"Who Holds Sovereign Debt and Why It Matters" by Fang, Hardy & Lewis

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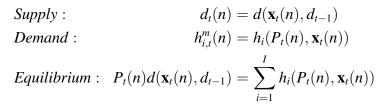
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A Macro Perspective

- Courageous paper
 - uses micro-finance methods to provide input to macro policy decisions
- I focus on one question the paper asks:
 - 1. How much do financing costs rise for a hypothetical debt increase?
- Can a macro framework help to understand the identification issues?
- Three components
 - government budget constraint
 - bond pricing/demand
 - optimizing behavior

Bond Market Behavior

The paper's setup



- ► **x**_t(n): country-specific objects affect S & D
- ► **x**_t(n) assumed to be exogenous!
- x_t(n) includes economic growth, inflation, exports, credit ratings exogenous
- If variables that affect welfare are unaffected by bond market outcomes...
 - what is at stake in the answer to the question posed?

Addressing the Question

- 1. How much do financing costs rise for a hypothetical debt increase?
- I interpret this as asking about new issuances of debt
 - For policy decisions "financing costs" are about the original sale prices of bonds
 - Prices on secondary markets, of course, are related, but irrelevant
 - imagine that primary & secondary markets segmented, with distinct participants
 - then prices in secondary market unrelated to financing costs to government
- Bond supply naturally begins with the government budget constraint

Bond Supply

Government budget constraint (nominal bonds)

$$\sum_{j=1}^{J} Q_t(t+j)B_t(t+j) + P_t s_t = \sum_{j=1}^{J} Q_t(t+j-1)B_{t-1}(t+j-1)$$

▶ Bond supply is choice of $\{B_t(t+j)\}$ at each date *t*

- given the deficit to be financed, government offers whatever par value is needed to satisfy the budget
- prices are equilibrium outcomes
- \triangleright s_t, P_t, and Q's may be functions of the paper's **x**_t
 - but their endogeneity doesn't change the nature of the supply decision
- Recent auctions revealed weak demand at long end
 - Treasury responded by changing maturity structure

• Leads me to posit B_t^s inelastic w.r.t Q

- \blacktriangleright *s*_t shifts supply
- maturities offered depend on expected Q's

Bond Demand

Consider a Lucas tree model

- representative agent (ignoring investor types)
- output exogenous
- no government spending: eqm $c_t = y_t$
- s_t is taxes net of transfers
- Central bank sets short nominal rate, R_t
- Maturity of bonds decays geometrically at rate $\mu \in [0, 1]$

A Simple Example

 Representative household—one investor—maximizes

$$E_0\sum_{t=0}^{\infty}\beta^t\log(c_t)$$

subject to

$$c_t + \frac{Q_t B_t}{P_t} + s_t = y_t + \frac{(1 + \mu Q_t) B_{t-1}}{P_t}$$

Euler equations

$$\frac{1}{R_t} = \beta E_t \frac{c_t}{c_{t+1}} \frac{P_t}{P_{t+1}}$$

$$Q_t = R_t^{-1} E_t (1 + \mu Q_{t+1})$$

A Simple Example

- Demand combines FOC with budget constraint
- Household's intertemporal budget constraint

$$\sum_{j=0}^{\infty} E_t m_{t,t+j} c_{t+j} = \sum_{j=0}^{\infty} E_t m_{t,t+j} (y_{t+j} - s_{t+j}) + \frac{(1 + \mu Q_t) B_{t-1}}{P_t}$$

- Bond demand:
 - solve for $(1 + \mu Q_t)B_{t-1}/P_t$
 - substitute back into flow budget constraint
 - obtain function for B_t^d/P_t

A Simple Example

Equilibrium condition is

$$\frac{(1+\mu Q_t)B_{t-1}}{P_t} = E_t \sum_{j=0}^{\infty} m_{t,t+j} s_{t+j}$$

Implies bond demand

$$\frac{B_t^d}{P_t} = \frac{1}{Q_t} E_t \sum_{j=1}^{\infty} m_{t,t+j} s_{t+j}$$

• decreasing in Q_t

• increasing in $E_t PV(\{s_{t+j}\}_{j=1}^{\infty})$

Bond Market Behavior

Supply:

$$B_t^s = \frac{1}{Q_t} \left[-P_t s_t + (1 + \mu Q_t) B_{t-1} \right]$$
Demand:

$$B_t^d = \frac{P_t}{Q_t} E_t \sum_{j=1}^{\infty} m_{t,t+j} s_{t+j}$$

Note that

 \blacktriangleright s_t enters supply, but not demand

• $\{m_{t,t+j}, s_{t+j}\}, j \ge 1$, enter demand, but not supply

Seek elasticity of B_t^d w.r.t. Q_t : here trivially = -1

Bond Market Behavior

Supply:

$$B_t^s = \frac{1}{Q_t} \left[-P_t s_t + (1 + \mu Q_t) B_{t-1} \right]$$
Demand:

$$B_t^d = \frac{P_t}{Q_t} E_t \sum_{j=1}^{\infty} m_{t,t+j} s_{t+j}$$

- Cannot say much more without specifying monetary & fiscal behavior
 - Q_t depends on path of *R*'s (MP)
 - only if $s_t \sim i.i.d.$ does shift in S not shift D
 - when st predicts future s—which it does—then st shifts S & D (FP)
 - which mix of MP/FP determines P_t?

Bottom Line

- Macro model reveals the nature of the identification problems
 - they are daunting
 - simultaneity bias can go in either direction
 - monetary-fiscal interactions create thorny identification problems
 - those interactions lie at the heart of sovereign bond markets
- Hard to see the *behavioral* aspects from the paper
- And mine is the "easy" case: auction market only

More Elaborate Modeling

Considerations to include

- banks use sovereign debt to meet regulatory constraints (financial repression?)
- zero-risk weight rule on domestic sovereign bonds seems critical
- credit default swaps: may matter for the riskiest bonds
- how does hedge fund "basis trade" affect demand?
 - ability to profit from derivatives market
- These details may aid identification

Final Remark

- Paper: "While governments issue debt and pay interest over time, investors focus upon holding period returns per period as measured in the secondary market."
- Small step to: "Bond markets don't pay attention to surpluses."
 - an argument I frequently hear
- A bond is redeemed and pays $\frac{B_{t-1}(t)}{P_t}$
- Price level at redemption matters
- That price level depends on monetary-fiscal mix
- Ultimately, the real backing for debt determines the real payoffs & value of the bond