Self-fulfilling debt crises: Can monetary policy really help?
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Nonlinearities in Macroeconomics and Finance in Light of the Crisis

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Introduction

- What are the channels, instruments and strategies that enable (monetary) policy to effectively shield a country from self-fulfilling debt crisis?
  - Recent crisis in Eurozone: Motivation and successful experiment.
- Literature is currently defining theoretical foundations and providing key insight.
- This paper **an excellent, leading contribution to this literature**.
  - Rich New Keynesian economy where default no fundamental reasons to default, but pessimistic expectations may drive up debt cost and borriwing precipitating default — Slow moving crisis similar to euro area.
  - Which type of monetary policy (if any) can rule out the bad equilibrium?

Main conclusion of the analysis

- Limits to using conventional/interest rate policy to backstop government funding: Inflation needs to be quite high!
- Unconventional policy (actually standard open market operations) works only under special circumstances — if zero lower bound binds.
- Even under commitment, policies likely to be incredibe because of associated costs.
- Very frustrating paper to discuss: **All bases covered already, even if it's preliminary!**

Outline

- Simplified framework to map the debate in the literature.
- Brief account of the paper.
- Some suggestions and questions.

A simplified framework

- Start with a **consolidated (government plus central bank) nominal budget constraint**

$$at\ t\ :\qquad (1-D)B - PS = QB' + M' - M$$
$$at\ t+1\ :\qquad (1-D')\,B' - P'S' = Q'B'' + M'' - M'$$

where B is short-term debt, M money, P price level, D default rate, Q nominal price of bond.

- Key assumption that LHS $(B - Ps)$ given, cannot change fiscal surplus s.

- Set D=0, and **divide by M**:

$$\overbrace{b - ps}^{\textit{LHS} \text{ demand for funds}} = \overbrace{Qb'\,(1+\mu) + \mu}^{\textit{RHS} \text{ supply for funds}}$$
$$(1-D')\,b' - p's' = PDV'\,(ps) + PDV'\,(\mu)$$

- With risk neutrality, equilibrium short-term debt pricing:

$$Q = E\frac{1-D'}{1+i}$$

A simplified framework

- **Two states of economy as in paper**: normal with prob. $1 - \psi$ and recession with prob. ψ.
- **(Optimal) default rule**:
  - if normal, always repay.
  - If recession, total default if also $b' > \overline{b} > PDV$ of primary surplus including seignorage. Hence

$$Qb' = \begin{cases} \dfrac{b'}{1+i} & b' \leq \overline{b} \\[2ex] (1-\psi)\,\dfrac{b'}{1+i} & b' > \overline{b} \end{cases}$$

- Figure next slide plots in the space b', Qb' :

$$\underbrace{b - ps}_{\text{LHS demand for funds}} = \overbrace{Qb'\,(1+\mu) + \mu}^{\text{RHS supply for funds}}$$

Or dividing by P

$$b - s = Qb'\,(1 + \pi') + \mu/p$$

If default expected, a low Q brings b' level where default possible.

Multiplicity

Qb'

supply of funds, high price Q
slope $(1+\mu)/(1+i)$

supply of funds, low price Q
$(1-\psi)(1+\mu)/(1+i)$

b-ps
(demand for funds)

μ

$\bar{b}$

$b>\bar{b}$ default with prob. ψ

b
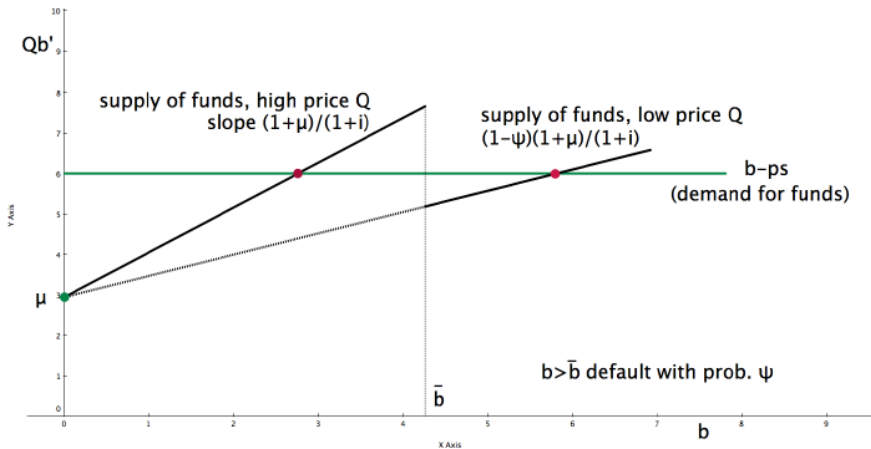
How can monetary policy help?

Figure meant to show that conventional/interest rate policy affects equilibrium via 3 channels:

1. **Slopes of supply of funds (RHS)**: Easing decreases real interest rate.

   ▸ Nominal rigidities as in the paper.
     But also liquidity effects, nominal rate $1 + i$ rises less than money growth $1 + \mu$.

2. **Intercept of demand for funds (b − ps in LHS)**:

   ▸ With non neutralities (e.g. sticky prices) s changes.
     With non-constant velocity, money expansion does not translate into a proportional change in prices $p = P/M$.

3. **Discontinuity of supply of funds ($\overline{b}$ in RHS)**

   ▸ Promise of future expansionary policies contingent on low state to raise PDV.

4. But also unconventional policy helps:

   ▸ **Intercept of supply of funds (μ in RHS)**: *Open market operations*, issuing M' against B.

Costs of these channels

- Relative to taxes and default:
    1. **Cost of expected inflation** (money demand distortions).
    2. **Cost of actual inflation** (NK Phillips curve).

- Note: Why do we worry about default?
    - We know there are high costs of adjusting surpluses (see fiscal limits).
    - Hence, we need to be careful not to represent monetary policy as the '*De Grauwe Fairy*', playing down (or playing too much with) these costs.

- This paper provides a clinical, unpleasant arithmetic of all these channels and costs.

Relevant equilibrium trade-offs

Depending on (how one models) central bank vs government and their interactions

- ▶ Policy instruments and distortions;
- ▶ Commitment vs discretion;
- ▶ Rules versus optimizing behavior;
- ▶ Same or different objective functions;
- ▶ Institutional constraints (i.e. budget rules).
  Focus here is on optimal monetary policy under commitment, fiscal policy exogenous (but actually fine).

The story of the paper in nutshell

1. Ex-ante and ex-post interest rate policies affecting nominal and real interest rates, inflation, fiscal surplus $(1 + i, b - ps, \bar{b})$.
   - ▶ Rich quantitative model (long-term debt, habits, hybrid PC, sticky expectations,...) with a battery of sensitivity checks.
   - ▶ High, costly inflation necessary in most relevant cases as the sunspot shock increases borrowing over time by a multiple of initial debt.

2. CB balance sheet policies (μ).
   - ▶ Either large assets holdings, or large increase in money, non-inflationary only at the ZLB.
   - ▶ Insightful discussion of open market operations, striking result that ZLB matters only around default date.

Suggestions and questions

1. What is exactly monetary policy doing and what are the trade-offs? It would be nice to have an analytical characterization for the "textbook" case, e.g. Benigno & Woodford (2007).

   ▶ Linear-quadratic framework with exogenous/non-Ricardian fiscal policy, optimal policy permanently increases price level to reduce real debt growth in line with solvency constraint.
   ▶ Leeper provides optimality conditions with nominal long-term debt.

2. Calibration issues:

   ▶ Forward-looking NK PC seems to make a difference because inflation jumps immediately, recent VAR evidence (e.g. Gertler & Karadi).
   ▶ Also with sticky prices inflation lower when revenues increase with stimulus (see BW 2007).
   ▶ But overall robustness remarkable given the extent of the sensitivity analysis (16 graphs shown!).

Suggestions and questions

3. Shocks to debt look very large, so is required adjustment — Linear-quadratic framework ok?
   - $B_{low} = 80\%$ of GDP must increase to over 200% for default, same factor for $B_{middle} = 112\%$ implies adjustment of $224\% - 200\% = 24\%$ of GDP?
   - Siu (2004) shows that with "large" spending shocks, optimal inflation volatility with sticky prices around 15% **annually** because of costs of distortionary taxes.
   - Reinhart-Rogoff (2010) show evidence that inflation very large in domestic default episodes (average 170%).

4. High sovereign rates and rapid debt accumulation in the paper have no macroeconomic effects:
   - In reality macroeconomic disruptions and recessions even before default, making monetary easing warranted.
   - Again RR reports a steady GDP fall in the years before domestic default, with -4% GDP the year before.
   - Also flight towards "safe" assets, abnormal demand for liquidity, CB liabilities.

What do we learn from the practice of monetary backstops?

- During the crisis, **central bank's balance sheet** key *instrument*, *separate* from the control of interest rate/inflation.
  Bank of England has bought close to 40% of debt with base rate at 50bps.

- In the paper it works at ZLB, but also in general, if the central bank can issue interest-bearing liabilities (reserves):

$$B + M + (1+i) V - Ps = QB' + V' + M'$$
$$(1 - D') B' + (1+i') V' + M' - P'S' = \ ...$$

- If now $\mu = \dfrac{V' + M'}{M}$ is the size of the balance sheet, we can think of strategies to expand it, as to rule out self-fulfilling default, with little effect on inflation.

- **This is another (complementary) story**: New style central banking (and its **limits**), Hall-Reis, Del Negro-Sims.

New style central banking

- Many combinations of changes in CB assets and liabilities can **temporarily** raise purchases of government bonds

$$M + (1 + i) V + Q_{CB} B'_{CB} = M' + V' - (1 - D_{CB}) B_{CB} - P\tau'$$

- In these contributions, **monetary liabilities of the central bank** can always be exchanged on par with cash.
  - Key difference relative to government bonds for which default possible $(1 - D) B$,
  - Otherwise the nominal price of money, reserves would not be 1 and we should write $(1 - D_m) (M + (1 + i) V)$.

- Problem here is **fundamental default risk** as present discounted value of CB resources **bounded**:

$$T = E \frac{\tau' + T'}{R'} \geq 0$$
$$T = PDV(Seignorage) + (1 - D_{CB}) b_{CB} - v$$

CB risks to have to increase seignorage to repay outstanding liabilities at face value, raising a host of other issues (but that's another paper).

Conclusion

- Great paper pushing the boundary of theory on a highly policy relevant issue
    - Nice complement to Aguiar et al.
- Great reading for anybody interested in the topic
    - Appreciation of the clarity and comprehensive analysis.
- Clearly neither the least, nor the last in the series of the authors' excellent contributions.