Money and Banking in a New Keynesian Model

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How does a convenience yield on the policy rate affect the transmission mechanism?

Typical models assume central bank controls household savings rate

- In particular, the rate of return, i^S, on a safe, pecuniary asset
- Money supply controlled by central bank with $i^D = 0$, and price level endogenously adjusts to clear money market.

In practice, they control the rate on short safe assets held by intermediaries...

- Central bank sets i^P on short safe assets that are held to back issuance of inside money
- By relaxing collateral/liquidity constraints, they provide non-pecuniary benefits

... whose convenience yield dampens power of rate policy ...

- Policy tightening lowers convenience yield on deposits, reducing total return of savings, dampening fall in consumption
- Dampening depends on pass-through of policy rate to deposit rate

... generating weaker policy in a "floor" vs. a "corridor" regime.

- In Abundant Reserves ("floor") Regime, nominal rigidities in bank assets bolsters dampening effect
- In Scarce Reserves ("corridor") Regime, interest-elastic deposit supply mitigates dampening effect

Model Setup: Households

Utility: CES bundle of consumption C_t, deposits D_t

$$\left(C_t^{1-\frac{1}{\eta}} + \omega(D_t/P_t)^{1-\frac{1}{\eta}}\right)^{\frac{1-\frac{1}{\eta}}{1-\frac{1}{\eta}}}$$

Convenience Yield: Deposit spread $(i_t^S - i_t^D)$

$$\frac{i_t^S - i_t^D}{1 + i_t^S} = \omega\left(\frac{P_t C_t}{D_t}\right)^{\frac{1}{\eta}} \equiv \omega v_t^{\frac{1}{\eta}}$$

Log-Linearized Euler Equation

$$\hat{c}_t = E_t\hat{c}_{t+1} - \sigma(i_t^D - E_t\pi_{t+1} - r^D) + \sigma\beta E_t\Delta\hat{v}_{t+1} - \underbrace{\frac{\sigma(r^S - r^D)}{\eta}\hat{v}_t}_{\text{conv. yield}}$$

Model Setup: Firms and Central Bank

Firms: Phillips Curve:

$$\pi_t = E_t\pi_{t+1} + \kappa\hat{c}_t + B\lambda\hat{v}_t$$

- $\kappa\hat{c}_t$ - standard cost channel
- $B\lambda\hat{v}_t$ - liquidity cost channel
  - Higher velocity $\rightarrow$ higher deposit spread $\rightarrow$ less desire to consume as C_t, D_t complements $\rightarrow$ labour supply falls

Central Bank (CB): Controls supply of CB safe assets, and its corresponding interest rate, i_t^P, via Taylor Rule

$$i_t^P = r^P + \phi_\pi\pi_t + \phi_c\hat{c}_t + u_t$$

CBDC Model - Deposit Supplier: CB

- CB controls deposit rate i_t^D via the Taylor rule ...
- ... and supplies deposits $\hat{d}_t$ directly to households.

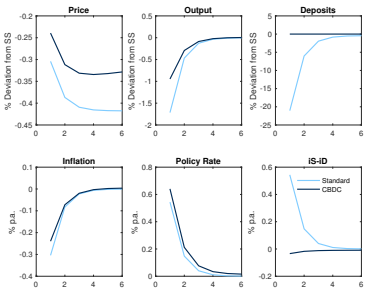
$$\hat{d}_t = \alpha\hat{d}_{t-1} - \alpha\pi_t$$

- α commands nominal rigidity in deposit supply
- Convenience yield on policy rate ...

$$\hat{i}_t^s - \hat{i}_t^D = \frac{r^S - r^D}{\eta}\hat{v}_t$$

- ... dampens power of rate policy ...
  - As deposit convenience moves procyclically, it dampens substitution effect on consumption
- ... and weakens conditions for local determinacy
  - Mitigates self-fulfilling recessions/booms by stabilising total return of deposits

CBDC Model: Monetary Policy Shock



Dampening effect increases in:

- η^{-1} - inelasticity of deposit demand
- α - nominal rigidities of deposit supply

Bank Model - Deposit Supplier: Banks

Regime 1: Abundant Reserves

- CB controls reserve rate i_t^M via Taylor rule...
- ... and supplies reserves $\hat{m}_t$ to banks.

$$\hat{m}_t = \alpha\hat{m}_{t-1} - \alpha\pi_t$$

- Banks issue deposits using reserves and assets $\hat{a}_t$ s.t. collateral constraint:

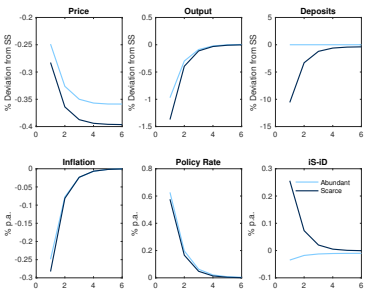
$$\hat{d}_t = \alpha_m\hat{m}_t + (1 - \alpha_m)\hat{a}_t$$

- Reserves abundant: no additional liquidity benefit
- Formally, model system very similar to CBDC model

Regime 2: Scarce Reserves

- CB controls interbank rate i_t^F via Taylor rule...
- ... and supplies reserves elastically to banks at $i_t^M = 0$
- Banks also subject to *liquidity constraint*
  - Require liquid assets to back deposits inflows
  - Use interbank market, reserves
- Reserves scarce: exhibit superior liquidity

Bank Model - Monetary Policy Shock



Abundant: retains most of CBDC dynamics

- policy strength decreases in market power

Scarce: closer to standard New Keynesian Model

- Deposit supply becomes interest-elastic
- Intuition: $\uparrow i_t^F \rightarrow$ cost of reserves, $(i_t^F - i_t^M)$ rises $\rightarrow$ cost of collateral rises $\rightarrow \hat{a}_t$ falls $\rightarrow (i_t^S - i_t^D) \uparrow$
- Result: Stronger policy as convenience *countercyclical*