Are Collateral-Constraint Models Ready for Macroprudential Design?

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May 13th, 2021

This paper

- When prices enter borrowing constraints, the competitive equilibrium (CE) is constrained-inefficient

  $\Rightarrow$ macro-prudential policies and capital controls are desirable

- This paper:
  - **Which** prices enter the constraint (i.e. current or future prices) is crucial
  - In a large class of models, intervention is **not desirable** if (i) only future prices enter constraints and (ii) planner lacks commitment

What I'll do

- Present simplified model
  1. Intuition for the result & why it's very general in some dimensions
  2. Discuss the role of commitment
- A few open questions

A three period model

- Consider a three period model $t \in \{0, 1, 2\}$.
- At $t = 1$, a state of the world $s \in S$ realizes. No further shocks at $t = 2$.
- Standard preferences,

$$U = u(c_0) + \sum_{s \in S} \sum_{t=1}^{2} \pi(s) u(c_t(s))$$

- Borrowing constraint at $t = 1$. Two versions,

$$d_1(s) \leq \Gamma(c_1(s)) \Rightarrow \text{current income}$$
$$d_1(s) \leq \Gamma(c_2(s)) \Rightarrow \text{future income}$$

- Microfounded by OPV with T&NT but more general. GE link is all we need.

Planning problem: Current income

$$\max u(c_0) + \sum_{s \in S} \sum_{t=1}^{2} \pi(s) u(c_t(s))$$

s.t.

$$d_{t-1} + c_t(s) = d_t(s) + \mathcal{Y}_t(s)$$
$$d_t(s) \leq \Gamma(c_t(s))$$

- FOC

$$u'(c_t(s)) = \lambda_t(s) - \mu_t(s)\Gamma'(c_t(s))$$
$$\lambda_t(s) - \mu_t(s) = \mathbb{E}_t \lambda_{t+1}(s)$$

- If constraint binds at s, then $\lambda_t(s) > u'(c_1(s))$. Since $\lambda_0 = u'(c_0) \Rightarrow$ agents overborrow at $t = 0$
- Time consistent

Planning problem: Future income

$$\max u(c_0) + \sum_{s \in S} \sum_{t=1}^{2} \pi(s) u(c_t(s))$$

s.t.

$$d_{t-1} + c_t(s) = d_t(s) + \mathcal{Y}_t(s)$$
$$d_t(s) \leq \Gamma(c_{t+1}(s))$$

- FOC

$$u'(c_t(s)) = \lambda_t(s) - \mu_{t-1}(s)\Gamma'(c_t(s))$$
$$\lambda_t(s) - \mu_t(s) = \mathbb{E}_t \lambda_{t+1}(s)$$

- Clearly, $\lambda_0 = u'(c_0)$ and $\lambda_1(s) = u'(c_1(s))$: These consumption values do not enter any BC $\Rightarrow$ borrowing decision at $t = 0$ is OK.

Planning problem: Future income (ctd)

- FOC

$$u'(c_t(s)) = \lambda_t(s) - \mu_{t-1}(s)\Gamma'(c_t(s))$$
$$\lambda_t(s) - \mu_t(s) = \mathbb{E}_t \lambda_{t+1}(s)$$

- Borrowing decision at $t = 1$ is also OK! In a crisis, $c_1(s)$ and $c_2(s)$ are determined by constraints:
  - $t = 1$ comes from borrowing constraint
  - $t = 2$ comes from budget constraint
- Planner may "feel" more or less hurt than private agents by the borrowing constraint (social vs. private μ), but the constraint binds so this is irrelevant for allocations ("one to one mapping")

Constrained efficient?

- Let us add a fourth period, $t = 3$ and let the borrowing constraint be $\Gamma(c_2(s), c_3(s))$.
- FOCs at $t = 0$ and $t = 1$,

$$u'(c_1(s)) = \lambda_1(s)$$
$$u'(c_0) = \lambda_0$$

$\Rightarrow$ **no tax** between $t = 0$ and $t = 1$.

- No "preventive" taxation idea holds even **with commitment**

Constrained efficient?

- Planner with commitment can do better than CE

$$u'(c_2(s)) + \mu_1(s)\frac{\partial\Gamma(c_2(s), c_3(s))}{\partial c_2(s)} = \lambda_2(s)$$
$$u'(c_3(s)) + \mu_1(s)\frac{\partial\Gamma(c_2(s), c_3(s))}{\partial c_3(s)} = \lambda_3(s)$$

- Planner wants to frontload consumption after the crisis if $\frac{\partial\Gamma(c_2(s),c_3(s))}{\partial c_2(s)} > \frac{\partial\Gamma(c_2(s),c_3(s))}{\partial c_3(s)}$. We intervene, but the rationale is quite different!

- Clearly, time inconsistent. Planner at $t = 2$ does not care about effect in red! No taxes ex post $\Rightarrow$ laissez faire is the time-consistent solution

Intuition

- When the constraint binds, the economy hits a “reset” button
  - Nothing the agents did before the crisis matters for the path **after** the crisis.
  - Therefore, intervention before the crisis is never desirable
- With commitment, the planner can alleviate the debt problem by *promising* stimulus in the short run.
- Without commitment, this is not time consistent, so there is no intervention at all. The latter is what OPV call “constrained efficient”.

So... What do we make of this?

- "Current" vs "future" income makes sense in the model, but what does it mean in reality?
  - Suppose I start splitting periods more and more thinly...
  - This mechanically makes "future" income more important and the "reset button" logic still works.
- We need a model that takes seriously time aggregation issues to think about these questions.
  - Would modeling debt maturity help?
  - Some heterogeneity or additional force to "smooth out" the "reset button" logic?
  - Technological links with future periods, e.g. investment subject to adjustment costs (story still won't be about overborrowing...)