

## The Fiscal Channel of Monetary Policy

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# Motivation

- The recent surge in inflation resulted in higher interest rates and subdued output.
- Calls for **fiscal measures** to ease the burden of increasing living costs and to boost the economy were immediately voiced (e.g. Inflation Reduction Act in US).
- Expansionary fiscal policy might **offset** part of the monetary tightening (BIS, 2023; Bańkowski et al., 2023; Adrian and Gaspar, 2022).
- In theory, not clear how fiscal policy affects the transmission of monetary policy
  - **No effect** if Ricardian equivalence holds (Clarida et al., 1999).
  - Fiscal policy **matters a great deal** (Kaplan et al., 2018).

## What we do

- We **empirically characterize** and **quantify** the fiscal channel of US monetary policy.
- We augment a standard US monetary VAR model with main fiscal measures.
- We investigate
  - (i) **Structural counterfactuals** in which we shut down individual fiscal measures one-by-one
  - (ii) **Policy counterfactuals** á la McKay and Wolf (2023) to optimize monetary-fiscal interaction
- Main findings
  - Pronounced adjustment in fiscal measures after monetary policy shocks
  - Endogenous response of **tax revenues** substantially **reduces** real output effects
  - Response of **social transfers dampens** effects on prices
  - ⇒ In a stagflationary environment, **tax cuts** are the '**optimal**' fiscal response

## Related literature

- Theoretical models studying monetary-fiscal interaction
  - with deviations from Ricardian equivalence through e.g. imperfect knowledge or borrowing constrained households (e.g. Eusepi and Preston, 2018; Kaplan et al., 2018).
- Bouscasse and Hong (2023) study a similar research question with a focus on deficit implications. (Price puzzle!)
- Empirical studies on the impact of the monetary policy stance on fiscal policy (e.g. Ramey and Zubairy, 2018; Miyamoto et al., 2018).
- Counter-factual policy rule analysis (e.g. Leeper and Zha, 2003; Antolín-Díaz et al., 2021; Barnichon and Mesters, 2023; McKay and Wolf, 2023).

## Methodology

# The structural VAR model

$$\mathbf{A}_0 \mathbf{y}_t = \mathbf{c} + \sum_{l=1}^p \mathbf{A}_l \mathbf{y}_{t-l} + \boldsymbol{\varepsilon}_t, \text{ with } \boldsymbol{\varepsilon}_t \sim N(\mathbf{0}, \mathbf{I}_n)$$

- where  $\mathbf{y}_t$  includes ...
  - (i) standard measures in a monetary VAR (e.g. Gertler and Karadi, 2015), including real GDP, GDP deflator, excess bond premium, one-year treasury bill rate, plus
  - (ii) tax revenues, social transfers, (discretionary) government spending, fiscal deficit.
  
- We consider  $p = 4$  in the baseline
  
- Data and sample
  - Quarterly data ranging from 1983Q1 to 2019Q4 (stable fiscal-monetary framework).
  - Federal Reserve Economic Database (FRED); Board of Governors of the FRS
  - Log levels and seasonally adjusted, except the interest rate and excess bond premium

# Identification

## ■ **Monetary policy proxy** (high frequency surprises)

- Asset price surprises in half-hour window around press releases (e.g. Gürkaynak et al., 2022).
- To obtain a pure policy surprise (control for potential information effects), we consider stock market surprises as in Jarociński and Karadi (2020).
- Quarterly aggregation considers timing of announcement as in Gertler and Karadi (2015)

▶ Comparison frequency and sample

## ■ **Fiscal proxies** (narrative accounts)

- Taxes: Romer and Romer (2010) narrative tax shocks from Mertens and Ravn (2011).
- Transfers: Romer and Romer (2016) narrative transfer shocks, extended by Párraga Rodríguez (2018).
- Spending: Government spending forecast error (Ramey, 2011; Auerbach and Gorodnichenko, 2012).

## Estimation and priors

- To identify **multiple shocks** with **multiple proxies** (instruments) we use the **Bayesian proxy SVAR** model put forward by Arias et al. (2021)
  - 'External instrumental' approach estimated in one step
  - Shocks are identified by imposing the standard **exogeneity** and **relevance** conditions
- Standard Minnesota shrinkage prior to deal with high dimensionality of augmented SVAR
  - Hyperparameters are selected hierarchically as described in Giannone et al. (2015).
- To improve efficiency we require the identified shocks to account for at least 10% of the variance of the respective proxy (Caldara and Herbst, 2019; Georgiadis et al., 2024)

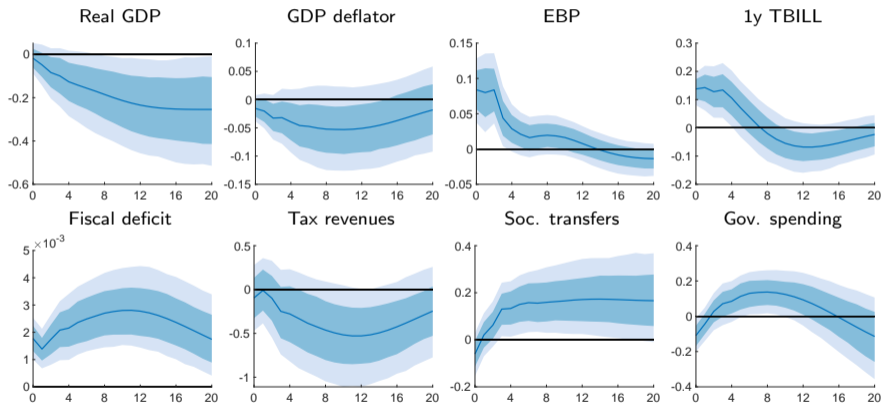
▶ Details BPSVAR



## VAR Results

# IRFs to (contractionary) MP shocks

► Sensitivity checks

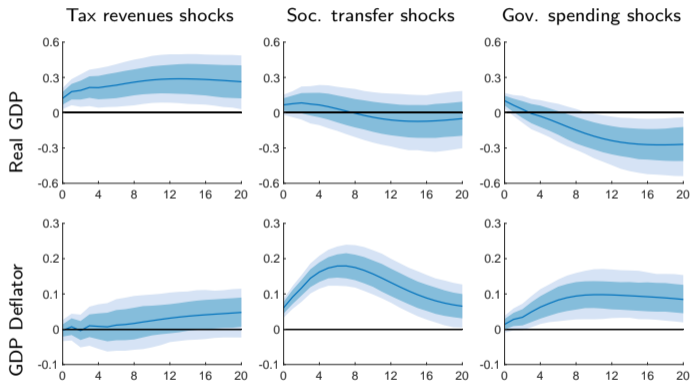


# IRFs to (expansionary) fiscal shocks

▶ Robustness tax rev. shocks

▶ Robustness soc. transfer shocks

▶ Robustness gov. spending shocks



## Taking stock

- Substantial endogenous fiscal response to monetary policy shocks.
- Fiscal shocks affect both output and prices.
- Our results are in line with existing literature and supported by a series of robustness checks
  - Variants of the purification (Miranda-Agrippino and Ricco, 2021; Swanson, 2021).
  - Maturity structure of the policy surprise.
  - Variants of the fiscal instruments.
- **Next: What is the role of the fiscal channel in the transmission of MP shocks?**

## Structural Counterfactuals

## Structural counterfactuals

- Our exposition closely follows Antolín-Díaz et al. (2021), who formalize scenario analyses that allow conducting counterfactual experiments in the form of conditional forecasts.
- Consider the SVAR rewritten as a **conditional forecast (stacked MA representation)**

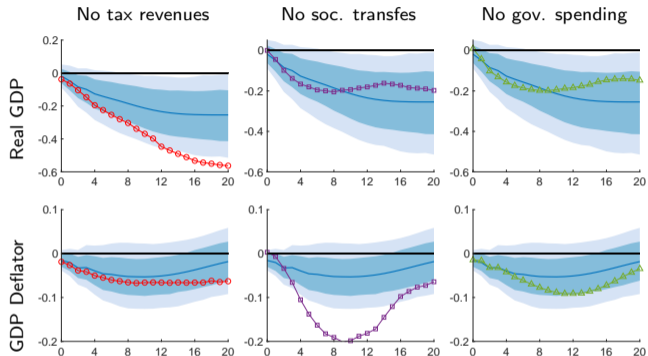
$$\begin{bmatrix} \mathbf{O} \\ \mathbf{S}\Theta^{-1} \end{bmatrix} \bar{\mathbf{y}}_{\tau+1, \tau+h} = \begin{bmatrix} \mathbf{O} \\ \mathbf{S}\Theta^{-1} \end{bmatrix} \mathbf{b}_{\tau+1, \tau+h} + \begin{bmatrix} \mathbf{O} \\ \mathbf{S}\Theta^{-1} \end{bmatrix} \Theta \bar{\boldsymbol{\varepsilon}}_{\tau+1, \tau+h} = \mathbf{f}_{\tau+1, \tau+h}.$$

where  $\mathbf{f}_{\tau+1, \tau+h}$  collects restrictions on endogenous variables and shocks, and  $\mathbf{O}$  and  $\mathbf{S}$  are selection matrices.

- For the **counterfactuals**, we solve  $\bar{\mathbf{y}}_{\tau+1, \tau+h} = \mathbf{C}^{-1} \mathbf{f}_{\tau+1, \tau+h}$ , where  $\mathbf{C}' = [\mathbf{O}', \Theta^{-1'} \mathbf{S}']$
- **Tax example:** (i)  $\bar{\mathbf{y}}_{\tau+1, \tau+h}^{TAX} = \mathbf{0}$  and (ii) only  $\bar{\boldsymbol{\varepsilon}}_{\tau+1, \tau+h}^{TAX}$  is unrestricted  
( $\mathbf{O}$  is  $h \times nh$ ,  $\mathbf{S}$  is  $(n-1)h \times nh$ , and  $\mathbf{f}_{\tau+1, \tau+h}$  is  $nh \times 1$  with  $\bar{\boldsymbol{\varepsilon}}_{\tau}^{MP} = 1$  and 0 otherwise.)

# Structural counterfactuals with absent fiscal adjustment

▶ Lucas-Critique ▶ Posterior Differences



- The ability of the CB to steer output and prices is influenced by fiscal policy
  - Lower taxes cushion the output response to MP shocks.
  - Transfers curb the price adjustment to MP shocks.

## Inspecting the mechanism

- The endogenous adjustment in tax revenues (i.e. lower taxes)
  - Stabilizes income and consumption.
  - Incentivizes households to save.
  - Materializes mainly through personal income tax
  
- The endogenous adjustment in transfers (i.e. higher payments)
  - Reduces the increase in unemployment (higher reservation wage).
  - Limits the fall in unit labor costs.

⇒ Firms' pass on higher costs into higher goods prices.

▶ Inspecting tax channel

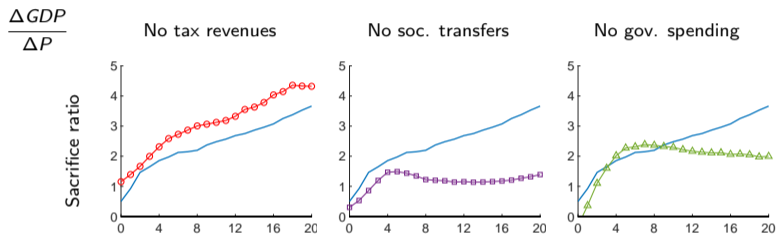
▶ Personal vs. corporate tax

▶ Inspecting transfer channel



## Implications for policy trade-off

- How do the individual fiscal policy measures affect the so called sacrifice ratio?



- How the fiscal channel impacts the sacrifice ratio, depends on the fiscal instrument:
  - The tax channel reduces the sacrifice ratio, i.e. lower output cost for a given price change
  - The social transfer channel increases the sacrifice ratio (larger output for given price change).

## Counterfactual Policy Rules

## Imposing policy rules

- We implement an **activist fiscal policy rule** that neutralizes any output effects while it preserves the MP transmission to prices.
- Consider the **loss function** of a dual mandate policymaker with preferences

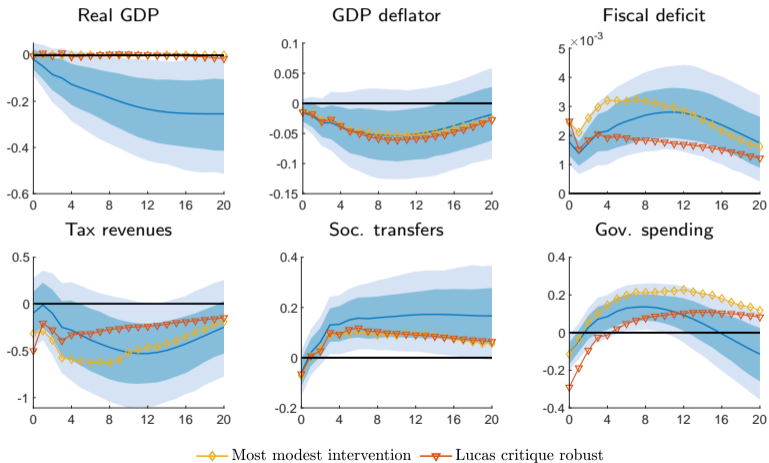
$$\mathcal{L} = \sum_{h=0}^H \beta^h (y_{t+h}^2 + \pi_{t+h}^2),$$

where  $y_t$  denotes the output gap,  $\pi_t$  denotes the difference to the unrestricted (baseline) response to the monetary policy shocks, and  $\beta = 1/1.01$ .

- Which **policy mix** reduces (**optimizes**) the loss function?
  - **Lucas critique robust** approach à la McKay and Wolf (2023) with neutralizing shocks only in  $h = 0$  (under-identified)
  - **Most-modest intervention** with neutralizing shocks over  $h = 0, \dots, H$  (over-identified)

# Activist fiscal policy rule

▶ Neutralizing shocks



# Implications

- The biggest adjustment materializes through the revenue side.
  - Tax revenues fall much stronger following the exogenous increase in the interest rate as observed for the baseline.
- The deficit implication depends on the implementation of the fiscal rule.
  - The Lucas critique robust approach indicates a stronger decline in discretionary spending relative to the most modest intervention scenario.
- Which of the two approaches depicts the mechanics of a change in the fiscal stance more accurately depends on the perspective.
  - The Lucas critique robust implementation requires substantial fiscal flexibility and responsiveness, where relatively large fiscal shocks materialize on impact.
  - While the most-modest intervention is smoother, agents are required to not adjust behavior to withstand the Lucas critique.

Conclusion

# Conclusion

- At the current juncture, understanding the fiscal channel of monetary policy is particularly warranted
- Structural counterfactuals reveal that the fiscal channel is quantitatively relevant.
  - Adjustment in tax revenues primarily impact the transmission of MP to output.
  - Adjustment in transfers primarily work through prices.
- ⇒ Effectiveness of the fiscal channel depends on the nature of the fiscal adjustment.
- Policy counterfactuals suggest that active monetary-fiscal interaction potentially improves monetary effectiveness in a stagflationary environment.

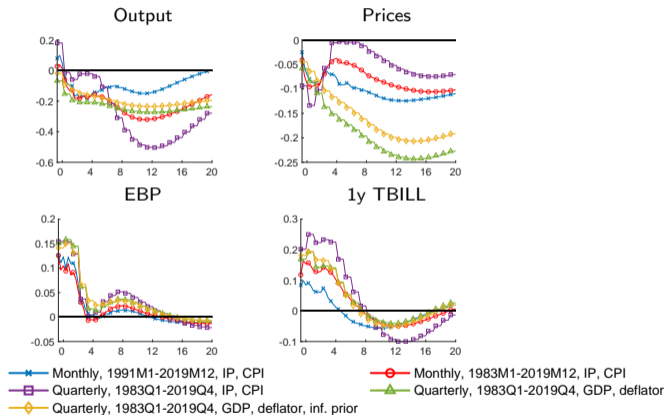


Thank you very much for your attention!



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# IRFs to MP shocks across different samples and data frequencies



▶ Back

## The BPSVAR model (Arias et al. 2021): multiple shocks, multiple instruments

$$\tilde{\mathbf{A}}_0 \tilde{\mathbf{y}}_t = \tilde{\mathbf{c}} + \sum_{l=1}^p \tilde{\mathbf{A}}_l \tilde{\mathbf{y}}_{t-l} + \tilde{\boldsymbol{\varepsilon}}_t, \quad (1)$$

$\mathbf{y}_t$  is the  $n \times 1$  vector of macro variables,  $\mathbf{m}_t$  the  $k \times 1$  vector of proxies,  $\tilde{\mathbf{y}}_t' = [\mathbf{y}_t', \mathbf{m}_t']$   
“External instruments”,  $\mathbf{y}_t$  is not directly affected by  $\mathbf{m}_t$

$$\tilde{\mathbf{A}}_i = \begin{bmatrix} \mathbf{A}_i & \mathbf{0} \\ \boldsymbol{\Gamma}_{i,1} & \boldsymbol{\Gamma}_{i,2} \end{bmatrix}, \text{ for } 0 \leq i \leq p. \quad (2)$$

The  $k$  structural shocks  $\boldsymbol{\varepsilon}_t^*$  ( $\boldsymbol{\varepsilon}_t^o$  unidentified) are identified by imposing exogeneity and relevance conditions:

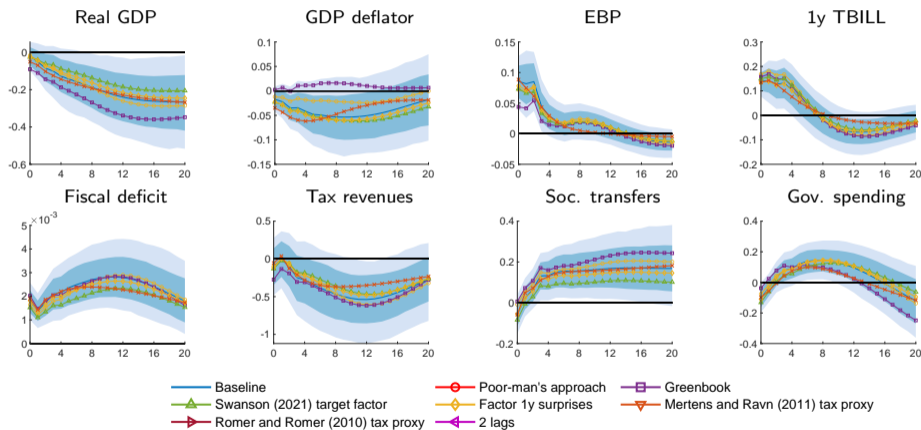
$$E[\mathbf{m}_t \boldsymbol{\varepsilon}_t^{o'}] = \mathbf{0} \quad (3)$$

$$E[\mathbf{m}_t \boldsymbol{\varepsilon}_t^{*'}] = \mathbf{V}. \quad (4)$$

$\mathbf{V}$  is set upper triangular, and monetary policy instrument ordered first.

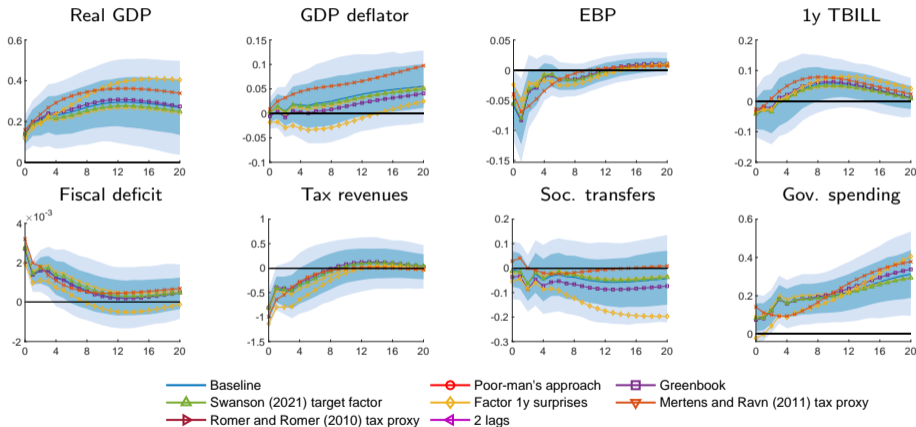
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# IRFs to MP shocks across various robustness checks



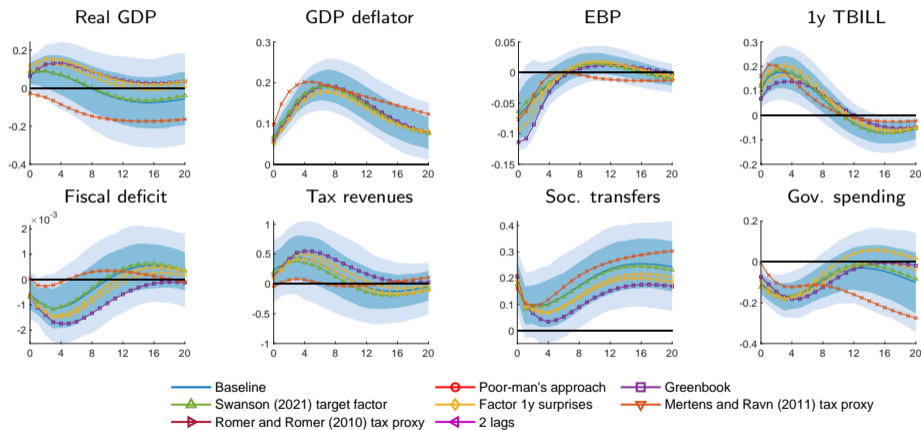
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# IRFs to tax revenues shocks across various robustness checks



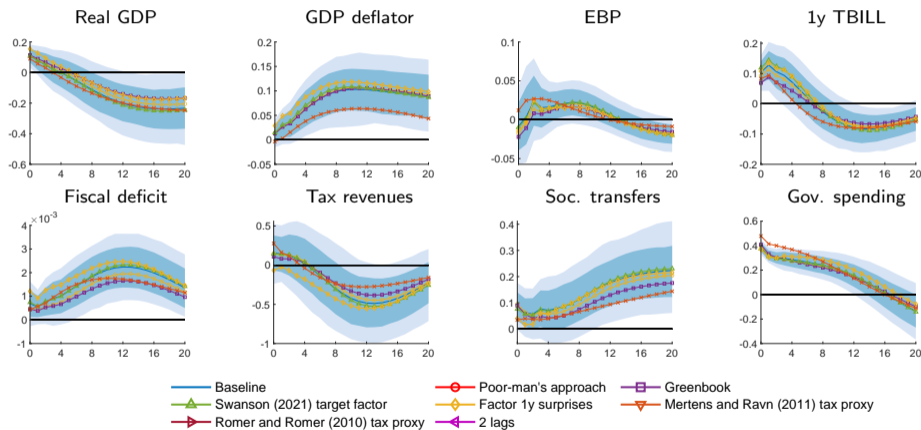
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# IRFs to soc. transfer shocks across various robustness checks



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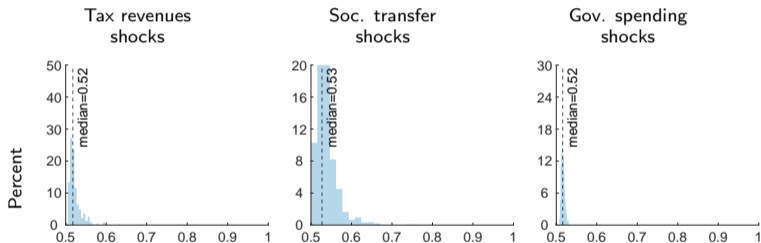
# IRFs to gov. spending shocks across various robustness checks



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## Plausibility of the counterfactuals

- Is the counterfactual exercise robust to the Lucas (1976) critique?
  - If the required change in the fiscal policy stance was fundamental, agents would likely adjust behavior and expectations .
  - The q-divergence by Antolín-Díaz et al. (2021) compares the distribution of shocks in the counterfactual with the actual one.

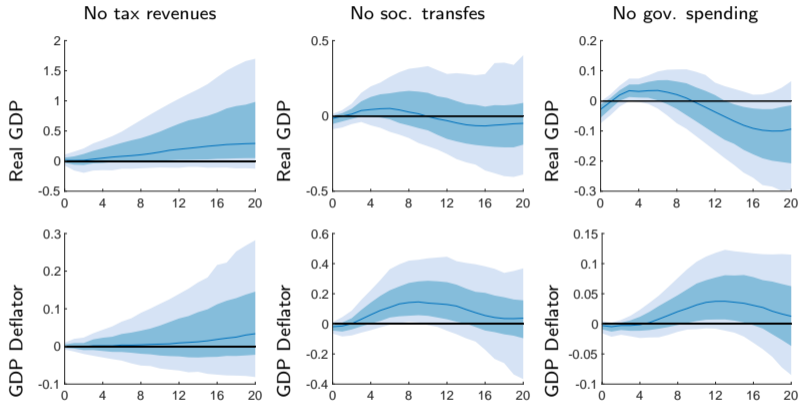


⇒ Values close to 0.5 indicate no difference to the unconditional counterpart.

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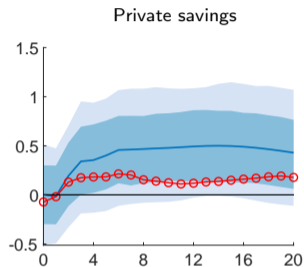
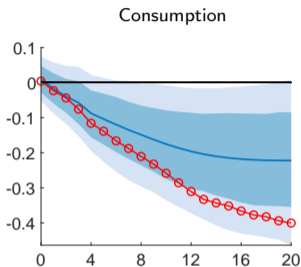
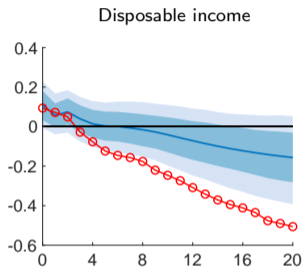


# Posterior differences



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## Inspecting the mechanism: the tax channel

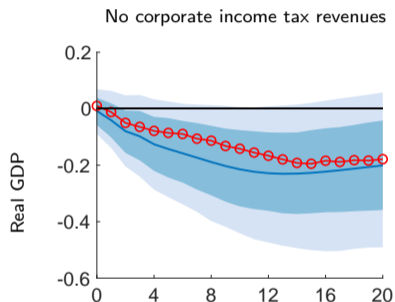
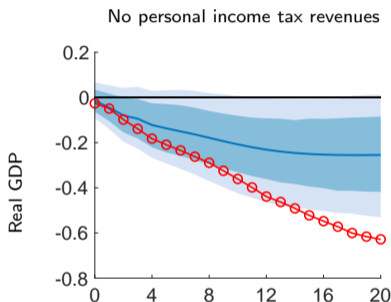


- The endogenous adjustment in tax revenues (i.e. lower taxes)
  - stabilizes income and consumption.
  - incentivizes households to save.

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## Inspecting the mechanism: the tax channel

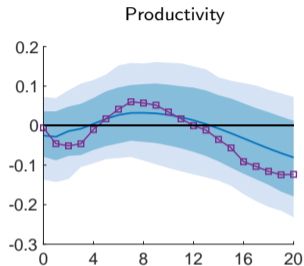
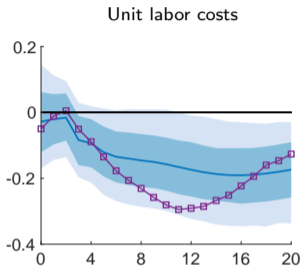
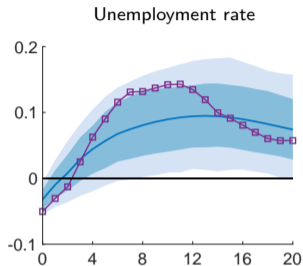
- We further distinguish between personal income and corporate income taxes.



- The tax channel works primarily through the endogenous adjustment in personal income taxes (not corporate income taxes).

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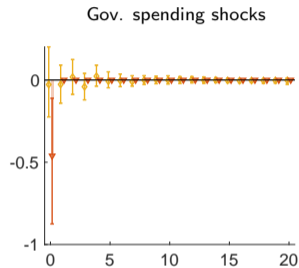
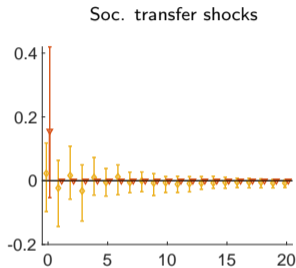
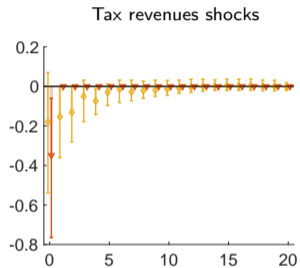
## Inspecting the mechanism: the transfer channel



- The endogenous adjustment in transfers (i.e. higher payments)
  - reduces the increase in unemployment (higher reservation wage).
  - limits the fall in unit labor costs.
  - Firms' pass on higher costs into higher goods prices.

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# Neutralizing shocks in the fiscal-activism scenarios



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