Evaluating Policy Counterfactuals: A "VAR-Plus" Approach

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A menu of research strategies in macro

Structural Modeling

Pros:
- Disciplined with micro data
- Mechanisms transparent
- Counterfactuals

Cons:
- Misspecification
- Calibration challenging

Reduced-form Identification

Pros:
- Agnostic about structure of economy
- Robust to model uncertainty

Cons:
- Identification challenging
- Limited set of experiments

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The approach in a nutshell

- How to study **policy counterfactuals**, imposing as little structure as possible?
- **Sufficient statistic approach**, combining
  1. Reduced-form projections
  2. Policy causal effects
- Key challenge: Estimating causal effects of different policies

  e.g. transitory or more persistent monetary shocks
- Impose some structure to extrapolate policy effects

Framework

- **Impulse propagation paradigm**:

$$y_t = \sum_{\ell=0}^{\infty} \Theta_\ell \varepsilon_{t-\ell}, \quad \text{where } \varepsilon_t \text{ are structural shocks driving the economy}$$

- IRFs Θ_ℓ are solutions of linear, perfect-foresight, inf-horizon economy:

$$\begin{aligned} \mathcal{H}_x \boldsymbol{x} + \mathcal{H}_z \boldsymbol{z} + \mathcal{H}_e e_0 &= \mathbf{0} \\ \mathcal{A}_x \boldsymbol{x} + \mathcal{A}_z z + \mathcal{A}_v v_0 &= \mathbf{0} \end{aligned}$$

- where $y_t = (x_t', z_t')'$ is partitioned into endogenous variables x_t and policy variables z_t, and $\varepsilon_t = (e_t', v_t')'$ consists of structural shocks e_t and policy shocks v_t
- $\{\mathcal{H}_x, \mathcal{H}_z, \mathcal{H}_e\}$ and $\{\mathcal{A}_x, \mathcal{A}_z, \mathcal{A}_v\}$ are sequence-space Jacobians for private-sector and policy block (Auclert et al., 2021)

Counterfactuals

- Aim is to study evolution of the economy if policy was set based on a different rule

$$\tilde{A}_x \boldsymbol{x} + \tilde{A}_z z = \mathbf{0}$$

- y_t under the counterfactual policy follows a counterfactual SVMA

$$\tilde{y}_t = \sum_{\ell=0}^{\infty} \tilde{\Theta}_\ell \varepsilon_{t-\ell}$$

- How to get $\tilde{\Theta}_\ell$ and $\tilde{y}_t$?
- **Idea:** Pick policy shocks $\boldsymbol{\nu}$ that impose the new rule
- Under invertibility suffices to back out $\tilde{y}_t$

Operationalization

- Challenge in practice: we do not observe all policy shocks
  - Credible estimates $\hat{\theta}_\nu$ available for some (e.g. high-frequency or narrative MP shocks), but not entire policy menu Θ_ν
- **Idea:** Use available evidence to discipline suite of candidate structural models via impulse response matching
- Use estimated models to **extrapolate** policy causal effects and get posterior distribution of Θ_ν

First assessment

- Very cool paper!
- Extremely useful tool for applied researchers interested in performing **policy counterfactuals**
- Does not require to fully specifying the structure of the economy
- Robust to Lucas critique
- Let's see it at work

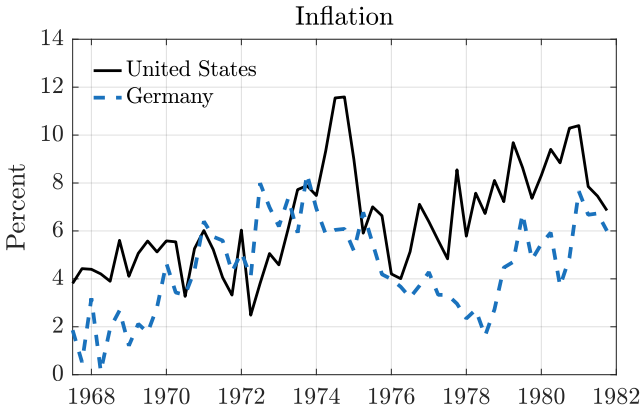
Revisiting the Great Inflation

- 1970's and early 1980's were characterized by poor economic performance
- To what extent **monetary policy** played a role in these episodes?
  - Could tighter monetary policy have prevented the stark rise in inflation?
  - And if so, at what cost?
- Classic question, see e.g. Primiceri (2005)
  - Study counterfactual economic performance, imposing monetary rule under Greenspan throughout the 1970s
  - Does not make much of a difference, higher variance of non-policy shocks more important

Revisiting the Great Inflation

- But maybe Greenspan was not enough of a hawk ...
- **Could the Bundesbank have prevented the Great Inflation in the US?**
  - Bundesbank commonly perceived as the inflation hawk
  - near-universally credited for preventing the Great Inflation in West Germany
  - see also Benati (2011)

Revisiting the Great Inflation



Monetary policy in the US and West Germany

- I estimate simple monetary VARs in output gap, inflation and policy rates for West Germany and the US

$$A_0 y_t = A(L) y_{t-1} + \varepsilon_t$$

- Use non-policy shocks as instruments for simple Taylor rule (estimated using GMM)

$$i_t = \rho i_{t-1} + (1-\rho)\left(\phi_\pi \pi_t + \phi_y y_t\right)$$

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- Results:

Country/Parameter	ϕ_π	ϕ_y	ρ
Germany	1.94	-0.16	0.77
United States	1.62	1.35	0.82

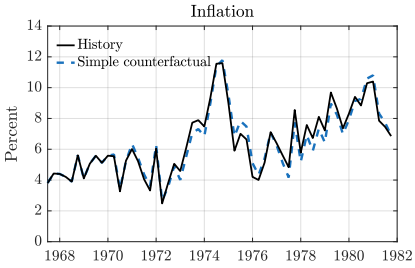
A simple counterfactual

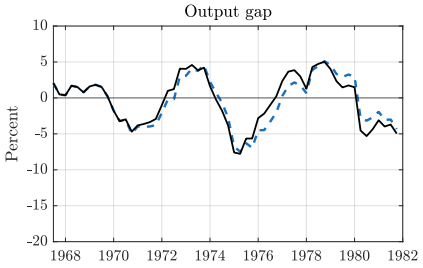
- A "simple" way of doing the counterfactual is just to replace the interest rate equation in the SVAR for the US with the German equation

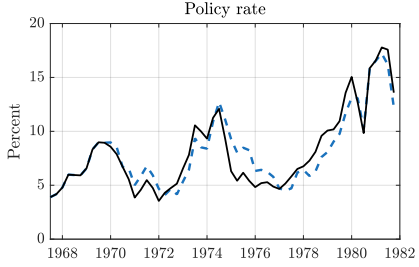
$$\begin{pmatrix} a_{0,1:2} \\ \tilde{a}_{0,3} \end{pmatrix} y_t = \begin{pmatrix} a_{1,1:2} \\ \tilde{a}_{1,3} \end{pmatrix} y_{t-1} + \ldots + \begin{pmatrix} a_{p,1:2} \\ \tilde{a}_{p,3} \end{pmatrix} y_{t-p} + \varepsilon_t$$

- Similar to exercise in Primiceri (2005)
- How does this look?

A simple counterfactual







A simple counterfactual

- Imposing monetary rule from Bundesbank like this does not make much of a difference
- Slightly lowers inflation in some periods, but in others even increases it
- In line with findings in Primiceri (2005) and Benati (2011)
- Key problem: Lucas critique
  - Changing policy rule will affect behavior of private sector, and thus all coefficients in VAR possibly change

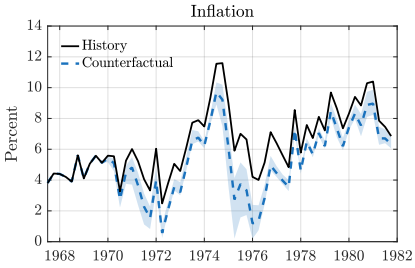
Using the CMW approach

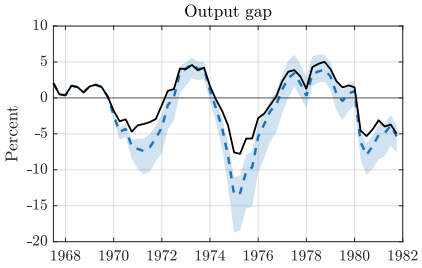
- Now let's do it using the CMW approach
- Impose Taylor rule, using the coefficients estimated for Germany

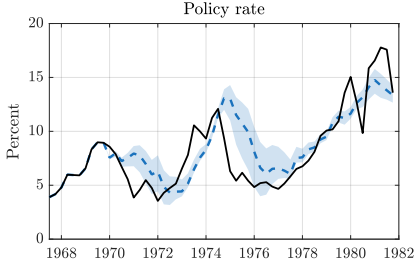
$$i_t = 0.77 i_{t-1} + (1 - 0.77)(1.94\pi_t - 0.16 y_t)$$

- How? As in CMW, impose corresponding $\tilde{\mathcal{A}}_x$, $\tilde{\mathcal{A}}_z$ using
  - reduced-form projections from medium-scale VAR
  - extrapolated monetary policy shocks from four models:
    - RANK & HANK
    - Behavioral RANK & HANK
- Do things look any different?

Could the Bundesbank have prevented the Great Inflation?





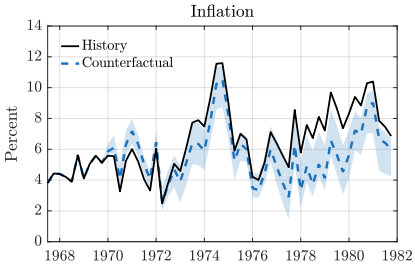


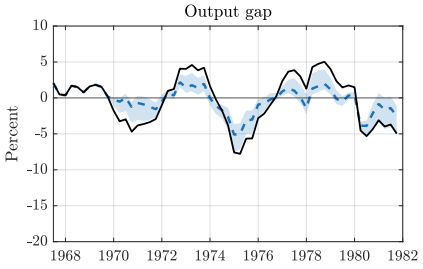
Could the Bundesbank have prevented the Great Inflation?

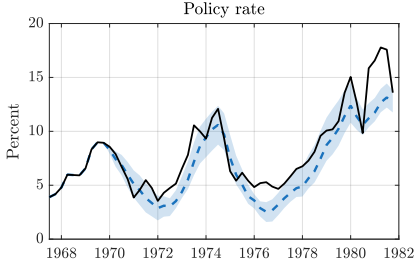
- Different conclusion!
- Bundesbank rule would have significantly reduced US inflation in the 70s
- However, comes at a substantial economic cost
- Fall in output gap in mid-70s almost a third larger

- What about optimal monetary policy?
  - Mimimize quadratic objective $\mathcal{L} = \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \left\{ \lambda_\pi \pi_t^2 + \lambda_y y_t^2 + \lambda_i \left(i_t - i_{t-1} \right)^2 \right\} \right]$

Optimal monetary policy







Optimal monetary policy

- Optimal monetary policy seems to be far from standard Taylor rule
- Manages to achieve lower inflation and more stable output gap
- Role of expectations? Likely a variant of the **forward guidance puzzle** (Del Negro, Giannoni, and Patterson, 2012)
  - Pricing block of models to extrapolate policy effects extremely forward-looking
  - Crucial how to extrapolate forward guidance shocks
  - Focus on models that are not subject to this extreme foresight

Comment #1: Invertibility

- Invertibility is key for the approach to work
- Authors use a medium-scale VAR (10 variables) to estimate the Wold coefficients
- But only 3 variable VAR for estimating the impulse responses to monetary policy shocks
- Why not use **same model** to estimate both these objects?
  - I would suggest using a *large-scale* Bayesian VAR or a FAVAR to incorporate an information set as large as possible for both steps
- This would also help if one wants to take estimation uncertainty in these objects into account

Comment #2: Fiscal and monetary policy interactions

- How should we think about **interactions** between policies, e.g. fiscal-monetary policy interactions?
- Fiscal policy rule is calibrated and fixed, so essentially part of non-policy block
- What if fiscal policy depends on monetary rule? Does that invalidate the counterfactual?
- Seems crucial since many fiscal-monetary policy interrelations in practice

To sum up

- Great paper with important **methodological contribution** and **interesting applications**
- Advances how to robustly extrapolate estimated policy causal effects
- Makes **semi-structural** methods applicable to a wider set of applications

Thank you!