Are Policy Counterfactuals Based on Structural VARs Reliable? Discussion

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Outline

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- Answer: No

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- Question:
  Are the changes in the structural parameters of the Taylor rule of a DSGE model seized by changes in Monetary Policy parameters of the SVAR ?
- Answer: No
- The reason lies on the cross correlation restriction of a DSGE model.
- A battery of numerical examples and a neat analytical solution make the point very clear.

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2. Main point of the paper
3. Discussion

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Main point of the paper

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- Consider a DSGE model with a Taylor rule such as

$$R_t = \rho R_{t-1} + (1-\rho)(\phi_y y_t + \phi_\pi \pi_t) + \eta_t^R$$

- Let $\Phi = [\rho, \phi_y, \phi_\pi]$ and θ be the non-policy parameters.

DSGE and SVAR

Benchmark scenario:

- DSGE solution

$$s_t = A(\Psi,\theta)s_t + B(\Psi,\theta)\imath_t \quad (1)$$

$$Y_t = C(\Psi,\theta)s_t + D(\Psi,\theta)\imath_t \quad (2)$$

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- Under ”regularity conditions” (see Fernandez-Villaverde et al. (2008)), (1)-(2) implies that Y_t is a VAR(∞) whose coefficients are functions of the A, B, C, D matrices

$$F_0(\Psi,\theta)Y_t = F_1(\Psi,\theta)Y_{t-1} + F_2(\Psi,\theta)Y_{t-2} + ... + \epsilon_t$$

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- Isolating the interest rate equation, and for a stochastic realization $\{\widehat{\epsilon}_t\}_{t=0}^{K}$ we get

$$\begin{pmatrix} f_0(\Psi, \theta) \\ \overline{F}_0(\Psi, \theta) \end{pmatrix} \widehat{Y}_t = \begin{pmatrix} f_1(\Psi, \theta) \\ \overline{F}_1(\Psi, \theta) \end{pmatrix} \widehat{Y}_{t-1} + ... + \widehat{\epsilon}_t$$

where $\widehat{Y}_t = [\widehat{R}_t, \widehat{\overline{Y}}_t']$

Counterfactuals with DSGE, change in the Taylor rule

Alternative scenario, change in the Taylor rule:

- DSGE solution

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\begin{aligned}
s_t &= A(\Psi', \theta)s_t + B(\Psi', \theta)\imath_t \qquad (3)\\
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- Again, isolating the interest rate equation

$$\widehat{Y}'_t = \left(\frac{f_0(\Psi', \theta)}{F_0(\Psi', \theta)} \right)^{-1} \left(\frac{f_1(\Psi', \theta)}{F_1(\Psi', \theta)} \right) \widehat{Y}'_{t-1} + \ldots + \left(\frac{f_0(\Psi', \theta)}{F_0(\Psi', \theta)} \right)^{-1} \widehat{\epsilon}_t$$

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- For the same initial conditions and using the same $\{\widehat{\epsilon}_t\}_{t=0}^{K}$ comparing $\widehat{Y}_t$ with $\widehat{Y}'_t$ is precisely performing a counterfactual, i.e. what would have happened to the economy if we were in Ψ', ceteris paribus.

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- For the same initial conditions and using the same $\{\widehat{\epsilon}_t\}_{t=0}^{K}$ comparing $\widehat{Y}_t$ with $\widehat{Y}_t''$ is performing a counterfactual, but
- clearly, two counterfactuals are different and present different results

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- Which of the two counterfactuals is true ?
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- Going a little further: if we do not the true DGP, what should we do ? trust or mistrust counterfactuals with SVAR ?
- Fernandez-Villaverde, Rubio-Ramirez, Sargent and Watson (2008)

  ”... *the recommendation [is] to estimate the deep parameters of a fully trusted model by likelihood-based method. If you trust your model, then you should accept that recommendation. [...]*”

  ”*If one is not dogmatic in favor of a particular fully specified model, it is easy to be sympathetic with the SVAR enterprise, despite its potential pitfalls.*”

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- Suppose that we estimate a misspecified DSGE model, are its counterfactuals trustworthy ?
- How do counterfactuals of a misspecified DSGE model look like compared to the counterfactuals of a SVAR ?
- My guess is that it will depend on the "degree" of mispecification. Eventually, the degree of mispecification is difficult to measure.

Weak mispecification

- Suppose the ”truth” is a NK model: the standard IS equation, NK Phillips curve and

$$R_t = \rho R_{t-1} + (1-\rho)(\phi_y y_t + \phi_\pi \pi_t) + \eta_t^R$$

Change policy scenarios from $\phi_\pi \rightarrow \phi'_\pi$, weak to strong reaction to inflation. Compute for example $\frac{SD(\widehat{Y}')}{SD(\widehat{Y})}$

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- Counterfactuals with DSGE:
  Estimate the parameters the NK model assuming $\rho = \phi_y = 0$. Change Taylor rule from $\phi_\pi \rightarrow \phi'_\pi$ and $\frac{SD(\widehat{Y'_{NK}})}{SD(\widehat{Y_{NK}})}$

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- Who is relatively more reliable ?

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- Estimate the parameters the SVAR using as identifying restrictions the NK model with $\rho = \phi_y = 0$. Change policy scenarios from $\Phi \rightarrow \Phi'$ and compute $\frac{SD(\widehat{Y'_{SVAR}})}{SD(\widehat{Y_{SVAR}})}$

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Thanks for the attention !