General equilibrium / Gains from trade

Why do ind'ls trade - why do we have economy?

Exchange/trade arises because of gains
source? differences in preferences, abilities

In economy - is trade "efficient"?
- who gets what?

Basic tool: Edgeworth box
- portray all possible allocations

- 2x2 economy: 2 goods, 2 ind'ls
goods: figs (x_1), oranges (x_2)
(24) (12)

E-box is 24x12

ind'ls: Zoey (Z) and Alexa (A)
well-behaved preferences

- start: initial allocation of goods
suppose Zoey has $(x_1^z, x_2^z) = (4, 2)$

Alexa has rest: $(x_1^a, x_2^a) = (\quad , \quad)$

Any incentive for trade? depends on preferences
Label *endowment point* = initial allocation as ω

Consider IC's for each individual through endowment point

are there trades which could make one or both better off, without making the other worse off?

If so, endowment not *Pareto-optimal*
also referred to as *pareto-efficient* , *efficient*

Def'n: An allocation of goods to individuals, B, is *Pareto optimal* if there is no other *feasible* allocation, C, such that

i) neither ind'l prefers B to C
ii) at least one individual strictly prefers C to B.

(P-O if nothing better)

Does Pareto optimality imply equality/fairness?

Contract curve*:* set of all efficient outcomes in Edgeworth box; if trade voluntary, must end up on contract curve.

Def'n: the *core* of an economy is the set of P-O allocations that cannot be improved upon by any ind'l acting alone (in an individually rational manner) or by any group of ind'ls acting together.

With 2 ind'ls (Z,A), exchange economy, core is all allocations satisfying:

i) $MRS^z = MRS^a$

ii) $U^z \geq U_\omega{}^z ; U^a \geq U_\omega{}^a$

(Recall ω is endowment point; voluntary trade)

Questions:

1. Are all efficient allocations in the core?

- no: depends on endowment
- core is subset of *contract curve*

2. What happens to core as # individuals increases (ie, as economy grows)?

- core shrinks - trading coalitions

- to what….?

3. Relation between core and equilibrium in competitive economy?

Def'n: *competitive economy*: economy in which each agent is so small that cannot affect prices - all agents are *price-takers*.

Def'n: *equilibrium*: set of prices (one for each good) such that all agents are maximizing, and no excess demand in any market.

Solving for a competitive equilibrium in our exchange economy?

1. individuals have preferences, endowments of goods, and prices at which can trade.
2. given prices, can determine value of endowment = income here; this gives budget set.
3. given prices, income, and preferences, individuals choose desired consumption bundle.
4. if desired bundle different from endowment, can (attempt to) exchange good in excess supply for good with excess demand, at market rate of exchange.
5. If every agent can attain optimal bundle, then have an equilibrium. If not, prices adjust - excess supply decreases price, excess demand increases price.
6. Loop back to 1. Iterate until process stops.

Important point: equilibrium prices depend on initial distribution.

Concrete example, to go with steps.

1. Alexa and Zoey, with endowments $\omega^a = (20,10)$, $\omega^z = (4,2)$

Initial prices: $p_1 = 3, p_2 = 2$

Preferences: $U^a(x_1, x_2) = x_1 x_2$,

$$U^z(x_1, x_2) = x_1^{0.25} x_2^{0.75}$$

2. Value of endowments?

Alexa: 3*20+2*10=80; Zoey: 3*4+2*2=16

Budget lines?:

Alexa: $3x_1 + 2x_2 = 80 \Rightarrow x_2 = 40 - 1.5x_1$

Zoey: $3x_1 + 2x_2 = 16 \Rightarrow x_2 = 8 - 1.5x_1$

(same slope, different intercepts; why?)

3. Optimal consumption bundles?

Alexa: choose x_1 to max

$$x_1(40 - 1.5x_1) \Rightarrow x_1 = 40/3,$$

$$x_2 = 40 - 1.5(\frac{40}{3}) = 20$$

Zoey: choose x_1 to max $x_1^{0.25}(8-1.5x_1)^{0.75}$

Alternatively, use result that, with C-D preferences, demand curves are:

max $U(x_1, x_2) = x_1^{\alpha} x_2^{1-\alpha}$

subject to budget constraint

gives demands: $x_1 = \dfrac{\alpha M}{p_1}, x_2 = \dfrac{(1-\alpha)M}{p_2}$

Here, $\alpha = 0.25$, so

$$x_1 = \frac{16}{4\times 3} = 4/3; x_2 = \frac{3\times 16}{4\times 2} = 6$$

4. Compare bundles with endowments?

Alexa: wants $(x_1, x_2) = (13\frac{1}{3}, 20)$, has (20,10)

so she wants to sell good 1, buy good 2

Zoey wants $(x_1, x_2) = (\frac{4}{3}, 6)$, has (4,2)

so she *also* wants to sell good 1, buy good 2

5. At initial prices, excess demand for good 2 and excess supply of good 1 - to clear market, need $(p_1 / p_2)\downarrow$ (both normal goods, here).

6. What is competitive equilibrium here?

Conditions which must be satisfied:

i) $x_1^{\ a} + x_1^{\ z} \leq \omega_1^{\ a} + \omega_1^{\ z} = 24$

ii) $x_2^{\ a} + x_2^{\ z} \leq \omega_2^{\ a} + \omega_2^{\ z} = 12$

(that is: must be in Edgeworth box)

iii)

$$p_1 x_1^{\ a} + p_2 x_2^{\ a} \leq p_1 \omega_1^{\ a} + p_2 \omega_2^{\ a} = 20 p_1 + 10 p_2$$

iv) $p_1 x_1^{\ z} + p_2 x_2^{\ z} \leq p_1 \omega_1^{\ z} + p_2 \omega_2^{\ z} = 4 p_1 + 2 p_2$

(that is, consumption must be affordable)

v) if interior solution, $MRS^a = \dfrac{p_1}{p_2} = MRS^z$

(both individuals are optimizing)

5 equations;
unknowns=$\{x_1{}^a, x_1{}^z, x_2{}^a, x_2{}^z, p_1, p_2\}$ 6?

can only solve for 5: quantities and (p_1 / p_2)

(micro, not macro! - need money to pin down absolute prices)