Managerial Economics
Unit 3: Perfect Competition, Monopoly and Monopolistic Competition

Rudolf Winter-Ebmer

Johannes Kepler University Linz

Winter Term 2019
OBJECTIVES

- Explain how managers should respond to different competitive environments (or market structures) in terms of pricing and output decisions

- Market Power
  - A firm’s pricing market power depends on its competitive environment.
  - In perfectly competitive markets, firms have no market power. They are “price takers.” They make decisions based on the market price, which they cannot influence.
  - In markets that are not perfectly competitive (which describes most markets), most firms have some degree of market power.
Strategy in the absence of market power

- Firms cannot influence price and, because products are not unique, they cannot influence demand by advertising or product differentiation.
- Managers in this environment maximize profit by minimizing cost, through the efficient use of resources, and by determining the quantity to produce.
MARKET STRUCTURE

- Perfect competition: When there are many firms that are small relative to the entire market and produce similar products
  - Firms are price takers.
  - Products are standardized (identical).
  - There are no barriers to entry.
  - There is no nonprice competition.
MARKET STRUCTURE

- Imperfect competition
  - Firms have some degree of market power and can determine prices strategically.
  - Products may not be standardized.
  - Firms employ nonprice competition.
    - Product differentiation
    - Advertising
    - Branding
    - Public relations
MARKET STRUCTURE

- **Monopolistic competition**: When there are many firms and consumers, just as in perfect competition; however, each firm produces a product that is slightly different from the products produced by the other firms.
  - There are no barriers to entry.

- **Monopoly**: Markets with a single seller
  - Barriers to entry prevent competitors from entering the market.

- **Oligopoly**: Markets with a few sellers
  - There are significant barriers to entry.
<table>
<thead>
<tr>
<th>Market Structure</th>
<th>Examples</th>
<th>Number of Producers</th>
<th>Type of Product</th>
<th>Power of Firm over Price</th>
<th>Barriers to Entry</th>
<th>Nonprice Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect competition</td>
<td>Some sectors of agriculture</td>
<td>Many</td>
<td>Standardized</td>
<td>None</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Monopolistic competition</td>
<td>Retail trade</td>
<td>Many</td>
<td>Differentiated</td>
<td>Some</td>
<td>Low</td>
<td>Advertising and product differentiation</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>Computers, oil, steel</td>
<td>Few</td>
<td>Standardized or differentiated</td>
<td>Some</td>
<td>High</td>
<td>Advertising and product differentiation</td>
</tr>
<tr>
<td>Monopoly</td>
<td>Public utilities</td>
<td>One</td>
<td>Unique product</td>
<td>Considerable</td>
<td>Very high</td>
<td>Advertising</td>
</tr>
</tbody>
</table>
Price and output in a perfectly competitive market

- Price and quantity are determined by the intersection of demand and supply.
- In such an industry it is important to know what drives demand and supply and thus to know what determines prices and revenues.
  - Demand shifters: prices, income, advertising, prices of other products.
  - Supply shifters: input cost, technology, research and development.
- Output decision:
  - A firm in a perfectly competitive market cannot affect the market price of its product.
  - If it would raise the price, consumers would buy at another firm.
  - It can sell any amount of output it wants (given its capacities).
Profit maximization in a perfectly competitive market

- \( P = MC \)

- Marginal cost curve left of shutdown level (min. variable cost) is supply curve: at least fix cost have to be covered otherwise a firm incurs losses

- \( P = MR = MC = AC \)

- Firm produces at minimum of average costs!
  - optimal outcome for industry

- In a constant-cost industry an increase in demand will lead in the long term to constant prices (i.e. horizontal supply curve)
  - first, prices increase; but then new firms enter the market and prices decrease again

- (see also book)
Marginal Revenue and Marginal Cost of a Perfectly Competitive Firm

FIGURE 06-04
Is this a perfect market? www.geizhals.at
<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Clicks</th>
<th>Prod</th>
<th>Subsubc</th>
<th>Prod</th>
<th>Subsubc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative price</td>
<td>-1.396***</td>
<td>-1.546***</td>
<td>-1.647***</td>
<td>-1.231***</td>
<td>-1.607***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.038)</td>
<td>(0.059)</td>
<td>(0.069)</td>
<td>(0.094)</td>
</tr>
<tr>
<td>Firm evaluation</td>
<td>-0.024***</td>
<td>-0.048***</td>
<td>-0.041***</td>
<td>-0.127***</td>
<td>-0.081***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.004)</td>
<td>(0.005)</td>
<td>(0.016)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Relative shipping cost</td>
<td>0.016***</td>
<td>0.011***</td>
<td>0.014***</td>
<td>0.000</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.014)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Germany</td>
<td>-0.196***</td>
<td>-0.249***</td>
<td>-0.260***</td>
<td>-0.191***</td>
<td>-0.229***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.007)</td>
<td>(0.011)</td>
<td>(0.016)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Availability</td>
<td>0.105***</td>
<td>0.152***</td>
<td>0.147***</td>
<td>0.230***</td>
<td>0.225***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.005)</td>
<td>(0.007)</td>
<td>(0.015)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Pickup</td>
<td>0.040***</td>
<td>0.075***</td>
<td>0.076***</td>
<td>0.154***</td>
<td>0.148***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.016)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>Missing shipping cost</td>
<td>0.126***</td>
<td>0.117***</td>
<td>0.134***</td>
<td>0.171***</td>
<td>0.211***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.007)</td>
<td>(0.009)</td>
<td>(0.020)</td>
<td>(0.023)</td>
</tr>
<tr>
<td>No. of evaluations</td>
<td>0.0003***</td>
<td>0.0003***</td>
<td>0.0003***</td>
<td>0.0004***</td>
<td>0.0004***</td>
</tr>
<tr>
<td></td>
<td>(0.000003)</td>
<td>(0.00001)</td>
<td>(0.00001)</td>
<td>(0.00003)</td>
<td>(0.00003)</td>
</tr>
<tr>
<td>Observations</td>
<td>847,246</td>
<td>400,694</td>
<td>306,641</td>
<td>90,626</td>
<td>73,678</td>
</tr>
<tr>
<td>Products</td>
<td>34,128</td>
<td>11,238</td>
<td>8,622</td>
<td>10,909</td>
<td>8,084</td>
</tr>
</tbody>
</table>
Larger research project on price-setting of firms and demand

- Price dispersion is large
- Coefficient of variation $\approx 0.1$
- Price elasticity $\approx -2.5$
- Seller reputation has big effect
  - (Dulleck, Hackl, Weiss and Winter-Ebmer, German Economic Review, 2011, 395-408)
- Competition has big effects:
  - Ten more firms reduce markup by 2.6 percentage points
    - (Hackl, Kummer, Winter-Ebmer and Zulehner, 2011)
Firms with market power: Monopoly and monopolistic competition

- Explain how managers should set price and output when they have market power

- With monopoly power, the firm’s demand curve is the market demand curve. A monopolist is the only seller of a product for which there are no close substitutes and which is protected by barriers to entry.

- Monopolistically competitive firms have market power based on product differentiation, but barriers to entry are modest or absent.
Example

- Demand function: \( P = 10 - Q \)
- Total revenue: \( TR = PQ = (10 - Q) \times Q = 10Q - Q^2 \)
- Total cost: \( TC = 1 + Q + 0.5Q^2 \)
  - \( FC = 1 \) and \( VC = Q + 0.5Q^2 \)
  - \( MC = 1 + Q \)
- Profits
  - \( Profit = TR - TC \)
  - Under monopoly (as under perfect competition) the firm maximizes profit, if it sets the output at the point at which marginal revenues are equal to marginal cost
  - \( 10 - 2Q = 1 + Q \rightarrow Q = 3 \) and \( P = 10 - 3 = 7 \)
<table>
<thead>
<tr>
<th>Output</th>
<th>Price (Dollars)</th>
<th>Total Revenue (Dollars)</th>
<th>Variable Cost (Dollars)</th>
<th>Total Cost (Dollars)</th>
<th>Total Profit (Dollars)</th>
<th>Variable-Cost Profit (Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>9</td>
<td>1.5</td>
<td>2.5</td>
<td>6.5</td>
<td>7.5</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>21</td>
<td>7.5</td>
<td>8.5</td>
<td>12.5</td>
<td>13.5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>24</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>4.5</td>
<td>5.5</td>
<td>24.75</td>
<td>14.625</td>
<td>15.625</td>
<td>9.125</td>
<td>10.125</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>17.5</td>
<td>18.5</td>
<td>6.5</td>
<td>7.5</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>24</td>
<td>24</td>
<td>25</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>21</td>
<td>31.5</td>
<td>32.5</td>
<td>-11.5</td>
<td>-10.5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>16</td>
<td>40</td>
<td>41</td>
<td>-25</td>
<td>-24</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>9</td>
<td>49.5</td>
<td>50.5</td>
<td>-41.5</td>
<td>-40.5</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>60</td>
<td>61</td>
<td>-61</td>
<td>-60</td>
</tr>
</tbody>
</table>
Total Revenue, Total Cost, and Total Profit of a Monopolist

FIGURE 07-01

Managerial Economics, 7e
Copyright © W.W. Norton & Company 2009
Marginal revenue

- Unlike perfect competition, MR is less than price and depends on Q.
- \( MR = P[1 + (1/\eta)] = P[1 - (1/|\eta|)] = P - P/|\eta| \)
A profit-maximizing monopolist will not produce where demand is inelastic; that is, where $|\eta| < 1$, because $MR < 0$.

$MC = MR = P[1 - (1/|\eta|)]$; so the profit-maximizing price is

$$MC = P[1 - (\frac{1}{|\eta|})] \text{or}$$

$$P = \frac{MC}{[1-(\frac{1}{|\eta|})]}$$
Marginal Revenue and Marginal Cost of a Monopolist

FIGURE 07-03
Monopolists produce less, price higher than firms in competitive equilibrium

\[ MR = P(1 + 1/\eta) = MC \]

- Situation is inefficient, insofar as the sum of consumer and producer surplus is concerned
  - Producer surplus = difference b/w marginal cost and price
  - Consumer surplus = difference b/w willingness to pay and price
  - Total welfare = producer surplus + consumer surplus
- Monopolist has to take demand conditions explicitly into account
- Why is no other firm entering the market?
Monopoly and market power

- Market Power: monopolist's ability to profitably raise price above a certain competitive level (=marginal cost).

- Impact of market power on social welfare:
  - Allocative efficiency:
    - effect on welfare if market power is exerted
  - Productive efficiency:
    - effect on welfare if market power is exerted by a technologically inefficient firm
  - Dynamic efficiency
    - the incentive to generate new technologies (innovation)
    - incentive to invest in R&D
Allocative Efficiency

- Any price above marginal cost induces a **net loss in social welfare**.

- Let us compare social welfare under monopoly (maximal market power) with that of perfect competition (zero market power): *(Fig. 1)*
  - Perfect Competition:
    \[ \text{Total Surplus} = \text{area } Op_c S \]
  - Monopoly:
    \[ \text{Total Surplus} = \text{area } p_m p_c TR + \text{area } Op_m R \]
    \[ \text{Net welfare loss of monopoly} = \text{area RST} \]

- Conflict of interest between producer and consumers
The determinants of welfare loss

- The **more market power**, the higher the price, hence the higher the welfare loss.
  \[ \Rightarrow \text{inverse relationship between market power and social welfare.} \]

- The **more elastic the demand curve** with respect to price, the lower is the welfare loss.

- The **larger the market** under consideration, the higher the welfare loss.
Rent-seeking activities

- The potential profits available to the monopolist can induce firms to waste resources in **unproductive lobbying activities** aimed at obtaining or maintaining market power.
  - In particular, if other firms try to get the monopoly as well
- In the limit, all the profits created under monopoly may be sacrificed on such activities ("full rent dissipation") (Posner, 1975).
- Conditions for full rent dissipation:
  - competition among the firms involved in rent-seeking
  - the rent-seeking activities do not have any social value
Productive Efficiency

- Additional welfare loss if market power is exerted by a technologically inefficient firm.

- Monopolist may produce at a higher marginal cost than a firm under perfect competition (productive inefficiency).

- Why?

- Managerial slack
  - Managers may not have the right incentives to adopt the most efficient technology

- Darwinian selection mechanism
  - In a competitive market, a selection mechanism similar to the Darwinian type in biology forces market exit by the least efficient firms
Dynamic efficiency

- Incentive to generate new technologies (innovation) is lower

**Example:**

- Possibility to introduce a technological innovation at fixed cost F which allows your firm to produce at a lower marginal cost \(c_b < c_a\)
- **Monopolist** adopts the new technology if: \(\Pi_b - \Pi_a > F\)
- **New firm under perfect competition** adopts the new technology if: \(\Pi_b > F\)

\(\Rightarrow\) Monopolist has lower incentives to innovate because it considers only the additional profit.
Other aspects of monopoly

- “Natural monopoly” if minimum of average cost occurs only at very high output level (minimum efficient scale) \( \Rightarrow \) there is only place for one firm in the market!

- Measure of monopoly power (markup of price over cost):

\[
\text{markup} = \frac{P - MC}{MC}
\]
Sources of monopoly power

- Natural monopoly (public utilities best example, railway tracks), economies of scale,
- Capital requirements on production or big sunk costs on entry
- Patents (17 years), trade secrets (Coke)
- Exclusive or unique assets (minerals, talent)
- Locational advantage (popcorn shop in cinema - but in general you pay rent for these advantages)
- Regulation (TV, taxi, telephone in the past)
- Collusion by competitors
What can a monopolist do? Erect strategic entry barriers

- Excessive patenting and copyright
- Limit pricing (set price below monopoly price)
- Extensive advertising to create brand name to raise cost of entry
- Create intentionally excess capacity as a warning for a price war
Franchising “McFood”

- A franchiser (mother company) with monopoly power gets a fixed percentage of sales, i.e. total revenues

- The franchisee is the residual claimant
  - It gets the full profit - deducting costs.

- What are the incentives for the two partners?
  - franchiser wants to maximize revenues (set MR=0), because the mother gets a percentage of sales from the franchisee
  - franchisee wants to maximize profits

- Other problems like number of shops in a region . . .

- Other examples:
  - authors and publishers - bargaining power b/w parties
AMD 11.1 Franchiser versus Franchisee?
Cost-plus pricing

When you ask managers, how they set prices, they always say “related to costs”, but not demand

Two steps:

- The firm estimates the cost per unit of output of the product  
  …usually average cost
- The firm adds a markup to the estimated average cost

\[
\text{Markup} = \frac{\text{Price} - \text{Cost}}{\text{Cost}}
\]
Does mark-up pricing maximize profit?

\[ MC = MR = \ldots \Rightarrow P = MC \frac{1}{1 + \frac{1}{\eta}} \]

\[ P = C (1 + \text{Markup}) \]

- Optimal markup easily calculated
- A markup system will maximize profit if:
  - Price elasticity of demand is known
  - Marginal costs are known (in general only average costs are used)
Table 7.3

Relationship between Optimal Markup and Price Elasticity of Demand

<table>
<thead>
<tr>
<th>Price Elasticity of Demand</th>
<th>Optimal Percentage Markup of Marginal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.2</td>
<td>500</td>
</tr>
<tr>
<td>-1.4</td>
<td>250</td>
</tr>
<tr>
<td>-1.8</td>
<td>125</td>
</tr>
<tr>
<td>-2.5</td>
<td>66.67</td>
</tr>
<tr>
<td>-5.0</td>
<td>25</td>
</tr>
<tr>
<td>-11.0</td>
<td>10</td>
</tr>
<tr>
<td>-21.0</td>
<td>5</td>
</tr>
<tr>
<td>-51.0</td>
<td>2</td>
</tr>
</tbody>
</table>
Multiproduct firm

- So far: firm has only ONE product
- No problem, if firm has more products, but they are not related

But
  - Demand interrelationship
    - or
  - Production interrelationship
The Multiproduct firm

Demand interrelationships

\[ TR = TR_X + TR_Y \]

\[ MR_X = \frac{dTR}{dQ_X} = \frac{dT X}{dQ_X} + \frac{dTR_Y}{dQ_X} \]

\[ MR_Y = \frac{dTR}{dQ_Y} = \frac{dT X}{dQ_Y} + \frac{dTR_Y}{dQ_Y} \]

- Products can be complements or substitutes for consumers.
Demand interrelationship

- What effect does it have on prices?
  - How should you react with your price-setting behavior???

- Example: Why do you get peanuts for free in Pubs, but you have to pay for tap water?

- What about water in wine bars or coffee shops?
Demand interrelationship

- X and Y are complements
- If you increase the price of X
  - Demand for X falls
  - but at the same time
  - Demand for Y falls as well
  - → Optimal price should be lower as in the absence of the complementary product Y

- X and Y are substitutes ...
Production interrelationships

- Products are produced jointly for technical reasons
- Example: by-products (Abfallprodukte) in plastic production, oil industry . . .
- Costs of separate production cannot be separated properly. 2 possibilities:
  - A) products always produced in same proportions
  - B) substitution in production possible
Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 1)

FIGURE 07-05
Optimal pricing: fixed proportions

- By producing one good, you automatically produce the other
- Total marginal revenue curve: The vertical summation of the two marginal revenue curves for individual products
- Pricing rule: Total marginal revenue curve = marginal cost
  - The marginal revenue (from both products) you get once you produce one more unit
Optimal Pricing for Joint Products Produced in Fixed Proportions (Case 2)

FIGURE 07-06
Example: Profit maximizing at Humphrey

- One piece of metal = two table legs in two designs
- Total cost function: $TC = 100 + Q + 2Q^2$
- Demand: $P(A) = 200 - Q(A)$ and $P(B) = 150 - 2Q(B)$
- Total revenue:
  - $TR = P(A)Q(A) + P(B)Q(B)$
  - $= (200 - Q(A))Q(A) + (150 - 2Q(B))Q(B)$
  - Humphrey wants to sell all they produce: $Q(A) = Q(B) = Q$
  - $\rightarrow TR = 350Q - 3Q^2$
Example: Profit maximizing at Humphrey

- Profits:
  - $\prod = TR - TC = \ldots = -100 + 349Q - 5Q^2$
  - FOC: $349 - 10Q = 0 \rightarrow 10Q = 349 \rightarrow Q = 34.9$
  - $P(A) = $165.10 and $P(B) = $80.20
  - Finally check, whether MR(A) and MR(B) are nonnegative
Joint products: variable proportions

- Output A can be substituted for output B
- Iso-revenue curve: combination of output levels A and B with same revenue
- Iso-cost curve: combination of output levels A and B with same costs
- Tangency condition
FIGURE 13.3 Optimal Outputs for Joint Products Produced in Variable Proportions
Output of Joint Products: Variable Proportions

- Optimal combinations of goods are found where isocost and isorevenue lines are tangent.
- Optimal total production is found where profit is maximized, which occurs at a point of tangency where the difference between cost and revenue is maximized.
Monopsony: Markets that consist of a single buyer

- Contrast with *monopoly* markets that consist of a single seller
- Buyers on a *competitive market* face a horizontal supply curve; they are price takers.
Monopsony: Markets that consist of a single buyer

- There is only one buyer on a monopsony market, and this buyer faces the upward-sloping market supply curve, which means that marginal cost is above the supply price.
- If the firm wants to buy more, she has to pay more for every unit: therefore, the marginal expenditure curve is higher than marginal cost.
- Thus, the buyer will purchase a quantity where marginal expenditure is equal to marginal revenue product (demand curve) and pay a price below marginal cost.
- Quantity is lower and price for the sellers is lower — as in perfect competition.
- Monopsony important for agricultural markets, monopsony in food stores, retailers, large shopping chains, ...
Monopsony
Characteristics of monopolistic competition

- Product differentiation - products are not perceived as identical by consumers
- Managers have some pricing discretion, but because products are similar, price differences are relatively small.
- Competition takes place within a product group.
  - Product group: Group of firms that produce similar products
- Demand curve not completely flat
MONOPOLISTIC COMPETITION

- Conditions that must be met, in addition to product differentiation, to define a product group as monopolistically competitive
  - There must be many firms in the product group.
  - The number of firms in the product group must be large enough that no strategic motives possible (no retaliation)
  - Easy entry and exit into the market
Behavior of monopolistically competitive firms

- Firms in an “industry group” are similar i.e. they have the same incentives
- What happens if firm changes price alone? (dd)
- If all firms change price? (DD)
- → demand is steeper in this case
  - In the extreme: a very small firm - changing the price alone - has a very flat demand curve!
- Marketing is important: firms want to make their product “unique”, in other words:
  - Demand for their product should get more inelastic (steep)
  - Use advertising!
Demand curve if the firm (dd) or the whole industry (DD) changes price
Short-run and long-run equilibrium

- Like a monopolist: set price where
  - marginal revenue = marginal cost

- Profits arise

- → market entry of similar products (firms)

- Each firm competes for a percentage of total demand, new entry means demand for the individual firm must be lower (shifts left/down)

- Shift must be so far, that profits disappear

- I.e. Demand curve must finally be tangential to long-run average cost curve
Short-run equilibrium

Figure 11.8 Short-Run Equilibrium in Monopolistic Competition
Long-run equilibrium

- Profits in the market attract new entrants
- Due to market entry demand shifted to the left for the firm
- Zero profit condition met (Revenue=Costs)
- Profit-maximization condition met (MC=MR)
- Problem: production is not cost-efficient
  - Long-run average costs not at minimum
  - “cost” of product variety
Monopolistic Competition: summing up

- Very common market form
- No interaction between firms
- Firm could reduce average cost by producing more
- Firms try to bind their customers to the firm:
  - Marketing, advertising plays a role (not in perfect competition)
  - Make the product different from the crowd
Optimal advertising rule

- For small variations in output (and/or) if the firm is only small part of the market, we can assume that price and marginal cost do not change following small changes in advertising.

- To determine optimal advertising, cost of advertising and cost of production must be considered.

- Simple rule: do so much advertising that . . .

  Marginal revenue from an extra euro of advertising = \( \eta \) (elasticity of demand)
Optimal advertising rule

- Marginal revenue from an extra euro of advertising = $\eta$
- Recall: $MR = P(1 + 1/\eta)$
  - $P - MC$ are gross profits from an additional unit of output (not taking advertising expenditure into account)
  - Set advertising such, that add. profit from adv. is equal to cost
  - $\Delta Q(P - MC) = 1$
  - $\Delta Q = 1/(P - MC)$
  - $\Rightarrow P\Delta Q = P/(P - MC)$
  - Substitute for $MC=MR$, then we see that
    - Left side is marginal revenue from advertising
    - Right side is elasticity of demand
Optimal advertising rule

- Marginal revenue from an extra euro of advertising $= \eta$

- Assume: $\eta = -1.6$

- Suppose, however, managers believe that an extra $100,000$ of advertising will increase sales by $200,000$.

- $\rightarrow$ this implies an effect of 2 rather than 1.6

- In this case the manager can increase profits by advertising more as the marginal revenue exceeds the absolute value of the price elasticity

- To maximize profits managers should increase advertising to the point where the return to an extra euro of advertising falls to 1.6
Optimal advertising expenditure: advertising meant to increase brand consciousness of clients

- With little advertising, elasticity will be high, because product will be considered as easily substitutable to others,
- Increase advertising and elasticity will fall
Advertising can have two effects:

- High-price strategy: increase brand consciousness, don’t talk about price:
  - Price elasticity of demand should decrease (demand curve should get steeper)

- Low-price strategy “promotions”, i.e. increase sales:
  - Advertise price cuts which should increase price consciousness of customers, i.e. price elasticity should increase
Price elasticity and advertising

<table>
<thead>
<tr>
<th>Brand</th>
<th>Advertised price change</th>
<th>Unadvertised price change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chock Full o’nuts</td>
<td>8.9</td>
<td>6.5</td>
</tr>
<tr>
<td>Maxwell House</td>
<td>6.0</td>
<td>*</td>
</tr>
<tr>
<td>Folgers</td>
<td>15.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Hill Brothers</td>
<td>6.3</td>
<td>4.2</td>
</tr>
</tbody>
</table>

* Not significantly different from zero.

Source: Katz and Shapiro, “Consumer Shopping Behavior in the Retail Coffee Market.”
Evidence

- Promotions do increase the price elasticities of consumers.
- Promotions have less effect on brand loyalists.
- The effects of promotions decay over time.
- Price elasticity of non-loyalists was found to be four times that of loyalists in one study.
- The effects of advertising on brand loyalty erode over time and price becomes more important to consumers.