Repos, Fire Sales and Bankruptcy Policy

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Discussion Overview

- Model to rationalize delay of collateral execution
  - Automatic Stay

Discussion Overview

- Model to rationalize delay of collateral execution
  - Automatic Stay
- Agenda
  - Layout simplified version of model
  - Discuss Key Frictions
  - Discuss Policy Interventions

Environment

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  - Two-periods, t=0,1.

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- **Commodity Space**
  1. Storable Consumption Goods (c)
  2. Non-Storable Input Goods (x)

Environment - II

- **Preferences:**
  1. Linear in t=1 consumption

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  1. Linear in t=1 consumption
- **Endowments:**
  1. Traders: $\bar{w}$ consumption goods at t=0.
  2. Investors: 0

Technologies - Early Trader

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  - t=0
  - one-for-one: c$\longrightarrow x$
  - irreversible

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  - t=0
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- **Risky productive technology:**
  - t=0
  - $x \rightarrow c$ according to

$$f(x) = \begin{cases} A_0 x^{\alpha} & w.p.\ \frac{1}{2} \\ x & w.p.\ \frac{1}{2} \end{cases}$$

Technologies - Late Trader

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- Linear technology:
  - t=1
  - one-for-one: c$\rightarrow x$
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Technologies - Investor

- Investor: one technology
- productive technology:
  - t=1
  - $x \rightarrow c$ according to $A_1 x^{\alpha}$
  - $\lambda = \frac{A_0}{A_1}$

Resource Allocation Problem

- **Investor:** access to technology
- **Late Trader:** has production input
- **Early Trader: potentially** has trading input
- Inputs should be allocated to Investor at t=1. How?

OTC - Markets

- Investor matched with **at most one** trader
  - π probability trader is matched:

$$\begin{cases} 0 & \text{no participation} \\ 1 & \text{single participation} \\ \frac{1}{2} & \text{double participation} \end{cases}$$

OTC - Markets

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- **Walrasian** prices
- **Congestion Externality**
  - Cannot buy-out other trader not to participate

Agent Problems - Early Trader

- **Early Trader**

$$\max_x c + \frac{1}{2}A_0 x^\alpha + \frac{1}{2}\pi p_1 x$$

subject to:

$$c + x = \bar{w}$$

Agent Problems - Late Trader

- **Late Trader:**

$$\max_x c + \pi p_1 x$$

subject to:

$$c + x = \bar{w}$$

Agent Problems - Investor

- Once matched, buys input
- To maximize profits:

$$\max_{x} A_1 x^{\alpha} - px.$$

- Inelastic supply schedule

Equilibrium - Competitive

1. Prices $\left(p_1^{ET}, p_1^{LT}\right)$
2. Participation Rules
3. Input Investments $\left(x_0^{ET}, x_1^{LT}\right)$ and input demand $\left(x_1^{I}\right)$
4. Such that, markets clear given match, inputs are optimal

F.O.C.

- Investor's FOC:

$$p = \alpha A_1 x^{\alpha - 1}$$

F.O.C.

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$$p = \alpha A_1 x^{\alpha - 1}$$

- Thus, $px = \alpha A_1 x^{\alpha}$.

Traders' Problems

- **Late Trader:**

$$\max_{x} \underbrace{\bar{w} - x}_{c} + \pi \underbrace{\alpha A_1 x^{\alpha}}_{px}$$

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- **Late Trader:**

$$\max_x \underbrace{\bar{w} - x}_{c} + \pi \underbrace{\alpha A_1 x^\alpha}_{px}$$

- **Early Trader:**

$$\max_x \underbrace{\bar{w} - x}_{c} + \frac{1}{2} \underbrace{A_0 x^\alpha}_{\text{success}} + \frac{1}{2} \underbrace{\pi p_1 x}_{\text{failure}}$$

Solutions

- **Concavity:** $\pi^{ET} = \pi^{LT} = \frac{1}{2}$

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- **LT:**

$$\bar{w} + \max_{x} \frac{1}{2}\alpha A_1 x^{\alpha} - x$$

$$\rightarrow \quad x^{LT} = \left[\frac{\alpha^2 A_1}{2}\right]^{\frac{1}{1-\alpha}}$$

Solutions

- **Concavity:** $\pi^{ET} = \pi^{LT} = \frac{1}{2}$
- **LT:**

$$\bar{w} + \max_x \frac{1}{2}\alpha A_1 x^\alpha - x$$

$$\rightarrow \quad x^{LT} = \left[\frac{\alpha^2 A_1}{2}\right]^{\frac{1}{1-\alpha}}$$

- **ET:**

$$\bar{w} + \max_x \frac{1}{2}\left(A_0 + \frac{\alpha A_1}{2}\right) x^\alpha - x$$

$$\rightarrow \quad x^{ET} = \left[\frac{1}{2}\left(\underbrace{\alpha A_0}_{ET-FOC} + \underbrace{\frac{\alpha^2 A_1}{2}}_{LT-FOC}\right)\right]^{\frac{1}{1-\alpha}}$$

The Planner

- At t=0 decides on input use:

$$\bar{w} + \max_{\{x_o\}} \frac{1}{2} f_0(x_0) - x_0 + \frac{1}{2} \underbrace{V^2(x_0)}_{\text{No t=0 no success}} + \frac{1}{2} \underbrace{V^2(0)}_{t=0 \text{ success}}$$

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- At t=1 decides on input use:

$$V^2(x_0) = \max_{\{xo\}} \bar{w} - x_1 + \max \left\{ \underbrace{f_1(x_o)}_{\text{Use } x_0}, \underbrace{f_1(x_1)}_{\text{Use New Input}} \right\}$$

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- Value of using x_0:

$$V^2(x_0) = \bar{w} + f_1(x_o)$$

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- Value of using x_0:

$$V^2(x_0) = \bar{w} + f_1(x_o)$$

- Value with x_1

$$V^2(0) = \bar{w} + A_1^{\frac{1}{1-\alpha}} \left[\alpha^{\frac{\alpha}{1-\alpha}} - \alpha^{\frac{1}{1-\alpha}} \right]$$

The Planner's Solution

- Time-Zero Value Function

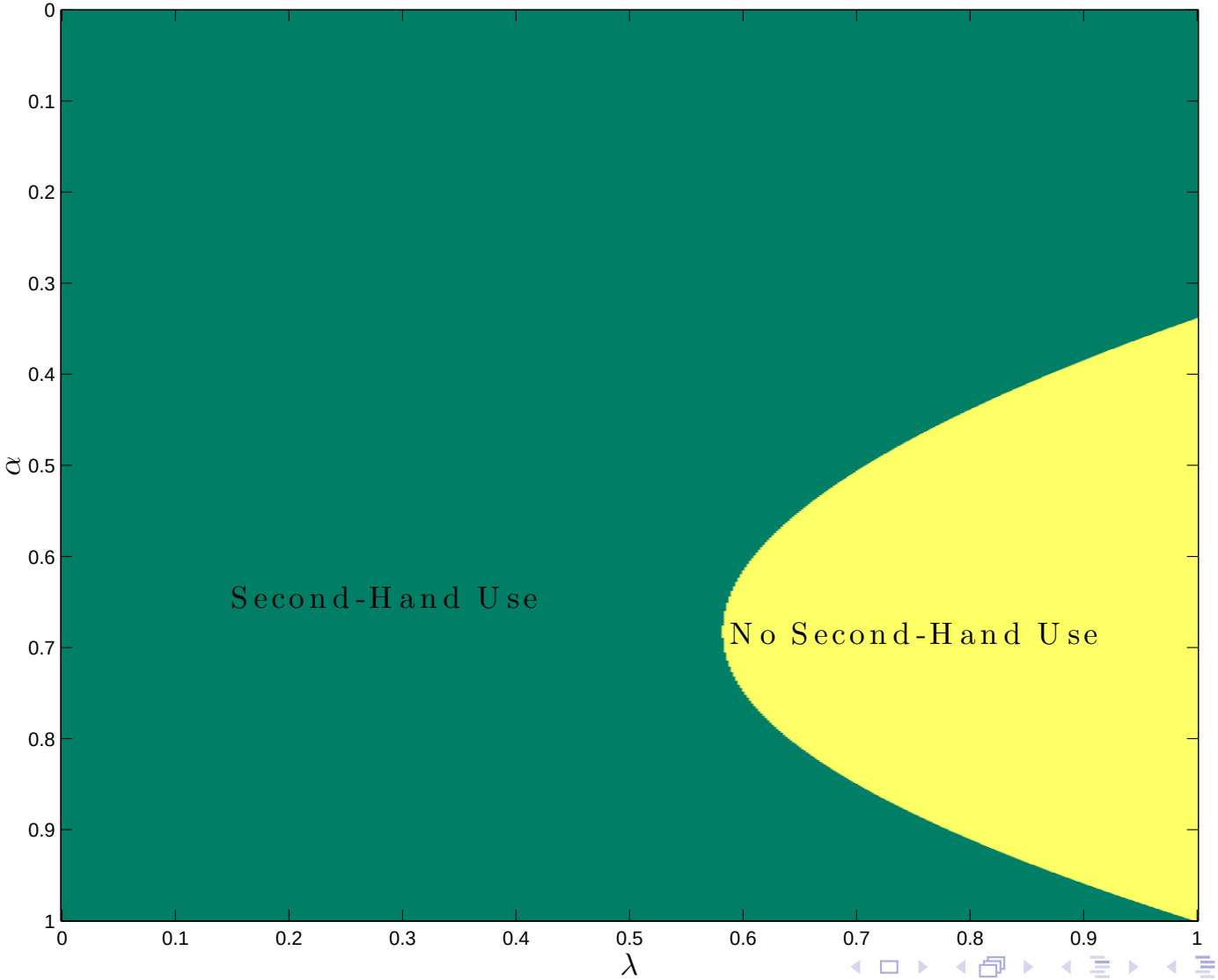
$$\max_{\{x_0\}} \frac{1}{2} f_0(x_0) - x_0 + \frac{1}{2} \max \left\{ f_1(x_o), A_1^{\frac{1}{1-\alpha}} \left[\alpha^{\frac{\alpha}{1-\alpha}} - \alpha^{\frac{1}{1-\alpha}} \right] \right\} + \frac{1}{2} V^2(0)$$

- so x_0 :

$$x_0^{No\ \text{Sec Use}} = \left[\frac{\alpha A_0}{2} \right]^{\frac{1}{1-\alpha}}$$

$$x_0^{\text{Sec Use}} = \left[\frac{1}{2} \left(\underbrace{\alpha A_0}_{ET-FOC} + \underbrace{\alpha A_1}_{LT-FOC} \right) \right]^{\frac{1}{1-\alpha}}$$

Planner - Optimal Input Use



Economic Forces - Distortions

1. **Incomplete Markets**: ET may participate when he shouldn't !
2. **Incomplete Markets:** LT may participate when he shouldn't!
3. **Incomplete Markets:**
   - Ex-ante intensity of investment
   - Call it "FIRE-SALES"
4. **Monopsony Effect:** price impact

Policy Issues

1. Parameters Restrictions
   - ET should not participate in second market (Yellow)
   - Intensity Distortion
   - Monopsony effect - possibly
2. Parameters could be different
   - LT should not participate in second market (Green)

Policy Issues

- Think of ET as REPO market
  - Success: in $f(x)$ good outcome
  - Failure: x collateral
  - Policy: delay transfer of x
    - Eliminates bad congestion effect
    - Good Policy in yellow area
    - May correct price distortion

Policy Issues

- **Finite Time:** Policy works in two-period model
  - $t < T$: postponed collateral same effect in t+1
  - Expectation of lower future prices may freeze market t, t+1
- Opposite Policy
  - LT should not participate in second market (Green)
  - Can governments distinguish green vs. yellow?

Policy Issues

- **Policy Strategy**: use a friction to solve another friction
- Motivation: OTC markets
  - May or may not impose capacity (physical) constraints
- Even if constraint is PHYSICAL
  - Dynamic matching?
  - Why not wait?
- Auctions?

What about REPO?

- Nothing inherent to REPO
- I'm not an expert but:
  - Specific Contract: Haircuts
  - Quick transactions
  - Substitute to Collateralized Debt
  - TRI-Party
- REPO:
  - What FRICTIONS lead to emergence of REPO?

Summary

- Fun exercise:
  - This is why I like models!
- Not convinced model:
  - Makes a solid case for delaying collateral execution