# Monetary Policy and Debt Fragility by Camous and Cooper $C^2$

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# Introduction

- What are the channels, instruments and strategies policies that enable (monetary) policy to effectively shield a country from self-fulfilling debt crisis?
  - Recent crisis in Eurozone: motivation and great experiment.
- Literature is currently defining theoretical foundations and providing key insight.
- Camous and Cooper $\mathbf{C}^2$ **is an excellent, leading example**.
  - Economy where default would not occur for fundamental reasons, but pessimistic expectations may drive up debt cost and so bring the government to prefer, ex post, costly default over the alternative of adjusting the primary surplus.
  - Which type of inflation policy (if any) can rule out the bad equilibrium?

# Main conclusion of the analysis

- Commitment enables monetary to pursue **state contingent plans** (leaning against the winds):
  - **high inflation in the default-risky states** of the world, to reduce the ex-post real burden of debt (while increasing seigniorage), and so cause the government to optimally choose repayment
  - **low (negative) inflation in the other states**, so to keep expected inflation (hence the price of debt) on (the low) target.
- The threat of these plans is enough: they need not be carried out in equilibrium, since they stabilize the price of debt at the no-default level.
- In contrast with non-contingent inflation plans, and inflation discretion are ineffective.

# Outline

- Simple theoretical framework to map the literature
- The story of the paper retold in this model
- Some comments on $C^2$ specification, and questions

# A simple framework

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

$$\begin{aligned} at\ t &: \quad (1-D)B + M - Ps = QB' + M' \\ at\ t+1 &: \quad \left(1-D'\right)B' + M' - P'S' = Q'B'' + M'' \end{aligned}$$

where $B$ is debt, $M$ money, $P$ price level, $D$ default rate, $Q$ nominal price of bond.
- Once the LHS ($B + M - Ps$ on the) is given, modelling bonds as discount bonds or as in Calvo (paper) does not matter.
- **Divide by M** (not P!):

$$\begin{aligned} \overbrace{(1-D)\,b - ps}^{LHS \text{ demand for funds}} &= \overbrace{Qb'\,(1+\mu) + \mu}^{RHS \text{ supply for funds}} \\ \left(1-D'\right)b' - p's' &= \ldots \end{aligned}$$

- With risk neutrality, equilibrium debt pricing

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

# A simple framework

- **States of economy**: high with prob. $1-\psi$ and low with prob. $\psi$.
- **(Optimal) default rule**:
  - if high, always repay.
  - If low, default is total if also $b' > \bar{b}$. Hence

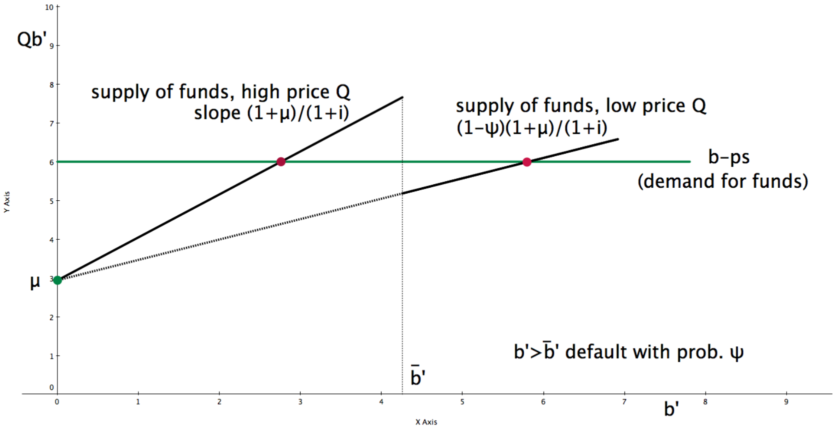
$$Qb' \begin{cases} \frac{b'}{1+i} & b' \leq b \\ (1-\psi)\frac{b'}{1+i} & b' > b \end{cases}$$

- Figure next slide plots (for $D = 0, D'$) :

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

in the space $b, Qb'$. If agents anticipate default, a high interest rate (low $Q$) brings $b'$ to a level where default is possible.

# Luca's Graph


Qb'
supply of funds, high price Q
slope (1+μ)/(1+i)
supply of funds, low price Q
(1−ψ)(1+μ)/(1+i)
b−ps
(demand for funds)
μ
b'>b̄' default with prob. ψ
b̄'
b'
Y Axis
X Axis
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
5
6
7
8
9

# How can monetary policy help?

Figure clarifies that Inflation (conventional monetary) policy affects equilibrium via 3 channels:

1. **Intercept of supply of funds (RHS)**: open market operations, issuing $M'$ against $B$
2. **Slopes of supply of funds (RHS)**, via $\mu$ (money creation) and $i$ (nominal rate).
   Monetary expansion decreases the real interest rates if
   - Liquidity effects
   - Nominal rigidities.
3. **Intercept of demand for funds (LHS)**:
   - With non-constant velocity, money creation does not translate into a proportional change in prices $p$, affecting the real primary surplus $s$
     With non neutralities (e.g. sticky prices) $s$ also changes.

# Different contributions, with a common feature

- Different channels explored in different papers: in addition to $C^2$, Aguiar et al., Bacchetta Van Wincoop, my work with Luca Dedola.
- What is common? In all these contributions, **monetary liabilities of the central bank are always redeemable at face value.**
  - one key difference relative to government bonds for which $(1 - D)\,B$
  - otherwise the nominal price of money would not be 1 and we should write $(1 - D_m)\,M$.

# Cost of these channels

- Relative to taxes and default
    1. **cost of expected inflation** (monetary distortions)
    2. **cost of ex-post inflation** (stressed by recent macro)
- 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.

# Relevant equilibrium trade-offs?

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

- commitment vs discretion,
- rules versus optimizing behavior,
- same or different objective functions,
- institutional constraints (i.e. budget separation),
- instruments...

## What do we learn from the practice of monetary backstops to government debt?

- During the crisis, we have realize that the **central bank's balance sheet** is a key *instrument*, *separate* from the control of the interest rate.
- This is clear at the zero lower bound, but it works also in general, to the extent that the central bank can issues interest-bearing liabilities (reserves).

$$
\begin{aligned}
(1-D)\,B + M - Ps &= QB' + Q_m M' \\
(1-D')\,B' - P'S' &= ...
\end{aligned}
$$

- If we look at $\mu$ as the size of the balance sheet, we can think of strategies to expand it, as to rule out self-fulfilling default, without an effect on inflation (easy if there is no fundamental default).
- But this is another (complementary) story: new style central banking, Hall-Reis, Del Negro-Sims, Corsetti-Dedola.

# The story of the paper retold: 1. non-contingent rules and 2. discretion

1. Non-contingent money growth: $\mu$ constant, hence $\frac{1+\mu}{1+i}$ and $(1+\psi)\,\frac{1+\mu}{1+i}$ possible equilibrium outcome.
   - obviously $\mu$ not irrelevant — but generally does not rule out multiplicity
2. Discretionary monetary policy: cost of ex-post inflation bounds ex post monetary expansion.

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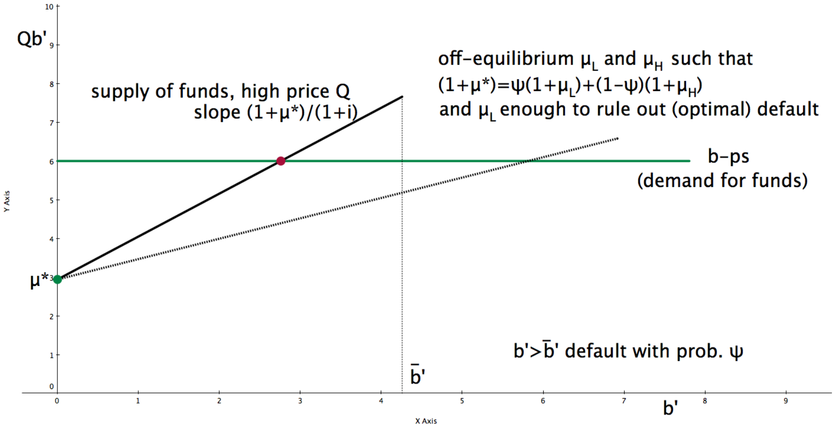
  - Suppose a constant upper bound on inflation and money growth $\overline{\mu}$
  - $\overline{\mu}$ is perfectly anticipated by private agent, so $\frac{1+\overline{\mu}}{R\left(1+\overline{\pi}\right)}$ and $(1+\psi)\,\frac{1+\overline{\mu}}{R\left(1+\overline{\pi}\right)}$ as above.

# The story of the paper retold using the graph: 3. commitment



# Comments on the paper

Salient features

- Open-economy OLG model. Agents only consume when old. Heterogenous productivity when young, homogeneous stochastic when old.
- Limited participation (cost of market access).
  - low productivity young only save via money.
  - high productivity ones save only via bonds (assumption 1).
- Abstract from intergenerational transfers. Part of debt is held abroad, hence default creates net gains, not relevant for the key conclusion.
- Assumption 3: there is a fundamental equilibrium without default.
- Assumption 2: no default if seigniorage large.
- Discretionary government optimally chooses (costly) Default when $\mathcal{W}^d > \mathcal{W}^r$. Let $\widetilde{\pi} = \frac{1}{1+\pi}$

$$\frac{A\left(1-\gamma\right)}{2} - \frac{A\left(1-t\right)}{2} + \nu^m \left(\widetilde{\pi}^d - \widetilde{\pi}^r\right) - \left(1+i\right)\widetilde{\pi}^r \theta b + T > 0$$

# Comments on the 'endogenous' demand for money

- Because of **limited participation**, **expected inflation** reduces their labor supply/saving, acting **like a tax on labor income**.
  - Laffer curve is there, but not really essential.
- Key: **no cost of expanding money and inflation ex post.** Only anticipated inflation matters.
- But then in a discretionary equilibrium systematic inflation surprises are cost-less and thus can rule out default.
  - $C^2$ need a bound on $\widetilde{\pi}$ (i.e. $\mu_{max} = M'/M$) which is a cost of ex-post inflation, to eliminate the problem.
- Is the bound on relevant in the commitment equilibrium with commitment?

# Comments on the 'endogenous' demand for money

- Wouldn't a cost of **ex-post inflation** help:
  - work out the equilibrium with discretion
  - model **fiscal and policy interactions in a game-theoretic structure**, so to derive precisely how an off-equilibrium threat can work (large literature of which Cooper is a master)?
- Also, the model abstracts from any intertemporal dimension.
  - But commitment can also work across periods.
  - Cooper: next paper?

Small issues with language

- Monetary delegation
- Exogenous vs endogenous money demand.

# Conclusion

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