CENTRE FOR MACROECONOMICS

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

A procedure for combining zero and sign restrictions in a VAR-identification scheme

CFM-DP2014-10

Alex Haberis[1,2] and Andrej Sokol[2]

Centre for Macroeconomics[1]; and [2]Bank of England

In this paper we describe a procedure for implementing zero restrictions within the context of a sign restrictions identification scheme for VARs. The procedure introduces an additional step into the algorithm outlined in Fry and Pagan (2011) and Rubio-Ramirez et al (2006) for implementing sign restrictions. This extra step involves rotating a candidate identification matrix using Givens rotation matrices to introduce zero restrictions. We then check whether the elements of the candidate matrix satisfy the sign restrictions as usual. We illustrate how our procedure works by generating artificial data from the theoretical model of An and Schorfheide (2007), which implies certain restrictions on the impact of its structural shocks on the model's endogenous variables. We exploit our knowledge of that pattern to identify structural shocks from the reduced-form errors of a VAR estimated on the simulated data.

Imposing zero restrictions, as well as sign restrictions, can be useful – and in some cases essential – for identifying economically-interpretable – `structural' – shocks from the reduced-form innovations to a VAR. This is because it is often the case that an economic theory used to motivate these identifying restrictions implies certain variables do not respond at all to some shocks. For example, in the An and Schorfheide (2007) model we consider, shocks to government spending have no effect on inflation or the nominal interest rate – i.e. the impulse response is zero. Therefore, to obtain accurate, empirical estimates of the government spending shock in this model using a structural VAR estimated on data for its observable variables, it would be necessary to impose a zero restriction on the response of inflation and the nominal interest rate to the shock identified with government spending.

CENTRE FOR MACROECONOMICS

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

References

An, S. and Schorfheide, F. (2007), "Bayesian analysis of DSGE models", Econometric Reviews, 26 (2-4): 113-172.

Fry, R. and Pagan, A. (2011), "Sign restrictions in structural vector autoregressions: A critical review", *Journal of Economic Literature*, 49 (4): 938-60.

Rubio-Ramirez, J. F., Waggoner, D., and Zha, T. (2006), "Markov-switching structural vector autoregressions: Theory and application", Computing in Economics and Finance 2006 69, Society for Computational Economics.