of ϕ_π. In contrast, the *qLL*-S set continues to span the indeterminacy region similarly to the baseline case. However, within the fiscal region, it now includes lower values of ϕ_π and ψ_b, bringing the set closer to the boundary of indeterminacy. Still, we cannot reject the fiscal regime under this specification.

Figure 2 – **ALTERNATIVE MONETARY POLICY RULES**. Panel A fits a monetary policy rule following an autoregressive process of order 2. Panel B considers a monetary policy rule responding to expected inflation.

S SET	QLL-S SET



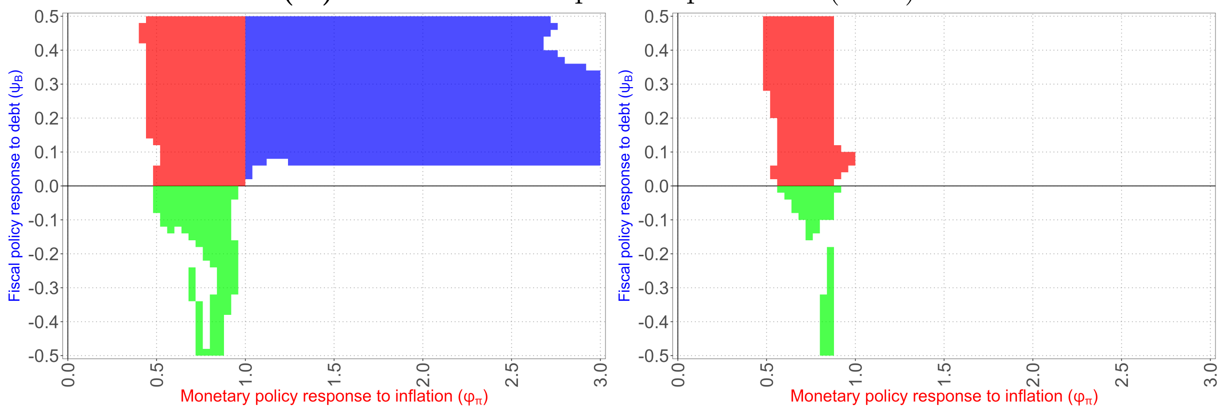
7.2 Alternative measure of inflation

Our baseline analysis uses CPI as the measure of inflation. As a robustness check, we consider the PCE price index. The *qLL*-S set based on PCE, shown in Panel A of Figure 3, exhibits a qualitative pattern similar to the baseline: both the indeterminacy and fiscal regimes remain plausible. However, the confidence set is somewhat larger across both parameters, suggesting weaker identification relative to the CPI-based results.

Figure 3 – ALTERNATIVE MEASURE OF INFLATION. Panel A uses the quarterly variation in the headline personal consumption expenditure as a measure of inflation.

S SET	qLL-S SET

(A) Personal consumption expenditure (PCE)



7.3 Estimation method

We assess the robustness of our results to alternative instrument sets and to different assumptions about the estimation of the variance-covariance matrix V_{ff} in equation (5) in the main text.

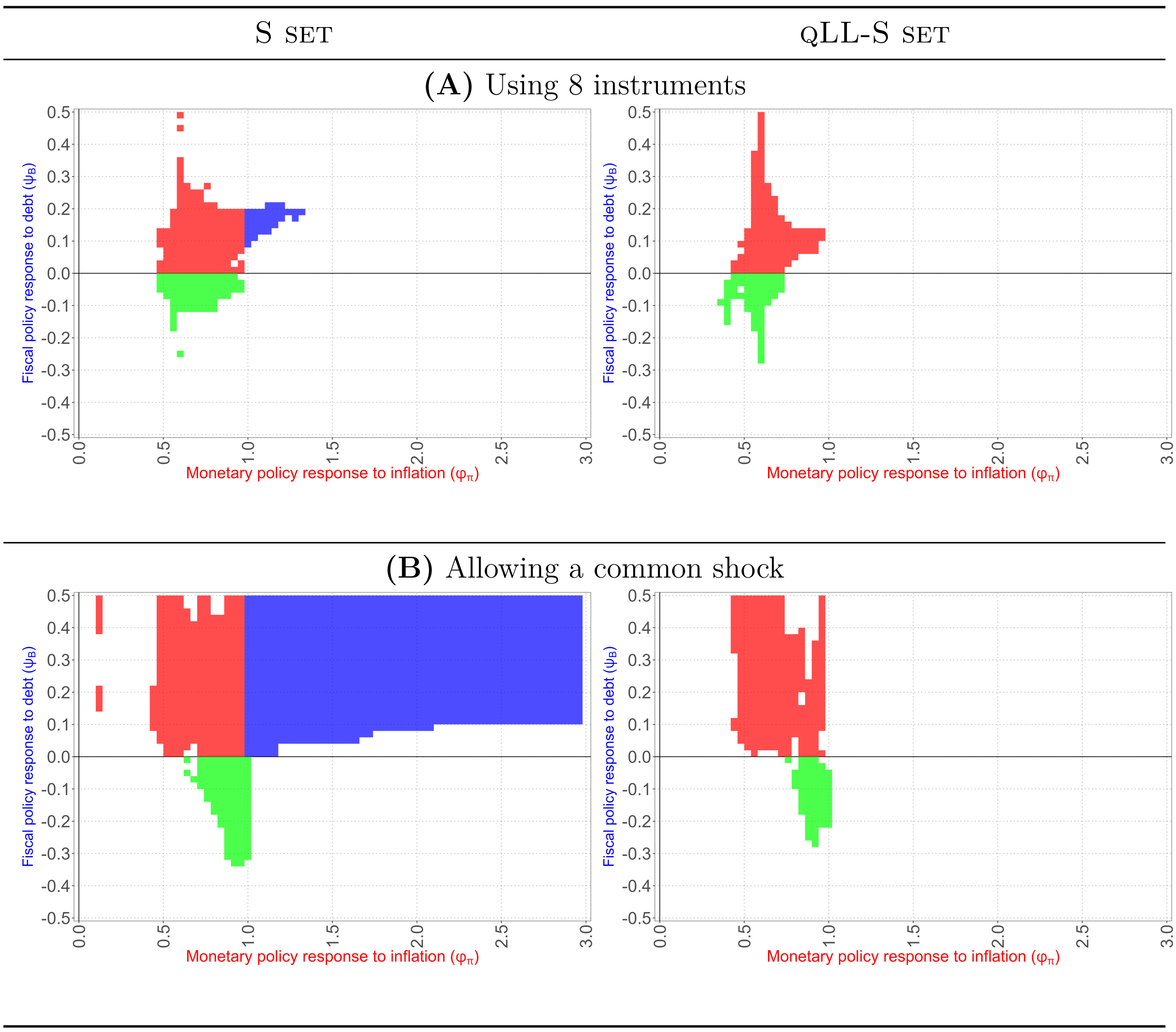
First, we restrict the instrument set to include only the second lag of the interest rate, inflation, output gap, and debt level. This choice guards against potential violations of instrument exogeneity due to time aggregation and ensures the desirable statistical properties of the test. Additionally, the S and qLL-S sets may be unreliable if the number of instruments is large relative to the sample size. Therefore, we keep the number of instruments small when we compute S and qLL-S sets.[2] The resulting *qLL*-S set remains qualitatively similar to the baseline: both

[2]See a discussion in Mavroeidis (2005, p 439).

the indeterminacy and fiscal regimes are supported. However, the set admits somewhat larger values of ϕ_π, reflecting mild weakening in identification.

Second, we relax the assumption that the monetary and fiscal policy shocks, $\varepsilon_{R,t}$ and $\varepsilon_{\tau,t}$, are contemporaneously uncorrelated. While this assumption violates their structural interpretation, it allows for unmodeled contemporaneous interactions between the policy rules. To address this, we allow all elements of $\hat{V}_{ff}$ to be unrestricted. The resulting confidence sets, shown in Panel B of Figure 4, are larger due to the reduced set of identifying restrictions. Nevertheless, the qualitative conclusions remain intact: under the *genS-qLL* criterion, indeterminacy continues to dominate, with only 19% of the set lying in the fiscal regime.

Figure 4 – ESTIMATION METHOD. Panel A uses as instruments constants and only the second lag of the interest rate, inflation, output gap and debt level. Panel B leaves the variance-covariance matrix of the moments unrestricted thus allowing potential contemporaneous correlation among the shocks in the policy rules.



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