Antitrust Law: An Analysis of Antitrust Principles and Their Application - Areeda and Hovenkamp, ¶503. Formal Price-Cost Measure of Market Power: The Theory

Antitrust Law: An Analysis of Antitrust Principles and Their Application - Areeda and Hovenkamp
Phillip E. Areeda (late) & Herbert Hovenkamp, Antitrust Law: An Analysis of Antitrust Principles and Their Application ¶503. (3rd and 4th Editions (Vols. 9, 10, 11 and Endmatter/Index Pamphlet) 2010-2018)
3rd and 4th Editions (Vols. 9, 10, 11 and Endmatter/Index Pamphlet)

Click to open document in a browser

Last Updated: 9/2018

This Paragraph explains how every firm maximizes profits by equating its marginal cost with its marginal revenue. [1] For the perfectly competitive firm, marginal revenue equals price. For the firm with some market power, its profit-maximizing price exceeds marginal revenue and therefore exceeds marginal cost as well. The greater that excess, the greater is the firm's power. Such power is commonly measured by the so-called Lerner Index. The theoretical difficulties in using that index are explained in ¶504. Some possible presumptions for using it in practice are explored in ¶¶516 and 521.

503a. Analysis.—Whenever a firm produces additional output, it incurs additional costs. The increment to cost that results from a small (one-unit) increase in production is *marginal cost*. [2] Similarly, when a firm makes additional sales, its revenues change; the increment to revenues that results from the sale of an additional unit is *marginal revenue*. [3]

When a firm sells an additional unit, the price it receives adds to its revenues. However, that gain may be offset by reduced receipts on other sales if it must lower prices generally in order to sell the additional unit. For example, the firm expanding output from 10 units to 11 may find that the 11th potential customer is not willing to pay the same price as earlier customers had been willing to pay. If the firm can discriminate in prices—charging the 11th customer a lower price without reducing the price for the other 10 customers—its marginal revenue is simply the price received for the 11th unit. [4] When unable to discriminate, it can lower the price to the 11th eleventh customer only by lowering the price to the first 10 customers as well.

Thus, a firm's marginal revenue reflects the effect of additional sales on the price of *all* of its output, which in turn depends both on the firm's ability to price discriminate and on the elasticity of the demand curve for the *firm's* output. "Elasticity" here refers to the rate at which customers will turn away from the firm's product in response to a price increase or toward it in response to a price decrease. The more responsive consumers are, the more elastic the demand curve is said to be.

For the firm unable to engage in price discrimination, the relationship between marginal revenue, the price of output and the elasticity of demand for the firm's output is depicted in Figure 1.

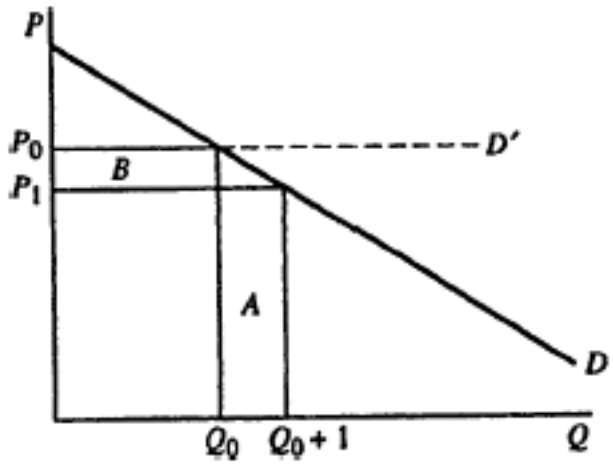

Figure 1

Initially the firm sells output Q_0 at a price of P_0 per unit, receiving revenues of Q_0 times P_0. Lowering the price to P_1 increases its sales by one unit to $Q_0 + 1$ units. The sale of the additional unit increases revenue by P_1 dollars; this is represented in Figure 1 by area *A*. This increase in revenues is offset by the reduction in revenues that results from the reduction in the price received on the original Q_0 units; this is represented in Figure 1 by area B. Thus, the total effect on revenues of this price decrease is area A minus area *B*.

If the demand curve has any downward slope, marginal revenue for any quantity is less than price at that quantity. [5] More generally, the less elastic is demand—the steeper the demand line going through the point Q_0, P_0—the larger is the reduction in price necessary to increase sales by one unit. This makes area A correspondingly smaller and area *B* correspondingly larger. As demand is less elastic, therefore, the greater will be the amount by which price exceeds marginal revenue. [6] It is entirely possible for area *B* to be larger than area *A*, so that reducing price decreases revenue. [7]

To maximize its profits, a firm must produce and sell that output at which its marginal cost equals its marginal revenue. If marginal revenue exceeds marginal cost, then selling another unit increases profit by adding more to revenue than it costs to produce. Conversely, if marginal cost exceeds marginal revenue, then the last unit sold cost more to produce than it added to revenue, and profits would be increased by reducing output. This is true for all firms, competitive or not.

What distinguishes the firm with market power from the perfectly competitive firm is the character of the demand it faces. The competitive firm would lose all of its sales if it raised its price above that being charged by its rivals. Its demand curve is therefore horizontal at the prevailing market price, so that its marginal revenue is identical with price. Its profit-maximizing output is thus at the point at which its marginal cost equals market price. The competitive firm can determine its own output, but not the market price, which reflects the marginal cost of competitive firms generally. Its only profit-maximizing choice is to expand its output to the point at which its rising marginal cost equals price; to produce an additional unit would bring more cost than revenue.

By contrast, the firm with market power can charge more than its marginal cost without losing all of its customers. Its demand curve slopes downward so that its marginal revenue is always less than price. Therefore, the price at which it equates marginal cost with marginal revenue must necessarily exceed marginal cost. [8]

In sum, both monopoly firms and competitive firms equate marginal cost and marginal revenue in order to maximize profits. The important difference is that for the competitive firm the demand curve and the marginal revenue curve are identical; so the equation of marginal cost and marginal revenue occurs when price equals

marginal cost. By contrast, for the firm with market power the marginal revenue curve lies below the demand curve, so that marginal cost and marginal revenue are equated at a price higher than marginal cost.

503b. The Lerner Index.*.—Having defined market power in terms of the ability profitably to raise price above marginal cost, the excess of that price over marginal cost measures the degree of power. The excess should be viewed in percentage terms, for a 50-cent markup above marginal cost is substantial on an item selling for $1, but trivial on an item selling for $1,000. The excess of price over marginal cost as a proportion of price is known as the *Lerner Index* [9]:

$$L_i = \frac{P_i - MC_i}{P_i}$$

where the subscript *i* refers to the *individual* firm whose power is being examined. [10] Because this index shows the monopoly markup as a percentage of price, its upper limit is one: at most, the entire price can be monopoly markup (if marginal cost were zero). The index is zero when prices are at the competitive level, which is marginal cost.

The Lerner Index indicates the deviation of price from marginal cost at current output, not necessarily the deviation of the current price from the competitive price. If market power were eliminated, output would rise, presumably at higher marginal cost. In that event, the price could fall by less than the excess by which the monopolist's price exceeded his marginal cost. As a result, the Lerner Index tends to exaggerate the difference between the competitive and the monopoly prices. [11]

Of course, the Lerner Index can only reveal exercised market power. A low index means either that the firm has no market power or that it has not raised price as far as it profitably could have. Economists generally regard unexercised power as a rarity, for they assume that firms take advantage of every opportunity to earn a profit. Still, a firm might fear that fully exercising its power would invite government regulation and so set a price yielding a Lerner Index lower than its "real" power. But if the firm refrains from pricing as high as it could because higher prices would induce entry reducing its longer-run profit stream, we might conclude that the entry potential in fact limits its power. [12]

In principle, the Lerner Index gives an explicit measure of exercised market power. A high value indicates substantial market power, and a low value indicates its absence. In practice, the relevant data may not be readily observable, as we next explain.

Footnotes

1 Readers may safely omit portions of this Paragraph marked with an asterisk (*) without loss of understanding of the general argument.

2 Costs are generally divided into variable and fixed. When a firm increases its output by one unit it incurs additional costs for variable-cost items (for example, the bakery's flour, sugar, labor and electricity), but not for fixed-cost items (for example, the bakery's investment in plant, durable equipment, real property). Marginal cost is thus a function of variable, but not fixed, costs. On the application of these measures to alleged predatory pricing and related practices, see ¶¶735 – 742.

3 For elaboration on these concepts any good introductory text in microeconomics, price theory, or antitrust and economics will do. *See, e.g.,* Jeffrey M. Perloff, Microeconomics (6th ed. 2011); Robert S. Pindyck & Daniel L. Rubinfeld, Microeconomics (8th ed. 2012); W. Kip Viscusi, John M. Vernon, & Joseph E. Harrington Jr., Economics of Regulation and Antitrust (4th ed. 2006).

4 Technically, price discrimination refers not to different prices but to different ratios of price to marginal cost. For example, a supplier incurring expenses of $6 and $8, respectively, in serving two buyers does not price discriminate by charging one $6 and the other $8. In fact, identical prices to these two buyers would be discriminatory.

5 If the firm faces a perfectly elastic demand for its output, the price at which it can sell is independent of the amount it sells and the demand curve for its output is horizontal at P_0— *D*' in the diagram. In that event, it can sell the eleventh unit at the same price as the other ten; area *B* ceases to exist, and marginal revenue is equal to an expanded area *A* given by P_0 times 1 unit.

6 * More formally, since marginal revenue is given by the difference in revenues at P_1 and P_0, we have:

$$MR = P1(Q_0 + 1) - P0Q_0 = P1 + \Delta P\, Q_0$$

where $\Delta P = P_1 - P_0$. Since $\Delta Q = 1$ unit, this can be written as:

$$MR = P1\left(1 + \frac{\Delta P}{P1}\frac{Q_0}{\Delta Q}\right)$$

and since $\varepsilon^d = -(\Delta Q/Q)/(\Delta P/P)$, this implies

$$MR = P\left(1 - \frac{1}{\varepsilon^d}\right)$$

for small changes in *P*.

7 *This occurs if the elasticity of demand is less than 1. See the last equation in note 6.

8 If price were at the competitive level of marginal cost, marginal revenue would necessarily be less than marginal cost so that the firm facing a downward-sloping demand curve could increase profit by restricting output until price rose enough to bring marginal revenue up to the level of marginal cost.

9 *See* Abba P. Lerner, *The Concept of Monopoly and the Measurement of Monopoly Power,* 1 Rev. Econ. Stud. 157 (1934).

10 If measuring the market power of a group of firms acting in concert, the "firm" in the formula would be the group.

11

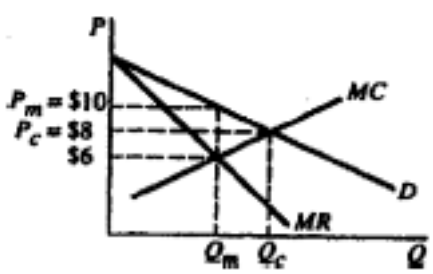

Figure 2

In Figure 2, the monopoly price is $10 per unit and the marginal cost (*MC*) at the monopoly quantity (Q_m) is $6 per unit. The Lerner Index here is 0.4, correctly indicating that 40 percent of the price is a monopoly markup over marginal cost. Because the marginal cost curve rises, the price and marginal cost at the higher competitive output (Q_c) is $8. Eliminating the monopoly thus reduces price 20 percent—not 40 percent—from the monopoly level.

12 In such cases, market share may overstate market power. A firm charging less than its short-run profit-maximizing price will produce more and therefore have a larger market share. In that event, its apparent market

power as measured by the Lerner Index decreases while its apparent market power as measured by its market share increases.