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

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June 2024

IMF-CARF-TCER-Waseda Conference

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

$$\begin{aligned} &\textit{Supply}: && d_t(n) = d(\mathbf{x}_t(n), d_{t-1}) \\ &\textit{Demand}: && h^m_{i,t}(n) = h_i(P_t(n), \mathbf{x}_t(n)) \\ &\textit{Equilibrium}: && P_t(n)d(\mathbf{x}_t(n), d_{t-1}) = \sum_{i=1}^{I} h_i(P_t(n), \mathbf{x}_t(n)) \end{aligned}$$

- $\mathbf{x}_t(n)$: country-specific objects affect S & D
- $\mathbf{x}_t(n)$ **assumed to be exogenous!**
- $\mathbf{x}_t(n)$ 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
- s_t, P_t, and Q's may be functions of the paper's $\mathbf{x}_t$
  - 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

Bond Supply

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

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

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

- Note that
  - s_t enters supply, but not demand
  - $\{m_{t,t+j}, s_{t+j}\}$, $j \geq 1$, enter demand, but not supply
- Seek elasticity of B_t^d w.r.t. Q_t: here trivially $= -1$

Bond Market Behavior

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

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

- 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 s_t predicts future s—which it does—then s_t 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