Discussion of "Estimating Macroeconomic Models of Financial Crises: An Endogenous Regime-Switching Approach"

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Main contributions

- Propose a novel specification of an occasionally binding constraint.
  - *Endogenous* regime switching between the unconstrained and constrained states
  - Switching probabilities are determined by variables that characterize the constraint.
- Develop a solution method using a higher-order perturbation approach.
- Estimate a small-open RBC model with an occasionally binding borrowing constraint to fit it to Mexico's business cycles and financial crisis episodes.
  - Conduct nonlinear estimation very efficiently.

Empirical results

- The estimated model can explain three crisis episodes well.
  - Varying duration and severity
  - Without relying on large or skewed shocks
  - Endogenous regime switching amplifies the propagation of shocks.

Do the proposed specification and solution method well approximate the occasionally binding constraint?

Specifications for the borrowing constraint

- Traditional inequality specification:

$$\frac{1}{(1+r_t)}B_t - \phi(1+r_t)(W_tH_t + P_tV_t) \geq -\kappa q_t K_t$$

- Endogenous regime switching specification:

  Define

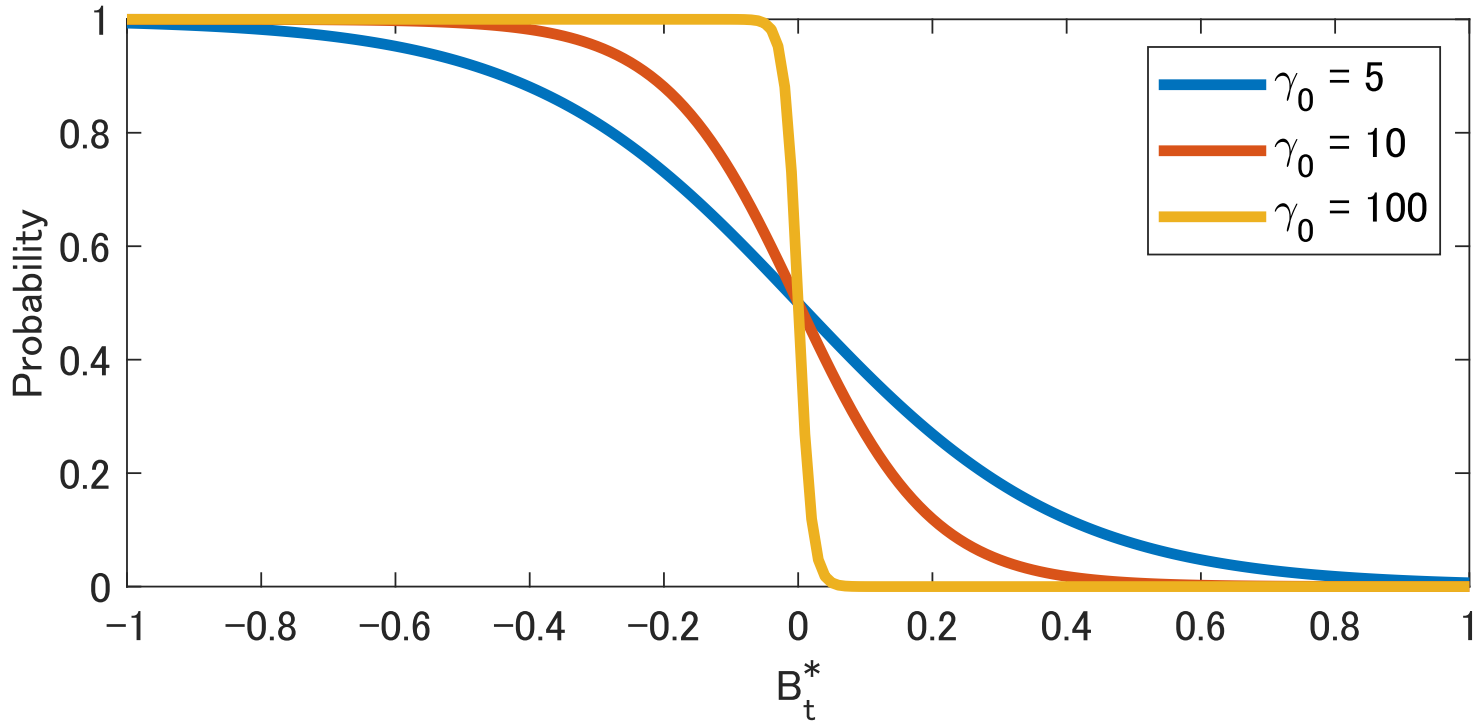
$$B_t^* = \frac{1}{(1+r_t)}B_t - \phi(1+r_t)(W_tH_t + P_tV_t) + \kappa q_t K_t$$

  - In the traditional inequality specification, $B_t^* = 0$ means that the constraint is binding.

Endogenous regime switching specification

- Transition probability from the non-binding to the binding regime:

$$\frac{\exp(-\gamma_0 B_t^*)}{1+\exp(-\gamma_0 B_t^*)}$$



- As B_t^* decreases, the transition probability increases gradually around $B_t^* = 0$.
  - As $\gamma_0 \to \infty$, this specification coincides with the traditional inequality specification.

A possible criticism to the endogenous regime switching specification

- Even if $B_t^* \leq 0$, the economy could still be in the non-binding regime with some probability.
  - It must be binding in the traditional inequality specification.
- However, the authors defend their specification by referring to micro evidence on lending and borrowing behaviors.
  - "... loan covenants are applied smoothing over time ..., triggering renegotiation rather than suddenly cutting off borrowers from funding once activated."
  - "Thus, in practice, collateral constraints bind for a range of leverage ratios rather than at any particular level as in the model with inequality constraints, ..."

Possible solution methods for models with occasionally binding constraints

- Fully nonlinear (global solution) approach
  - Projection methods
- Piecewise linear approach
  - Constraints are imposed but other equilibrium conditions are linearized.
  - OccBin toolbox
- Higher-order perturbation approach
  - Proposed solution method in the paper
  - 2nd-order Taylor-series approximation around the ergodic mean of each variable

Pros and cons for each solution method

	Fully nonlinear	Piecewise linear	Higher-order Perturbation
Precautionary effects	○	×	○
Computation time	×	○	○
Kinked policy function	○	○	×
State-dependent IRFs	○	○	?

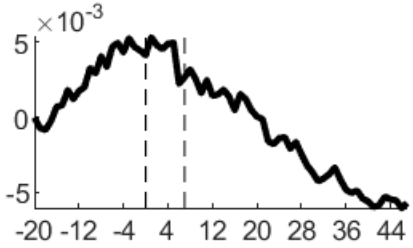
Can the proposed solution method generate distinct IRFs, depending on whether the constraint is binding or not?

Specific question and comment

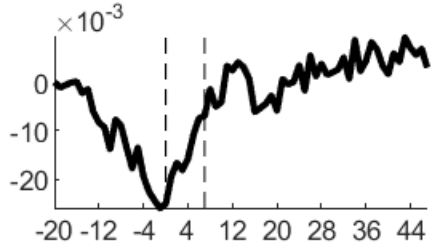
- Section 6.4 analyzes model-simulated crisis dynamics.
- How are the simulated paths constructed?
  - How are the shock series calculated to replicate the crisis episodes of 8 consecutive quarters?
- Several shocks exhibit huge changes as if there were regime switching in the shock processes.
- If the endogenous regime switching worked well, such huge changes in shocks would not be needed.
  - Section 5.2 demonstrates that the estimated model can replicate actual crisis episodes well, without relying on large shocks.

Figure 7: Dynamics of Crisis Episodes

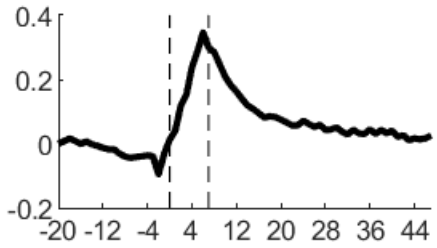
(a) Technology



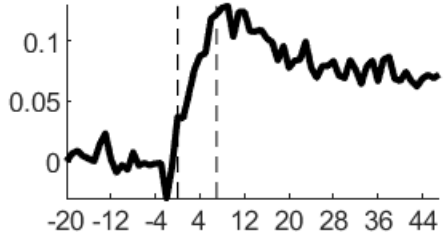
(b) Import Prices



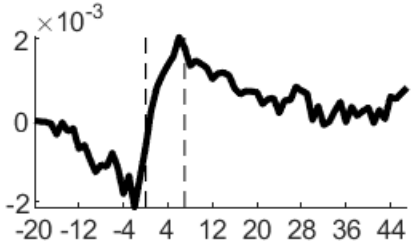
(c) Expenditure



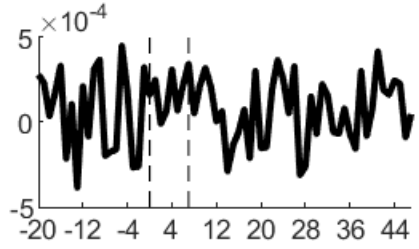
(d) Preference



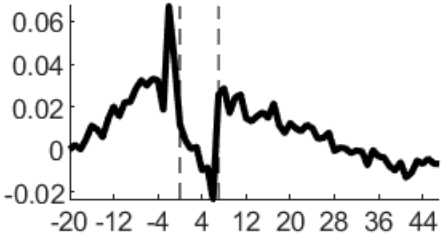
(e) Persist. Int. Rate



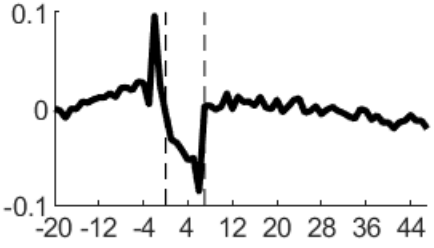
(f) Temp. Int. Rate



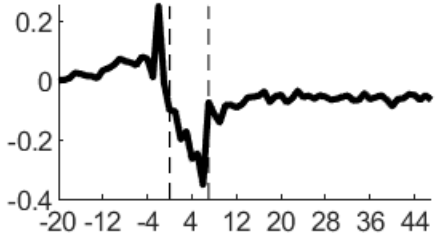
(g) Output



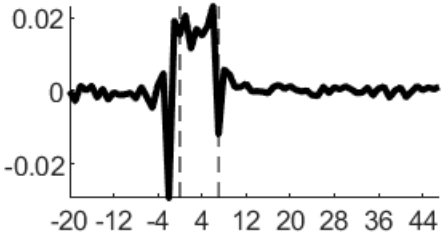
(h) Consumption



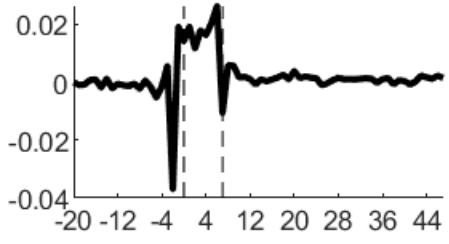
(i) Investment



(j) CA/Y



(k) TB/Y



(l) EFPD