SELF-FULFILLING DEBT DILUTION

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Discussion by
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INTRODUCTION

• Characterizes equilibria in Eaton and Gersovitz (1982) type model with long term debt
  • What we knew before: with short term debt, equilibrium unique
  • What we know now: if debt long-term, multiple equilibria

• Mechanism that generates multiplicity builds on feed-back between future fiscal policy behavior and current bond prices

• Simplifying assumptions, but analysis crystal-clear
OVERVIEW OF DISCUSSION

• Preliminaries

• Multiple equilibria in sovereign debt models
  • Cole and Kehoe (2000)
  • Calvo (1988), Lorenzoni and Werning (2013)
  • Aguiar and Amador (2018)

• Two comments/suggestions
  • Differences with other sources of multiplicity
  • Make framework more “operational”
KEY INGREDIENTS OF A SOVEREIGN DEBT MODEL

• Game between a government and atomistic lenders. Government issues state uncontingent bonds, with an option to default

• Government chooses fiscal policy (consumption, borrowing and default) to maximize $U(.)$ subject to

\[ c + \delta b = y + q(b')[b' - (1 - \delta)b] \]

• No-arbitrage condition for the lenders. For example

\[ q(b') = \mathbb{E} \left[ \frac{1}{1 + r'}D'[\delta + (1 - \delta)q'] \right] \]

• Rules of the game: what can the government commit to?
**Limited Commitment**

- In all sovereign debt models, government cannot commit to
  - Repay in the future
  - Future path of fiscal policy

- Models differ on degree of commitment for the government today
  - In Eaton and Gersovitz, can commit on $b'$ and on $D$ today
  - In Cole and Kehoe, can commit on $b'$ but not on $D$
  - In Calvo, cannot commit on $b'$ (just on the resources raised today, $x = qb'$)
1. In E-G, equilibrium is unique when only short term debt available (Auclert and Rognlie, 2016)

2. In C-K, confidence crises possible
   - Lenders expect a default today and do not buy bonds
   - Govt needs to repay maturing debt by cutting current consumption
   - Might not be optimal to do so

3. In Calvo, confidence crises possible
   - Govt needs to raise $x$. If prices high, it would promise a face value $b^L$
   - Lenders expect lower prices. To raise $x$, the Govt issues $b^H > b^L$
   - Can be self-fulfilling because $q'(b') < 0$
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• E-G framework

• Long maturity debt \(\neq\) Auclert and Rognlie, 2016

• Assumptions
  
  • Linear utility for the government and the lenders
  
  • iid shocks to outside option, \(V \in \{\underline{V}, \overline{V}\}\)

  • Impatience, \(\rho \geq r\)

  • Deadweight loss from default

• Trade-off for government: Impatience vs. deadweight losses
Consider first the solution of a planning problem that

- Respects option to default of government
- Has commitment over future spending paths

Solution can be of either two types, depending on model parameters

1. **Borrowing** ("Italy"): Government borrows up to endogenous debt limit $V_B(\bar{b}_B) = \bar{V}$. Risk of default

2. **Saving** ("Germany"): Government borrows up to the "safe" limit, $V_S(\bar{b}_S) = \bar{V}$, and save if $b \in (\bar{b}_S, b^I]$. No risk of default
**Why multiple competitive equilibria?**

Assume the saving allocation is a competitive equilibrium. So

$$c^*_S(q_S) = y - \{r + \delta[1 - q_S(b_S)]\} b_S = y - rb_S$$

and

$$V_S(b_S) \geq V_B(b_S)$$

Suppose now lenders think Germany will behave like Italy in the future

$$\hat{c}_S(q_B) = y - \{r + \delta[1 - q_B(b_S)]\} b_S < c^*_S(q_A) = \rho V_S(b_S)$$

A necessary condition for multiplicity is

$$\frac{\hat{c}_S(q_B)}{\rho} < V_B(b_S) \leq V_S(b_S)$$
Logic of Self-fulfilling Crises in Aguiar and Amador

- Saving equilibrium supported by high bond prices (low refinancing costs)
- If lenders are pessimistic about future fiscal policy, government today faces higher refinancing costs
- The borrowing strategy might then be optimal at those prices

Key ingredients

1. Bond prices reflect expectations of future policies (long term debt)
2. Government cannot commit to future fiscal policy

Related to Lorenzoni and Werning (2013), but in E-G framework
Comment 1: Differences with other multiplicity

- In paper, authors emphasize C-K and Calvo are models of “crises”. But there are extensions (Bocola and Dovis; Aguiar et al.; Lorenzoni and Werning)

- A key distinction is on the role of public debt management
  - In C-K, a Govt afraid of a rollover problem would want to lengthen maturity
  - Same in Calvo-style multiplicity (and in its dynamic version of L-W)
  - Here, lengthening is bad
    - Opens the door to multiplicity
    - Can select inefficient equilibrium

- Distinction could matter for measurement
Comment 1: Debt maturity across crises
**Comment 1: Debt Maturity Across Crises**

In euro crisis, mostly shortening of maturity.
SUGGESTION 1: HOW DOES AN AGUIAR-AMADOR DEBT CRISIS LOOKS LIKE?

- Experiment of a switch between saving and borrowing equilibrium

- Study dynamics of
  - Debt (increasing)
  - Spreads (increasing), more so for long term bonds (slope initially positive, then flat?)

- Helpful to understand differences with other sources of multiplicity

- Helpful to see if we match qualitatively pattern of crises in data
**Comment 2: Toward a more “operational” framework**

**Want:** Procedure to compute equilibria in more quantitative framework

- Seems hard to do by brute force (need to guess pricing schedules)

- Can use theoretical results to build an algorithm
  - Is there any way we can use the planner’s problem?
  - Solve competitive equilibrium for large $\delta$. Use previous solution as initial guess for lower $\delta$. Keep iterating. Do we select borrowing equilibrium, if it exists?
  - Where does the limit of finite horizon economy converges to?

**Question:** are there regions of fragility as in C-K?

- In C-K, indeterminacy only in regions of state space (“crisis zone”)
- Also here, allocations across two equilibria differ in certain regions
- Helpful to discuss how these regions vary with parameters
CONCLUSION

• Beautiful paper, characterizes equilibria in a benchmark model of sovereign debt

• Two suggestions
  • Explore differences with other sources of multiplicity
  • More emphasis on making framework operational

• Looking forward to learn more about it