SUPPLEMENTAL NOTES ON MARKET

CONCENTRATION AND MARKET POWER

By

Dennis L. Weisman

Department of Economics
Kansas State University
Manhattan, KS 66506-4001

1. Market Concentration

This section is partitioned into two subsections. The first subsection examines the evolution of thought on the political economy of market concentration. The second subsection explores the emphasis placed on market concentration in the horizontal merger guidelines (HMG) of the United States Department of Justice and the Federal Trade Commission (DOJ/FTC).

A. Historical Perspectives

Concerns and general suspicion about market concentration and monopolies have a long history in the United States, dating back to the earliest days of the new republic. That economic and political liberties were seen as inextricably linked fostered the sentiment that the concentration of economic power invariably leads to the concentration of political power. As Dirlam and Kahn (1954, p. 17) observe:

> Clearly we are not devoted to a competitive system only for "economic" reasons. It is also associated with such social and political ideals as the diffusion of private power and maximum opportunities for individual self-expression. If the economy will run itself, government interference in our daily life is held to a minimum.

Thorelli (1955, p. 37) contends that this sentiment was perhaps even more pronounced among the early colonists than it was in the English common law:

> Grants or patents of monopoly not related to invention have generally been opposed with even greater vigor in the American colonies and in the United States than in Great Britain. This was so because one of the main reasons for leaving the mother country in many instances had been the aversion to unjustified privilege, more strongly felt among the emigrants than any other group of Anglo-Saxon society, and because monopoly was the antithesis of the very spirit of individualistic pioneering characteristic of life on the new continent.

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These ideas trace their origins back to the writings of Jefferson and Paine and their support for small businesses and the "virtues" of the agrarian life (Jefferson, 1998, pp. 258-261). There was a resurgence of these ideas during the Populist movement in this country in the mid-nineteenth century.[1] This was a time when agricultural interests were purportedly being exploited by the monopolistic business practices of the railroads (Thorelli, 1955, pp. 58-62).

Despite these early concerns with the concentration of economic power, the founders recognized the need for the government to protect the rights of the citizenry to acquire property in accordance with their individual skills and abilities. To wit, writing in *Federalist 10*, James Madison observed that:

> The diversity in the faculties of men, from which the rights of property originate, is not less an insuperable obstacle to a uniformity of interests. The protection of these faculties is the first object of government. From the protection of different and unequal faculties of acquiring property, the possession of different degrees and kinds of property immediately results; and from the influence of these on the sentiments and views of the respective proprietors ensues a division of the society into different interests and parties. …The regulation of these various and interfering interests forms the principal task of modern legislation and involves the spirit of party and faction in the necessary and ordinary operations of government.

The founders understood the role of government, both in preserving desirable incentives to acquire property and in "regulating" the resultant clash of competing interests. The primary antitrust laws in this country—the Sherman Act and the Clayton

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[1] There is an important distinction between populist principles and the principles espoused by Jefferson and Paine. Populists are opposed to economic concentration and the accumulation of wealth and power regardless of how they are achieved (Posner, 2001, pp. 23-28). In contrast, Paine and Jefferson were concerned with economic concentration and the accumulation of wealth and power that derives from the exercise of undue privilege, but not necessarily that which derives from the exercise of superior talent and ability. In support of this hypothesis, recognize that their opposition to "hereditary succession" was based on the idea that the most talented members of each generation should be allowed to assume leadership in their society (Kramer, 2000, p. xi; Paine 1995, Chapter II). It would be logically inconsistent for Paine and Jefferson to support rewarding superior talent and virtue in the "market" for political leaders, while disavowing the very same principle in markets for other goods and services.

Act—embody the same fluidity that the founders wrote into the constitution. And much like the constitution, the antitrust laws are required to referee the struggle between competing interests while recognizing that "the referee's role must be appropriately circumscribed" (Klein, 1998, p. 12).

The multi-faceted question of whether the antitrust laws should be used for socio-political as well as economic ends has evoked a spirited debate. Judge Robert Bork (1978, p. 51) has argued that "The only legitimate goal of antitrust law is the maximization of consumer welfare."[2] The courts have not always adhered to this doctrine. In the landmark *Alcoa* case, Judge Learned Hand observed that:

> We have been speaking only of the economic reasons which forbid monopoly; but . . . there are others, based on the belief that great industrial consolidations are inherently undesirable, regardless of their economic results. In the debates in Congress, Senator Sherman himself . . . showed that among the purposes of Congress in 1890 was a desire to put an end to great aggregates of capital because of the helplessness of the individual before them.[3]

In *Brown Shoe*, the court ruled that the Congress intended for smaller firms to be protected, even if it resulted in higher prices:

> Of course, some of the results of large integrated or chain operations are beneficial to consumers. Their expansion is not rendered unlawful by the mere fact that small independent stores may be adversely affected. It is competition, not competitors, which the Act protects. But we cannot fail to recognize Congress' desire to promote competition through the protection of viable, small, locally owned, businesses. Congress appreciated that occasional higher costs and prices might result from the maintenance of fragmented industries and markets. It resolved these competing considerations in favor of decentralization.[4]

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[2] Judge Bork further contends that "Competition," for purposes of antitrust analysis, must be understood as a term of art signifying any state of affairs in which consumer welfare cannot be increased by judicial decree. He therefore rejects the idea that "competition" is synonymous with "rivalry" (Bork, 1978, p. 58).

[3] *United States v. Aluminum Co. of America*, 148 F.2d 416, 428, 429 (2d Cir. 1945).

[4] *Brown Shoe Co. v. United States*, 370 U.S. 294, 344 (1962).

It is significant that a key premise contained in Senator John Sherman's resolution, a precursor to the passage of the Sherman Act, is that the antitrust laws should serve to prohibit arrangements that "tend to advance the cost to the consumer…."(Thorelli, 1955, p. 166).[5, 6]

It is beyond the scope of this discussion to evaluate the various arguments that have been advanced concerning the proper role of the antitrust laws. It suffices to recognize that concerns with market concentration have historically included socio-political as well as economic considerations. This observation notwithstanding, Judge Richard Posner (2001, p. 35) observes that "After a century and more of judicial enforcement of the antitrust laws, there is a consensus that guidance must be sought in economics."

B. DOJ/FTC Merger Guidelines

Concerns about the adverse economic effects of market concentration figure prominently in the HMG of the DOJ/FTC (2010).[7] These guidelines make allowances for countervailing effects, including ease of entry, merger economies and substitute products, but these are probably best characterized as exceptions to the general rule that non-trivial

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[5] Tracing the origins of the Sherman Act back to the common law, Kleit (1993) contends that the Congressional goal of this legislation was not the welfare of consumers (consumers' surplus), but rather economic efficiency. In contrast, Lande (1982) argues that, in passing the Sherman Act, Congress was primarily concerned with wealth transfers from consumers to producers. Kleit (1993, p. 647) concedes that more recent antitrust policies have applied a "welfare of consumers" standard. For further discussion of the relevant measure of economic welfare for purposes of antitrust, see Carlton (2007).

[6] Indeed, as Dirlam and Kahn (1954, p. 15) observe, the "sponsors of the Sherman Act were not hostile to mere size or market power."

[7] "The unifying theme of these Guidelines is that mergers should not be permitted to create, enhance, or entrench market power or to facilitate its exercise. … A merger enhances market power if it is likely to encourage one or more firms to raise price, reduce output, diminish innovation or otherwise harm customers as a result of diminished competitive constraints or incentives" (DOJ/FTC, 2010, p. 2). It is noteworthy that the previous version of the HMG defined market power in the following terms. "Market power to a seller is the ability profitably to maintain prices above competitive levels for a significant period of time" (DOJ/FTC, 1992, p. 2). "Market power may be exercised, however, not only by raising price, but also, for example, by reducing quality or slowing innovation" (DOJ/FTC, 2006, p. 1),

increases in market concentration typically confer greater market power, at least in moderately concentrated and highly concentrated industries.

The merger guidelines rely extensively upon the Herfindahl-Hirschman Index (HHI) of market concentration to establish the relevant benchmarks.[8] For example, the HMG (DOJ/FTC, 2010, p. 19) state that:

> Mergers resulting in highly concentrated markets that involve an increase in the HHI of more than 200 points will be presumed to be likely to enhance market power.

Moreover, even in moderately concentrated industries, defined as industries with an HHI of between 1500 and 2500,[9] the HMG specify that changes in the HHI of 100 points or more "potentially raise significant competitive concerns" (DOJ/FTC, 2010, p. 19). [10] Nonetheless, the DOJ/FTC merger guidelines (2010, p. 19) appear to recognize the prospective limitations of an exclusive focus on market concentration:

> The purpose of these thresholds is not to provide a rigid screen to separate competitively benign mergers from anticompetitive ones, although high levels of concentration do raise concerns. Rather, they provide one way to identify some mergers unlikely to raise competitive concerns and some others for which it is particularly important to examine whether other competitive factors confirm, reinforce or counteract the potentially harmful effects of increased concentration.

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[8] The DOJ/FTC (2010, p. 18) state that "the HHI is calculated by summing the squares of the individual firms' market shares . . . and thus gives proportionately greater weight to the larger market shares." Weisman (2003, 2007) argues that a careful assessment of the merits of a proposed merger requires that antitrust authorities go even further and investigate the degree to which market demands are interdependent and firms engage in multi-market participation.

[9] The earlier guidelines classified an industry as moderately competitive when the HHI was between 1000 and 1800 (DOJ/FTC, 1992, p. 16).

[10] As Carlton and Israel (2010, p. 3) observe, "the value of any such general HHI thresholds for merger review is extremely limited since we know the effect of industry concentration on price varies enormously across industries."

2. Traditional Cournot Analysis

In the simple Cournot model of oligopoly, there is assumed to be a single market in which each firm chooses an output level with the belief that its choice of output has no influence on the output choice of its rivals.[11] Suppose that inverse market demand is given by $P(Q)$, where P is price, Q is quantity with $Q = q_1 + q_2 + ... + q_n$ and q_k is the output of firm k, $k = 1, ... n$. The cost function for firm k is given by $C_k(q_k) = c_k q_k$. Each firm k chooses a level of output, q_k, to maximize its profit, Π_k, or

$$(1) \quad \max_{\{q_k\}} \Pi_k = q_k[P(Q) - c_k], k = 1,...,n.$$

It is straightforward to show that in the Cournot-Nash equilibrium,[12] the mark-up of price over marginal cost, a measure of market power, is given by

$$(2) \quad \frac{P - c_k}{P} = -\frac{s_k}{\varepsilon},$$

where $s_k = q_k / Q$ is the market share of firm k and $\varepsilon = (dQ/dP) \times (P/Q)$ is the own price elasticity of demand (Martin, 1993, p. 21). The left-hand side of (2) is the familiar Lerner index of market power (Lerner, 1934; Carlton and Perloff, 2005, p. 283). Equation (2) indicates that the mark-up of price over marginal cost for firm k is increasing with its

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[11] The firms in this model compete in a standard strategic substitutes Cournot game with homogenous output (Bulow *et al.*, 1985; Vives, 1999).

[12] In the Nash equilibrium of the Cournot game, each firm chooses an output level that maximizes its profit given the output choice of each of its rivals. A Nash equilibrium thus represents a simultaneously rational choice of output for each firm in the market.

market share, *ceteris paribus*. This is the basis for the claim that "market share is synonymous with market power."[13, 14]

The relationship in (2) must hold for each of the *n* firms in the market. Multiplying both sides of the expression in (2) by s_k and summing over all *n* firms in the market yields:

$$(3) \quad \frac{\sum_{k=1}^{n} s_k (P - c_k)}{P} = \frac{P \sum_{k=1}^{n} s_k - \sum_{k=1}^{n} s_k c_k}{P} = \frac{P - \sum_{k=1}^{n} s_k c_k}{P} = -\frac{\sum_{k=1}^{n} (s_k)^2}{\varepsilon},$$

since $\sum_{k=1}^{n} s_k = 1$. Appealing to the definition of the Herfindahl-Hirschman Index, we obtain

$$(4) \quad \frac{P - \bar{c}}{P} = -\frac{H}{\varepsilon},$$

where $\bar{c} = \sum_{k=1}^{n} s_k c_k$ is the weighted average industry marginal cost and *H* is the Herfindahl-Hirschman Index. Equation (4) indicates that the mark-up of price over average industry

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[13] In some cases, however, there is evidence that "a little competition can go a long way." For example, in an empirical study of pricing behavior in concentrated retail and professional services industries, Bresnahan and Reiss (1991, p. 978) observe the following.

> Our empirical results suggest that competitive conduct changes quickly as market size and the number of incumbents increase. In markets with five or fewer incumbents, almost all variation in competitive conduct occurs with the entry of the second and third firms. … These data show that prices fall when the second and third firms enter, but then level off.

[14] The theoretical relationship between market share and market power predicted by some economic models often lacks empirical validation.

> Although several economic models of firm behavior predict that larger market shares are associated with higher prices, the relationship has been difficult to detect empirically. First, market share data are hard to obtain in many cases. In addition, it is likely that the relationship between market shares and market performance (e.g., profitability) is industry-specific. … Accordingly, scholars disagree on whether there is a "critical market share" where a firm becomes sufficiently dominant that it can exercise unilateral market power."[14] (footnotes omitted) (ABA, 2005, pp. 82-83).

marginal cost is increasing with market concentration, *ceteris paribus* (Schmalensee, 1988, p. 660). This is a primary cause for concern with increasing market concentration.

Suppose now that all firms in the market have the same marginal cost, c, and that the price elasticity of demand, ε, is a constant. Rearranging the terms in (4) and solving for the market price yields

$$(5)\ P = \left[\frac{\varepsilon}{\varepsilon + H} \right] \times c.$$

Equation (5) implies that an increase in market concentration $(\Delta H > 0)$ must induce greater efficiencies $(\Delta c < 0)$ if market price is to be non-increasing, post merger.[15] The HMG (DOJ/FTC, 2010, § 10) explicitly allow merger efficiencies to be used as a defense for a proposed merger.

> Competition usually spurs firms to achieve efficiencies internally. Nevertheless, a primary benefit of mergers to the economy is their potential to generate significant efficiencies and thus enhance the merged firm's ability and incentives to compete, which may result in lower prices, improved quality, enhanced service, or new products. … In a uni-lateral effects context, incremental cost reductions may reduce or reverse any increases in the merged firm's incentive to elevate price (p. 29).

The final question that we address in this section concerns the precise nature of the trade-off between market concentration and merger efficiencies necessary for the *non-increasing price condition* $(\Delta P \leq 0)$ to be satisfied, post-merger. Taking the total differential of (5), setting the resulting expression to be less than or equal to zero, and simplifying yields

$$(6)\ \frac{dc}{dH}\bigg|_{dP \leq 0} \leq \frac{c}{\varepsilon + H} \Rightarrow \frac{dc}{c}\frac{H}{dH} \leq \frac{c}{\varepsilon + H}\frac{H}{c} \Rightarrow \frac{\%\Delta c}{\%\Delta H} \leq \frac{H}{\varepsilon + H}, \text{ or}$$

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(7) $\%\Delta c \le \left[\dfrac{H}{\varepsilon + H}\right] \times \%\Delta H.$ [16]

Equation (7) indicates that the *non-increasing price condition* is satisfied when each 1

percent increase in H is accompanied by a reduction in c of at least $H/(\varepsilon + H)$ percent.

The following is an example.

Example 1. Let $c = 8$, $\varepsilon = -2$ and $H = 0.4$. This yields an equilibrium market price of 10
upon appeal to (5). Suppose that a merger is proposed that would increase market
concentration by 10% to $H = 0.44$. Absent any change in marginal cost, price would rise
to approximately 10.26. Conversely, if costs decrease to 7.8, a reduction of 2.5%,
following the increase in market concentration, the market price remains unchanged as
may be confirmed by (5). It follows from (7) that costs must fall by at least 2.5% in order
for a 10% increase in H not to result in an increase in market price.

It is noteworthy that Professors Landes and Posner (1981, pp. 948-949) suggest that

a superior measure of market share in drawing inferences about market power would be

based on the capacity rather than the current output of the competitive fringe:

> If i's market share is 80%, consumers cannot easily substitute other goods,
> and producers of other goods cannot easily switch to the production of this
> good, i may still lack substantial market power. Suppose the output of
> competing producers of the good is highly responsive to changes in the price.
> . . . Market share alone would be a poor measure of market power in such a
> case, at least in the long run. . . . The excess capacity of the fringe firm
> would limit i's efforts to raise price above marginal cost. To reflect this
> factor, one could redefine i's market share as its current output divided by the
> sum of i's output and the fringe firm's capacity (*i.e.,* by their potential rather
> than current, output). This adjustment would reduce i's market share . . . and
> thereby provide a better measure of i's market power.

The investment in capacity by the competitive fringe constitutes a sunk cost. This

implies that the marginal cost of expanding output for the competitive fringe is quite low.

As a result, the excess capacity of the competitive fringe represents a credible threat of

additional entry which serves to discipline the pricing behavior of the dominant firm.

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[16] See Williamson (1968) for an early formal analysis of the trade-off between market concentration and
merger efficiencies.

Policymakers in the telecommunications industry have recognized the importance of measuring market shares in terms of capacity rather than actual sales. For example, in deciding upon the merits of forbearing from regulation of incumbent local telephone companies, regulators have increasingly relied upon the presence of actual competitors that have made irreversible investments in network infrastructure rather than the actual sales of those competitors (Industry Canada, 2007). The following quotations from the Competition Bureau in Canada are instructive.

> Market shares should be defined in a manner that reflects the potential for the ILEC to exercise market power if there is forbearance. . . . Therefore, the mere presence of the competitor has a larger impact on ILEC behaviour than its actual market share (CRTC, 2005, ¶ 61).[17]

> For example, in geographic markets where there are two independent facilities-based service providers with sunk costs, that are not capacity constrained, and are equally capable of offering the relevant product, the capacity market share of the ILEC and the new entrant will each be 50% (CRTC, 2005, ¶ 62).

In evaluating proposed mergers in the wireless industry and the significance of HHI measures, the Federal Communications Commission has recognized the limitations of market-share and concentration measures based on actual sales.[18]

> For many markets where the facts of a high subscriber-based HHI and a high change in HHI might seem to suggest a potential competitive problem, there is in fact little likelihood of harm. We find that the presence and capacity of other firms matter more for future competitive conditions than do current subscriber-based market shares. In particular, current market shares understate the likely future competitive importance of Verizon Wireless, Sprint, T-Mobile, and Nextel. These firms all compete fiercely for customers; all are investing substantially in capacity and new services in this sector; and Verizon Wireless, T-Mobile, and Nextel have been gaining nationwide market share over recent quarters (FCC, 2004, ¶ 148).

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[17] ILEC is the acronym for incumbent local exchange carrier.

[18] For further discussion of the prospective limitations of market share in drawing inferences about market power, see Antitrust Modernization Commission (2007) and Weisman (2010).

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