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FORMS OF COMPETITION AND CONTRACTING

IN THE PRIVATE MARKETING OF COLLECTIVE GOODS

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FORMS OF COMPETITION AND CONTRACTING IN THE PRIVATE MARKETING OF COLLECTIVE GOODS

by

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INTRODUCTION

A. Outline of the paper. In a recent issue of this journal, Thomas Borcherding claims to produce a "counterexample" that "refutes" a theorem of mine on the oversupply of privately produced collective goods under perfectly competitive conditions (1968, 1969). While his argument explicitly violates a condition of the theorem--namely, the Cournot assumption--and therefore is certainly not a counterexample, the alternative pricing contracts that form the basis of Borcherding's critique are well worth discussing. For showing why his "complex contracts," or fixed-price commitments, by sellers of collective goods cannot arise in a perfectly competitive model, as we do in section I of this paper, requires a heretofore missing specification of the micro-dynamics underlying the model. Borcherding's fixed-price, Lindahl-type model is seen to imply buyer cooperation, or monopsony purchase of the collective good. Monopsonistic cooperation is similarly found in the related, also allegedly competitive, collective-goods analyses of Demsetz (1970) and Cheung. Finally, our simple microdynamic pricing model of Section I is used to explain the empirical observation that long-term, fixed-price commitments arise under buyer cooperation but not under buyer competition in the wire-service industry, the observed industry that we believe most closely approximates a perfectly competitive, perishable-collective-good industry.

Section II of this paper relaxes the informational perfection assumptions of the perfectly competitive, microdynamic model. First, we allow a sequence of separate, independent sales of related, durable, collective goods over time. Here we find a quasi-competitive environment in which fixed-price commitments are rational contracting solutions. But the commitments serve only to reduce--they cannot eliminate--the competitive oversupply of these substitutable collective goods. This multiperiod generalization indicates a greater robustness of my original welfare results than heretofore indicated and leads us into an empirical application of the theory to the observed market for technical innovations. As in the single-period, wire-service case, fixed-price and variable-price contracts arise according to the predictions of our microdynamic theory, and tendencies toward the overproduction of collective-good substitutes are detected. Also, quite topically, the related, competitive underproduction of private-good complements to a prospective collective-good output translates into support for "Atari mercantilism," the subsidization of investment in an industry according to the industry's prospective rate of technical progress.

A second kind of weakening of the conditions of the perfectly competitive microdynamic model leading to fixed current prices to the buyers is obtained by not allowing firms to observe one another's price offers or quantities sold. This, relatively crude, Bertrand-type, market information structure also yields

analogous forces toward the competitive overvaluation of collective-good substitutes: First, if, as in numerous Lindahlian models (e.g., Arrow, Foley, Mas Colell and Milleron), sellers somehow knew a priori each buyer's current solution marginal valuations, then a strictly analogous overvaluation of current substitutes to future collective goods would remain. Second, when, as in the several existing collective-good models with imperfect price discrimination (e.g., Steiner, Owen et al., and Brito-Oakland), the more realistically informed sellers simply present all potential buyers with a single, untailored, imperfectly discriminatory, fixed-price schedule, a roughly analogous force toward the overvaluation of all collective goods emerges in that expanding sellers of collective goods benefit from the induced changes in the quantities sold by the price-passive producers of related collective-goods. That the latter overproduction tendency exists in the real world is a common observation among students of broadcasting, where this generalized model most obviously applies. The model is also applied to the ubiquitous markets for the information services provided by private-goods retailers, brokers, and dealers and, as in the other cases, helps rationalizes existing statutes providing incomplete exclusion rights to private providers of information.

A third generalization of the basic model leading to collective-good prices that are fixed to individual buyers is achieved by dropping the conventional assumption that any collective-good seller with an exclusion device is successful in

winning each of his microeconomic bilateral monopolies with his several buyers. Losing sellers must create special contracting procedures such as the granting of market-restricting, exclusive distribution rights in order to obtain significantly positive prices from their winning buyers. Observed sellers do in fact grant these peculiarly restrictive rights in the only collective-goods market we could find in which buyers evidently win their bilateral monopolies, the wholesale market for mass-media entertainment and education products.

Finally, in Section III, the concluding section of the paper, our basic economic analysis is extended to worlds without collective goods. Here too, while fixed-price commitments sometimes arise to rationally reduce the private-good analogue to my various collective-good misevaluations, important, seemingly unjustifiable, statutory interventions have evolved to reduce the remaining, substantial inefficiencies.

B. Introductory example. The clarity of our subsequent theoretical development will be enhanced by tying it to a numerical example: Suppose there are three possible wire services, each capable of delivering a continuous stream of news, a collective good. The quantity (quality) produced by the i^{th} wire service is denoted by Q_i. The sum of the real values of an additional unit of any service, say wire service #1, to all potential users, Σ MRS $(Q_1, Q_2 + Q_3)$, relative to a numeraire private good (say apples) declines with the previous quantity

supplied of the service, Q_1, for any given total supply of the other wire services, $Q_2 + Q_3$, as shown in the following table.

Table 1.

Σ MRS $(Q_1, Q_2 + Q_3)$

Q_1 \ $Q_2 + Q_3$	0	1	2
0	100	90	80
1	90	80	70
2	80	70	60

The matrix is symmetric in order to reflect an assumption of interchangeability of wire-service units provided by different suppliers. The wire services are substitutes in that larger values of $Q_2 + Q_3$ uniformly reduce Σ MRS for given Q_1. (Σ MRS would increase with $Q_1 + Q_2$ for complements, which would in turn force Σ MRS to increase with Q_1 in order to maintain a symmetric matrix and interchangeability among different wire-service units.) The seller of any wire service is a natural monopolist over his unique product. So, giving him the bargaining edge over his several buyers, we can assume that he price-discriminates

perfectly among his users. Thus, when $Q_2 + Q_3 = 0$, the marginal revenue function of the first wire service is Σ MRS(Q_1,0).

Say the cost of producing a single unit of a wire service to any supplier is 89 apples, while the additional cost involved in producing a second unit of that service is 91 apples. Then, in the absence of a competition, the first wire service would maximize profits by producing one unit of its service for a price-sum, $P(0,0) = \Sigma$ MRS(0,0), or 100 apples. The social surplus from doing so is 11 apples. An additional apple of social surplus would be produced if another firm entered and produced one unit of wire service. And there is certainly profit to entry, as the price-sum available to an additional supplier is at least 90 apples, while his cost is only 89 apples. We say "at least" because actually he will receive much more than 90 apples. Subscribers to a unit of his wire service also gain from price reductions from the first wire service. The use-value of the first unit, which was 100 apples, is now only 90. So the discriminated-against users gain from the availability of a second wire service through price reductions on the first wire service. But since the first wire service similarly gains from the presence of the second in that subscriptions to the first wire service also serve to lower the prices paid for the second, the price-sum of the first wire service will not fall with entry by the full, 10-apple decrease in real service-value. To compute the new price-sum to the first wire service, note that it is also the price-sum to the

second wire service, since they are providing interchangeable services. Therefore,

$$P(0,1) = \Sigma\ MRS(0,1) + [P(0,0) - P(0,1)]$$

$$= \Sigma\ MRS(0,1) + [\Sigma\ MRS(0,0) - P(0,1)]$$

$$= \frac{\Sigma\ MRS(0,0) + \Sigma\ MRS(0,1)}{2} = 95 \text{ apples.}$$

The entry of the second firm is therefore highly privately profitable, although it is barely socially profitable, generating an increased social surplus of only one apple but profit to the entrant of six apples. A further entrant is definitely not in the social interest. The marginal social value of his product, $\Sigma\ MRS(0,2)$, would be only 80, while his costs would be 89. His entry would reduce the aggregate social surplus from the wire-service industry from 12 to 3 apples. But the price with three independent wire services is

$$P(0,2) = \Sigma\ MRS(0,2) + 2[P(0,1)] - P(0,2)]$$

$$= \Sigma\ MRS(0,2) + 2\left(\frac{\Sigma\ MRS(0,0) + \Sigma\ MRS(0,1)}{2}\right) - 2P(0,2)$$

$$= \frac{\Sigma\ MRS(0,0) + \Sigma\ MRS(0,1) + \Sigma\ MRS(0,2)}{3} = 90 \text{ apples.}$$

So the third independent wire service will enter, driving industry profits to a minimal, competitive-equilibrium, level of one apple per producer.

The source of the competitive misallocation is an internalization of pecuniary effects that appear in marketing collective

goods: Since buyers always pay their demand prices to a seller of a given collective good, they receive pecuniary benefits from purchasing substitutes, benefits that come at the expense of the collective-good seller but cannot be made the basis of contractual compensation to the seller without implying a cooperative interaction, or "collusion," against the sellers of substitutes.

A strictly analogous pecuniary internality induces a competitive underpurchase of complementary collective goods. One producer's collective good then serves to <u>increase</u> the prices the buyers must pay for complementary collective goods and is therefore <u>undervalued</u> by the buyers. As emphasized in my 1968 paper, this introduces the theoretical possibility of dramatically inefficient, infant-industry traps in the competitive production of complementary collective factors. As was also pointed out, since previously purchased, <u>private-good</u> complements to collective goods are similarly undervalued while previously purchased, <u>private-good</u> substitutes are overvalued, the standard theory of value <u>between ordinary private goods</u> must be replaced once we recognize the existence of future, privately marketed, collective goods.

I. THE IRRATIONALITY OF FIXED-PRICE CONTRACTS IN THE PERFECTLY COMPETITIVE MARKETING OF COLLECTIVE GOODS

<u>A. Borcherding's argument</u>. Borcherding first notes, correctly, that my competitive overvaluation-of-collective-goods result occurs because the purchase of a given seller's unit of a

collective good lowers the prices that the buyer must pay to other sellers of the collective good. He then argues, also correctly, that the consequent overpricing of collective goods implies abnormally high buyer incentives to seek out contractual forms that will change the solution. But, given the informational limitations implied by a competitive environment, will such contractual forms be available?

Borcherding argues that they will be. In particular, he argues that each buyer can induce all of his suppliers to individually commit themselves to a fixed price, independent of the buyer's other purchases. Any such price commitment benefits the buyer in that he can use it to reduce his purchases from other sellers without suffering a price increase from the now-committed seller, increases such as this one being responsible for his initial overvaluation and overpurchase of the collective good. The fixed-price-committing sellers, Borcherding argues, are not hurt by offering these "complex" contracts, because the sellers receive essentially the same price with or without the price commitment.

B. Borcherding's error: The microdynamics of competitive pricing. However, since the buyer's purpose in obtaining these fixed-price agreements is to reduce his purchases from other, competing producers without suffering price increases from the committed producers, such agreements cannot be in the interests of a producer once we apply the Cournot assumption that he cannot influence the quantities sold of the other producers. Competitive

counterbidding for the smaller market by the threatened producers would merely lower all prices and unambiguously damage the initiating producers. Therefore, given this ordinary, competitive bidding for contracts, a rational decision to offer fixed-price contracts implies an ability of the customers to induce substantial reductions in production by some of their suppliers, an ability requiring non-Cournovian, collusive, buyer agreements.

To show this in a more concrete environment, we now impose Borcherding's "complex" contracting procedure on our illustrative example. Starting from our overproduction equilibrium, suppose a wire service offered--say to a buyer with $MRS(0,2) = \frac{1}{10} \Sigma\ MRS(0,2)$ and therefore an initial price of 9 apples--a new, fixed-price commitment--say initially at 9 1/2 apples--regardless of the buyer's actual demand price and therefore of his quantities purchased from the second and third wire services. If neither of these other wire services responded with price commitments of their own, the buyer's demand price for either one of their flexibly priced services would fall to

$$P = MRS(0,2) + \frac{MRS(0,1) + MRS(0,2)}{2} - P = 8\ 1/4 \text{ apples.}$$

An additional fixed-price commitment by either of these two would restore its demand price to $MRS(0,2) + [MRS(0,2) - MRS(1,2)] = 9$ apples if the third did not add with a fixed-price commitment of its own, in which case the third, being left with a demand price of only $MRS(0,2) = 8$ apples, would undercut its two competitors with counteroffers of fixed-price commitments as low as

8 apples in order to replace them. And if, anticipating this rational reaction, neither the second nor the third wire service added a fixed-price commitment to the first, it would still pay either one of them to counteroffer with a fixed-price commitment as low as 8 1/4 apples in order to replace the first. Anticipating such rational counteroffers, the first price-committer would have to drop his fixed-price offer to a self-defeating level of at most 8 1/4 apples. (If, alternatively, the first seller offered a contract of the form: "If you will pay me a side payment of, say, an apple and a half, I will offer you a fixed-price commitment," then the others would end up countering with less burdensome side payments until the total maximum price of 8 1/4 apples to any seller initiating a fixed-price after would remain.) Therefore, in view of ensuing counteroffers, no rational firm employs fixed-price commitments.[1]

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[1] This is in stark contrast to a competitive market for private goods, where having a high-demand buyer pay out his total user surplus to a particular, perfectly discriminating seller is not an equilibrium because another seller will--for a small fixed fee--profitably offer a lower price to the customer even though the initially discriminating seller employs a successful counteroffer to retain the customers. As we have seen, a collective-good seller providing a high-demand buyer with an analogous favor is being self-destructive because the ensuing rational counteroffers by the damaged competitors correspondingly shrinks the market for the price-cutter's own output. Thus, while commitments to narrowly irrational, predatory reactions to suppliers who offer price breaks to high-priced customers are required for perfectly discriminating, cooperative pricing of private goods (Thompson-Faith 1981), no such predatory commitments are required to effect the punishment of collective-good suppliers offering analogous price breaks. The latter suppliers are punished by the simple, uncommitted, noncooperative reactions of damaged competitors.

Now, if counteroffers were somehow infeasible--say because the buyer could practically precommit to certain sellers to reject more favorable counteroffers--fixed-price commitments would become profitable. In our wire service example, a favored seller would receive, say, an extra apple and a half, and his variable price would be down to eight apples. However, the buyer and his protected seller would jointly benefit even more from a price function whose variable component increased with his purchases of related collective goods. Such a price function would lower the prices he pays to other sellers even more than would a fixed-price contract. As the theortically optimal price function would then be one enabling the buyer to purchase the other collective goods at their respective supply prices to the buyer, the possible surplus of any competing firm would be eliminated, leaving us with a monopoly solution. We shall discuss this case at length in our empirical applications, where it will often be realistic to rule out the counteroffers that form the basis of a perfectly competitive process.

If each of many, independent, collective-good buyers could practically establish a complete, prior, bargaining commitment over a given seller, that seller would not have entered the industry. Viable producer-sellers of collective goods must be willing and able to make prior bargaining commitments when there are a large number of independent buyers; without such commitments, the sellers would receive no substantial revenue. Suppose the total collective-good sales of every producer-seller exceeded the total

collective-good purchases of each of his buyers. Then, each seller's return to devoting the overhead resources necessary to make a prior commitment to charging his buyers their demand prices would exceed the return to any buyer to incurring the overhead cost necessary to make a prior commitment to pay only the producers' supply prices to him, and a simple bargaining model (e.g., Thompson-Faith 1979) would have each producer-seller of a collective good large enough to win his bargaining contest with every one of his individual buyers. Therefore, given such a bargaining model, as long as there are many independent buyers, the number of active, competitive sellers can always be reduced to where each will find it profitable to establish a prior bargaining commitment and generate our competitive equilibrium.

Finally, when there are only a few, independent, pre-established buyers purchasing from a comparatively large number of competing sellers, the above bargaining discussion would lead us to assume that the buyers would win their separate, micro-economic, bilateral monopolies with their collective-good suppliers. An analysis of rational seller responses to such a situation is developed in section IID.

C. An alternative one-period microstructure. A one-period, quasi-competitive microstructure that does generate fixed, Lindahlian prices to the individual buyers is implicit in the models of collective-goods allocation of several mathematical economists (e.g., Arrow, Foley, Mas Colell, and Milleron). This microstructure gives sellers no information regarding the actual

price offers or sales of the other sellers but still, somehow, gives them perfect a priori knowledge of each buyer's solution marginal value. Such a world--which obviously violates the condition for perfect competition allowing sellers to observe the price offers and sales of rival sellers--has price offers that are necessarily invariant to the buyer's actual behavior. So a fixed-price, Lindahlian solution would be admissible.[2] We object to any such information structure because it is inappropriate to decentralized market analysis. Borcherding also rejects such a structure (see his footnote 44). If everyone knew the solution-use-values a priori (i.e., without inferring them from the offers and transactions of others), there would be no point to a market mechanism or exclusion rights in the first place. Besides, even with such an extreme degree of informational perfection, a temporal sequence of Lindahlian, fixed-price equilibria--coinciding with the sequence we derive in section II under an assumption that the counteroffers used in the above microdynamic analysis are infeasible because some future producers are not active in current markets--will be found to generate the same kind

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[2] The possibility of the Lindahlian ideal should be qualified by the assumption that we are dealing with only collective consumer goods and not collective-good inputs. Otherwise, the Lindahlian ideal is generally impossible if there are also neoclassical competitive markets for private-goods inputs (Thompson 1968, pp. 9-10). Fixed prices for collective-good inputs obviously create uniformly decreasing average costs to the firms in a standard, neoclassical, production envirnonment; and tying collective-good-input prices to the marginal products of these inputs creates analogous problems in all but rare technologies.

of overproduction of collective-good substitutes that arises in the one-period, perfectly competitive model. Moreover, restricting the environment to a single period, the realistically imperfect price-discrimination resulting from the inability of sellers to observe one another's behavior will be seen in Section II to lead to an alternative force toward the overproduction of collective-goods. For the remainder of this section, we continue to assume perfect competition so that all sellers can observe and respond to one another's price offers.

D. The collusion implicit in Borcherding's type of Lindahlian equilibrium. Returning now to the assumption that the transactions of other sellers are observable, let us also adopt Borcherding's fixed-price contracts a priori, together with his conclusion that such pricing leads to an optimal, Lindahlian equilibrium under constant costs. So each customer pays a contractually fixed, collective-good price to each seller equal to his marginal use value for the good. Does the resulting Lindahlian equilibrium pass any of the familiar, Stiglerian tests for the presence of a competitive, noncollusive interaction? First: If collusion were absent, there would be no incentive for any producer-seller and some buyers to expand to above-equilibrium output levels, if they could also avoid sanctions imposed by other firms or buyers. Borcherding's hypothesized equilibrium fails this test. For it would pay a producer in this kind of Lindahlian equilibrium to expand his output and sell an extra unit of the collective good at market prices, plus separate fees, and thereby

lower the marginal use-values--and hence prices--charged by other producers. Other producers would do the same, and an over-production equilibrium would emerge. But since we are maintaining Borcherding's hypothesized equilibrium, the side deals must be detectable and each consumer must be precommitted to the existing sellers to refuse all such temptations. Such agreements require the same, extreme, enforcement conditions of effective cartels in that each party in a given trade, having an incentive to transact with numerous third parties in ways that vitiate the agreement, must have his outside transactions observed and disciplined.

A second Stiglerian test for the presence of a competitive equilibrium is the absence of any incentive toward noncontractual price changes. Borcherding's hypothesized equilibrium also fails this test. Each producer in his world gains by raising somewhat the noncontracted price of his product. That is, while Borcherding's buyers all have contracts assuring them of given nominal prices from the sellers, each seller has an incentive to threaten to cut off any buyer that refuses to pay a higher effective price. For if the buyer were cut off, he would have a higher marginal use-value for the collective good and therefore have to face still higher effective prices from all of the other sellers.

Summarizing, while perfectly competitive equilibria imply the absence of incentives toward production increases with side-deals and noncontractual price changes, the substitute, Lindahlian equilibrium described by Borcherding implies both of these

incentives. Alternatively, relating the discussion back to our earlier, competitive-type assumption that the outputs of third parties are given, allowing conditional contracts so as to affect these outputs means dropping this basic Cournot assumption. The problem with Borcherding's attempt at an alternative model is that, having dropped my Cournot assumption, he did not replace it with an explicit, alternative interaction assumption and therefore did not see the collusive interaction implicit in his Lindahlian conclusion.[3]

I agree with Borcherding's position that institutions such as his implicily cooperative one empirically evolve to amoliorate the inefficiences appearing in my competitive model. In fact, I used this hypothesis in my 1968 paper to rationalize governmental restrictions on the duration of patent rights. While we may disagree on how such cooperation usually works (in that I think it usually works through coercive, political processes, while he apparently believes that it works through voluntaristic, private behavior), my only objection to his theoretical argument is that

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[3] Borcherding's failure to see that his price-function analysis was incomplete is apparently based on his implicit acceptance of a traditional economic methodology that argues, without any apparent theoretical discipline, what "competitive price functions should look like." While I was overly indirect in indicating the need for a model determining competitive price functions for collective goods, all of the alternative derivations of my competitive-overproduction result of which I an aware [viz., those of Auster, Compton, and Heiner] have collective-good price functions that are developed from fairly well-specified interaction assumptions. Borcherding was apparently not aware of any of these interesting theoretical studies.

he represents his private, voluntaristic behavior as competitive even though it implies the extreme informational conditions of a model with costless monopsonistic cooperation.[4]

Others have made the same slip.

E. The Demsetz-Borcherding-Cheung model. Professor Demsetz' argument for price constancy for collective goods (1970) is essentially that "competition-for-a-market" (Demsetz 1968) applies at all subequilibrium outputs of a collective good, so that homogeneous producers must sell all subequilibrium outputs at prices that yield them zero profits. While (as argued in my 1973 "Comment"

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[4] A question remains as to how Borcherding--who recognized that he was not using a Cournot assumption and that his buyer-seller contracts implied incentives toward the monopsonistic underpurchase of inputs into the production of collective goods in the increasing-cost case--was able to convince himself that his contracting was of a competitive variety. My best answer is that he felt that while his world might not be thoroughly competitive, my world was even less competitive than his. Evidence for this hypothesis is that his critique emphasizes my 1969 restatement and generalization of the model, in which I analyzed the microeconomics of the buyer-seller relationship for collective goods as a bilateral monopoly relationship. But he fails to note that this microeconomic bilateral monopoly is a natural one that necessarily applies to any world--including his own--in which collective goods are privately sold and that the familiar competition-versus-collusion distinction arises at a less microeconomic level, where the issue is whether or not there are many contractually independent transactors on each side of the market. Additional evidence that Borcherding felt that my model was not competitive is his erroneous remark that the model "describes the behavior of an open but perfectly price discriminating cartel." While discriminatory pricing for a private good requires suppliers of the good to form a cartel, discriminatory pricing for a collective good does not; the price-discriminating suppliers of a collective good may be independent competitors. Subsequent comments by Professor Borcherding have confirmed the above conjectures on his initial views of my model.

for this journal) such a procedure implies indeterminate competitive outputs, the indeterminacy obviously disappears under cooperative, monopsonistic purchasing of the collective good. Moreover--and I had not recognized this in writing my comment--any "competition-for-the-market" argument requires cooperative, monopsonistic purchasing. All buyers must agree on a contract before a supplier enters the industry under "competition for a market." Buyer cooperation is implicit. That is, a private-supply contract allowing Demsetz' "competition for a market" is conditional on the transactions of third parties, as it in essence reads: "I will supply you the collective good at the specified price if all other buyers agree to buy at their specified prices." The buying group thus becomes a unanimity-based, monopsonistic cooperative. Borcherding accepts this part of Demsetz' analysis, giving further evidence of his willingness to label a collusive buying arrangement "competitive."[5]

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[5] He criticizes Demsetz only for adopting a Lindahlian price distribution between the buyers without recognizing the general indeterminacy of the price distribution under "competition-for-the-market." The same criticism also works against Borcherding's own, general case, which includes increasing costs. In this case, Borcherding jumps to contracts that allow different prices to different producers and joint cooperation between all producers and consumers in order to avoid monopsony underpurchase. In this framework, his price functions also become indeterminate and his differences with Demsetz amount to a mere family squabble. They both represent a somewhat indeterminate form of cooperation as a "competitive" institution and differ only in the contracts that they impose in order to secure cooperation.

There is a parallel to the work of Borcherding and Demsetz in a recent paper by Cheung, who imposes a "competition-for-the-market," constant-cost paradigm in a model of the competitive supply of technical innovations without noting that buyer collusion is implied. Section II of this paper will outline a more competitive model of the observed market for technical innovations.

What has led so many of our best-trained price theorists to illogically use perfect Lindahlian pricing to represent "competitive" solutions is probably their strong a priori belief that perfectly competitive, private-property institutions always yield Pareto-optimal solutions. However, as pointed out in footnote 2 above, even if its underlying price constancies were justifiable, the Lindahlian "ideal" would inevitably yield decreasing costs and a breakdown of competition once we attempt to apply this "ideal" pricing system to collective-good input markets. Moreover, once a sequence of trading dates and some degree of intertemporal substitutability between the purchases at different dates is permitted, the Lindahlian buyers of Borcherding, Demsetz, and Cheung (like those of Arrow, Foley, Mas Colell, and Milleron) would still pay more than their current use-values for the good because more current usage lowers future use-values, and therefore future prices, for the collective good.

Before going on to develop the latter point in the more general environment of section II, we should illustrate how the

central theoretical analysis developed in this section applies to a real-world collective-good market.

F. An empirical application. The industry probably best approximating the conditions employed in the above, one-period model is the actual wire-service industry. Only here do we find both perishable outputs (so that single-period analysis suffices) and many buyers facing individually tailored, personally discriminatory prices. Also, since most major media distributors purchase from essentially all wire services and the number of wire services is small compared to the number of these purchasers (Sobel-Emery), wire services can be expected to win each of their microeonomic bilateral monopolies with the individual media distributors. Now, corresponding to our theoretical results, almost every real-world wire service is marketed through flexible pricing rather than through long-term, fixed-price commitments. And lower demand-prices via lower circulation or a greater availability of substitute news-sources commonly lower the prices that a distributor pays to a wire service (Rosewater, pp. 170-80, 328; Grambling, Morris, and Shmanske). The notable exception since the early 1900's has been the largest wire-service producer, the Associated Press (AP), which bases its prices to newspapers on a formula that fixes long-term charges independently of actual circulation and the amounts of competing wire services purchased. The AP price to a given newspaper, being based solely on an estimate of the paper's potential, rather than actual, news demand, is unique in

not inefficiently inducing the purchasing newspaper to reduce its prior operating scale and expand its purchases of substitute news-sources so as to lower its payments to the wire service. Since the AP is also unique in that it is a monopsonistic association of existing newspaper publishers, a possible explanation for these fixed-price contracts is Borcherding's prevention of my collective-good over-valuation incentives. However, as noted above, if the buying newspapers were using a prior price commitment simply to lower the prices of related wire services, the newspapers and committing wire service would jointly benefit even more from a price function that increased as a newspapers's use of other news-sources, and therefore its circulation, increased. Other motivations must be present to explain the AP's fixed-price commitment. We have also noted that fixed-price contracts set up an artificial, anticompetitive, economy of scale. This independently benefits established newspapers by helping them to discourage entry and maintain their local monopolies. The AP's fixed-price contracts can apparently can be rationalized only by recognizing this special advantage to the established newspapers of a fixed, overhead charge for using their wire service.[6]

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[6] Prior to 1945, the AP could, at some cost, collect discriminatory fees from new members and thereby partially collect for their losses in local monopoly power when admitting new, sufficiently-lower-cost, members. However, since the Supreme Court decision in U.S. v. A.P., 326, U.S. 1, 1945, new members have had to be admitted on the same terms as the old ones. The rational response of the AP, a cost-sharing, nonprofit cooperative, has been to disproportionately increase its fixed fee for its relatively

(footnote continued)

Besides the historical evidence that one of the chief advantages of purchases of extra wire services is the reduction in the prices the newspaper has to pay to competing, non-AP, wire services, relatively direct overvaluation evidence exists in the form of an abnormal stockpiling of regularly purchased, but never-used, news services by both TV broadcasters and newspapers. (See, respectively, Epstein, pp. 138 and 185, Rosewater, p. 180 and Villard.) Correspondingly, on the retail level, we find graphic evidence of a much lower use-value of an incremental TV news program relative to other programs (analyzed in Section IIC below) in the relative similarities between the concurrent news broadcasts of the various TV stations (Lemert) as well as in the abnormally high degree to which the popularity of a typical TV news program is determined by the popularity of the preceding TV program (Epstein, pp. 94-95).

(footnote continues)

inelastically demanded, morning news, thereby inducing local morning-news monopolies where previously they had admitted a few, sufficiently-low-cost, competitors by charging discriminatory entry fees. In effect then, ever since the development of the AP's fixed-price function in the early 1900's (Rosewater, pp. 320-27), there has been an artificially high incentive to establish locally monopolistic market structures even when more competitive structures are somewhat more efficient. Correspondingly, the dramatic post-World-War I trend toward regional newspaper monopolies (Rosse, Owen, and Dertouzos), and the post-World-War II trend toward morning monopolization, may well be the result of the above-described changes in AP pricing, as other sources of scale economies have probably been gradually diminishing due to a secularly decreasing cost of sharing overhead services (Owen).

II. GENERALIZATIONS

A. The effect of sequential, independent marketing. Suppose now that durable collective goods are marketed at substantially different points in time. Then the convenient interchangeability assumption no longer applies. All we have is a set of related collective goods sequentially marketed by independent, perfectly discriminating monopolists. A succession of technical improvements, each sold in sequence by their independent inventors to all of the firms in a given industry, would be an empirical example of this case.

The assumption of independent, sequential marketing eliminates the competitive, offer-counteroffer interaction between the various sellers and thereby completely reverses our argument against price commitments.

Assume initially that the sucessively marketed collective goods are substitutes. Then, recalling the analysis of Section I.A., a buyer is better-off with a fixed-price commitment from a current seller in that it reduces his demand prices--and therefore his actual prices--for the outputs of other sellers. While any current seller offering a fixed-price commitment would end up worse-off under the perfectly competitive conditions described in section I.B. because of the induced counteroffers of his injured competitors, now the injured rivals, being future sellers, cannot respond with competing offers. Competitive bidding is now absent. So the current seller, being unchallanged by rival offers, can now

receive higher prices from his buyers by offering them fixed-price commitments. Thus, permanent rights to use disembodied technical improvements are typically sold for single, current lump-sums, thereby eliminating the inefficient incentive of customers to overpurchase future substitutes in order to drive down the would-be payments to current innovators.[7] Although an additional improvement in the current seller's revenue is theoretically achieveable through a price function that increases with the buyer's purchases of the future technologies of others, the extra

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[7] While most real-world innovations are provided by salaried employees, who sell their disembodied innovation services to firms that retain, without further licensing, exclusive patent rights to their inventions, it should not be inferred that most innovations are not marketed as collective goods to many other firms. Many important innovations are diffused by having the original innovators or their associates move from firm to firm, spreading the technology by innovating around the previous patents. As the original innovators have a substantial comparative advantage at such activities, the previous patents provide them with a method of collecting close to the aggregate value of their innovation without being harrassed by duplicating imitators and without involving the firms in expensive patent-right negotiations. This contrasts with the usual, Shumpeterian, free-rider theory designed to explain the widely observed diffusion of most major innovations despite the absence of patent license agreements in marketing these innovations (Mansfield et al.).

After selling his services to one firm, an innovator may or may not find it profitable to successively sell his idea to others. Since the innovator's potential charge to the first firm's competitors would be merely an overhead cost, diffusion would significantly reduce output prices. So the first firm is willing to pay a positive price to the innovator for staying and keeping his idea from spreading. However, assume a sufficiently minor innovation or sufficiently important firm-specific factors of the competitors that the aggregate output of the competitors would exceed the output of the first firm at post-diffusion output prices even if the competitors did not employ the new technology. Then, familiar Marshallian curves tell us that it would pay the innovators to reject the offer of the first firm and, in keeping with our competitive model, diffuse the innovation.

transaction costs, including legal costs in view of U.S. v. United Shoe Machinery Corp. (U.S. Dist. Ct., 1953, 110 F Supp. 295), of such a monopolizing contract evidently seldom justify the return in the case of disembodied innovations. Moreover, the extra transaction costs of imperfectly monopolizing, legal substitutes--e.g., contracts tying royalties to the gross outputs of the buying firms--are also evidently prohibitive for most disembodied innovations.

The overvaluation of currently produced, substitutable collective-goods remains despite the presence of fixed-price commitments. The current producer-seller is still able to sell at a real price in excess of the buyer's real use-value of his product because having an extra current unit of the good will lower the buyer's future use-values, and thereby lower his future purchase prices, from all future sellers of substitutable collective goods. The same is true for the second seller, except that the first seller has already made his deal, so that this particular price is not reduced. This continues until the last seller, if one exists, just receives the buyer's real use-values for the good. Thus, the firms to which any innovator sells are willing to pay too much for his innovation to the extent that having it lowers the sum of the prices that they will have to pay to subsequent innovators. This is perhaps empirically evinced by the observed buildup of unused patent inventories to the point that the observed excess capacity of unused patent rights is ordinarily

many times larger than the excess capacity of other inputs (Gharrity).

When the successively marketed collective goods are complements rather than substitutes, a buyer's current purchase of a fixed-price collective good will increase the prices he will have to pay to the suppliers of future, complementary collective goods. The buyer will, of course, pass on the future, pecuniary loss to the current seller, resulting in a tendency to undervalue currently produced complements to expected, future, collective-good outputs. However, the complex-contracting argument for fixed-price commitments does not extend to complements because fixed-price commitments from the current seller would generally induce buyers to pay higher prices to the future sellers of complements than they would without such a commitment. That is, since the noncommitted prices of the future services of a currently marketed, durable good would generally rise on the sale of later-marketed complements, a fixed-price commitment would generally rob the current buyer and seller of their implicit tax on the sales of future sellers. Nevertheless, a variable-price commitment serving to increase prices with the introduction of future complements, a commitment which ideally would give the initial traders the entire potential surplus from the sequence of collective-good outputs, remains privately superior to a variable, noncommitted price, which would now induce even higher future

transaction costs because of the prospective multilateral bargaining problem arising under complementarity in the absence of a prior price commitment. Empirically, near-term, future complementarities occur mainly when the primary innovation must be embodied in new, durable, capital equipment. For such innovations, substitute innovations in the near future will not immediately lower the marginal physical product of the initial idea (substitute innovations serve only to hasten the obsolescence of the original machine) while complementary innovations (in the form of improvements on the original machine) will immediately raise the productivity of the initial idea. Correspondingly, for innovations embodied in new capital equipment, we commonly observe, rather than fixed-price commitments, patent license agreements in which royalty payments vary directly with the gross outputs of the new machinery. Contract payments thus, appropriately, increase as future improvements come along to increase the marginal product of the original idea, thereby serving the originally contracting parties by suitably lowering the expected prices that the buyer must pay to subsequent innovators.[8] And, as

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[8] Innovators unable to costlessly convince customers of the usefulness of their inventions might also want to offer contracts making their royalty incomes dependent upon their customers' utilization rates in order to partially guarantee their technoglogies. Such inventors might want to offer such contracts even when future inventions are expected to be net substitutes for the technologies. Standard historical examples tied purchases of ordinary salt to patented salt machines, ink to patented mimeograph machines, motion picture film to patented cameras and computer cards to patented computers (Areeda). The usual rationale given

(footnote continued)

obsolescence nears and the productivity of the entire technology falls, royalty rates should fall, an effect reflected in the near-universality of regressive royalty rates (Joelson). Since each subsequent innovator in a sequence of complementary innovations has his product taxed by the initial innovator under these imperfectly monopolistic, royalty-as-a-percentage-of-output, contracts, an undervaluation of some (viz., future) collective-good complements again appears. (The more complex issue of the efficiency of the valuation of initial complements is considered in the next subsection.) An obvious policy to prevent wholesale undervaluations of groups of subsequently produced, complementary collective goods is to suspend the antitrust laws and allow patent-pooling among the owners of the complementary patents.

(footnote continues)

for these "tie-in" sales (Burstein) is that they "meter" demand and hence facilitate price discrimination. However, without the inventor-incentive problem, tying royalties to <u>total buyer outputs</u> rather than complementary inputs would provide a privately superior, metered, pricing system in that the prices paid to future innovators of substitutes as well as complements would be reduced under these alternative contracts.

Under Section 3 of the Clayton Act, the above, "tie-in" sales are illegal. The rationale offered here, of course, is that tie-in sales contracts intensify the incentive to overproduce substitutable collective goods while the alternative contracts--which set royalties equal to fixed percentages of total outputs--appropriately reduce the incentives of potential inventors of substitute technologies but not of potential inventors of complementary technologies.

Such a policy is actually observed in the United States (Ellis).[9] (Unfortunately, the antitrust exemption is often extended to users of the technologies, whose collective incentive to improve is insignificant because of their competitive output interaction and who correspondingly write cross-licensing contracts containing clauses that force the parties to freely share their improvements with other members of the pool, thereby all but eliminating each firm's individual incentive to improve the initial technology.)

Regardless of the complementarity or substitutability relationship between successive innovations, firms will underpurchase ordinary private-good-inputs to the extent that additional quantities of such inputs increase the sum of the prices that the

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[9] Besides patent pooling for complementary innovations, there is a second kind of collusive interaction between innovators that is frequently observed and seldom discouraged by Government anti-monopoly policy: Innovating firms will often "stake out" an area of research or development and punish would-be competitors by a predatory "raiding" of their companies for top technical personnel to prevent competition in the same line of research or development. While such commitments to respond to the actions of others are of the same logical form as collusive contracts, they deal only with current and near-future interactions among small subsets of the set of all innovators, and the welfare implications of such collusive-reaction commitments are much different than for private goods. In the absence of such commitments, because there are no governmentally preassigned rights to produce prespecified types of innovations in the real world and rights to an idea are obtained by producing it before anyone else does, there would be an inefficient "rush-to-invent" (Barzel) and duplication of research effort under simultaneous, Nash-Cournot, innovator interactions. By allowing innovators to stake out certain research areas with predatory reaction functions, the Government allows for the removal of the substantial inventor losses from their jointly excessive impatience in the development of an idea. That is, such cooperative behavior serves to efficiently establish property rights to innovations in given sub-fields and thereby permits us to use our above, property-rights models.

firms will have to pay for future innovations. (The strict dominance of complementarity between private- and collective-good inputs under neoclassical production conditions is shown in Thompson 1968, Part II.) Aggregative time-series evidence for the resulting, theoretically unambiguous excess of social over private marginal products of private-good inputs is developed elsewhere (Thompson, 1975).

B. Replacing the Cournot assumption. We have, mainly for analytical convenience, been retaining our original, Cournot-on-outputs assumption that no current seller's output affects the outputs of future sellers. This is not particularly reasonable. A current seller's output, by altering the demand curves and prices charged by future producer-sellers, generally will alter the outputs of these future sellers. Replacing the Cournot-on-outputs assumption with a more appropriate, Stackelberg-on-outputs, assumption, we now allow current producer-sellers to recognize their effects on the outputs of succeeding producer-sellers. The interaction is still noncooperative in that it still excludes commitments contingent on the behavior of others. Each successive producer merely picks an output that maximizes his profit, given the previously produced outputs and the predictable, similarly selected, subsequent output choices of future producers.[10] Now, when a current collective-good producer expands his

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[10] That a Stackelberg-on-output interaction in an all-private-goods economy yields competitive-type results while an interaction permitting the communication of committed reactions to the outputs of others leads to a cooperative-type result (monopoly) is demonstrated in Thompson-Faith (1979).

output, he realizes that the demand decrease for future collective-good substitutes will generate lower outputs of these substitutes. While this cushions the induced fall in the prices of future collective-good substitutes and thereby reduces the redistributive, future-price-reduction component of each buyer's current demand price, it simultaneously creates a positive, redistributive, future-quantity-change, component! For the induced output decreases of future substitutes increases the values of his current output to his existing customers. The reduction in the redistributional, future-price-benefit component of the demand for the current producer's output is approximately offset by the new, redistributional component of current demand stemming from the induced reduction in the outputs of future producers of substitutes. So the more appropriate, Stackelberg-on-outputs, assumption leads to the same qualitative results as the simplifying Cournot assumption when the successively produced collective goods are substitutes.

However, when the successively produced collective goods are complements, the increases in outputs of future complements induced by an expanding current producer will serve to increase the demand prices for his currently produced collective good and therefore to work against his undervaluation incentive based upon the positive effect of his expansion on his buyers' prices for future collective goods. In effect, the investment coordination afforded by sequential, perfect-information, Stackelberg interaction eliminates the severe underinvestment trap possible under

the uncoordinated, simultaneous investment decisions of a Cournot interaction. A roughly optimal innovation policy thus subsidizes the initial innovation in a sequence of complements only as it does net unrelated innovations: Viz., the optimal policy subsidizes these innovations only to compensate for various nonappropriabilities, such as those implied by limited producer information or bargaining power or by Government-imposed restrictions on patent lives.

Finally, such policies, while working toward the marginal productivity pricing of collective-good inputs, still fail to cure the net undervaluation of private-good inputs. Buying firms still have an unambiguous incentive to shrink their capital stocks so as to reduce the marginal productivities, and hence prices, of future innovations to their firms. Heavy investment subsidies to industries with rapid prospective innovation rates (i.e., the policies of "Atari Mercantilism") are therefore still required for a Pareto optimum.

C. Bertrand interaction. A pure form of the above internalization of benefits from inducing changes in the marketed quantities of other collective-good sellers occurs when sellers cannot adjust their prices at all in responding to another seller's expansion decision. This Bertrand-type interaction occurs (as pointed out in section I.C.) when one seller cannot observe the others' prices in the relevant market period. Here, following the analysis of the above subsection, there is an overvaluation of both complementary and substitutable collective goods

in that an expanding collective-good producer can charge higher prices both because he induces the sales of future complements to expand and the sales of future substitutes to contract.[11]

A fairly realistic example of this Bertrand-type interaction occurs in the retail marketing of mass-media outputs by competing broadcasters. Owing to the the large numbers of final information consumers in the various broadcasting markets, these retail distribution specialists, who buy, package, and resell the basic product, rather than attempting to tailor prices to the individual demand prices of particular consumers, employ imperfectly discriminatory pricing formulas in which each consumer is presented with fixed, parametric prices.[12] The inevitable imperfection of

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[11] While this unambiguous overvaluation incentive, a formal proof of which will be sent on request, has apparently gone unnoticed in the empirically oriented literature on imperfectly marketed collective goods, the empirical examples discussed below concentrate on the case of substitute collective goods because the Bertrand assumption is only an approximation and the overvaluation-of-complements result does not extend to the Stackelberg or Cournot cases.

[12] Although purely pecuniary pricing (e.g., pay TV) is sometimes observed, advertising is the predominant technique for pricing these collective goods. Since wealthier consumers typically have higher demand prices for the distributor's collective good and have correspondingly higher time-costs, advertising achieves a discriminatory system of consumer charges. To allow the distributors to collect benefits in proportion to the charges, we assume that wealthier consumers make correspondingly more valuable advertising targets. Then, once the distributor has chosen his optimal mix between advertising and direct, equally discriminatory, pecuniary pricing, the last dollar of time costs imposed on
(footnote continued)

these fixed-price schedules leads to the familiar artificial exclusion of many potential buyers of a given seller's output and an underpricing to all but the marginal customers of any given seller (Brito-Oakland). Since all but the marginal customers of a given broadcaster's rivals pay less than their demand prices, an output expansion by this broadcaster will not induce any of his several rivals to substantially lower their prices. For the rivals will still be able to sell their individual outputs to almost all of their previous customers if they merely maintain their prices and surrender their marginal customers. The resulting tendency toward passive, Bertrand-type, price responses is reinforced by the difficulty that broadcasters face in attempting to distinguish reductions in their sales due to changes in the public's volatile preferences between programs from reductions due to the relatively minor, not directly observable, alterations in

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(footnote continues)

a viewer generates the same revenue as a direct-dollar charge--a dollar. To make marginal advertising socially equivalent to pecuniary charges, we also assume that the only effect of advertising on consumers is to increase their utilities for, and correspondingly their prices of, the products of the advertiser. An additional dollar of time costs imposed on a viewer then gives him a dollar's increase in utility from consumption, and there is no net effect on his utility other than through his transfer of a dollar to the advertiser.

The fact that advertising is used so extensively to collect for the provision of collective consumer goods but almost never to collect for the provision of private goods indicates that advertising is, in fact, substantially discriminatory. The fact that nondiscriminatory pecuniary pricing is also sometimes observed in marketing collective consumer goods indicates that advertising is a highly imperfect collection device.

the prices or qualities of rival programs. In fact, we commonly observe very popular and unpopular radio and TV programs imposing similar advertising costs on their audiences; the improvement of a radio or TV program typically leads to a substantial contraction in the quantities purchased of substitutes (Steiner, Owen et al.). In private-good markets, it is strictly efficiency-enhancing to have firms respond to the expansions of their rivals by maintaining their prices and qualities, while absorbing simple reductions in their quantities sold. If Ford produced one fewer car whenever GM produced one more, making GM a price-taker, the social value of GM's supplying another car would be Ford's marginal resource cost of producing a car, a number equaling the price of a car as long as GM similarly contracted when Ford expanded. The social value of GM's production then equals its private value. Bertrand interaction for private goods represents a socially efficient, purely competitive interaction. But when CBS surrenders some audience to a quality-expanding NBC without cutting its effective program price, no resources are freed to society. And while the social value of NBC's improvement may be insignificant, its private value, being equal to the revenues received from its new audience, is not insignificant. Thus, as in the previous subsection, there is an excess of private-over-social value of a collective-good-supplier's expansion to the extent that the expansion reduces the quantities sold by fixed-price competitors, the corresponding sales declines now representing an internalized

redistribution away from the shrinking competitors with no matching savings in society's resources.

Since quality-expanding broadcasters may well be unable to collect the total values of their improvements from their intramarginal customers, a tax on the outputs of established broadcasters is not unambiguously justified. Nevertheless, collective-good substitutes are again overvalued relative to unrelated collective goods. And again the misevaluation occurs because buyers, and therefore sellers, internalize a purely pecuniary transfer away from sellers of other, existing outputs. This implies, of course, the widely publicized "vast wasteland" of highly substitutable programs relative to unique, unrelated programs (Steiner, Owen et. al., and Noll et. al.).

A second application is to brokers and information-supplying retailers of private goods. The value added by these sellers is largely from their production of information that is collective to all of their customers. These ubiquitous sellers cannot estimate, a priori, the highly variable, true demand prices among the various potential customers for their information. A retailer or real estate broker typically cannot distinguish, a priori, a serious customer with a buying probability of 1/2 from a browser with a buying probability of 1/200. And a stockbroker cannot tell, a priori, whether a particular buyer is ready to purchase 100 or 1,000 shares of a touted stock. To rationally price-discriminate between high- and low-value information demanders, information-providing retailers and brokers almost universally charge for

their information by committing themselves to uniform, nondiscriminatory overcharges for complementary private goods, thereby approximating a fixed-price, Lindahlian system.[13] As above, with passive, Bertrand-type interactions inappropriately rewarding quality-expanding brokers and retailers with the marginal customers of their many rivals, there is an overproduction of the kind of information that substitutes for the information produced by rivals relative to unique, unrelated information and a possible overproduction of total information produced by brokers and retailers relative to the private-good numeraire. As there is also an unambiguous underproduction of the over-priced, private-good complements to the collective-good (relative to the private-good numeraire), we find efficiency results for these substitutable

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[13] To protect their margins from the free-riding of private-good sellers who do not supply the complementary collective good, collective-good sellers enlist the support of government or their own, private-good suppliers. Thus, security and real estate brokers have obtained the legal right to collectively impose common, industrywide commission rates, thereby increasing the service costs to free-riding brokers to prohibitive levels. Wholesale brokers distributing to various retailers have Section 2C of the Robinson-Patman Act to eliminate the free-riding of manufacturers, farmers, or growers who would otherwise make direct sales to retailers as well as indirect sales through their customer-finding brokers. It is widely recognized (cf. Schwartz-Eisenstadt) that information-providing retailers have used resale-price-maintenance laws or agreements, exclusive territories, or vertical ties in order to deter free-riding discounters and <u>also</u> that such exclusion devices are often restricted by the Government in the same way that patent rights are restricted, thereby inducing some free-riding. Using our models, such seemingly perverse policies may enhance economic efficiency by working against the tendency of free markets to overproduce collective goods or their substitutes and to underproduce competitively supplied, private-good complements.

collective goods that are qualitatively identical to the welfare results that arose from a Cournot or Stackelberg output interaction.

D. Exclusive-use contracting and the few-buyer, many-seller case. The media distributors discussed above ordinarily purchase their basic "entertainment" (i.e., non-news) inputs by obtaining "exclusive-use" contracts from these collective-good suppliers (Grossman). Such contracts prevent suppliers from selling to more than one distributor in a given market. But why would a primary collective-good supplier so restrict the market for his product? If he sold to all retail distributors in a given market, and he were able to obtain their demand prices, he would receive more--sometimes much more--than he receives from his exclusive purchaser.[14] The answer must be that primary suppliers obtain much closer to true demand prices by committing themselves to selling to only one retailer in a given market. This occurs because an exclusive-use commitment by a seller converts the independent buyers from simultaneous users, with the usual,

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[14] This is because each distributor is willing to pay not only for the value of the input in attracting new customers to the industry but also for its value in attracting customers away from its fixed-price competitors. Say a given comic strip is worth $5 in total to the newspapers in an area (in terms of the induced increase in total readership) but $18 to a single newspaper, because of its ability to attract $15 worth of readers away from its competitor and $3 worth of additional total readership. The strip could be sold for a total of $36 if the seller could obtain the buyers' demand prices, whereas exclusive rights to the to the strip can be sold for at most $18.

collective-good bargaining incentives to under-reveal and under-pay, into alternative users, who have the same demand-revealing incentives as buyers of an ordinary private good.

Regarding under-revelation incentives, with exclusive-use contracts, each of the possible broadcasters of a given seller's program--knowing that he stands to capture close to the entire market demand for the program--reveals this concentrated value in competing for the sole distribution right as long as the value is the same for all bidders. With broadcasters having about equal capacity to supply the relevant retail market, the winning bidder, who must pay at least the value to the next-highest bidder, has no significant incentive to engage in demand-hiding behavior. The seller's commitment to exclusive contracting thus eliminates his own costs of discovering the market values of his product to the various buyers. The above explanation for exclusive-use contracts helps rationalize the unusual, equality-of-size restriction the U.S. Government has imposed on our three national over-the-air broadcasting networks (Owen, et. al.) Also, with an approximately equal capacity to supply the national market, these networks will bid similar amounts for any given program and therefore have no significant incentive to reduce their own demand prices for the program. As independent local broadcasters have an analogous problem, an analogous argument supports governmental attempts to equalize the broadcast range of competing local stations.

But the above, demand-revelation through demand-concentration, argument is wholly insufficient to explain the near-universality of exclusive-use contracts in selling entertainment features to newspapers. Newspapers face a much higher cost of concentrating the distribution of a primary media input in the hands of a single distributor; many more potential buyers are lost by exclusively distributing a newspaper feature than a radio or TV program. Also, being protected by First Amendment guarantees, the newspapers in a given market area have a much less equal size distribution than the broadcasters. However, the naturally small number of potential buyers in each local market, together with the large number of small, primary-entertainment suppliers, requires us to drop our basic assumption that each of the informed collective-good sellers wins his bilateral monopolies with the buyers.[15]

To protect himself from receiving only his insignificant supply price to a given local market, the basic supplier changes the nature of his marketed product by selling exclusive-use rights, thereby setting up a private-goods type of competition in

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[15] Also, newspapers typically have been organized prior to the sellers of the basic entertainment products from whom they buy, thereby facilitating the making of prior, organizational commitments to pay only supply-prices to their suppliers of primary-entertainment inputs. While the same can be said for the large oligopolists among the innovation buyers discussed in the previous subsection, any such organizational commitment on their part would invite entry by the innovators--a situation probably inferior to simply paying out their demand prices to the innovators.

order to assure himself of prices equal to at least the values to the second-highest demanders in each of the local markets.[16] (And, to acquire the input, potential purchasers must commit themselves not to sell rights to share the entertaiment input with competitors in order to widen the inputs' circulation; for if the input supplier permitted such transactions, one potential purchaser would, for an appropriate initial fee from his rival(s), let the latter use the input at an insignificant price, thereby cutting all bid prices down to insignificance and totally undermining the competitive bidding environment required by the supplier). This argument applies to broadcasters and book publishers as well as to newspapers. But it is only for newspapers that the buyers obtaining exclusive-use rights do not distribute the basic good to close to the entire potential market. So only for newspapers can we <u>infer</u>, from the adoption of exclusive-use contracts, that the sellers of primary collective-good inputs are losing their bilateral monopolies.

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16 Corresponding to this theory, my interviews with newspaper purchasing agents have revealed a reliance on exclusive-use contracts for all entertainment inputs except some highly unique inputs (e.g., certain popular columnists), toward which inputs their usual aggressive bargaining attitude switches to one of almost passive submission.

III. CONCLUSION

A. Summary of the contracting results. Price commitments by sellers of collective goods are irrational under perfectly competitive conditions. However, price commitments become rational when: (1) collective-good sellers or buyers are, respecly, monopolistic or monopsonistic cooperatives; (2) buyers monopolize their collective-good-using industries by establishing an artificial overhead cost to deter potential entrants, in which case a simple, fixed-price commitment may be suffice, (3) the outputs of other collective-good sellers are marketed only at future dates so that competitive bidding is absent, fixed-price commitments being advantageous only when the successively produced collective goods are substitutes; or (4) individually tailored, personal price discrimination is prohibitively costly. Close correlates to these rational contracting solutions exist in commonly observed collective-good markets. There is also some, albeit indirect, evidence for the theoretical, overproduction-of-collective-good results emerging under each one of our alternative information structures. Finally, where collective-good buyers are large enough to win their microeconomic bilateral monopolies with each of the various sellers, the sellers should--and do--switch to selling exclusive-use contracts, cutting their losses by marketing the collective good as if it were a private good.

We summarize the basic welfare argument of the paper by applying it to a prospective, perfectly discriminating, private-goods monopolist. (As noted in my 1969 paper, it is the failure

of economists to recognize the inefficiency inherent in standard, perfect ["first degree"] price discrimination that makes my extreme-overproduction result appear surprising).

B. The welfare analysis applied to a perfectly discriminating, private-good monopolist. The prospective customers of a future, perfectly discriminating monopolist both overpurchase current substitutes and underpurchase current, competitively supplied complements in order to benefit from socially valueless redistributions away from the discriminator. And the potential welfare loss from these investments in demand-reduction--being equal to the entire potential consumer and producer surplus from the monopolist's output--greatly exceeds any of the welfare losses appearing in the received theory of monopoly. Suppose, for example, your local electric-utility company were going to be allowed to price-discriminate at will, paying a lump sum for the privilege. The utility, once it finally received permission to discriminate, would charge a tremendously high flat rate to capture your consumer surplus from home electricity. Your rational response to this prospect would be to quickly develop substitutes. You might add a gas-driven electricity generator to your home at substantial real cost, sell several convenient electric appliances, etc. These are obvious inefficiencies; you

are devoting substantial resources to gaining a simple transfer of wealth away from the future price-discriminator.[17]

The relatively familiar deadweight welfare loss that a monopolist may create in working to impose discriminatory prices (e.g., Posner, Williamson) is only the excess of a discriminator's over a nondiscriminator's profit while our potential welfare loss from price discrimination is the discriminator's entire profit. Thus, for example, the prospect of our loss may easily reduce the value of imposing discriminatory prices to negative levels! This is because discriminatory prices induce buyers to reduce their demands for the seller's goods--possibly all the way down to the seller's supply price--while a non-discriminatory monopoly price

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[17] Perhaps economists have been ignoring these large inefficiencies because they have been making a tacit assumption that a first-degree price-discriminator can either: (1) anticipate all customer preferences and precommit to requiring total payments from each buyer equal to the buyer's prior potential surplus from the good in a joint optimum, or (2) observe the prior decisions of his customers and costlessly contract with them regarding these choices. However, the former alternative, as argued in section I.B., is both generally empirically unreasonable and inappropriate to decentralized market analysis, in that the market would be a socially pointless institution if such information existed. And the latter alternative, as argued in section I.C., implies contracting as a complete buyer-seller cooperative rather than a simple discriminating monopoly. Besides, both conditions are entirely empirically unreasonable when there are several buyers.

Nevertheless, we could assume that the discriminators imperfectly estimate buyer demand prices to the point that they do not adjust their prices to variations in the actual demands of their customers. In this case, as discussed in section II.C., the tendency of buyers to over-demand substitutes is replaced by a tendency of sellers to over-supply them because of the now-overly-passive sales responses of the discriminators. This corresponds to the familiar text-book result that buyers are induced to overpurchase competitively in supplied substitutes to the outputs of a fixed-price monopolist.

induces no such deleterious effects. So sellers of normal, differentiated, manufactured goods normally work to establish fixed, nondiscriminatory, price systems, thereby eliminating the incentive of their customers to reduce their own demand prices for the differentiated product. The sellers do this by committing themselves to receiving constant prices over significant intervals of time even though the expected market demands for their individual products are bound to shift so as to make their fixed prices obsolete and apparently irrational. But without such a "rigid" price pattern, these sellers could alter prices over short intervals of time in order to personally price-discriminate between their various customers, a possibility that could easily lower the sellers' average price by inducing their customers to overbuy substitutes and underbuy competitively supplied complements. Nevertheless, when the potential returns from discrimination are very high, it is likely that the net returns from a discriminatory price system will exceed the net returns from any of the above fixed-price systems despite the rash of demand-reducing investments that discrimination invites.

The failure of economists to recognize the potentially large inefficiencies resulting from prospective, first-degree price discrimination has led some to inappropriately criticize our main anti-price-discrimination laws, the Robinson-Patman Act (Secs. 2(a), 2(b), and 2(f)) and the Hepburn Act of 1906, the latter being the culmination of a 35-year evolution of legislation aimed at achieving nondiscriminatory railway rates (Locklin). While

examples of wasteful investments by railway users in order to lower the prices they had to pay to price-discriminating railroads can be readily found in the contemporary intellectual arguments supporting anti-price-discrimination laws (e.g., Hendrick), economists writing on these discriminatory systems (e.g., Oi, Locklin, Machlup, Friedman) have ignored these losses.

Similarly, the failure of economists to recognize the potentially large welfare losses from prospective, first-degree price discrimination has left them no rational theory to explain the popularity of the widespread governmental policies that coarsely break-apart or crudely price-regulate observed monopolies. Standard economic theory argues against such policies. It argues instead for allowing monopolies to form at will, subsidizing their outputs to the extent that they underproduce because of an inability to perfectly price-discriminate and taxing them lump-sum to eliminate their over-devotion of resources to monopolization (Tullock, Posner). Economists, unable to explain why their first-best, "optimal" policy is politically infeasible, have consequently been of little help in formulating an optimal anti-monopoly policy. The suggestion here is that an "optimally" taxed, unregulated monopoly would be tempted to substantially price-discriminate, and this in turn would induce substantial inefficiencies, real social losses that governmental policy cannot eliminate without either regulating prices and quantities or creating sufficient private-goods competition that it no longer pays to price discriminate.

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