



Laura Veronika Gati <gati@bc.edu>

little question regarding estimation

3 messages

Laura Veronika Gati <gati@bc.edu>
To: Peter Ireland <peter.ireland@bc.edu>

Thu, Jun 11, 2020 at 4:46 PM

Dear Peter,

As I am working on implementing the estimation, I encounter a small technical issue. I am estimating the anchoring function via GMM, targeting the autocovariance structure of data on inflation, the output gap and the federal funds rate. To have an estimate of the autocovariance matrix at different lags, I fit a reduced-form VAR to the data and the model-generated data. (Footnote: I first filter both data and model-implied data using the Baxter-King filter.)

The issue is that when estimating the VAR on the model-generated data, the matrix $X'X$ (where X is the matrix of regressors, i.e. lags of the observables and a constant) is always close to singular. I'm not sure what I should do about this since I think that the potential source of the problem - multicollinearity - should occur naturally in the model. But maybe not to this extent? Do you have some useful insight for me here?

Laura

Peter Ireland <peter.ireland@bc.edu>
Reply-To: peter.ireland@bc.edu
To: Laura Veronika Gati <gati@bc.edu>

Thu, Jun 11, 2020 at 5:05 PM

Laura, thanks for writing.

It may be that the model is stochastically singular. If there are more observables than shocks, then there will be linear combinations of current and past observables that have zero variance. Now that you mention the problem, this in fact seems likely: if you are simulating data on inflation, the output gap, and the interest rate with a model driven by cost-push and natural rate shocks alone, then there won't be any independent variation in one of the three series.

If you think this is the case, there are three possible solutions. One is just to use inflation and the output gap -- or any other pair of the three series -- instead of all three in the estimation exercise. A second is to introduce measurement error: take the simulated series from the model and add to each observation of each variable a serially uncorrelated measurement error. The reference for that would be Thomas Sargent's 1989 JPE paper on "Two Models of Measurement and the Investment Accelerator." Then the series won't be linearly independent anymore. The third would be to add another structural disturbance, say a shock to the monetary rule, to the model before generating the simulated data.

Let me know if this makes sense. If not or if you try one of these solutions and it still doesn't work, please let me know.

Peter

[Quoted text hidden]

Laura Veronika Gati <gati@bc.edu>
To: Peter Ireland <peter.ireland@bc.edu>

Thu, Jun 11, 2020 at 5:13 PM

Peter, that makes so much sense! Your suggestions are also super helpful. I'll try first by adding a monetary policy shock, since earlier versions of the model already had that. I'm confident that's going to solve it.

Thanks so much for the quick and helpful response! Have a nice evening,
Laura

[Quoted text hidden]