

## The Invisible Hand

- Adam Smith argued that the workings of the market led to desirable social outcomes.
  - “Whoever offers to another a bargain of any kind, proposes to do this. Give me that which I want, and you shall have this which you want, is the meaning of every offer; and it is in this manner that we obtain from one another the far greater part of those good offices which we stand in need of. It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their self-love, and never talk to them of our own necessities but of their advantages.”

## Welfare Theorems

- We have seen for a two-good, two-person exchange economy two welfare theorems:
  - First Welfare Theorem: Competitive equilibrium is Pareto optimal
  - Second Welfare Theorem: Any Pareto optimal outcome can be achieved as the outcome of a competitive equilibrium with suitable transfers.
- It turns out these welfare theorems hold when production is allowed as well.

## Efficiency in Production

- When considering an economy with production, we need to modify our notion of optimality.
- An allocation of resources is efficient in production if no further reallocation would permit more of one good to be produced without necessarily reducing the output of some other good.

## Three Rules for Efficient Production

- Each firm uses inputs in the “right” proportions.
  - The rate of technical substitution is the same for every good the firm produces.
  - This will be true if firms minimize costs.
- Inputs are “correctly” allocated across firms.
  - The marginal physical product of any resource in production of a particular good is the same no matter which firm produces that good.
  - If this did not hold, those firms that were inefficient would have higher costs and would go out of business in a competitive equilibrium.

## Three Rules (continued)

- The outputs produced by firms are “correctly” chosen so that reallocation of inputs to another firm will not increase total outputs.
  - Firms should focus on their comparative advantage in production.
  - If any two firms produce the same two (or more) outputs, they will operate on their production possibility frontier such that their rates of product transformation one product for another are equal.
  - Profit maximization guarantees this.

## The Third Rule and Comparative Advantage in Trade

- Example from Nicholson: England and Portugal produce wine and cloth.
- England’s marginal costs are \$8 per bottle of wine and \$4 per shirt.
- Portugal’s marginal costs are \$2 per bottle of wine and \$2 per shirt.
- Both countries start with \$100.
- Should Portugal trade with England when she can produce both goods more efficiently than England can?

## Production without Trade

- With no trade, suppose England and Portugal both spend half their resources on wine and half on cloth.
- England produces:
  - $50/8 = 6.25$  bottles of wine.
  - $50/4 = 12.5$  shirts
- Portugal produces:
  - $50/2 = 25$  bottles of wine.
  - $50/2 = 25$  shirts

## Production with Trade

- England's comparative advantage is in cloth.
  - If England spends all its money producing shirts, it can make  $100/4 = 25$  shirts.
- Portugal's comparative advantage is in wine.
  - If Portugal spends \$70 producing wine, and \$30 producing shirts, it can make  $70/2 = 35$  bottles of wine and  $30/2 = 15$  shirts.
- Total world production of shirts and wine have gone up.
- Trade of shirts for wine will bring England and Portugal to the contract curve and Pareto optimal outcomes.

## Will Firms Produce What Consumers Want?

- In the two-good two-input example, the market led to prices such that  $MRS = RPT$  on the PPF.
  - The rate at which consumers trade off one good for another exactly equals the rate at which firms are able to exchange the production of one good for another.
  - If this holds, no trade will make anyone better off without making someone else worse off—Pareto optimal outcome.
- Adam Smith was pretty smart.

## When Equilibrium Might Not Exist

- The argument about the existence and optimality of equilibrium is not as general as claimed in the last few lectures.
- There are a few underlying assumptions:
  - No agent in the economy has market power  $\mathcal{L}$  Often leads to multiplicity of equilibria if violated
  - There are no "externalities" in production and consumption  $\mathcal{L}$  Equilibria are often not optimal if violated.
  - Buyers and sellers are equally well informed about the quality of goods  $\mathcal{L}$  Equilibrium may not exist if violated.

## The Market for Used Cars

- Example of asymmetric information ruining a perfectly good market.
  - The argument was first developed by Akerlof over 30 years ago.
- The basic problem is that sellers can observe the quality of the cars they are selling exactly, while buyers can only observe the average quality of cars sold on the market.

## Lemons on the Market

- Let  $q$  be the proportion of good cars on the market and let  $1-q$  be the proportion of lemons sold on the market.
- Since buyers cannot tell the difference between good cars and lemons, both must sell at the same price.
- Sellers with good cars will not want to sell them at the average market price (which takes into account how many lemons are on the market).

## Akerlof's Example

- Let the quality of each car be  $x_i \sim U[0,2]$ . Let  $n$  be the number of cars owned by each person. Let  $p$  be the price of cars.
- Let the only other good in the economy be  $M$ , with a price of \$1 per unit.
- There are two types of people in the economy. All else equal, type II people like cars better than type I people:

$$U_1(x, M) = M + \sum_{i=1}^n x_i \quad U_2(x, M) = M + \sum_{i=1}^n \frac{3}{2} x_i$$

## Incentives for Trade

- Type I people own the  $N$  cars in the economy and have an income equal to  $Y_1$ .
  - Their budget constraint is  $M + pD_1 = Np + Y_1$
  - $D_1$  is the number of cars bought by a Type I person.
- Type II people own nothing except income  $Y_2$ .
  - Their budget constraint is  $M + pD_2 = Y_2$
- Type II people would be willing to trade  $3x/2$  units of  $M$  in exchange for a car with quality  $x$ .
- Type I people would be willing to trade  $x$  units of  $M$  in exchange for a car with quality  $x$ .
- Clearly, both parties gain from trade.

## Which Cars will Sellers Sell?

- Each car sold by a Type I trader leads to a loss of  $x_i$  units of utility, in exchange for  $p$  worth of  $M$ .
- Since sellers observe the quality of cars they sell exactly, those sellers who own high quality cars ( $x_i > p$ ) will never put those cars on the market.
  - To do so would result in a loss in utility

## Buyers Can Do the Math

- If all the cars were sold on the market, then the average car sold would have a quality of 1
  - $E[x] = 1$
- But buyers are aware that the high quality cars are systematically held off the market. The average quality of cars actually on the market depends on  $p$ .
  - Since all cars with  $x < p$  are sold, the average quality of cars on the market is  $E[x | x < p]$
  - For a uniform distribution,  $E[x | x < p] = p/2$

## How Much Do Buyers Value the Cars that are on the Market?

- If the average quality of cars on the market is  $p/2$ , Type II traders (buyers) will be willing to trade up to  $3/2 * p/2 = 3p/4$  units of  $M$  in exchange for the average car on the market.
  - This is true, even though buyers would be disappointed with lemons half the time.
- However, the prevailing price of cars on the market is  $p > 3p/4$ . On average buyers would gain less from trading with sellers than they would give away.
- No matter what the price, buyers never buy the cars that are sold.
- The market collapses.

## Then Why is There a Used Car Market?

- Sellers can effectively send signals about the quality of the cars they are selling.
- Buyers are better able (than in the model) to discriminate between good cars and lemons.
- Buyers often have recourse in the courts against sellers who misrepresent their wares.
- Lesson: Asymmetric information does not always kill off a market, though it might do so.
- It may make the market equilibrium outcome non-optimal.