Term paper: 2nd stage

Analyse propagation of macroeconomic shocks

Tools for Modern Macroeconometrics, IES FSV UK

Setup

The goal of this stage is to estimate the effects of monetary policy shock and one additional shock on real GDP and inflation and to forecast those variables using multivariate models.

1) *Data and choice of the shock.* Download the most relevant time series that can be relevant for estimating the VAR model and identification of two shocks. For the monetary policy shock, the interest rate will be needed; additional series depend on your intuition. For the second shock, pick up one of the following:

- Shock to government expenditures => government expenditure, perhaps less interest payments, or a specific type of expenditure such as military; usually taken as a ratio of GDP. For inspiration, check Caldara-Kamps (2008).
- Shock to government revenues => you might choose total revenues or total revenues less social security contributions; use the ratio of GDP. For inspiration, check Caldara-Kamps (2008).
- Uncertainty shock => financial uncertainty approximated by implied volatility, broader uncertainty such as Economic Policy Uncertainty index. Bloom (2009) serves as starting point.
- Some specific supply shock (oil prices, index of shipping costs…).
- Credit, stock prices, or another financial variable (see Gilchrist-Zakrajšek (2012) for the effects of credit spreads which serve as a proxy for financial instability).
- Exchange rate shock.

Note that it's up to your decision whether you will decide to estimate one VAR for both shocks or two separate VARs. The goal is to achieve meaningful identification.

2) *Appropriate transformations:* Describe your choices. Note that your time series do not have to be strictly stationary, but shall not have a clear trend. For series, that are already in percentages, such as the unemployment rate or inflation rate, prefer using these rates and do not opt for second differences. Whether to use first differences or year-on-year differences is up to you; just be consistent across your variables.

3) *Identification:* For both shocks, use Cholesky identification + either SVAR model or sign restrictions. Which variables do you need to identify the shocks? Which identification is used in relevant literature? Defend your ordering of variables, restrictions on A or B matrix in the case of SVAR model, or your sign restrictions.

4) *Estimation, impulse responses, forecast error variance decompositions, and forecasts:*

- Select the appropriate number of lags and estimate the model. Assure your model is stable and that the residual ACFs do not have many significant terms.
- Do two alternative structural identifications and estimate impulse responses. Present them in a graphically convenient way.
- Estimate forecast error variance decompositions and provide forecasts for a two year horizon.

For presentations:

- Short data information: Country, sample, shocks of interest, variables.
- Description of your identification.
- Specification: Lag length selection, stability.
- Impulse responses of Cholesky identification and of SVAR model/sign restrictions + assessment of their reasonableness.
- Forecasts + assessment of their reasonableness.
- Brief information on what else you have tried to improve your results and why you have selected that particular results.

For term paper:

Stage 1: Data description, description of modeling choices for univariate forecasts, resulting univariate forecasts, and their evaluation.
Stage 2: Motivation for estimation of the two articular shocks. Variables are used, transformations, lag length, and ordering. Impulse responses of the two identification schemes. Forecasts and comparison with univariate forecasts.

Recommended R packages

- For retrieving data, see Guidelines.
- Easy plots of time series: `forecast` (function `autoplot`), `xts` (function `plot.xts`)
- Unit root tests: `urca`
- Seasonal adjustment: `seasonal` (works only with time series as ts objects, but `tsbox` library can easily convert time series from one format to another.
- Autocorrelation functions, spectrum, and periodogram are included in the `stats` library (default in R).
- ARIMA models: `forecast` (good for estimation, post-estimation diagnostics, forecast; note we are asking for the Box-Jenkins estimation procedure, not automatic lag length selection).
- HP filter: `mFilter`
- Hamilton's regression filter: `neverhpfilter`
- For VAR modelling see the seminars: `vars` for estimation and forecasting, `svars` or user-defined functions for impulse responses and other graphical outputs, `VARsignR` for sign restrictions.