Fiscal / Monetary Interactions: Liquid Bonds

Behzad Diba

Study Center Gerzensee

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- this can make a big difference for determinacy results even if bonds are a very poor substitute for money.
- it has other interesting implications if we think the liquidity services of bonds are significant (motivated by observations about US Treasury bills).
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In this model, there is no fundamental difference between a monetary policy that sets the sequence of money supplies and one that sets a sequence for inflation plus the initial nominal interest rate. Either policy can be mapped into the other with a unique sequence of open-market operations.
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Determinacy or Indeterminacy

The argument is based on the government budget constraint:

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Writing this as

\[ \frac{M_t}{P_t} + \frac{B_t}{P_t} = \frac{M_{t-1}}{P_t} + \frac{(1 + i_{t-1})B_{t-1}}{P_t} + G_t - \tau_t, \]

indeterminacy of \( P_t \) (and the right-hand side) must correspond to indeterminacy of \( B_t / P_t \) (on the left-hand side), according to standard models in which real money balances are determinate.
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So, any model without Ricardian Equivalence must exhibit either nominal determinacy or real indeterminacy.
Canzoneri, Cumby, Diba, and López-Salido (CCDL, 2011) develop a model suitable for calibration, in which holding money and bonds reduces transactions costs.
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The representative household maximizes

\[ E_t \sum_{j=0}^{\infty} \beta^j [u(c_{t+j})] , \]

(with \(0 < \beta < 1\), \(u'(.) > 0\), and \(u''(.) < 0\)) subject to the budget constraint

\[ B_t + M_t + (1 + \theta_t)P_t c_t + P_t \tau_t = P_t y_t + M_{t-1} + (1 + i_{t-1})B_{t-1} \]

where \(\theta\) represents transactions costs per unit of consumption.
Transactions Costs

Let $m_t = M_t / P_t$, $b_t = B_t / P_t$, define a velocity measure

$$v_t = \frac{c_t}{m_t^\alpha b_t^{1-\alpha}}, \ 0 < \alpha < 1$$

and set

$$\theta_t = A \left[ v_t - v^* \right]^2, \ A > 0, \ v^* > 0$$

for $v_t > v^*$, and $\theta_t = 0$ for $v_t \leq v^*$
Transactions Costs

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and set

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\theta_t = \frac{A}{\nu_t} [\nu_t - \nu^*]^2, \quad A > 0, \quad \nu^* > 0
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for \( \nu_t > \nu^* \), and \( \theta_t = 0 \) for \( \nu_t \leq \nu^* \)

Set the parameters (i.e., calibrate the model) to match US data on money and bond holdings, T-bill rates, inflation, etc.
The rest of this model is a standard New Keynesian model calibrated to US data.
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In this setup, there is no policy coordination issue to address about the change in US monetary policy in the 1980s.
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Krishnamurthy and Vissing-Jorgensen (2012) present empirical evidence on the transactions services of US Treasury debt. They argue that US Treasury debt (like currency) provides a "convenience" yield that reflects both the liquidity and safety attributes of government debt. Their estimate of this convenience yield averages 73 basis points per annum over 1926-2008. They find that bond seigniorage has averaged about 0.25% of US GDP per annum, which is about the same as estimates of US seigniorage from money creation.

Krishnamurthy and Vissing-Jorgensen (2012) also find that the yield spread between Aaa rated corporate bonds relative to US Treasuries is inversely related to the US debt-to-GDP ratio. This argues in favor of models with a bond demand function, much like a money demand function. They propose a model with bonds in the utility function of the representative household.
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The figure plots the Aaa-Treasury corporate bond spread ($y$-axis) against the Debt-to-GDP ratio ($x$-axis) based on annual observations from 1919 to 2008. The corporate bond spread is the difference between the percentage yield on Moody’s Aaa long maturity bond index and the percentage yield on long maturity Treasury bonds.
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- changes in the maturity structure of the public debt (including "operation-twist" type transactions of central banks) may matter in ways that standard models don’t capture
- standard models that exhibit Ricardian Equivalence may be missing an important element for policy applications