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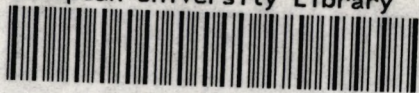
## **Basing Point Pricing, Competition and Market Integration**

LOUIS PHILIPS

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**ECONOMICS DEPARTMENT**

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**LOUIS PHILIPS**

**BADIA FIESOLANA, SAN DOMENICO (FI)**

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# Basing Point Pricing, Competition and Market Integration

Louis Philips\*

Department of Economics  
EUROPEAN UNIVERSITY INSTITUTE  
Badia Fiesolana  
I-50016 S. Domenico di Fiesole (Fi)  
ITALY

*Tel.:* +39-55-5092.225

*Fax:* +39-55-5092.202

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## Abstract

This paper discusses the competitive nature of basing point pricing with special reference to market integration in Europe. It concludes that recent game-theoretic contributions do not provide insights that contradict conventional wisdom: basing point pricing cannot be rationalized as a competitive outcome.

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Does Economic Space Matter? Essays in Honor of Melvin Greenhut,  
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# 1 Introduction

"Americans generally consider apple pie, hot dogs, and baseball to be uniquely theirs in origin. Less pride of origin is assigned to the Basing Point System, originally known as Pittsburgh-Plus". This is how Greenhut (1987) started his lively description of the origins and competitive properties of the single basing point system as practiced in the United States. Let me suggest that Europeans consider Sacher Torte, pommes frites and football to be uniquely theirs in origin. Less pride of origin is assigned to the multiple basing point system introduced on the occasion (and because) of the creation (in 1952) of a common market for coal and steel and made mandatory (sic) in Article 60 of the European Coal and Steel Community.

This paper is an effort to contribute to the discussion of the competitive nature of basing point pricing with special inference to market integration in Europe. The rules of the simple and the multiple basing point systems are briefly described in Section 2. Section 3 discusses the conventional wisdom about their competitive nature. Section 4 assesses recent game-theoretic contributions which ask under which conditions basing point systems can emerge as non-cooperative equilibria. I conclude that up to now game theory did not provide insights that could contradict conventional wisdom: Basing point pricing cannot be rationalized as a competitive outcome.

## 2 Single versus Multiple Basing Point Systems

Before 1951, German and French steelmakers operated a single basing point system.<sup>1</sup> To Pittsburgh corresponded Oberhausen (in the Ruhr area) and Thionville (in the North of France, close to the Luxemburg border). Consider Thionville: the biggest French steel plants were located in and around that city. In all of France, delivered prices were computed by summing the announced base price at Thionville plus the cost of transportation to any particular location. This implies that the delivered prices went up to the extent that steel was moved towards the South or the South-West. Note, however, that this also implies that the delivered prices went down when steel was moved towards the North. In other words, the big Northern steel companies could sell anywhere in France, while the small Southern producers were constrained to sell in their local regional market. But the South was compensated for this in terms of phantom freight collected in the vicinity of its plants. The system was meant to keep the Southern producers happy and small. In that sense, it was the equivalent of a national geographical market sharing agreement.

When a common market for steel between the Benelux countries, France, Germany and Italy was envisaged, the problem arose of how to define a common pricing policy, such that the prevailing allocation of geographical markets could be maintained. Different possibilities were discussed.

A first possibility was to impose fob-mill pricing, since that was presented by the welfare economies of the time<sup>2</sup> as the only system compatible with a Pareto optimum.

<sup>1</sup>See Wagner (1952), Harbers (1953) and Zimmermann (1962).

<sup>2</sup>See Allais (1958).

The big production centres didn't like it, because they would have lost access to peripheral regional markets. In particular, the Belgian steelmakers (who had to export more than half of their production) would have lost many export markets inside the common market, given their location between Thionville and Oberhausen at a short distance of these centres. Second, it is very difficult to compute and compare delivered prices in any given location under a fob-mill system, because of the large number of steel plants in the European common market and because buyers can use different means of transportation (so that effective transportation costs vary from buyer to buyer). To enter a distant market, competitors would therefore have had to grant secret price discounts. The end result would have been a series of regional price wars to avoid a loss of distant markets.

A single basing point system would have made it easy for the producers to compute the delivered price to be quoted in any location, given a particular means of transportation. But where to locate such a single basing point? Not in France, since that would have limited the geographical extent of German sales west- and southwards. Not in the Ruhr area, for symmetric reasons. Not in the Benelux or Italy: that would have made all other countries unhappy.

The only way to maintain the existing trade patterns inside and between the six countries was to create a multiple basing point system with the possibility to "meet competition" anywhere as the basic feature.<sup>3</sup> (This possibility was called "alignment".) This system was written down in article 60 of the European Coal and Steel Community at the urgent request of the steelmakers. The declared aims included (a) the creation of a perfectly competitive market (*sic*) since there would be only one single delivered price in any location; (b) the creation of a "perfect" market, since all delivered prices would be perfectly known by all sellers and buyers; (c) giving the centrally located producers (such as the Benelux steelmakers) the possibility of continuing to export to other European countries by meeting the local competition there; (d) ensuring that in any location the buyers would enjoy the "lowest possible" delivered price (while avoiding price competition!).

Let me explain. The alignment rule ensures that, at any geographical location, the delivered price to be quoted by all competitors is equal to the lowest combination of a base price plus freight (to that location) calculated from all basing points existing in the system. (Since base prices differ, the lowest delivered price does not necessarily correspond to the nearest basing point.) Thus at a given place of destination only a single delivered price is possible, identical, and known with precision regardless of the seller and regardless of the actual distance covered in carriage to the place of destination. Indeed, the freight to be added to the base prices is worked out from a published tariff accepted by all concerned, such as a railway company's schedule of charges.

When a seller "aligns" on a competitor's delivered price, a base price other than his own is applied. Certain centres published such a high base price that they found themselves aligning on the price of other centres for all sales, including sales in their own vicinity: This is a simple trick used by price followers. Other centres published such a low base price that all other centres had to align on it: This is a simple trick

<sup>3</sup>See Fallon (1958), Demaria (1958), Erb and Rogge (1958) and Stegemann (1968).



for low-cost producers to become price leaders. On the other hand, the system has the inherent feature that the freight incorporated in the delivered price corresponds to actual cost of carriage only if the goods are actually dispatched from the basing point whose base price was used for calculation of the delivered price and if use is made of the commonly agreed means of transportation. If actual costs of transportation are higher than the calculated freight, the seller is absorbing freight. If it is lower, the seller benefits from a phantom freight incorporated in the delivered price on which he "aligns".

Note that without the alignment rule, a multiple basing point would be equivalent to a system with fob-mill pricing. The two systems would then be identical if each plant was used as a basing point.

### 3 Conventional Wisdom

The foregoing description of the birth of the multiple basing point system in the European common market for steel suggests that it was meant to allow for geographical market sharing without explicit agreements, which were prohibited by the Coal and Steel Treaty. Clearly, it created the conditions for tacit collusion. The American conventional wisdom about its non-competitive nature is also valid for Europe.

Notice, first, that it did not develop spontaneously. Lengthy discussion among and much lobbying by the European steelmakers was necessary to convince the lawyers who wrote the Coal and Steel Treaty of its perfectly competitive nature. Given the highly technical and somewhat mysterious nature of the system, it was perhaps not surprising that lawyers were willing to be convinced that unicity of price and perfect "transparency" of the market indeed implied perfect competition. A thorough understanding of the system of course points to tacit collusion, that is, collusive outcomes reached by a noncooperative oligopolistic game.

The basic ingredient of tacit collusion is perfect information on actual prices, here delivered prices. Tacit collusion is therefore much easier with basing point prices than with fob-mill prices. With the latter, there is uncertainty as to the exact delivered price, as noticed above: Buyers may exploit this to obtain secret price reductions and then may carry out arbitrage through resale, so that general price levels may fall through the weakening of the geographical structure of delivered prices.<sup>4</sup>

Second, the alignment rule by itself makes local price competition impossible. It is true that, given the rules of the system, the base prices and the transport tariff to be used, the delivered price is the lowest of all possible delivered prices in any location. Nevertheless, alignment has no competitive values. Although it may, at first sight, indicate aggressive conduct, in reality it makes undercutting competitors' prices impossible. Alignment is a defensive tactic: Given equal prices, the sellers can tie traditional pre-common-market customers to them wherever such customers may be located. The purpose is to freeze existing trade patterns and thus to leave market shares unchanged.

<sup>4</sup>See Adelman (1948), Mestmäcker (1955), Loescher (1959, pp. 26-29) and Philips (1964).

Alignment of course implies cross-hauls, that is, an inefficient use of resources so that profits are reduced. Collusion in the framework of a multiple basing point system must therefore be short of joint profit maximization.

The misconception of the lawyers who wrote up article 60 of the treaty creating the Coal and Steel Community, who thought they were creating a perfectly competitive market, is comparable to the misconception which is at the heart of Haddock's (1982) defense of basing point pricing. To clarify matters, it may be worthwhile to take a closer look at Haddock's assumptions.

To begin with, Haddock's firms are price takers: the market delivered prices are given! In any basing point system, to the contrary, firms have the power to fix prices.

For Haddock, each so-called basing point is in fact the geographic location of a competitive market, typically a double auction (such as the London Metal Exchange). A delivered price is then the price at the exchange plus transportation cost to wherever the buyer is located, on the assumption that the commodity is available at the market centre. Hence the following astonishing example, given by Haddock (1982, pp. 289–290), of a price “based on” the price for wheat at Galveston, Texas: “For example, the price paid for wheat at Trinidad, Colorado (a very small source of the supply of wheat) is based on the price paid at Galveston, Texas (where a large part of American wheat is collected for export). Buyers purchasing wheat in Trinidad offer the Galveston price minus (sic) the sum of the cost of shipping to Galveston plus the cost of transacting”. The cost of transportation is subtracted because a seller located in Trinidad does not have to ship the wheat (sold in Trinidad) to Galveston. This clearly has nothing to do with the working of a basing point system.

Haddock goes on to explain that freight absorption occurs when commodities are shipped between points with price differences insufficient to compensate the dealers fully for the freight charges incurred. Now, nobody ever doubted that such absorption can appear in a world with geographically separated competitive market centres. But it has nothing to do with the freight absorption that occurs in a multiple basing point system and does not imply that such a system is competitive. In the same vein, cross-hauling is shown to occur and even to be profitable between competitive market centres. Again, this point has never been in doubt, as far as I can see, and has nothing to do with cross-hauling between basing points.<sup>5</sup>

Figure 1 is taken from Haddock (1982, p. 295) and should be compared with Figure 2, where I illustrate the working of an oligopolistic multiple basing point system with alignment.

Figure 1 shows marginal delivered cost (marginal production cost plus unit transport cost) from two competitive production sites (basing points, supposedly) with distance along the horizontal axis. At site I each firm has a lower marginal cost than each firm at site II. Transport rate schedules reflect economies of long haul. Buyers purchase from the site with the lowest marginal delivered cost, so that the market boundary separating the two sites is at  $\underline{e}$  and  $\underline{e}'$ . The market area for firms at site I includes points to the right of  $\underline{e}'$ . Between  $\underline{e}$  and site II, there is cross-hauling: shipments from II heading westwards pass shipments from I leading eastwards. There is no geographical market sharing.

<sup>5</sup>Benson, Greenhut and Norman (1990) make a similar point.

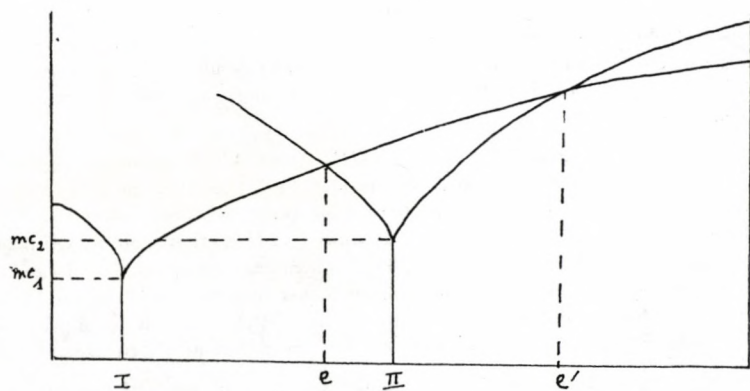


Figure 1

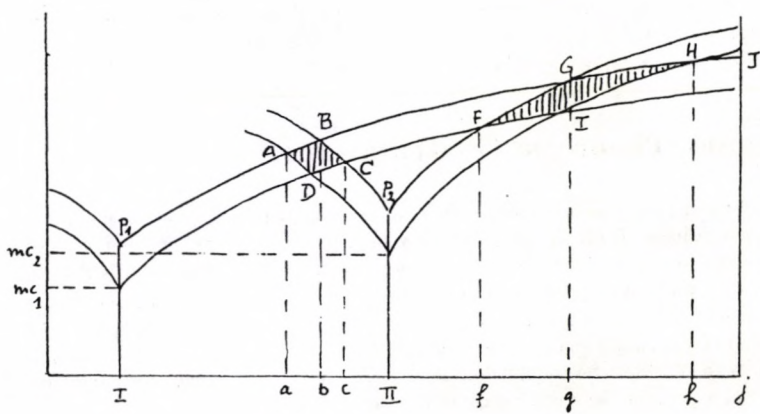


Figure 2



In Figure 2, site I is the low-cost basing point. The announced base point prices  $p_1$  and  $p_2$  are above the corresponding marginal production costs. Average transport charges per ton-mile also decrease as mileage increases, not because marginal transport charges per ton-mile fall as mileage increases but because this is the profit-maximizing pricing policy of monopolistic carriers (see Greenhut, Hwang and Norman (1974)). Firms located at II sell westwards until point  $\underline{a}$  and westwards until point  $\underline{h}$ . Firms located at I sell eastwards until point  $\underline{c}$  and then from  $\underline{f}$  till  $\underline{j}$ . (No firm sells below marginal delivered cost.)

Alignment occurs along  $AB$ ,  $BC$ ,  $FG$  and  $GH$ . Along  $AB$ , firms located at II align on the  $p_1$ -plus delivered prices fixed by firms located at I (so that the delivered prices of firms II go down as they sell more toward I). Along  $BC$ , firms located at I align on the  $p_2$ -plus delivered prices fixed by firms located at II (so that their delivered prices go down as they sell more toward II). These alignments ensure that a) I can sell in the segment  $\underline{bc}$  although its delivered price is higher than II's; b) II can sell in the segment  $\underline{ab}$  although its delivered price is higher than I's; c) there will be no price competition pushing the delivered prices down to  $ADC$  inside the area  $ABCD$ .

A similar argument applies to  $FG$  (where I aligns on  $p_2$ -plus) and  $GH$  (where II aligns on  $p_1$ -plus), both centres enlarging their market area while avoiding price competition in the area  $FGHI$ . Without the alignment rule, prices would have dropped to  $FIH$  along the segment  $\underline{fh}$ .

Let me summarize the consequences of an application of the alignment rule as follows. First, price undercutting becomes impossible. Second, compared with Figure 1 (or with fob-mill pricing for that matter), some market areas ( $\underline{ac}$  and  $\underline{fh}$ ) are now shared geographically. As a result, both production centres extend<sup>6</sup> their geographical market areas, I over  $\underline{bc}$  and  $\underline{fg}$  and II over  $\underline{ab}$  and  $\underline{gh}$ . Third, buyers always get the lowest delivered price at any location (so that it looks as if there was price competition in the areas where the alignment rule is applied). Finally, cross-hauling occurs over longer distances, that is, not only between  $\underline{b}$  and II but also between  $\underline{a}$  and  $\underline{b}$ .

## 4 Game-Theoretic Contributions

Thisse and Vives (1988) have examined different geographic pricing policies, including basing point pricing, from the point of view of game theory, asking what sort of practices could be rationalized as equilibria of a particular oligopoly game. Right from the start, they make a very important distinction between the choice of a particular "pricing policy" or "pricing method" (such as uniform fob pricing or the basing point system) and the choice, given a pricing policy, of a particular price. This distinction allows them to consider the commitment to a policy in the first stage of a game and the choice of a price in the second stage of the same game.

The single basing point system is interpreted as the outcome of a two-stage duopoly game in which the firm (firm 1) located at the basing point moves first and chooses to price uniformly. It will thus be the price leader. The other firm reacts

<sup>6</sup>or maintain access to these areas if they already exported there before their national markets were integrated.

optimally to the leader's price. Both firms use price (or Bertrand) strategies. In the light of what was said above, this is a most unnatural assumption. Yet, it is worth making, since it provides a competitive interpretation of basing point pricing. If the latter can be shown to be the equilibrium outcome of the game, then a competitive defense appropriate to an oligopolistic environment could be presented, which would be very different indeed from Haddock's approach in terms of competitive market centres with given prices.

Further assumptions are that the buyers are uniformly distributed over some interval  $[0, 1]$  with unit density, with firm 1 located at 0 and firm 2 at 1. Firms have constant marginal production costs (0 for firm 1 and  $c \geq 0$  for firm 2). Transportation costs are linear with slope  $t$ .

What is the outcome of this game? Given the leader's uniform base price, the buyers pay the base price plus the transportation cost from 0 to the location of the buyer no matter what firm serves the consumer. The delivered price thus lies on the heavy line in Figure 3. The market areas of firms 1 and 2 are given by  $[0, \bar{x}]$  and  $[\bar{x}, 1]$  on the assumption that marginal production costs are zero for both firms. In other words, the market areas are separated so that no cross-hauling occurs. This result is in clear contradiction with real-world practice and disqualifies the model as a description of the operation of a single basing point system. The reasoning behind it follows directly from the assumption of price strategies. In the area  $[\bar{x}, 1]$  firm 2 can, given the announced base price of the leader, always undercut the delivered price of the leader since it is larger than the sum of the marginal production and transportation costs of firm 2 (the thin line in Figure 3). The slightest price cut allows firm 2 to capture the demand on  $[\bar{x}, 1]$  because firm 1 is the first mover (and thus committed to the announced price  $p_1$  plus transportation cost). This being the case, the optimal response of firm 2 to firm 1's commitment is to simply match the latter's delivered price inside area  $[\bar{x}, 1]$ . In equilibrium, firm 2 does not have to undercut and yet has its own market area  $[\bar{x}, 1]$  inside which firm 1 cannot penetrate. In this area, firm 2 fixes delivered prices equal to  $p_1$  plus transportation cost from basing point 0, which amounts to discriminatory pricing: firm 2's delivered price decreases as it ships the commodity from point 1 towards  $\bar{x}$ .

This competitive interpretation of a single basing point system is (not surprisingly) shown by Thisse and Vives not to be an equilibrium of the game in price policies. Instead of the two-stage game just described, three other subgames can be defined under the same basic assumptions: one in which firm 2 commits to uniform pricing and firm 1 reacts optimally (which is similar), one in which both firms choose to price uniformly and one in which both firms keep complete freedom. Each of these four games is a special case of a more basic two-stage game where firms may either commit to price uniformly or keep their freedom of pricing.

A comparison of the profits made in the four cases shows that the last one gives the equilibrium profits of the price policy game. Firms then choose to both price discriminate and this policy is a dominant strategy for any firm. The resulting equilibrium delivered prices then lie on the heavy line in Figure 4 (with  $c = 0$ ). Consequently "no firm, not even the more efficient one, wants to be the price leader taking as basing point its location and, therefore, single BPP [basing point pricing] is not a stable configuration since it is not an equilibrium of our two-stage game."

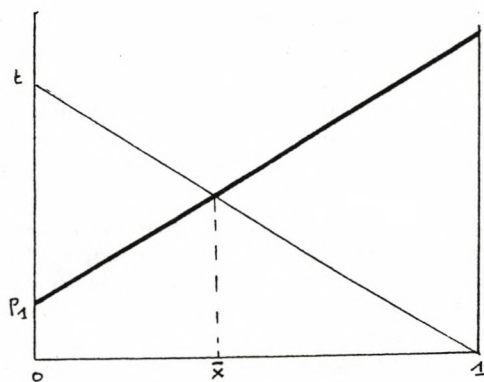


Figure 3

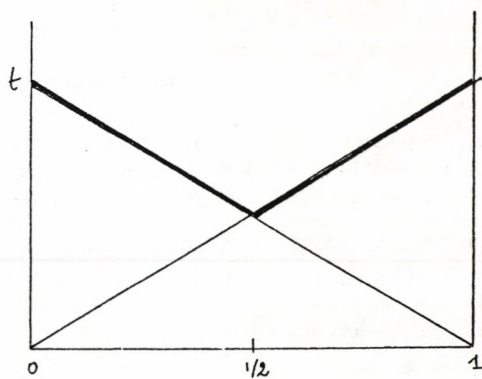


Figure 4



(Thisse and Vives, 1988, p. 130.) The attempt to give a competitive interpretation which fits an oligopolistic market structure is a failure and the conventional wisdom on the collusive market-sharing nature of single basing point pricing is not contradicted.

Benson, Greenhut and Norman (1990) made an heroic effort to combine the Thisse-Vives approach in terms of price strategies with Haddock's assumption of there being several firms located at the basing point. Under these assumptions, a single basing point system will arise only if production at distant sites is monopolized and firms at the basing point are the low-cost suppliers to all buyers. It is necessary that a single firm located at a distance exploits its local market power, collects locational rents and alone sells over its market area. Conventional wisdom, stressing market sharing, is more appropriate.

What about the multiple basing point system? Here, Thisse and Vives (1988) recognize that, although it resembles the case where both duopolists choose to price uniformly, it is in fact very different because of the alignment rule. This rule implies that there is market sharing in a common market area, and hence cross-hauling, with a concomitant reduction in profits. However, these profits turn out to be larger than in the case where both firms keep their freedom to price-discriminate, but lower than those obtained when both firms choose to price uniformly. The conclusion is that "market sharing in the common area gives the multiple basing point system a noncompetitive flavor" (Thisse and Vives, 1988, p. 132). Again, conventional wisdom is not contradicted: basing point pricing is a form of partial collusion.

A final comment is in order. In industries selling heavy products such as steel and cement, sales depend on distance and therefore on geographical market areas, the products being homogeneous. It would seem natural, therefore, to consider games with quantity (or Cournot) strategies. That is precisely what Greenhut and Greenhut did in their pioneering 1975 paper. They derived the non-cooperative Cournot-Nash equilibrium delivered price schedules characterizing different types of geographical concentration. In each case, they found that only some percentage of transport costs is added to the mill price. Adding the full transportation cost occurs in equilibrium only if the number of competing firms located together in some point in space tends to infinity. As long as oligopoly prevails, basing point pricing cannot be a property of non-cooperative equilibria: When oligopolists announce they will add 100 per cent of the cost of transportation to their mill or base price, a collusive arrangement is to be suspected.

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