Chapter 5: Consumers and Incentives

Chapter Outline
5.1. The Buyer’s Problem
5.2. Putting It All Together
5.3. From the Buyer’s Problem to the Demand Curve
5.4. Consumer Surplus
5.5. Demand Elasticities

Key Ideas
1. The buyer’s problem has three parts:
   1. what you like,
   2. prices, and
   3. your budget.
2. An optimizing buyer makes decisions at the margin.
3. An individual’s demand curve reflects an ability and willingness to pay for a good or service.

Key Ideas
4. Consumer surplus is the difference between what a buyer is willing to pay for a good and what the buyer actually pays.
5. Elasticity measures a variable’s responsiveness to changes in another variable.

Evidence-Based Economics Example
▶ Would a smoker quit the habit for $100 a month?

= incentives

▶ What would motivate you?

Consumers and Incentives
Why does the demand curve have a negative slope?

▶ Why the price has to fall to buy another unit?
Consumers and Incentives

Why does a soda machine only dispense one bottle or can at a time, but a newspaper vending machine opens up so that you can take as many as you want?

The Buyer’s Problem

1. What do you like?
2. How much does it cost?
3. How much money do you have?

The Buyer’s Problem: What You Like: Tastes and Preferences

What do you like?

Everyone has different likes and dislikes, but we assume everyone has two things in common:
1. We all want the biggest bang for our buck
2. What we actually buy reflects our tastes and preferences

The Buyer’s Problem: Prices of Goods and Services

How much does it cost?

We also assume two characteristics of prices:
1. Prices are fixed—no negotiation
2. We can buy as much as we want of something without driving the price up (because of an increase in demand)

The Buyer’s Problem: The Budget Set

How Much Money You Have to Spend

How much money do you have?

There are lots of things to do with your money, but we assume:
1. There is no saving or borrowing, only buying
2. That even though we use a straight line to represent purchase choices, we only purchase whole units

Exhibit 5.1 The Budget Set and the Budget Constraint for Your Shopping Spree
Why does the budget line have a negative slope?

What does the slope represent?

Suppose Bill Gates offered to buy you a Jaguar—a $100,000 car.

Would you accept his offer?

The next day, he calls and says he doesn’t have time to buy the car and will just give you a check for $100,000 instead.

Will you go buy the car?
Putting It All Together

- Consumer Equilibrium Condition:

\[
\frac{MB_s}{P_s} = \frac{MB_j}{P_j}
\]

- What if $MB_s = 75$ and $MB_j = 100$?

Putting It All Together: Price Changes

Exhibit 5.3 An Inward Pivot in the Budget Constraint from a Price Increase

Exhibit 5.4 A Rightward Pivot in the Budget Constraint from a Price Decrease

Putting It All Together: Income Changes

- Consumer Equilibrium Condition:

\[
\frac{MB_s}{P_s} = \frac{MB_j}{P_j}
\]

Exhibit 5.5 An Outward Shift in the Budget Constraint from an Increase in Income
### From the Buyer’s Problem to the Demand Curve

#### Why does the demand curve have a negative slope?

- Why are you only willing to buy another unit if the price falls?

#### Exhibit 5.6: Your Demand Curve for Jeans

- Price $125
- Quantity Demanded
  - 0: 0 pairs of jeans
  - 50: 3 pairs of jeans
  - 75: 2 pairs of jeans
  - 100: 1 pair of jeans

#### Table: Marginal Benefits per Dollar Spent

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Total Benefits (A)</th>
<th>Marginal Benefits (B)</th>
<th>Marginal Benefits per Dollar Spent (B) / $25</th>
<th>Total Benefits (C)</th>
<th>Marginal Benefits (D)</th>
<th>Marginal Benefits per Dollar Spent (D) / $50</th>
<th>Marginal Benefits per Dollar Spent (D) / $75</th>
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<td>310</td>
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<td>410</td>
<td>490</td>
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<td>0.6</td>
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<td>410</td>
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<td>530</td>
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<td>8</td>
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<td>660</td>
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<td>40</td>
<td>530</td>
<td>535</td>
<td>30</td>
<td>530</td>
<td>0.13</td>
</tr>
</tbody>
</table>

#### Benefits

- Total Benefits (A)
- Marginal Benefits (B)
- Marginal Benefits per Dollar Spent (B) / $25
- Total Benefits (C)
- Marginal Benefits (D)
- Marginal Benefits per Dollar Spent (D) / $50
- Marginal Benefits per Dollar Spent (D) / $75
Why does a soda machine only dispense one bottle or can at a time, but a newspaper vending machine opens up so that you can take as many as you want?

The difference between what you are willing to pay and what you have to pay (the market price)

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The difference between what you are willing to pay and what you have to pay (the market price)
Would a smoker quit the habit for $100 a month?

= incentives

What would motivate you?

Exhibit 5.10 Experimental Results from Smoking Study

Your Buyer’s Problem with an Extra $100

Exhibit 5.2b Your Buyer’s Problem ($300 → $400 available)

Demand Elasticities

Why are last-minute airplane tickets so expensive?

Why are last-minute Broadway show tickets so cheap?

Demand Elasticities

Suppose you play in a band.

Your band has a steady gig with a bar that gives you the cover charge without taking a cut.

You and your band are interested in increasing the money you make from this gig and are talking about changing the cover charge.

Should you increase it or decrease it?
Demand Elasticities:

- **Elasticity**
  - A measure of how sensitive one variable is to changes in another

Demand Elasticities:

- Three measures of elasticity:
  1. **Price** elasticity of demand
  2. **Cross-price** elasticity of demand
  3. **Income** elasticity of demand

Demand Elasticities: Price Elasticity of Demand

1. **Price elasticity of demand** answers the question:
   - How much does quantity demanded change when the good’s price changes?
   - Mathematically:
     - Percentage change in quantity demanded due to a percentage change in price:
     
     \[
     \text{Price elasticity} = \frac{\text{Percentage change in } Q_d}{\text{Percentage change in } P}
     \]

Demand Elasticities: Elasticity Measures

- \( ED = \infty \) = Perfectly Elastic
- \( ED > 1 \) = Elastic
- \( ED = 1 \) = Unit Elastic
- \( ED < 1 \) = Inelastic
- \( ED = 0 \) = Perfectly Inelastic

<table>
<thead>
<tr>
<th>Good Category</th>
<th>Price Elasticity^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olive Oil</td>
<td>1.92</td>
</tr>
<tr>
<td>Peanut Butter</td>
<td>1.73</td>
</tr>
<tr>
<td>Ketchup</td>
<td>1.36</td>
</tr>
<tr>
<td>Wine</td>
<td>1.00</td>
</tr>
<tr>
<td>Laundry Detergent</td>
<td>0.81</td>
</tr>
<tr>
<td>Shampoo</td>
<td>0.79</td>
</tr>
<tr>
<td>Potato chips</td>
<td>0.45</td>
</tr>
<tr>
<td>Cigarettes</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Exhibit 5.13 Examples of Various Price Elasticities
Demand Elasticities:
Price Elasticity of Demand

- Let’s look at another point on the demand curve for jeans:
  - Original price = $25; original quantity = 4 pair
  - What if
    - Price increased to $30 (20% increase)
      - and as a result, the optimal quantity fell to 3 (25% decrease)
  - ED = -25%/20% = -1.25

Demand Elasticities:
Midpoint Method for Calculation

- Problem: The above method gives different answers depending on where you start.
  - From A to B, $P$ rises 20%, $Q$ falls 25%,
    - ED = -25/20 = -1.25
  - From B to A, $P$ falls 16.7%, $Q$ rises 33.3%,
    - ED = -33.3/16.7 = -2

Demand Elasticities and Total Revenue

- Suppose you play in a band.
  - Your band has a steady gig with a bar that gives you the cover charge without taking a cut.
  - You and your band are interested in increasing the money you make from this gig and are talking about changing the cover charge.
  - Should you increase it or decrease it?

Demand Elasticities and Total Revenue

- TR = $P \times Q$
  - If demand is inelastic, when price increases, quantity decreases—a little:
    - TR = $\uparrow P \times Q = \uparrow TR$
  - The price increase pushes total revenue up,
    - the quantity decrease pushes total revenue down,
  - but the price increase is more than the quantity decrease,
  - so the final result is that total revenue increases.
Demand Elasticities and Total Revenue

\[ TR = P \times Q = \downarrow TR \]

- If price decreases, total revenue also decreases.
- As a result of lower price, quantity increases, but because demand is inelastic, quantity increases only slightly.
- Net result is that total revenue decreases.

If demand is elastic, when price increases, quantity decreases—a lot:

\[ TR = P \times Q = \downarrow TR \]

- The price increase pushes total revenue up,
- the quantity decrease pushes total revenue down,
- but the quantity decrease is more than the price increase,
- so the final result is that total revenue decreases.

Selected Price Elasticity (from Wiki)

- **Rice** [48]
  - -0.47 (Austria)
  - -0.80 (Bangladesh)
  - -0.80 (China)
  - -0.25 (Japan)
  - -0.55 (US)

- **Eggs**
  - -0.1 (US: Household only) [49]
  - -0.35 (Canada) [50]
  - -0.55 (South Africa) [51]

- **Livestock**
  - -0.5 to -0.6
    - (Broiler Chickens) [52]

- **Soft drinks**
  - -0.8 to -1.0 (general) [53]
  - -3.8 (Coca-Cola) [54]
  - -4.4 (Mountain Dew) [54]

- **Alcoholic beverages** (US) [55]
  - -0.3 or -0.7 to -0.9 as of 1972 (Beer)
  - -1.0 (Wine)
  - -1.5 (Spirits)

- **Cigarettes** (US) [56]
  - -0.3 to -0.6 (General)
  - -0.6 to -0.7 (Youth)

- **Transport**
  - -0.20 (Bus travel US) [57]
  - -2.80 (Ford compact automobile) [58]

- **Airline travel** (US) [59]
  - -0.3 (First Class)
  - -0.9 (Discount)
  - -1.5 (for Leisure Travelers)

- **Car fuel** [60]
  - -0.25 (Short run)
  - -0.64 (Long run)

- **Medicine** (US)
  - -0.31 (Medical insurance) [61]
  - -0.03 to -0.06 (Pediatric Visits) [62]

- **Steel**
  - -0.2 to -0.3 [63]

- **Oil** (World)
  - -0.4

- **Cinema visits** (US)
  - -0.87 (General) [64]
  - Live Performing Arts (Theater, etc.)
    - -0.4 to -0.9 [65]

- **Cinema visits** (general)
  - -0.87 (General) [64]
  - Live Performing Arts (Theater, etc.)
    - -0.4 to -0.9 [65]
Demand Elasticities: Determinants

- Determinants of Price Elasticity of Demand
  1. Number and closeness of substitutes
  2. Budget share spent on the good
  3. Time horizon available to adjust to price changes

Demand Elasticities: Cross-Price Elasticity of Demand

- Cross-price elasticity of demand answers:
  1. How much does the quantity demanded of one good change when the price of another changes?
  2. Mathematically:
     \[
     \text{Cross-price elasticity of demand} = \frac{\% \text{ change in } Q^d \text{ for good } 1}{\% \text{ change in price of good } 2}
     \]

Demand Elasticities: Income Elasticity of Demand

- Income elasticity of demand answers:
  1. How much does quantity demanded change when income changes?
  2. Mathematically:
     \[
     \text{Income elasticity of demand} = \frac{\text{Percentage change in } Q^d}{\text{Percentage change in income}}
     \]

Exhibit 5.14 Examples of Various Cross-Price Elasticities

<table>
<thead>
<tr>
<th>Goods</th>
<th>Cross-Price Elasticity $^d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat and Fish</td>
<td>1.6</td>
</tr>
<tr>
<td>Clothing and Entertainment</td>
<td>0.6</td>
</tr>
<tr>
<td>Whole Milk and Low-Fat Milk</td>
<td>0.5</td>
</tr>
<tr>
<td>Meat and Potatoes</td>
<td>–0.2</td>
</tr>
<tr>
<td>Food and Entertainment</td>
<td>–0.7</td>
</tr>
</tbody>
</table>

Exhibit 5.15 Examples of Various Income Elasticities

<table>
<thead>
<tr>
<th>Goods</th>
<th>Income Elasticity $^d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Vacation</td>
<td>2.10</td>
</tr>
<tr>
<td>Domestic Vacation</td>
<td>1.70</td>
</tr>
<tr>
<td>Vacation Home</td>
<td>1.20</td>
</tr>
<tr>
<td>Healthcare</td>
<td>1.18</td>
</tr>
<tr>
<td>Meats</td>
<td>1.15</td>
</tr>
<tr>
<td>Housing</td>
<td>1.00</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>0.61</td>
</tr>
<tr>
<td>Gasoline</td>
<td>0.48</td>
</tr>
<tr>
<td>Cereal</td>
<td>0.32</td>
</tr>
<tr>
<td>Environment</td>
<td>0.25</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.23</td>
</tr>
<tr>
<td>Rice</td>
<td>–0.44</td>
</tr>
<tr>
<td>Public Transit</td>
<td>–0.75</td>
</tr>
</tbody>
</table>
Conclusion

- Demand is derived from Buyer’s Problem
- Consumer Surplus is the Gain from Trade
- Elasticity (= Sensitivity) of Demand
  - Price Elasticity of Demand
  - Cross-Price Elasticity of Demand
  - Income Elasticity of Demand

Homework For ALL Chapter 5

- ALL Chap.5, Problem 1, 4, 7, 10, 11, 13
- Challenge Questions (from Past Midterms)
  - 2007 - Essay Q2
  - 2008 - Essay Part D (Multi-Choice Q4-6)
  - 2009 - Essay C2-C7, D7-D8
  - 2010 - Essay B2-B4, B7, B10-B11 (True/False Q4)
  - 2012 - Essay B3, C (True/False Q5)
  - 2013 - Essay A, D13-D14 (True/False Q4)
  - 2014 - Essay A6-A10, C1-C5
  - 2015 - Essay B1-B13 (True/False A6)