Econ 301 - Microeconomic Theory 2 **Winter 2018**

Lecture 19: March 21, 2018

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19.1 Externalities Continued

Note : This lecture builds upon the example in Lecture 17

Second solution for externalities : Government intervention through permit system

Definition 19.1 *Permit System is a framework where in order to consume one unit of a good, consumers need to pay cost $c > 0$ for a permit*

- Suppose government expropriates all endowments of good 2 in the economy. Basically, permits must be bought for good 2.
- We need to specify what the government does with the revenue it collects from permit sales. We can assume that the revenue is returned to consumers and shared equally.
- There is a competitive market for good 1 that determines its equilibria price.
- Given a permit price c, a competitive equilibrium is price p^*, allocations x^{A*}, x^{B*}, and per-capita tax return T^* that satisfy
  1. Given p_1^* and c, x_A^* is a solution to
  $$\max_{x_1^A, x_2^A \geq 0} {x_1^A}^{\frac{1}{2}} {x_2^A}^{\frac{1}{2}} \quad \text{s.t} \quad p_1^* x_1^A + c x_2^A \leq 2p_1^* + T^*$$
  x^{B*} is a solution to
  $$\max_{x_1^B, x_2^B \geq 0} {x_1^B}^{\frac{1}{2}} [2 - x_2^{A*}]^{\frac{1}{2}} \quad \text{s.t} \quad p_1^* x_1^B + c x_2^B \leq 2p_1^* + T^*$$
  2. $x_1^{A*} + x_1^{B*} = 2$ (MC1)
     - There is no market clearing condition for good 2, since there is no competitive market for good 2.
  3. Governments budget it balanced :
  $$2T^* = c \cdot [x_2^{A*} + x_2^{B*}]$$
- Demand functions are :
$$(x_1^A(p_1, c, T), x_2^A(p_1, c, T)) = \left(\frac{2p_1 + T}{2p_1}, \frac{2p_1 + T}{2c}\right)$$
$$(x_1^B(p_1, c, T), x_2^B(p_1, c, T)) = \left(\frac{p_1 + T}{p_1}, 0\right)$$

- Evaluate (MC1)

$$\frac{2p_1^* + T^*}{2p_1} + \frac{p_1 + T^*}{p_1} = 3$$
$$\implies T^* = \frac{2}{3}p_1^*$$

- Evaluate balanced budget condition (BB).

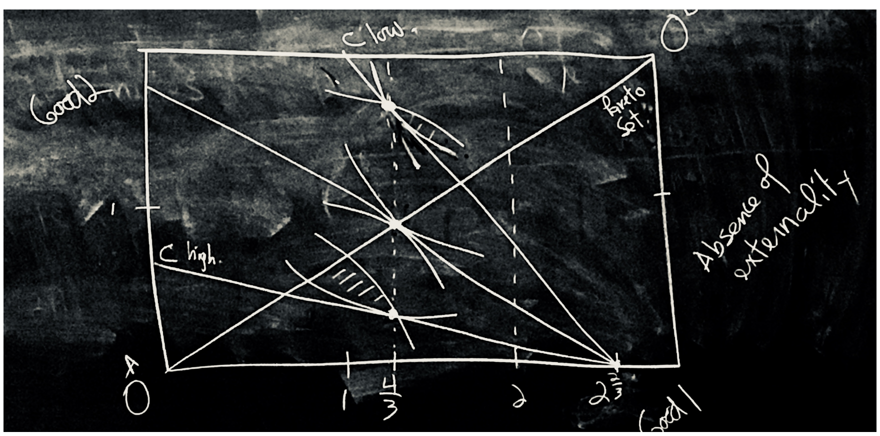
$$2T^* = c \cdot \left[\frac{2p_1^* + T^*}{2c}\right] \implies T^* = \frac{2}{3}p_1^*$$

- This displays the (MC1) holds $\iff$ (BB) holds
- Normalize $p_1^* = 1$, then $T^* = \frac{2}{3}$
- Given c, price $p_1^* = 1$, tax return $T^* = \frac{2}{3}$, and allocations $x^{A*} = \left(\frac{4}{3}, \frac{4}{3c}\right)$ and $x^{B*} = \left(\frac{5}{3}, 0\right)$ form a competitive equilibrium
- Are competitive equilibrium allocations with government intervention Pareto-efficient?

$$\frac{\frac{d}{dx_1^A}u^A(x_1^{A*}, x_2^{A*})}{\frac{d}{dx_2^A}u^A(x_1^{A*}, x_2^{A*})} = \frac{x_2^{A*}}{x_1^{A*}} = \frac{1}{c}$$

$$\frac{\frac{d}{dx_1^B}u^B(x_1^{B*}, 2 - x_2^{A*})}{\frac{d}{dx_2^B}u^B(x_1^{B*}, 2 - x_2^{A*})} = \frac{2 - x_2^{A*}}{x_1^{B*}} = \frac{6c - 4}{5c}$$

$$MRS^A \geq MRS^B \iff c \leq \frac{3}{2}$$



Changing C, will pivot the budget line.

- So, government intervention can resolve inefficiencies due to externalities, but only if permit price is $c = \frac{3}{2}$. Otherwise, resulting allocations are inefficient.