

# Discussion: Endogenous Technology, Scarring and Fiscal Policy

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  - Rich-medium scale **DSGE model with endogenous technology growth**
    - Endogenous TFP: Productivity-enhancing investment in R&D and technology adaptation
    - Effective lower bound (ELB) and fiscal policy
- ⇒ Investigation of connection between **fiscal policy and scarring at the ELB**

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⇒ Investigation of connection between **fiscal policy and scarring at the ELB**
- Findings:
  1. ELB amplifies recession and long-term output losses with endogenous TFP
  2. ELB **flips connection between fiscal policy and technology growth**

# Main Idea

- Macroeconomic model with rich endogenously growth mechanism
  - TFP evolves in two steps: R&D investment and then adaption (based on Gertler and Comin (2006) and Romer (1990))
  - Embedded in a medium scale quantitative DSGE model with ELB
  - Fiscal policy: government spending and targeted growth policies

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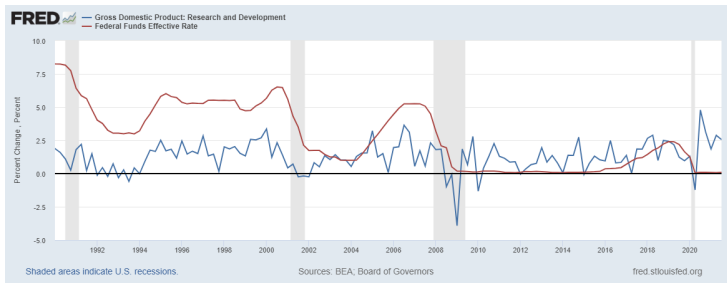
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  - Normal times: Government spending crowds out not only investment, but also R&D research and technology adaption → Decrease in TFP
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- ⇒ In-depth analysis in underlying drivers of TFP and business cycle dynamics
- **State-dependent dynamics** and fiscal multiplier

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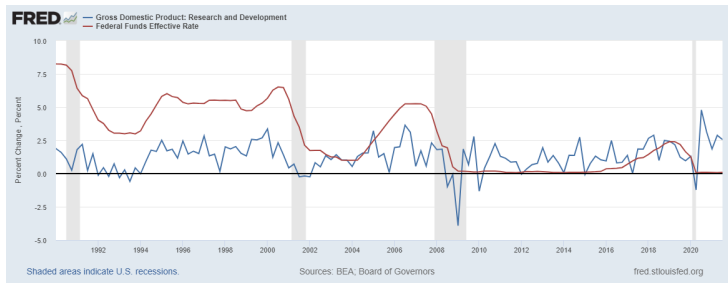
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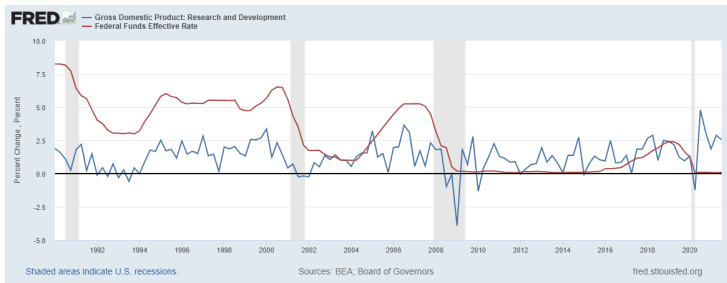


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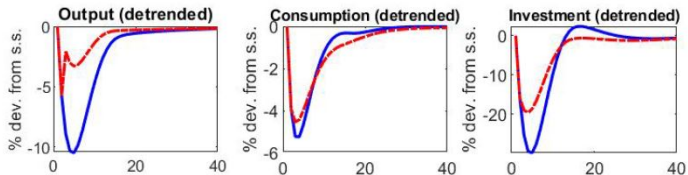
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- ⇒ Estimate the model with the ELB to see how the model explains the data
  - Model is so far only calibrated
- ⇒ Provide **reduced-form evidence** about fiscal and monetary shocks
  - E.g. state-dependent local projections as in Tenreyro and Thwaites (2016)

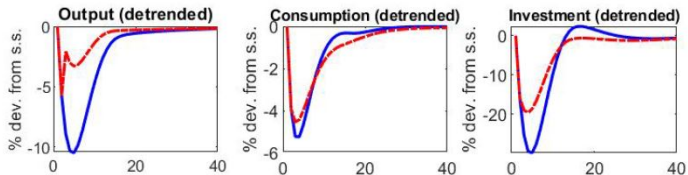
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- Fiscal policy at the ELB is very powerful

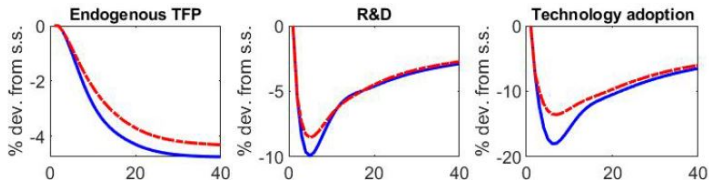


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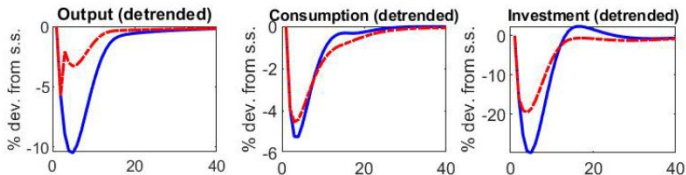


- Endogenous TFP component seems to be more a **second order effect**

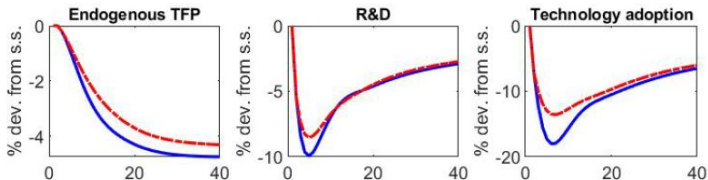


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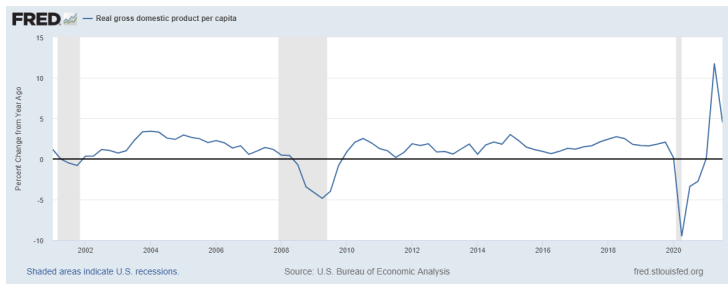
⇒ What part of the **amplification is really driven from endogenous TFP?**

## Comment 3: Future Extension for Covid-19 pandemic

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  - Paper gives a primer: *“COVID-19 shock substantially exceeds the output drop inflicted by preceding crisis episodes, highlighting the elevated risk of permanent output losses”*

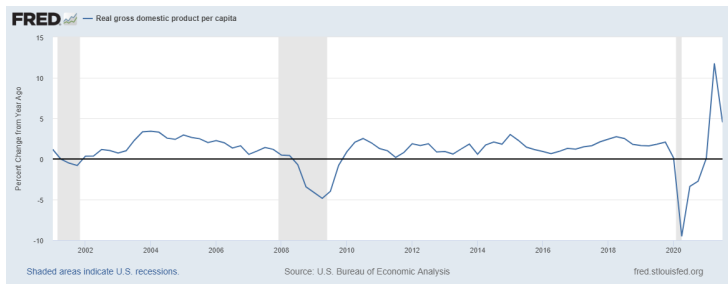
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⇒ How can we think about **nonlinear effects and scarring** with such a model?



# Summary

- Exciting paper that sheds light on permanent output losses after recessions
- Provides an important quantitative perspective on ELB, fiscal policy and R&D investment
- Future research could evaluate the scarring induced by the Covid pandemic