

Other-Regarding Preferences in Markets: Identification and Welfare

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INTRODUCTION

Yesterday we learned:

- ▶ Lab, Field, and Introspective Evidence Against (Narrowly) Selfish Behavior
- ▶ Standard theory predicts market outcomes well.

How to reconcile these observations?

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How to reconcile these observations?

No problem, the two observations are logically consistent.

OBSERVATIONS, I

General Equilibrium: Agents have no market power

- ▶ An interesting class of economies with other-regarding preferences have equilibria that coincide with a related “Classical” Economy.
- ▶ Price taking makes sense in these economies when it makes sense classically.
- ▶ Welfare Theorems/ Efficiency Properties.

OBSERVATIONS, II

Call Markets: Limited market power

- ▶ Necessary and Sufficient Conditions for Competitive Outcomes in Double-Auction Settings
- ▶ Connection between “Markets” and “Bargaining”

General Equilibrium

“Marriage” of independent papers by Kirchsteiger-Dufwenberg and Heidhues-Riedel

History of Courtship after the Lecture.

GENERAL EQUILIBRIUM FRAMEWORK

- ▶ Exchange economy with N commodities;
- ▶ Agents are elements of an index set A ; I agents
- ▶ Agent i : consumption set, endowment ω_i , preferences $(\succsim_i, U_i(\cdot))$.
- ▶ γ_i summarizes consumption set (depends on prices and endowment).
- ▶ Novel feature: Preferences depend on allocation of the entire economy and consumption possibilities.

Own-Consumption Preferences from Other-Regarding Preferences

Under what conditions can one speak of preferences for own consumption? That is, when is it true that for agent i :

$$(x_i, x_{-i}, \gamma) \succ_i (x'_i, x_{-i}, \gamma)$$

if and only if

$$(x_i, x'_{-i}, \gamma') \succ_i (x'_i, x'_{-i}, \gamma')$$

for all x'_{-i} and γ' . (γ describes the consumption possibilities of the agents.)

If condition holds, we have a natural notion of (**internal preferences**) over own consumption induced by more general preferences.

THE ECONOMY WITHOUT EXTERNALITIES

Define demand function:

$$d_i(p, \omega_i; x_{-i}, \gamma) = \operatorname{argmax}_{p \cdot x_i \leq p \cdot \omega_i} U_i(x; \gamma). \quad (1)$$

Agent a behaves **as if classical** if $d_i(p, \omega_i; x_{-i}, \gamma)$ depends only on (p, ω_i) .

SEPARABILITY RESULT

Proposition

1. *If agent i 's preferences can be represented in the form*

$$U_i(m_i(x_i), x_{-i}, \gamma)$$

for a strictly quasiconcave, continuous function $m_i : \mathbb{R}^L \rightarrow \mathbb{R}$ and a function U_i that is increasing in its first variable, then agent i behaves as if classical.

2. *Suppose agent i 's preferences are locally non-satiated and d_i is continuously differentiable in (p, ω) . If agent i behaves as if classical, then her preferences can be represented in the form*

$$U_i(m_i(x_i), x_{-i}, \gamma)$$

for a strictly quasiconcave, continuous function $m_i : \mathbb{R}^L \rightarrow \mathbb{R}$ and a function U_i that is increasing in its first variable.

Equilibrium Definition

A **competitive equilibrium** is a pair $(p^*, x^*) \in P \times X$ such that for each i x_i^* solves:

$$\max_{x_i \in X(i)} U_i(x_i; x_{-i}^*, \gamma) \text{ subject to } p \cdot x_i \leq p \cdot \omega_i$$

and

$$\sum_{i \in A} x_i^* = \sum_{i \in A} \omega_i$$

Can define equilibrium for an underlying economy without externalities.

OBVIOUS

Theorem

Equilibrium Exists (whenever the economy without externalities has an equilibrium).

Theorem

Agents maximize internal preferences in equilibrium.

Separable preferences and price taking make people look (as if) they cared only about their own consumption.

You can add production (and profit maximizing firms) too.

COMMENTS

- ▶ Perhaps too narrowly defined notion of externalities (separability is too strong).
- ▶ Perhaps too broadly defined notion of extended preferences (not just distributional concerns, but general consumption externalities).
- ▶ Perhaps Wrong Institution (Topic for Tomorrow)
 - ▶ Why do agents take prices as given?
 - ▶ Why don't agents make direct transfers?
 - ▶ Why don't agents destroy their endowment?
- ▶ What are the properties of equilibrium?

MANIPULATION GAME

Summary:

1. Incentive to make strategic demands in order to manipulate prices exists in classical environments.
2. Arguments exist that show that this incentive is small as the economy gets large.
3. These arguments extend to models of extended preferences.

FIRST WELFARE THEOREM

Theorem

When preferences are separable, the competitive equilibrium is efficient with respect to internal preferences.

SECOND WELFARE THEOREM

Theorem

Every efficient outcome with respect to internal preferences is a competitive outcome for the right initial endowments.

WELL-BEING EXTERNALITIES

Assume that preferences depend only on consumptions of others (not possibilities).

In fact, assume that preferences are Bergsonian:

$$U_i(m_1(x_1), \dots, m_I(x_I)).$$

1. Efficiency does not imply efficiency with respect to own consumption (or even full utilization)
2. Equilibria need not be efficient (in fact, generically, they won't be)

EFFICIENCY PROPERTIES

Assume **Social Monotonicity**:

For any allocation x and $z \in \mathbf{R}_+^L$, $z \neq 0$, there is a (z_1, \dots, z_I) such that $z_i \geq 0$ for all i , $\sum_{i=1}^I z_i = s$ and

$$U_i(m_1(x_1 + z_1), \dots, m_I(x_I + z_I)) > U_i(m_1(x_1), \dots, m_I(x_I)). \quad (2)$$

The assumption “social monotonicity” means that an increase in resources can lead to a Pareto improvement.

Theorem

If (SM) holds, then every efficient outcome is efficient with respect to internal preferences.

Theorem

If (2), then every efficient outcome is a competitive outcome for the right initial conditions.

COMMENT

This is the “right” version of the Second Welfare Theorem.
Assertion: Strengthen Social Monotonicity and we can show that every core allocation for the economy with other-regarding preferences is in the core of the internal economy.

First Welfare Theorem?

No. Not even when transfers are permitted. Lack of efficiency due to coordination problems:

1. Different agents contribute complementary goods.
2. Due to different preferences over allocations, one agent may not correctly use the gift of another agent.
3. Due to extended preferences, an agent will not wish to contribute unless another agent does.

Example: First get everyone above poverty level, next maximize internal utility.

CHOICE-SET EXTERNALITIES

Assume $U_i(\cdot)$ depends on x_i and opportunities (but not consumptions) of others.

Leading example: wealth distribution matters.

Specific functional form:

$$m_i(x_i) - \frac{\alpha_i}{I-1} \sum_k \max\{\tilde{m}_{ki} - \tilde{m}_{ii}, 0\} - \frac{\beta_i}{I-1} \sum_i \max\{\tilde{m}_{ii} - \tilde{m}_{ki}, 0\}$$

where \tilde{m}_{ki} is the (internal) utility of Agent i if she had access to Agent k 's budget set.

Incorporates some of the earlier result:

$$U_i(x_i, \gamma) = V_i(x_i, x_{-i})$$

where

$$x_k \text{ solves } \max_{x'_k \in B_k} m_k(x'_k)$$

EFFICIENCY

- ▶ Specialize to wealth distributions, make an assumption, conclude that outcomes are efficient.
- ▶ Assumption holds for familiar preferences in large economies.
- ▶ Assumption rules out incentives to make transfers taking prices as given.

DEFINITION: Feasible

Limit attention to choice sets determined by prices and wealths, so that $B_i = \{x_i : px_i \leq w_i\}$ for some p and w_i . Denote the price and wealth associated with B_i $p^*(B_i)$ and $w^*(B_i)$ respectively.

The triple (x, \mathcal{B}) is feasible for a price p if and only if for all agents i and firms j and commodities l :

1. $\sum_{i \in I} x_{il} \leq \sum_{i \in I} \omega_{il}$.
2. $x_i \in B_i$.
3. $p^*(B_i) = p$ for all i .
4. $\sum_{i \in I} w^*(B_i) = \sum_{i \in I} p\omega_i$.

DEFINITION: Efficiency with Respect to a Price

(x, \mathcal{B}) is efficient with respect to p if

1. (x, \mathcal{B}) is feasible for p .
2. There is no other feasible (x', \mathcal{B}) that is both feasible for p and preferred by all agents.

REDISTRIBUTIONAL LOSER PROPERTY

RLP holds at a budget set profile B if for any other profile of budget sets $B' \neq B$ for which there exists a p such that $p(B_i) = p(B'_i) = p$ for all i and $\sum_{i \in I} w(B_i) \geq \sum_{i \in I} w(B'_i)$

$$V_k(m_k(d_k(B_k)), B) \leq V_k(m_k(d_k(B'_k)), B') \text{ for all } k \implies$$

$$V_k(m_k(d_k(B_k)), B) = V_k(m_k(d_k(B'_k)), B') \text{ for all } k.$$

RLP holds if implication holds at all B . Notice that this holds if there always exists an agent r for whom

$$V_r(m_r(d_r(B_r)), B) > V_r(m_r(d_r(B'_r)), B').$$

If the inequality holds, then Agent r loses when budget sets change from B to B' .

IMPLICATIONS OF RLP

- ▶ RLP rules out voluntary transfers (holding prices fixed).
- ▶ RLP is true for own-consumption preferences.
- ▶ RLP is true for familiar “distributional” preferences in large economies.
- ▶ RLP guarantees that equilibria are efficient relative to a price p .
- ▶ If equilibria are efficient, then RLP holds for feasible B' .

CRITICISMS and RESPONSES

- ▶ Assumption is Strong.
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- ▶ Assumption is Strong.
- ▶ Restrictive Definition of Efficiency.
- ▶ Distributional Preferences Capture Some Intuitions about Social Concerns.
- ▶ Conditions are necessary.

Market Power

Slightly different approach.

Common feature:

You can observe “selfish” outcomes if agents are not selfish.

MARKETS “WORK” WITH NON-RATIONAL AGENTS

1. Downward Sloping Demand
Becker
2. Cournot Approximations
Conlisk
3. Double Auctions
Gode and Sunder; Hurwicz, Radner, Reiter
4. General Equilibrium

Alternative Approach

Broaden notion of rationality in “standard” market settings.
Provide more general conditions under which competitive outcomes arise in market settings.

FRAMEWORK

- ▶ m buyers and n sellers.
- ▶ Buyers demand at most one unit of a homogeneous good.
- ▶ Buyer B_i has valuation v_i .
- ▶ Sellers can produce at most one unit of the good.
- ▶ Seller S_j has cost c_j .

Simultaneously, each buyer makes an offer for the item (interpreted as the most he will pay to purchase an item) and each seller sets an asking price (interpreted as the least she will accept to produce the item).

MARKET CLEARING

- ▶ Put the $m + n$ bids (offers and asks) in non-decreasing order.
- ▶ The $(m + 1)^{\text{th}}$ of these quantities becomes the market price, p .
- ▶ Buyers who bid no less than p and sellers who ask no more than p are said to make acceptable offers.
- ▶ Buyers who bid more than p and sellers who ask less than p transact.
- ▶ Traders offering p are marginal traders.

STANDARD OUTCOME

- ▶ Greedy sellers ask c_j (weak dominance).
(Note that if seller trades she cannot influence price.)
- ▶ Buyer with the smallest valuation greater than or equal to d_{m+1}^* to be the price setter.
- ▶ Distinct valuations: transact at d_m^* .
- ▶ Multiple price setters, $d_{m_1}^*$

GENERAL PREFERENCES

- ▶ Outcome: (T, p) where T is the set of active traders and p is the price.
- ▶ Outcome determines a distribution of monetary payoffs:
 $O(T; p) = (x, y)$
- ▶ $x = (x_1, \dots, x_j, \dots, x_n)$ where x_j is the monetary payment to seller S_j .
- ▶ $y = (y_1, \dots, y_m)$ is the vector of monetary payments to the buyers.
- ▶ $\mathbf{0}$: the outcome in which there are no trades.
- ▶ I permit general preferences over outcomes.

ASSUMPTIONS: IR

[Individual Rationality (IR)]

For all σ^* , if $S_j \in T$ and $p < c_j$, then for all p' and T' with $S_j \notin T'$,

$$(\mathbf{T}', \mathbf{p}') \succ_{j, \sigma^*} (T, p) \quad (3)$$

and if $B_i \in T$ and $p > v_i$, then for all p' and T' with $B_i \notin T'$

$$(\mathbf{T}', \mathbf{p}') \succ_{i, \sigma^*} (T, p) \quad (4)$$

.

ASSUMPTIONS: C

[Continuity (C)]

For all σ^* and $p > c_j + \delta$ there exists $p' < p$ such that if T is obtained from T' by replacing $S_{j'} \in T'$ by $S_j \notin T$, then

$$(T, p') \succ_{i, \sigma^*} \frac{n-1}{n}(T, p) + \frac{1}{n}(T', p) \quad (5)$$

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$$(T, p') \succ_{i, \sigma^*} \frac{m-1}{m}(T, p) + \frac{1}{m}(T', p). \quad (6)$$

ASSUMPTIONS: R

[Replacement (R)]

For all σ^* , if $p > c_j$ and T is obtained from T' by replacing $S_{j'} \in T'$ by $S_j \notin T'$, then

$$(T, p) \succ_{j, \sigma^*} (T', p) \quad (7)$$

and if $p < v_i$ and T is obtained from T' by replacing $B_{i'} \in T'$ by $B_i \notin T'$, then

$$(T, p) \succ_{i, \sigma^*} (T', p). \quad (8)$$

REPLACEMENT IN CONTEXT

“Our people are playing the lottery. We just need to decide which schools we should fund other states’ or ours.”

North Carolina Governor Mike Easley
quoted on front page of NYT October 7, 2007

ASSUMPTIONS: GT

[Gains From Trade (GT)]

If $c_i + \delta < v_j$ and $T = T' \cup \{B_i, S_j\}$ for $B_i, S_j \notin T'$, then there exists $p_{i,j}^*$ such that for all σ^* and T containing $\{B_i, S_j\}$, then

$$(T, p) \succ_{j, \sigma^*} (T', p) \quad (9)$$

for all $p \geq p_{i,j}^*$ and

$$(T, p) \succ_{i, \sigma^*} (T', p) \quad (10)$$

for all $p \leq p_{i,j}^*$.

ASSUMPTIONS: RI

[Redistribution Indifference (RI)]

For all σ^* and all $j = 1, \dots, n$, and all p and p' , if $S_j \notin T$, then

$$(T, p) \sim_{S_j, \sigma^*} (T, p'). \quad (11)$$

MAIN RESULT

Proposition

In a market game, if preferences satisfy IR, C, R, GT, and RI, then in all equilibria in undominated strategies, the volume of trade is competitive. Moreover, if there is excess demand the equilibrium price must be the highest competitive price and if there is excess supply, then the equilibrium price must be the lowest competitive price.

COMMENTS

- ▶ Expect the competitive volume of trade under a wide range of conditions.
- ▶ With excess supply or demand, uniqueness.
- ▶ Call market gives buyers power to extract surplus. They may not use it with general preferences.

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BALANCE

Balance: Neither excess supply nor excess demand.

- ▶ Balanced: Individual can unilaterally reduce volume of trade.
- ▶ Unbalanced: Always another trader to replace you.

Unbalanced market functions in the same way as one containing conventionally greedy agents.

Large markets “should be” approximately balanced.

ULTIMATUM GAME

- ▶ $n = m = 1$ and $c_1 = 0$, $v_1 = 1$.
- ▶ Buyer's offer is the proposal.
- ▶ The seller accepts by bidding less. Rejects by bidding more.
- ▶ Selfish players: unique equilibrium in undominated strategies is to trade at 0.
- ▶ Extended preferences: Trade, but at a higher price.

GENERALITY OF ASSUMPTIONS

- ▶ Fehr-Schmidt
- ▶ Not pure utilitarian, surplus maximizing (unless strategies are monotonic)
- ▶ Charness-Rabin
Assuming some weight on monetary payoffs and iterative dominance.
- ▶ Not Bolton-Ockenfels (relative position)
(R) and (GT) may fail. (Sellers may wish to close the market if trading generates large gains for a single trading pair.)
Assumptions hold in large, homogenous markets.

HOMOGENEOUS MARKETS

A **homogenous market game** is one in which all buyers have the same valuation, $v_i = 1$ for all i and all sellers have the same valuation, $c_j = 0$ for all j .

Corollary

In a homogenous market game, if preferences satisfy IR, C, R, RI, and GT, then in all equilibria in undominated strategies, the volume of trade is $\min\{m, n\}$. If $m > n$, then the market price is 1. If $m < n$, then the market price is 0.

Possible Explanations for Results

1. Large Numbers
2. A few selfish guys force selfish outcome
3. Without Market Power there is no Scope for Altruism
4. Anonymous Transactions

EVALUATION

Market Settings Limit Ability to Be Kind or Spiteful
Large Numbers Make Conditions for Result More Likely

CONCLUSION

1. Technical

Mathematically, theorems are better when they have fewer assumptions.

2. Substantive

There may be a role for market intervention, institution design, because welfare theorems may fail, markets prevent good behavior.

- ▶ Competitive Behavior Does not Identify Preferences.
- ▶ Competitive Outcome Need not Be Efficient.
- ▶ Familiar “extra-market” Institutions (charity and gifts) may be efficiency enhancing.

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