Computational Economics in Action

Solving the Bianchi Overborrowing Model

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Overview

A brief discussion of some computational work I did for the Central Bank of Chile in May

This work was related to the overborrowing model of Javier Bianchi

- "Overborrowing and systemic externalities." AER (2011)

My task was to increase computational efficiency

Background

The Central Bank of Chile (CBC) is

- the equivalent of RBA in Chile
- strongly research-oriented

Has dealt with waves of financial and political instability

- Pinochet dictatorship
- financial crisis of 1982
- 2019-22 protests

The CBC recognizes the importance of working with nonlinear models

- crises tend to have self-reinforcing components

The CBC uses a number of models to track data and measure vulnerability to crises

One is Bianchi's overborrowing model

- private sector tends to borrow execessively in good times
- negative shocks lead to sudden stops

The existing version

- solved using MATLAB
- running on a workstation with 1TB RAM and 350 CPUs
- runtime $\approx$ 7.5 hours

The version I wrote in May

- solved using Python / JAX
- runs on a single GPU
- runtime $<$ 6 seconds

Efficiency gains

- fully JIT-compiled
- better memory management
- better parallelization
- improved algorithm