More on the Theory of Choice

- We have talked about indifference curves to represent a consumer’s preferences.
- That is not all of the story. Budget realities play a role.

Marginal Rate of Substitution

\[ U = AB \]

- In this example, the following points lie on a single indifference curve:

<table>
<thead>
<tr>
<th>Apples</th>
<th>16</th>
<th>8</th>
<th>5.33</th>
<th>4</th>
<th>3.2</th>
<th>2.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bananas</td>
<td>1</td>
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<td>3</td>
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### Marginal Rate of Substitution

- How many apples is our consumer willing to substitute for an additional banana?

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<th>MRS</th>
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</tr>
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</tr>
<tr>
<td>4</td>
<td>4</td>
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</tr>
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### Declining MRS

- MRS is declining. With more bananas, the number of apples you will give up to get another banana declines.

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### MRS and Indifference Curves

- The Slope of the Indifference Curve gives us the MRS.

- As we move along the indifference curve, the principle of diminishing MRS means a diminishing slope.

### The Budget Constraint

- Indifference curves, such as shown on the right, tell us about preferences.
The Budget Constraint

• Indifference curves, such as shown on the right, tell us about preferences.
• There is another part of the story, the budget constraint.

\[ p_A A + p_B B = Y \]

\[ p_A A + p_B B - p_A A = Y - p_A A \]

Suppose apples sell for \( p_A \); bananas for \( p_B \).
The consumer has income \( Y \).

\[ p_A A + p_B B = Y \]

\[ p_B B = Y - p_A A \]
The Budget Constraint

- Suppose apples sell for $p_A$; bananas for $p_B$
- The consumer has income $Y$
  
  \[ p_A A + p_B B = Y \]
  
  \[ p_A A + p_B B - p_A = Y - p_A \]
  
  \[ p_B B = Y - p_A \]
  
  \[ \frac{1}{p_B} (p_B B) = \frac{1}{p_B} (Y - p_A) \]

Graphing The Budget Constraint

- If we spend everything on bananas, we can buy $\frac{Y}{p_B}$ bananas.
- If we spend everything on apples, we can buy $\frac{Y}{p_A}$ apples.

\[ B = \frac{1}{p_B} Y - \left( \frac{p_A}{p_B} \right) A \]

Constrained Maximization

- In fact, given the budget, 2 is the best we can do.
- This choice maximizes utility subject to the budget constraint.

The Budget Constraint

- At the utility-maximizing point, the budget line is just tangent to the indifference curve.
The Budget Constraint

- At the utility-maximizing point, the budget line is just tangent to the indifference curve.
- It just touches the curve.

MRS and MRT

- The Marginal Rate of Substitution (MRS) is the rate at which we will substitute bananas for apples.
- The Marginal Rate of Transformation (MRT) is the rate at which we can substitute bananas for apples.

Utility maximization requires that

\[ MRS = MRT \]
MRS and MRT

• Utility maximization requires that 
  \[ MRS = MRT \]
• Why? Suppose \( p_a = 50\tau \) and \( p_b = 10\tau \)
  \[ MRT = \frac{50\tau}{10\tau} = 5 \]
• Suppose \( MRS = 4 \). That is, I would be willing to take four bananas for one apple.

MRS and MRT

• Suppose \( MRS = 6 \). That is, I would be willing to take six bananas for one apple.

• Another way of putting that is that I would be willing to give up six bananas for one apple'

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- Suppose MRS = 6. That is, I would be willing to take six bananas for one apple.
- Another way of putting that is that I would be willing to give up six bananas to get one apple.

Sell five bananas, get another apple and be better off

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