Maturity Transformation and Liquidity

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Motivation

• **Main Question:** Who is best placed to,
  1. Transform Maturity
  2. Provide Liquidity
• Banks and other financial intermediaries best placed to transform maturity
• But how well are they placed to provide liquidity?
Motivation 2

• Two main observations:
  1. Financial innovation seeks to make better use of cash or capital reserves
     – Lower cash holdings
     – Higher leverage and
     – Lower equity capital buffer

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• Greater exposure to maturity/liquidity risk
Motivation 3

2. Financial innovation has increasingly taken the form of greater reliance on markets as a source of liquidity

\[ \rightarrow \]

- Liquidity crises in recent years have been securities market crises and not so much bank-run crises
Motivation 4

Build a model with:

- Maturity transformation by financial intermediaries (FIs) and liquidity provision by both FIs and through markets (HFIs),
- Asset valuation problem inherent in securities markets liquidity crises
- Endogenous timing of trade in a liquidity crisis,
Figure 1: Expected Payoffs on long duration asset
Key Results

• First-best efficiency $\rightarrow$ trade at date $1^+$

BUT…
• FI over-invest in cash or capital reserves in equilibrium

=>
• may be desirable to induce trade at date $1^-$ as a way of mitigating asset valuation problems and improving liquidity provision by markets
Related literature

- Rochet and Vives (2004)
- Wagner (2007)
- Allen and Carletti (2007)
The model

• 3 periods: 0, 1-, 1+, 2

• Date 0:
  – FIs compete to raise funds from investors
  – FIs choose portfolio composition between cash $\alpha$ and long duration asset ($1 - \alpha$)
  – Hedge Funds (HFs) determine portfolio composition between cash $\pi$ and long-term asset ($K - \pi$)
The model 2

• Date 1:
  – long duration asset matures with probability $\lambda$ and yields $D$
  – In the event that the long duration asset matures later FIs may sell their assets for cash to HFs
  – Investors in FIs redeem their investments and consume their wealth

• Date 2:
  – HFs consume their wealth
The model 3

- **Preferences:** investors and HFs are risk-neutral
  =>
- Unlike in Diamond and Dybvig (1983) there is no role for risk-sharing

- But there are gains from trade between investors and HFs by selling claims to the long duration asset (when it matures in period 2) against cash in period 1
  =>
- Main potential inefficiency is an ex-ante inefficiency
- There is no ex-post or interim inefficiency!
The model 4

- **Endowments and Assets:**
  
  1. **Hedge Funds**

     Start with $\varepsilon K \rightarrow \pi$ cash $(K - \pi)$ long-term investment with gross return $\varepsilon K \approx \gamma$

  2. **Financial Intermediaries**

     Raise $\varepsilon l \rightarrow \alpha$ cash $(1 - \alpha)$ long-duration asset

     Make zero profit in equilibrium

     Face maturity risk: $\lambda \rightarrow D$ in period 1-

     $(1 - \lambda) \rightarrow \eta D$ in periods 1+ or 2
The model 5

• Asset valuation problem
  – When asset does not mature at date 1\(-\) FIs can either trade the asset immediately for cash at price P\(-\) or delay their trade
  – If they delay their trade to date 1\(+\) they may get lucky and see the asset mature at date 1\(+\); this happens with probability 0\(\).
  – When the asset matures at date 1\(+\) it is worth either D (with probability 0\(\)) or 0 (with probability 1-0\(\)) [this is private information to FI]
  – When asset matures at date 2 (with probability 1-0\(\)) it is worth in expectation 0\(D\).
Analysis

- Basic Assumption:

  ⇒ Without Hedge Funds FIs do not invest in long-duration asset; they only hold cash!

  ⇒ For $K$ large enough and $\epsilon$ low enough, or for sufficiently high welfare weight $(1-\gamma)$ on HFs it is optimal to set $\alpha = 0$!
Analysis 2

• Two types of equilibrium:

1. Delayed trading equilibrium
   – Only trade at 1+ when long-duration asset matures at date 2 or when FI learns that asset is worthless \((D = 0);\) private information to FIs

\[
P_{d} = \frac{1}{1+D}
\]
Analysis 3

2. Immediate trading equilibrium
   - Trade at 1- when there is no asymmetric information about long-duration asset

   \[ P^i \begin{array}{c} \mathcal{E} \\ \mathcal{V} \end{array} \Rightarrow \begin{array}{c} \mathcal{E} \\ \mathcal{V} \end{array} \frac{1}{1} \begin{array}{c} \mathcal{E} \\ \mathcal{V} \end{array} \]

   • **Tradeoff:** better asset valuation vs. better realized early asset returns
Analysis 4

- Welfare optimum:

\[
\max \mathcal{E} \leftrightarrow I \rightarrow E \leftrightarrow I \leftrightarrow H
\]

Subject to:
1. Ex-ante participation constraints
2. Resource constraints
3. Interim participation constraints
4. Incentive compatibility constraints
Main Results

1. Optimal to trade at date 1+
2. Optimal to rely on market liquidity as much as possible
3. Delayed trading equilibrium is generally inefficient as FIs hold too much cash
4. Better investment in cash in an Immediate trading equilibrium

Basic logic: FIs get too low a price for long duration asset when they need liquidity

(Similar to Allen & Gale or Allen & Carletti)
Policy Implications

Policy implications are somewhat counterintuitive:

1. Tax holdings of cash by FIs
2. Enforce *stop-loss* or *Var*-type rules that induce FIs to trade early (at date 1-)
3. Reward cash holdings by HFs (but how?)
4. Increase *transparency* of FIs?

→ Rules for FIs may also apply to short-termist HFs
Conclusion and caveats

- Market-based liquidity maximizes gains from trade between long-horizon and short-horizon investors
- But efficiency of market-based liquidity constrained by asset valuation problems
- Important missing ingredient: moral hazard in investment by FIs