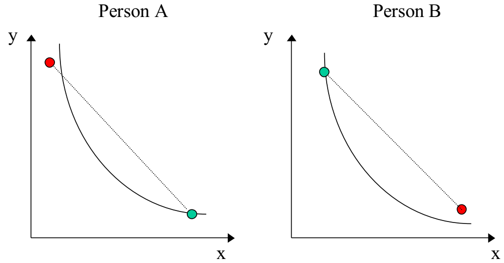
Preview of Rest of the Course

- We have covered consumer decision making and firm decision making.
- One more lecture on decision making under uncertainty—next Tuesday.
- The rest of the lectures will focus on how consumers and firms interact in a market.
  - The emphasis will be on whether market outcomes are "good."

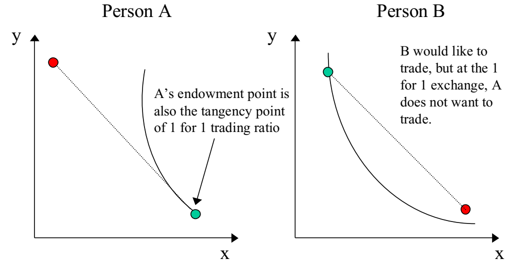
Voluntary Trade is Good for Both Parties

- Consider an economy consisting of two people (A and B) with well behaved preferences and two goods (x and y).
- Suppose A starts with $x_a = 100$ and $y_a = 1$
- Suppose B starts with $x_b = 1$ and $y_b = 100$.
- With well behaved preferences, averages are preferred to extremes.
- Some trades that involve A giving up to 99 x in exchange for up to 99 y (at a rate of one for one) will leave both A and B better off.

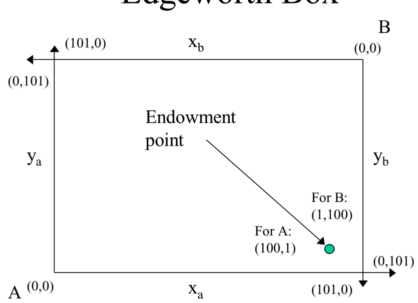
Trade is good



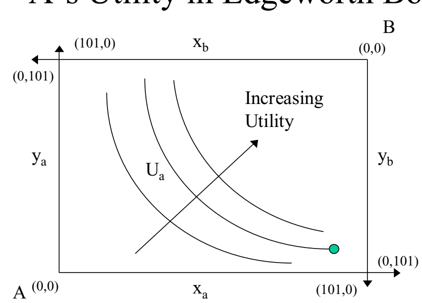
Sometimes Trade is Not Wanted



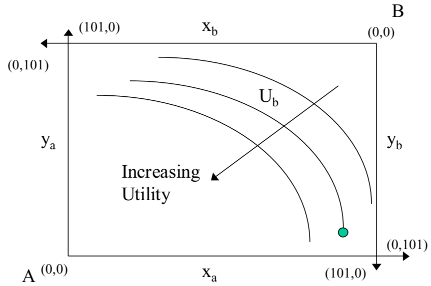
Edgeworth Box



A's Utility in Edgeworth Box



B’s Utility in Edgeworth Box



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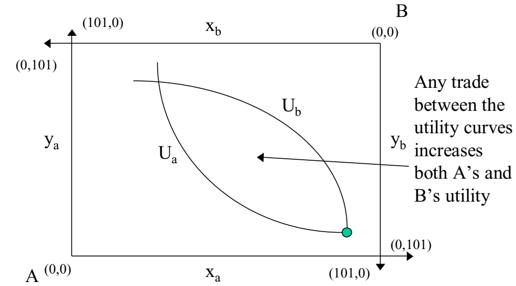
Trading Region



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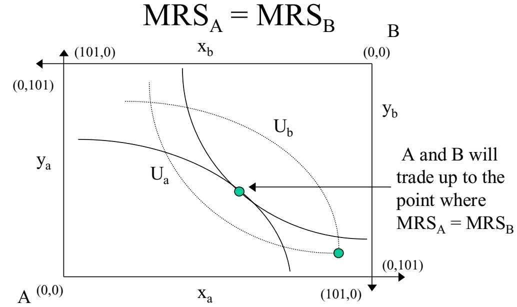
Trading Region Vanishes When $MRS_A = MRS_B$



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If $MRS_A \neq MRS_B$ then Mutually Beneficial Trades Still Exist

- Consider an allocation of x and y where MRS_A(x for y) > MRS_B(x for y)
  - A is willing to give up MRS_A units of x in exchange for a unit of y (and remain on the same indifference curve)
  - B is willing to give up a unit of y in exchange for MRS_B units of x (and remain on the same indifference curve).
  - Clearly A will give up $MRS_B < MRS_A$ units of x in exchange for a unit of y.
- A similar argument holds if $MRS_A < MRS_B$

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Pareto Efficient Allocations

- Definition: An allocation is Pareto Efficient if no person can be made better off without making some other person worse off.
- For economists, this notion of efficiency is a minimal necessary condition for considering an allocation “good”.
- This is not sufficient for a “good” allocation—an economy with Bill Gates and an impoverished student might be Pareto efficient, but the student may not consider this a good allocation.

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Contract Curves

- Defined as the set of all Pareto efficient allocations in an Edgeworth box.
- If mutually beneficial trades exist for some allocation, then
  - That allocation cannot be Pareto efficient.
  - That allocation cannot be on the contract curve.
- No mutually beneficial trades exist for an allocation on the contract curve
  - This implies that the trading region has vanished
  - Thus, $MRS_A = MRS_B$ on the contract curve.

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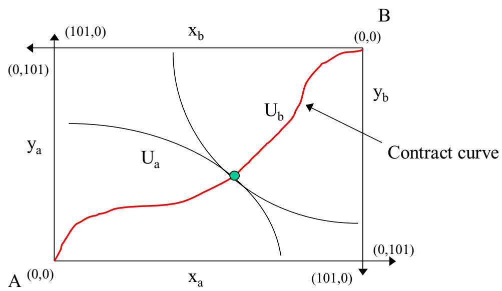
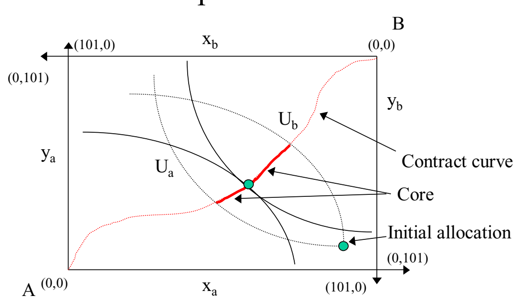
Example of a Contract Curve



Core of an Exchange Economy

- The core of an exchange economy is defined as the set of all allocations for which no participant in the economy will want additional trades.
  - The core is a subset of the points on the contract curve.
  - The notion of a core depends crucially on a (possibly Pareto inefficient) initial allocation.
  - The core consists of all points on the contract curve that improve the position of at least one of the participants without making any of the other participants worse off **relative to that initial allocation**.

Example of a Core



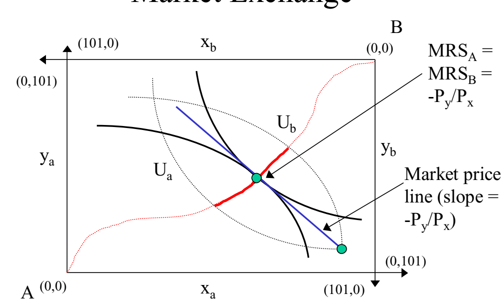
A Market Facilitates Trade by Imposing Prices

- All the analysis up to now has abstracted away from price setting in a market.
  - We have effectively assumed that A and B barter with each other.
- The same analysis applies in a market setting, where A and B take the exchange ratio of x for y as given and set by the market.

Properties of Market Exchange

- Market participants will trade from the initial allocation point up to where the market price line intersects the contract curve.
- Market price lines that intersect the contract curve outside the core result in no trade.
- At the equilibrium point, $MRS_A = MRS_B =$ slope of the market price line.

Market Exchange



Welfare Properties of Market Equilibrium

- Ken Arrow has shown that in an exchange market with many participants, the core consists of a single point.
- First Welfare Theorem: Market outcomes are necessarily Pareto efficient.
- Second Welfare Theorem: Any Pareto efficient outcome can be supported in a market by a reallocation of initial resources.

Nicholson Example Problem

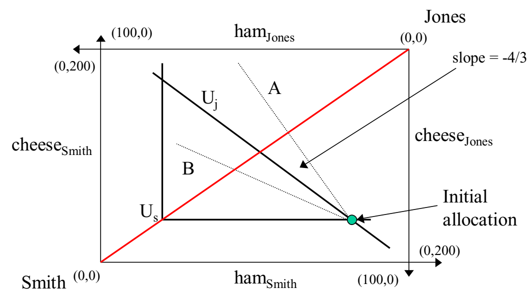
- *Smith and Jones are stranded on a desert island. Each has in his possession some slices of ham (H) and cheese (C). Smith is a very choosy eater and will eat ham and cheese in the fixed proportions of 2 slices of cheese to 1 slice of ham:*

  $U_s = \min(H, C/2)$.
- *Jones more flexible and has a utility function given by* $U_j = 4H + 3C$.
- *Total endowments are 100 slices of ham and 200 slices of cheese.*

Example Problem—Part (a)

- *Draw the Edgeworth box diagram that represents the possibilities for exchange in this situation. What is the only exchange ratio that can prevail in any equilibrium?*

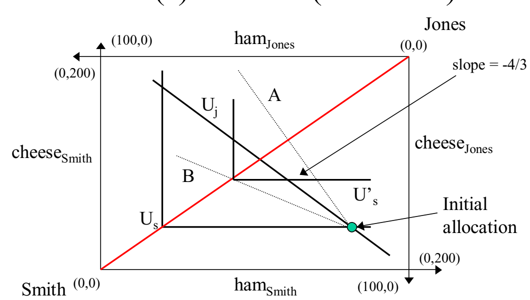
Part (a) Solution



Part (a) solution (continued)

- The contract curve must be a straight line with slope = 2 slices of cheese per 1 ham, since for Smith, any allocation outside that line is inefficient.
- Jones will never trade an exchange ratio of less than four pieces of cheese for three slices of ham—such exchanges always leave him worse off.
  - Jones will never trade on exchange line A.
  - Jones is willing to trade on exchange line B.

Part (a) Solution (continued)



Part (a) solution (continued)

- Even after the trade on line B, there is still room to trade at an exchange ratio between the slope of B and –4/3.
- Since the slope of B was arbitrarily chosen to be any slope greater than –4/3, this argument will always hold until the slope of B is arbitrarily close to –4/3.
- Thus, the equilibrium exchange ratio must equal –4/3.

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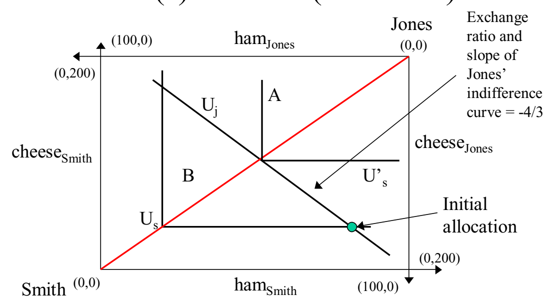
Part (a) Solution (continued)



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Example Problem—Part (b)

- *Suppose that Smith initially had 40H and 80C. What would the equilibrium position be?*
- Jones initially has 60H and 120C, and his initial (and final) utility is 60*4 + 120*3 = 600.
- The equilibrium position is the intersection of the trading line ($4H_j + 3C_j = 600$) and the contract curve ($C_s = 2H_s$ Ł $200 – C_j = 2*(100 – H_j)$).
- The solution is $H_j = 60$, $C_j = 120$. No trade takes place. This is not surprising since Smith and Jones are already on the contract curve at the start.

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Example Problem—Part (c)

- *Suppose that Smith initially had 60H and 80C. What would the equilibrium position be?*
- Jones initially has 40H and 120C, and his initial (and final) utility is 40*4 + 120*3 = 520.
- The equilibrium position is the intersection of the trading line ($4H_j + 3C_j = 520$) and the contract curve ($C_j = 2H_j$).
- The solution is $H_j = 52$, $C_j = 104$.

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Example Problem—Part (d)

- *Suppose that Smith (much stronger of the two) decides not to play by the rules of the game. Then what could the final equilibrium position be?*
- Smith beats up Jones, takes all his ham and all his cheese, leaving Jones with nothing.

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