

Model Calibration

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Calibration vs Estimation

Problems with estimation:

Behavioral vs Steady-state parameters

How to calibrate

Calibrating steady-state parameters:

Calibrating behavioral parameters:

Exercise

Calibration vs Estimation

QPM models usually calibrated, not estimated.

Problems with estimation:

1. **Identification:** Parameter is only identifiable if it influences first or second moments predicted by the model. Some parameters (or combination of parameters) not estimable.
2. **Data:** Short time series, structural breaks, sensitivity to sample, sensitivity to outliers.
3. **Parameter (in)variance:** QPM is semi-structural, reduced form. Parameters are not "deep", they change over time. Estimation gives average parameter value over the sample. We want value corresponding to the current situation = based on recent data.
4. **Shock stds:** Estimation depends on log-likelihood, which depends on shock stds, which are also parameters. Greatly increases complexity.

Estimation is feasible on a limited subsample of parameters (FX pass-through to inflation).

Behavioral vs Steady-state parameters

Steady-state parameters do not impact model dynamics (IRFs). They impact model equilibrium.

Behavioral parameters impact IRFs but not (necessarily) the model equilibrium.

The division is not always clear.

Example:

$$x_t = \alpha x_{t-1} + (1 - \alpha)x_{ss} + \epsilon_t$$

Which parameter is which?

How to calibrate

Model purpose: forecast. We don't want to explain historical data. Calibrate based on the recent data, or disregard data completely in case there was a structural shift.

Calibration is art, not a science. Deal with it.

Calibrating steady-state parameters:

To get the right model equilibrium after shocks fade away. Can be very different from the history.

Model itself doesn't tell you anything about the equilibrium. Needs to be based on your analysis.

Calibrating behavioral parameters:

To get sensible reactions to shocks (IRFs).

To get good, sensible data filtration (historical interpretation).

To minimize shocks (to an extent).

There is no one single criterion, we have to consider multiple criteria. There will be trade-offs.

Exercise

You need to calibrate steady-state parameters for your model (currently set to zeros). Think of this as your long-term forecast, perhaps 10-year ahead forecast for Azerbaijan. Two things to pay attention to:

- take historical data as a reference point; e.g. higher / lower growth than in history
- make sure that you are consistent across variables: e.g. if growth is faster than historically, so should be the REER appreciation

I messed up one behavioral parameter. You need to find it and fix it. Look into historical decomposition of the key equations.