LECTURE 8
WELFARE ANALYSIS
February 8, 2018

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LECTURE 8
Welfare Analysis

February 8, 2018
Announcements

• Problem Set 2:
  • Due next Tuesday (February 13\textsuperscript{th})
  • Problem set work session this afternoon (February 8), 4–6 p.m. in 648 Evans.

• First Midterm:
  • Tuesday, February 20
  • We will give you more information and a sample midterm next Tuesday.
I. Overview
Welfare Analysis

• An extension of the supply and demand framework:
  • Makes use of the optimization analysis we have been doing.
  • It is a tool that helps us evaluate the desirability of market outcomes.

• It is a tool that we will use over and over:
  • To evaluate the effects of government intervention.
  • To understand market failures.
II. CONCEPT OF ECONOMIC SURPLUS
Economic Surplus

• A measure of the amount by which buyers and sellers benefit from participating in the market.

• The total economic surplus is the sum of:
  • Consumer surplus
  • Producer surplus
  • Government revenue (if relevant)
Utility Maximization: \( \frac{MU_x}{P_x} = \frac{MU_y}{P_y} \)
Marginal Benefit (or Reservation Price)

- The dollar value to consumers of another unit of a good.
- What they would be willing to pay for one more unit.
Consumer Surplus

The diagram illustrates the concept of consumer surplus. The shaded area represents the consumer surplus, which is the difference between what consumers are willing to pay and what they actually pay for a good or service. In the graph, the demand curve (D₁, MB) intersects with the supply curve (S₁) at point Q₁. The price at this intersection is P₁, and the consumer surplus is the area shaded in red, indicating the total benefit consumers receive beyond the market price.
Supply

Market

Typical Firm

Profit Maximization: \( mr = mc = P \)
Producer Surplus

Producer Surplus = Total Revenue − Variable Cost
III. ALLOCATIVE EFFICIENCY
Total Surplus = Consumer Surplus + Producer Surplus

Area between the MB and MC curves up to the level bought and sold.
Allocative Efficiency  
(Also Called Pareto Efficiency)  

- The total surplus is as large as possible.
Conditions for Allocative Efficiency

- The good is produced up to the point where MB = MC.
- The good is allocated to the consumers with the highest MB.
- The good is produced by the producers with the lowest MC.
Allocative Efficiency of the Competitive Market Outcome

- At $Q_1$, $MB = MC$.
- Good is allocated to consumers with the highest marginal benefit.
- Good is produced by suppliers with the lowest marginal cost.
IV. EQUITY AND EFFICIENCY
Equity Issues

• Willingness to pay (which underlies consumer surplus) depends in part on income.

• Economists’ measure of welfare doesn’t take into account that consumers may enter the market with vastly different incomes.
Equity and Efficiency

• Allocative efficiency is still a worthy goal.

• Interfering with the price system to improve equity may be costly. (And may not improve equity much.)

• There are ways to improve equity without sacrificing what is good about the price system.
V. WELFARE ANALYSIS OF A PRICE CEILING
Effects of a Price Ceiling

Diagram showing the effects of a price ceiling. The price ceiling $P_C$ is set below the market equilibrium price $P_1$. The quantity supplied at the price ceiling is $Q_S$, while the quantity demanded is $Q_D$. The difference $Q_D - Q_S$ represents the shortage. The graph illustrates the market equilibrium at $P_1$ and $Q_1$. The supply curve is labeled $S_1$ and the demand curve is labeled $D_1$. The price axis is labeled $P$ and the quantity axis is labeled $Q$. The diagram highlights the concepts of supply, demand, and shortage in a price-controlled market scenario.
Welfare Analysis of a Price Ceiling

<table>
<thead>
<tr>
<th></th>
<th>Free Market ($Q_1$)</th>
<th>Price Ceiling ($Q_S$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Surplus</td>
<td>$a+b$</td>
<td>(less than) $a+c$</td>
</tr>
<tr>
<td>Producer Surplus</td>
<td>$c+d+e$</td>
<td>$e$</td>
</tr>
<tr>
<td>Total Surplus</td>
<td>$a+b+c+d+e$</td>
<td>(less than) $a+c+e$</td>
</tr>
<tr>
<td>Deadweight Loss</td>
<td>$b+d$ (+ misallocation)</td>
<td></td>
</tr>
</tbody>
</table>
Deadweight Loss

• Any shortfall in total surplus from its maximum level.

• The deadweight loss of a price ceiling is surely larger than $b+d$ because there is misallocation among consumers.

  • Consumer surplus is, in fact, less than $a+c$ because the good is allocated in some way other than by price.
Glaeser and Luttmer
“The Misallocation of Housing under Rent Control”

• **Look at the overlap percentage:** The fraction of time a member of the group we expect to consume fewer rooms actually consumes more than a member of the group we expect to consume more.

• **Empirical strategy:** Look at the *difference* in the overlap percentage between a city with rent control (NYC) and a number of cities without rent control.
**Glaeser and Luttmer**  
The Misallocation of Housing under Rent Control

<table>
<thead>
<tr>
<th>TABLE 2—AVERAGE OVERLAP IN HOUSING CONSUMPTION BETWEEN POPULATION GROUPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability that rooms for household from group $A$ &gt; rooms for household from group $B$</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Group $A$: High school dropout$^b$</td>
</tr>
<tr>
<td>Group $B$: College or more</td>
</tr>
<tr>
<td>Group $A$: Households without children</td>
</tr>
<tr>
<td>Group $B$: Households with children</td>
</tr>
<tr>
<td>Group $A$: Age $\leq 35^a$</td>
</tr>
<tr>
<td>Group $B$: Age $&gt; 35$ and $\leq 60$</td>
</tr>
<tr>
<td>Group $A$: 1 person households</td>
</tr>
<tr>
<td>Group $B$: 3+ person households</td>
</tr>
<tr>
<td>Group $A$: Per capita income in bottom $\frac{1}{3}$</td>
</tr>
<tr>
<td>Group $B$: Per capita income in top $\frac{1}{3}$</td>
</tr>
</tbody>
</table>

Source: Glaeser and Luttmer, "The Misallocation of Housing under Rent Control."
Equity Issues Related to Rent Control

• Who benefits from rent control?

• Who is harmed?

• Are there other ways of helping poor renters?
VI. WELFARE ANALYSIS OF A TAX
Effect of a Tax

The diagram illustrates the impact of a tax on the market. The supply curves shift upward due to the tax, leading to an increase in the price from $P_1$ to $P_2$ and a decrease in the quantity from $Q_1$ to $Q_2$. The tax increases the price paid by consumers and decreases the price received by producers.
Welfare Analysis of a Tax (Version 1)

**Free Market (Q₁)**
- Consumer Surplus: \(a+b+c+d\)
- Producer Surplus: \(e+f+g+h+i\)
- Government Revenue: \(b+c+e+f\)
- Total Surplus: \(a+b+c+d+e+f+g+h+i\)
- Deadweight Loss: \(d+g\)

**Tax (Q₂)**
- Consumer Surplus: \(a\)
- Producer Surplus: \(h+i\)
- Government Revenue: \(b+c+e+f\)
- Total Surplus: \(a+b+c+e+f+h+i\)
- Deadweight Loss: \(d+g\)
Welfare Analysis of a Tax (Version 2)

<table>
<thead>
<tr>
<th></th>
<th>Free Market (Q₁)</th>
<th>Tax (Q₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Surplus</td>
<td>a+b+c+d</td>
<td>a</td>
</tr>
<tr>
<td>Producer Surplus</td>
<td>e+f+g</td>
<td>b+e</td>
</tr>
<tr>
<td>Government Revenue</td>
<td></td>
<td>c+f</td>
</tr>
<tr>
<td>Total Surplus</td>
<td>a+b+c+d+e+f+g</td>
<td>a+b+c+e+f</td>
</tr>
<tr>
<td>Deadweight Loss</td>
<td></td>
<td>d+g</td>
</tr>
</tbody>
</table>
Some Points about the Welfare Effects of a Tax

- A tax distorts production away from the competitive equilibrium, so at the resulting level of production and consumption MB>MC.

- Production and consumption are still allocated according to willingness to pay and willingness to supply, so there is no misallocation.

- The standard welfare analysis of a tax is incomplete for goods that have effects on people outside the market.