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

Lecture 17: March 14, 2018

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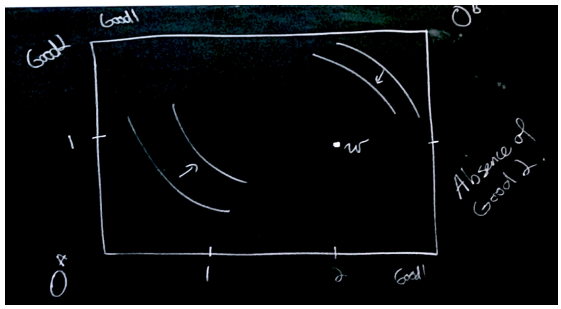
17.1 Externalities Continued

Example 17.1 *An example of a two-consumer economy with externalities*

- *Consumers have endowments* $\omega^A = (2,1)$ *and* $\omega^B = (1,1)$
- *Consumer A has utility* $u^A(x_1^A, x_2^B) = x_1^{A\frac{1}{2}} x_2^{A\frac{1}{2}}$
- *Consumer B has utility* $u^B(x_1^B, x_2^B) = x_1^{B\frac{1}{2}}[2 - x_2^A]^{\frac{1}{2}}$
  - *Consumption of good 2 imposes a negative externality on consumer B*
  - *Interpret* x_2^A *in utility function for B as aggregate amount of consumption of good 2 in the economy*



- *Find a competitive equilibrium of this economy*
- *Demand functions:*

$$(x_1^A(p), x_2^A(p)) = \left(\frac{2p_1 + p_2}{2p_1}, \frac{2p_1 + p_2}{2p_2}\right)$$

$$(x_1^B(p), x_2^B(p)) = \left(\frac{m}{p_1}, 0\right) \rightarrow \text{ Consumer B only values good 1}$$

- *Normalize* $p_1^* = 1$, *(MC2)*

$$\frac{2 + p_2^*}{2p_2^*} = 2 \implies p_2^* = \frac{2}{3}$$

  - *Prices* $p^* = (1, \frac{2}{3})$ *and allocations* $x^{A*} = \left(\frac{4}{3}, 2\right)$, $x^{B*} = \left(\frac{5}{3}, 0\right)$ *form a competitive equilibrium*
- x^{A*} *and* x^{B*} *are not pareto-efficient*

$$\frac{\frac{d}{dx_1^{A*}} u^A(x_1^{A*}, x_2^{A*})}{\frac{d}{dx_2^{A*}} u^A(x_1^{A*}, x_2^{A*})} = \frac{x_2^{A*}}{x_1^{A*}} = \frac{3}{2}$$

$$\frac{\frac{d}{dx_1^{B*}} u^B(x_1^{A*}, x_2^{B*})}{\frac{d}{dx_2^{B*}} u^B(x_1^{A*}, x_2^{B*})} = \frac{2 - x_2^{A*}}{x_1^{B*}} = 0$$

- *In equilibrium, consumer A consumes "too much" of good 2 relative to its impact on consumer B.*
- *Consumer B is willing to exchange good 1 against reduction in consumption of good 2, but no market for this trade exists.*
- *FWT fails which is an example of a market failure*
- *Problem is that there is a missing market, as there is no market for the third good ("absence of good 2"), which is a good that consumer B values.*
- *Can we restore efficiency in this market?*
- *Solution 1 : compete the set of markets*
- *Establish a market in which :*
  - *Consumer B can purchase right to be free of external effects of consumption of good 2.*
  - *Consumer A can purchase rights to produce externality*
  - *3 markets: good 1, good 2, and rights to externalities generated by good 2*
- *Must specify what allocations of rights over externality*
  - *Fix endowments* $0 \leq \omega_R^A \leq 2$ *and* $\omega_R^B 2 - \omega_R^A$

Yes, we did spend the entire class on just one example. That's how long these problems take.