

# **The Lerner Index of Monopoly Power: Origins and Uses\***

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## **ABSTRACT**

Abba Lerner's paper in the *Review of Economic Studies* (1934) is the source of what is now referred to as the Lerner Index of monopoly power. The Lerner Index has become the standard measure of monopoly power and one of the most widely cited indexes in the discipline of economics. This paper traces the origins of the index, sets out its strengths and weaknesses, and examines its role in antitrust enforcement. The Index is a better indicator of a firm's price-setting discretion than its ability to sustain monopoly prices.

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Abba Lerner's 1934 paper in *The Review of Economic Studies* is known today as the source of the Lerner Index of monopoly power. By identifying the social loss from monopoly as the divergence between price and marginal cost, rather than the "usually accepted" (p. 161) relationship between price and average cost, Lerner redirected attention from the monopolist's profits to the allocative inefficiency created by the pursuit of those profits. This insight is so ingrained in the mind of economists today that it is easy to overlook what a significant advance it represented.

In a paper commemorating Lerner's sixtieth birthday, Paul Samuelson (1964) observed that while Lerner's insight "may seem simple, . . . I can testify that no one at Chicago or Harvard could tell me in 1935 exactly why  $P = MC$  was a good thing" (p. 173). Lerner's reasoning about the social loss from monopoly identified the "social optimum" with a Pareto optimal state of affairs and in the process offered what Tibor Scitovsky (1984) called the "first clear, rigorous and definitive statement of Pareto optimality" (p. 1551). These encomia from titans of the discipline refer to a paper written when Lerner was a graduate student.<sup>1</sup>

The Lerner Index  $(P - MC) / P$  identified the "degree of monopoly" with the difference between the firm's price and its marginal cost at the profit-maximizing rate of output. For Lerner, a bigger wedge between  $P$  and  $MC$  meant greater monopoly power. A profit-maximizing firm's monopoly power varied directly and only with the firm's own-price elasticity of demand. Lerner's benchmark for measuring monopoly power and discussing the welfare economics of monopoly is "the social optimum that is reached in perfect competition" (1934, p. 168). He clarifies this benchmark to mean a hypothetical competitive equilibrium in which many firms produce with constant returns to scale and with marginal costs equal to those of the firm whose

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<sup>1</sup> In their book on famous diagrams in economics, Mark Blaug and Peter Lloyd credit Lerner as the discipline's "star performer" in part because he "was the originator of the Lerner degree of monopoly . . . and its diagram" (2010, p. 16).

monopoly power he seeks to measure. Whether technological conditions are such that this equilibrium would be feasible is irrelevant to the Lerner Index because the Index is primarily a measure of the firm's departure from the social optimum. For this reason, Scitovsky (1955) observed, "Lerner's index . . . measures market imperfection rather than monopoly or oligopoly power" (p. 105).

Appearing in the same time frame as Edward Chamberlin's (1933) and Joan Robinson's (1933) books on monopolistic and imperfect competition, and thus before their ideas were completely absorbed, it is natural that Lerner's reference point for assessing departures from the social optimum was a state of affairs where many sellers produce a homogeneous product with constant returns to scale and full information, and where  $P = MC$  in equilibrium. Chamberlin's and Robinson's contributions were to explain what went on inside the continuum Lerner envisioned.

Lerner believed that his Index was appropriate for assessing the monopoly power of a firm in a monopolistically competitive equilibrium (although he did not identify it as such). He recognized that zero profits, or  $P = AC$ , did not absolve such a firm from the monopoly power that sustains a "divergence . . . from the social optimum" (1934, p. 173) because  $P > MC$ . Lerner attributed this divergence to the less-than-infinitely elastic demands that accompany differentiated products. The Lerner Index serves the same purpose in homogeneous- or differentiated-product oligopolies, with or without free entry, and in homogeneous-product markets with a dominant firm.<sup>2</sup> In each instance the Lerner Index signals the extent to which the firm's price-setting discretion (in the case of differentiated products) or influence over price (in

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<sup>2</sup> See generally Louis Kaplow & Carl Shapiro (2007). Early derivations of the Cournot oligopoly and the dominant firm versions of the Lerner Index were given, respectively, by Keith Cowling and Michael Waterson (1976), and Thomas R. Saving (1970). Charles A. Holt, Jr. (1982) explores the implications of the oligopoly version for calculating welfare loss.

the case of homogeneous products) steers outcomes away from the social optimum defined by marginal-cost pricing.

In advancing the Lerner Index as a measure of monopoly power, Lerner described the shortcomings of alternative measures. He noted that measures based on the number of firms or the size-distribution of firms (e.g., concentration) are problematic because they must surmount difficult market-definition problems. Also, these measures do not reflect the firm-specific demand elasticities that determine the firm's ability to raise price by reducing output.

Several other measures of monopoly power were proposed on the heels of Lerner's *RES* paper, but none gained the traction of the Lerner Index.<sup>3</sup> Fritz Machlup (1952) characterized alternative measures as "at best 'circumstantial evidence' of the presence and exercise of monopoly power" (p. 508). Joe S. Bain (1941) proposed an index of profit rates to measure the degree of monopoly, but using accounting data to measure a firm's profit raises other formidable problems, better understood today than when Bain advanced his index.<sup>4</sup>

Economists' acceptance of the Lerner Index has been qualified. In a cluster of papers published in a 1955 NBER conference volume on the subject of measuring monopoly power and industrial concentration, Scitovsky, William Fellner, Carl Kaysen, and John P. Miller agreed with Bain's assessment that "no single simple measure . . . [of monopoly] will serve adequately to distinguish situations that may differ in many ways" (p. 139). Several limitations and qualifications of the Lerner Index were cited in this volume and elsewhere. As a measure of departure from the social optimum, the Index ignores (as Lerner himself acknowledged) firms' exercise of monopsony power in factor markets and the effect of upstream market imperfections.

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<sup>3</sup> Among these were Robert Triffin (1940), Kurt W. Rothschild (1942), Joe S. Bain (1941), Theodore Morgan (1946) and A. G. Papandreou (1949).

<sup>4</sup> Much later, Eric B. Lindenberg and Stephen A. Ross (1981) used both accounting and financial market data to estimate monopoly rents using Tobin's  $q$ .

The Lerner Index also ignores those departures from cost-minimizing behavior that, absent competitive discipline, may attend a monopolist's pursuit of what J. R. Hicks called the "quiet life" (1935, p. 8). Because the Lerner Index is a static measure, it does not encompass dynamic effects that are relevant to the social optimum generated by technological change, innovation and learning by doing.<sup>5</sup> Chamberlin challenged the singular emphasis Lerner placed on price competition and Lerner's neglect of "the important problems of competition and monopoly in the non-price area" (1954, p. 266).

A firm with a Lerner Index significantly greater than zero has some discretion over its pricing and may use that discretion in various ways other than simple linear pricing. Where a firm's "average revenues" are taken for its price, the Lerner Index overstates departures from the social optimum when a firm uses familiar non-linear pricing tactics. Where a firm's bundled discounts require its customers to purchase a "competitive" good in order to qualify for a discount on the "monopolized" good, the Lerner Index for the latter good understates departures from the social optimum. In a case of mixed bundling, calculating the Lerner Index becomes a challenge because it is difficult to impute a price for goods sold both inside and outside the bundle.

The most important limitation of the Lerner Index, as summarized by Eric B. Lindenberg and Stephen A. Ross (1981), is that the Index "does not recognize that some of the deviation of  $P$  from  $MC$  comes from either efficient use of scale or the need to cover fixed costs" (p. 28). When using the Index to assess departures from the social optimum of firms with increasing returns to scale, it is misleading to attribute the entire departure to the exercise of monopoly power.

Departures of price and marginal cost are equally attributable to the absence or infeasibility of

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<sup>5</sup> Robert S. Pindyck (1985) later identified other characteristics of dynamic markets that cause the Index to give a distorted picture of a firm's monopoly power.

arrangements to secure subsidies from buyers to bridge the gap between firms'  $AC$  and  $MC$  when efficient production requires increasing returns.<sup>6</sup> In these instances especially, departures from the social optimum identified with marginal cost pricing are not departures from a competitive equilibrium that is actually attainable, a qualification forcefully articulated by Joseph Schumpeter (1942). This is a significant limitation because few firms fit the textbook description of perfect competition. The cost structure of firms in many technology-driven industries (e.g., software, pharmaceuticals) is markedly front-loaded. Marginal cost pricing in these industries is neither feasible nor desirable.

Notwithstanding its limitations and qualifications as a measure of monopoly power, the Index is a useful pedagogical tool for depicting the ability of a firm to exercise pricing discretion profitably and for accentuating both the logic of  $P = MC$  and the fundamental nature of monopoly. It is the conventional practice for textbooks in microeconomics and industrial organization to describe the Lerner Index as “the best-known” measure of monopoly power (Scherer 1970, p. 50). In macroeconomics, where cyclical changes in prices and output often are explained in terms of capacity utilization and productivity under conditions of perfect competition, Lerner’s inference that prices significantly above  $MC$  signal market power suggests that alternative explanations for cyclical patterns may involve the exercise of market power (Hall, 1988).

Because the Lerner Index has been influential in shaping economists’ understanding of monopoly power, it is natural to ask whether the Index has been influential in shaping antitrust enforcement. While antitrust scholars have recognized the value of the Lerner Index as a conceptual tool, the Index has not been used extensively in antitrust enforcement. In antitrust,

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<sup>6</sup> Endogenous scale economies and fixed costs that merely erect barriers to entry must be excluded from this generalization.

the degree of monopoly is not *measured* by an index so much as it is *indicated* by a variety of factors – such as market concentration, barriers to entry, and the particular conduct of the firm in question. Antitrust enthrones no single quantitative measure.<sup>7</sup> Shortly after Lerner’s article was published, Edward S. Mason (1937) distinguished the legal meaning of monopoly, which emphasizes a firm’s power to exclude rivals, from the economic meaning, which the Lerner Index encapsulates.

Economists often are surprised to learn that the Sherman Act never mentions “monopoly power” or “market power.” The provenance of these two terms is obscure. Economists were using the term monopoly power before Lerner’s 1934 paper<sup>8</sup> and before federal courts and legal scholars grew to appreciate the relationship between monopoly as an economic concept and the various restraints of trade and monopolizing tactics that the antitrust laws sought to prevent. The term market power came into use in the 1950s following the Court’s *Alcoa* decision.<sup>9</sup> It was only as antitrust became infused with economic theory that the Lerner Index surfaced in the scholarly literature of antitrust.<sup>10</sup> For example, Phillip Areeda and Donald Turner’s (1978) influential antitrust treatise indicated that a “monopolist’s degree of market power is commonly defined by the excess of his profit-maximizing price above his marginal cost,” where the “difference is expressed by the so-called Lerner Index  $(P-MC)/P$ ” (¶502).

It was William Landes and Richard Posner (1981) who sought to “introduce greater rigor into the analysis of market power” by making explicit use of the Lerner Index (p. 938). They began by observing that “[t]he standard method of proving market power in antitrust cases

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<sup>7</sup> See generally Frank M. Fisher (1979) and Kenneth G. Elzinga (1989).

<sup>8</sup> As early as 1926, John M. Clark used the term in much the way it is used today.

<sup>9</sup> Judge Knox used the term in *United States v. Aluminum Company of America*, 91 F. Supp. 333, 341 (S.D. N.Y. 1950). Walter Adams’ (1951, p. 917) and Alfred E. Kahn’s (1953, p. 29ff) analyses of *Alcoa* also spoke of the firm’s “market power.” Carl Kaysen and Donald F. Turner’s *Antitrust Policy* moved the term and the economic conception of market power to center stage in antitrust where it remains today.

<sup>10</sup> Ward S. Bowman (1953) and George E. and Rosemary D. Hale (1955) cite the Index as a formal measure of monopoly power. It took about two decades for the Lerner Index to make its way into the scholarship of antitrust.

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. Other evidence – for example, of the defendant’s profits, or of the ability of new firms to enter the market, or of price discrimination – may be presented to reinforce or refute the inference from market share” (p. 938). Landes and Posner accept the Lerner Index as the authoritative measure of market power, and write that “[i]f we knew the elasticity of demand facing [a] firm . . . , we could measure its market power directly . . . , without troubling ourselves about what its market share was.” They derive a version of the Index that identifies the own-price elasticity of demand of a dominant supplier who shares a market with many small price-taking producers,<sup>11</sup> and “demonstrate the functional relationship between market power on the one hand and market share [ $s_d$ ], market elasticity of demand [ $\eta$ ], and supply elasticity of fringe competitors on the other [ $\varepsilon_f$ ]” (p. 938):

$$\frac{P - MC_d}{P} = \frac{s_d}{\eta + (1 - s_d)\varepsilon_f} \quad (1)$$

Their discussion emphasizes that, depending on how the relevant market is defined, the restraining effect on a dominant firm’s price can show up in its modest market share (broadly defined market) or in the elasticity of market demand and competitors’ supply (narrowly defined market).

Although the Landes and Posner paper raised antitrust awareness of the Lerner Index by showing how the index draws together factors already widely accepted as indicators of market power, the usefulness of their version of the Index is limited by its structural context. The dominant firm theory that undergirds their version of the Index makes no provision for

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<sup>11</sup> This version of the Lerner Index was developed first by Thomas R. Saving (1970).



differentiated products or oligopolistic interactions, two characteristics of markets in which firms may exercise market power.<sup>12</sup>

Economists generally agree that, outside the textbooks, almost all firms have positive price cost margins. Robert E. Hall's examination of these margins in a large sample of 2-digit U.S. industries for the period 1953-1984 found "a large gap [between price and marginal cost] in many industries" (1988, p. 946).<sup>13</sup> More often than not, firms with Lerner Indices large enough to indicate significant market power are not "monopolies" in the traditional antitrust sense that emphasizes heavy-handed output constraints and the absence of competition. Rather, these firms' price-cost margins may reflect "superior skill, foresight and industry" that is the *very result of competition*. Or, a relatively high Lerner Index may reveal nothing more than the necessity of covering fixed costs.

Outcomes in markets with significant scale economies or differentiated products do not fit the theory of perfect competition, but this does not mean that they call for an antitrust remedy. If the operative benchmark for measuring a firm's departure from the social optimum were not Lerner's hypothetical competitive equilibrium, but a welfare-maximizing equilibrium that is attainable given actual conditions of technology and demand, and given the practical limitations on securing subsidies necessary to sustain marginal-cost pricing, much of the market power indicated by the Lerner Index has nothing to do with a lessening of competition.<sup>14</sup> This makes the Lerner Index an unreliable stand-alone indicator of the "degree" to which a firm's market power represents a genuine monopoly problem. While acknowledging that the Index is

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<sup>12</sup> See Richard Schmalensee (1982) and Janusz A. Ordover, Alan O. Sykes, and Robert D. Willig (1982) for discussion.

<sup>13</sup> Robert E. Hall characterizes his empirical finding as a rejection of the joint hypothesis of perfect competition and constant returns to scale in many industries, and as support for the theoretical relevance of theories of oligopoly and product differentiation.

<sup>14</sup> Louis Philips (1988) proposed that the proper benchmark for antitrust policy should be defined in terms of a Nash equilibrium that accounts for actual conditions of technology and demand rather than the equation of price and marginal cost.

informative about a firm's ability to control its *own* price, Ben Klein (1993) cautions that it may not be informative about a firm's ability to raise *market* price and constrain *market* output.<sup>15</sup>

Because there are various potential explanations for a Lerner Index of a given magnitude, it is difficult to say how influential the Lerner Index should be or even will become as a measure of market power in antitrust law. The courts have not embraced the Lerner Index as an appropriate measure of market (or monopoly) power to the extent that antitrust scholars have. We are unaware of the number of unreported antitrust cases in which the Lerner Index played a role, but it has been cited in opinions in only a few reported cases. We are unaware of any case in which the Index played a pivotal role.

For example, in *U.S. v. Eastman Kodak* (1995), the Department of Justice (DOJ) sought to prove that Kodak has market power in the sale of photographic film in the U.S. The DOJ's economic expert estimated the demand elasticity for Kodak's film to be 2 and, based on the Lerner Index, concluded that "the sales price of Kodak film is twice the short-run marginal cost" (p. 108).<sup>16</sup> From this, the DOJ contended that Kodak has market power because it was "earning monopolistic profits from the sale of its film" (p. 109). The court rejected this view, recognizing that "[c]ertain deviations between marginal cost and price, such as those resulting from high fixed costs, are not evidence of market power" and that "there was overwhelming evidence that Kodak's film business is subject to enormous expenses that are not reflected in its short-run

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<sup>15</sup> Ben Klein's concern that the Lerner Index gives insufficient attention to the "market" in which a firm operates has an interesting legacy. In reviewing the Lerner papers at the Library of Congress, Elzinga found the galley proofs to Lerner's 1934 *RES* article, with pencil notes hand written by Joan Robinson. This is but one of the remarkable documents in the voluminous papers of Lerner held at this library and at the Bancroft Library at the University of California Berkeley. While she appreciated Lerner's contribution, Robinson's understanding of monopoly power emphasized the "industry" or "market" context in which that power was exercised. For Robinson, that market was a group of firms and products delineated by "a gap in the chain of substitutes" (p. 5).

<sup>16</sup> Various econometric strategies for estimating own-price elasticities of demand were developed during the 1980s. Timothy F. Bresnahan (1989) summarized this literature and evaluated the usefulness of these tools.

marginal costs” (p. 109). Evidence that Kodak has a Lerner Index of 0.5 was not sufficient for the court to conclude that the firm has market power in the relevant market.

Courts have been hesitant to infer the existence of market (or monopoly) power from evidence based on the Lerner Index alone. The hesitancy is over inferring the presence of market power from a high Lerner Index. Where a firm’s Index is sufficiently low, inferring the absence of market power is less problematic. Louis Kaplow and Carl Shapiro do not envision the Index ever becoming the exclusive indicator of market power: “Given the near ubiquity of some degree of technical market power [as indicated by a Lerner Index of significant magnitude], the impossibility of eliminating it entirely, and the inevitable costs of antitrust intervention, the mere fact that a firm enjoys some technical market power is not very informative or useful in antitrust law” (2007, p. 3).

The impact of the Lerner Index has been greater in merger enforcement. Here, the relevant question is not whether a firm has market power, but whether a proposed merger would *increase* the firm’s market power. The predicted change in post-merger price-cost margins, whether estimated directly or inferred from a change in estimated own-price elasticities of demand, is routinely used by the enforcement agencies to assess the competitive effects of proposed mergers. Gregory J. Werden states that estimated firm-specific demand elasticities used in conjunction with the Lerner Index “can be the most important source of evidence on market power” and their use “can be expected to be a common occurrence” (1998, p. 384).

Specific reference to the Lerner Index is more common in the scholarly literature of antitrust than in its judicial application. The relevance of the Lerner Index, with its pristine focus on price and marginal cost, is that it directs the inquiry about market power to the pricing discretion of the firm and away from the firm’s profit level, its absolute size, and the rhetoric of

its business documents. The Supreme Court's definition of monopoly power as the ability to control price and exclude competition is Lernerian in its substance but not in its application.

No doubt Lerner enjoyed seeing his measure of monopoly power become widely used in teaching microeconomics. But he was a theorist who wanted his theories applied. The Index came out of Lerner's quest to develop a blueprint for a centrally planned economy as eventually and more fully drawn out in *The Economics of Control* (1944). Schumpeter (1942) understood this when he wrote that Lerner meant the principle of marginal cost pricing to "constitute an important contribution to the theory of the socialist economy . . ." (p. 176). Contributing to "the theory of the socialist economy" was a life-long agenda for Lerner, and he never lost his enthusiasm for pricing at the margin whether in a socialist or capitalist economy. Indeed, Lerner's appeal to economists who could restrain their enthusiasm for socialism was Lerner's passionate advocacy for consumer sovereignty.<sup>17</sup>

Lerner never envisioned the Index becoming a tool in the antitrust arsenal. There is no evidence, either from his published work or from his collected papers, that Lerner gave much thought to antitrust policy or the application of his index to antitrust enforcement. For most of his career, Lerner devoted his energies to macroeconomics and policy issues related to unemployment. He did not see monopoly as a major social problem. He wrote: "Some studies of the degree of damage done by monopolistic restrictions estimate it at less than one percent of the national income. These may well be underestimates, but vociferous critics of our society speak almost as if monopoly was wasting the greater part of our potential output" (1972, p. 260). The enduring legacy of the Lerner Index is unlikely to become its practical use in antitrust

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<sup>17</sup> Lerner wrote that the "control" of his preferences by an outside authority was "the denial of my personality – a kind of rape of my integrity" (1972, p. 258).

enforcement. The greater contribution of the Index is in clarifying the nature of monopoly and emphasizing the implications of departures from  $P = MC$ .

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