

HOMEWORK 3: EXTERNALITIES AND WELFARE THEOREMS

Due: Monday, February 9th, 2015

LEARNING OBJECTIVE

- Pigovian taxes (and tradable permits, which we will see next class) are government interventions to ensure that externalities are internalized and that a decentralized solution equals a centralized solution.
- A CE implies a PO allocation, but a PO allocation does not always guarantee a CE, i.e. convexity matters for the 2nd fundamental theorem of welfare economics.

INSTRUCTIONS

Carefully read the questions before answering. Make sure your pages are in order and stapled together. Your work should be clear and easy to follow. When prompted, make sure you've explained your answers completely.

QUESTION

- (10 points) Continuing with the example we began in class and letting the price of good one equal p_1 and the price of good two equal p_2 ,
 - determine the decentralized outcome. Does the decentralized outcome equal the centralized outcome that we solved for in class? If not, provide intuition for the difference.
 - determine the optimal tax on consumption, t_c , and compensation to firm 2, τ , such that the consumption externality is internalized.
 - Assume now that consumer externality is removed, but that firm 1 now leads to a negative externality on firm 2*, i.e. $f^2(y_1^2, y_1^1)$ where $f_{y_1^1}^2 < 0$. Determine the centralized and decentralized solutions with this new production externality. Determine the optimal taxes on firm 1, t^1 , and the compensation to firm 2, τ , such that the production externality is internalized.
- (5 points) In many of our examples we have used the assumption of a strictly concave production function to describe the production possibilities set as convex. Consider an economy with nonconvex production possibilities sets. In these economies, are the First and the Second welfare theorems maintained? Use diagrams to help motivate your answer.
- (5 points) What are three possible research areas that would benefit from GE theory analysis? Be specific about sectors and individuals affected.

* This could be an example of downwind air pollution, where upwind there is a refinery (firm 1) that produces negative byproducts in its production process that are blown downwind and impact the production process of firm 2, a process that requires clean air.