Endogenous Lemon Markets: Risky Choices and Adverse Selection

Avi Lichtig and Ran Weksler

Hebrew University of Jerusalem

The Market for Lemons

The Market for Lemons

- Akerlof (1970): a seller and a competitive market of buyers.

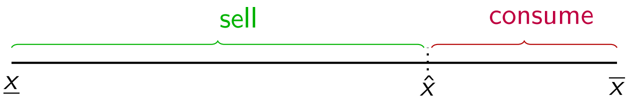
The Market for Lemons

- Akerlof (1970): a seller and a competitive market of buyers.
- The seller has an asset of type x; private information.

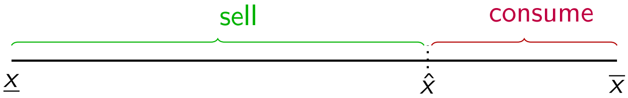
The Market for Lemons

- Akerlof (1970): a seller and a competitive market of buyers.
- The seller has an asset of type x; private information.
- The seller can
  - utilize the asset and obtain $v_s(x)$.
  - sell the asset and obtain p.

Equilibrium



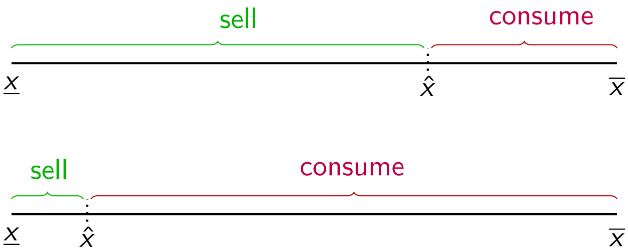
Equilibrium



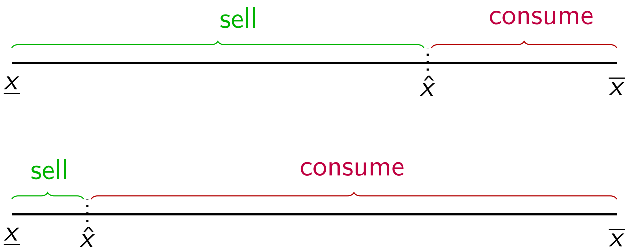
$$\mathbb{E}_F\left[v_b\left(x\right)|x \leq \hat{x}\right] = v_s\left(\hat{x}\right) = p.$$

Prediction

Prediction

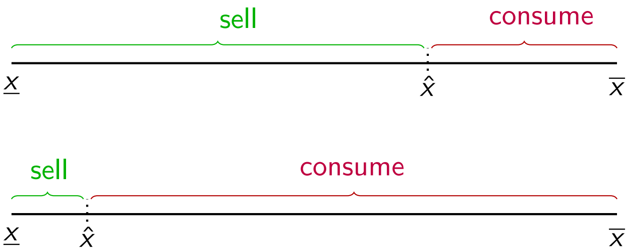

sell
consume
$\underline{x}$
$\hat{x}$
$\overline{x}$
sell
consume
$\underline{x}$
$\hat{x}$
$\overline{x}$

Prediction



- Both are consistent with the model.

Prediction



- Both are consistent with the model.
- Indeterminacy of adverse-selection severity.

Distribution Endogeneity

Distribution Endogeneity

- In Akerlof's (1970) model the distribution is exogenous.

Distribution Endogeneity

- In Akerlof's (1970) model the distribution is exogenous.
- Consider the illiquidity in financial markets during the crisis of 2007–2008.

Distribution Endogeneity

- In Akerlof's (1970) model the distribution is exogenous.
- Consider the illiquidity in financial markets during the crisis of 2007–2008.
- According to the literature, a result of adverse selection; e.g., Philippon and Skreta (2012) and Tirole (2012).

Distribution Endogeneity

- In Akerlof's (1970) model the distribution is exogenous.
- Consider the illiquidity in financial markets during the crisis of 2007–2008.
- According to the literature, a result of adverse selection; e.g., Philippon and Skreta (2012) and Tirole (2012).
- Decisions of a banker affect the value of a traded MBS.

Distribution Endogeneity

- In Akerlof's (1970) model the distribution is exogenous.
- Consider the illiquidity in financial markets during the crisis of 2007–2008.
- According to the literature, a result of adverse selection; e.g., Philippon and Skreta (2012) and Tirole (2012).
- Decisions of a banker affect the value of a traded MBS.
- What if the distribution of the traded asset is endogenous?

Connecting the Two Points

- We study an Akerlof (1970) model with a preliminary stage, in which, actions of the seller affect the distribution of the traded asset.

Connecting the Two Points

- We study an Akerlof (1970) model with a preliminary stage, in which, actions of the seller affect the distribution of the traded asset.
- We ask: is there a reason for us to expect a market failure?

Connecting the Two Points

- We study an Akerlof (1970) model with a preliminary stage, in which, actions of the seller affect the distribution of the traded asset.
- We ask: is there a reason for us to expect a market failure?
- If the actions of the seller are observed by the buyers, the seller behaves efficiently.

Connecting the Two Points

- We study an Akerlof (1970) model with a preliminary stage, in which, actions of the seller affect the distribution of the traded asset.
- We ask: is there a reason for us to expect a market failure?
- If the actions of the seller are observed by the buyers, the seller behaves efficiently.
- Each action defines a different "Akerlof Game", and in each, the seller pockets all social welfare.

Connecting the Two Points

- We study an Akerlof (1970) model with a preliminary stage, in which, actions of the seller affect the distribution of the traded asset.
- We ask: is there a reason for us to expect a market failure?
- If the actions of the seller are observed by the buyers, the seller behaves efficiently.
- Each action defines a different "Akerlof Game", and in each, the seller pockets all social welfare.
- If the actions are unobservable, e.g., a banker whose decisions are based on private information, then "lemon" markets are endogenous.

Intuition

- The seller's equilibrium payoff has an option value: he sells low realizations and consumes high ones.

Intuition

- The seller's equilibrium payoff has an option value: he sells low realizations and consumes high ones.
- Therefore, the seller's equilibrium behavior is characterized by a risk-seeking property.

Intuition

- The seller's equilibrium payoff has an option value: he sells low realizations and consumes high ones.
- Therefore, the seller's equilibrium behavior is characterized by a risk-seeking property.
- Under a natural condition (location independent risk), this behavior implies low trade and welfare in equilibrium.

An Additional Example

- An entrepreneur is setting a startup company.

An Additional Example

- An entrepreneur is setting a startup company.
- Private decisions: HR strategy, capital allocation, etc.

An Additional Example

- An entrepreneur is setting a startup company.
- Private decisions: HR strategy, capital allocation, etc.
- Those decisions affect the distribution of the company's value at the exit stage.

Related Literature

- Disclosure: Ben-Porath, Dekel and Lipman (2017), DeMarzo, Kremer and Skrzypacz (2019).
- Information structure in Akerlof's (1970) model: Doherty and Thistle (1996), Levin (2001).
- Insurance: Jewitt (1989), Landsberger and Meilijson (1994).
- The hold-up problem: Gul (2001), Hermalin and Katz (2009), Hermalin (2013), Dilmé (2019).

The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.

The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.
- Then, Nature chooses x according to F.

The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.
- Then, Nature chooses x according to F.
- Finally, the seller steps into a trade game à la Akerlof (1970).

The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.
- Then, Nature chooses x according to F.
- Finally, the seller steps into a trade game à la Akerlof (1970).
- In this presentation:
  - $v_s(x) = x$.
  - $v_b(x) = x + \Delta$, $\Delta > 0$.

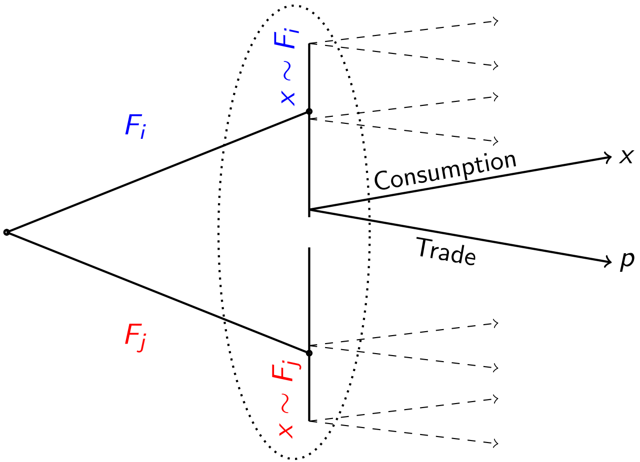
The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.
- Then, Nature chooses x according to F.
- Finally, the seller steps into a trade game à la Akerlof (1970).
- In this presentation:
  - $v_s(x) = x$.
  - $v_b(x) = x + \Delta$, $\Delta > 0$.
- The market is competitive, i.e., $p = \mathbb{E}[x + \Delta | x \leq p]$

The Extended Trade Game

- First, the seller chooses a probability distribution $F \in \mathcal{F}$ (finite).
- The choice is unobservable.
- Then, Nature chooses x according to F.
- Finally, the seller steps into a trade game à la Akerlof (1970).
- In this presentation:
  - $v_s(x) = x$.
  - $v_b(x) = x + \Delta$, $\Delta > 0$.
- The market is competitive, i.e., $p = \mathbb{E}[x + \Delta | x \leq p]$ (taken according to market's beliefs w.r.t. the seller's strategy in the first stage.)

The Extended Trade Game



Example

- The seller chooses between two projects

$$X_1 = 1 \text{ w.p. } 1, \; X_2 = \begin{cases} 0 & \text{w.p. } \frac{3}{5} \\ 2 & \text{w.p. } \frac{2}{5} \end{cases}$$

- $\Delta = \frac{1}{2}$.

Example

- The seller chooses between two projects

$$X_1 = 1 \text{ w.p. } 1, \; X_2 = \begin{cases} 0 & \text{w.p. } \frac{3}{5} \\ 2 & \text{w.p. } \frac{2}{5} \end{cases}$$

- $\Delta = \frac{1}{2}$.
- $p_1 = \frac{3}{2}$; probability of trade $= 1$.

Example

- The seller chooses between two projects

$$X_1 = 1 \text{ w.p. } 1, \; X_2 = \begin{cases} 0 & \text{w.p. } \frac{3}{5} \\ 2 & \text{w.p. } \frac{2}{5} \end{cases}$$

- $\Delta = \frac{1}{2}$.
- $p_1 = \frac{3}{2}$; probability of trade $= 1$.
- $p_2 = \frac{1}{2}$; probability of trade $= \frac{2}{5}$.

Example

- The seller chooses between two projects

$$X_1 = 1 \text{ w.p. } 1, \; X_2 = \begin{cases} 0 & \text{w.p. } \frac{3}{5} \\ 2 & \text{w.p. } \frac{2}{5} \end{cases}$$

- $\Delta = \frac{1}{2}$.
- $p_1 = \frac{3}{2}$; probability of trade $= 1$.
- $p_2 = \frac{1}{2}$; probability of trade $= \frac{2}{5}$.
- Claim: in the unique equilibrium of the extended trade game, the seller chooses X_2 and only "lemons" are traded.

Example (cont.)

- Assume that the seller is choosing X_1 in equilibrium.

Example (cont.)

- Assume that the seller is choosing X_1 in equilibrium.
- The seller's profit is

$$p_1 = \frac{3}{2} < 2.$$

Example (cont.)

- Assume that the seller is choosing X_1 in equilibrium.
- The seller's profit is

$$p_1 = \frac{3}{2} < 2.$$

- The seller can deviate to X_2 and then sell the asset only if a "lemon" is realized

$$\frac{3}{5} \cdot p_1 + \frac{2}{5} \cdot 2 > p_1.$$

Example (cont.)

- Assume that the seller is choosing X_1 in equilibrium.
- The seller's profit is

$$p_1 = \frac{3}{2} < 2.$$

- The seller can deviate to X_2 and then sell the asset only if a "lemon" is realized

$$\frac{3}{5} \cdot p_1 + \frac{2}{5} \cdot 2 > p_1.$$

- The same argument holds in any mixed equilibrium.

The Trade Stage Game

- First, a concise analysis of a trade game in which $x \sim F$.

The Trade Stage Game

- First, a concise analysis of a trade game in which $x \sim F$.

Assumptions

- $x \geq 0$.
- positive density over $\mathbb{R}_+$: $f(x) > 0 \; \forall x \geq 0$.
- F is log-concave.

The Trade Stage Game

- First, a concise analysis of a trade game in which $x \sim F$.

Assumptions

- $x \geq 0$.
- positive density over $\mathbb{R}_+$: $f(x) > 0 \ \forall x \geq 0$.
- F is log-concave.

- log-concavity $\Longrightarrow$ unique equilibrium

The Trade Stage Game

- First, a concise analysis of a trade game in which $x \sim F$.

Assumptions

- $x \geq 0$.
- positive density over $\mathbb{R}_+$: $f(x) > 0 \; \forall x \geq 0$.
- F is log-concave.

- log-concavity $\Longrightarrow$ unique equilibrium
- unboundedness $\Longrightarrow$ equilibrium in the interior

Welfare in Equilibrium

- Denote the unique equilibrium price by $\hat{p}_F > 0$:

$$\mathbb{E}_F\left[x + \Delta | x \leq \hat{p}_F\right] = \hat{p}_F$$

.

Welfare in Equilibrium

- Denote the unique equilibrium price by $\hat{p}_F > 0$:

$$\mathbb{E}_F \left[x + \Delta | x \leq \hat{p}_F \right] = \hat{p}_F$$

.

- For every $F \in \mathcal{F}$, let

Definition

- $PT(F) := F(\hat{p}_F)$
- $SW(F) := \int_0^{\hat{p}_F} v_b(x) f(x) \, dx + \int_{\hat{p}_F}^{\infty} v_s(x) f(x) \, dx$

Second-order Stochastic Dominance

Definition

Let $F_1, F_2 \in \mathcal{F}$. F_1 dominates F_2 in the sense of second-order stochastic dominance if

$$\int_0^t F_1(x)\,dx \leq \int_0^t F_2(x)\,dx,$$

for every $t \geq 0$.

Strong Second-order Stochastic Dominance

Definition

Let $F_1, F_2 \in \mathcal{F}$. F_1 dominates F_2 in the sense of strong second-order stochastic dominance if

$$\int_0^t F_1(x)\,dx < \int_0^t F_2(x)\,dx,$$

for every $t > 0$.

Excessive Risk

- Denote the seller's strategy at the first stage by $\alpha \in \Delta(\mathcal{F})$.

Excessive Risk

- Denote the seller's strategy at the first stage by $\alpha \in \Delta(\mathcal{F})$.

Theorem 1

Let $F_1, F_2 \in \mathcal{F}$ be two distributions such that

- $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$, and
- $F_1 \succ_{SSOSD} F_2$.

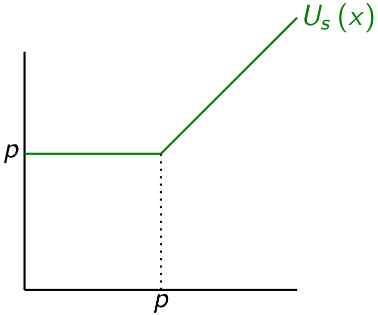
Then, in any equilibrium of the extended trade game, $\alpha_1 = 0$.

Intuition

- The seller's equilibrium payoff, $U_s(x)$, is convex.

Intuition

- The seller's equilibrium payoff, $U_s(x)$, is convex.

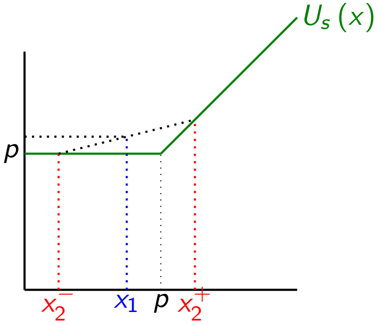


Intuition

- SOSD + equal expectation implies
  - $X_2 \overset{d}{=} X_1 + \epsilon$, where $\mathbb{E}\left[\epsilon | X_1 = x\right] = 0 \ \forall x$.

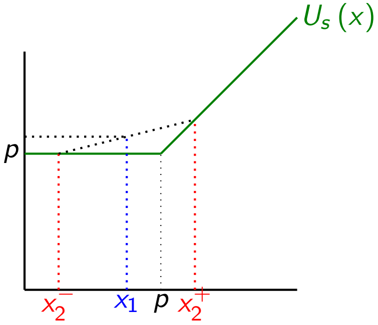
Intuition

- SOSD + equal expectation implies
  - $X_2 \overset{d}{=} X_1 + \epsilon$, where $\mathbb{E}\left[\epsilon | X_1 = x\right] = 0 \; \forall x$.



Intuition

- SOSD + equal expectation implies
  - $X_2 \overset{d}{=} X_1 + \epsilon$, where $\mathbb{E}\left[\epsilon | X_1 = x\right] = 0 \ \forall x$.



- SSOSD: such realizations exist.

Risk and Trade

- Which distribution induces more trade?

Risk and Trade

- Which distribution induces more trade?
- $F_1 = U[50, 150]$ or $F_2 = U[0, 200]$

Risk and Trade

- Which distribution induces more trade?
- $F_1 = U[50, 150]$ or $F_2 = U[0, 200]$
- Note $X_2 \overset{d}{=} 2X_1 - 100$

Risk and Trade

- Which distribution induces more trade?
- $F_1 = U[50, 150]$ or $F_2 = U[0, 200]$
- Note $X_2 \overset{d}{=} 2X_1 - 100$
- In uniform distributions, the link between risk and trade is immediate.

Intuition

- Equilibrium of the F_1 trade game:

$$\mathbb{E}_{F_1}\left[x + \Delta | x \leq \hat{x}_1\right] = \hat{x}_1$$

Intuition

- Equilibrium of the F_1 trade game:

$$\mathbb{E}_{F_1}\left[x + \Delta | x \leq \hat{x}_1\right] = \hat{x}_1$$

- Equilibrium of the F_2 trade game:

$$\mathbb{E}_{F_1}\left[2x - 100 + \Delta | x \leq \tilde{x}_2\right] = 2\tilde{x}_2 - 100$$

Intuition

- Equilibrium of the F_1 trade game:

$$\mathbb{E}_{F_1}\left[x + \Delta | x \leq \hat{x}_1\right] = \hat{x}_1$$

- Equilibrium of the F_2 trade game:

$$\mathbb{E}_{F_1}\left[2x - 100 + \Delta | x \leq \tilde{x}_2\right] = 2\tilde{x}_2 - 100$$

- That is,

$$\mathbb{E}_{F_1}\left[x + \frac{\Delta}{2} | x \leq \tilde{x}_2\right] = \tilde{x}_2$$

Intuition

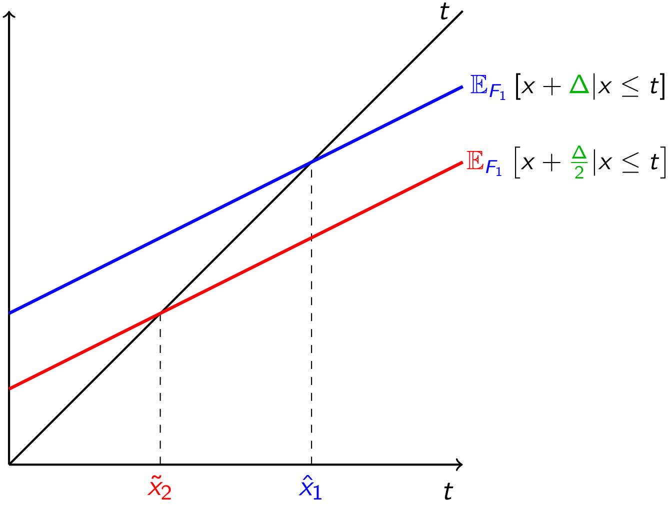
- Equilibrium of the F_1 trade game:

$$\mathbb{E}_{F_1}\left[x+\Delta|x\leq\hat{x}_1\right]=\hat{x}_1$$

- Equilibrium of the F_2 trade game:

$$\mathbb{E}_{F_1}\left[x+\frac{\Delta}{2}|x\leq\tilde{x}_2\right]=\tilde{x}_2$$

Intuition (cont.)



Normal Distributions

- The same argument applies in normal distributions.

Normal Distributions

- The same argument applies in normal distributions.
- Let $X_1 \sim N\left(\mu, \sigma_1^2\right)$, $X_2 \sim N\left(\mu, \sigma_2^2\right)$, $\sigma_2 > \sigma_1$.

Normal Distributions

- The same argument applies in normal distributions.
- Let $X_1 \sim N\left(\mu, \sigma_1^2\right)$, $X_2 \sim N\left(\mu, \sigma_2^2\right)$, $\sigma_2 > \sigma_1$.
- Note that $X_2 \overset{d}{=} \frac{\sigma_2}{\sigma_1} X_1 - \frac{\sigma_2 - \sigma_1}{\sigma_1} \mu$

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.
- Beforehand, on its origins in the context of insurance.

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.
- Beforehand, on its origins in the context of insurance.
- Let $X_1 \sim F_1$, $X_2 \sim F_2$, and $F_1 \succ_{SOSD} F_2$.

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.
- Beforehand, on its origins in the context of insurance.
- Let $X_1 \sim F_1$, $X_2 \sim F_2$, and $F_1 \succ_{SOSD} F_2$.
- Let DM_1, DM_2, be two risk-averse agents; DM_1 is less risk averse than DM_2.

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.
- Beforehand, on its origins in the context of insurance.
- Let $X_1 \sim F_1$, $X_2 \sim F_2$, and $F_1 \succ_{SOSD} F_2$.
- Let DM_1, DM_2, be two risk-averse agents; DM_1 is less risk averse than DM_2.
- Assume that both agents are faced with X_2 and can pay a price π, in which case they will be faced with X_1.

A Note on Insurance

- A necessary and sufficient condition for a monotone link between risk and trade.
- Beforehand, on its origins in the context of insurance.
- Let $X_1 \sim F_1$, $X_2 \sim F_2$, and $F_1 \succ_{SOSD} F_2$.
- Let DM_1, DM_2, be two risk-averse agents; DM_1 is less risk averse than DM_2.
- Assume that both agents are faced with X_2 and can pay a price π, in which case they will be faced with X_1.
- Is it possible that DM_1 is willing to pay π in order to switch, while DM_2 is not?

Location Independent Risk

Definition

Let $F_1 \succ_{SOSD} F_2$. F_1 is location independent less risky than F_2 if

$$\mathbb{E}\left[u_1\left(X_1 - \pi\right)\right] = \mathbb{E}\left[u_1\left(X_2\right)\right] \Longrightarrow \mathbb{E}\left[u_2\left(X_1 - \pi\right)\right] \geq \mathbb{E}\left[u_2\left(X_2\right)\right],$$

for every concave u_1 and u_2 such that u_2 is a non-decreasing concave transformation of u_1.

Location Independent Risk

Definition

Let $F_1 \succ_{SOSD} F_2$. F_1 is location independent less risky than F_2 if

$$\mathbb{E}\left[u_1\left(X_1-\pi\right)\right]=\mathbb{E}\left[u_1\left(X_2\right)\right] \Longrightarrow \mathbb{E}\left[u_2\left(X_1-\pi\right)\right] \geq \mathbb{E}\left[u_2\left(X_2\right)\right],$$

for every concave u_1 and u_2 such that u_2 is a non-decreasing concave transformation of u_1.

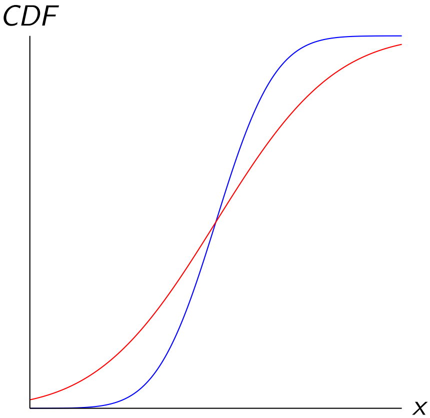
Jewitt (1989)

F_1 is location independent less risky than F_2 if and only if

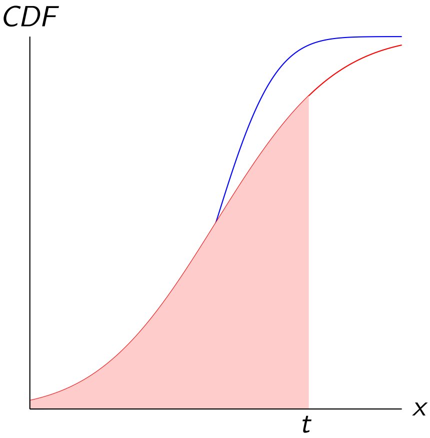
$$\int_0^{F_1{}^{-1}(q)} F_1(x)\,dx < \int_0^{F_2{}^{-1}(q)} F_2(x)\,dx$$

for every $q \in (0,1)$.

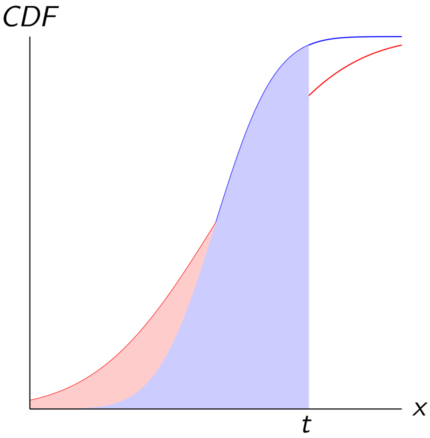
Second-order Stochastic Dominance



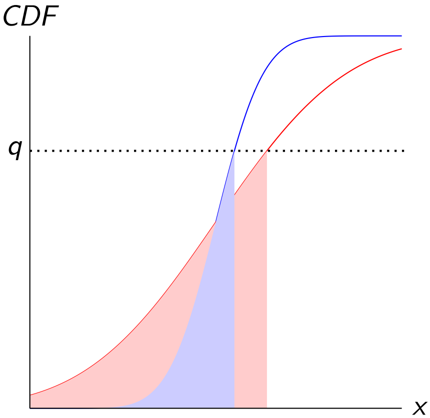
Second-order Stochastic Dominance



Second-order Stochastic Dominance



Location Independent Risk



Trade in Equilibrium

Theorem 2

Let $F_1, F_2 \in \mathcal{F}$ be two distribution such that

- $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$, and
- $F_1 \succ_{SOSD} F_2$.

Then $PT(F_1) > PT(F_2)$ for every $\Delta > 0$ if and only if $F_1 \succ_{LIR} F_2$.

Trade in Equilibrium

Theorem 2

Let $F_1, F_2 \in \mathcal{F}$ be two distribution such that

- $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$, and
- $F_1 \succ_{SOSD} F_2$.

Then $PT(F_1) > PT(F_2)$ for every $\Delta > 0$ if and only if $F_1 \succ_{LIR} F_2$.

- When extending the model to an increasing gains from trade environment $F_1 \succ_{LIR} F_2 \implies SW(F_1) > SW(F_2)$.

Proof Idea

- Let:

$$D_F(q) := \mathbb{E}_F\left[x + \Delta | x \leq F^{-1}(q)\right] - F^{-1}(q)$$

.

Proof Idea

- Let:
$$D_F(q) := \mathbb{E}_F\left[x + \Delta | x \leq F^{-1}(q)\right] - F^{-1}(q)$$
.
- Equilibrium: $D_F(q) = 0$.

Proof Idea

- Let:
$$D_F(q) := \mathbb{E}_F\left[x+\Delta | x \leq F^{-1}(q)\right] - F^{-1}(q)$$
.
- Equilibrium: $D_F(q) = 0$.
- Note that
$$D_F(q) = \Delta - \frac{\int_0^{F^{-1}(q)} F(x)\,dx}{q}$$
.

Proof Idea

- Let:

$$D_F(q) := \mathbb{E}_F\left[x + \Delta | x \leq F^{-1}(q)\right] - F^{-1}(q)$$

.

- Equilibrium: $D_F(q) = 0$.
- Note that

$$D_F(q) = \Delta - \frac{\int_0^{F^{-1}(q)} F(x)\, dx}{q}$$

.

- Log-concavity implies monotonicity of D_F.

Proof Idea

- Let:
$$D_F(q) := \mathbb{E}_F\left[x + \Delta | x \leq F^{-1}(q)\right] - F^{-1}(q)$$
.
- Equilibrium: $D_F(q) = 0$.
- Note that
$$D_F(q) = \Delta - \frac{\int_0^{F^{-1}(q)} F(x)\,dx}{q}$$
.
- Log-concavity implies monotonicity of D_F.
- We show that $D_{F_2}(q) = 0 \Rightarrow D_{F_1}(q) > 0$ if and only if $F_1 \succ_{LIR} F_2$.

Public Information

- In the baseline model, the buyer cannot use public information in order to settle uncertainty.

Public Information

- In the baseline model, the buyer cannot use public information in order to settle uncertainty.
- Akerlof (1970) can easily accommodates such an extension.

Public Information

- In the baseline model, the buyer cannot use public information in order to settle uncertainty.
- Akerlof (1970) can easily accommodates such an extension.
- $F=$ Description of the uncertainty unresolved by all public information.

Public Information

- In the baseline model, the buyer cannot use public information in order to settle uncertainty.
- Akerlof (1970) can easily accommodates such an extension.
- $F=$ Description of the uncertainty unresolved by all public information.
- In our model, this simple reduction is not appropriate.

Public Information

- In the baseline model, the buyer cannot use public information in order to settle uncertainty.
- Akerlof (1970) can easily accommodates such an extension.
- $F =$ Description of the uncertainty unresolved by all public information.
- In our model, this simple reduction is not appropriate.
- The joint distribution of the signal and the asset value depends on the seller's initial choice.

Normal Distributions Model

Normal Distributions Model

- The seller chooses between normally distributed random variables.

Normal Distributions Model

- The seller chooses between normally distributed random variables.
- Before trade is taking place, a signal $s = x + \epsilon$ is publicly observed.

Normal Distributions Model

- The seller chooses between normally distributed random variables.
- Before trade is taking place, a signal $s = x + \epsilon$ is publicly observed.
- $\epsilon \sim N\left(0, \sigma_{\epsilon}^{2}\right)$. Independent of x and the seller's choice.

Excessive Risk

Theorem 3

Let $F_1 = N\left(\mu, \sigma_1^2\right)$, and $F_2 = N\left(\mu, \sigma_2^2\right)$, where $\sigma_2^2 > \sigma_1^2$. For every $\sigma_\epsilon^2 > 0$, in any equilibrium of the extended trade game with the signal S, $\alpha_1 = 0$

Excessive Risk

Theorem 3

Let $F_1 = N\left(\mu, \sigma_1^2\right)$, and $F_2 = N\left(\mu, \sigma_2^2\right)$, where $\sigma_2^2 > \sigma_1^2$. For every $\sigma_\epsilon^2 > 0$, in any equilibrium of the extended trade game with the signal S, $\alpha_1 = 0$

- Theorem 2 implies that the probability of trade is lower if the seller is choosing F_2.

Monopolistic Buyer

- We study the case where the market power is in the buyer's hands.

Monopolistic Buyer

- We study the case where the market power is in the buyer's hands.

Monotone increasing in risk (Landsberger and Meilijson (1994))

$F_1 \succ_{MIR} F_2$ if F_2 is more dispersed than F_1 (the horizontal distance ${F_1}^{-1}(q) - {F_2}^{-1}(q)$ is a non-decreasing function) and $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$.

Monopolistic Buyer

- We study the case where the market power is in the buyer's hands.

Monotone increasing in risk (Landsberger and Meilijson (1994))

$F_1 \succ_{MIR} F_2$ if F_2 is more dispersed than F_1 (the horizontal distance ${F_1}^{-1}(q) - {F_2}^{-1}(q)$ is a non-decreasing function) and $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$.

- Let $\widetilde{PT}(F) :=$ the probability of trade in the F trade game with a monopolistic buyer.

Monopolistic Buyer

- We study the case where the market power is in the buyer's hands.

Monotone increasing in risk (Landsberger and Meilijson (1994))

$F_1 \succ_{MIR} F_2$ if F_2 is more dispersed than F_1 (the horizontal distance $F_1^{-1}(q) - F_2^{-1}(q)$ is a non-decreasing function) and $\mathbb{E}_{F_1}[x] = \mathbb{E}_{F_2}[x]$.

- Let $\widetilde{PT}(F) :=$ the probability of trade in the F trade game with a monopolistic buyer.

Proposition

Let $F_1, F_2 \in \mathcal{F}$ be two distribution such that $F_1 \succ_{SOSD} F_2$.
$\widetilde{PT}(F_1) > \widetilde{PT}(F_2)$ for every $\Delta > 0$ if and only if $F_1 \succ_{MIR} F_2$.

General Utility Functions

- First, one can view the structural assumption $v_s(x) = x$ as a normalization.

General Utility Functions

- First, one can view the structural assumption $v_s(x) = x$ as a normalization.
- F describes the distribution of the seller's value.

General Utility Functions

- First, one can view the structural assumption $v_s(x) = x$ as a normalization.
- F describes the distribution of the seller's value.
- Assuming increasing gains from trade and a (weakly) concave $v_b(x)$, Theorem 1 and 2 carry through.

General Utility Functions

- First, one can view the structural assumption $v_s(x) = x$ as a normalization.
- F describes the distribution of the seller's value.
- Assuming increasing gains from trade and a (weakly) concave $v_b(x)$, Theorem 1 and 2 carry through.
- If we reverse those assumptions the results are not reversed.

Conclusion

- In Akerlof's (1970) model, if the seller's hidden actions affect the distribution of the asset, "lemon" markets are endogenous.

Conclusion

- In Akerlof's (1970) model, if the seller's hidden actions affect the distribution of the asset, "lemon" markets are endogenous.
- Due to the option value of his equilibrium payoff, the seller is risk seeking.

Conclusion

- In Akerlof's (1970) model, if the seller's hidden actions affect the distribution of the asset, "lemon" markets are endogenous.
- Due to the option value of his equilibrium payoff, the seller is risk seeking.
- Location independent riskier distributions result in lower trade and social welfare in equilibrium.

Conclusion

- In Akerlof's (1970) model, if the seller's hidden actions affect the distribution of the asset, "lemon" markets are endogenous.
- Due to the option value of his equilibrium payoff, the seller is risk seeking.
- Location independent riskier distributions result in lower trade and social welfare in equilibrium.
- The result is robust to various changes in the structural assumptions of the model.

The End

Thank You!