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Buyer Power in a Bilateral Duopoly Model*

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When there are a few upstream and a few downstream enterprises, a situation of bilateral oligopoly is very likely to emerge. It is a situation according to which the concentration of the buying downstream firms curtails the pricing and output options of the selling upstream firms. Nevertheless, there has not been yet a theory of buyer vs. seller power. This paper elaborates such a theory through the duopsony-duopoly paradigm, i.e. in terms of a bilateral duopoly model, in an attempt to identify the impact of buyer power on market price and output.

1. Introduction

This paper develops an economic theory of buyer power emerging from buyer concentration. It is well known that buyer power can compell oligopolistically structured sellers to conform to consumer wants. Yet, there have not been any systematic attempts toward a formal analysis of this issue. The only theoretical propositions that have been established thus far are the results of the theory of bilateral monopoly. The relevant literature includes the original expositions of *Bowley* 1928, *Fellner* 1949 and *Morgan* 1949, and an investigation of the possibility and effects of vertical integration by *Blair/Kaserman* 1978, *Comanor* 1967, *Gould* 1977, *Greenhut/Ohta* 1976, *McGee/Bassett* 1976, *Perry* 1978, *Schmalensee* 1973, *Vernon/Graham* 1971, *Warren-Boulton* 1974 and others, (though vertical integration is not necessarily the outcome of a bilateral oligopoly situation). Any other treatment of buyer power utilizes in one way or the other the available empirical evidence to identify problematics which could enhance our knowledge. A non-exhaustive account of important contributions toward this direction includes apart from the seminal book of *Galbraith* 1952, works by *Adams/Dirlam* 1964, *Allen* 1971, *Baumol/Quandt/Shapiro* 1965, *Bolch/Damon* 1978, *Brooks* 1973, *Clevenger/Campbell* 1977, *Crandall* 1968, *Guth/Schwartz/Whitcomb* 1976, *Lustgarten* 1975, *McGuskin/Chen* 1976, *Nicol* 1975 and *Porter* 1974.[1]

This paper, however, analyzes buyer power using the principles of economic theory in order to derive some meaningful propositions which can

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[1] For a detailed survey on buyer concentration and power see e.g. the tenth chapter in *Scherer* 1980.

become an integrated part of the received economic theory. More precisely, it is well known that in a market with a single seller and a single buyer it is not possible for the former to behave as a monopolist and for the latter as a monopsonist. The reason is that no one can exploit a demand function which does not exist, and this leads to the theory of bilateral monopoly. Nevertheless, when the number of buyers and sellers increase in a way that both of them preserve some market power, an exploitable demand curve exists and the question is if this exploitation benefits the sellers or the buyers. But first, one has to establish the existence of conflict between oligopolistically structured sellers and buyers. As soon as this task has been carried out successfully, one may proceed to examine the benefits of the buyers when the exploitation of the demand curve is to the advantage of either the sellers or the buyers.

In what follows, the next three sections model a market situation where there are two sellers and two buyers and show the existence of conflict between the participants. They are followed by a section developing a market solution when the sellers dominate and examining its impact on buyers. A market solution for the case where the dominant force are the buyers is established, and possible changes in their welfare relative to the welfare results of the previous sections are traced by still another section. A concluding section provides a program for further research. The major proposition emerging from the analysis is that the simple presence of buyer concentration acts as a constraint to seller behavior. This is very close to the concept of "countervailing power" developed by *Galbraith* in 1952. Therefore, this paper may be considered as an attempt to advance countervailing power from a concept to a theory via a bilateral duopoly model.[2]

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[2] Real-world bilateral duopolies should be as rare as "pure" duopolies are. They would be the limiting case of such bilateral oligopoly situations as those pointed out initially by Galbraith: "the discounts won from oligopolistic tire markets by Sears, Roebuck; the auto industry's reputed success in curbing the pricing power of steel mills; and (on the other side of the market) the ability of strong unions to win large wage and fringe benefit concessions from powerful employer groups" (*Scherer* 1980, 306). In other words, the issue in hand is the market which is developed between a few upstream and a few downstream enterprises. The analysis is made in terms of interduopoly relations for the same (methodological) reasons the theory of pure oligopoly is carried out in terms of pure duopolies: simplicity of the exposition and identification of the fundamental economic relations that are governing an otherwise complex phenomenon of the modern industrial economies. Strictly speaking, it would be hard to identify quantitatively a bilateral duopoly, because the extent of buyer concentration among trading manufacturers is hardly assessible. If not anything else, industry definitions given by the input-output tables upon which the measurement of buyer concentration is based, are too broad to capture accurately such trades.

2. Oligopolistically Structured Buyers' Behavior

Consider a case of bilateral duopoly in the market for a produced good q_2. The buyers use q_2 as an input to produce q_1 according to the weakly additive production functions

$$q_{1Bi} = c_{Bi} + a_{Bi} q_{2Bi} \qquad i = 1, 2, \tag{0}$$

where c is a function of inputs other than q_2, a is a constant, and the subscript Bi denotes the *ith* buyer. c may be interpreted as involving inputs which for simplicity are taken to be fixed. Methodologically, this assumption is plausible because the input of primary interest is q_2 and hence, it is convenient to keep the other inputs fixed.[3] Also, the assumption of additivity underlying the production functions is not as restrictive as it seems to be since, one may always apply an input independence transformation to a non-additively separable function and obtain additivity.[4]

Now, buyers sell q_1 in a competitive market at a fixed price p_1. The profit Π of each buyer is

$$\Pi_{Bi} = p_1 c_{Bi} + p_1 a_{Bi} q_{2Bi} - p_2 q_{2Bi} \qquad i = 1, 2. \tag{1}$$

If the buyers follow the basic behavior assumption of the Cournot duopoly and if the inverse demand function for q_2 is linear of the form

$$p_2 = k_S - u_S (q_{2Sm} + q_{2Sn}) \qquad m, n = 1, 2, \qquad m \neq n, \tag{2}$$

with

$$q_{2Sm} + q_{2Sn} = (q_{2Sm} + q_{2Sn})_{Bi} + (q_{2Sm} + q_{2Sn})_{Bj} \qquad i, j = 1, 2, \qquad i \neq j, \tag{3}$$

being the parts of the total sales of the *mth* and *nth* sellers that go to the *ith* and *jth* buyers and

$$q_{2Bi} = (q_{2Sm} + q_{2Sn})_{Bi}, \tag{4}$$

being the purchases of the *ith* buyer from the *mth* and *nth* seller, then substituting equations (2), (3) and (4) in (1) yields

$$\begin{aligned} \Pi_{Bi} = {} & p_1 a_{Bi} (q_{2Sm} + q_{2Sn})_{Bi} + p_1 c_{Bi} - k_S (q_{2Sm} + q_{2Sn})_{Bi} + \\ & + u_S (q_{2Sm} + q_{2Sn})^2_{Bi} + u_S (q_{2Sm} + q_{2Sn})_{Bi} (q_{2Sm} + q_{2Sn})_{Bj}. \end{aligned} \tag{5}$$

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[3] c confines the issue to its short-run aspects but as it will be shown shortly, the results of the analysis are independent of c and thus, cover both the short- and long-run as well.

[4] See *Theil* 1980, 193.

The buyers maximize profits when

$$(6) \qquad \frac{d\Pi_{Bi}}{dq_{2Bi}} = p_1 a_{Bi} - k_S + 2u_S(q_{2Sm} + q_{2Sn})_{Bi} + u_S(q_{2Sm} + q_{2Sn})_{Bj} = 0.$$

Now, suppose that h_{Sm} percent of the total sales of the *mth* seller go to the *ith* buyer. Consequently, $(1 - h_{Sm})$ percent go to the *jth* buyer. Therefore,

$$(7) \qquad q_{2Sm} = (q_{2Bi} + q_{2Bj})_{Sm} = h_{Sm} q_{2Sm} + (1 - h_{Sm})\, q_{2Sm}.$$

Substituting equation (7) in (6) we may obtain the input reaction functions

$$(8) \qquad q_{2Sm} = \frac{k_S - p_1 a_{Bi}}{u_S(1 + h_{Sm})} - \frac{(1 + h_{Sn})}{(1 + h_{Sm})} q_{2Sn},$$

which when solved for q_{2Sm} yield

$$(9) \qquad q_{2Sm} = \frac{1}{3u_S(h_{Sm} - h_{Sn})}\left[(2 - h_{Sn})(k_S - p_1 a_{Bi}) - (1 + h_{Sn})(k_S - p_1 a_{Bj})\right].$$

Substituting equation (9) in (2) the price of q_2 is

$$(10) \qquad p_2 = k_S - \frac{(3 - h_{Sn} + h_{Sm})}{3(h_{Sn} - h_{Sm})}\left[2k_S - p_1(a_{Bi} - a_{Bj})\right].$$

Equations (9) and (10) describe the market solution under a pure duopsony. The sellers still constitute a duopoly but they are assumed to behave as under perfect competition and hence, buyers are essentially buying their input requirements from a competitive market; this is exactly the pure duopsony case. A possible interpretation of this seller behavior is that they simply ignore or are not aware of their market power.

3. Oligopolistically Structured Sellers' Behavior

Sellers use a single input x for the production of q_2. They buy x in a competitive market at the fixed price w. Assume that their production functions have precisely the same form as those of the buyers and can be expressed in inverse form as

$$(11) \qquad x_{Sm} = (q_{2Sm} - c_{Sm})/a_{Sm} \qquad m = 1, 2,$$

where c is a function of inputs other than x, a is a parameter, while the subscript Sm refers to the *mth* seller. Of course, the qualifications associated with the production technologies of the buyers, apply to sellers as well. Note that since we are essentially dealing with successive stages of production, c may then be interpreted as representing inputs that are common to the production processes of both buyers and sellers and which are assumed to be fixed. Put differently, c represents fixed non-specific inputs whereas x and q_2 are specific to the production of sellers and buyers, respectively.[5]

As an example consider the entire production process of food. This process is composed of three stages. In the first stage food is produced in agricultural plots, then it is processed by manufacturers and finally, it is sold as an end product to the final consumers by supermarkets. All three stages use as inputs capital and labor and therefore, these are the non-specific inputs modeled through the function c. In addition, each of the three stages uses inputs which are specific to a particular line of commerce and stage of production. This, however, interpretation of c and x raises the question of why their roles are not inversed so that we can study the impact of buyer concentration and power on non-specific inputs such as capital and labor; this would be more interesting and significant. The answer is that as soon as q_2 is specific then it would be a fallacy to consider x as non-specific. To obtain theoretical propositions concerning the non-specific input, q_2 has to be non-specific, too. But this is equivalent to that the sellers use, say labor to produce labor. Consider, for instance, unions such as the American Federation of Labor (AFL) and the Congress of Industrial Organizations (CIO). Their input is labor of all trades and skills and their output is again labor. But the number of buyers of this labor is big enough to make AFL and/or CIO be a duopsony or monopsony. Therefore, our problem vanishes.

Now, we are in a position to consider the behavior of sellers. Assuming again a Cournot duopoly, the profit of each seller is

$$\Pi_{Sm} = p_2 q_{2Sm} - w\,(q_{2Sm} - c_{Sm})/a_{Sm}, \tag{12}$$

which substituting from equation (2) becomes

$$\Pi_{Sm} = k_S q_{2Sm} + u_S\,(q_{2Sm}^2 + q_{2Sm} q_{2Sn}) - w\,(q_{2Sm} - c_{Sm})/a_{Sm}. \tag{13}$$

Maximization of profits requires

$$\frac{d\Pi_{Sm}}{dq_{2Sm}} = k_S - 2u_S q_{2Sm} - u_S q_{2Sn} - (w/a_{Sm}) = 0. \tag{14}$$

Therefore, the reaction functions are

$$q_{2Sm} = \frac{1}{2}\left(\frac{a_{Sm}k_S - w}{a_{Sm}u_S}\right) - \frac{1}{2}\,q_{2Sn} \tag{15}$$

and so

[5] As soon as q_2 is used only by buyers, it is specific.

(16) $$q_{2Sm} = \frac{1}{3u_S}\left[w\left(\frac{1}{a_{Sn}} - \frac{2}{a_{Sm}}\right) + k_S\right].$$

Substituting equation (16) back in (2) yields

(17) $$p_2 = \frac{1}{3}w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right) + k_S.$$

Equations (16) and (17) provide the market solution under pure duopoly. The concentration of buyers is still present but they behave as if they were under competitive conditions. Consequently, the sellers sell q_2 essentially in a competitive market and the result is a pure duopolistic solution.

4. The Conflict Between Buyers and Sellers

Apparently, the q_{2Sm}'s given by equations (9) and (16) are not equal while there is also a discrepancy between the p_2's of equations (10) and (17). To find out which quantities are larger note that solving for k_S from equation (10) and inserting the result in equation (17) yields

(18) $$p_{2(17)} = \frac{1}{3}\left\{w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right) + p_{2(10)} + \frac{(3 - h_{Sn} + h_{Sm})}{3(h_{Sn} - h_{Sm})}\left[2k_S - p_1(a_{Bi} - a_{Bj})\right]\right\},$$

where the number in parentheses in the subscripts of p_2 denotes equation number, i.e. $p_{2(17)}$ is the p_2 of equation (17). Now, when the third term in the big bracket of equation (18) is positive or even negative but with

(19) $$w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right) > \frac{(3 - h_{Sn} + h_{Sm})}{3(h_{Sn} - h_{Sm})}\left[2k_S - p_1(a_{Bi} - a_{Bj})\right],$$

then

(20) $$p_{2(17)} > p_{2(10)} \iff q_{2Sm(16)} < q_{2Sm(9)}.$$

These inequalities can be reversed iff inequality (19) is reversed. But since p_2 has to be positive we must have

$$p_{2(10)} > \left\{\frac{(3 - h_{Sn} + h_{Sm})}{3(h_{Sn} - h_{Sm})}\left[2k_S - p_1(a_{Bi} - a_{Bj})\right] - w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right)\right\} > 0,$$

which in turn implies that

(21) $$k_S < w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right),$$

or that the horizontal intercept of the demand curve for q_2 is lower than the sum of the marginal costs of the individual sellers, because otherwise

$p_{2(10)} \leqslant 0$ by virtue of equation (10). Evidently, equation (21) can not exist and so equation (20) is always true. Furthermore, it should be remarked that the third term in the big brackets of equation (18) can become negative only if $h_{Sm} > h_{Sn}$ and not when $p_1 a_{Bi} - p_1 a_{Bj} > 2k_S$. Since $p_1 a_{Bi}$ and $p_1 a_{Bj}$ are the value marginal products of the *ith* and *jth* buyer respectively, then it does not make sense that the difference between $p_1 a_{Bi}$ and $p_1 a_{Bj}$ is more than twice the horizontal intercept of the aggregate demand curve for q_2.

These considerations establish the existence of conflict between oligopolistically structured sellers and buyers. Therefore, the market solution will have to be consistent with either seller or buyer domination. The issue at hand is what happens to buyer welfare in each of these cases and how it is compared relative to other cases. It is to this subject that we next turn.

5. Domination of Sellers

When the sellers dominate and force the buyers to accept whatever quantities and price they set, then by virtue of equations (2) and (3), equation (6) yields

$$p_2 = p_1 a_{Bi} + u_S (h_{Sm} q_{2Sm} + h_{Sn} q_{2Sn}), \tag{22}$$

and so substituting equation (22) in (12), each seller is found to maximize

$$\Pi_{Sm} = p_1 a_{Bi} q_{2Sm} + u_S (h_{Sm} q_{2Sm}^2 + h_{Sn} q_{2Sn} q_{2Sm}) - w (q_{2Sm} - c_{Sm})/a_{Sm}, \tag{23}$$

by setting the derivative

$$\frac{d\Pi_{Sm}}{dq_{2Sm}} = p_1 a_{Bi} + 2u_S h_{Sm} q_{2Sm} + h_{Sn} q_{2Sn} - (w/a_{Sm}) = 0. \tag{24}$$

The corresponding reaction functions are

$$q_{2Sm} = \frac{w - a_{Sm} p_1 a_{Bi}}{2a_{Sm} u_S h_{Sm}} - \frac{h_{Sn} u_S a_{Sm}}{2a_{Sm} u_S h_{Sm}} q_{2Sn}. \tag{25}$$

Solving these relations for q_{2Sm}

$$q_{2Sm(26)} = \frac{1}{3h_{Sm} u_S} \left[w \left(\frac{2}{a_{Sm}} - \frac{1}{a_{Sn}} \right) - p_1 a_{Bi} \right], \tag{26}$$

and substituting back to equation (22)

$$p_{2(27)} = \frac{1}{3} \left[p_1 a_{Bi} + w \left(\frac{1}{a_{Sm}} + \frac{1}{a_{Sn}} \right) \right]. \tag{27}$$

Equations (26) and (27) describe the market solution when the sellers dominate.

The question now is whether equations (26) and (27) coincide with (16) and (17), respectively. If they do, then buyer concentration does not matter. But if they do not coincide, then even though it is the sellers that dominate, buyer power emerging from buyer concentration is taken into account by the sellers and they act accordingly. Equating $q_{2\,Sm\,(16)}$ with $q_{2\,Sm\,(26)}$ yields $h_{Sm} = -1$ while when $p_{2\,(17)} = p_{2\,(27)} \Rightarrow k_S = p_1 a_{Bi}$. Since $0 \leqslant h_{Sm} \leqslant 1$ and $k_S > p_1 a_{Bi}$ we obtain that

$$(28) \qquad p_{2\,(17)} > p_{2\,(27)} \Leftrightarrow q_{2\,Sm\,(16)} < q_{2\,Sm\,(26)}.$$

Consequently, even though the sellers are the dominant force, their decisions are constrained by the power of buyers. As inequality (28) explains, this is to the advantage of buyers because now they enjoy larger quantity at a lower price.

Furthermore, solving equation (10) for $p_1 a_{Bi}$ and substituting the result in equation (27) we obtain

$$(29) \quad p_{2\,(27)} = \frac{1}{3}\left[(p_{2\,(10)} - k_S)\frac{3\,(h_{Sn} - h_{Sm})}{(3 - h_{Sn} + h_{Sm})} + 2k_S + p_1 a_{Bj} + w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right)\right].$$

If the first term in the big brackets is positive or even negative but with

$$(30) \quad w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right) + 2k_S + p_1 a_{Bj} > \left|(p_{2\,(10)} - k_S)\frac{3\,(h_{Sn} - h_{Sm})}{(3 - h_{Sn} + h_{Sm})} - p_{2\,(10)}\right|,$$

then

$$(31) \qquad p_{2\,(27)} > p_{2\,(10)} \Leftrightarrow q_{2\,Sm\,(26)} < q_{2\,Sm\,(9)}.$$

The same rational behind inequality (21) explains that for $p_{2\,(27)}$ to be positive and less than $p_{2\,(10)}$ it takes

$$w\left(\frac{1}{a_{Sn}} + \frac{1}{a_{Sm}}\right) > p_1 a_{Bi}$$

or that the total marginal cost of the buyers is greater than the value marginal product of the *ith* buyer. This is not correct and therefore, inequality (31) is always true. The conjunction of inequalities (28) and (31) yields

$$(32) \qquad p_{2\,(17)} > p_{2\,(27)} > p_{2\,(10)} \Leftrightarrow q_{2\,Sm\,(16)} < q_{2\,Sm\,(26)} < q_{2\,Sm\,(9)}.$$

In words, the price of pure duopoly is greater than the price of bilateral duopoly when the sellers dominate and this is greater than the price of pure duopsony. Of course, the opposite holds for the quantities.

6. Domination of Buyers

When the buyers dominate and force the sellers to supply whatever quantities they demand at whatever price they offer, then equation (14) yields

$$p_2 = u_S q_{2Sm} + (w/a_{Sm}), \tag{33}$$

and so substituting in equation (1) the profits of each buyer become

$$\Pi_{Bi} = p_1 c_{Bi} + p_1 a_{Bi} q_{2Bi} - u_S q_{2Sm} q_{2Bi} - (w/a_{Sm})\, q_{2Bi}. \tag{34}$$

Now, suppose that h_{Bi} percent of the total purchase of q_2 by the *ith* buyer come from the *mth* seller. Consequently, $(1 - h_{Bi})$ percent come from the *nth* seller. Therefore, equation (4) becomes

$$q_{2Bi} = (q_{2Sm} + q_{2Sn})_{Bi} = h_{Bi} q_{2Bi} + (1 - h_{Bi})\, q_{2Bi} \quad \text{with} \tag{35}$$

$$h_{Bi} q_{2Bi} = h_{Sm} q_{2Sm} \quad \text{and} \tag{36}$$

$$h_{Bj} q_{2Bj} = (1 - h_{Sm}) q_{2Sm}. \tag{37}$$

Substituting equation (35) in (34) we obtain

$$\Pi_{Bi} = p_1 c_{Bi} + p_1 a_{Bi} q_{2Bi} - u_S (h_{Bi} q_{2Bi}^2 + h_{Bj} q_{2Bj} q_{2Bi}) - (w/a_{Sm})\, q_{2Bi}. \tag{38}$$

Maximization of these profits requires

$$\frac{d\Pi_{Bi}}{dq_{2Bi}} = p_1 a_{Bi} - 2u_S h_{Bi} q_{2Bi} - u_S h_{Bj} q_{2Bj} - (w/a_{Sm}) = 0. \tag{39}$$

From these relations we can find the corresponding input reaction function

$$q_{2Bi} = \left(\frac{p_1 a_{Bi}}{2u_S h_{Bi}} - \frac{w}{2u_S h_{Bi} a_{Sm}}\right) - \frac{h_{Bj}}{2h_{Bi}} q_{2Bj}. \tag{40}$$

Solving them for q_{2Bi}

$$q_{2Bi} = \frac{1}{3u_S h_{Bi}} \left[p_1 (2a_{Bi} - a_{Bj}) - (w/a_{Sm}) \right]. \tag{41}$$

Next, solving equation (36) for q_{2Sm} in terms of q_{2Bi} and substituting the results in equation (33) we obtain

$$p_2 = u_S (h_{Bi}/h_{Sm})\, q_{2Bi} + (w/a_{Sm}). \tag{42}$$

Substituting equation (41) in (42)

(43) $$p_{2(43)} = \frac{1}{3h_{Sm}}\left[p_1(2a_{Bi}-a_{Bj})+(2w/a_{Sm})\right].$$

Or since from equation (33) $q_{2Bi} = (h_{Sm}/h_{Bi})\,q_{2Sm}$, equation (41) may be rewritten as follows

(41′) $$q_{2Sm(41)} = \frac{1}{3u_S h_{Sm}}\left[p_1(2a_{Bi}-a_{Bj})-(w/a_{Sm})\right],$$

while equation (43) remains unchanged.

Now, we proceed to comparisons. Solving $p_{2(43)}$ for $p_1 a_{Bi}$ and substituting the result in $p_{2(27)}$ yields

(44) $$p_{2(27)} = \frac{1}{2}h_{Sm}p_{2(43)}+\frac{1}{3}\left[(p_1 a_{Bj}/2)+(w/a_{Sn})\right],$$

which implies that

(45) $$p_{2(27)} > p_{2(43)} \Leftrightarrow q_{2Sm\,(26)} < q_{2Sm(41)}.$$

Next, solving $p_{2(10)}$ for $p_1 a_{Bi}$ and substituting the result in $p_{2(43)}$ we obtain

(46) $$p_{2(43)} = \frac{2}{3h_{Sm}}\,\frac{(3-h_{Sn}+h_{Sm})}{3\,(h_{Sn}-h_{Sm})}(p_{2(10)}-k_S)+(2k_S+p_1 a_{Bj}) + \frac{1}{3h_{Sm}}\left(\frac{2w}{a_{Sm}}-p_1 a_{Bj}\right).$$

Since $p_2 > 0$ and the first two terms in the left hand side of this expression equal to $p_1 a_{Bi}$, then they have to be greater than the absolute value of the third term in case $(2w/a_{Sm}) > p_1 a_{Bj}$. But $p_1 a_{Bi} > 0$, too and so, in case the first term is negative its absolute value must be less than the term $(2k_S + p_1 a_{Bj})$. Given these remarks and observing that we have the following cases:

$\frac{2}{3h_{Sm}}\,\frac{(3-h_{Sn}+h_{Sm})}{3\,(h_{Sn}-h_{Sm})}(p_{2(10)}-k_S)$	$(2k_S+p_1 a_{Bj})$	$\frac{1}{3h_{Sm}}\left(\frac{2w}{a_{Sm}}-p_1 a_{Bj}\right)$
(1st term)	(2nd term)	(3rd term)
−	+	+
−	+	−
+	+	+
+	+	−

then

(47) $$p_{2(43)} > p_{2(10)} \Leftrightarrow q_{2Sm(41)} < q_{2Sm(9)}.$$

The conjunction of inequalities (32), (45) and (47) yields

$$\begin{aligned} &p_{2(17)} > p_{2(27)} > p_{2(43)} > p_{2(10)} \Leftrightarrow \\ (48) \qquad &\Leftrightarrow q_{2\,Sm(16)} < q_{2\,Sm(26)} < q_{2\,Sm(41)} < q_{2\,Sm(9)}. \end{aligned}$$

This relation explains that the price of pure duopoly is greater than that of bilateral duopoly when the sellers dominate. This, in turn, is greater than the price of bilateral duopoly when the buyers dominate but with the price of pure duopsony being the smallest. Clearly, it is not only the sellers that are constrained by the power of buyers. Dominating buyers are also constrained by powerful sellers, so that they can not force them to a pure duopsony situation. In other words, the effects of power are symmetric on both sides of an oligopolistically structured market. And, as far as buyer power from buyer concentration is concerned, the buyers are always better off compared to a situation where concentration is small or even inexistent. Therefore, buyer concentration is by itself welfare enhancing. It is not even necessary for buyers to attempt a market domination because even the simple presence of their power acts as a constraint to strong sellers. The wants of buyers are satisfied better and this could be improved further if the buyers participated in the market actively by pursuing to dominate it. Summing up, it seems that we have a theory of Galbraith's concept of countervailing power.

7. Conclusion

This paper developed a theory of "countervailing power" via a bilateral duopoly model. The analysis could be extended along the following lines:

(i) Relaxing the assumption that p_1 is fixed in order to examine forward pass-on dynamics, i.e. benefits resulting from buyer power that pass forward to final consumers. w will still have to remain fixed.

(ii) Relaxing the assumption that w is fixed in order to examine backward pass-on dynamics, i.e. benefits or losses resulting from buyer power that pass backward to the suppliers of specific inputs to sellers. p_1 will have to be kept fixed.

(iii) Relaxing the assumption that both p_1 and w are fixed. Both prices will be allowed to vary in order to examine forward and backward pass-on dynamics simultaneously.

These are questions that occupy the literature of buyer concentration and power in industrial organization. Their treatment has been superficial and without any theoretical foundations. In this manner, while this paper is concerned with a bilateral duopoly modeling of countervailing power, its results might be used in order to answer buyer power questions in industrial organization. Such issues are of great importance not only to policy makers but also theoretically because what has been known so far about them is rarely in the way of formal economic theory.

A possible explanation of the reasons for the lack of such a theory thus far, is that bilateral oligopolies tend, under the influence of the structural change and of the macrodynamics of the capitalist economy, to dismantle through various vertical integration schemes. This tendency is easily discerned when one compares e.g. the timing of merger and acquisition bursts with the changes in the vitality of the economy, in the technological base of the production, and even in the available menu of financial instruments. But, this tendency has also produced almost unconsciously an attitude of thinking of the bilateral oligopoly as an inherently unstable situation that finally leads to vertical integration. Unconsciously, because the issue of bilateral oligopoly is treated by the literature as part of the issue of vertical integration, while there has not been previously a theory of bilateral oligopoly upon which to base a would-be instability conclusion. The model developed herein might be used as an outlet for research in this direction as well.

Summary

The objective of this paper is the construction of a consistent mathematical model, with regard to the market power of two duopsonists vs. two duopolists. The result is an explicitly derived mutual constraint on price and quantity determination by both parties. The paper concludes with some directions for further research on the subject.

Zusammenfassung

Gegenstand des Papiers ist die Konstruktion eines konsistenten mathematischen Modells das die Marktmacht von zwei Dyopsonisten berücksichtigt, die mit zwei Dyopolisten konfrontiert sind. Aus der Analyse ergeben sich gegenseitige constrains für beide Marktteilnehmer in Bezug auf die Preis- und Mengensetzung. Die Arbeit schließt mit einem Ausblick auf noch offene Fragestellung, die eine weitere Untersuchung benötigen.

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