Reply to Lefever

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The penultimate paragraph of J. Timothy Lefever's Comment contains a surprise. It is at this juncture, and not before, that Lefever discloses that my original article expressly deals with the welfare complications that arise if the long-run average cost function declines smoothly throughout—rather than as a step function, as I assume in the main part of my paper. Since my original discussion was both explicit and compact, I think it useful to repeat it here. The point is this: If the long run average cost function is smoothly declining throughout, then

> rules that cause flatter residual demand curves (as the cost-based rules do) will be tangent to the long-run average cost curve at a lower price and larger output. The pre-entry output of the dominant firm will [in that event remain smaller] for cost-based rules than for the output restriction rule. Post-entry output (of dominant firm and new entrant taken together), however, will be greater under the cost-based rules.
>
> Although the pre-entry welfare advantages of the output restriction rule are unambiguously greater when the tangency point varies [as described] among the rules,the post-entry welfare effects may (but need not) favor the output restriction rule. A weighted average of these two effects would probably preserve the rule ordering, however, since entry (and hence post-entry adaptations) is presumably the exception in industries given to the type of strategic behavior investigated here.[1]

Lefever has not, therefore, discovered a lapse in the original analysis. Instead, he uses several pages of text and two figures to *elaborate* the particular but interesting case in which pre- and post-entry welfare effects differ because of smoothness in the long run average cost function. Had I thought that many readers would have difficulty completing this exercise, I would have developed the passages quoted above in my original treatment. To the extent that some readers are benefited by his diagramatics, it is useful to have them in print.

Inasmuch as the theoretical point of Lefever's Comment was already made in the original text, the importance of his remarks turns mainly on

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1. Williamson, *Predatory Pricing: A Strategic and Welfare Analysis*, 87 YALE L.J. 284, 315 (1977).

his empirical assertion that smoothly declining average cost functions are the norm and, given this condition, on his welfare assessment of the alternative rules.

Regarding the first, he asserts that "numerous empiricial estimates of cost-scale relationships lend little if any support to Williamson's [step function] cost curve, which is characterized by a pronounced 'discontinuity' at low output levels. A smoothly declining LRATC, on the other hand is consistent with the empirical findings."[2] He is careful to acknowledge in a footnote,[3] however, that statistical cost studies *assume* that cost curves decline smoothly and hence are irrelevant in attempting to discriminate between the smooth versus step function hypotheses. Accordingly, we need to appeal to other evidence. In the absence of a systematic survey, piecemeal observations will have to do. I submit that while few of us have seen smooth technologies, many of us have observed discrete ones. Sometimes these involve large indivisibilities associated with joining successive business functions. Thus forward integration into marketing may be feasible only if some minimum scale of activity is achieved, at which point a significant discontinuity (or step) appears. Sometimes these involve differences in manufacturing technologies. The recent FTC case concerning the production of titanium dioxide (du Pont had pioneered the chloride process as a replacement for the sulfate process and evidently realized significant economies as a consequence) is an illustration.[4]

More generally, while smooth technology assumptions are convenient and sometimes useful, economics needs to face up more fully to the incidence and consequences of discreteness. I submit that such studies will mainly corroborate my position. Certainly there is nothing in Lefever's remarks that warrants a judgment that smooth cost functions are the rule rather than the exception. Accordingly, his repeated assertion that he is investigating the "general case" is unwarranted and misleading. Lefever is investigating the "smooth case"—no more and no less. The adjective smooth is not interchangeable with general in the lexicon of economics.

But suppose, arguendo, that LRATC curves are normally shaped as he describes. Do we then conclude that the output restraining rule is typically inferior to the cost-based rules in terms of net welfare gain? Although Lefever's remarks suggest as much, he appears to rely on simple aggregation to reach this result. This is not entirely satisfactory.

Thus whereas I argue that pre-entry welfare effects should be given

2. Lefever, *Predatory Pricing Rules: A Comment on Williamson's Output Restriction Rule*, 90 YALE L.J. 1639, 1642 (1981).

3. *Id.* at 1642 n.15.

4. Complaint, E.I. du Pont de Nemours & Co., [1976-1979 Transfer Binder: FTC Complaints and Orders] TRADE REG. REP. (CCH) ¶ 21,407 (Apr. 5, 1978).

greater weight because entry will be uncommon, Lefever takes the position that "[i]t is not at all clear that entry is unlikely under the assumptions of the Williamson model."[5] Among the relevant assumptions of my model are that severe structural preconditions must be satisfied before claims of predation are seriously entertained. Specifically, very high concentration coupled with high barriers to entry are required.[6] There is growing agreement with this statement of preconditions (both Paul Joskow and Alvin Klevorick[7] and Janusz Ordover and Robert Willig[8] have since proposed a "two tier" test for predatory pricing in which the fist tier involves this structural test). Whether Lefever has overlooked these structural preconditions, has chosen to ignore them, thinks them incorrect, or regards them as irrelevant is not evident from his remarks. Taking his statement that he is working within "the assumptions of the Williamson model" at face value, however, the question is whether attempted entry is frequent in industries with high concentration and high barriers to entry. Although he may have evidence to the contrary, frequent entry is ordinarily associated with industries where entry is easy rather than difficult. Accordingly, the unweighted aggregation of pre- and post-entry welfare effects on which Lefever relies in his assessment should be supplanted instead by weighting the welfare effects in the way I describe.

One should also note that Lefever's unweighted aggregation ignores the effects I described under the subheading "Information and Uncertainty"[9] in my original article. As I pointed out there, the prospective entrant faces more difficult problems of forming expectations and of proving violations when cost-based rules are employed. *Ceteris paribus*, the cost-based rules are disfavored by these considerations. Lefever's welfare assessement also ignores the strategic incentive for dominant firms to choose an inferior (e.g., more highly capital intensive) technology that cost-based rules introduce.[10] Cost-based rules are disfavored in welfare respects on this account as well.

Readers should thus recognize that Lefever's diagramatics do not make a new point, but merely elaborate a point already present in the original

5. Lefever, *supra* note 2, at 1643.

6. Williamson, *supra* note 1, at 292-293.

7. Joskow & Klevorick, *A Framework for Analyzing Predatory Pricing Policy*, 89 YALE L.J. 213 (1979).

8. Ordover & Willig, *An Economic Definition of Predation: Pricing and Product Innovation*, 91 YALE L.J. (forthcoming 1981).

9. Williamson, *supra* note 1, at 312.

10. I discuss these distortions in Williamson, *supra* note 1, at 313-314. Although I initially indicated that these distortions may not be serious, subsequent discussions of strategic entry impediments in which fixed costs and specific investments are featured have caused me to reconsider. *See* Eaton & Lipsey, *Capital, Commitment, and Entry Equilibrium*, 12 BELL J. ECON. (forthcoming); Eaton & Lipsey, *Exit Barriers Are Entry Barriers: The Durability of Capital as a Barrier to Entry*, 11 BELL J. ECON. 721 (1980).

article. And readers are cautioned against ready acceptance of Lefever's empirical cost function remarks and his unweighted aggregation of pre- and post-entry welfare consequences. Even if, contrary to my views, he is correct about empirical cost functions, his aggregation procedures appear to be unacceptable. Furthermore, readers are reminded that while smoothly declining cost functions can yield pre- and post-entry welfare consequences of opposite signs, they need not. Since the net welfare effects of the output restraint rule in pre-entry respects are always positive, the case in which pre- and post-entry effects have the same sign is always favorable to the output restraining rule. Accordingly, the value added of the Lefever Comment appears to reside more in the diagramatics than in the follow-on commentary that he offers. Put differently, I stand by the above quoted remarks in my original article.

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