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Comment

*1789 ANOTHER LOOK AT MARKET POWER

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The recent Harvard Law Review article on market power in antitrust cases by Professors Landes and Posner [FN1] is an important contribution to antitrust analysis. The aim of this Comment is not to quarrel with their basic analytical approach, but rather to identify some limitations of their analysis and warn of some improper inferences regarding antitrust policy that one might draw from it. The world is more complex than Landes and Posner assume. While I recognize that courts have difficulty dealing with complex economic issues, a sound antitrust policy cannot be founded on the fiction that the world is simple.

Part I addresses the technical issues raised by Landes and Posner's theoretical analysis of market power, in order to clarify the implications of the measures Landes and Posner propose and the limitations of the market model they use. Part I also discusses the questions that arise when the distinction between short-run and long-run analysis is introduced into a market power inquiry. [FN2] Part II examines, in nontechnical terms, the use of market share as a measure of market power and the hazards of adjusting shares to reflect departures from "standard" market conditions or of computing shares when markets are ill defined. Part III briefly examines, in similarly nontechnical terms, some alternative approaches to detecting market power that, under some conditions, are more reliable than are market share computations.

*1790 I. MARKET POWER IN THEORY

A perfectly competitive market is defined in part as an arena in which no seller or buyer can influence the price at which transactions occur. If a seller can affect the terms of its sales -- in the words of Landes and Posner, "raise price above the competitive level without losing so many sales so rapidly that the price increase is unprofitable and must be rescinded" [FN3] -- the seller is said to possess market power. Perfect competition is rarely encountered outside textbooks; almost all firms have some market power, though most have very little. Accordingly, the relevant question in antitrust cases is not whether market power is present, but whether it is important. I begin by examining this question in the context of a static, single-firm model, then discuss some important dynamic complications, and conclude this Part by considering the relation between analysis of a single firm and analysis of a market as an aggregate.

A. The Firm in the Short Run

For a single-product firm facing a well-defined demand curve and maximizing its short-run profits, the following condition holds: [FN4]

$$L = (P\text{-}MC)/P = I/\langle\langle epsilon \rangle\rangle \text{ subf } . \quad (I)$$

L is the Lerner index of monopoly power, P is price, MC is marginal cost, and $\langle\langle epsilon \rangle\rangle$ subf is the elasticity of the firm's demand curve. In Part I of their article, Landes and Posner treat L as "a precise economic definition of market power" [FN5] and examine its theoretical determinants by relating the firm demand elasticity, $\langle\langle epsilon \rangle\rangle$ subf , to other quantities (for example, market share). In Part II, however, when addressing applications of their market power theory, Landes and Posner shift their focus to the deadweight loss caused by monopoly pricing.

The deadweight loss is the sum of areas C and E in Figure I. [FN6] D is the firm's demand curve; MC is its marginal cost schedule. Deadweight loss is the dollar cost to society of the monopolist's failure to increase output from Q subm , assumed to be ***1791** the profit-maximizing level, to Q subc , the competitive level. [FN7] If the MC and D curves are linear, the deadweight loss is given by the following equation: [FN8]

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DW = L(P subm Q subm)K/2. (2)

K is a constant between zero and one that reflects the slope of the marginal cost curve; it equals one if the marginal cost is ***1792** constant. P subm and Q subm are the price charged and quantity sold by the monopolist.

Equation (2) clarifies the main difference between L and DW. DW reflects the amount of commerce affected by a firm's market power and therefore is measured in dollars of loss, whereas the L is a dimensionless figure. It is thus quite appropriate for Landes and Posner to turn from L to DW when considering the degree of market power sufficient to warrant antitrust concern: [FN9] a small firm with a high L causes insubstantial social losses. A firm must have both a high L (or, equivalently, face a low < <epsilon> > subf) and significant dollar revenues to impose significant costs on society.

Equation (2) also demonstrates -- despite Landes and Posner's assertion to the contrary [FN10] -- that the firm's sales volume, and not the size of the "relevant market," is the most direct indication of the need for antitrust intervention. Because defining "the relevant market" is usually difficult and sometimes impossible, [FN11] this result is reassuring. If available, information on a single firm's costs and revenues is sufficient to assess the magnitude of the costs the firm imposes on society.

Other social costs that may result from market power are the loss of resources expended to obtain or maintain such power and the waste of resources by managers not subject to the discipline of effective competition. [FN12] In such cases, deadweight-loss estimates based on observed firm costs will understate the total costs of market power.

Single-product firms are common in textbooks but uncommon in reality. To use, in the more realistic multiple-product case, the apparatus developed by Landes and Posner and discussed above, one must aggregate L's or (more importantly) DW's across products. [FN13] Section A of the Appendix considers a tractable special case: a two-product monopoly with constant marginal costs, linear demands, and no "income effects." This special case provides aggregation rules that should not be grossly misleading in more general settings. An average L can ***1793** be computed as the weighted average of individual product L's (using dollar revenues as the weighting factors); total firm DW is calculated as half the product of this average L and total firm revenue. These rules require no estimate of aggregate demand elasticity for all of the firm's products. [FN14]

B. The Dynamics of Market Power

The formal analysis in Section A (and its Landes and Posner counterpart) focuses on the short-term consequences of monopoly power. As an analysis of real world behavior, it is strictly valid only if cost and demand conditions never change. Under this extreme assumption, DW gives the annual net social cost caused by the monopoly's exercise of market power. To obtain the net present value of those costs -- the true measure of the cost to society of market power -- the future stream of deadweight losses would be capitalized by dividing DW by an appropriate discount rate. [FN15]

A simple capitalization of constant deadweight losses, however, implicitly assumes a static market with identical short-run and long-run conditions. Real world markets are much more complex. In the short run, the set of producers of any particular product, and the producers' investment in plant and equipment, is taken to be fixed (unless there exist nonproducers who could begin production without significant new investment). In the long run, firms are assumed to enter any market in which they expect to earn adequate returns. Market power, therefore, is likely to be more important in the short run, when the range of competition is limited by the fixed assets already in

place, than in the long run, when market entrants may create sufficient competition to force prices down. In other words, the individual firm's demand curve is more elastic in the long run than in the short run, because the loss of sales ***1794** from any increase in price should increase over time as competitors enter the market. [FN16]

Section A has demonstrated that the deadweight loss from market power depends in part on a firm's Lerner index (equation (2)), which is itself determined by the firm's demand elasticity (equation (1)). [FN17] A lower long-run demand elasticity, therefore, indicates that the long-run deadweight loss from the exercise of market power will be lower than the short-run deadweight loss. The true cost to society of the exercise of market power cannot be determined by capitalizing the short-run loss alone, but must also reflect reductions in deadweight loss over the long run. If < <gamma> > represents the annual fractional reduction in the gap between short-run and long-run DW [FN18] -- in effect, the decay rate for market power -- and if r is defined to be the interest rate used to discount future costs, the total deadweight loss (TDW) is given by: [FN19]

TDW =I/r [r(DW subs) + < <gamma> >(DW subL)/r + < <gamma> >]. (3)

Equation (3) emphasizes that the measurement of the social cost of market power is a quantitative exercise that involves both short-run and long-run deadweight losses (DW subs and DW subL), the discount rate (r), and the decay rate for market power (< <gamma> >). Precise estimates of the variables in equation (3) will rarely be feasible. But the equation does provide a framework for integrating judgments about the magnitude of each variable in a particular problem of market analysis. For example, even the approximate ratio of < < gamma> > to r provides a quantitative indication of the relevant importance of DW subL , and DW subs . If < <gamma> > is large relative to r -- indicating, perhaps, low barriers to entry -- then DW subL will be much more important than DW subs in determining TDW.

***1795** The distinction between short-run and long-run analyses does not explicitly appear in the Landes and Posner discussion, and this omission leads to needless confusion. [FN20] For instance, Landes and Posner find "puzzling" [FN21] the definition of market power enunciated in United States v. E.I. du Pont de Nemours & Co. (Cellophane) -- "the power to control prices or exclude competition." [FN22] But there is nothing wrong with this definition. Market power has two conceptually distinct dimensions. [FN23] The power to control prices in the short run leads to a high value of DW subs , whereas the power to exclude competition over the long run is reflected in positive values of DW subL . Confusion also arises when Landes and Posner state that "[t]he supply elasticity of the competitive fringe is determined by both the ability of existing firms to expand output and the ability of new firms to enter the market." [FN24] The first of these two determinants is all that matters in the short run, whereas the conditions of entry are a key element affecting the long-run elasticity. The distinction is important because entry can be expected to occur more slowly than expansion, and because different techniques are required to analyze the two mechanisms.

The most serious risk of confusion, however, arises when Landes and Posner argue that firms of average profitability do not possess significant market power, even if they have high Lerner indices. [FN25] A firm that has developed a desirable product will enjoy short-run discretion over the price it charges, even if free entry prevents any significant degree of long-run power. For example, if no entry barriers hinder the development and marketing of new prescription drugs, the drug industry as a whole will not enjoy persistent excess profits. But each individual firm will have considerable discretion over the price charged for unique and desirable drugs that it develops ***1796** and patents. The absence of long-run power does not by itself imply that the social cost of market power is insufficient to justify antitrust action. To determine whether antitrust action is warranted, one must consider the dynamics of the industry involved (as indicated by product lifetimes) along with the importance of short-run power.

Product lifetimes relate to the speed with which short-run power decays -- the parameter < <gamma> > in equation (3). If the decay is slow enough, the absence of long-run power has no quantitative importance. For example, the expected lifetime of a patented product is at least as long as the patent grant; thus, the TDW associated with such a product may be sizeable (because < < gamma> > is effectively very low) even though DW subL is zero. After all, in the very long run all patents expire; it is nonetheless appropriate to be concerned

with the conduct of any particular patent holder that has monopoly power. [FN26] As always in the assessment of market power, the issues are fundamentally quantitative.

The absence of long-run power may also be relatively unimportant if one is considering relief designed to alter an industry's prevailing mode of conduct. In the popular-song industry, for instance, the effective lifetime of an average individual product is probably so short (< <gamma> > is probably so large) that TDW is very small for any individual song. There may be little reason, therefore, for concern over the pricing of any particular popular song, but the aggregate deadweight loss associated with all popular songs may be significant. Further, even though the market power associated with any one song may vanish rapidly, the industry may be marked by the continued exercise of short-run power even in long-run equilibrium. [FN27]

C. Selection and Use of Market Models

The demand conditions a firm faces are central to an assessment of its market power. Since firm demand curves are *1797 rarely observable, [FN28] however, their characteristics are generally inferred from other data. Landes and Posner make specific assumptions that enable them to relate a single-product firm's demand elasticity, < <epsilon> > subf in equation (1), to such parameters as market share. [FN29] But those assumptions and the market model they imply do not describe all markets, and their use may significantly understate market power for some industries that are of particular concern to antitrust lawyers.

In their formal analysis, Landes and Posner assume a well-defined market in which all sellers offer identical products and the dominant firm (a price maker) confronts a large number of price-taking, perfectly competitive rivals, each with a tiny market share. Though Landes and Posner describe the model that results from these assumptions as an "example," [FN30] its implications are employed extensively and structure their entire discussion.

In light of the importance of this model to Landes and Posner's analysis, the model's limitations warrant careful examination. The model rests on the structural assumption that the firm under study has a much larger share of the relevant market than does any other single seller. Therefore, the model cannot be used to analyze oligopolistic markets, which are characterized by several large firms. Because the Landes and Posner model assumes that no single entrant can noticeably affect market conditions, it has little to say about entry deterrence or predatory conduct. Moreover, the assumption of product homogeneity is clearly violated in many industries; this result rules out using the model to analyze advertising, product innovation, and all other forms of nonprice competition. In a particular case, if any of the assumptions of the Landes and Posner "example" are clearly inconsistent with the relevant facts, it makes little sense to use that model as an analytic tool or to take seriously the formulae it implies.

Furthermore, the Landes and Posner example is biased in the direction of understating a firm's market power. First, the assumption that all competing firms produce perfect substitutes will overstate the constraints that rival production imposes on *1798 the dominant firm if that firm in fact produces a differentiated product. [FN31] Because some differentiation exists in most markets, the Landes and Posner model generally understates market power (though if differentiation is slight, the understatement is trivial). Second, Landes and Posner's assumption that the dominant firm's rivals are perfectly competitive does not apply when those rivals have market power of their own. Exercise of such power will tend to raise prices and thus increase the Lerner index of the dominant firm.

Finally, the concept of elasticity of supply, which appears frequently in Landes and Posner's discussion, is strictly relevant only in a situation characterized by perfectly competitive behavior. Under any other assumption about rival behavior, one needs to know more than cost curves and entry conditions in order to predict responses by rivals to changes in the price or output of the firm being studied. [FN32]

II. MARKET SHARE AND MARKET POWER

As Landes and Posner state, "[t]he standard method of proving market power in antitrust cases involves first defining a relevant market in which to compute the defendant's market share, next computing that share, and then deciding whether it is large enough to support an inference of the required degree of market power." [FN33] This approach focuses attention on market definition, not on the fundamental question of market power. [FN34] It has a number of intrinsic weaknesses, some of *1799 which are noted by Landes and Posner, and thus is not always reliable or even usable.

This Part focuses on two sets of general problems with the market share approach. Section A discusses the problems that develop when no well-defined market exists or when products are highly differentiated, two situations that frustrate the market share approach at its initial step. Section B discusses the problems with interpreting market shares even of well-defined markets.

A. Product Differentiation and Ill-Defined Markets

The market share approach can yield useful results only when there exists a good approximation to a standard textbook market. Such a market is bounded by a "marked gap in the chain of substitutes" for a particular firm's output, [FN35] such that the supply of, and demand for, the products within the defined market are independent of the supply of, and demand for, products outside the market.

The market share approach depends on the implicit assumption that "marked gaps in the chain of substitutes" generally occur in convenient places. That is, the approach assumes not only that the gaps separating included from excluded products are sufficiently wide that all excluded products may be neglected in an analysis of market power, but also that all products within "the relevant market" defined by those gaps are very close substitutes. [FN36]

It is easy to think of examples in which "marked gaps in the chain of substitutes" do not occur in convenient locations. For instance, a Chevrolet and a Mercedes-Benz are not especially close substitutes in demand, though some substitutability undoubtedly exists. On the other hand, in the array of automobiles of intermediate price there are no obvious "marked gaps" across which little substitution takes place. Similar problems seem likely to exist in cameras (consider the spectrum of products between a Kodak Instamatic and a Hassleblad), in computers (in which the products range from a small Apple to a large IBM mainframe computer), and in other lines of business.

*1800 Exactly the same problem may be encountered in the context of geographic market definition. On Interstate 55 between Chicago and St. Louis there are (or at least there used to be) a large number of gasoline stations, distributed more or less evenly along the way. Should one attempt to measure the share of "the relevant market" accounted for by a hypothetical group of colluding stations near Springfield, one would not find a "marked gap in the chain of substitutes" by proceeding either north or south. But it would clearly make little sense to compute the ratio of the sales of the hypothetical colluding group to total gasoline sales between Chicago and St. Louis.

When a sizeable number of differentiated products are involved, "marked gaps in the chain of substitutes" will seldom occur in convenient places, and the market share measure of market power is not likely to be reliable. There is no general, universally applicable model of the competitive relationships among differentiated products. A low market share does not necessarily establish that market power is negligible, for competition may be "localized": [FN37] a particular firm or brand may have only a few effective rivals even though a large number of generally similar brands are marketed, or firms may have long- run market power by virtue of membership in "strategic groups" protected by "mobility barriers." [FN38] A large share of a market of differentiated products provides evidence of substantial market power only if the market definition is not excessively narrow.

Regardless of the number of brands considered, if all plausible definitions of "the relevant market" require grouping products that are significantly differentiated, one can say nothing about the relation between a firm's demand elasticity and that firm's share of the market. If substantial differentiation can be demonstrated, market

share computation is unlikely to yield reliable information, and other tests must be employed to diagnose the importance of market power.

B. Adjusting Shares to Reflect Elasticities

Even if a well-defined market can be identified, a firm's share of such a market may nevertheless give a seriously distorted ***1801** indication of the firm's market power. [FN39] First, there is no theoretical reason or factual basis for supposing that all markets thus defined have similar demand elasticities. Because the Lerner index for a monopoly is the reciprocal of the market demand elasticity, [FN40] even monopolists of such well-defined markets can exercise sharply differing amounts of market power. [FN41] Second, when the dominant firm/competitive fringe model defined by Landes and Posner applies, the Lerner indices of firms with the same market share can also differ substantially, because of variations in fringe-firm supply elasticities. [FN42]

To compensate for these shortcomings of the market share approach to measuring market power, Landes and Posner propose modifications in the computation of market shares. [FN43] When mechanically applied, however, share adjustment procedures tend to focus attention on peripheral issues, may not always operate in the right direction, and may not produce adjustments of the appropriate magnitude. These problems become apparent upon examination of two Landes and Posner scenarios -- excess capacity among competitive firms, and the presence of close product substitutes.

1. Excess Capacity. -- Landes and Posner propose, as a general rule, that "the sum of the capacity, or potential output, of competitors and the current output of the firm in question should be the denominator in computing the firm's market share." [FN44] I contend that this general rule should not be employed in antitrust cases, even when the dominant firm/competitive fringe model is valid and applicable.

First, it is very difficult to define "capacity" in a universally satisfactory way, and it is equally difficult to obtain good estimates under any definition. [FN45] In the dominant firm/competitive fringe model, one may generally assume that competitors' marginal cost schedules are rising over the range of ***1802** observed and plausible output levels. [FN46] But rising marginal cost makes "capacity" difficult to measure accurately -- the precise estimate of capacity is dependent on the exact definition of capacity and the reference market price selected. Estimates of "excess capacity" in individual industries will therefore be very hard to interpret. It is easy to imagine such definition and measurement issues consuming enormous amounts of time and money in antitrust cases [FN47] and thus diverting attention from the more fundamental (and comparably complex) question of competitive supply elasticity.

Second, it is not necessarily true that an accurate calculation of capacity will permit adjustments to observed market shares that are even qualitatively correct. Landes and Posner assume that in general "[t]he greater the difference between capacity and current output, the greater is the supply elasticity of competing firms, and therefore the greater is the constraint that these firms place on a firm that tries to raise price above marginal cost." [FN48] However, well-behaved nonpathological short-run supply curves exist for which increases in output raise the elasticity of supply. [FN49] The presence of excess capacity may therefore reduce the supply elasticity of competing firms, rather than increase it as Landes and Posner assume. In such a case, the dominant firm's market power can be greater than initially estimated. The firm's market share should be adjusted upward, not reduced as is required by Landes and Posner's rule.

Finally, even if the Landes and Posner adjustment is qualitatively correct, quantitative success will typically be impossible. The quantitative relation between supply elasticity and excess capacity depends on the details of the fringe-firm cost function. Thus, the extent of excess capacity (however measured) by itself can provide no quantitative information about fringe-firm elasticity of supply. [FN50]

***1803** In view of these difficulties, it is preferable to avoid mechanical adjustments based on excess capacity estimates (especially if the market involved is not well described by the competitive fringe model) and instead to

"interpret the market share statistics in each case by reference to qualitative indicia" [FN51] of the relevant elasticities. Conceptual simplicity is no justification for using a theoretically flawed procedure when there is no evidence of its general accuracy.

2. Market Definition. -- As equation (3) in Landes and Posner's article [FN52] makes clear for the dominant firm/competitive fringe model, the relationship between market share and market power depends on the market elasticity of demand, < <epsilon> > subm . Landes and Posner argue that < < epsilon> > subm is likely to be high for well-defined products with close substitutes. [FN53] By their treatment of an example, they suggest that, if a product has a high demand elasticity, the market should be more broadly defined: the resulting reduction in market share would then provide a truer indication of a firm's market power. [FN54] However, unless the products involved are very close substitutes, market redefinition will give unreliable indications of a firm's market power.

First, market redefinition and its consequent share adjustments focus attention on the wrong question. Arguments about market definition are usually couched in terms of substitutability among commodities or, more technically, in terms of cross-elasticities of demand. But the real issue is the demand elasticity that a firm faces -- the direct determinant of its market power. [FN55]

Second, the proposed redefinition does not lead to the correct direction of adjustment in all cases. The first "marked gap in the chain of substitutes" surrounding the outputs of a particular firm will usually imply a narrow market definition that includes only very close substitutes. If nonincluded products are then judged to be close substitutes for the products originally included in the market, the market definition will be expanded. However, even if there are good but imperfect substitutes for a narrowly defined product, that product's demand elasticity may be unusually low, rather than unusually *1804 high. [FN56] Expanding the market definition in such a case would further understate market power, rather than revise it upward as would be appropriate.

Finally, the proposed adjustment may produce very misleading quantitative results. Should one conclude that products x and y are close substitutes that belong in a single market, the reduction of the market share of product x depends only upon the relative sales volume of the two products. But relative sales may have no relation at all to the market demand elasticity of product x. If product y's revenue is small, aggregation may produce a share that is misleadingly large. On the other hand, if product y's revenues greatly exceed those of product x, aggregation may incorrectly suggest that even a monopoly over product x would confer negligible market power.

To avoid including products that are only imperfect substitutes, one should use "qualitative indicia of the market elasticity of demand" to interpret shares of narrowly defined markets. It is more natural and more reliable to interpret the shares of such markets than to haggle over the validity of alternative, broader market definitions and the labeling of particular products as "close substitutes." [FN57]

III. OTHER INDICATORS OF MARKET POWER

If their central argument -- that market share is of interest only to the extent that it provides accurate information about market power -- is widely understood and accepted, Landes and Posner will have performed a valuable service. An immediate corollary of their argument is that other evidence of market power deserves equal standing with market share data. [FN58] Two broad categories of such evidence deserve mention here: evidence of profitability and evidence derived from patterns of conduct.

*1805 A. Persistently High Profitability

Under the simple assumptions made in Part I above and by Landes and Posner in their formal analysis, the excess profit earned by a single-product firm exercising market power is directly proportional to the deadweight loss (DW) the firm imposes on society. [FN59] When demand is linear and marginal costs constant, DW is equal to exactly half of the firm's excess profits. [FN60] In simple models, therefore, profitability data are exactly as

informative about DW as is information about price-cost margins or firms' demand elasticities. Because elasticities of demand and marginal costs are generally difficult to establish, profitability is likely to be considerably easier to use in cases in which a firm sells a number of different products.

There are, however, three serious problems with using profitability to gauge market power. [FN61] First, it is very difficult in practice to measure actual profitability, and it may be even more difficult to measure excess profits. [FN62] There are no simple, generally valid techniques for obtaining accurate estimates of these quantities, though advances have been made in this area recently and continued progress is likely. [FN63] Second, the absence of significant excess profit does not establish the absence of significant market power. The costs of obtaining or keeping such power, [FN64] as well as waste caused by managers not subject to competitive pressures, reduce observed profits but represent real social costs of market power. Finally, substantial excess profits can arise in the short run even in perfectly competitive ***1806** markets. Such profits provide essential signals to guide the flow of investment funds in market economies.

Even if all measurement problems are solved, therefore, profitability is an unreliable measure of short-run market power. Nevertheless, persistent excess profits provide a good indication of long-run power; they show clearly that there is some impediment to effective imitation of the firm in question. [FN65] The deadweight loss caused by such a breakdown in competition, and the resulting market power available to individual firms, can be roughly estimated from the observed excess profits.

B. Patterns of Conduct

Evidence that competitors have conspired to fix prices or divide markets is treated as very good evidence that those competitors have market power. [FN66] Other kinds of evidence of a firm's conduct may also provide useful information about the firm's market power.

It is, for example, a standard textbook proposition that "[f]or a seller to practice price discrimination profitably," it "must have some control over price -- some monopoly power." [FN67] If the same product is sold to different customers at different prices and if it is reasonable to assume that no sales are made below cost, one can obtain a lower bound on the extent of market power by using the lowest price as an estimate of marginal cost. In general, however, it is difficult to proceed from the fact of price discrimination to estimates of the degree of market power. [FN68] Thus, evidence of price discrimination is probably most useful in cases in which only some minimum quantum of market power is required.

In a similar vein, one can argue that proof of predatory conduct should in principle suffice to establish market power. Predation has been defined as:

***1807** a firm's deliberate aggression against one or more rivals through the employment of business practices that would not be considered profit maximizing except for the expectation either that (1) rivals will be driven from the market or (2) rivals will be chastened sufficiently to abandon competitive behavior the predator finds inconvenient or threatening. [FN69]

Without a material effect from the exit or passivity of the prey, predation could not be profitable. [FN70] If one assumes that firms rarely engage in strategies that present negligible chances of success, one may conclude that a predatory firm has (or at least thinks it has) the ability to affect market conditions materially. Predatory behavior, therefore, implies some degree of market power, although evidence of such behavior cannot lead directly to any estimate of the extent of market power. [FN71]

Finally, a firm's price and output decisions may yield direct evidence of the presence of market power. Documentation of recognition of market power in a firm's price setting and other marketing decisions, coupled with the market's acceptance of those decisions, provides evidence of some market power. [FN72] Unless such evidence is unusually strong, it may be insufficient by itself in a monopolization case. But if comprehensive high-quality data are available, skillful econometric analysis may permit rigorous testing of hypotheses about market

power or collusive conduct. [FN73] This issue is a particularly interesting area of current research in industrial economics.

*1808 IV. CONCLUSION

Even though I have disagreed with a number of their specific assertions and proposals, [FN74] it should be clear that I endorse the basic approach of Landes and Posner to the analysis of market power. The deadweight loss (DW) associated with a firm's price and output decisions is in principle a good measure of the short-run significance of the firm's market power. Fundamentally, this measure depends on the net demand curve of the firm, not on its share of the relevant market or on any other aggregate. The particular market model used by Landes and Posner to relate firm and market demand curves is valid only under special structural conditions. The analysis of deadweight loss can be improved by explicitly recognizing that market power erodes over time; information on the likely speed and extent of that erosion can be used to assess the total deadweight loss (TDW) imposed by the exercise of market power.

Computation of market share can provide information about the importance of market power, but markets differ considerably and shares should be interpreted in light of evidence on market demand elasticities and other conditions. Mechanical adjustments to ordinary share computations can be misleading. In particular, I do not think that excess-capacity estimates should be used to adjust market shares. In situations in which "gaps in the chain of substitutes" do not occur in convenient places, whether because of product differentiation or other reasons, the absence of a "standard" market may cripple the reliability of the market share approach. Other approaches to proving the existence of substantial market power are no less valid than the market share approach. Depending on the facts of the case at hand, data on profitability or on patterns of conduct may be more informative than are market shares.

*1809 APPENDIX

A. Properties of the Deadweight-Loss Measure

1. Monopoly Firm. -- If demand and marginal cost are linear, as in Figure I, the formula for the area of a triangle yields

$$DW = (1/2)(P_m - MC_m)(Q_c - Q_m)$$
$$= (1/2)[(P_m - MC_m)/P_m][P_m Q_m][(Q_c - Q_m)/Q_m] \quad (4)$$
$$= L_m (P_m Q_m)K/2,$$

where $K = (Q_c - Q_m)Q_m$. This is equation (2). If MC is constant, $Q_c = 2Q_m$, and $K = 1$. If marginal cost is rising, Q_m exceeds $Q_c/2$, and K is less than one.

2. Dominant Firm/Competitive Fringe. -- Deadweight loss can be analyzed as the difference between net surplus at competitive output levels and net surplus at reduced output levels, where net surplus is defined as the sum of consumer surplus and monopoly profit. If Figure I depicts a textbook monopoly, the consumer surplus at monopoly production levels would be given by area A, and the consumer surplus at competitive production levels given by area [(A + B + C). The monopoly profit at monopoly production levels is (B +D + F); the profit at competitive levels is (D + E + F). The difference between net surplus at monopoly and competitive production levels is the shaded area in Figure I:

$$[(A + B + C) + (D + E + F)] - [(A) + (B + D + F)] = (C + E).$$

Now suppose that Figure I describes a "dominant" firm that has a substantial market share but faces competition from a set of price-taking firms producing the identical product. The demand curve in Figure I is then a net demand schedule, computed by subtracting competitive supply from market demand at each price level. Net surplus is now the sum of (1) dominant firm profits, (2) consumer surplus, and (3) competitive fringe profits. Nevertheless, deadweight loss for the entire market still equals area (C + E) and can therefore be calculated by

reference to only the dominant firm's Lerner index, price, and output.

Since the dominant firm's excess profits are the same no matter which market Figure 1 depicts, proving the assertion about market deadweight loss requires a showing that the net demand curve in Figure 1 provides sufficient information on total consumer surplus as well as competitive fringe excess profits. Consider Figure 2, which diagrams total demand (D subt) ***1810** as well as the relevant range of the competitive fringe supply (S subf). At any relevant price level, the consumer surplus is the shaded area above the price line; the shaded area below the line is the profit of the competitive fringe. For any decrease in price (< <triangle> >P) below any initial level (P subo), therefore, the total increase in net surplus for all consumers and for the competitive fringe would be given by the cross-hatched region in Figure 2. The area of this region is approximately < <triangle> >P x (Q subt - +- Q subf). Because total output minus fringe output is the output of the dominant firm, taking the limit as < <triangle> >P approaches zero produces

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

d(S subt + < <pi> > subf)/dP = -Q subd .

S subt is total consumer surplus, Pi subf is the profits of the fringe firms, and Q subd is the output of the dominant firm. Return to Figure 1, and observe that the net surplus for the dominant firm's customers (S subd) measured there, as represented by area A, is governed by the same equation:

dS subd /dP = -Q subd .

Thus, the change in consumer surplus (S subd) from Figure 1 equals the sum of (1) the change in total consumer surplus (S subt), plus (2) the change in fringe-firm excess profits (< <pi> > subf), as both were illustrated in Figure 2. The calculation of dominant-firm profits is unaffected by the presence of fringe-firm production and sales; as a result the total deadweight loss for a dominant firm/competitive fringe market is the same as the deadweight loss indicated by the dominant firm's output and price alone.

***1811** 3. Multiple Products.-- Assume that a monopoly sells two with unit sales Q sub1 and Q sub2 and respective constant marginal costs v sub1 and v sub2 . If market demands for these products are linear and there are no income effects, sales at prices P sub1 and P sub2 are given by

Q sub1 = b sub1 - c sub1 P sub1 - dP sub2 , and Q sub2 = b sub2 - c sub2 P sub2 - dP sub1 ,

where b sub1 , b sub2 , c sub1 , and c sub2 are positive constants and d is a constant that is positive if the goods are complements and negative if they are substitutes. [FN75] Under these assumptions, one can derive consumers' surplus in both markets as

V(P sub1 ,P sub2) = a - b sub1 P sub1 - b sub2 P sub2 + (c sub1 %/2)(P sub1)2 + (c sub2 %/2)(P sub2)2 + dP sub1 P sub2 ,

where a is a constant of integration. [FN76] The monopoly's profits are given by

< <pi> >(P sub1 ,P sub2) = (P sub1 - v sub1)Q sub1 + (P sub2 - v sub2)Q sub2 .

As above, the deadweight loss associated with charging prices P subm1 , and P subm2 , instead of the competitive prices v sub1 and v sub2 is the difference between net surplus under competition and that under monopoly:

DW = [V(v sub1 ,v sub2) + < <pi> >(v sub1 ,v sub2)] - [V(P subm1 ,P subm2) + < <pi> >(P subm1 ,P subm2)].

Substituting the demand function in the profit function, one can write this quantity as a function of price/cost differences and demand function parameters only. Solving the demand functions for the price/cost differences in terms of differences between competitive and monopoly quantities, one obtains, after considerable algebraic manipulation,

DW = (1/2)[(P subm1 - v sub1)(Q subc1 - Q subm1) + (P subm2 - v sub2)(Q subc2 - Q subm2)]. (5)

This equation is in the form of equation (4) above. The monopolist's maximum profits occur when Q subm1 = Q subc1 /2 and Q subm2 = Q subc2 /2. Substituting for the Q subc 's into equation (5), one obtains

DW = (1/2)[L sub1 (P subm1 ,Q subm1) + L sub2 (P subm2 Q subm2)], (6)

where the L's are the Lerner indices for the two products, as defined by equation (I). As in the single product case, DW is ***1812** equal to one-half of the monopoly's excess profit. The total deadweight loss caused by the firm's market power is determined by applying equation (2) to each market separately and adding the results. [FN77]

To relate this discussion to profitability data that may be available, consider a firm that employs capital (K), earns a rate of return (r) on that capital, and would earn a rate of return of r* on investments of comparable risk elsewhere in the economy. [FN78] The firm's excess profits are equal to (r -r*) K; if the deadweight loss is equal to one-half of those profits, then

DW = [(r - r*)/r][rK]/2. (7)

The first term on the right of equation (7) corresponds to L in equation (2) -- it measures the percentage deviation from the competitive norm. The second term is total observed profit; it factors in a measure of dollar volume, just as total revenue does in equation (2).

B. Share Adjustment -- The Excess Capacity Example

I. Qualitative Difficulties. -- Let the supply function of the competitive fringe be Q subs (P), where P is the market price, and let, < <mu> > subs (P) be the corresponding supply elasticity. For Landes and Posner to be correct in asserting that elasticity of supply increases with excess capacity, [FN79] it must be the case that < <mu> > subs , increases when P decreases, because lower values of P correspond to lower values of Q subs and thus to greater excess capacity. Differentiating elasticity of supply, one finds that Landes and Posner's assertion is true when the following expression is negative, but is false when it is positive:

d< <mu> > subs dP = (d2Q subs %/dP2)(P/Q) + (< <mu> > subs /P)(1 -- < <mu> > subs). (8)

Since Landes and Posner assume < <mu> > subs <I in some of their examples, [FN80] they apparently agree that there is nothing pathological about inelastic supply. But if the supply curve is linear at any point, equation (8) shows that decreases in P reduce < <mu> > subs if < <mu> > subs is less than one; Landes and Posner's assertion is false in ***1813** the linear case in which supply is inelastic. In general, if supply is inelastic, d< <mu> > subs /dP is positive rather than negative unless d2Q subs /dP2 is negative and sufficiently large to outweigh the other term on the equation's right-hand side. A priori, this second derivative is as likely to be positive as it is to be negative. In general, therefore, increases in excess capacity may either increase or decrease the elasticity of supply of a group of price-taking firms with inelastic supply.

2. Quantitative Difficulties. -- To examine the quantitative properties of Landes and Posner's proposal to add competitors' excess capacities to market sales for the purpose of defining "adjusted" market shares, consider a special case in which increases in excess capacity do increase the elasticity of supply. Suppose that a perfectly competitive firm's total cost is given by

TC = F + AQ + BQ2, (9)

where F, A, and B are positive constants and Q is the firm's output. If we define capacity (Q*) as the output level at which average cost (TC/Q) is minimized, [FN81] then Q* = < <square root> > F/B. As long as market price exceeds A, the firm's supply curve is equal to its marginal cost curve, and the firm's elasticity of supply is

< <mu> > subs = 1 + (Z + 1)(A/2 < <square root> > FB), (10)

where Z = (Q* - Q)/Q, a measure of the extent of excess capacity. If all of a dominant firm's rivals are identical to the competitive firm considered here, equation (10) holds for the elasticity of competitive fringe supply. Note that increases in Z increase < <mu> > subs . But note also that knowing the value of Z tells one essentially

nothing about the value of << mu >> subs . Even in this special case, one would have to know the values of all three parameters of the cost function (F, A, and B) to know whether << mu >> subs is particularly large or small.

A second quantitative hurdle that the share adjustment approach must overcome arises from the treatment of deviations of individual markets from typical or "standard" conditions. Landes and Posner propose modifying the market definition approach to provide the courts with an accurate assessment of a firm's true market power. That is, they attempt to substitute for a firm's actual market share (S) an adjusted market share (S*) that indicates the market power the firm would wield if market demand elasticity and fringe ***1814** supply elasticity were at their "typical" values. To indicate a firm's market power if the dominant firm/competitive fringe model holds, S* would have to satisfy Landes and Posner's own equation:

L = S*/[<< epsilon >> subm + (1 - S*)<< mu >> subs]. (11)

Here L is the dominant firm's true Lerner index, [FN82] and << epsilon >> subm and << mu >> subs are the "typical" values for the elasticities of market demand and fringe supply, respectively.

The quantitative pitfalls in Landes and Posner's mechanical approach to market redefinition can be understood by applying equation (11) to the scenario of excess fringe capacity. Landes and Posner argue that the presence of excess capacity undercuts the dominant firm's market power, and recommend assessing true market power by computing an adjusted share as follows:

S* = S/[S + (1 - S)(1 + Z)],

where Z is defined, as above, as the ratio of excess capacity to current output for the competitive fringe. This adjustment is correct if and only if substitution of this S* into equation (11) yields the firm's actual L. Using the formula for L in this model, [FN83] one can reach this result if and only if the following relation holds:

<< mu >> subs = << mu >> subs + Z(subs s<< mu >> + << epsilon >> subm). (12)

There are two reasons that equation (12) is unlikely to be true for any particular industry. First, supply elasticities vary across industries for reasons other than excess capacity, but equation (12) allows for no such variation. Second, even if << mu >> subs is defined to be the elasticity of supply for the industry when Z equals zero, the equation is unlikely to be valid. Indeed, for the quadratic example studied above, equation (10) establishes that equation (12) is always invalid even if << epsilon >> subm is equal to one.

Since equation (12) will seldom be satisfied, the proposed share adjustment will rarely yield quantitatively correct results. Similar problems afflict other mechanical rules for adjusting market shares: no simple rules can take into account the complex differences among real markets.

***1815** C. Own-Price and Cross-Price Elasticities

Consider two products, which will be identified by subscripts 1 and 2, that are related in demand. Let Q sub1 and Q sub2 be the corresponding unit sales, P sub1 and P sub2 be price, << epsilon >> sub1 and << epsilon >> sub2 be the absolute values of the own-price elasticities, << epsilon >> sub1 be the elasticity of Q sub1 with respect to P sub2 (P sub1 held constant), and << sigma >> sub2 be the elasticity of Q sub2 with respect to P sub1 (P sub2 held constant).

There is no reason ever to expect the two cross-price elasticities, << sigma >> sub1 and << sigma >> sub2 , to be equal; there is in general no such thing as the cross-price elasticity. If it is necessary to summarize the degree of substitutability between two products by a single number, a sensible quantity to employ is

<< sigma >> = w sub1 << sigma >> sub1 + w sub2 << sigma >> sub2 ,

where w sub1 is product 1's share of the total revenue of the two products and w sub2 is product 2's share. The quantity << sigma >> is generally positive when the two products are substitutes, and is larger the more readily

substitutable they are. [FN84]

When a set of products are imperfect substitutes (or imperfect complements), there is no unambiguously correct method for defining the set's aggregate demand elasticity. The procedure adopted here focuses on the response of total revenue to proportional price changes. Consider a single product with market demand function Q(P), and define the revenue function as

R(<<lambda>>;P) = (<<lambda>>P)Q(<<lambda>>P).

The following equation can be verified:

1 - [(dR(1;P)/d<<lambda>>)/R(1;P)] = - (dQ/dP)(P/Q) = <<epsilon>> subm ,

where (dR(1;P)/d<<lambda>>) is the derivative of R with respect to <<lambda>> evaluated at <<lambda>> = 1. Similarly, in the case of two products we can define the revenue function as

R(<<lambda>>;P sub1 ,P sub2) = (<<lambda>>P sub1)Q sub1 (<<lambda>>P sub1 ,<<lambda>>P sub2) + (<<lambda>>P sub2)Q sub2 (<<lambda>>P sub1 ,<< lambda>> sub2).

By analogy with the single-product case, the demand elasticity for the pair of products (<<epsilon>>) is

<<epsilon>> = 1 - [(dR(1;P sub1 ,P sub2)/d<<lambda>>)/R(1;P sub1 ,P sub2)],

*1816 where again the derivative is evaluated at <<epsilon>> = 1. Carrying out the differentiation and employing the definitions above, one obtains

<<epsilon>> = w sub1 <<epsilon>> sub1 + w sub2 <<epsilon>> sub2 - << sigma>>.

If the two goods taken together have no perfect substitutes, <<epsilon>> will be a finite number. If <<sigma>> is very large, indicating that the two goods are very close substitutes, both <<epsilon>> sub1 and <<epsilon>> sub2 are probably very large, and at least one must be. But in general, one cannot be sure that either <<epsilon>> sub1 or <<epsilon>> sub2 is unusually large simply because <<sigma>> is sizeable. Even if one knows, for example, that <<epsilon>> sub1 = <<epsilon>> sub2 , a finding that <<sigma>> = 2 is compatible with << epsilon>> sub1 = 2.5 (<<epsilon>> = 0.5) or <<epsilon>> sub1 = 5.0 (<<epsilon>> = 3.0). One simply cannot infer much about a product's own-price elasticity of demand, the quantity that is basic to assessment of the importance of market power, from information about the product's cross-price elasticities with respect to other products.

FNa1. Professor of Applied Economics at the Sloan School of Management, Massachusetts Institute of Technology. MIT, S.B., 1965; Ph.D. 1970. The author is grateful to the Ford Motor Company for research support through a grant to MIT, to Severin Borenstein for excellent research assistance, and to Joseph Brodley, William Comanor, Paul Joskow, and Richard Posner for valuable comments.

FN1. Landes & Posner, Market Power in Antitrust Cases, 94 HARV. L. REV. 937 (1981). Though the discussions in the Landes and Posner article and in this Comment speak almost exclusively of "market power," economists generally consider that term to be synonomous with "monopoly power" and "economic power."

FN2. Landes and Posner do not explicitly state that their analysis is concerned with the short run, but their reference to fixed costs, id. at 939, so indicates: no costs are fixed in the long run. Further discussion of the relation between short-run and long-run analysis is presented in Section B of Part I.

FN3. Landes & Posner, supra note 1, at 937. To simplify the discussion, I deal explicitly with only the problem of measuring a single firm's market power. The same concepts and techniques may be applied to firms proposing a merger or alleged to be acting jointly. See id. at 972-74.

FN4. See id. at 939-40, 983-85. I have changed the notation somewhat.

FN5. Id. at 938.

FN6. Figure 1 is essentially identical to Landes and Posner's Figure 2. See id. at 991.

FN7. Actually, this measure is exact only if the commodity involved is sufficiently unimportant that changes in its price do not cause noticeable changes in consumers' real incomes and if it is considered appropriate to work with unweighted sums of losses incurred by affected firms and households. Nevertheless, the deadweight loss measure is widely employed in applied work as a useful approximation of social cost. For discussions of the issues involved in the use of this measure, see Harberger, Three Basic Postulates for Applied Welfare Economics: An Interpretive Essay, 9 J. ECON. LITERATURE 785 (1971); Hausman, Exact Consumer's Surplus and Deadweight Loss, 71 AM. ECON. REV. 662 (1981); Willig, Consumer's Surplus Without Apology, 66 AM. ECON. REV. 589 (1976).

FN8. This equation can be shown to be a generalization of the formula presented by Landes and Posner for linear demand and constant marginal cost, see Landes & Posner, supra note 1, at 954 n.32, 993.

FN9. See id. at 952-55.

FN10. See id. at 953. Section A of the Appendix shows that equation (2) is valid for the dominant firm/competitive fringe model that Landes and Posner develop and employ. See infra pp. 1809-12.

FN11. See infra Section A of Part II.

FN12. See Posner, The Social Costs of Monopoly and Regulation, 83 J. POL. ECON. 807, 807-08, 821 (1975).

FN13. Landes and Posner do not address the case of a single firm selling multiple products. They do discuss a single product sold at multiple prices: "The Lerner index for the price-discriminating firm will be a range of numbers rather than a single number." Landes & Posner, supra note 1, at 943. They do not indicate how such a range should be interpreted.

FN14. A complication is introduced if the firm's products are either substitutes or complements. The second equality in equation (I), which relates the Lerner index to the elasticity of the firm's demand curve, would then no longer hold, because the firm's optimal markups over marginal cost would also depend on the cross-elasticities of demand among its products. See, e.g., E. SINGER, ANTITRUST ECONOMICS 177-82 (1968); Schmalensee, Monopolistic two-part pricing arrangements, 12 BELL J. ECON. 445 (1981). Nevertheless, total deadweight loss is equal to one-half of the firm's excess profits for the hypothetical two-product case examined in Section A of the Appendix. If the social costs from lost or wasted resources are small, total excess profits provide an automatic aggregation of deadweight losses, at least to a first approximation. However, generally available profit data may not be accurate enough to support such calculations. See infra p. 1805.

FN15. For discussion of the computation of present values, see, for example, R. BREALEY & S. MYERS, PRINCIPLES OF CORPORATE FINANCE 10-38 (1981).

FN16. Another factor contributing to higher long-run elasticity is change in purchasing patterns over time as buyers adapt to the price increases.

FN17. See also Landes & Posner, supra note 1, at 991-96 (showing that "an increase in the demand elasticity reduces both the Lerner index and deadweight loss" (emphasis in original)). For the case of a demand curve of constant elasticity, Landes and Posner limit their proof to simulation, id. at 992-93, but the relationship of elasticity and deadweight loss in this case can also be demonstrated analytically, see Letter from Professor Joel Yellin to Richard Schmalensee (Aug. 25, 1981).

FN18. Thus, if the calculated DW falls from $100 million to $70 million over a three year period (a total reduction of .3), < <gamma> > would be approximately equal to .1.

FN19. The assumptions in text describe a first order exponential decay of market power:

DW(t) = DW(subl) + (DW subs - DW subs) sube < <gamma> >t
Equation (3) is derived by integrating this market power curve.

FN20. Landes and Posner, of course, are aware of the dynamic phenomena discussed here. They suggest adjusting the period over which elasticity is determined according to the time period with which the relevant antitrust statute is concerned. Landes & Posner, supra note 1, at 959. Although Landes and Posner's observations in this regard seem generally sensible, they combine two issues that are conceptually distinct. I think it is preferable to consider separately the net loss involved, TDW, and the costs and delays likely to be involved in attempting to mitigate it.

FN21. Id. at 977.

FN22. 351 U.S. 377, 391 (1956).

FN23. See Schmalensee, On the Use of Economic Models in Antitrust: The ReaLemon Case, 127 U. PA. L. REV. 994, 1005-1009 (1979).

FN24. Landes & Posner, supra note 1, at 945 n. 19.

FN25. See id. at 956-57. This sort of situation is also discussed in Fisher, Diagnosing Monopoly, Q. REV. ECON. & BUS., Summer 1979, at 7, 10-12. Fisher's prescriptions are essentially identical to those of Landes and Posner.

FN26. Cf., e.g., Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917) (patent privilege does not extend to sanctioning an illegal tying arrangement).

FN27. Of course, any attempt to reduce aggregate deadweight loss by restricting a firm's ability to exercise such short-run power (such as a restriction on the use of tying arrangements or price discrimination) will reduce the rewards to innovators and thus tend to retard innovation. But just as it is not obvious that in general the optimal patent lifetime is infinity or that patent holders should generally be immune to antitrust prosecution, so it is not obvious that reducing the incentive to innovate is always undesirable. There is a tradeoff in such cases between static efficiency losses (as measured by DW and TDW) and long-run gains from innovation.

FN28. Indeed, in a situation in which oligopolistic interdependence is recognized, the firm's demand curve is not even well defined. See, e.g., J. HENDERSON & R. QUANDT, MICROECONOMIC THEORY 199 (3d ed. 1980). Even in such cases, however, it is often useful to think of firms to be behaving as if they faced well-defined demand curves and then to inquire into the properties (such as elasticities) of those curves. The discussion here and in Landes and Posner's article is consistent with this approach. See Landes & Posner, supra note 1, at 951.

FN29. See Landes & Posner, supra note 1, at 945.

FN30. Id. at 944.

FN31. See J. BAIN, INDUSTRIAL ORGANIZATION 223-35 (2d ed. 1968).

FN32. For example, in Landes and Posner's equation (4), see Landes & Posner, supra note 1, at 972, an assumption of perfectly competitive rival behavior underlies the prediction of market power enhancement brought about by a merger of two firms. When the assumption does not apply, the prediction overstates the true increase in market power. Equation (4) assumes that the larger firm (which, in Landes and Posner's illustrative example, enjoys a 20% premerger market share) behaves as a dominant firm, whereas the smaller merger partner (occupying, in the example, a 10% premerger share) behaves perfectly competitively. But if shares are of the same order of magnitude, there is no obvious reason to expect such sharp qualitative differences in premerger behavior. If the smaller firm exercises some market power before the merger, the difference between the premerger and postmerger prices will generally be less than equation (4) indicates. The equation makes most sense when the smaller merger partner has a negligible premerger share, in which case almost any formal or informal model would predict a negligible impact of the merger on market power.
Landes and Posner acknowledge other difficulties with predicting the enhancement of market power that would result from

a merger. See id. at 973-74.

FN33. Id. at 938.

FN34. See Fisher, supra note 25, at 16 ("The fundamental question is that of the constraints on power. Focusing on the question of relevant market can often lead to losing sight of that fact.").

FN35. For the source of the quoted language and a clear description of the market share approach, see J. ROBINSON, THE ECONOMICS OF IMPERFECT COMPETITION 5-6 (1933).

FN36. Thus, Fisher notes that in antitrust "the temptation is to regard products which are in [the relevant market] as all counting equally and products which are out [of the relevant market] as not counting at all." Fisher, supra note 25, at 16.

FN37. For discussion of localization, see Schmalensee, Entry deterrence in the ready-to-eat breakfast cereal industry, 9 BELL J. ECON. 305 (1978); Schmalensee, The New Industrial Organization and the Economic Analysis of Modern Markets, in ADVANCES IN ECONOMIC THEORY (W. Hildenbrand ed.) (forthcoming).

FN38. For a discussion of strategic groups and mobility barriers, see Caves & Porter, From Entry Barriers to Mobility Barriers, 91 Q.J. ECON. 241 (1977).

FN39. See Landes & Posner, supra note 1, at 947-51.

FN40. If the dominant firm in Landes and Posner's equation (3), see id. at 945, is a monopoly, then S subi = 1 and the Lerner index equals the reciprocal of market demand elasticity.

FN41. And since "markets" thus defined will differ dramatically in size, monopolies can produce dramatically different values of DW.

FN42. See Landes & Posner, supra note 1, at 948-50.

FN43. Id. at 947-51.

FN44. Id. at 949; see id. at 966.

FN45. Four different definitions of "capacity" are discussed in G. STIGLER, THE THEORY OF PRICE 156-58 (3d ed. 1966). For a discussion of some of the empirical problems involved in measuring "capacity," see Phillips, Industrial Capacity -- An Appraisal of Measures of Capacity, AM. ECON. REV., May 1963, at 275.

FN46. Landes and Posner apparently disagree with this proposition. They assume constant marginal costs over some range when they prescribe that "only so much of the excess capacity as can be converted to output without increasing marginal cost should be included in computing market share." Landes & Posner, supra note 1, at 950. If marginal cost is constant over some range, supply elasticity is infinite over that range; in such a situation, the dominant firm can have no market power, regardless of its market share. Moreover, an assumption of constant marginal costs is generally incompatible with the assumption that the fringe firms are price takers.

FN47. Data on competitors' costs and capacities may be difficult to obtain in litigation, particularly if the competitors are not parties or if they are foreign.

FN48. Landes & Posner, supra note 1, at 949.

FN49. See infra Section B of the Appendix.

FN50. These quantitative problems are explored further in Section B of the Appendix.

FN51. Landes & Posner, supra note 1, at 958.

FN52. See id. at 945.

FN53. See id. at 947, 961 n.43.

FN54. See id. at 947-48.

FN55. Landes and Posner make the same point, arguing correctly that ambiguity "could be avoided by using elasticity of demand instead of cross-elasticity of demand as the ruling concept in antitrust cases." Id. at 961 n.43.

FN56. See infra Section C of the Appendix.

FN57. Landes and Posner recognize the dangers of preoccupation with market definition. Landes & Posner, supra note 1, at 958-59, 978-79; accord Fisher, supra note 25, at 16. My aim here is to clarify and support what I think is our common position on this issue.

FN58. Of course, the courts have generally been willing to consider other evidence. See, e.g., United States Steel Corp. v. Fortner Enters., 429 U.S. 610, 617, 619-21 (1977) (discussing price discrimination and product uniqueness).

FN59. This discussion is motivated in part by the considerable weight apparently given to information about profitability by Landes and Posner, see Landes & Posner, supra note 1, at 957; supra pp. 1795-96.

FN60. Cf. supra pp. 1790-91. (calculation of DW).

FN61. See Fisher, supra note 25, at 18-23.

FN62. In addition to the measurement problems discussed by Fisher, id., inflation can also render conventional accounting statements almost meaningless. See generally Shoven & Bulow, Inflation Accounting and Nonfinancial Corporate Profits (pts. 1 & 2), 1975 BROOKINGS PAPERS ON ECON. ACTIVITY 557, 1976 BROOKINGS PAPERS ON ECON. ACTIVITY 15 (discussing the accounting changes necessary to measure the real income of nonfinancial corporations). For discussion of some of the difficulties involved in estimating a firm's cost of capital or normal rate of return, see R. BREALEY & S. MYERS, supra note 15, ch. 9; Schmalensee, Risk and Return on Long-Lived Tangible Assets, 9 J. FIN. ECON. 185 (1981). See generally 2 P. AREEDA & D. TURNER, ANTITRUST LAW ¶ 512 (1978) (discussing difficulties in proving excess returns).

FN63. For some interesting recent work in this general area, see Lindenberg & Ross, Tobin's q Ratio and Industrial Organization, 59 J. BUS. 1 (1981).

FN64. See generally Posner, supra note 12 (competition to obtain a monopoly can transform expected monopoly profits into social costs).

FN65. 2 P. AREEDA & D. TURNER, supra note 62, ¶¶ 509-510. To prove market power, one must also show that excess returns are not entirely attributable to ownership of a unique and long-lived asset (for example, a small but unusually rich deposit of some mineral) that provides lower cost but does not confer market power. As Professor Areeda speculates, such competitive explanations for high profits as "superior production resources or managerial skill . . . . [p]erhaps become less likely as the period of high profits is more prolonged." P. AREEDA, ANTITRUST ANALYSIS ¶ 133, at 41 (3d ed. 1981).

FN66. See, e.g., A. NEALE, THE ANTITRUST LAWS OF THE U.S.A. 37 (2d ed. 1970).

FN67. F. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 315 (2d ed. 1980).

FN68. See 2 P. AREEDA & D. TURNER, supra note 62, ¶ 514b.

FN69. R. BORK, THE ANTITRUST PARADOX 144 (1978). For a rigorous development of the implications of this definition, see Ordover & Willig, An Economic Definition of Predation: Pricing and Product Innovation, 91 YALE L.J. 8 (1981).

FN70. See, e.g., Schmalensee, supra note 23, at 1016, 1029-31. In the dominant firm/ competitive fringe model used by Landes and Posner, all rivals are assumed to be too small to affect market conditions; thus, this model cannot sensibly be used when the entry or exit of any single rival noticeably affects a firm's profits.

FN71. A more serious problem is the difficulty of directly establishing the motives and expectations that underlie firm conduct, especially conduct alleged to be predatory in intent and expected effect. For an analysis of such conduct, see Joskow & Klevorick, A Framework for Analyzing Predatory Pricing Policy, 89 YALE L.J. 213 (1979).

FN72. Conversely, if a firm raises prices under the assumption that it has market power and is then forced to lower prices because of inadequate sales, the market's rejection of the firm's decision attests to a lack of market power.

FN73. Examples of such analyses include P. MACAVOY, PRICE FORMATION IN NATURAL GAS FIELDS (1962); Applebaum, Testing Price Taking Behavior, 9 J. ECONOMETRICS 283 (1979); Carlton, Landes & Posner, Benefits and costs of airline mergers: a case study, 11 BELL J. ECON. 65 (1980); Gollop & Roberts, Firm Interdependence in Oligopolistic Markets, 10 J. ECONOMETRICS 313 (1979); Iwata, Measurement of Conjectural Variation in Oligopoly, 42 ECONOMETRICA 947 (1974); T. Bresnahan, Competition and Collusion in the American Automobile Industry: The 1955 Price War (Nov. 1980) (unpublished manuscript in possession of author).

FN74. I must disagree with one more dictum. Landes and Posner assert that "[i]t should always be open to a defendant in an antitrust case to rebut an inference of market power based on market share by showing that its market share is the result of low prices." Landes & Posner, supra note 1, at 976. Except for cases in which mergers, regulatory limits on entry, or blatantly exclusionary practices are important, firms generally acquire large market shares because cost advantages or product superiority permit them to sell at a quality- adjusted price that is lower than that of their closest rivals. If one followed Landes and Posner's recommendation, most "clean-handed" monopolists could thus rebut the inference that they had any market power. Evidence of the sources of market power is much more appropriately used to judge the legality of the acquisition and exercise of that power. It would cause considerable confusion if "market power" were to be redefined (as Landes and Posner implicitly suggest) so that "clean-handed" firms could never possess it.

FN75. Equality of the cross-price coefficients is a consequence of the assumption of no income effects. See, e.g., H. VARIAN, MICROECONOMIC ANALYSIS 84-99 (1978). Landes and Posner make this same assumption when they hold real income constant. See Landes & Posner, supra note 1, at 961 n.43.

FN76. This equation is the indirect utility funtion corresponding to the demand functions given above. See H. VARIAN, supra note 75, at 89-90. In order for this function to be well-behaved, it must be true that c subl c sub2 d2. This condition suffices to show that DW is always nonnegative and is zero only when P subl = v subl and P sub2 = v sub2 .

FN77. It is important to note that the second equality in equation (1) does not hold in the multiple-product case. The optimal markup over marginal cost in each market is determined by both own-price responsiveness of demand (measured here by c subl and c sub2) and cross-price responsiveness (measured here by d).

FN78. In the absence of the measurement problems discussed in Section A of Part III, r would be the firm's accounting rate of return and r* the firm's cost of capital. For a discussion of this concept, see R. BREALEY & S. MYERS, supra note 15, ch. 9.

FN79. See Landes & Posner, supra note 1, at 949.

FN80. See, e.g., id. at 951.

FN81. This definition is the easiest of the four notions of "capacity" discussed in G. STIGLER, supra note 45, to employ here.

FN82. This equation is a modified version of Landes and Posner's equation (3), see Landes & Posner, supra note 1, at 945.

FN83. The relevant formula is Landes and Posner's equation (3), see id., with obvious changes in notation and < <epsilon> > subm = < <epsilon> > subm .

FN84. If there are no income effects, see supra note 75, one can show that
< <sigma> > = 2w subl < <sigma> > subl = 2w sub2 < <sigma> > sub2 .
With income effects, it is theoretically possible for the two cross-price elasticities to have opposite signs, although this occurrence is unlikely ever to be encountered in an antitrust context. For a discussion of some of the technical issues that arise in this context, see Samuelson, Complementarity, 12 J. ECON. LITERATURE 1255 (1974).

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