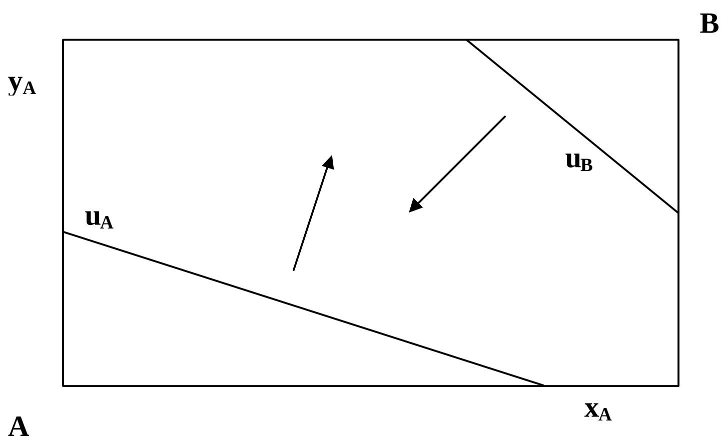
Handout #5

Midterm results are out, average score is at 82.13 out of 100 points that were possible. Next in the class schedule is the final and the project. The in-class final will be on June, 9 from 12:15 to 3:15. The project presentations will be on June, 2 during class hours. Both dates are Mondays. Regarding the project, you might hand in an outline/ draft proposal of just a few lines one week before the presentation date to get some feedback.

Solution to Problem Set 4: Economic Efficiency

Economic Efficiency I

Luengerger 6.3 a.) Draw an Edgeworth box like the following:



b.) By inspection of the Edgeworth box diagram, Pareto Efficient set = {(x_A = 0, y_A ✞ [0,1)) or (x_A ✞ [0,2], y_A = 1)}.

c.) Consider the following two cases:

i.) (x_A= 0, y_A ✞ [0,1)). This is a "corner" solution (compare to Luenberger, pp. 133-34) for A ☹ $MRS_{2,1}^A$ ⌨ P_1/P_2. For B, it is also a corner solution, so $MRS_{2,1}^B$ 🖰 P_1/P_2. For $MRS_{2,1}^A$ = (☜u_A/☞x_1)/(☜u_A/☞x_2) = ½, $MRS_{2,1}^B$ = 1/1, P_1 = 1 ☹ ½ ⌨ 1/P_2 ⌨ 1/1 ☹ P_2 ✞ [1,2].

ii.) $(x_A \in [0,2], y_A = 1) \Leftrightarrow (x_B = 2 - x_A, y_B = 0)$ is a corner solution for B $\Rightarrow MRS_{2,1}^{B} \geq P_1/P_2$. And. For A, $P_1/P_2 \geq MRS_{2,1}^{A}$. For $P_1 = 1$, we obtain $P_2 \in [1,2]$.

Economic Efficiency II

Luenberger 6.7 a.)

Max $\quad x \cdot y$

s.t. $\quad x_2 + y_2 \leq 1000$

$\Rightarrow x^* = y^* = 500^{1/2}$

b.) With trading, we have now two problems to solve. Production should maximize profits and consumption should maximize utility (given the profits).

Production problem:

Max $\quad x_p + 3y_p$

s.t. $\quad x_p^2 + y_p^2 \leq 1000$

$y_p/x_p = 3,\ x_p^2 + y_p^2 \leq 1000$

$\Rightarrow x_p = 10,\ y_p = 30$

Optimal profits are 100.

Consumption problem:

Max $\quad x_c \cdot y_c$

s.t. $\quad x_c + 3y_c \leq 100$

$x_c = 50,\ y_c = 50/3$

Optimal utility is 833.33

From this result, we can see that trading increases the utility of CIZ's inhabitants.

c.) Since the production possbility set of CIZ has expanded, more goods will be available on the world market. Since more goods are desirable, utility level will increase on average. The expansion of capacity to produce electronics may cause a rise in the supply of electronics. If demand for electronics remains the same, we expect the price of electronics tp drop. Thus, those countries that produce mainly electronics may be worse off than before CIZ's expansion.

d.) *Production problem*

Max $x_p + 2y_p$

s.t. $x_p2 + 4/5y_p2 \le 1000$

$x_p/y_p = 2.5$

$\Rightarrow x_p = (500/3)^{1/2} \quad y_p = 2.5 \cdot (500/3)^{1/2}$

Total profits are $6 \cdot (500/3)^{1/2}$

Consumption problem

Max $x_c \cdot y_c$

s.t. $x_c + 2y_c \le 6 \cdot (500/3)^{1/2}$

$x_c = 3 \cdot (500/3)^{1/2}$, $y_c = 1.5 \cdot (500/3)^{1/2}$

Optimal utility is 750, CIZ would be worse off than before.

Problem Set 5: General Equilibrium and Externalities

General Equilibrium I

Luenberger: Chapter 7, Problem 3

Externalities I

Luenberger: Chapter 9, Problem 13

Externalities II

Luenberger: Chapter 9, Problem 15