Outline

1. Barter

2. Walrasian Equilibrium

3. Example

4. An Example of Excellent Economics

5. Unsolicited advice
1 Barter

- Consumers can trade goods 1 and 2

- Allocation \( ((x_1^1, x_2^1), (x_1^2, x_2^2)) \) can be outcome of barter if:

- **Individual rationality.**
  \[
  u_i(x_1^i, x_2^i) \geq u_i(\omega_1, \omega_2) \text{ for all } i
  \]

- **Pareto Efficiency.** There is no allocation \( ((\hat{x}_1^1, \hat{x}_2^1), (\hat{x}_1^2, \hat{x}_2^2)) \) such that
  \[
  u_i(\hat{x}_1^i, \hat{x}_2^i) \geq u_i(x_1^i, x_2^i) \text{ for all } i
  \]
  with strict inequality for at least one agent.
• Barter outcomes in Edgeworth box

• Endowments \((\omega_1, \omega_2)\)

• Area that satisfies individual rationality condition

• Points that satisfy pareto efficiency

• **Pareto set.** Set of points where indifference curves are tangent
• **Contract curve.** Subset of Pareto set inside the individually rational area.

• Contract curve = Set of barter equilibria

• Multiple equilibria. Depends on bargaining power.

• Bargaining is time- and information-intensive procedure

• What if there are prices instead?
2 Walrasian Equilibrium

- Prices $p_1$, $p_2$

- Consumer 1 faces a budget set:

$$p_1 x_1^1 + p_2 x_2^1 \leq p_1 \omega_1^1 + p_2 \omega_2^1$$

- How about consumer 2?

- Budget set of consumer 2:

$$p_1 x_1^2 + p_2 x_2^2 \leq p_1 \omega_1^2 + p_2 \omega_2^2$$

or (assuming $x_i^1 + x_i^2 = \omega_i$)

$$p_1 (\omega_1 - x_1^1) + p_2 (\omega_1 - x_2^1) \leq p_1 (\omega_1 - \omega_1^1) + p_2 (\omega_2 - \omega_2^1)$$

or

$$p_1 x_1^1 + p_2 x_2^1 \geq p_1 \omega_1^1 + p_2 \omega_2^1$$
• **Walrasian Equilibrium.** \((x_1^{1*}, x_2^{1*}), (x_1^{2*}, x_2^{2*}), p_1^*, p_2^*)\) is a Walrasian Equilibrium if:

- Each consumer maximizes utility subject to budget constraint:
  \[
  (x_1^{i*}, x_2^{i*}) = \arg \max_{x_1^i, x_2^i} u_i(x_1^i, x_2^i) \\
  \text{s.t. } p_1^* x_1^i + p_2^* x_2^i \leq p_1^\omega_1 + p_2^\omega_2
  \]

- Markets clear:
  \[
  x_1^{1*} + x_2^{2*} \leq \omega_1^1 + \omega_2^2 \text{ for all } j.
  \]
• Compare with partial (Marshallian) equilibrium:
  – each consumer maximizes utility
  – market for good $i$ clears.
  – (no requirement that all markets clear)
• Graphical depiction in Edgeworth box. Set of optimal points as prices $p_1$ and $p_2$ vary.

• Draw offer curve for consumer 1 (equivalent of demand curve in partial equilibrium):

$$ (x_1^{1*} (p_1, p_2, (\omega_1, \omega_2)), x_2^{1*} (p_1, p_2, (\omega_1, \omega_2))) $$

• Offer curve is set of points that maximize utility as function of the varying prices $p_1$ and $p_2$.

• Draw offer curve for consumer 2.
• Walrasian Equilibrium is at intersection of the two offer curves!

• Walrasian Equilibrium is a subset of barter equilibrium:
  – Does satisfy individual rationality?
  – Does it satisfy the Pareto Efficiency condition?
  – Is any point in Contract Curve a WE for allocation \((\omega_1, \omega_2)\)?
3 Example

• Consumer 1 has Leontieff preferences:

\[ u(x_1, x_2) = \min \left( x_1^1, x_2^1 \right) \]

• Bundle demanded by consumer 1:

\[
x_1^1 = x_2^1 = x^1 = \frac{p_1 \omega_1^1 + p_2 \omega_2^1}{p_1 + p_2} = \frac{\omega_1^1 + (p_2/p_1) \omega_2^1}{1 + (p_2/p_1)}
\]
- Consumer 2 has Cobb-Douglas preferences:

\[ u(x_1, x_2) = (x_1^2)^{.5} (x_2^2)^{.5} \]

- Demands of consumer 2:

\[ x_1^{2*} = \frac{.5 \left( p_1 \omega_1^1 + p_2 \omega_2^1 \right)}{p_1} = .5 \left( \frac{\omega_1^1 + \frac{p_2}{p_1} \omega_2^1}{\frac{p_1}{p_2}} \right) \]

and

\[ x_2^{2*} = \frac{.5 \left( p_1 \omega_1^1 + p_2 \omega_2^1 \right)}{p_2} = .5 \left( \frac{p_1 \omega_1^1 + \omega_2^1}{p_2} \right) \]
• Impose Walrasian equilibrium in market 1:

\[ x_1^{1*} + x_1^{2*} = \omega_1^1 + \omega_1^2 \]

• This implies

\[
\frac{\omega_1^1 + (p_2/p_1)\omega_2^1}{1 + (p_2/p_1)} + 0.5 \left( \omega_1^1 + \frac{p_2}{p_1}\omega_2^1 \right) = \omega_1^1 + \omega_1^2
\]
4 An example of Excellent Economics

- Savings Rate in the US very low: essentially zero in year 2,000

- Perhaps: Self-control Problem

- People would like to save but...Not today!

- Credit cards and (too) high borrowing rates
• Is this testable?

• Prediction of hyperbolic discounting theory:
  – people do not like to save today
  – people like to save tomorrow

• Save Tomorrow?
• Benartzi and Thaler (2002): Design of Save More Tomorrow (SMT) Plan

• 401(k) private savings or retirement

• SMT Plan:
  – No increase in savings today
  
  – 3% *automatic* increase in savings at time of paycheck raise
  
  – can drop out at any time
• Advantages:

  – No current increase

  – Commit today for future

  – Use inertia/procrastination the good way!

  – No decrease in nominal salary (loss aversion)

  – Option out
The facts:

- 1998: mid-size company, 315 eligible employees
- ‘you guys are saving too little!’
- 79 employees: increase savings now
- 162 employees: no increase now, will try SMT
- 158 employees: remain in SMT plan for two years

Effect: savings rate up from 3.5 to 11.6 percent! In three years!
5 Advice

1. Listen to your heart

2. Trust yourself
3. Take ‘good’ risks:

   (a) hard courses

   (b) internship opportunities

   (c) research – URAP

   (d) (graduate classes?)

4. Learn to be curious, critical, and frank
5. Be nice to others! (nothing in economics tells you otherwise)