## OBJECTIVES

- Explain how managers can use bundling and tying strategies to increase profit when customers have heterogeneous tastes
- Explain how firms use transfer pricing to provide incentives to wholly-owned subsidiaries and divisions and to shelter profit from taxes in a global environment

## DEFINITIONS

- Simple bundling: When managers offer several products or services as one package so consumers do not have an option to purchase package components separately
  - Example: Inclusion of a service contract with a product

## DEFINITIONS

- Mixed bundling: Allows consumers to purchase package components either as a single unit or separately
  - The bundle price is generally less than the sum of the prices of the individual components.
  - Examples: Season tickets to sporting events or value meals at McDonald's

## DEFINITIONS

- Negative correlation: When some customers have higher reservation prices for one item in the bundle but lower reservation prices for another item in the bundle, whereas another group of customers has the reverse preferences
  - Managers form bundles so as to increase profit by creating negative correlations across consumers.

- Advantages of bundling
  - Bundling can increase the seller's profit, as customers have varied tastes.
  - Bundling can emulate first-degree price discrimination when it is not otherwise possible because individual reservation prices cannot be determined or laws prohibit price discrimination.
  - Bundling does not require knowledge of individual consumers' reservation prices, but only the distribution of consumers' reservation prices.

- Strategies
  - Assumption: Goods are independent, so the value of a bundle is equal to the sum of the reservation prices of the goods in the bundle.
  - Separate pricing: Goods are not bundled.
    - Prices are set equal to profit-maximizing monopoly prices.

# Strategies (cont'd)

- Pure bundling
  - Bundle price is set to maximize profit.
- Mixed bundling
  - Bundle price and individual good prices are set to maximize profit.
- Optimal strategy is that which maximizes profit.

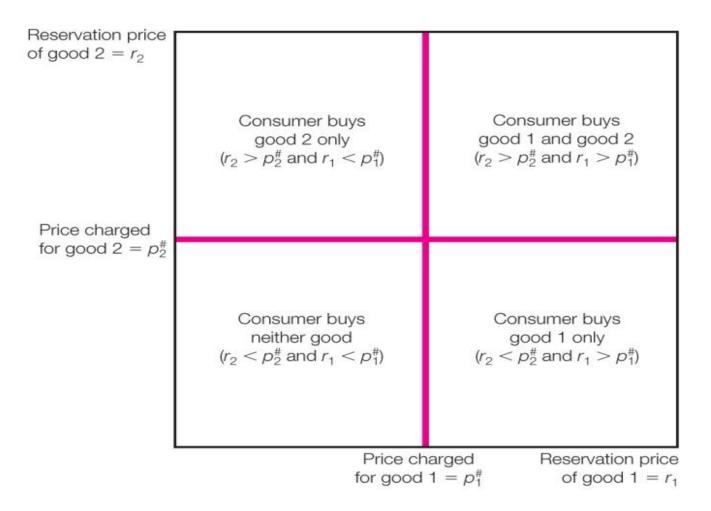
- Example Figures
  - Notation
    - r<sub>i</sub> = Reservation price of good i
    - p<sub>i</sub><sup>#</sup> = Price charged for good i
    - $P_B^{\#}$  = Price of bundle

- Example Figures (cont'd)
  - Figure 10.1: Price Separately
    - If r<sub>1</sub> < p<sub>1</sub><sup>#</sup> and r<sub>2</sub> < p<sub>2</sub><sup>#</sup>, then consumer buys neither good.
    - If  $r_1 > p_1^{\#}$  and  $r_2 < p_2^{\#}$ , then consumer buys only good 1.
    - If  $r_1 < p_1^{\#}$  and  $r_2 > p_2^{\#}$ , then consumer buys only good 2.
    - If  $r_1 > p_1^{\#}$  and  $r_2 > p_2^{\#}$ , then consumer buys both goods.

### <u>PRICE SEPARATELY</u>

#### FIGURE 10.1

#### **Price Separately**

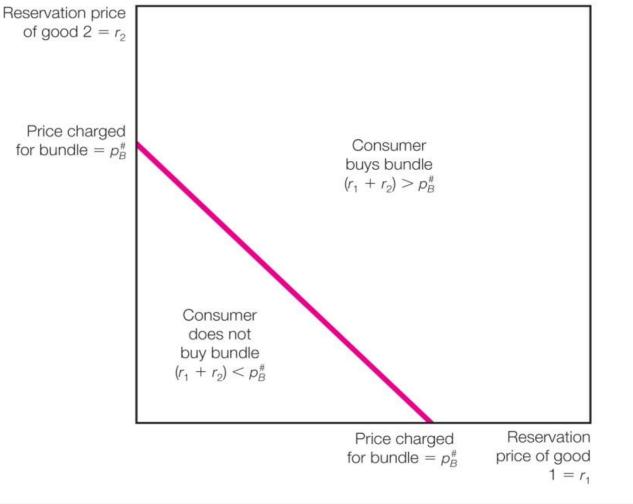


- Figure 10.2: Pure Bundling
  - If  $(r_1 + r_2) < P_B^{\#}$ , then consumer does not buy the bundle.
  - If  $(r_1 + r_2) > P_B^{\#}$ , then consumer buys the bundle.
- Figure 10.3: Mixed Bundling
  - Buy neither good nor bundle:  $(r_1 + r_2) < P_B^{\#}$ ,  $r_1 < p_1^{\#}$ , and  $r_2 < p_2^{\#}$
  - Buy bundle:  $(r_1 + r_2) > P_B^{\#}$
  - Buy good 1 only:  $r_1 > p_1^{\#}$ ,  $r_2 < p_2^{\#}$ , and  $r_2 < (P_B^{\#} p_1^{\#})$
  - Buy good 2 only:  $r_2 > p_2^{\#}$ ,  $r_1 < p_1^{\#}$ , and  $r_1 < (P_B^{\#} p_2^{\#})$



#### FIGURE 10.2

#### Pure Bundling

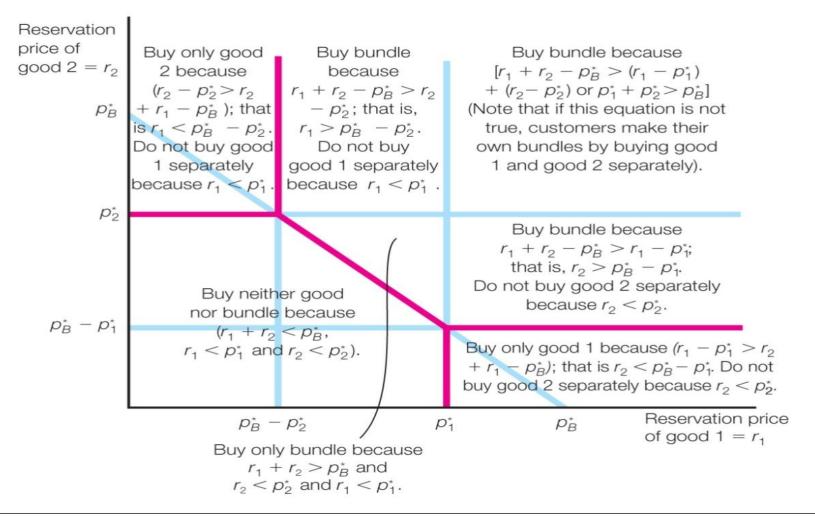


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### MIXED BUNDLING

#### FIGURE 10.3

#### Mixed Bundling

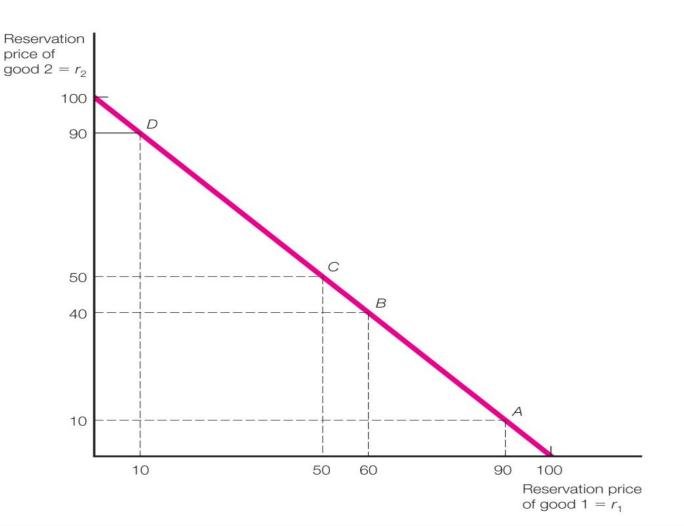


- Example 1
  - Assumptions
    - Perfect negative correlation among consumer reservation prices (Figure 10.4)
    - No variation in total bundle valuation; all value the bundle at \$100.
    - Unit cost of production for each good = \$1
  - Table 10.1: Consumer Reservation Prices
  - Table 10.2: Optimal Separate Prices for Good 1 and Good 2: Profit = \$264

### EXAMPLE OF PERFECT NEGATIVE CORRELATION OF CONSUMERS'

#### FIGURE 10.4

#### Example of Perfect Negative Correlation of Consumers' Reservation Prices



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### Reservation Prices of Good 1 and Good 2 of Consumers A, B, C, and D

|          | Reservat | Bundle |       |
|----------|----------|--------|-------|
| Consumer | Good 1   | Good 2 | Price |
| A        | 90       | 10     | 100   |
| В        | 60       | 40     | 100   |
| С        | 50       | 50     | 100   |
| D        | 10       | 90     | 100   |
|          |          |        |       |

### Optimal Separate Prices for Good 1 and Good 2

| Consumer             | Price 1              | Cost/unit                            | Profit/unit             | Number of units      | Profit              |
|----------------------|----------------------|--------------------------------------|-------------------------|----------------------|---------------------|
| A                    | 90                   | 1                                    | 89                      | 1                    | 89                  |
| В                    | 60                   | 1                                    | 59                      | 2                    | 118                 |
| С                    | 50                   | 1                                    | 49                      | 3                    | 147                 |
| D                    | 10                   | 1                                    | 9                       | 4                    | 36                  |
|                      |                      |                                      |                         |                      |                     |
|                      |                      |                                      |                         |                      |                     |
| Consumer             | Price 2              | Cost/unit                            | Profit/unit             | Number of units      | Profit              |
| <b>Consumer</b><br>A | <b>Price 2</b><br>10 | <b>Cost/unit</b>                     | <b>Profit/unit</b><br>9 | Number of units<br>4 | <b>Profit</b><br>36 |
|                      |                      | <b>Cost/unit</b><br>1<br>1           |                         |                      |                     |
| A                    | 10                   | <b>Cost/unit</b><br>1<br>1<br>1      | 9                       | 4                    | 36                  |
| A<br>B               | 10<br><b>40</b>      | <b>Cost/unit</b><br>1<br>1<br>1<br>1 | 9<br>39                 | 4<br>3               | 36<br><b>117</b>    |

## • Example 1

- Table 10.3: Optimal Pure Bundle Price for Consumers A, B, C, and D: Profit = \$392
- Table 10.4: Optimal Mixed Bundle Prices: Profit = \$392
- Table 10.5: Optimal Mixed Bundle Prices When Consumers Buy Bundle and at Least One of the Separately Priced Goods: Profit = \$373.98

### Optimal Pure Bundle Price for Consumers A, B, C, and D

|            | Bundle | o           |               | Number of |        |
|------------|--------|-------------|---------------|-----------|--------|
| Consumer   | Price  | Cost/Bundle | Profit/Bundle | Bundles   | Profit |
| A, B, C, D | 100    | 2           | 98            | 4         | 392    |

### **Optimal Mixed Bundle Prices**

| <b>Consumer</b><br>A, B, C, D | <b>Bundle<br/>Price</b><br>100 | <b>Cost/Bundle</b><br>2 | <b>Profit/Bundle</b><br>98  | Number of<br>Bundles<br>4 | <b>Profit</b><br>392 |
|-------------------------------|--------------------------------|-------------------------|-----------------------------|---------------------------|----------------------|
| <b>Consumer</b><br>None       | <b>Price 1</b><br>90.01        | <b>Cost/Unit</b><br>1   | <b>Profit/Unit</b><br>89.01 | Number of<br>Units<br>O   | <b>Profit</b><br>0   |
| <b>Consumer</b><br>None       | <b>Price 2</b><br>90.01        | <b>Cost/Unit</b><br>1   | <b>Profit/Unit</b><br>89.01 | Number of<br>Units<br>O   | <b>Profit</b><br>0   |

### Optimal Mixed Bundle Prices When Consumers Buy Bundle and at Least One of the Separately Priced Goods

| Consumer | Bundle<br>Price | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|----------|-----------------|-------------|---------------|----------------------|--------|
| В, С     | 100             | 2           | 98            | 2                    | 196    |
| Consumer | Price 1         | Cost/Unit   | Profit/Unit   | Number of<br>Units   | Profit |
| A        | 89.99           | 1           | 88.99         | 1                    | 88.99  |
| Consumer | Price 2         | Cost/Unit   | Profit/Unit   | Number of<br>Units   | Profit |
| D        | 89.99           | 1           | 88.99         | 1                    | 88.99  |

## Definitions

- Credibility of the bundle: When managers correctly anticipate which customers will purchase the bundle or the goods separately
- Extraction: When the manager extracts the entire consumer surplus from each customer
- Exclusion: When the manager does not sell a good to a customer who values the good at less than the cost of producing it
- Inclusion: When a manager sells a good to a consumer who values the good at greater than the seller's cost of producing the good

## Definitions

- Extraction, exclusion, and inclusion are all satisfied by perfect price discrimination.
- Pricing separately will satisfy exclusion but will not result in complete extraction or inclusion.

- Definitions (cont'd)
  - Pure bundling can result in complete extraction, but if consumer reservation prices do not have a perfect negative correlation, extraction will be less than complete. It is also possible for pure bundling to fail to attain full inclusion and exclusion.
  - The profit from mixed bundling is always equal to or better than that of pricing separately or pure bundling.

- Example 2
  - Assumptions
    - Perfect negative correlation among consumer reservation prices
    - No variation in total bundle valuation; all value the bundle at \$100.
    - Unit cost of production for each good = \$11

- Example 2 (cont'd)
  - Table 10.6: Optimal Separate Prices for Good 1 and Good 2: Profit = \$204
  - Table 10.7: Optimal Pure Bundle Price for Consumers A, B, C, and D: Profit = \$312
  - Table 10.8: Optimal Mixed Bundle Prices: Profit = \$312
  - Table 10.9: Optimal Mixed Bundle Prices When Consumers Buy Bundle and at Least One of the Separately Priced Goods: Profit = \$313.98

### **Optimal Separate Prices for Good 1 and Good 2**

| Consumer | Price 1 | Cost/Unit | Profit/Unit | Number of Units | Profit |
|----------|---------|-----------|-------------|-----------------|--------|
| A        | 90      | 11        | 79          | 1               | 79     |
| В        | 60      | 11        | 49          | 2               | 98     |
| С        | 50      | 11        | 39          | 3               | 117    |
| D        | 10      | 11        | -1          | 4               | -4     |

| Consumer | Price 2 | Cost/Unit | Profit/Unit | Number of Units | Profit |
|----------|---------|-----------|-------------|-----------------|--------|
| A        | 10      | 11        | -1          | 4               | -4     |
| В        | 40      | 11        | 29          | 3               | 87     |
| С        | 50      | 11        | 39          | 2               | 78     |
| D        | 90      | 11        | 79          | 1               | 79     |

### Optimal Pure Bundle Prices for Consumers A, B, C, and D

| Consumer   | Bundle<br>Price | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|------------|-----------------|-------------|---------------|----------------------|--------|
| A, B, C, D | 100             | 22          | 78            | 4                    | 312    |

### **Optimal Mixed Bundle Prices**

| <b>Consumer</b><br>A, B, C, D | <b>Bundle Price</b><br>100 | <b>Cost/Bundle</b><br>22 | <b>Profit/Bundle</b><br>78  | Number of<br>Bundles<br>4 | <b>Profit</b><br>312 |
|-------------------------------|----------------------------|--------------------------|-----------------------------|---------------------------|----------------------|
| <b>Consumer</b><br>None       | <b>Price 1</b><br>90.01    | <b>Cost/Unit</b><br>11   | <b>Profit/Unit</b><br>79.01 | Number of<br>Units<br>O   | <b>Profit</b><br>0   |
| <b>Consumer</b><br>None       | <b>Price 2</b><br>90.01    | <b>Cost/Unit</b><br>11   | <b>Profit/Unit</b><br>79.01 | Number of<br>Units<br>O   | <b>Profit</b><br>0   |

Optimal Mixed Bundle Prices When Consumers Buy Bundle and at Least One of the Separately Priced Goods

| Consumer | Bundle Price | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|----------|--------------|-------------|---------------|----------------------|--------|
| В, С     | 100          | 22          | 78            | 2                    | 156    |
| Consumer | Price 1      | Cost/Unit   | Profit/Unit   | Number of<br>Units   | Profit |
| Consumer | FILEI        | COSI/OIII   | FIOID         | Units                | FIUII  |
| Α        | 89.99        | 11          | 78.99         | 1                    | 78.99  |
|          |              |             |               | Number of            |        |
| Consumer | Price 2      | Cost/Unit   | Profit/Unit   | Units                | Profit |
| D        | 89.99        | 11          | 78.99         | 1                    | 78.99  |

- Example 3
  - Assumptions
    - Perfect negative correlation among consumer reservation prices
    - No variation in total bundle valuation; all value the bundle at \$100.
    - Unit cost of production for each good = \$55

## • Example 3 (cont'd)

- Table 10.10: Optimal Separate Prices for Good 1 and Good 2: Profit = \$70
- Table 10.11: Optimal Pure Bundle Price for Consumers A, B, C, and D: Profit = \$0
- Table 10.12: Optimal Mixed Bundle Prices at Any Pure Bundle Price over \$100 (So No Bundle Is Purchased): Profit = \$70

### **Optimal Separate Prices for Good 1 and Good 2**

| Consumer             | Price 1              | Cost/Unit       | Profit/Unit               | Number of Units      | Profit            |
|----------------------|----------------------|-----------------|---------------------------|----------------------|-------------------|
| A                    | 90                   | 55              | 35                        | 1                    | 35                |
| В                    | 60                   | 55              | 5                         | 2                    | 10                |
| С                    | 50                   | 55              | —5                        | 3                    | -15               |
| D                    | 10                   | 55              | -45                       | 4                    | -180              |
|                      |                      |                 |                           |                      |                   |
| Consumer             | Price 2              | Cost/Unit       | Profit/Unit               | Number of Units      | Profit            |
| <b>Consumer</b><br>A | <b>Price 2</b><br>10 | Cost/Unit<br>55 | <b>Profit/Unit</b><br>-45 | Number of Units<br>4 | <b>Profit</b><br> |
|                      |                      |                 |                           |                      |                   |
| A                    | 10                   | 55              | -45                       | 4                    | -180              |

### Optimal Pure Bundle Prices for Consumers A, B, C, and D

| Consumer   | Bundle<br>Price | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|------------|-----------------|-------------|---------------|----------------------|--------|
| A, B, C, D | 100             | 110         | -10           | 4                    | -40    |

### Optimal Mixed Bundle Prices at Any Pure Bundle Price over \$100 (So No Bundle Is Purchased)

| Consumer             | Price 1              | Cost/Unit       | Profit/Unit              | Number of Units | Profit              |
|----------------------|----------------------|-----------------|--------------------------|-----------------|---------------------|
| А                    | 90                   | 55              | 35                       | 1               | 35                  |
|                      |                      |                 |                          |                 |                     |
|                      |                      |                 |                          |                 |                     |
| Consumer             | Price 2              | Cost/Unit       | Profit/Unit              | Number of Units | Profit              |
| <b>Consumer</b><br>B | <b>Price 2</b><br>90 | Cost/Unit<br>55 | <b>Profit/Unit</b><br>35 | Number of Units | <b>Profit</b><br>35 |

- Conclusions from Examples 1–3: When reservation prices are negatively correlated
  - When production cost is low, pure bundling will extract all consumer surplus.
  - When production cost rises, mixed bundling is best.
  - When production cost rises further, separate pricing is best.

## THE MECHANICS OF BUNDLING

- Conclusions from Examples 1–3: When reservation prices are negatively correlated (cont'd)
  - The optimal separate prices are always equal to consumers' reservation prices.
  - The optimal pure bundle price is always equal to the sum of consumers' reservation prices.
  - The optimal mixed bundle prices are not necessarily equal to reservation prices or their sum.

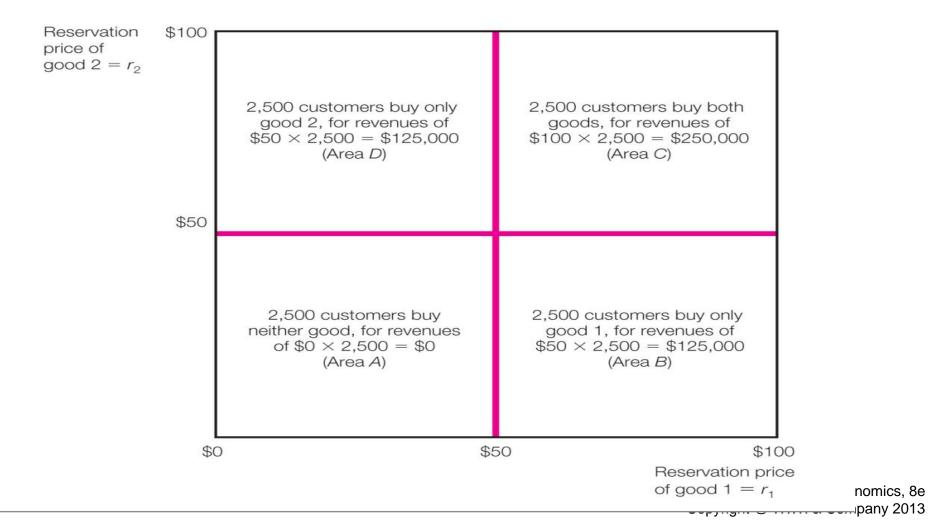
# THE MECHANICS OF BUNDLING

- Example 4
  - Assumptions
    - Distribution of reservation prices is uniform over the range \$0 to \$100 for each good.
    - Correlation is zero.
    - There are 10,000 customers.
    - Production cost is zero.
  - Figure 10.5: Optimal Separate Prices in the Case of Uniformly Distributed Consumer Reservation Prices: Profit = \$500,000

### OPTIMAL SEPARATE PRICES IN THE CASE OF UNIFORMLY DISTRIBUTED CONSUMER RESERVATION PRICES

#### FIGURE 10.5

#### Optimal Separate Prices in the Case of Uniformly Distributed Consumer Reservation Prices



### THE MECHANICS OF BUNDLING

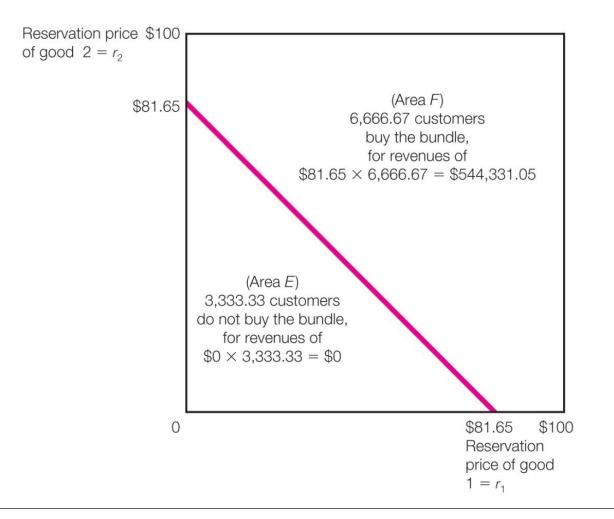
# • Example 4

- Figure 10.6: Optimal Pure Bundle Price in the Case of Uniformly Distributed Reservation Prices: Profit = \$544,331.10
- Figure 10.7: Optimal Mixed Bundle Pricing in the Case of Uniformly Distributed Reservation Prices: Profit = \$549,201

### OPTIMAL PURE BUNDLE PRICE IN THE CASE OF UNIFORMLY DISTRIBUTED CONSUMER RESERVATION PRICES

#### FIGURE 10.6

#### Optimal Pure Bundle Price in the Case of Uniformly Distributed Consumer Reservation Prices



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### OPTIMAL MIXED BUNDLE PRICING IN THE CASE OF UNIFORMLY DISTRIBUTED CONSUMER RESERVATION PRICES

#### FIGURE 10.7

#### Optimal Mixed Bundle Pricing in the Case of Uniformly Distributed Consumer Reservation Prices



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## THE MECHANICS OF BUNDLING

- Example 5
  - Assumptions
    - Quantity discounting is a form of mixed bundling.
    - Unit cost of production for each good = \$1
  - Table 10.13: Reservation Prices for the First and Second Units of a Good by Consumers A and B
  - Table 10.14: Optimal Separate Prices for the Good: Profit = \$6

# Reservation Prices for the First and Second Units of a Good by Consumers A and B

| Reservation Price of Good |             |  |
|---------------------------|-------------|--|
| First Unit                | Second Unit |  |
| 4                         | 1.5         |  |
| 3.99                      | 3           |  |
|                           | First Unit  |  |

### **Optimal Separate Prices for the Good**

| Price of Good | Cost/Unit | Profit/Unit | Number of Units | Profit |
|---------------|-----------|-------------|-----------------|--------|
| 4             | 1         | 3           | 1               | 3      |
| 3.99          | 1         | 2.99        | 2               | 5.98   |
| 3             | 1         | 2           | 3               | 6      |
| 1.5           | 1         | 0.5         | 4               | 2      |
|               |           |             |                 |        |

### THE MECHANICS OF BUNDLING

- Example 5 (cont'd)
  - Table 10.15: Optimal Pure Bundle Price for Two Units of the Good: Profit = \$7
  - Table 10.16: Optimal Mixed Bundling Prices for the Case of a Single Good: Profit = \$7.99

# Optimal Pure Bundle Price for Two Units of the Same Good

| Price of Bundle | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|-----------------|-------------|---------------|----------------------|--------|
| 5.5             | 2           | 3.5           | 2                    | 7      |
| 6.99            | 2           | 4.99          | 1                    | 4.99   |
|                 |             |               |                      |        |

### Optimal Mixed Bundling Prices for the Case of a Single Good

| Price of Bundle | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|-----------------|-------------|---------------|----------------------|--------|
| 6.99            | 2           | 4.99          | 1 ( <i>B</i> )       | 4.99   |
| Price of Good   | Cost/Unit   | Profit/Unit   | Number of<br>Units   | Profit |
| 4               | 1           | 3             | 1 (A)                | 3      |
|                 |             |               |                      |        |

# THE MECHANICS OF BUNDLING

- Example 6
  - Assumptions
    - Three consumers with negatively correlated reservation prices
    - Each consumer wants no more than one unit of each of two goods.
    - Cost of production is \$4.
  - Table 10.17: Consumer Reservation Prices for Good X and Good Y (in Dollars)
  - Table 10.18: Best Separate Price Strategy: Profit = \$16.00

### Consumer Reservation Prices for Good X and Good Y (in Dollars)

#### **Reservation Prices for Goods by Consumer**

|                   | Good X | Good Y | Both X and Y |
|-------------------|--------|--------|--------------|
| Consumer A        | 5.33   | 8      | 13.33        |
| Consumer <i>B</i> | 12     | 3      | 15           |
| Consumer C        | 3      | 11     | 14           |
|                   |        |        |              |

### **Best Separate Price Strategy**

|            | Cost/Unit | Profit/Unit | Number of Units | Profit |
|------------|-----------|-------------|-----------------|--------|
| Price of X |           |             |                 |        |
| 5.33       | 4         | 1.33        | 2               | 2.66   |
| 12.00      | 4         | 8.00        | 1               | 8.00   |
| 3.00       | 4         | -1.00       | 3               | -3.00  |
| Price of Y |           |             |                 |        |
| 8.00       | 4         | 4.00        | 2               | 8.00   |
| 3.00       | 4         | -1.00       | 3               | -3.00  |
| 11.00      | 4         | 7.00        | 1               | 7.00   |
|            |           |             |                 |        |

### THE MECHANICS OF BUNDLING

- Example (cont'd)
  - Table 10.19: Best Pure Bundling Strategy: Profit = \$15.99
  - Table 10.20: Best Mixed Bundling Strategy: Profit = \$17.97

### **Best Pure Bundling Strategy**

| Price of Bundle | Cost/Bundle | Profit/Bundle | Number of<br>Bundles | Profit |
|-----------------|-------------|---------------|----------------------|--------|
| 13.33           | 8           | 5.33          | 3                    | 15.99  |
| 15.00           | 8           | 7.00          | 1                    | 7.00   |
| 14.00           | 8           | 6.00          | 2                    | 12.00  |
|                 |             |               |                      |        |

. .

### **Best Mixed Bundling Strategy**

| Price of<br>Bundle<br>13.33 | <b>Cost/Bundle</b><br>8 | <b>Profit on Each</b><br>5.33 | <b>Total Number</b><br>1 (consumer A) | Total Profit<br><b>5.33</b>           |
|-----------------------------|-------------------------|-------------------------------|---------------------------------------|---------------------------------------|
| Price of X                  | Cost/Unit               | Profit/Unit                   | Total Number                          | Total Profit                          |
| 10.32                       | 4                       | 6.32                          | 1 (consumer <i>B</i> )                | 6.32                                  |
| Price of Y                  | Cost/Unit               | Profit/Unit                   | Total Number                          | Total Profit                          |
| 10.32                       | 4                       | 6.32                          | 1 (consumer <i>C</i> )                | <b>6.32</b><br>Sum of Profit<br>17.97 |

# WHEN TO UNBUNDLE

- Example
  - Assumptions
    - Three consumers with negatively correlated reservation prices
    - Each consumer wants no more than one unit of each of two goods.

# WHEN TO UNBUNDLE

- Example (cont'd)
  - Table 10.21: The Reservation Prices for Consumers A, B, and C for Good X, Good Y, and a Bundle of Good X and Good Y
  - Figure 10.8: Depiction of Bundling Problem in Table 10.21 (cost =\$3)
    - Pure bundling gives the lowest profit.
    - Mixed bundling gives the highest profit.
    - Ignore crow's feet (blue lines)

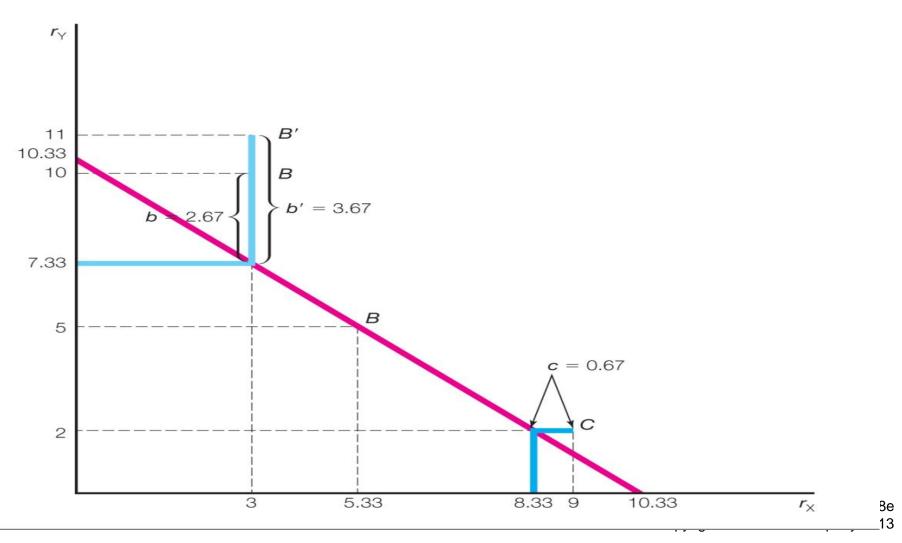
# The Reservation Prices for Consumers A, B, and C for Good X, Good Y, and a Bundle of Good X and Good Y

|                   | <b>Reservation Price</b> |        |                             |
|-------------------|--------------------------|--------|-----------------------------|
|                   | Good X                   | Good Y | Bundle of Good X and Good Y |
| Consumer A        | 5                        | 5.33   | 10.33                       |
| Consumer <i>B</i> | 3                        | 10     | 13                          |
| Consumer C        | 9                        | 2      | 11                          |
|                   |                          |        |                             |

### DEPICTION OF BUNDLING PROBLEM IN TABLE 10.21

#### FIGURE 10.8

#### Depiction of Bundling Problem in Table 10.21



### BUNDLING AS A PREEMPTIVE ENTRY STRATEGY

- Bundling can be used to deter entry.
- Assumptions
  - The bundle offered by Alpha Company is made up of W and S, has a cost of 4, and will be priced at \$X.
  - The Beta Company is developing C, which has a cost of 2 and is a close substitute for W.

## BUNDLING AS A PREEMPTIVE ENTRY STRATEGY

- Assumptions (cont'd)
  - The Gamma Company is developing N that has a cost of 2 and is a close substitute for S.
  - Only Alpha has the assets to produce a bundle.
  - Alpha's entry cost to the market with a bundle is 30. Entry cost for each product individually is 15.
  - Beta's entry cost to the market is 17.
  - Gamma's entry cost to the market is 17.
  - Demand for the goods are perfectly negatively correlated.

### BUNDLING AS A PREEMPTIVE ENTRY STRATEGY

- Example
  - Table 10.22: Reservation Prices for Consumers A, B, and C for Good W or C, Good S or N, and a Bundle of Good W and Good S or a Bundle of Good C and Good N

### The Reservation Prices for Consumers A, B, and C for Good W or C, Good S or N, and a Bundle of Good W and Good S or a Bundle of Good C and Good N

| Consumer Class | Reservation Price for Product W or C | Reservation Price for Product S or N | Reservation Price<br>for bundle W and S<br>or C and N |
|----------------|--------------------------------------|--------------------------------------|---|
| A              | 10                                   | 20                                   | 30  |
| В              | 15                                   | 15                                   | 30  |
| С              | 20                                   | 10                                   | 30  |
|                |                                      |                                      |   |

- If Alpha charges 15.33 for each bundle, it will cover the cost of entry plus the cost of each bundle 30 + (4\*3) =42.
- Profit will be 46-42=4.
- Neither Beta or Gamma will enter because neither can cover the cost of entry plus the per unit cost of each item.

# TYING AT IBM, XEROX, AND MICROSOFT

- Tying: Pricing technique in which managers sell a product that needs a complementary product
  - This is a form of bundling that applies to complementary products.
  - Tying requires market power.
  - Tying may be used to protect a monopoly.
  - Tying may be used to ensure that a firm's product works properly and its brand name is protected.
    - Examples: Maintenance contracts and franchise requirements

# TYING AT IBM, XEROX, AND MICROSOFT

# Examples

- Xerox required customers who leased copy machines to use Xerox paper.
- IBM required customers who leased computers to use IBM punch cards.
- Microsoft forced customers to use Internet Explorer with its operating system in order to exclude Netscape and protect its monopoly.

# TRANSFER PRICING

- Transfer price: Payment that simulates a market where no formal market exists
  - Refers to intrafirm pricing among whollyowned subsidiaries or divisions.
  - The purpose of transfer prices:
    - Encourage profit-maximizing or costminimizing behavior by providing an incentive
    - Measure the performance of semiautonomous divisions

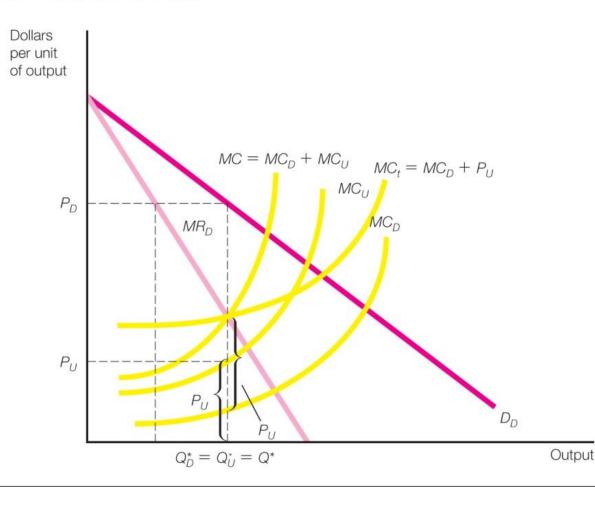
# TRANSFER PRICING

- Notation  $(MR_D MC_D)MP_U = MC_U$ 
  - In the absence of an external market, the optimal transfer price is the marginal cost of the upstream product (MC<sub>U</sub>) when the optimal quantity (Q<sub>U</sub>) is produced.
  - (MR<sub>D</sub> MC<sub>D</sub>) is the difference between the downstream Marginal Revenue and Marginal Cost.

### DETERMINATION OF THE TRANSFER PRICE, GIVEN NO EXTERNAL MARKET FOR THE TRANSFERRED GOOD

#### FIGURE 10.9

# Determination of the Transfer Price, Given No External Market for the Transferred Good



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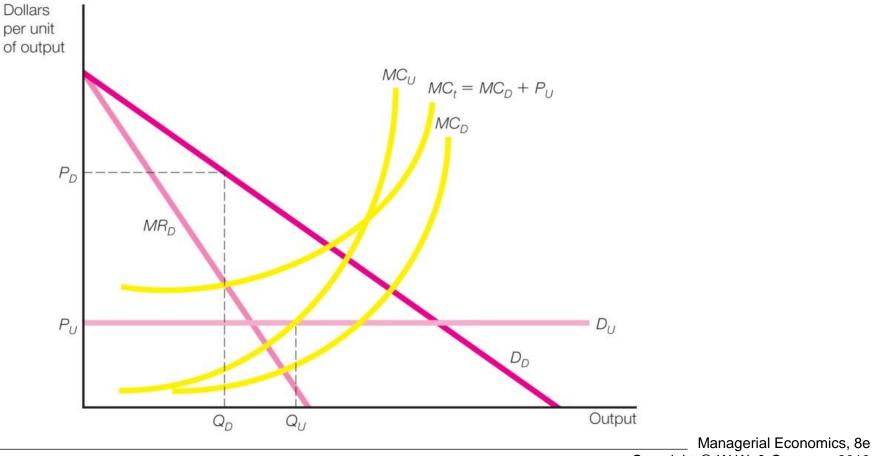
### TRANSFER PRICING: A PERFECTLY COMPETITIVE MARKET FOR THE UPSTREAM PRODUCT

- The optimal transfer price is the competitive market price.
- Example: Figure 10.10: Determination of the Transfer Price, Given a Perfectly Competitive External Market for the Transferred Product

### DETERMINATION OF THE TRANSFER PRICE, GIVEN A PERFECTLY COMPETITIVE EXTERNAL MARKET FOR THE TRANSFERRED PRODUCT

#### **FIGURE 10.10**

#### Determination of the Transfer Price, Given a Perfectly Competitive External Market for the Transferred Product



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- For international transfers, the most common methods of determining transfer prices are market-based transfer prices and full productions costs plus a markup.
  - A comparison with the results of an earlier study indicates that the market-based transfer prices are increasingly being used.

- Managers can use transfer pricing to shift profits between divisions to minimize tax liability.
  - Increase profit in low-tax countries and decrease profit in high-tax countries

- Notation and implication
  - Assume there is no external market for the upstream product and that all profits are expressed in the same currency.
  - $\alpha$  = Tax rate in a downstream country
  - $\beta$  = Tax rate in an upstream country, where  $\alpha > \beta$

- Notation and implication (cont'd)
  - After-tax profit in the downstream country =

$$(1 - \alpha)(\mathsf{TR}_\mathsf{D} - \mathsf{TC}_\mathsf{D} - \mathsf{P}_\mathsf{U}\mathsf{Q}_\mathsf{U})$$

After-tax profit in the upstream country =

$$(1 - \beta)(P_UQ_U - TC_U)$$

- Total after-tax profit =
- $(1-\alpha)(\mathsf{TR}_\mathsf{D}-\mathsf{TC}_\mathsf{D})-(1-\beta)(\mathsf{TC}_\mathsf{U})+(\alpha-\beta)(\mathsf{P}_\mathsf{U}\mathsf{Q}_\mathsf{U})$
- Increasing the transfer price (P<sub>U</sub>) will increase aftertax profit if α > β.

- Reasons for the importance of global transfer prices:
  - Increased globalization
  - Different level of taxation in various countries
  - Greater scrutiny by tax authorities
  - Inconsistent rules and laws in different tax jurisdictions

- Transfer price policies that cause the fewest problems:
  - Comparable uncontrolled price as if they are not related. (arms-length price)
  - Cost-plus prices, using the armslength markup
  - Resale price