Payments, Credit & Asset Prices

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Dollar payments; quarterly at annual rates

Enduser

Interbank w/ reserves

$ Trillions

Enduser

Interbank w/ reserves

$ Trillions

nonfinancial

NSCC/DTCC

FICC + FedSec

NSS

FedSec

FedFunds

other settlement

residual

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Simple model of payments & asset pricing

- Endusers = households & institutional investors
  - pay for goods & securities with payment instruments = inside money
  - payment instruments = deposits, MMMF shares, credit lines

- Banks handle enduser payment instructions
  - make interbank payments with reserves = outside money
  - liquidity management: hold reserves or rely on interbank credit?
  - capital structure: liquidity benefit vs leverage cost of pmt instruments

- Government issues debt & reserves, trades in securities

⇒ Questions
  - Interaction securities markets vs payment system
  - How does policy affect asset prices & nominal price level
  - What does an efficient payment system look like?
Baseline: only goods transactions require inside money
Extension: asset trades also require inside money

Households → Deposits → Banks → Equity → Active traders → Trees

Banks → Equity → Active traders

Banks → Overnight credit → Reserves

Trees

Bank trees

Nominal govmt debt

Reserves
Inside money: deposits & credit lines

Households → Banks
- equity
- credit lines
- deposits
- overnight credit

Banks → Active traders
- equity
- credit lines

Active traders → Trees

Banks → Bank trees

Nominal govmt debt

Reserves
Model summary

- **Households**
  - infinitely-lived, linear utility, averse to Knightian uncertainty
  - pay for goods with inside money

- **Financial institutions: banks & active traders**
  - maximize shareholder value, freely adjust equity, constant returns
  - idiosyncratic liquidity shocks require payments
    - banks pay with reserves (possibly borrowed)
    - active traders pay with inside money
  - bank leverage cost = resources used when commitments made
    - increases with interbank credit, inside money (incl. credit lines)
    - declines with value & safety of bank assets

- **Government**
  - interest rate on reserves, paths for short term debt & reserves
  - government leverage cost declines with claims on future taxes

- **Competitive equilibrium with flexible prices**
  - inside money supply, nominal price level & real asset prices
  - share of resources used up as leverage cost
Determination of prices

- Nominal price level: $PT = \bar{v}(D + L)$
  - bank supply of inside money $D + L$
  - $T$ includes institutional investor trades
  - inflation follows from growth rate of nominal govmt liabilities

- Opportunity cost of payment instruments
  - inside money in enduser layer: depends on bank leverage, liquidity cost
  - reserves in bank layer: depends on real return set by government

- Intermediary asset pricing
  - banks’ valuation high if collateral scarce
    - endogenous market segmentation
    - e.g. short interest rate priced only by banks
  - active traders’ valuation high if inside money cheap
Steady state equilibria with goods trade only

- plot aggregate bank leverage & real reserves
- real short interest rate inversely related to bank leverage

- scarce reserves
  - banks borrow reserves
  - if large liquidity shock
  - (US before 2008)

- abundant reserves
  - banks never borrow
  - (US since 2008)
Capital structure curve

- What bank leverage needed to handle transactions \( T \) given reserves?
- Slopes down in plane: more collateral \( \rightarrow \) lower leverage

- Steeper if banks’ share of nominal assets higher
- More real reserves (given nominal reserves) \( \Rightarrow \) lower price level
  increases nominal collateral
Liquidity management curve

- What leverage maintains return on equity given reserves?
- Slopes upward in plane: reserves less scarce / useful → more leverage

- scarce reserves: more reserves less interbank credit less leverage cost
- abundant reserves: no liquidity benefit leverage constant short rate = reserve rate
Shifts in capital structure curve

- Shift up: less collateral in banking system
- More leverage needed at any given level of reserves

- open market purchase
  = fewer bonds
  = less collateral

- new steady state:
  real rate decreases
  price level increases
  (less than reserves!)

- large shift makes reserves abundant
Shifts in liquidity management curve

- Shift down: higher real return on reserves
- Lower leverage needed to maintain same return on equity

- higher interest on reserves or lower growth rate of nominal liabilities
  → lower tax on reserves
  
  - new steady state: real rate increases price level decreases
Shifts in liquidity management curve

- Shift down: higher real return on reserves
- Same return on equity at lower leverage

- Large shift makes reserves abundant
- Policy tools then: unconventional trades
- Real return on reserves
- Banks’ share of nominal assets matters for slope of CS curve & price level
Optimal policy

- Minimize total cost of leverage = move towards origin
- Trade off bank vs government leverage

- abundant reserves optimal only if government borrowing cheap
- select optimal equilibrium via real return on reserves
Increase in uncertainty with active traders

- **Shift up**: bank collateral worth less
- **Shift down**: lower demand for inside money from active traders

forces on price level:
- inside money supply ↑
- inside money demand ↓

details of financial structure matter!
Summary of main results

- Interaction securities markets vs payment system
  - value of banks’ collateral $\rightarrow$ supply of inside money
  - value of institutional investor trades $\rightarrow$ demand for inside money

- Government policy tools
  1. set real return on reserves = tax on intermediate input
  2. change mix of collateral by issuing or trading securities
    - both affect collateral & liquidity benefits on assets
      - permanent effects on real asset prices
      - policy stance cannot be summarized by interest rates alone

- Scarce vs abundant reserves?
  - select by setting interest on reserves, nominal liabilities
  - optimal policy depends on government vs bank leverage costs