Exercise

Dunne, P. and Smith, R. (1990) ”Military spending and unemployment in the OECD”, Defence Economics, 1, 57-73.

This article looks at the relation between military spending and unemployment across a number of advanced economies, with a section that looks at long time series for the US and the UK. The aim exercise is to replicate their work.

They estimate a second order dynamic model

$$\Delta u_t = \alpha_0 + \alpha_1 u_{t-1} + \alpha_2 \Delta u_{t-1} + \beta_1 m_{t-1} + \beta_2 \Delta m_t + \beta_3 \Delta m_{t-1} + \varepsilon_t$$

which is a reparameterisation of

$$u_t = \gamma_0 + \gamma_1 u_{t-1} + \gamma_2 u_{t-2} + \delta_1 m_t + \delta_2 m_{t-1} + \delta_3 m_{t-2} + \varepsilon_t$$

Now

- if $\alpha_1 = 0$ then unemployment has a unit root. We would expect $\alpha_1 < 1$
- if $\beta_1 = \beta_2 = \beta_3$ then m is Granger non-causal with respect to u . This means that past values of military spending are no better for prediction future values of unemployment than past values of unemployment alone. We can also test for Granger causality the other way The equivalent equation for military spending is

$$\Delta m_t = \alpha_3 + \alpha_4 u_{t-1} + \alpha_5 \Delta u_t + \alpha_6 \Delta u_{t-1} + \beta_5 m_{t-1} + \beta_6 \Delta m_{t-1} + \varepsilon_t$$

- Can test for Granger causality by F tests on the equations with and without m

Can see how this relates to a VAR:

$$\begin{bmatrix} \Delta u_t \\ \Delta m_t \end{bmatrix} = \begin{bmatrix} \alpha_2 & \beta_2 \\ \alpha_3 & \beta_3 \end{bmatrix} \begin{bmatrix} \Delta u_{t-1} \\ \Delta m_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_1 & \beta_1 \\ \alpha_4 & \beta_4 \end{bmatrix} \begin{bmatrix} u_{t-1} \\ m_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix}$$

which would give the same equations except for the contemporaneous effect

Note:
These are in error correction form

Could write in form:

$$\Delta Z_t = \sum_{i=1}^{i=k-1} \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-k} + \varepsilon_t$$