

Computational Economics in Action

Solving the Bianchi Overborrowing Model

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Overview

An outline of computational work conducted for the Central Bank of Chile in 2024

Related to the overborrowing model of Javier Bianchi

- “Overborrowing and systemic externalities.” AER (2011)

Work undertaken during my second visit to Santiago (May 2024)

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



Source: Reuters R. Garrido

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 excessively 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 < 10 seconds

Efficiency gains

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

See <https://jax.quantecon.org/overborrowing.html> for more details