Econ Dept, UMR
Presents

The Demand Side of the Market
Starring

- Utility Theory
- Consumer Surplus
- Elasticity
Featuring

- The MU/P Rule
- The Meaning of Value
- Four Elasticities:
  - Price Elasticity of Demand
  - Income Elasticity
  - Cross Price Elasticity
  - Price Elasticity of Supply
- The Elasticity-TR relationship
In Three Parts

Consumer Choice Theory

Consumer Surplus

Elasticity
Part 1

Consumer Choice Theory

Income/Substitution Effects

Utility Theory
Assumptions underlying the Consumer choice model:

- Consumers buy competitively, that is they can buy as much as they want at a given price
- Consumers have limited money incomes and sufficient information to make informed choices
- Consumers are rational
- Consumers seek to maximize their total utility or satisfaction
Consumers Have to Choose What They Want With Their Limited Incomes
Hot Links

- **USADATA**

Jump to USADATA and Click on “Free Examples” to see some data on your buying patterns
Review -- the determinants of consumer demand (PINTE):

- **P**: The price of the product, and the prices of substitutes and complements available to the consumer
- **I**: The income available to the consumer
- **N**: The number of consumers
- **T**: The consumer’s tastes and preferences
- **E**: The consumer’s expectations about future income, wealth, and prices
Basic Demand Theory

- Law of Demand - The rule that consumers buy more at low prices than they do at high prices.
- The Law may be argued from an analysis of:
  - The Income/Substitution Effect of a Price Change, or
  - Utility Theory - A theory of consumer behavior in which people buy goods based on the satisfaction they expect to derive from those goods.
First, We’ll Look at the Income and Substitution Effect of a Price Change

- **Price changes affect consumers in two ways:**
  - **Income effects**: Consumption changes because purchasing power changes.
  - **Substitution effects**: Consumption changes because opportunity costs change.
Income Effect of a Price Change

- When the price of a product **falls**, a consumer has **more** purchasing power with the same amount of income.
- When the price of a product **rises**, a consumer has **less** purchasing power with the same amount of income.
- More purchasing power will **increase** the demand for **normal** goods and **decrease** the demand for **inferior** goods.
Normal vs Inferior vs Giffen Goods

- **Normal Goods** - Those that consumers buy more of as their real incomes rise and less of as their real income falls.

- **Inferior Goods** - Those goods consumers buy more of as their income falls and less of as their income rises.

- **Giffen Goods** - Those inferior goods with an income effect that moves in the same direction as price and for which the income effect is larger than the substitution effect.
Substitution Effects of a Price Change

- When the price of a product **falls**, that product becomes **more** attractive relative to potential substitutes.
- When the price of a product **rises**, that product becomes **less** attractive relative to potential substitutes.
- The substitution effect implies the demand curve will be downward sloping.
**Income vs. Substitution Effect**

- **Income Effect** - The change in quantity demanded of a good due to a change in real income caused by a change in the price of a good.
- **Substitution Effect** - The change in the quantity demanded of a good resulting from a change in its price relative to the price of other goods.
- Usually, **normally**, the two effects work together--increase in $Q_D$ when $P$ falls and decrease in $Q_D$ when $P$ increases.
Income, Substitution Effect of a Fall in Price of a Normal Good

- Price Falls
  - Real Income Increases
  - Substitution Effect
  - $Q_D$ Increases
Income, Substitution Effect of a Fall in Price of an **Inferior** Good

*Inferior, but not a Giffen Good

- **Price Falls**
- **Real Income Increases**
- **Substitution Effect**
- **Total Effect = \( \frac{Q}{t} \)**

**Q_D** Decreases

Q_D Increases
Income, Substitution Effect of a Fall in Price of a Giffen Good

Price Falls

Real Income Increases

Substitution Effect

Total Effect = \( \frac{Q_D}{P} \)

Q_D Decreases

Q_D Increases

Q_D Decreases

Income Effect
Summary: The Law of Demand and the Income - Substitution Effect

- Both effects work to explain the law of demand
- Only in the case of inferior goods is an upward sloping demand possible
- Even with inferior goods, the substitution effect will outweigh the income effect unless
  - the good is strongly inferior and occupies a large portion of a person’s budget
  - the market is dominated by persons for whom the good is a Giffen good
- Economists are still looking for a Giffen good
Now, let’s look at the law of demand and consumer choice within the context of Utility Theory.

- We need to establish some basic concepts:
  - The budget constraint
  - Total and Marginal Utility
  - The common sense of the MU/ P rule
The limits imposed on consumer choices by income, wealth, and product prices
Showing the Budget Constraint Graphically

\[ 40 = \frac{I}{P_Y} \]

\[ 20 = \frac{I}{P_X} \]

\[ \text{I = Income per period = $200} \]

\[ P_X = \text{Price of Good X = $10} \]

\[ P_Y = \text{Price of Good Y = $5} \]

\[ \text{Slope} = - \frac{40}{20} = - \frac{\frac{I}{P_Y}}{\frac{I}{P_X}} \]

\[ = - \frac{P_X}{P_Y} \]
Showing A Decrease in Income

$I = \text{Income per period} = \$200$

$P_X = \text{Price of Good X} = \$10$

$P_Y = \text{Price of Good Y} = \$5$

Slope $= \frac{-40}{20} = \frac{I}{P_Y}/(I/P_X)$

$= \frac{P_X}{P_Y}$

New Income $= \$100$

Parallel shift inward, slope doesn’t change
I = Income per period = $200

P_X = Price of Good X = $10

P_Y = Price of Good Y = $5

Slope = -40/20 = - (I/P_Y)/(I/P_X)

= -P_X/P_Y

Both Prices Double

Parallel shift inward, slope doesn’t change since relative prices didn’t change
Showing A Change in A Price

I = Income per period = $200

$P_X = Price of Good X = $10$

$P_Y = Price of Good Y = $5$

$P_{Y_2} = New Price of Good Y = $10$

Rotation from the X axis, slope changes since relative prices change

Slope = \(-\frac{20}{20}\) = \(-\frac{P_X}{P_{Y_2}}/\left(I/P_X\right) = -\frac{P_X}{P_{Y_2}}\)

Price of Y Double

40 = I/P_Y

20 = I/P_X

\(10\)
The basis of choice: Utility

- The budget constraint shows us the combinations of two goods that a consumer CAN buy.
- What else do we need to know to determine what the consumer WILL buy?
Utility

- The satisfaction, or reward, a product yields relative to its alternatives
- Impossible to measure
- Cannot be compared across people
- Helps us to better understand consumer choice
Some Definitions for Utility Theory

- **Total utility** is the total amount of satisfaction obtained from consumption of a good, service, or activity.
- **Marginal utility** is the additional satisfaction gained by the consumption or use of one more unit of a good, service, or activity.
- **Util** is a unit of satisfaction used to subjectively measure satisfaction.
Ordinal Measures and Interpersonal Utility Comparisons

- The actual number of utils doesn’t matter, just the relationship between them.
- For this reason, we can’t compare utils between people. We can only compare utils between goods, services, or activities for one person.
A Point to Note

- Utility comes from any activity that gives us happiness-viewing a sunset, talking with a person we like, hiking a mountainous trail, or munching a candy bar.

- For convenience, we refer to “consuming a good” but we mean any activity that we enjoy.
Total and Marginal Utility

- **Total Utility** (TU) - relates consumption of a good to the utility derived from consuming a good.
- **Marginal Utility** (MU) - the change in total utility when consumption of a good changes by one unit.
  - \[ MU = \frac{\Delta TU}{\Delta Q} \]
Law of Diminishing Marginal Utility

- Law of Diminishing Marginal Utility - as more of a good is consumed, the added utility (MU) decreases, ceteris paribus.
Law of Diminishing Marginal Utility

- **Example**
  - If I’m really hungry, I get a lot of satisfaction from first slice of pizza.
  - As I keep eating pizza, the satisfaction from the next slice would be less than that of the first slice.
  - And the MU of the third slice less than that of the second slice.
Notes on the Law of Diminishing MU

- As with Demand and Supply, Utility is a Flow: A Time Period must be specified.
- The Law tells us that the Total Utility curve will become “flatter” as consumption increases.
  - Slope of the total utility curve is equal to marginal utility.
Marginal Utility

 MU

 Q/t
Shape of MU

- Downward sloping
  - Law of diminishing marginal utility
- Always positive
- Rational behavior
  - Consumer only purchases a good if they get some positive utility from it.
Total Utility

\[ MU = \frac{\Delta TU}{\Delta Q} \]

Region of “too much fun”
Total Utility and Marginal Utility

At B, $MU = 0$

More precisely, $MU$ is defined at a point. At point A, $MU = \frac{\Delta TU}{\Delta Q}$

$MU = \frac{\Delta TU}{\Delta Q}$

More precisely, $MU$ is defined at a point. At point A, $MU = \frac{\Delta TU}{\Delta Q}$ is the slope of the $TU$ curve.
Shape of TU

- Positive slope
  - Consumer only purchases a good if gets some positive amount of utility (rational behavior)
- Slope gets flatter as Q increases
  - Law of diminishing marginal utility
Consumer Equilibrium

- Now that we understand the concepts of utility theory - we will use them to explain how consumers make decisions about what to buy
Consumer Equilibrium

- How well we like something is encompassed in the concepts of total utility and marginal utility.
- But I can’t afford to think about what I like the most, I have to think about what I have to give up as well.
- So if I want to maximize my utility, I don’t just pick the thing that gives me the most pleasure. I have to weigh the price of the good in my decision as well.
Allocating Income to Maximize Utility

How can we use the information on the budget set and utility theory to determine the utility maximizing bundle of goods and services?
Utility-Maximizing Rule

- A utility maximizing consumer allocates his or her expenditures such that the marginal utility per dollar spent on each activity is equal for all activities.

  \[ \frac{MU_x}{P_x} = \frac{MU_{AOG}}{P_{AOG}} \]

- For activities not undertaken, or goods not bought, the MU/P ratio is less than the ratio for those activities undertaken.

- This rule is a necessary condition derived from applying calculus to maximization problems. It also follows from common sense as we will see.
Consider Fran. She is trying to determine the utility maximizing combination of trips to a blues club and to a coffee house to take per week.

<table>
<thead>
<tr>
<th>Club</th>
<th>Total Utility</th>
<th>Marginal Utility</th>
<th>Coffee House</th>
<th>Total Utility</th>
<th>Marginal Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trips</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>12</td>
<td>1</td>
<td>20</td>
<td>20</td>
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<tr>
<td>2</td>
<td>22</td>
<td>10</td>
<td>2</td>
<td>36</td>
<td>16</td>
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<tr>
<td>3</td>
<td>31</td>
<td>9</td>
<td>3</td>
<td>50</td>
<td>14</td>
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<td>39</td>
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<td>4</td>
<td>62</td>
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</tr>
<tr>
<td>5</td>
<td>45</td>
<td>6</td>
<td>5</td>
<td>72</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>49</td>
<td>4</td>
<td>6</td>
<td>80</td>
<td>8</td>
</tr>
</tbody>
</table>
If club trips cost $3.00 and trips to the coffee house cost $6.00, what will she buy with a $24 budget?

<table>
<thead>
<tr>
<th>Club Trips</th>
<th>Marginal Utility</th>
<th>MU/P</th>
<th>CHouse Trips</th>
<th>Marginal Utility</th>
<th>MU/P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>4.0  (=12/3)</td>
<td>1</td>
<td>20</td>
<td>3.7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>3.3</td>
<td>2</td>
<td>16</td>
<td>2.7</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>3.0</td>
<td>3</td>
<td>14</td>
<td>2.3</td>
</tr>
<tr>
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<td>8</td>
<td>2.7</td>
<td>4</td>
<td>12</td>
<td>2.0</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>2.0</td>
<td>5</td>
<td>10</td>
<td>1.7</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>1.3</td>
<td>6</td>
<td>8</td>
<td>1.3</td>
</tr>
</tbody>
</table>
First let’s look at Fran’s Weekly Budget Constraint

Blues Trips

8

Coffee House Trips

4

She may select any combination within the triangle formed by the origin and the budget line, B

Note: The negative of the slope of the budget constraint is the ratio of relative prices
### The Common Sense of Maximizing Utility

<table>
<thead>
<tr>
<th>Blues Trips</th>
<th>Club Trips</th>
<th>Marginal Utility</th>
<th>MU/P (=x/3)</th>
<th>Coffee House Trips</th>
<th>Marginal Utility</th>
<th>MU/P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
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<td></td>
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<td>12</td>
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<td>4</td>
<td>1.3</td>
<td></td>
<td>6</td>
<td>8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

(6, 1) is on the budget line, but MU/P are not equal. MU/P = 1.3 for the blues < 3.7 for the coffee.

You get more for your $ at the coffee house.
Now Apply the MU/P Rule

<table>
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<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>1.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coffee House Trips</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
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<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>
Utility Maximization Requires Equal MU/P Ratios and Being on the Budget Line

<table>
<thead>
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<th></th>
<th>Club MU/P Trips</th>
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MU/P =, but (6,6) is outside budget
Something To Think About

- To make life simpler, we compartmentalize problems such as consumer choice
- Fran has allocated so much of her budget to having fun, to clothing, etc. $24 in this example
- We are looking at her choice problem within the compartment of entertainment—hearing the blues, and enjoying people/ conversation at the coffee house
Visits to the Blues Club and the Coffee House has well defined costs—estimated by a “Price”

Often we want things not available for a $ price

When this is the case, we estimate the “cost” subjectively

Economists estimate these cost objectively through statistical methods
More Common Sense of the MU/P Rule

- If MU/P for X = 10 and MU/P for Y = 5, you are getting more pleasure per dollar buying X.
- As you reallocate spending from Y to X (moving on your budget constrain), the MU_X falls and the MU_Y increases. This follows from the law of diminishing MU.
- You continue to reallocate until the ratios are equal.
The Law of Demand and the MU/P Rule

- The rational for equating MU/P ratios to maximize utility implies the law of demand.
- \( \frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} \) now suppose \( P_X \) falls
- \( \frac{MU_X}{P_X} > \frac{MU_Y}{P_Y} \) and you will buy more X
- So the Law of Demand is valid if the Law of Diminishing MU is valid
- Can you think of any exceptions?
We need to wrestle with one more concept to discover the meaning of Value

**Consumer Surplus**

go on to Part 2
The End

Part 1