# EMPIRICAL MACROECONOMICS

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Problem set 1: due 11-4-2019

**Exercise : Blanchard and Quah.**

(1) Explain the identification procedure in Blanchard and Quah starting from the structural VMA model

$$X(t) = \sum_{j=0}^{\infty} A(j)e(t-j)$$

   (a) state every condition/assumption that you need to identify the $e = (e_d, e_s)'$ from the VAR innovations (the reduced form residuals).

   (b) give an interpretation of the identifying restrictions.

(2) Produce a Table and a plot of the structural shocks for the period 1971-1975,1978-1982. Comment.

(3) Extend the sample to today and estimate carefully again the model and identify the shocks.

   (a) Compare the structural shocks identified in the original sample with the shocks identified in the extended sample

   (b) Produce a Table and a plot of the structural shocks for the period 2000-2003, 2007-2013. Comment.

(4) Produce a counterfactual history of the 21st century without the transitory shock and without the permanent shock.

(5) Estimate the reduced form VAR using maximum likelihood (you can use part of the code from notebook 1) and compare the value of the loglikehood with the one obtained with statsmodels.

**Exercise : Time Series.**

(1) Suppose you have a stylized model that suggests:

$$u_t = u^* - \epsilon_t - \delta_1\epsilon_{t-1} - \theta\eta_t - \theta_1\eta_{t-1}$$

where $\epsilon_t \sim i.i.d.(0, \sigma_\epsilon^2)$ and $\eta_t \sim i.i.d.(0, \sigma_\eta^2)$ and $\eta_t$ and $\epsilon_t$ are orthogonal.

   (a) Find the mean, variance and autocovariances of $u_t$.

   (b) Is $u_t$ stationary? ergodic? why?