Dynamic Asset-Backed Security Design

Discussion of Ozdenoren, Yuan, Zhang

by Saki Bigio (UCLA)
on May 27, 2021
Introduction
Overview

- Comment: view paper as static security design w/ long-lived assets
  - dynamic security in the spirit of dynamic contracts
> Overview

* Comment: view paper as static security design w/ long-lived assets
  * dynamic security in the spirit of dynamic contracts

* Beautiful Economics
  * feedback: future prices to extent of asymmetric information

* Discussion
  * simplify/clarify model
  * discuss features
Models of private information in financial market:

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<th>Market Structure \ Security</th>
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- Embedded funding friction
  - Kiyotaki & Moore, Kurlat, Bigio
  - investigate stability when asset is long-lived
  - market structure
Simplified Model
Core Model

* Holmstrom-Tirole notation
Core Model

* Holmstrom-Tirole notation

* Population
  * entrepreneur: linear $U$, long-lived discount $\beta$, specialist,
  * investor: linear $U$, live one period, OLG, deep pocket

* Asset
Core Model

* Holmstrom-Tirole notation

* Population
  * entrepreneur: linear $U$, long-lived discount $\beta$, specialist,
  * investor: linear $U$, live one period, OLG, deep pocket

* Asset
  * Lucas tree
  * State: $Q \in \{L, H\}$
  * Fruit: $s(H) > s(L)$
  * Symmetric Markov chain:
    \[
    P = \begin{bmatrix}
    p & 1 - p \\
    1 - p & p
    \end{bmatrix}
    \]
  * Unconditional prob: 1/2
Timing + Information

- Market design
  - once at time 0
> Timing + Information

* Market design
  * once at time 0

* Each period $t$, two stages
  * contracting stage
    * matched
    * agents can opt out
    * entrepreneur: exploits private information
  * settlement, resell
    * investor paid
    * if ends with collateral, resells at spot market
> Timing + Information

- Market design
  - once at time 0

- Each period $t$, two stages
  - contracting stage
    - matched
    - agents can opt out
    - entrepreneur: exploits private information
  - settlement, resell
    - investor paid
    - if ends with collateral, resells at spot market

- Investment opportunity
  - great return $\rho > 1$
  - but not too much, $\rho < 2$
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Assume $\beta = 0$

In a pooling equilibrium

Good asset sold if:

$$\rho \mathbb{E}[s] - s(H) > 0$$

Otherwise, market unravels (not separates)

- single “static” equilibrium
- depends on “information sensitivity”
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Classic Akerlof + long-lived asset

* Assume $\beta > 0$

* Asset price is $\phi(Q)$

* Good asset sold if: $\rho \mathbb{E}[s + \phi] > s(H) + \phi(H)$

* Re-arranging condition:
  
  $$\rho (\mathbb{E}[s] - s(H)) + \rho (\mathbb{E}[\phi] - \phi(H)) > 0$$

  Akerlof condition + price condition
> Classic Akerlof + long-lived asset

* Observation
  * Akerlof condition may fail
    \[
    \rho \left( \mathbb{E}[s] - s(H) \right) < 0
    \]
    Akerlof condition
  * still, prices may sustain equilibrium if:
    \[
    \rho \left( \mathbb{E}[\phi] - \phi(H) \right) >> 0
    \]
    price condition

* Multiplicity: strategic complementarity
> long-lived asset

Strategic complementarity

* If market illiquid:
  * Lucas price:

\[ \phi (Q) = \mathbb{E} \left[ \sum_{t} \beta^t s_{t+1} | Q \right] \]

* high information sensitivity $\implies$ illiquid market

* If market liquid:
  * conjecture constant resale price

\[ \phi = \rho \mathbb{E} [s] + \frac{(\rho - 1) \phi}{1 - \beta} \]

* no information sensitivity $\implies$ liquid market
Classic Akerlof + long-lived asset

Compstats:

* Recall need

\[ \rho \left( \mathbb{E} [\phi] - \phi (H) \right) > 0 \]

* Higher \( \beta \) helps scale up price relative to \( s \)
* Persistence \( p \) creates greater sensitivity
> **Spot - Short Lived**

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Security Design

- Market unravels if Akerlof condition fails

\[ \rho \mathbb{E}[s] - s(H) < 0 \implies s(L) < \frac{\Lambda}{\frac{2}{\rho} - 1} s(H) \]
Security Design

* Market unravels if Akerlof condition fails

\[ \rho \mathbb{E}[s] - s(H) < 0 \implies s(L) < \frac{\Lambda}{s(H)} \equiv \left( \frac{2}{\rho} - 1 \right) \]

* This sucks!
  * lose ability to invest in good state
Security Design

* Clever idea: security design
  * issue debt $D$
  * default if $s < D$
Security Design

*Clever idea: security design
  * issue debt $D$
  * default if $s < D$

*Collateralized
  * Akerlof condition:
    \[ s(L) = \Lambda \cdot D \]
  * sold at:
    \[ q = \frac{1}{2} (s(L) + D) \]
  * Self financed:
    \[ D < s(H) \]
    \[ s(L) = s(L) \]
### Spot - Short Lived

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Security Design

- Condition:

\[ s(L) + \phi(L) < \Lambda (s(H) + \phi(H)) \]
Security Design

- Condition:
  \[ s(L) + \phi(L) < \Lambda (s(H) + \phi(H)) \]

- Same principle

- Uniqueness
  - Always issue debt
  - Constant price: \( q \)
  - Per unit return is unique
  \[ \phi = \frac{\rho q}{1 - \beta} \]
Comments
> Some Comments

* Comment 1:
  * security design assumes ex-ante commitment
  * fine only in some market
  * Bigio-Shi (2020) with ex-post competition
    * curious to see dynamics there

* Comment 2:
  * Message here: securitization reduces volatility
  * but Brunnermeier-Pedersen
    * asset-backed securities
    * re-hypothecation: generates large spirals
    * amplification of aggregate shocks
    * tail events provoked by leverage
  * curious to know if you could build both