On the Basing-Point System

By Bruce L. Benson, Melvin L. Greenhut, and George Norman*

Jacques F. Thisse and Xavier Vives observed in this journal (1988) that analysis of the base-point price (BPP) system "should consider its role as a coordinating and collusive device" (p. 12). This conclusion has much in common with that of Fritz Machlup (1952) and Clair Wilcox (1955) and provides a sharply contrasting thesis from that of David D. Haddock, who had contended in (1982) that BPP systems are competitive. However, Thisse and Vives (henceforth TV) were not specifically, or even primarily concerned with base-point pricing. Rather, they focused attention on noncooperative strategies in spatial markets, deriving several conclusions by approaching the choice of pricing policy from an explicitly strategic, game-theoretic viewpoint. While their results do imply that noncooperative base-point pricing is unlikely, they did not center attention on the conditions that must exist in order for a *competitive* base-point pricing system to arise.

The present paper extends TV's theoretical analysis by focusing exclusively on base-point pricing *and* by ascertaining the conditions that would be required for Haddock's noncooperative BPP system to arise. In particular, the initial part of this paper utilizes the TV framework to identify the necessary conditions for a noncooperative BPP system. The TV framework leads us to a different interpretation than Haddock proposed. The second part of this paper adds, however, to the contention that the system *could indeed have* competitive origins; but we shall observe that it limits such claim to certain highly restrictive conditions. This part of the paper also refers to the reality of BPP. A third and concluding section accounts for the "cooperative" use of the system when, in fact, other "collusive" delivered pricing systems that would be more profitable than BPP can be conceived of.

I. Theory

For simplicity, assume that all consumers are identical, and are distributed over a line market in which there are two production sites I and II, with site I the lower-cost site (perhaps because of better access to raw materials). Assume that there are two firms, $i = I, II$ selling a homogeneous product, with firm i located at site i. Transport costs per unit of output from site i to consumer location x are given by a nonnegative, increasing function $t_i(|i - x|)$, where $|\cdot|$ is the distance norm, and $t_i(0) = 0$. Figure 1 (see also Haddock, Figure 1) illustrates such a case, with mc_i denoting marginal production cost at site i, and $m_i(x)$ denoting marginal cost of production and transportation from site i to consumer location x: $m_i(x) = mc_i + t_i(|i - x|)(i = I, II)$.

Define the monopoly price $p_i^M(x)$ that firm i would charge to consumers at x as the price that would maximize profit to firm i from consumers at x in the absence of any competition (this price is derived from the standard $MR = MC$ condition). TV show that if the duopolists simultaneously choose their pricing policy and price, the noncooperative equilibrium pricing strategy $p_i^*(x)$ for firm i is

$$p_i^M(x) \text{ if } p_i^M(x) \leq m_j(x)$$

$$(1) \quad p_i^*(x) = m_j(x) \text{ if } p_i^M(x) > m_j(x),$$

$$\text{and } m_i(x) \leq m_j(x)$$

$$m_i(x) \text{ otherwise,}$$

*Department of Economics, Florida State University, Tallahassee, FL 32306-2045; Department of Economics, Texas A&M University, College Station, TX 77843-4228 and adjunct, University of Oklahoma, Norman, OK 73019; and Department of Economics, The University of Leicester, Leicester, England LE1 7 RH.
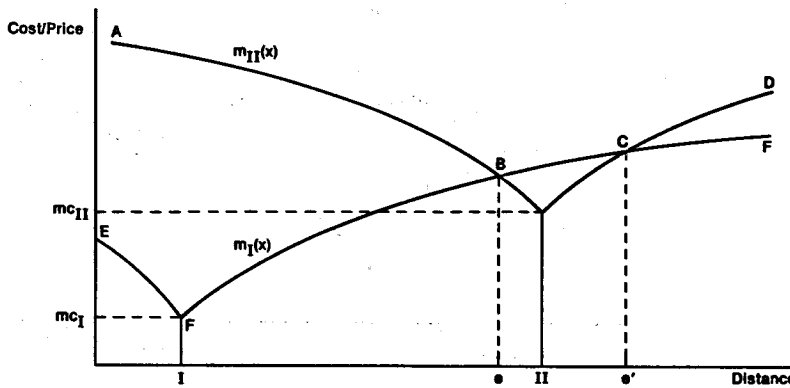
FIGURE 1

a form of price discrimination first discussed by Edgar M. Hoover (1937).[1] Assume without loss of generality that $p_i^M(x)$ everywhere exceed marginal cost of production and transportation for firm j ($j \neq i$). Then the price equilibrium is illustrated in Figure 1 by the lines AB, CD for firm I and BC for firm II. If the pricing game is a two-stage game, in which firms first choose a pricing policy and then compete in prices contingent on the chosen pricing policies, TV show again that the discriminatory policy of equation (1) is the unique (Nash) equilibrium outcome.

Is pricing policy (1) consistent with BPP? It is quite clear that firm II is following a BPP with site I as base, *but firm I is also following BPP with site II as base*. In other words, the only equilibrium is a peculiar type of multiple BPP system in which consumers are charged a price less by the amount ε than the marginal costs plus freight of the second-lowest cost supplier.

Now consider what will arise if a second firm is introduced at site I: if, for example, the producer at site II has a second plant at site I. Using precisely the same argument, the resulting Nash equilibrium prices are

now given by

$$(2) \qquad p_I^*(x) = m_I(x)$$

$$p_{II}^*(x) = \left\{ \begin{array}{l} m_I(x) \text{ if } m_I(x) > m_{II}(x) \\ m_{II}(x) \text{ if } m_I(x) < m_{II}(x) \end{array} \right\}.$$

These are illustrated in Figure 1 by the lines EFB and CF for the firms at site I and BC for the firm at site II. Pricing policy (2) is the policy derived by Haddock (although Haddock does so by requiring that production at site I be "competitive"): it is BPP with site I as base.[2]

II. Conditions for Competitive BPP

We can now identify the somewhat restrictive condition under which this policy emerges. For a single-base basing-point pricing system to be the outcome of a competitive process, it is necessary that production at the basing point be in some sense compe-

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[1] This equilibrium assumes that individual demand is "well behaved," in that profit from consumers at x is quasi-concave in price.

[2] Recall that the pricing equilibria assume $p_i^M(x) > m_j(x)(j \neq i)$ for all x. Note that Haddock ignores the possibility that firm II (the local monopolist) could have a sufficiently strong monopoly advantage near site II as to be able, and so willing, to charge the monopoly price.
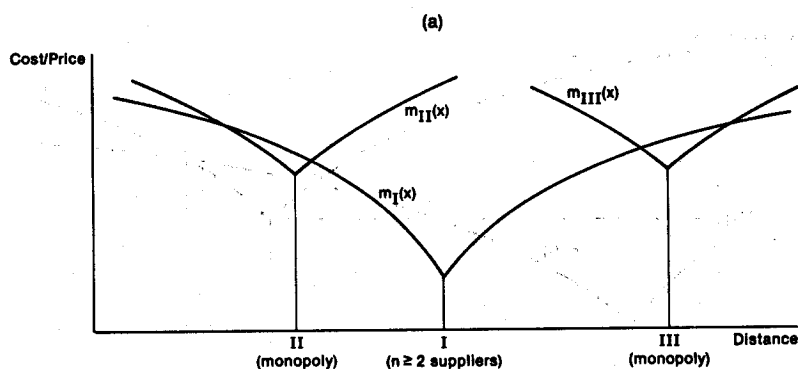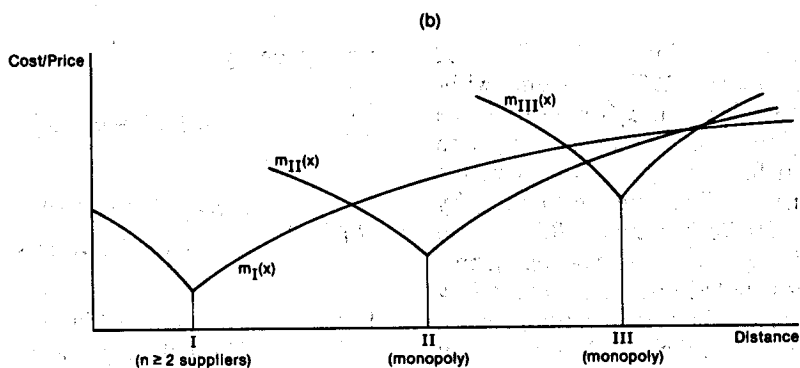
(a)

FIGURE 2. PANEL (a)

(b)

FIGURE 2. PANEL (b)

titive[3] *and production at distant sites be monopolized.* It is *further necessary that firms at the basing point always be either the lowest or the second-lowest cost suppliers to all consumers.* Extending the analysis, a single-base BPP system will also arise from the configuration of suppliers in Figure 2a, but not necessarily from the configuration in Figure 2b. Far from being competitive, the delivered price system in Figure 2a *derives from the exploitation of locational rents!*

A further peculiar result is readily evident with the BPP of equation (2). The low-cost producers just break even, but the high-cost nonbase-point firm that has a local monopoly position can earn supernormal profit or loca-

[3]In the TV analysis, two competing producers will suffice.

tional rents. Haddock's argument (p. 304) in this respect is in error. The locational rents arise because multiple-firm entry at the distant site is barred by a combination of demand and cost conditions. In particular, sufficient demand and revenues exist to generate returns for one firm that exceed opportunity costs, but entry of another firm would mean that both sellers incur economic losses. These conditions are exogeneous to the producer at the distant site. Such indivisibility has been discussed by Nicholas Kaldor (1935), Harold Demsetz (1964), and, more recently, B. Curtis Eaton and Richard G. Lipsey (1978).

One further concern of Haddock was to use BPP to present an efficiency argument for cross-hauling. But it is clear that cross-hauling does not require basing-point pricing. There is exactly the same form of cross-

hauling under the pricing equilibrium in equation (1), with firm *II* shipping to consumers to its left, and firm *I* shipping to consumers to the right of firm *II*. Simply put, differences in production costs and economies of long-haul transportation are sufficient to generate this kind of cross-hauling.[4]

In addition to the aforenoted theoretical criticisms, the idea of a competitive BPP system is further subject to the most basic criticism that it misinterprets the system. In particular, the BPP equilibrium under competitive conditions is justified on the grounds that it will allow the firm at site *II* to survive when f.o.b. pricing would not.[5] This result requires that firm *II* supply all demand in its natural market area: defined in Figure 1 as the area in which $m_{II}(x) < m_I(x)$ —region *ee'*. With such an assumption, BPP always generates greater total revenue than will f.o.b. pricing.[6] There will, therefore, exist some range of cost and demand conditions such that BPP will allow firm *II* to at least break even, while f.o.b. pricing will not. But this is not in the spirit of the BPP system. As Machlup (1949) states: "[the] basing-point technique of pricing makes it possible for any number of sellers, no matter where they are located and without any communication with each other, to quote identical delivered prices for any quantity of the product in standardized qualities and specifications" (p. 7).

Assume then that BPP leads to firm *II* sharing its market with the firms at site *I*. We know there must be at least two producers at site *I* for the subject BPP system to

emerge. It follows that firm *II* can at the most expect only one-third of the total sales in the region *ee'* under the BPP system. By contrast, f.o.b. pricing will secure all demand for firm *II* in a region somewhat smaller than *ee'*. As Melvin L. Greenhut (1956, pp. 313, 314; 1970, Chapter 7) points out, once such market sharing is considered, f.o.b. pricing can dominate basing-point pricing and would if costs corresponded to those of Figure 1. Indeed, the classical form of spatial price discrimination by the distant firm, where its delivered price increases in *each direction* from its site, can dominate the f.o.b. pricing alternative; moreover, it would not appear to be predatory, as is the case for the systematic lowering of delivered prices in region *ee'* at some market points located at greater distances from the seller than others.

III. Conclusions

In order for a competitive simple basing-point price system to hold, it is necessary that a single firm located at a distance from a competitive production center exploit its local market power, collect locational rents, and alone sell over its dominated market space. This composite is a necessary condition; without its fulfillment, the *noncooperative* base-point price system would not exist. It follows in light of the requisite local market power at a distance that BPP is a non-competitive system. Moreover, when such power exists, other delivered pricing forms will be used in the absence of collusion.

This paper thus contends that traditional views on the subject are more appropriate. (See Greenhut, 1956, Appendix V.) When base-point pricing is followed, it is attributable to (i) conscious parallelism of action, where some firms feel obliged (compelled) to adhere to the price schedule of others or (ii) stems from an outright collusive conspiracy whose design is to maximize profits *subject to* cartel policing and enforcement costs. Such costs are an intrinsic part of the system since a cartel must be organized and its agreement enforced in the presence of incentives to cheat. As many have pointed out (for example, Hoover, 1937, p. 190; Machlup, 1949, pp. 131–136; George

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[4]Actually, even more extensive cross-hauling involving simultaneous supply of an area by two or more firms is easily explained with spatial competition models involving price discrimination (for example, John Greenhut and Melvin L. Greenhut, 1975). Base-point pricing is not a necessary condition for cross-hauling, or for freight absorption, so Haddock is clearly correct in emphasizing that these phenomena are not evidence of collusion. But significantly, they do not necessarily imply base-point pricing either.

[5]Actually, of course, the choice is more likely to involve discriminatory pricing than f.o.b. pricing.

[6]With trivial exception of some peculiar demand functions.

J. Stigler, 1979, pp. 1147–1148; Frederic M. Scherer, 1980, pp. 329–330), a base-point system is much less costly to police and enforce than are other spatial pricing arrangements. This helps explain its use instead of other organized delivered price systems that would be more profitable in the absence of policing and enforcement costs.

The fact that base-point pricing generates locational rents for distant firms also indicates why this system might characterize a cartel notwithstanding the existence of more profitable arrangements, such as f.o.b. pricing or spatial discriminatory pricing. These other more profitable systems may well induce competitive entry. It follows that if base-point pricing deters entry and in the process protects existing rents, it may actually be the most desirable arrangement that the cartel can adopt.

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