EC202 Week 7
Covering Materials from Week 5

Junxi Liu

14 Nov 2022

Recap of what we've been through so far…

- Pure exchange economy:
  - Week 2 material: Edgeworth Box, Pareto Efficiency
  - Week 3 material: Walrasian equilibrium
- Economy with production (Robinson Crusoe economy):
  - Week 4 material: Walrasian equilibrium with production

The Welfare Theorems

- The First Fundamental Theorem of Welfare Economics
  - If (markets are complete and) everyone's preferences are locally non-satiated then any Walrasian Equilibrium is Pareto optimal.
  - (Assuming markets are complete.) Given an economy with fundamentals listed in Lecture 4, Definition 2.1, let (**p**, **x**, **y**) be a Walrasian Equilibrium. If all consumers have locally non-satiated preferences then the allocation (**x**,**y**) is Pareto efficient.
- The Second Fundamental Theorem of Welfare Economics
  - (Assuming markets are complete) Let **x** be a Pareto efficient allocation. If all agents have continuous, convex and locally non-satiated preferences then there exists a reallocation of resources such that for some price schedule **p**, (**p**, **x**) is a Walrasian Equilibrium.
  - (Assuming markets are complete.) Given the fundamentals listed in Lecture 4, Definition 2.1, let (**x**, **y**) be a Pareto efficient al location where $x_{ij} > 0$ forall $i \in I$ and $j \in J$. Suppose
    - i) all preferences are convex, continuous and locally non-satiated.
    - ii) all production sets are convex, closed and satisfy free-disposal.

    Then there exists a distribution of resources such that (**x**,**y**) is a Walrasian Equilibrium allocation.

In-class Question

Q3. Crusoe has 10 units of time (good 1) to allocate between work and leisure and 2 units of the consumption good (good 2). If he works for k hours he can produce $2\sqrt{k}$ units of the consumption good and can freely dispose of each good. Crusoe has utility function $u : \mathbb{R}^2_{\geq 0} \to \mathbb{R}$ where

$$u(x_1, x_2) = x_1^{\frac{1}{10}} x_2^{\frac{2}{10}}$$

a) Find the Pareto efficient bundle(s) and draw a diagram to illustrate them. (Hint: in this case algebra gets messy, so just show that the solution of Crusoe working 4 hours satisfies the first order condition.)
b) Write down the firm's production set.
c) What if anything can we learn about the Walrasian Equilibrium or Equilibria from the First Welfare Theorem?
d) What if anything can we learn about the Walrasian Equilibrium or Equilibria from the Second Welfare Theorem?
e)Find the Walrasian Equilibrium or Equilibria.

In-class Question

Q4. Repeat Q3 but with changing the preferences and production technology to:
- Let Crusoe have preferences represented by $u(x_1, x_2) = 2x_1 + x_2$.
- Let Crusoe's production technology be the ability to transform k units of good 1 into $2k$ units of good 2 .

In-class Question

Q5. Repeat Q3 but with changing the preferences and production technology to:
- Let Crusoe have preferences represented by $u(x_1, x_2) = \min\{2x_1, x_2\}$.
- Let Crusoe's production technology be the ability to transform k units of good 1 into $\frac{5k^2}{8}$ units of good 2 .