# Searching for Hysteresis

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# QUESTION AND ANSWER OF THE PAPER

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- Answer: Not very much

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** This is an econometrically very challenging question, and empirical researchers risk wrongly concluding that the answer is "yes"*

# STRATEGY AND FINDINGS

- Structural VAR (VECM) approach, in a Bayesian setting:
  1. Short-run sign restrictions: AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y \downarrow P \downarrow$
  2. Long-run sign restrictions:
     - A No hysteresis: AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y\ 0\ P \downarrow$
     - B Hysteresis: AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y \downarrow P\ ?$

  **Main finding:** AD shocks explain $\sim 20\%$ of LR output variation

- Simulation study: DGP is New Keynesian DSGE with $a_t = a_{t-1} + \varepsilon_t^a + \delta \tilde{y}_{t-1}$

  **Main finding:** SVAR approach detects hysteresis when there is none

- Propose correction procedure based on simulating from alternative BVAR-DGPs

  **Main finding:** Hysteresis is actually negligible ($\sim 5\%$), apart from Great Recession

# Some new things I learned (outside of the main findings)

- With hysteresis, LR price level response to demand shocks theoretically ambiguous
  - So the slope of the demand curve potentially matters for the long run (though restrictions about this do not appear to matter here)
- One can impose restrictions on signs of multiple variables in the long run
  - Different from long-run restrictions à la BQ (1989), Gali (1999), Fisher (2006), ... (although these can also be cast in the VECM representation)
  - It's not about zero impact in the long run, but about sign differences across variables
  - Implementation seems to be natural in Arias-Rubio-Ramirez-Waggoner algorithm
  - I have not seen this done – maybe highlight more?

# COMMENTS OVERVIEW

1. High-level thoughts:
   - 1.1 Using other variables for identification
   - 1.2 Assumptions and findings about the short run
2. More direct suggestions:
   - 2.1 Run more model simulations
   - 2.2 Bring in evidence from other countries
   - 2.3 Link to other empirical work
   - 2.4 Improve structure of the paper

# COMMENT 1.1: USING OTHER VARIABLES

- We learn: imposing signs on P and Y can lead to spuriously detecting hysteresis
- **BUT:** theories deliver specific channels, and implications for other variables
  - Labor force participation
  - Firm entry and exit
  - R&D
  - ...
- Why not use those to inform the identification procedure?

# COMMENT 1.1: USING OTHER VARIABLES

- Very speculative example: patents
  - Short-run sign restrictions: AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y \downarrow P \downarrow$ $patents\ 0$
  - Long-run sign restrictions:
    - A No hysteresis: AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y\ 0\ P \downarrow$ $patents\ 0$
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- Of course, this might be easier said than done:
  - Measurement issues with additional variables
  - Need to think about cointegrating relationships
  - Might only work for one hysteresis channel at a time

# COMMENT 1.2: THE SHORT RUN

- Short-run AS-AD restrictions are very natural
- However, something that made me ponder:
  - Angeletos, Collard and Dellas (2020 AER) ['ACD']:
    - Main business cycle shock is "noninflationary demand shock"
  - In the setting proposed here:
    1. Aggregate demand shocks are imposed to have price impact
    2. Aggregate supply shocks found to be the important driver of short-run fluctuations

    ... and 2 might be a consequence of 1
- In light of this, one might argue that alternative SR restrictions could be desirable

# COMMENT 1.2: THE SHORT RUN

- ACD-inspired SR restrictions? AS $\rightarrow Y \downarrow P \uparrow$ AD $\rightarrow Y \downarrow P\ 0$
  or maybe refined as AS $\rightarrow Y \downarrow P \uparrow TFP\ ?$ AD $\rightarrow Y \downarrow P\ ?\ TFP\ 0$

- Along similar lines, one could argue for model simulations based on
  - A New Keynesian model with a very flat Phillips curve
  - A model that allows for sentiment driven shocks, e.g. Angeletos and La'O

- I understand ACD identify "the" AD shock and BQ might give us "an" AD shock
  - But statistical power is a central issue pointed out by the paper
  - So studying a type of AD shock that matters in SR FEVD is desirable

- (Interestingly, ACD find their shock has no impact in LR output and LR TFP)

# COMMENT 2.1: MORE MODEL SIMULATIONS

- Two different DGPs are contrasted: economy with and without hysteresis
- Otherwise, sample size (for each Monte Carlo draw) and parameters are fixed
- It would be very interesting to explore variations here. In particular:
  - Does the spurious detection of hysteresis vanish with $T \to \infty$?
  - How much do the relative standard deviations of the shocks matter?

# COMMENT 2.2: EVIDENCE FROM OTHER COUNTRIES

- Hysteresis might be more relevant in other countries
  - Classic papers on hysteresis emphasize European labor markets
  - In emerging economies the "cycle is the trend" (Aguiar and Goptinath, 2007 JPE)
- Should be quite straightforward to provide further validation for the procedure

# COMMENT 2.3: LINK TO OTHER EMPIRICAL WORK

- Furlanetto et al. (2021):
  - BVAR approach with SR sign and LR zero restrictions
  - Hysteresis found to be very important
- To me, these different conclusions are quite confusing
- Is above methodology subject to same threat of detecting hysteresis spuriously?
  - The paper speculates that this is the case, but it remains unclear
  - My intuition is actually that it might not, because it is less restrictive in LR

# COMMENT 2.4: STRUCTURE OF THE PAPER

- For my taste, the current structure is not ideal
  - First, the BVAR is introduced and results based on it are presented
  - Then, it is shown that we actually shouldn't trust those results
  - Finally, the correction procedure comes to the rescue

- In my view, it is worth thinking about the following alternative:
  1. Introduce the problem: using the simulations from the theoretical model
  2. Present the solution: examine BVAR with & without proposed correction procedure