The Economics of the Network-Affiliate Relationship in the Television Broadcasting Industry

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Under various acts of Congress, the Federal Communications Commission is empowered to regulate the television broadcasting industry in the public interest.[1] Among the Commission's objectives have been the promotion of program diversity, the encouragement of local programming, and the maintenance of widespread ownership of broadcasting facilities.[2] In order to further these objectives, the FCC has limited the number of local broadcasting stations which can be owned by any one group of individuals or corporations, including networks, and forbidden network affiliates from entering into agreements to accept specific amounts of network programming during specified hours. In addition, the FCC has recently established a ceiling on the number of hours during prime time which a local station can "clear" for network programs.[3] In this paper we have formulated a model of the network-affiliate relationship which allows us to examine the effects of each of these regulations and to examine the extent to which FCC objectives are consistent with one another.

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[1] For a discussion of the development of government regulation of broadcasting, see Hiram Jome and Ronald Coase.

[2] For a discussion of FCC objectives, see Hyman Goldin.

[3] In the jargon of the industry, to clear time for the network means to accept network programs; i.e., to keep the time slot clear of other programs.

I. The Network-Affiliate Contract

The specific details of the typical affiliation agreement have been documented by John Peterman and by Harlan Blake and Jack Blum. For our purposes, the important features of these contracts are the methods by which advertising revenue is shared by the network and affiliate. The standard agreement separates broadcasting time into two categories: announcement time and program time. The announcement time is the brief interval between programs in which the station identifies itself and sells spot commercials. Local stations usually keep all revenue from these sales. Program time is the time during which program material is being broadcast. The networks sell segments of this time for commercial messages. The price which the network charges for this time is determined separately for each station carrying the network program and the revenue which the network collects from these sales is shared with the local affiliates except for a certain specified amount of cleared time for which the network retains all of the revenue.

The important dimensions of the affiliation agreement are i) the length of announcement time allowed by the network, ii) the proportion of program time revenue returned to affiliates, and iii) the number of hours for which all program time revenue is kept by the network. (Hereafter this is referred to as uncompensated time.)

II. A Simple Model of Affiliate Behavior

In order to understand the basic features of the process by which the terms of the affiliation agreement, the number of affiliates, and the number of hours cleared are determined, we develop a model of affiliate behavior. Initially, we consider a highly simplified version of the model. As we proceed, we relax a number of its restrictive assumptions. In the simplified model we assume:

1. The proportion of program time revenue, p, returned to a station is assumed to be the same for all programs cleared regardless of the time during the day at which it is cleared.
2. The amount of announcement time is fixed and not subject to change by the network or station.
3. There is no uncompensated time.
4. There are no constraints on the value or number of hours which the local station must or must not clear for network programming. The affiliates can choose to clear anything from zero to 100 percent of its time for the networks.
5. All network programming costs are fixed. The marginal cost of supplying an additional hour of existing network programming to an affiliate or potential affiliate is zero.
6. In making an agreement, both the station and the network act as if the behavior of other stations and networks is not affected by the nature of the agreement reached.

Since different hours of the day or week will have different values and hence one hour is qualitatively not the same as another, we take as the decision variable for a particular station the value of the time cleared for network programming. The total value of hours cleared is equal to the sum of the amounts which each hour cleared will yield in program time advertising revenue. This in turn is affected by the size of the market (population, number of TV sets, number of TV stations, time of day, what other stations are broadcasting, and so on).

The value of hours cleared by a station is, given all of the above assumptions and parameters, a function of p, the proportion of the program time revenue which is returned to the station. Given the value of announcement time if it adjoins a local program, its value if it adjoins a network program, the value of program time for network and nonnetwork programs, and the cost of nonnetwork programs, it is possible to array time periods according to the value of p for which it will pay the local station to clear the network program.

If A_i^L represents the value of advertising during program time for a nonnetwork program during the ith hour of the broadcasting day, C_i the cost of the program, and S_i^L the value of advertising during the announcement time adjoining the program, the return to the local station from a nonnetwork program during that time period is

$$V_i^L = A_i^L + S_i^L - C_i \tag{1}$$

If A_i^N is the value of program time for a network program during the ith hour and S_i^N, the value of the announcement time adjoining the network program, the return to the affiliate from clearing the network program is equal to $pA_i^N+S_i^N$. In deciding whether or not to clear the ith hour for a network program, the affiliate compares these two returns. If $pA_i^N+S_i^N > V_i^L$ the station accepts the network program. Otherwise it does not.

For each hour of broadcasting time the affiliate can calculate the value of p for which it would be indifferent between network and nonnetwork programming. If we denote this p by $\hat{p}_i$ we have, for each i

$$\hat{p}_i A_i^N + S_i^N = V_i^L \tag{2}$$

or

$$\hat{p}_i A_i^N = V_i^L - S_i^N \tag{3}$$

If we array program hours according to $\hat{p}_i$, we can construct a schedule which indicates, for each level of p, the value of hours which the affiliate would be willing to clear for network programming.[4] The higher the p, the greater will be both the number and the value of hours cleared for network programs.[5]

In Figure 1, we have plotted such a "supply" curve for a representative station as BC. The horizontal axis measures the total amount advertisers pay for program time commercial messages during the hours cleared for network programs. The point A^* represents the acceptance of all network programs. We have drawn the curve so that it has a negative intercept. In general, we expect that there are some hours for which $S_i^N > V_i^L$, in which case the local affiliate would even be willing to pay the network for the right to clear network programs, i.e., the value of $\hat{p}$ would be negative. This situation arises because the value of announcement time is greater if the time is adjacent to a network program than if it adjoins a locally originated program and because by clearing a network

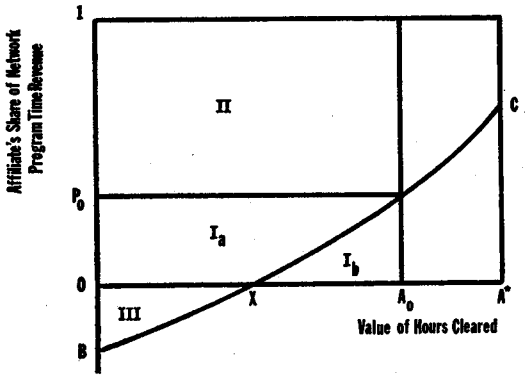

FIGURE 1

program a station avoids the cost of program origination.[6]

If the level of p set by the network is p_0, the station will clear hours worth A_0. The revenue which it collects from the network as its share of the network program time revenues is given by the rectangular area I_a+I_b. The network's revenue from the programs cleared on this station is area II. The net profit to the station from network affiliation, i.e., revenues over and above profits, if any, which could be earned from locally originated programs for these hours, is given by the area I_a+III.[7] This is the value of network affiliation to the local station. It is a quasi rent which accrues to the local affiliate so long as the network does not engage in price discrimination by establishing a different p for each hour of time cleared.

What value of p will be set by the network for the affiliate depicted in Figure 1? As the network raises p, the value of hours

[4] Note also that we are assuming that, for any i, V_i^L is independent of the amount of time cleared for network programming. This assumption is undoubtedly not strictly correct.

[5] One alternative available to a station is to originate local programs. Another is the purchase of a program from a company specializing in the production of programs. In this case, too, the local station retains all revenue from program advertising. Still another alternative is the so-called barter arrangement. Here, an advertiser supplies a program free of charge to a local station and the latter is permitted to sell some program advertising time from which it can retain all revenues. Even if less advertising revenue accrues to the local station under this arrangement because the supplier of the program does not pay for his advertising time, it may still be the best alternative to a network program since the station avoids the cost of originating or purchasing a program. Of course, it is the return from the best alternative which will be compared to the gains from accepting network programming.

[6] There may be markets where local programming is very profitable, relative to network programs. In this case, the local station will not be willing to clear any network programs without a positive p. The supply curve for this station would have a positive intercept. These cases are, however, rare. There are no stations which do not affiliate with a network if they can.

[7] Recall that the supply curve represents the opportunity cost of program time to the affiliate. Hours to the left of X have negative opportunity cost; i.e., the affiliate would pay for network programming if necessary.

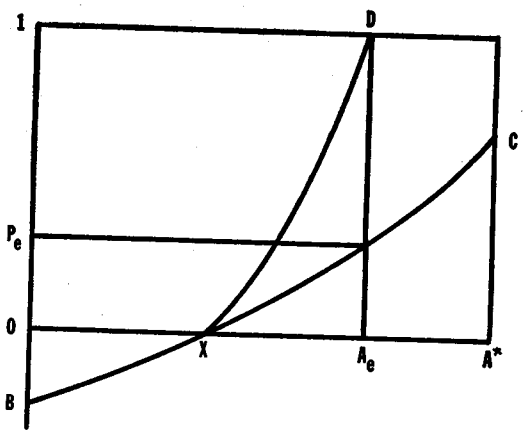

FIGURE 2

cleared by the affiliate increases. The profits that the network earns on the newly cleared units is at least partially offset, however, by the decline in revenue on previously cleared units. In other words, since a lower value of $1-p$ must be accepted on all previously cleared units, the return from an additional unit cleared is less than $1-p$ for that unit. The network will, therefore, employ the curve marginal to the supply curve, XD in Figure 2, in determining the value of p for which its profits are a maximum.[8] By assumption, the marginal cost of supplying a program to an additional station is zero.[9] Therefore, profits are maximized when the curve marginal to the supply curve intersects the horizontal line for $p=1$. Given this, the profit maximizing value of p can be determined.[10] In Figure 2 this is p_e. In equilibrium, the affiliated station is indifferent between clearing the last hour of network programming, A_e, and not doing so. Note that the price charged by the network, $(1-p)$ times advertising revenue, exceeds the cost (zero by assumption) of supplying an additional hour of programming to the affiliate.

III. Price Discrimination by Network

Suppose that the network has considerable market power since the number of stations exceeds the number of networks in a given market and some stations will not be able to obtain an affiliation. In principle, the network should be able to extract the entire increment to the profits of an affiliate generated by network affiliation. One way to do this would be to charge different prices for each program cleared.[11] Another way of accomplishing the same objective is not to compensate the affiliate for all programs cleared and to require in the contract of affiliation that the affiliate clear some minimum number of hours. We consider these, in turn.

Uncompensated Time

The uncompensated time constraint can be described as follows: If the value of advertising during an hour of prime time on a network program is A_P^N and if the constraint is H hours,[12] then the affiliate does not share in program time advertising revenue on the first HA_P^N dollars worth of network time that it clears.

Consider an affiliate which was clearing time periods of value greater than HA_P^N in the absence of the constraint. When a constraint of that amount is imposed, the affiliate will clearly wish to satisfy it with the smallest loss of profits. Given p, it will never clear hours not previously cleared

[8] The curve XD does not extend below the horizontal axis because the network will have programs of value OX cleared even if $p=0$. If the network were permitted to make p negative, i.e., to charge the affiliate for a cleared program, the curve marginal to the supply curve would begin at B.

[9] This departs from reality in that the network typically pays the AT&T interconnection charge.

[10] For example, if the supply curve were a straight line, p would equal 1/2.

[11] Notice that this would require a negative p for programs to the left of X. We will return to this point shortly.

[12] The constraint is specified, in the affiliation contract, in terms of prime time hours or equivalents thereof but is, in effect, a claim to an amount of revenue rather than to a number of hours.

(when there was no constraint) in order to satisfy the constraint. In Figure 3, hours previously cleared have an aggregate value of A_O for $p=p_O$. The constraint is shown as $\bar{A}$. If, after the imposition of the constraint, the affiliate continues to clear time periods of value greater than $\bar{A}$ it will continue to clear A_O since eliminating a single program does not affect the constraint and contributes a positive amount, $(pA^N + S^N - V^L)$, to profits. But if area I is greater than area II, the affiliate would be better off if it reduced the value of hours cleared to OX. This is a preferred position because the gain from clearing hours between $\bar{A}$ and A_O is less than the foregone income on hours between X and $\bar{A}$. The affiliate would continue to clear hours up to X, however, since all hours to the left of X have the characteristic that S^N exceeds V^L and would be cleared even if p were negative.

What effect does the possibility of employing an uncompensated time constraint have on the policy pursued by a network with respect to a particular station? It is easy to see that the optimal policy for the network is to set p sufficiently high so that all network programs are cleared and to adjust the constraint so that the affiliate's profits from network affiliation are almost

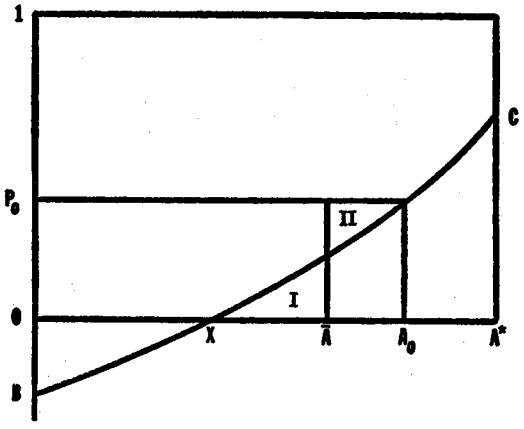

FIGURE 3

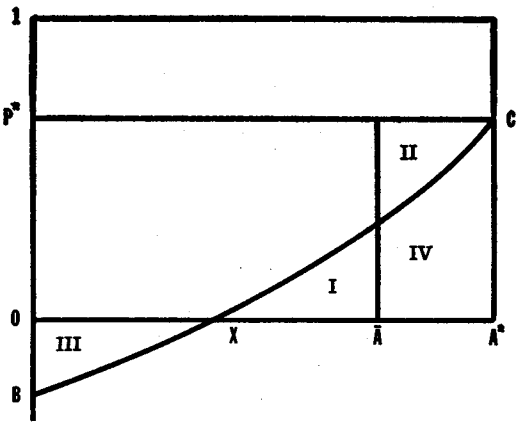

FIGURE 4

eliminated. This is demonstrated in Figure 4, where A^* represents the acceptance of all network programs, the sharing ratio is set at p^* and the constraint at $\bar{A}$ so that area I is equal to area II. If the constraint were any larger, the affiliate would be induced to reduce the number of hours cleared to OX. Notice that in this case the affiliate would continue to earn profits from network affiliation equal to area III.

If the network acted as a perfect price discriminator and set $p=\hat{p}$ for each hour to the right of X, profits accruing to the affiliate on these hours would be equal to areas I and IV. Since these profits are equal to what the station would earn if it were an independent station, profits from network affiliation on hours to the right of X would be zero. The uncompensated time constraint thus appears as a relatively simple, yet sophisticated, device for practicing price discrimination among hours. Instead of setting prices on each program individually the network simply establishes a sharing ratio sufficiently high so that all network programs are cleared and then adjusts the constraint so as to eliminate almost all of the profits from affiliation and, at the same time, maximizes the profits of the network.

The above arrangement with a high sharing ratio and a large amount of un-

compensated time is very similar to the incentive contract initiated by CBS in 1961 and subsequently overturned by the FCC in 1962. The CBS contract called for affiliates to receive 10 percent of the revenue from the first three-fifths of the programs that CBS asked them to clear and 60 percent of the revenue from all additional programs cleared. This sharing ratio contrasts sharply with the 30 percent which prevailed both before and since the imposition of the incentive contract. The FCC overturned the contract on the grounds that it unduly restricted the ability of nonnetwork program sources to obtain clearances on CBS affiliates.[13,14]

The overturning of the CBS incentive contract raises the question of how the terms of network-affiliate contracts are affected by it. From the comments made at the time by the FCC, we deduce that the constraint imposed is in terms of a maximum sharing ratio permitted,[15] say p_{max}. With such a restriction, the network would set the constraint so that the affiliate is indifferent between clearing the number of hours cleared at p_{max} and OX, the minimum amount that affiliates would always want to clear. The situation is depicted in Figure 5 where area I is equal to area II. The effect of the constraint, and the principal one intended by FCC policy, is to

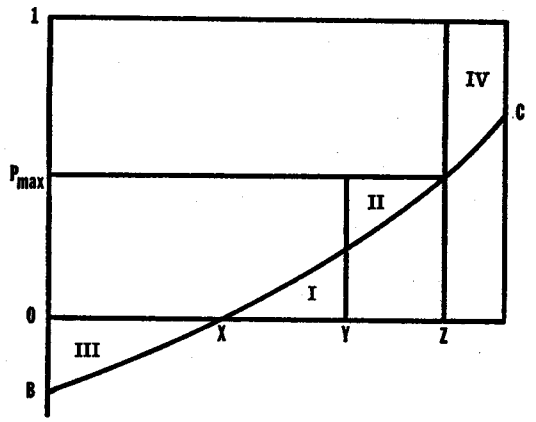

FIGURE 5

reduce the number of network hours which an affiliate will accept. The quasi rents earned by the affiliate as a result of network affiliation are still restricted to area III but the profits earned by the network are much reduced (by area IV) from those obtained where there is no restriction on p.

Option Time

A network which has the power to practice price discrimination need not settle for almost all of the quasi rent it generates for its affiliates. Under certain circumstances it may also be able to extract the quasi rent earned on hours cleared to the left of OX. The device employed is called option time[16] whereby the affiliate must clear some minimum number of hours for network programs.

Consider the situation depicted in Figure 6 which partly reproduces Figure 4. If the value of uncompensated time were increased beyond $\bar{A}$, say to $\hat{A}$, the affiliate would clear only OX hours, since with a constraint equal to $\bar{A}$ the station was indifferent between clearing OA^* hours and OX hours. The change in the constraint

[13] See *Wall Street Journal*, Apr. 13, 1962, p. 4, and June 1, 1962, p. 14.

[14] In some instances, there has been a more direct form of price discrimination by hours. For example, in 1956, the contract of WNBF affiliate in Binghamton, New York, called for a 25 percent sharing ratio on the first 20 hours cleared, a 35 percent ratio on the next 10 hours, and 40 percent on all additional hours. At the same time the CBS affiliate in Youngstown, Ohio, WKBN, received 10 percent on the first 5 hours cleared, 20 percent on the next 5, and 30 percent on all other hours. However, such sliding scale arrangements are apparently not common. On the terms of contracts see U.S. Congress, Hearings: *Monopoly Problems in Regulated Industries, Part 2, Television.*

[15] This is the aspect of the contract that limits the ability of nonnetwork program sources to compete with networks for program time.

[16] Option time was forbidden to be included in the contract of affiliation in 1963. Yet, some observers of the industry believe, local stations are often "forced" to accept programs they would otherwise not clear. The threat used against them is the withdrawal of affiliation.

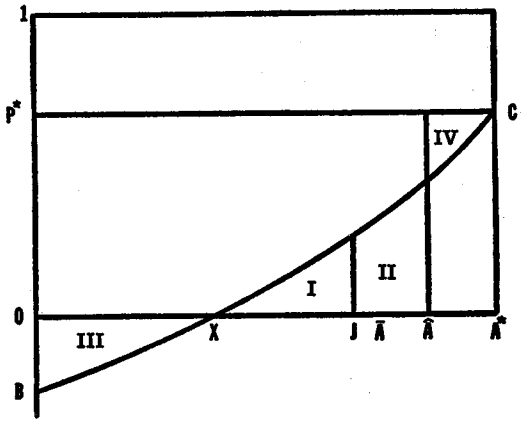

FIGURE 6

induces a shift to OX. But suppose that the contract of affiliation requires that hours of value at least OJ be cleared. Then the station must decide whether it will clear OJ hours, and perhaps some larger number of hours, or refuse the opportunity to affiliate. Which course it will choose depends on the relationship between areas III and I in Figure 6. If the network sets OJ so that these areas are equal, then at least OJ hours will be cleared. The loss on the hours between OX and OJ, area I, is just compensated for by the quasi rents earned on the first OX hours, area III. In fact, the station then considers, as a marginal decision, whether to clear some larger number of hours. If area IV is greater than area II, it will clear all network programming since the loss on hours between J and $\hat{A}$ is more than compensated for by the gain on hours between $\hat{A}$ and A^*. If $\hat{A}$ is set so that areas II and IV are equal in addition to setting the option time OJ so that areas I and III are equal, the network will be able to extract all of the quasi rents that it generates.

To summarize: The use of uncompensated time is a device for practicing price discrimination which can eliminate almost all of the quasi rents which would otherwise be received by a network affiliate as a result of affiliation. Combined with option time, or some "unofficial" requirement that some minimum number of hours be cleared, all of the quasi rents can, in principle at least, be eliminated. Placing restriction on the maximum sharing ratio results in a decline in network profits with no corresponding gain in affiliate profits. The bar against option time, if it is effective, may result in some quasi rents being retained by the affiliate.

IV. Price Discrimination by Stations

To this point we have considered situations in which the networks have considerable market power vis-à-vis potential affiliates. This presumably occurs in markets in which there are very many stations, each vying for the right to be an affiliate. In other markets, however, the situation is reversed. A small number (one or two) stations exist and each of the networks would wish to have the station as its affiliate. Here, competition among the networks should completely eliminate any profits that networks obtain from having an additional affiliate. Rent accrues to the station from being an affiliate as well as from the fact that it is one of a small number of stations in the market. If, from the point of view of the station, one of the network affiliations is more desirable than the others in the sense that advertising revenues from that network's programs are larger, then that network can obtain the portion of revenue which results from its superior programming. This is the portion of the rents which results from the differential productivity of the networks.

V. Affiliate Profits and Market Structure

As we have pointed out above, our model has some implications for the profitability of network affiliates in markets in which there are more stations than networks. In the absence of any FCC restrictions, some combination of sharing ratio, uncompensated time, and option time should succeed in eliminating all quasi rents which would

otherwise accrue to a station from its affiliation with a network. In such markets, network stations should be no more profitable than are independents. If, however, option time is not permitted, and the restriction is effective, a portion of the quasi rents will continue to accrue to affiliates.

There is some empirical evidence on this point. Edward Greenberg has shown that, in markets with four or more stations, network affiliates are more profitable than are independents when other determinants of profitability are allowed for. This indicates that, even in markets in which competition among stations for the right to a network affiliation might be expected to lead to the extraction by networks of all profits from affiliation this does not in fact occur.[17] The implication of this is that either the FCC prohibition of option time is effective or that network pricing policies are not such as to fully eliminate the additional revenue that network affiliation produces.[18] Further, it follows, a fortiori, that in markets with less than four stations, where the bargaining power of the network is weaker, it is even more likely that local stations are able to capture at least a portion of the incremental revenues which results from affiliation.

VI. The Prime Time Access Rule

The FCC has recently enacted a rule which restricts the number of prime time hours which an affiliate can clear to a network.[19] Assuming that the affected affiliates do not now satisfy this constraint, as is likely to be the case, what is its effect? We assume that the situation which the Prime Time Access Rule will affect is that depicted in Figure 5 where there is both an upper bound to the sharing ratio and the absence of option time. In Figure 5, the value of uncompensated time is set at OY hours. If the program omitted by the network as a result of the Prime Time Access Rule lies to the left of OY, the impact of the rule will be to raise the value of uncompensated time. The affiliate's loss on programming to the left of Y caused by the existence of uncompensated time is now reduced with the elimination of one program. The network can now increase uncompensated time in order to, once again, equalize areas I and II. If, on the other hand, the program omitted lies to the right of OY, the impact will be to reduce the value of uncompensated time. To predict the precise impact of the rule would, therefore, require detailed knowledge of the value to the affiliates of the programs to be omitted.[20] In either case, network profits will be reduced.[21,22]

[17] Harvey Levin also found that network affiliation is significant as a determinant of the value of a station even when the effect of other factors is allowed for.

[18] There is one further possibility: Greenberg's results may reflect the fact that UHF stations are less profitable than VHF stations, and that network affiliates are largely the latter. A UHF-VHF variable was not significant in Greenberg's regressions but this may be explained by the multicollinearity between this variable and the network affiliation variable.

[19] The rule, which would apply only to affiliates located in the 50 largest markets, would prohibit stations from carrying more than 3 hours of network programming other than news between 7 and 11 P.M. Because each offers a half hour early evening news program the practical effect would be to reduce network programs by one-half hour each night. Networks would be forbidden from extending news programming. See *Wall Street Journal*, Apr. 15, 1970, p. 2 and May 4, 1970, p. 10.

[20] The omitted program is most likely to lie to the right of OY. Since the network is assumed to vary the uncompensated time constraint so as to extract all quasi rents from network programs, the contribution to the network's profits from any one program is equal to the difference between the amount of program time revenue (net of costs) paid to affiliates and the amount which must be paid in order to induce the affiliate to carry the program. In the case where all prime time hours produce the same program time revenue (net of costs), the decrease in the network's profits due to the Prime Time Access Rule is minimized for a given p if the network eliminates that prime time program having the largest $\hat{p}$. Affiliation contracts currently call for about 30 hours of uncompensated time per month while prime time programming amounts to approximately 120 hours per month. Since only 15 hours of network programming must be eliminated, prime time hours having the largest $\hat{p}$ will lie to the right of OY. This conclusion may not hold in the case when prime time hours do not yield equal revenue.

[21] A network spokesman has estimated that a loss of

VII. The Group Ownership Rule and the Fourth Network

One of the perplexing aspects of behavior in the television broadcasting industry is the fact that very large profits are earned by affiliated television stations, yet the formation of a fourth commercial network has not taken place.[23] This has apparently resulted in very small profits for those stations unable to obtain an affiliation, and, in some cases, the failure to obtain an affiliation has forced stations out of business.

The formation of a network involves very substantial costs which are independent of the number of affiliates. In addition, there are relatively low costs of supplying an additional station with programming.[24] According to a well-known proposition in welfare economics, the undertaking of any indivisible activity is justified if a perfectly discriminating monopoly could profit from doing so. And that would seem to be the appropriate test for the introduction of a fourth network. But the results of our analysis are that networks will be unable to extract all of the extra benefits that they generate in markets in which the number of stations is smaller than the number of networks. And, further, while it would seem possible for networks to extract all quasi rents which they might generate in other markets, they apparently fail to do so either because they are not very efficient price discriminators, because of the ban on option time, or both. As a result, some of the benefits generated by the formation of a network accrue not to the network but to its affiliated stations. This fact may partly explain why a fourth network is not formed even though it may be economically justified.

One way to allow networks to appropriate all of the benefits which they generate, the outright ownership of affiliates by the network, is precluded by the Group Ownership Rule which restricts the number of stations that a network can own.

In addition to restricting the degree to which networks can appropriate the rents which they generate, some FCC regulations such as the maximum permitted sharing ratio and the Prime Time Rule simply reduce network profits without increasing the profits of affiliated stations. These regulations also reduce the likelihood that a fourth network will develop.[25]

It may seem paradoxical at first that permitting networks to receive larger profits can enhance the success of local stations. But the paradox can be resolved when one realizes that most, if not all, of the marginal television stations have no network affiliation, and that a network affiliation, even on terms which are very favorable to the network, may be better than no affiliation at all.

VIII. Conclusion

This paper has provided a model of the economic relationship between television

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one-half hour of prime time could cost each network $6–14 million per year in gross profits. See *Wall Street Journal*, Apr. 15, 1970, p. 2.

The FCC limitation of the proposed rule to the 50 largest markets is apparently based on the assumption the networks will continue to furnish their affiliates in other markets with network programming throughout prime time. Apparently some of the smaller stations fear that they will not be able to obtain network programming through prime time, *Wall Street Journal*, May 8, 1970, p. 4. See also the *Wall Street Journal* editorial, May 13, 1970, which expresses a similar fear.

[22] It is useful to point out that there exists a relationship between our analysis of the ban on option time, the prime time rule, and the ceiling to the sharing ratio, and the literature on the behavior of the regulated firm. See, for example, Harvey Averch and Leland Johnson. Unlike the Averch-Johnson model, where the constraint imposed on the regulated firm is in terms of the maximum rate of return that it is permitted to earn, in our model the profits of the networks are not directly regulated and the restrictions take other forms.

[23] There have been a number of abortive attempts to form such a network.

[24] The principal incremental cost is the AT&T interconnection charge.

[25] Another barrier to entry of a fourth network which has been alleged to be important is the structure of AT&T interconnection charges. On this point see, for example, Joel Dirlam and Alfred Kahn.

networks and their affiliates. The model was employed to examine the manner in which advertising revenues are shared. We were able to demonstrate that the use of uncompensated time and of option time both contribute to the ability of television networks to extract the quasi rents which would otherwise accrue to local stations as a result of their network affiliation. We also analyzed the impact of the ban on option time, the restriction on the maximum permissible sharing ratio, and the new Prime Time Access Rule. An important policy conclusion is that these rules in addition to the limitation on station ownership imposed by the Group Ownership Rule may be important barriers to the development of a fourth network.

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