# *Market definition and concentration: One size does not fit all*

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The assumption that *one* set of concentration thresholds can be used to identify the potential for an exercise of market power across *different* markets, even if properly delineated, should be reexamined. This "one size fits all" assumption is embedded in the initial step of defining the relevant product and geographic markets and then calculating concentration ratios using the Herfindahl-Hirschman Index ("HHI") set forth in the Federal Trade Commission 1992 Horizontal Merger Guidelines (the "Guidelines").[1] While we fully accept the approach taken by the Guidelines, a reassessment of the Guidelines' application of post-merger concentration ratios to such markets is in order. When applying concentration ratios, the Guidelines use a *single* set of General Standards contained in Section 1.51 of the Guidelines, regardless of the market at issue. Behind this procedure is the assumption that one set of Guideline HHIs provides the same or similar inferences about the ability of firms to exercise market power in all markets.[2] This is an important assumption. Even if the market definition/concentration

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1 57 FED REG. 41, 552 (1992).

2 The closest the Guidelines appear to come to addressing this difficulty is section 1.522.

exercise were viewed merely as a screening device preceding a more robust competitive effects analysis, false positives (which thrust parties into such an analysis) impose real costs on parties, and false negatives (which allow a merger to escape analysis) result in economic inefficiencies. Moreover, many courts have begun to adopt the initial Guidelines step in both merger and monopolization cases.[3] Accordingly, it is important to understand the faulty justifications for this assumption and to explore alternative methodologies.

The assumption underlying the Guidelines' "one size fits all" approach to concentration is that the market definition exercise itself calibrates markets for comparability through the hypothetical monopolist test. Justification for this view is contained, for example, in Robert Willig's 1991 article *Merger Analysis, Industrial Organization Theory, and Merger Guidelines.*[4] Willig's presentation *does not,* however, provide a coherent foundation for the Guidelines' "one size fits all" assumption, and we are not aware of any other literature which does. In fact, the recent literature suggesting the use of the concept of critical elasticity for operationalizing the market definition exercise demonstrates that the Guidelines' assumption that the HHI is comparable across markets is untenable. In what follows we first set forth the basic economic relationship between market power and concentration. We then consider Robert Willig's claim that there are equal direct relationships in all markets between concentration and market power, thus underwriting a one size fits all assumption. Finally, we show that the application of a critical elasticity analysis is incompatible with the one size fits all assumption.

## I. THE ONE SIZE FITS ALL ASSUMPTION

The aim of the Guidelines, and antitrust policy generally, is to prevent the creation or enhancement of market power. Market power

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[3] *See, e.g.,* FTC v. Illinois Cereal Mills, Inc., 691 F. Supp. 1311 (N.D. Ill. 1998); United States v. Country Lake Foods, Inc., 754 F. Supp. 699 (D. Minn. 1990). *See generally* Gregory J. Werden, The 1982 Merger Guidelines and the Ascent of the Hypothetical Monopolist Paradigm, 71 ANTITRUST L.J. 253 (2003).

[4] BROOKINGS PAPERS ON ECONOMIC ACTIVITY 281 (Martin Neil Baily & Clifford Winston eds., 1991).

is defined by the Guidelines as the "ability profitably to maintain prices above competitive levels for a significant period of time"[5] and can be generally represented by the Lerner index:

$$\frac{P - MC}{P}$$

where $P$ = price and $MC$ is marginal cost. This quantity measures a firm's ability to price above marginal cost in percentage terms.

It is well known that an inverse relationship exists between a profit maximizing firm's ability to price above marginal cost and the market elasticity when the firm faces a downward sloping demand curve.[6]

$$\frac{P - MC}{P} = \frac{1}{e} \qquad (1)$$

where e = the market elasticity of demand. However, in order to establish a relationship between market power and the HHI, more restrictive assumptions are required. If Cournot rivalry prevails, then a relationship between market power and the HHI concentration ratio can be established:[7]

$$\frac{P - \overline{MC}}{P} = \frac{HHI}{e} \qquad (2)$$

where $\overline{MC}$ is the average marginal cost.

Even in this relationship, however, the impact of the HHI on a firm's market power depends on the individual market elasticity. Empirically, we know that market elasticity should be expected to differ, possibly significantly, across markets. So why do the Guidelines assume that the same concentration thresholds should be applied to all markets without adjustment? The answer appears to be a belief that the Guidelines' market definition step calibrates all markets so that the impact of market elasticity is the same or

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5 Guidelines, *supra* note 1, at 0.1.

6 *See* JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 66 (1989).

7 *See* LYNNE PEPALL, DANIEL RICHARDS & GEORGE NORMAN, INDUSTRIAL ORGANIZATION CONTEMPORARY THEORY AND PRACTICE 223 (2005).

proportional across markets. The words of the market definition test appear to suggest this:

> A market is defined as a product or group of products and a geographic area in which it is produced or sold such that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a "small but significant and nontransitory" increase in price.[8]

Further, the approach of adding in products until a hypothetical monopolist could profitably raise price by a specified small but significant amount seems to suggest an attempt to normalize markets to proportional elasticities.

This appears to be the interpretation Robert Willig advanced in his 1991 paper written just before the 1992 Guidelines were released.[9] Willig derives an equation relating changes in welfare, the HHI and the change in the HHI, in which the market elasticity term does not appear. After presenting his equation, he comments that "this factor [market elasticity of demand] does not appear [in the equation] *due to the market delineation step that served to calibrate the market power at stake.*"[10] Re-expressing Willig's key equation in terms of price changes, and eliminating the conjectural variation terms, his equation becomes:[11]

$$\frac{dP}{P} = \frac{.05(dH)}{(1.05 - H_0 - .05H)} \quad (3)$$

By inspecting equation (3), we see that there appears to be a relationship between the ability to increase price and the HHI (*H*) and the changes in the HHI (*dH*) that is *unmediated* by the market elasticity. However, Willig's equation does not support a conclusion

8 Guidelines, *supra* note 1, at 1.0.

9 Willig, *supra* note 4.

10 *Id.* at 28 (emphasis added).

11 In the appendix, we derive equation (3) and show it is equivalent to Willig's equation (6), which expresses the change in terms of consumer surplus plus producer surplus instead of the more direct price change used here.

that the market delineation step eliminated the influence of market elasticity. Market elasticity continues to determine the degree of the price increase ($\frac{\Delta P}{P}$) through Willig's $H_0$ term and is therefore not eliminated. We demonstrate this in the appendix. All Willig has done is to redefine terms so that it appears as if the effects of market elasticity are subsumed in the HHI. Thus, Willig does not provide the rationale required for the Guidelines' assumption of a single set of concentration thresholds.

## II. CRITICAL ELASTICITY AND THE ONE SIZE DOES NOT FIT ALL ASSUMPTION

The recent literature on critical elasticity establishes that no direct relationship between concentration and market power exists, and that an adjustment for market elasticity is required. The critical elasticity is the highest market elasticity of demand at premerger prices such that a hypothetical monopolist facing this demand *would* raise the price by (at least) a small but significant nontransitory increase in price (the SSNIP).[12] If the actual market elasticity in the candidate market is higher than the critical elasticity, then the hypothetical monopolist operating in that market would not raise the price by the SSNIP. It therefore cannot yet be a relevant market. The market test then dictates that the next closest substitute must be added to the candidate market, and the market test is rerun. The elasticity of this new provisional market will be lower than before because one outside constraint has been eliminated. Beginning with the same initial price, the hypothetical monopolist would now raise its price by an amount greater than previously. If this price increase equals or exceeds the SSNIP, then an antitrust market is obtained. Thus, the market delineation test can be conceptualized as adding products to the provisional market until the elasticity in the provisional market decreases sufficiently to reach the critical elasticity.

The derivation of the formula for critical elasticity is not difficult. However, the analyst must make an assumption concerning the structure of demand. A common assumption is that demand is linear.

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[12] *See* Gregory J. Werden, *Demand Elasticities in Antitrust Analysis*, 66 ANTITRUST L.J. 363 (1998).

To obtain the critical elasticity formula, one begins with profit maximizing behavior by a monopolist, or a firm with some degree of market power. Typically, the SSNIP is defined as $t = .05$, where $t$ is the percent price increase of the hypothetical monopolist

$$t = \frac{(P_m - P_o)}{P_0} \tag{4}$$

and $P_m$ is the monopolist's optimal price and $P_o$ is the initial price. The critical elasticity is the elasticity at $P_o$ such that the monopolist would set $P_m$ so that $t = .05$. The formula for critical elasticity with linear demand is:

$$e_c = \frac{1}{(2t + m)} \tag{5}$$

where $m$ is the contribution margin.

Notice that equation (5) does not require any post-merger information. One can obtain the critical elasticity from a given pre-merger contribution margin $m$ and a given SSNIP $t$. The critical elasticity test involves evaluating the actual elasticity at the initial prices, data that is typically available. One then compares the critical elasticity to a calculated actual elasticity to evaluate a given candidate market. The candidate market is expanded until the elasticities are equal.

Conceptualizing the market definition test using critical elasticity, with a given $t$, demonstrates that the size of each market depends on the size of the premerger contribution margins. A one size fits all assumption of equal elasticities would require that all industry or all market contribution margins be approximately equal. This, we know, is not the case.

Setting a common threshold for the HHI for all markets may overestimate the market power in some markets and underestimate market power in others. The correct approach is to scale the concentration ratio by the market elasticity, and the Guidelines approach to defining markets does not eliminate the need to do so.

## APPENDIX: ROBERT WILLIG'S 1991 ANALYSIS

TERMS USED IN APPENDIX

$P_0$ is the premerger price

$P_m$ is the price a hypothetical monopolist would charge

$P_1$ the post-merger price (when perhaps two of eight firms merged, for example)

$dP = P_1 - P_0$

$H_0$ and $H_1$ the pre- and post-merger HHIs, respectively

$e$ is the (constant) market elasticity

$c$ is the constant marginal cost

$dP/P_0$ is the percentage price increase

$t$ is the specified critical percentage price increase

$m = (P_0 - c)/P_0$ is the initial markup of price above cost

$R = PQ$ is the revenue

We will first derive the equivalent equation (3) for change in welfare expressed in terms of the change of price form used in much antitrust analysis, and then derive its equivalence to the form derived in Robert Willig's paper cited in the text.

Following Willig, we will assume a constant market elasticity of demand and Cournot market behavior. Using equation (2) gives an initial price $P_0$ that is determined by $(P_0 - c)/P_0 = H_0/e$. Since a monopolized market has $H_0 = 1$, a monopolist that controlled the same market would set his price $P_m$ such that $(P_m - c)/P_m = 1/e$. The market is delineated so that $P_m/P_0$ is $t$ (we will use the standard 5%) above 1, as we have described in the article. Hence

$$(P_m - P_0) = (P_m - c) - (P_0 - c) = (P_m - P_0H_0) / e = (1.05P_o - P_0H_0) / e \rightarrow$$

$$.05 = (P_m - P_0) / P_0 = (1.05P_o - P_0H_0) / P_0e = (1.05 - H_0) / e \rightarrow$$

$$e = (1.05 - H_0) / 0.05. \quad \text{(A1)}$$

The above shows that $H_0$ is a function of $e$.

Next, note that

$$(P_1 - c)/P_1 = 1 - c/P_1 = H_1/e \rightarrow$$
$$c/P_1 = 1 - H_1/e = (e - H_1)/e \rightarrow$$
$$ec/P_1 = (e - H_1). \tag{A2}$$

Now consider the difference in the post- and premerger Lerner indexes.

$$(P_1 - c)/P_1 - (P_0 - c)/P_0 = (H_1 - H_0)/e = dH/e \rightarrow$$
$$1 - c/P_1 - 1 + c/P_0 = c/P_0 - c/P_1 = c(dP)/P_0P_1 = dH/e \rightarrow$$
$$(\text{using (A2)})\ (ec/P_1)(dP/P_0) = (e - H_1)(dP/P_0) = dH \rightarrow$$
$$(dP/P_0) = (dH)/(e - H_1).$$

Since this is a differential change, to the first order this can be expressed as, for any $P$ between $P_0$ and $P_1$ and $H$ between $H_0$ and $H_1$,

$$(\mathrm{dP/P}) = (\mathrm{dH})/(\mathrm{e} - \mathrm{H})\,. \tag{A3}$$

At this point, we can express the increase in market power from the merger, $dP/P$ in two equivalent ways. In the expression $(dP/P) = (dH)/(e - H)$, the dependence of the increase in market power on the delineated market elasticity is evident. Alternatively, we could reconstruct what Willig did in his article; using equation (A1) to replace e by $(1.05 - H_0) / 0.05$, and obtain an analogy to his equation (6),

$$(dP/P) = (0.05)(dH)/(1.05\text{-}\ H_0 - .05H). \tag{A4}$$

Here the same dependence on $e$ still exists; it is just hidden by the relation

$$e = (1.05 - H_0) / 0.05.$$

As the final part of this appendix, we will indicate the equivalence of (A3) in terms of welfare to the form actually presented in Willig's paper, his equation (6). First we use the relation for differential

Welfare in terms of a differential change in output, defined as the differential change in consumer surplus plus producers surplus, good to the first order, as

$$dW = dQ(P-c). \tag{A5}$$

Then

$$-\frac{dW}{R} = -\frac{dQ}{PQ}(P-c)\frac{dP}{dP}\frac{P}{P} = \frac{dP}{P}\left(-\frac{dQ}{dP}\frac{P}{Q}\right)\frac{(P-c)}{P} = \left(\frac{dP}{P}\right)(e)\frac{(P-c)}{P} \tag{A6}$$

where $R = PQ$ and is revenue.

Hence Willig's measure of differential welfare change (A6) is just our measure of differential price change (A3) or (A4), multiplied by the elasticity and the Lerner index at the price where the differential change is occurring. If we now use (A4) to substitute for $dP/P$, $(P-c)/P = H/e$ to substitute for $(P-c)/P$, and (A1) to substitute for $e$ we get

$$-\frac{dW}{R} = \frac{dH}{e-H}e\frac{H}{e} = \frac{HdH}{\frac{(1.05-H_0)}{.05}-H} = \frac{.05HdH}{1.05-H_0-.05H}. \tag{A7}$$

Finally, if we integrate the differential expression (A7) from the initial values to the final values and use the mean value theorem, we obtain an expression for the finite change in welfare for such a change given in equation (6) in Willig,

$$-\frac{\Delta W}{R^*} = \frac{.05H^*\Delta H}{1.05-H_0-.05H^*}, \tag{A8}$$

where $R^*$ and $H^*$ are the values of $R$ and $H$ from the mean value theorem, $\Delta W = W_1 - W_0$ and $\Delta H = H_1 - H_0$.