

Course 2: Model based identification / Structural VARs

Topics in Empirical Macroeconomics and Finance, Econ 221

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Monetary Policy -> Fiscal Policy

- Few things are more endogenous than monetary policy.
- Why do we study it so much?
- Official view:
 - ▶ Post 1970s consensus that aggregate demand management should be managed by monetary policy. However: that has not stopped governments from changing taxes!
 - ▶ Monetary policy faces a time inconsistent problem, thus should be managed by independent central banks. This gives an important role to “experts” (economics PhDs).
- Cynical view:
 - ▶ Many grants for economic research come from central banks.
 - ▶ This is the one thing that economists control.
 - ▶ Monetary policy seems very complicated, so it seems to make sense to delegate it to experts.

1 Blanchard and Perotti (2002)

2 Let's look at some code now...

Question: What is the fiscal multiplier?

- Ramey (2016) provides an excellent summary of the literature.

There is a very large literature:

- Blanchard and Perotti (2002) found low multipliers.
- Mertens and Ravn (2013) found much larger multipliers.
- Romer and Romer (2010) based on a narrative approach find multipliers close to 3.

Framework

- Blanchard and Perotti (2002) consider

$$\begin{aligned}v_t^T &= \theta_G \sigma_G e_t^G + \theta_Y v_t^Y + \sigma_T e_t^T, \\v_t^G &= \gamma_T \sigma_T e_t^T + \gamma_Y v_t^Y + \sigma_G e_t^G, \\v_t^Y &= \zeta_T v_t^T + \zeta_G v_t^G + \sigma_Y e_t^Y.\end{aligned}$$

where the observables are the following:

- T_t is Log Real Federal Tax Revenues per capita,
- G_t is Log Real Federal Government depending on Final Goods per capita,
- Y_t is Log Real GDP per capita.

Framework

- The following 9 parameters thus need to be estimated: $\theta_G, \theta_Y, \sigma_G, \sigma_T, \sigma_Y, \gamma_T, \gamma_Y, \zeta_T, \zeta_G$. Now let's try to write the residuals in the following form:

$$v_t = \mathcal{D}e_t$$

Or, expanding the matrices:

$$\begin{bmatrix} v_t^T \\ v_t^G \\ v_t^Y \end{bmatrix} = \begin{bmatrix} d_{11} & d_{12} & d_{13} \\ d_{21} & d_{22} & d_{23} \\ d_{31} & d_{32} & d_{33} \end{bmatrix} \begin{bmatrix} e_t^T \\ e_t^G \\ e_t^Y \end{bmatrix}$$

- Using Blanchard and Perotti (2002)'s methodology:

$$\begin{bmatrix} 1 & 0 & -\theta_Y \\ 0 & 1 & -\gamma_Y \\ -\zeta_T & -\zeta_G & 1 \end{bmatrix} \begin{bmatrix} v_t^T \\ v_t^G \\ v_t^Y \end{bmatrix} = \begin{bmatrix} \sigma_T & \theta_G \sigma_G & 0 \\ \gamma_T \sigma_T & \sigma_G & 0 \\ 0 & 0 & \sigma_Y \end{bmatrix} \begin{bmatrix} e_t^T \\ e_t^G \\ e_t^Y \end{bmatrix}$$
$$\Rightarrow \mathcal{D} = \begin{bmatrix} 1 & 0 & -\theta_Y \\ 0 & 1 & -\gamma_Y \\ -\zeta_T & -\zeta_G & 1 \end{bmatrix}^{-1} \begin{bmatrix} \sigma_T & \theta_G \sigma_G & 0 \\ \gamma_T \sigma_T & \sigma_G & 0 \\ 0 & 0 & \sigma_Y \end{bmatrix}$$

Framework

- The variance covariance matrix of reduced form residuals:

$$\mathbb{E} [v_t v_t'] = \mathcal{D} \mathcal{D}'$$

provides 6 independent restrictions on parameters, defining matrix \mathcal{D} . On the other hand, assumptions are made about decision lags and the effects of output on taxes due to automatic stabilizers:

- ▶ $\gamma_Y = \gamma_T = 0$ based on decision and recognition lags
 - ▶ $\theta_Y = 2.08$ based on OECD estimates.
- Only 6 numbers are used to: $\theta_G, \sigma_G, \sigma_T, \sigma_Y, \zeta_T, \zeta_G$. Using the R file blanchard-perotti.R, one gets the following estimates:

$$\begin{aligned} \theta_G &= -0.116, & \sigma_G &= 0.050, & \sigma_Y &= 0.082, \\ \sigma_T &= 0.058, & \zeta_T &= -1.585, & \zeta_G &= 0.254. \end{aligned}$$

1 Blanchard and Perotti (2002)

2 Let's look at some code now...

Requirement: Use R ! (with tidyverse)

- So that we are all on the same page, I will teach you R Statistical Software as we go along. As well as the basics of applied econometrics.
- **R statistical software**, which you may download on the UCLA website: <http://cran.stat.ucla.edu/>. You may download the latest release (2018-03-15, Someone to Lean On) which is version 3.4.4. For Mac OSX: <http://cran.stat.ucla.edu/bin/macosx/R-3.4.4.pkg>. For Windows: <http://cran.stat.ucla.edu/bin/windows/base/R-3.4.3-win.exe>.
- I also recommend that you download **R studio** or another Graphical User Interface to make using R more pleasant !
- We'll also be using the package suite “tidyverse”, including “dplyr” and “ggplot2”, by Hadley Wickam. Here is a tutorial:
 - ▶ <https://suzan.rbind.io/2018/01/dplyr-tutorial-1/>
 - ▶ <https://suzan.rbind.io/2018/01/dplyr-tutorial-2/>
 - ▶ <https://suzan.rbind.io/2018/02/dplyr-tutorial-3/>
 - ▶ <https://suzan.rbind.io/2018/04/dplyr-tutorial-4/>

Bibliography I

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- Ramey, V. A.**, “Chapter 2 - Macroeconomic Shocks and Their Propagation,” in John B. Taylor and Harald Uhlig, eds., *Handbook of Macroeconomics*, Vol. 2, Elsevier, January 2016, pp. 71–162.
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