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ABSTRACT

In an effort to assess the potential impact of cable television on broadcasting statistical techniques were used 1) to estimate cable penetration, 2) to build a model describing how the audience divides its viewing among available signals, and 3) to assess relationships between audience and revenue and between revenue and programming. These techniques were put together in a comprehensive computerized model in order to estimate in detail the potential impact of cable on broadcasting. On the basis of these estimates, it i s predicted that cable will have the highest penetration in areas with two or fewer local signals; that large stations will likely gain and small stations lose audience as a result of cable growth; that str ng positive relationships will exist between quantity and quality of public service and local programming and station revenue; and that the overall revenue lost due to cable (estimated to be about 9 percent) is small enough so that it would be wiped out by one year's normal revenue growth. (Author/JY)

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POTENTIAL IMPACT OF CABLE GROWTH ON TELEVISION BROADCASTING

Rolla Edward Park

A Report prepared under a Grant from
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PREFACE

Although the future growth of cable television holds out the promise of more diverse programming, it also poses a threat to over-the-air television broadcasting. This Report estimates the dimensions of that threat.

In this study, statistical techniques are used to estimate expected cable penetration, the elements of a model describing how the audience divides its viewing among available signals, and relationships between audience and revenue and between revenue and programming. These pieces are put together in a comprehensive computerized model, which is used to estimate in detail the potential impact of cable on broadcasting.

Some of the work reported here was performed at the Federal Communications Commission (FCC) computer facility in Washington, D.C. The author wishes to thank J. N. Hand and his staff at the FCC for their generous help, which made this part of the work possible. Valuable assistance and comments were also provided by A. Carlin, S. J. Carroll, L. L. Johnson and E. C. Poggio of Rand, M. S. Horne of Covington and Burling, A. Korn of the FCC, and R. R. Ridgeway of the American Research Bureau (ARB).

This Report is part of a larger Rand effort, financed by a Ford Foundation grant, to explore public policy issues raised by the future of cable television. Other publications in the series include:

o Leland L. Johnson, The Future of Cable Television: Some Problems of Federal Regulation, RM-6199-FF, January 1970.

o Richard A. Posner, Cable Television: The Problem of Local Monopoly, RM-6309-FF, May 1970.

o Nathaniel E. Feldman, Cable Television: Opportunities and Problems in Local Program Origination, R-570-FF, September 1970.

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I. INTRODUCTION AND SUMMARY

THE PROBLEM

The growth of cable television raises a real dilemma for public policy. On the one hand, it holds out the promise of more diverse programming made possible, even promoted, by the ability of cable to carry a large number of signals. On the other, it poses a threat to over-the-air television broadcasting. When cable carries distant signals, it fragments the local audience, tending to reduce local station revenue. There are several reasons for being concerned over the reduction of broadcast stations' revenue. Some of the more important ones are listed below.

1. Most directly, broadcasters themselves are understandably concerned about developments that may decrease their profits and jeopardize their investments.

2. The Federal Communications Commission (FCC) has an historical commitment to promote and protect the viability of ultra-high-frequency (UHF) broadcast stations. In light of this commitment, the FCC is particularly concerned over possible adverse effects of cable growth on such stations.

3. Smaller profits or larger losses might force some stations off the air. This would reduce the amount of service available to cable non-subscribers. The loss to those viewers who are in areas not served by cable, and to those who cannot afford the cable subscription fee, might be considerable.

4. Reduced revenues may force broadcasters to reduce the quality of their programming, particularly local and public service programming.

5. If the aggregate revenue of broadcast stations were reduced, total support for program production would also decline (at least as long as no new source of support were added). Because support is provided primarily by advertisers rather than viewers, at a level of only a few pennies per viewer hour, there is some presumption that

the current level is already too low to be optimal. A further decline would therefore be unfortunate.

Each of these concerns can be illuminated by a study of cable's potential impact on broadcasting, but each suggests a somewhat different focus. Concerns 1 and 2 center attention on the magnitude of revenue changes due to cable, and their distribution; concern 2 singles out UHF stations for special attention. Concern 3 suggests the desirability of investigating the profit impact of cable, as indicated perhaps by the number of profitable stations made unprofitable (or vice versa). To illuminate concern 4, one would want to investigate relationships between station revenue and local and public service programming. For concern 5, a relevant statistic is the decline in aggregate station revenue to be expected because of cable. The work reported here attempts to shed light on each of these aspects.

METHOD AND RESULTS

All the work described in this Report is aimed at the construction of a computerized "impact model" capable of providing the type of information sketched above. Four important pieces of the model are estimated in Chapters II through V. They are put together to make the impact model in Chapter VI.

Certainly, the potential impact of cable on broadcasting depends on what portion of households can be expected to subscribe to cable service. Estimates of cable penetration ultimately to be expected are made in Chapter II by fitting a set of "logistic" growth curves to data on a fairly large sample of cable systems. Not surprisingly, ultimate cable penetration tends to be higher (a) for systems carrying a greater number of distant signals and (b) for systems operating in areas with fewer signals available locally over the air. For the classifications used, estimated ultimate penetration ranges from 29 to 60 percent. Rough calculations suggest an ultimate nationwide average penetration on the order of 40 to 45 percent of households.

In estimating impact, it is of central importance to know what share of the audience will watch distant signals, and what share will continue to watch local ones. A method for estimating audience shares is developed in Chapter III. The hypothesis there is that "attractiveness" indices can be assigned to television signals so that, for any set of signals, audience shares tend to be proportional to the indices. In the process of actually assigning such indices, several rough tests provide some support for the hypothesis. Of particular interest in Chapter III is an estimate that the attractiveness index for a network signal broadcast over UHF is only about one-half the index for the same signal broadcast by very-high-frequency (VHF) transmission, probably because of transmitter, antenna, and tuner differences. Since the UHF handicap is wiped out when the UHF station is carried on cable, this estimate provides one reason to expect that cable may help UHFs, at least relative to local VHFs.

Taken together, the results of Chapters II and III permit the calculation of station audience if distant signal carriage is specified. Chapter IV contains estimates that aid in translating station audience into station revenue. Of particular interest here are two results that indicate that an audience taken from local stations by distant signals is more valuable to the losing station than to the gaining station. First, the revenue-audience relationship is found to be curved in such a way that an additional household is worth less to a large station than to a small one. Second, distant audience is found to be worth less than closer audience. Since one result of cable growth is likely to be a decrease in the local audience of small stations and a corresponding increase in the distant audience of larger stations, both results indicate that total audience value will be decreased by cable growth.

In Chapter V, the relation between local and public service programming, on the one hand, and station revenue, on the other, is investigated. In general, both the quantity and the quality of such programming are higher for stations with higher revenue. On the average, between 15 and 21 cents of each additional revenue dollar is spent on local programming. This suggests that any adverse impact of cable on station revenue may well be reflected in decreased local programming.

In Chapter VI, the pieces are put together to form the comprehensive impact model. A strong set of distant signals is assumed -- signals from four very strong independents in the top 100 markets and three in the next 100, plus network signals sufficient to provide three-network service. Cable penetration is assumed to reach ultimate levels. The model provides detailed estimates of station audience, revenue, and local programming expenditure, with and without cable, in three different environments:

o 1960's environment, with UHF set penetration at November 1968 levels, and a UHF handicap due to antenna, transmitter, and tuner differences of about one-half, as estimated in Chapter III.

o 1970's environment, in which UHF set penetration is assumed to reach 100 percent, but the UHF handicap due to the other factors remains unchanged.

o 1980's environment, in which technological improvements are assumed to have eliminated the UHF handicap entirely.

Table 1.1, showing the impact of cable on revenue in the 1970's environment, is a sample of the results presented in Chapter VI. This table reflects only effects on local audience. Stations carried by cable into distant markets have, in addition, a distant audience that also contributes to revenue. The contribution of distant audience is discussed separately below.

Overall, station revenue (attributable to local audience) is reduced 18 percent by cable at its ultimate penetration, carrying the strong set of distant signals assumed. There is, however, considerable variation among markets and among different kinds of stations. Generally, stations in smaller markets are harder hit than those in larger markets. Those in large (top 50) markets lose, on the average, 15 percent of their non-cable revenue; those in small (fourth 50) markets lose 56 percent, on the average.

Table 1.1

PERCENTAGE CHANGE IN REVENUE DUE TO CABLE IN A 1970'S ENVIRONMENT[a]

Type of Station	Market Rank				
	1-50	51-100	101-150	151-200	1-200
Network VHF	-17	-24	-31	-55	-20
Network UHF	+12	-18	-15	(b)	-14
Independent VHF	-11	(b)	(b)	(b)	-11
Independent UHF	+20	+20	(b)	(b)	+19
All	-15	-23	-30	-56	-18

Notes:

[a]All figures reflect the effect on local audience only. Distant audience increases values in some cases.

[b]Classifications with fewer than five stations are not reported in detail, but are included in the totals.

The reasons for stations in the smaller markets being harder hit are easy to see. Distant signals capture a larger share of the local audience when competing with a smaller number of local signals. Also, cable penetration is expected to be higher in markets with fewer local signals.

There is also striking variation in how different kinds of stations are affected. Generally, UHF stations are less harmed -- many are even benefited -- by cable than are VHF stations. Network affiliated UHFs in the model lose, on the average, 14 percent of non-cable revenue, and the revenue of UHF independents actually rises 19 percent above its non-cable level.

The general reasons for this differential impact between UHF and VHF are clear. Over the cable, UHF stations are on an equal footing with VHF stations. It does not matter whether the cable subscriber lacks a UHF antenna or lives where UHF reception is poor. He gets UHF stations with the same click-stop tuning as VHF stations. The gain from achieving technical parity with VHF over the cable tends to offset, and in some cases more than offsets, the loss from audience fragmentation.

Among the UHF stations, the network affiliates are harmed by cable while the independents are helped. There are two explanations for this. First, the principal competition of independent UHFs is VHF stations, but many UHF network stations compete with one or two other network UHFs. Independents thus have more to gain than network stations from achieving technical parity with VHF stations on the cable. Second, network UHFs are generally found in smaller markets than are independent UHFs, and the smaller markets are harder hit by cable growth.

The discussion above reflects only the effects of cable on local audience. In the model, the gain in distant audience exactly equals the loss in local audience. The distant audience also has some value, and thus tends to offset some of the revenue losses discussed. Results on audience-revenue relationships from Chapter IV may be used to estimate the size of the offset. Estimates there indicate that distant audience is worth less than local audience. Also, because of the curved relationships between audience and revenue, additional audience is worth less to large stations than to small ones. It seems likely that stations carried as distant signals will tend to be fairly large ones with strong programming, certainly larger on the average than the local stations whose audience they capture. The combined effect of curvature and distance is to make distant audience worth about half as much as local audience. The net overall revenue loss attributable to cable is then 9 percent; half of the 18 percent loss in revenue based on local audience is gained back by stations carried as distant signals.

If, as seems likely, distant signals are taken mostly from larger markets, the differential impact of cable in large and small markets, apparent in the table, is accentuated. Large-market stations, which lose least in terms of local audience, stand to gain most in terms of distant audience.

Additional results, relating to audience, profit, and local programming expenditure as well as to revenue in the 1960's, 1970's, and 1980's environments, are reported in Chapter VI. Generally, the patterns that emerge in Table 1.1 and the discussion above are repeated in the additional results:

o Cable reduces aggregate station revenue by about 9 percent, roughly equal to one year's normal revenue growth.

o Stations in larger markets are, on the average, little affected by cable growth.

o Stations in smaller markets, on the other hand, are significantly hurt -- enough so that many might be forced to discontinue service or continue only as a satellite of a larger station.

o In the near term, say through the 1970's, the impact of cable on UHF network stations is slight, and UHF independents are helped substantially.

II. EXPECTED CABLE PENETRATION

In 1969, roughly 6 percent of U.S. television homes were cable subscribers,[1] and this figure is increasing rapidly. Over the past decade, the number of subscribers has increased at an average annual rate of about 21 percent,[2] while the number of cable systems has grown by 15 percent per year.[3]

The future impact of cable on television broadcasting certainly depends on how far this remarkable growth continues. If 90 percent of all television homes ultimately subscribe to cable service, the impact will obviously be greater than if only 30 percent do. This chapter presents estimates of average cable penetration levels ultimately to be expected. These estimates suggest that ultimate penetration may be on the order of 40 to 45 percent nationwide.

LOGISTIC GROWTH CURVE

The logistic growth curve,

$$Y = e^{\alpha-\beta/T}, \qquad (2.1)$$

is frequently used to represent growth processes. The size of the growing entity is denoted by Y, T denotes time since growth began, e is the base of natural logarithms, and α and β are parameters. This curve is sketched in Figure 2.1. The shape of the curve makes clear its relevance for many growth processes. The entity grows slowly at first, then at an increasing absolute rate as it gets bigger. As it

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[1] There were 3,600,000 cable subscribers in January 1969 and 57,514,300 television households in September 1968 (ARB figure) according to Television Factbook, 1969-1970 Edition, No. 39, Services Volume, published by Television Digest, Inc., Washington, D.C., 1969, pp. 79-a and 97-a.

[2] From 550,000 in 1959 to 3,600,000 in 1969. Television Factbook, p. 79-a.

[3] From 560 in 1959 to 2,260 in 1969. Television Factbook, p. 79-a.

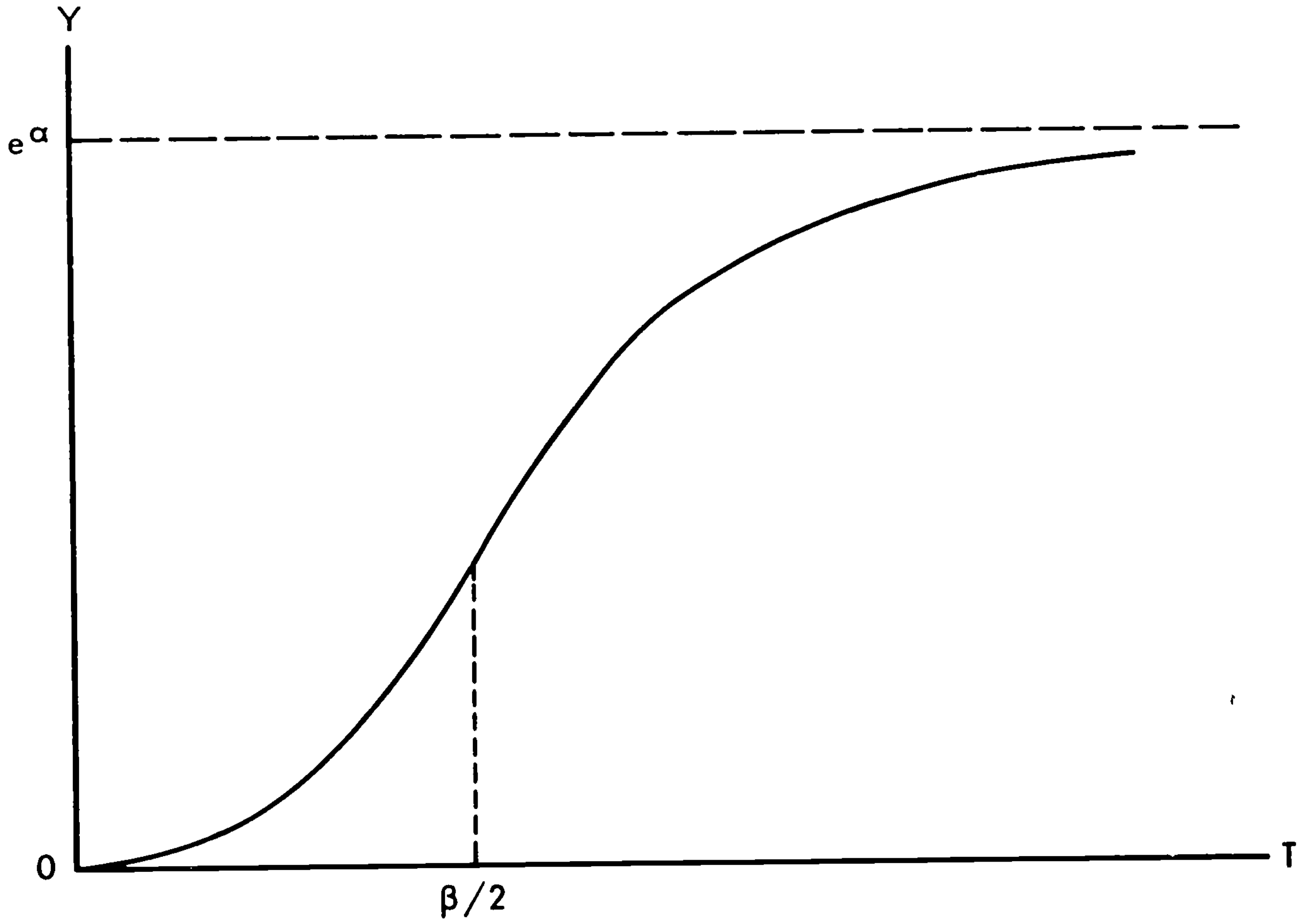

Fig. 2.1 — Logistic growth curve

approaches its mature size, its growth rate begins to decrease. Finally, it approaches its ultimate size asymptotically.

Qualitatively, at least, the logistic curve is a good descriptor of growth of many entities whose ultimate size is limited, for example, a tree, or a colony of fruit flies in a finite container, or a cable television system with a finite service area. Figure 2.1 is easily interpreted in terms of a cable system. The new system gets off to a relatively slow start for a variety of reasons: since it is new to the community, many people do not know of its existence or understand the service it provides. Nor is the firm likely to be staffed to sustain a maximal growth rate from the beginning. But as the system grows, the word gets around. More people now have neighbors who subscribe, and so know first hand about the service. The growth rate picks up. Perhaps additional installers and sales personnel are hired. At some point, though, most of the easy sales have been made. The growth rate slows as fewer and fewer potential subscribers remain unsigned. The system slowly approaches its ultimate size, with all households that desire service being served.

THE MODEL

To estimate ultimate cable penetration levels, I fit a set of logistic growth curves to data on actual cable systems. For this purpose, equation (2.1) needs some embellishment.

When (2.1) is applied to a cable system, Y denotes the number of subscribers. Obviously, the ultimate number of subscribers, e^{α}, will vary from system to system, depending on the number of households in the system's service area, the type of service offered, and other factors. To account for this, I specify

$$e^{\alpha} = F_i H e^{u} \quad . \tag{2.2}$$

Here H is the number of households in the service area; F_i is the fraction of all households expected ultimately to subscribe if the system offers service of types i; u is an error term introduced to represent the influence of all other factors — income, availability

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of alternative entertainment, variations in taste and in cable system management, for example.

Type of service is defined initially in terms of the numbers of local and distant signals carried by the system. If other things were equal, one would expect a system that carried many distant signals to have a higher ultimate penetration than one with few distant signals. Also, other things again equal, one would expect that a system in an area with more local signals would have a lower ultimate penetration than one in an area with fewer. If local signals are abundant, distant signals available only on the cable offer less incentive to subscribe. "Service of type i" is specified more concretely in the following section, as are the other variables in the model.

Referring to Figure 2.1, we note that the parameter β is a measure of how stretched out the growth curve is. The larger is β, the longer is the time until the inflection point on the growth curve is reached. This parameter, too, may be expected to vary from system to system. I expect it to be larger the more households there are in the system's service area, and so specify

$$\beta = \beta_1 + \beta_2 H + \beta_3 H^2 \quad . \qquad (2.3)$$

The H^2 term is included to allow for possible curvature in the relation, there being no reason a priori to expect it to be linear. Admittedly, (2.3) should be a stochastic relation like (2.2). I omit the error term, making the relation deterministic, for pragmatic reasons: to make it possible to estimate the resulting equation, (2.4) below, using conventional methods.

Substituting from (2.2) and (2.3) in (2.1) and taking natural logarithms, we get

$$\log Y = \log F_i + \log H + \beta_1(-1/T) + \beta_2(-H/T) + \beta_3(-H^2/T) + u \quad . \qquad (2.4)$$

With some slight additional manipulation, and assuming that the errors u are distributed independently (of each other and of the independent variables) with zero mean and constant variance, (2.4) is an appropriate subject for ordinary least squares estimation. The next section discusses the data used to estimate (2.4), and the section after that presents the estimates themselves.

THE DATA

Data used are for a cross section of cable systems as of February 1969, taken from the 1969-1970 Television Factbook.[1] The sample includes all 46 of the systems listed as having 10,000 or more subscribers, plus every sixth listed operational system with fewer than 10,000 subscribers, read from a randomly chosen starting point.[2] Since the listing is alphabetical by state, the geographical distribution of systems in the sample is the same as that of all listed systems. The total number of systems in the sample is 416.

Entries in the Factbook usually include a list of television stations carried by the cable system. By referring to maps in the CATV Atlas,[3] one can usually determine which of the stations are distant signals (that is, carried by a cable system outside the station's Grade B contour) and which are local signals. The number of systems for each combination of distant and local signals is shown in Figure 2.2. The systems represented in Figure 2.2 total 395; for 21 of the systems in the gross sample, stations carried are not listed in the Factbook.

The systems in Figure 2.2 are divided into six groups, each providing a roughly homogeneous type of service. Assignments to groups are made based on a priori judgment, and on the need to have a minimum of thirty or so systems in each group to get good estimates. Analytically, the most important division is that between systems with two or fewer local signals, that is, systems in areas where a full network lineup is not available over the air, and systems with three or more local signals. In the former case, the cable typically carries the missing network signal or signals, presumably making cable service especially attractive. The other divisions, shown by lines in the figure, are chosen with less a priori justification primarily so that systems are well distributed among different types of services.

[1]Television Factbook, pp. 363a-591a.

[2]Alexander City, Alabama.

[3]CATV and Station Coverage Atlas, 1968-1969, published by Television Digest, Inc., Washington, D.C., 1968.

Distant signals \ Local signals	0	1	2	3	4	5	6	7	8	9	10 +
10 +	1	2	4	0	2	0	0	0	0	0	0
9	3	2	1	2	0	0	0	0	0	0	0
8	4	1	6	2	2	2	0	2	0	0	0
7	4	7	3	7	3	2	0	0	0	1	0
6	6	5	7	6	5	5	1	0	0	1	0
5	13	6	7	7	6	7	2	1	0	1	0
4	9	18	9	9	8	6	2	0	3	0	0
3	3	5	23	9	3	4	4	2	2	0	2
2	0	3	2	10	6	5	2	5	1	1	2
1	2	1	4	6	6	0	1	0	3	3	5
0	0	0	0	6	7	7	2	14	4	3	14

Fig. 2.2— Number of systems carrying different combinations of local and distant signals

To obtain estimates of the asymptotic penetration levels for each type of service, the F_i in equation (2.4), dummy variables, D_i, are defined corresponding to the service classifications as follows. $D_i = 1$ if:

i	Type of Service	
1	Local signals ≤ 2	Distant signals ≤ 3
2	Local signals ≤ 2	Distant signals ≥ 4
3	$3 \leq$ Local signals ≤ 6	Distant signals ≤ 3
4	$3 \leq$ Local signals ≤ 6	Distant signals ≥ 4
5	Local signals ≥ 7	Distant signals $= 0$
6	Local signals ≥ 7	Distant signals ≥ 1 .

Otherwise, $D_i = 0$. A system with service of type 1, for example, is represented by $D_1 = 1$, $D_2 = \ldots = D_6 = 0$.

The number of households variable, H, is constructed in the following manner. The Factbook listing usually includes population of the system's service area. This figure is converted to number of households by dividing by the average number of persons per household in the state in which the system is located. Average persons per household, in turn, is calculated from census data[1] by dividing state population by number of occupied dwelling units in the state.

The time variable, T, is calculated from the Factbook listing, which usually includes the date that the system began service. Time in months from begin-service date to February 1969 is the value used for T.

Finally, the number of subscribers, Y, is taken directly from the Factbook listing.

Because subscribers, population, or begin-service date is missing from some listings, the usable sample is further reduced to 352 observations.

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[1] County and City Data Book, 1967, U.S. Department of Commerce, Washington, D.C., 1967.

THE ESTIMATES

Making use of the dummy variables defined in the preceding section, (2.4) can be rewritten in a form suitable of ordinary least squares estimation as

$$\log Y - \log H = \sum_{i=1}^{6} \log F_i(D_i) + \beta_1(-1/T) + \beta_2(-H/T) \qquad (2.5)$$
$$+ \beta_3(-H^2/T) + u \;.$$

Regression of log Y - log H on the D_i's, $-1/T$, $-H/T$, and $-H^2/T$, with the intercept suppressed, yields estimates for the log F_i's and the β's. The estimated coefficients for this first regression, together with their t values, are shown as line (1) in Table 2.1.

There are two things to note about this first regression before going on to the definitive form of the relationship. First, the estimated coefficients of D_1 and D_2 are the same; the sample offers no evidence that asymptotic penetration levels for systems with two or fewer local signals depend on the number of distant signals carried. Second, the estimated coefficient of the $-H^2/T$ term is not significantly different than zero at the .95 confidence level; there is no evidence that the β parameter in the logistic growth curve is a non-linear function of number of households.

Consequently, I estimate a revised form of the relationship. Service of types 1 and 2 is lumped together and called type 1. In other words, all systems with two or fewer local signals are classified as offering type 1 service, regardless of the number of distant signals they carry. Also, the H^2/T term is omitted from the equation. The resulting equation to be estimated is

$$\log Y - \log H = \sum_{i=1,3}^{6} \log F_i(D_i) + \beta_1(-1/T) + \beta_2(-H/T) + u \;. \qquad (2.6)$$

Estimated coefficients and t values are shown as line (2) in Table 2.1.

Estimated Penetrations

The coefficients of the D_i are estimates of log F_i. By raising e to these powers, one obtains estimates of the F_i themselves, the

Table 2.1

REGRESSION RESULTS

Dependent Variable	Estimated Coefficients										R^2
	D_1	D_2	D_3	D_4	D_5	D_6	$-1/T$	$-H/T$	$-H^2/T$	0	
(1) log Y - log H	-.509 (-3.55)	-.509 (-6.19)	-.986 (-9.45)	-.697 (-7.12)	-1.237 (-6.10)	-.875 (-5.44)	1.194 (2.16)	$.405(10^{-3})$ (6.88)	$-.808(10^{-10})$ (-0.47)		.391
(2) log Y - log H	-.508 (-7.12)		-.987 (-9.48)	-.696 (-7.13)	-1.223 (-6.10)	-.874 (-5.45)	1.307 (2.63)	$.387(10^{-3})$ (8.73)			.390
(3) log Y - log H	-.495 (-6.33)		-.976 (-9.09)	-.673 (-6.01)	-1.206 (-5.88)	-.856 (-5.15)	1.300 (2.61)	$.387(10^{-3})$ (8.73)		-.0277 (-0.41)	.391

asymptotic penetration levels. These values, the central results of this chapter, are presented in Figure 2.3. Ninety percent confidence intervals for the estimates are shown within parentheses in the figure.[1]

The relative magnitudes of the estimated asymptotic penetration levels correspond well with a priori expectations. Systems in areas with two or fewer local signals have the highest penetration. Here cable service is especially attractive because it supplies missing network signals and adds greatly to the very limited service available over the air. My estimate indicates that a cable system in such an area can expect, on the average, ultimately to serve 60 percent of all households in its service area. In areas where more local signals are available, estimated asymptotic penetration levels are lower. In an area with between three and six local signals, a cable system that imports three or fewer distant signals can expect an ultimate penetration level of .37; a system importing more than three distant signals will do better, averaging an ultimate penetration of .50. For areas even better endowed with local signals, estimated ultimate penetration decreases still further: .29 for systems that do not import distant signals, .42 for those that do.

Nationwide Average

Estimated ultimate penetration levels in Figure 2.3 may be used to calculate a rough estimate of expected nationwide average penetration. I make two assumptions, both of which bias the estimate upwards. First, all cable systems will carry four or more distant signals, so the boxes at the top in Figure 2.3 apply. Second, all television homes are located in areas where cable service can be provided at a reasonable price.

Nearly two-thirds of all television homes are located in areas where three to six signals are received, so the middle column of boxes

[1]Based on a 1.65 standard error band on either side of the estimated log F_1.

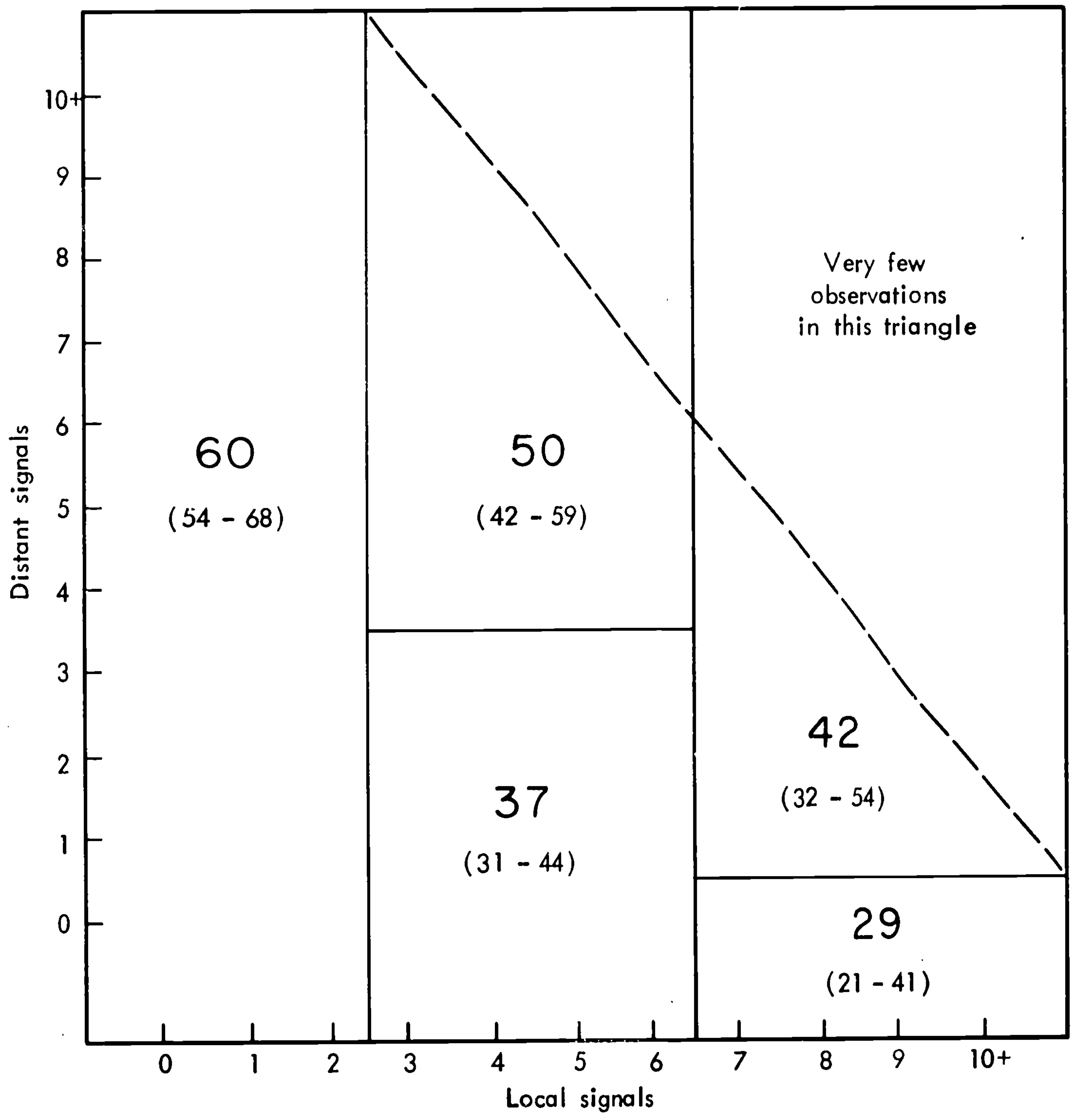

Fig. 2.3—Estimated ultimate penetration percentages

in Figure 2.3 is numerically the most important one. Most of the remainder can receive seven or more signals, so the column to the right is also important. Using the distribution of homes by signals received, and penetration estimates from Figure 2.3, expected nationwide average cable penetration is calculated in Table 2.2. Making some allowance for the upward bias introduced by my assumptions, the result can be stated as follows: Expected nationwide average cable penetration is on the order of 40 to 45 percent.

Estimated β Coefficients

It may be of some interest, if only as a check on the plausibility of the model, to discuss the estimated β coefficients, as well. From line (2) of Table 2.1, the estimated expression for the parameter β in the logistic growth curve is $\beta = 1.307 + .000387H$. In the sample, the mean number of households is 12,929. Recall that the inflection point of the logistic curve comes at $T = \beta/2$. For the average system, then, the estimated inflection point is reached only three months after service begins. For a system with a large service area, say 250,000 households, the estimated inflection point comes 49 months after service begins. These figures strike me as being somewhat on the low side, but not altogether unreasonable.

ASSESSING THE OVERALL SIGNIFICANCE OF THE MODEL

R-squared for the second regression in Table 2.1 is .39. All it takes is a glance at the t values to assure one that this is statistically a highly significant portion of the total variance in the dependent variable. But the variance of log Y - log H does not have much intuitive meaning.

To make possible a more informative assessment of the overall in-sample performance of the model, I rewrite equation (2.6) as a predictor of number of subscribers:

$$\hat{Y} = \hat{F}_1 H e^{-(\hat{\beta}_1 + \hat{\beta}_2 H)/T} \qquad (2.7)$$

Table 2.2

EXPECTED NATIONWIDE AVERAGE PENETRATION

Number of Stations Received	Percent of TV Households[a]	Estimated Penetration	Percent on Cable[b]
2 or fewer	3.4	.60	2.0
3 to 6	64.0	.50	32.0
7 or more	32.6	.42	13.7
Total	100.0		47.7

Notes:

[a]From Nielson national sample in September 1967 cited in "A Study of Distribution Methods for Telecommunications (Complan Associates)," A Survey of Telecommunications Technology Part 2, President's Task Force on Communications Policy, June 1969, PB 184 413.

[b]Column 2 times column 3.

As shown in the third line of Table 2.3, equation (2.7) explains 31 percent of the total variance in subscribers. Obviously, the "other factors" represented by the error term in the model are important, resulting in 69 percent of the total variance. But it is also true that the factors included explicitly in the model have a highly significant influence. The F statistic for equation (2.7) is 25.9, and $F_{6,\ 345,\ .01}$ is only about 2.70. Thus the equation is significant far beyond the .01 level. If the other factors remain reasonably constant, then my estimates should be reasonably good predictions. If not, then the other factors should be taken explicitly into account in the model, if possible.

Another way to evaluate the performance of the model as a predictor of subscribers is to compare its performance with that of a naïve (an even more naïve) model. For the comparison model, I use number of households as a linear predictor of number of subscribers, getting the least squares equation

$$\underset{}{\hat{Y}} = \underset{(10.34)}{2537} + \underset{(6.17)}{.02523H} \quad . \qquad (2.8)$$

The numbers in parentheses are t values.

As shown in Table 2.3, equation (2.8) explains 10 percent of the variance in Y. Even this simple equation is highly significant. Its F statistic is 20.2,[1] much greater than $F_{1,\ 350,\ .01} = 6.72$.

But equation (2.7) does much better than the naïve comparison model. It explains more than three times as much variance. The F statistic for additional variance explained by (2.7) relative to (2.8) is 21.2. $F_{5,\ 345,\ .01}$ is only about 3.08.

CABLE PENETRATION VERSUS CABLE SHARE OF VIEWING

Figure 2.3 shows estimates of percent of <u>households</u> that will ultimately subscribe to cable. This may not be the same as percent of

[1] Equation (2.8) explains $768(10^6)$ subscribers^2 of variance with one degree of freedom, leaving $7072(10^6)$ unexplained with 350 degrees of freedom. $F = (768/1)/(7072/350) = 20.2$.

Table 2.3

ANALYSIS OF VARIANCE OF SUBSCRIBERS ABOUT MEAN

Source of Variance	R-Squared	Sum of Squares (10^6)	Degrees of Freedom	Mean Square	F Statistic
Explained by (2.8)	.098	768	1		
Additional explained by (2.7)	.213	1672	5	333.4	21.2[a]
Total explained by (2.7)	.311	2440	6	406.7	25.9[b]
Unexplained residual	.689	5400	345	15.7	
Total	1.000	7840	351		

Notes:

[a] $F_{5,\ 345,\ .01} = 3.08$.

[b] $F_{6,\ 345,\ .01} = 2.70$.

viewers that subscribe, and it is this latter quantity that is needed for the impact model of Chapter VI. In fact, there are good reasons to expect that the two quantities will differ: Avid television watchers seem more likely to subscribe than those with less interest. If that is true, then the 42 percent (say) of households that subscribe may account for significantly more than 42 percent of homes viewing television at any given time.

Four audience surveys that report cable and over-the-air viewing separately[1] shed some light on this subject. In all four cases, the percentage of cable subscribers watching television during prime time is greater than the corresponding percentage of non-subscribers. (The same is true for the 9 a.m. to midnight averages.) For example, a 1968 survey in Kern County, California, found that 64 percent of cable subscribers used television on average during prime time, compared to 56 percent of non-subscribers. Therefore subscribers, who constituted 26.6 percent of all television homes in the county, accounted for 29.3 percent of all prime-time viewing.[2] Similar figures from two surveys in San Diego County, California, and one in El Paso County, Colorado, are shown in Table 2.4.

The four points in Table 2.4 aid in establishing the assumed relationship, plotted in Figure 2.4, between percent of households subscribing to cable and percent of viewing accounted for by cable subscribers. The assumed relationship consists of three straight line segments. The first, over the range from zero to one-third cable penetration, is the least-squares line through the origin, defined by the four observed points. The second, from one-third to two-thirds penetration, is parallel to the 45-degree "equality" line. The third, from two-thirds to 100 percent penetration, completes the route to 100 percent viewing at 100 percent penetration.

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[1] Reproduced in "The Economics of the TV-CATV Interface," Staff Report to the Federal Communications Commission, Washington, D.C., July 15, 1970, p. 14 and Appendices 2 and 3. Hereafter this is referred to as Staff Report.

[2] $(64 \times .266)/(64 \times .266 + 56 \times .734) = .293$.

Table 2.4

CABLE PENETRATION VS. CABLE SHARE OF VIEWING

Survey	Non-Cable: Fraction of Households	Non-Cable: Prime-Time HUT[a] (percent)	Cable: Fraction of Households	Cable: Prime-Time HUT[a] (percent)	Cable: Fraction of HUT[a]
Kern County, California	.734	56	.266	64	.293
San Diego County, California, 1970	.860	56	.140	59	.146
San Diego County, California, 1969	.891	56	.109	60	.116
El Paso County, Colorado	.796	60	.204	69	.228

Note:

[a]Homes using television.

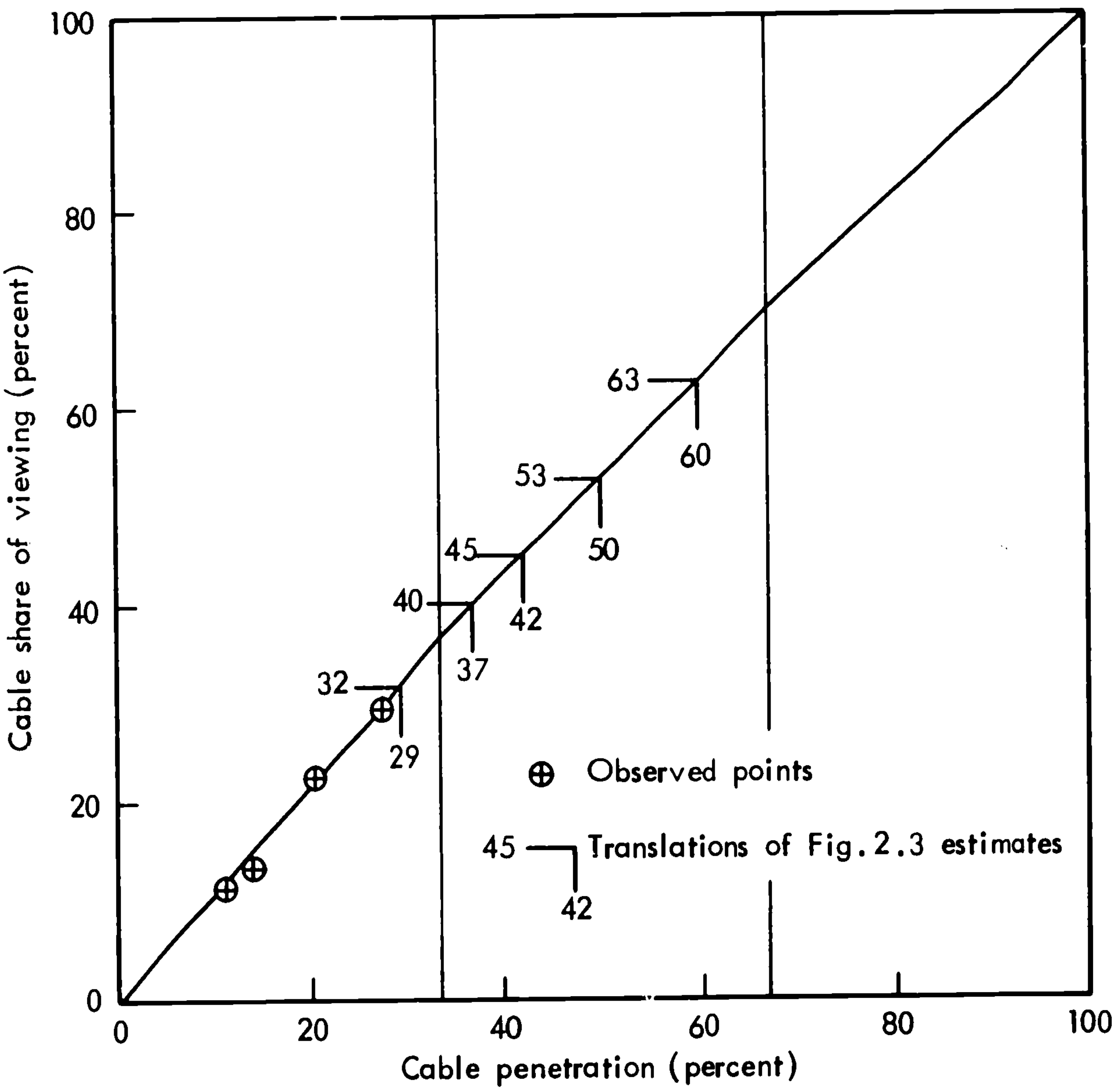

Fig. 2.4—Cable penetration versus cable share of viewing

OTHER SERVICES

Obviously, the estimates of asymptotic cable penetration levels presented in this chapter (Figure 2.3) apply only to cable systems whose primary service is delivery of some combination of local and distant television signals. Future cable systems may additionally offer a number of other, essentially different services, such as opinion polling, automatic meter reading, and unique kinds of cable originated programming. If such services should come to motivate an important part of cable demand, my estimates will no longer be relevant. (To the extent that cable originations resemble broadcast programming, however, origination channels could be counted as distant signals, and my estimates could still be used.)

Of course, empirical estimates of the importance of dramatic new services are impossible as long as the services are non-existent. In an attempt to get some feel for the importance of extra services offered by cable systems, I estimate a model that allows for an effect of two unique extra services currently available on some systems: mechanical origination, such as time and weather, and local live origination. The model is

$$Y = F_1 H e^{\gamma O - (\beta_1 + \beta_2 H)/T + u} . \quad (2.9)$$

The new variable O is a crude index of a system's origination activity. It can take on values of zero, one, or two, with one point assigned for each type of origination offered by the system. In the model, origination increases expected subscribers at any point in time by the factor $e^{\gamma O}$, where γ is a parameter to be estimated.

Model (2.9) results in a regression equation identical to (2.6) except that it includes a γO term on the right hand side. Parameter estimates for this model are shown as line (3) back in Table 2.1. The estimated origination coefficient has the wrong sign, but is not significantly different than zero, with a t value of only -.41. Other specifications of the origination index O — including canned as well as mechanical and live origination, and using a zero/one origination dummy instead of the additive index described above — perform even worse. Estimated γ coefficients for these other specifications are larger negatively, but in no case does the t value exceed 0.8 in absolute value, so none are significant even at the .25 level.

Based on these results, one cannot reject the hypothesis that current cable originations have no effect on asymptotic penetration levels. However, other services available in the future may result in penetrations greater than those estimated here.

SUMMARY

Expected ultimate cable penetration levels are estimated by fitting a set of logistic growth curves to 1969 data on cable systems. Highest penetration, 60 percent on average, is to be expected in areas with two or fewer local signals. In such cases, the number of distant signals carried has little or no effect on expected penetration. Lowest penetration is estimated for cable systems that carry no distant signals and operate in areas with many local signals; such a system can expect ultimately to serve 29 percent of all homes in its service area on average. Expected penetration for systems with other combinations of local and distant signals ranges from 37 to 50 percent, as shown in Figure 2.3. Rough calculations based on these estimates suggest an ultimate nationwide average cable penetration on the order of 40 to 45 percent.

Because cable subscribers watch more television than do non-subscribers, 40 percent, say, of homes subscribing to cable constitute more than 40 percent of television audience. About 3 percent should be added to the numbers in Figure 2.3 to convert them from percent of homes to percent of audience.

Ultimate penetration may be higher than estimated if radically new cable services are offered in the future. The kind of origination now offered, however, does not significantly affect penetration.

III. AUDIENCE SHARES

Cable companies that offer their subscribers a choice among local and distant signals tend to decrease local station audience because some subscribers choose to watch the distant signals instead of the local ones. In order to assess the potential impact of cable growth on television broadcasting, it is necessary to have some way of estimating how audience divides among available signals. One method is developed in this chapter for use in the impact model of Chapter VI.

STRUCTURE OF THE MODEL

My basic hypothesis is that "attractiveness" indices can be assigned to television signals so that audiences tend to divide among any group of signals in proportion to the indices. Say a particular group of viewers can receive a set of signals θ. Denote the index for the i^{th} signal by a_i. Then, according to my hypothesis, the fraction of viewers watching the i^{th} signal tends to equal $a_i/\sum_{\theta} a_i$. The usefulness of such a hypothesis for this study is that it is a basis for predicting how well particular signals will do in distant markets (and how well local signals will stand up to the competition).

The hypothesis assumes that there is some degree of consistency in the popularity of signals in different markets, for example, that an independent with a large audience share in its home market will tend to do better in distant markets than will a competing independent with a smaller share. This would not be true if the station's popularity were based on programs of purely local appeal. But it seems indisputably true that the appeal of most popular programming is not restricted to a certain small geographical area.

The hypothesis also assumes that there is one fairly homogeneous audience for entertainment programming, so that an additional signal will tend to draw away audience from all other signals. This would not be true in Peter Steiner's model of program patterns and preferences;[1] there, an additional western would split the audience of other westerns, leaving audiences viewing detective stories and other types of programs unchanged. My hypothesis deals, though, with average audience over long periods, and thus remains plausible even if Steiner's model describes viewers' micro-behavior.

To keep data handling manageable, it is necessary to assume that television markets are "autarkic," that is, that (in the absence of cable) only home stations are viewed in each market. I also assume that total audience, A, is not changed (increased) by importation of distant signals.[2]

Within each market, I assume that there are three groups of viewers, each able to receive a different set of signals. Cable viewers can receive all home market stations plus whatever distant signals are brought into the market. I denote this set of signals by C. If c is cable penetration (as a fraction of viewers, not homes), cable audience $A_C = cA$. Homes with all-channel receivers that do not subscribe to cable can receive all home market stations, a set denoted by U. Using u to denote UHF penetration, all-channel (non-cable) audience $A_U = u(1-c)A$. Non-subscribing homes with VHF-only receivers can receive only home market VHF stations, a set denoted by V. VHF-only audience $A_V = (1-u)(1-c)A$.

A station's local audience, A_i, is the sum of its audience from each of the three groups of viewers A_C, A_U, and A_V. Using a dummy variable D_i equal to one if the i^{th} station is UHF and zero if it is VHF, one can write the expression for local audience as

$$A_i = \frac{(1-D_i)a_i}{\sum_V a_i} A_V + \frac{a_i}{\sum_U a_i} \cdot A_U + \frac{a_i}{\sum_C a_i} A_C \quad . \tag{3.1}$$

---

[1] Peter O. Steiner, "Program Patterns and Preferences, and the Workability of Competition in Radio Broadcasting," Quarterly Journal of Economics, May 1952, pp. 194-223.

[2] There is some evidence to support this assumption in the Staff Report, pp. 12-15. If it were to be established that more signals lead to more viewing, this could easily be built into the model.

(We see, though, in the next section, that a_i for a UHF station is generally different over the air and over the cable, and this requires some modification of equation (3.1)).

ASSIGNING THE a_i

My hypothesis is that indices a_i can be assigned to signals so that audiences tend to split in proportion to the indices. In this section I make the assignments and in so doing provide several rough tests of the hypothesis.

VHF Network Stations

During prime time, all of a network's affiliates broadcast much the same programs. Here is one case, then, in which the same set of signals is broadcast in many different markets, making possible one test of the audience share hypothesis.

Consider only markets in which there are three VHF stations with unambiguous (not multiple) network affiliations. Then summing (3.1) over the three network stations in a market (the set NV) and dividing into (3.1) gives

$$A_i / \sum_{NV} A_i = a_i / \sum_{NV} a_i \qquad (3.2)$$

My hypothesis implies that there is a tendency for each network's share to be the same in different markets. That is, if my hypothesis is correct, knowing a station's network affiliation should permit a useful estimate of its share of all network audience.

This may be tested by regressing $A_i / \sum_{NV} A_i$ on D_1, D_2, and D_3, dummies for NBC, CBS, and ABC affiliation, respectively. The resulting regression equation using 234 observations is

$$A_i / \sum_{NV} A_i = \underset{(57.48)}{.332} D_1 + \underset{(67.39)}{.390} D_2 + \underset{(47.98)}{.278} D_3 \; . \qquad (3.3)$$

The numbers in parentheses are t values; R-squared is .447. Network affiliation explains nearly half of the variance in network shares.

At least in the absence of a better general predictor, this is enough to be useful, tending to support my hypothesis.

Normalizing by setting $\sum_{NV} a_i = 1$, we can use the average shares — the coefficients in (3.3) -- as estimates of a_i for VHF network affiliates. For multiple affiliates, I use appropriate averages of the single-affiliate a_i's.

UHF Network Affiliates (The UHF Handicap)

UHF stations are at a disadvantage competing with VHF stations for a number of reasons. First, not every home has an all-channel receiver. Second, not every home with an all-channel receiver has a UHF antenna. Third, UHF stations typically operate at low power, making reception more difficult, particularly at the edges of a market. Fourth, the continuous tuner for UHF is less convenient to use than the click-stop tuner for VHF. Thus it seems likely that, even among homes with all-channel receivers, UHF stations attract smaller audiences than would a VHF station broadcasting the same signal.

I hypothesize that the "attractiveness" of a signal broadcast over UHF is decreased by the fraction H for reasons two through four above. For example, a_i for an NBC UHF affiliate would be .332 (1-H).

To estimate H, consider all three-station intermixed markets with unambiguous network affiliations. The expected share of each station in all-channel homes, S_i, is given by

$$S_i = \frac{(1 - D_i H)\, a_i}{\sum (1 - D_i H) a_i} \qquad (3.4)$$

Manipulating (3.4), and recalling that $\sum a_i = 1$, one obtains

$$S_i - a_i = H(S_i \sum D_i a_i - D_i a_i) \quad . \qquad (3.5)$$

Equation (3.5) suggests that H can be estimated by regressing $S_i - a_i$ on the term in parentheses in (3.5), with the intercept suppressed. To do so, one must have numbers for the S_i, a_i, and D_i.

The a_i are given by (3.3), and the D_i are of course known. The method used to obtain the S_i is as follows: Start with each station's total prime-time audience, A_i, for February and March 1968. For the VHF stations, part of this audience is in homes without all-channel receivers; since S_i refers only to all-channel audience, this portion of VHF stations audience must be deducted. Assuming that cable audience is negligable, the VHF-only audience, $A_V = (1-u)A$, is attributed to VHF stations in proportion to A_i and deducted to give audience in all-channel homes. The shares S_i for VHF stations are the ratios of all-channel audience to $A_U = uA$. All of a UHF station's audience is in all-channel homes, so for a UHF $S_i = A_i/A_U$.

The resulting regression equation, using observations on all 30 stations in three-network, intermixed markets in which cable penetration is less than 10 percent, is

$$S_i - a_i = \underset{(14.34)}{.543} \; (S_i \sum D_i a_i - D_i a_i) \tag{3.6}$$

with R-squared of .876. H is estimated as .543 with a small standard error (.038). That is, broadcast over UHF on average reduces a signal's a_i to about one half what it would be if broadcast over VHF.

The good fit of equation (3.6) provides additional rough support for my basic audience share hypothesis.

For readers familiar with the FCC staff report, it may be helpful to compare my UHF handicap H with the somewhat different UHF handicap defined and estimated there, which I denote by H^*. H^* is defined[1] only in terms of the UHF affiliate in markets with three affiliates, exactly one of which is UHF. If the UHF station is given the index 1, then, using my notation, H^* is defined as

$$H^* = \frac{a_1 - A_1/uA}{a_1} \quad . \tag{3.7}$$

In contrast, my H is defined in terms of all stations in all three-station intermixed markets. But limiting attention to the UHF station in a three-station, one-UHF market, the following relationship holds:

[1] Staff Report, Appendix 1.

$$\frac{A_1}{uA} = \frac{(1-H)a_1}{(1-H)a_1+a_2+a_3} \quad . \tag{3.8}$$

Solving (3.8) for H, one obtains

$$H = \frac{a_1 - A_1/uA}{a_1(1-A_1/uA)} \quad . \tag{3.9}$$

Comparing (3.9) and (3.7), it is apparent that H is generally larger than H^*.

In fact, my estimated H of .543 does exceed the FCC staff's estimated H^* of .276 (for prime-time audience in the total survey area). Only part of the difference is accounted for by the differing definitions, though. From (3.7) and (3.9), H should tend to exceed H^* by a factor of $1/(1-A_1/uA)$. In my sample, A_1/uA averages about .2, so this factor is 1.25, while .543/.276 = 1.97.

VHF Independents

Attractiveness indices a_i are easily assigned for VHF independent stations using (3.2). All markets with VHF independents have three VHF network affiliates, so $\sum_{NV} a_i = 1$. Thus (3.2) becomes

$$a_i = A_i/\sum_{NV} A_i \quad . \tag{3.10}$$

That is, a_i for a VHF independent equals its audience expressed as a fraction of audience for all three network affiliates together.

UHF Independents

Assignment of a_i for UHF independents uses much the same method as for VHF independents, but in practice is somewhat more complicated. First, I rewrite (3.1) to take into account the UHF handicap in competing for over-the-air viewers:

$$A_i = \frac{(1-D_i)a_i}{\sum_V a_i} A_V + \frac{(1-D_iH)a_i}{\sum_U (1-D_iH)a_i} A_U + \frac{a_i}{\sum_C a_i} A_C \quad . \tag{3.11}$$

Assuming cable audiences to be negligible in 1968, only the middle term in (3.11) contributes to audiences for UHF independents. (The assumption is reasonable because independent stations are generally found in large markets, where cable penetration is typically still low.) For all UHF independents together (the set IU), we have from (3.11)

$$\sum_{IU} A_i = \frac{(1-H)\sum_{IU} a_i}{\sum_{V} a_i + (1-H)\sum_{NU} a_i + (1-H)\sum_{IU} a_i} A_U \quad . \tag{3.12}$$

where NU is the set of UHF network affiliates. Solving for $\sum_{IU} a_i$, one finds

$$\sum_{IU} a_i = \frac{\sum_{V} a_i + (1-H)\sum_{NU} a_i}{1 - H} \quad \frac{\sum_{IU} A_i}{A_U - \sum_{IU} A_i} \quad . \tag{3.13}$$

All the terms on the right hand side of (3.13) are given by previous work in this section, so the expression is easily evaluated. Partition of $\sum_{IU} a_i$ among individual UHF independents is then made in proportion to A_i.

The assignment of a_i's for independents (both VHF and UHF) is tautological in the sense that it assures by definition that the share hypothesis holds for these stations in their home markets. The assertion that the same a_i determine audience shares when these stations are carried into other markets is, however, far from empty. Unfortunately, there are very few data available with which to test it.

Three surveys that report cable viewing of Los Angeles independent stations in the San Diego and Bakersfield markets[1] provide the only readily available data that permit comparison of calculated and actual shares. These comparisons are summarized in Table 3.1. The calculated and observed shares are remarkably close for Bakersfield. For San Diego, the calculations generally overestimate the share of cable audience viewing distant signals. Overall, the agreement is good enough to lend some additional support to my basic audience share hypothesis.

[1] Reproduced in <u>Staff Report</u>, Appendices 2 and 3.

Table 3.1

CALCULATED VS. ACTUAL SHARES OF CABLE AUDIENCE FOR INDEPENDENT STATIONS IN DISTANT MARKETS

Independent Station	Bakersfield		San Diego	
	Calculated[a]	Observed[b]	Calculated[a]	Observed[c]
KTLA	5	8	5	4
KHJ	5	5		
KTTV	10	10	10	4
KCOP	5	4	5	3

Notes:

[a]Using method described in this chapter.

[b]American Research Bureau (ARB) special tabulation for November 1968.

[c]Weighted average of ARB special tabulations for February-March 1969 and February-March 1970.

IV. AUDIENCE-REVENUE RELATIONSHIPS

The results of Chapters II and III are used in the impact model to estimate the effect of cable on television stations' audience size. This chapter develops estimates that aid in translating changes in audience size into changes in broadcast revenues.[1]

The estimates go beyond previous work in a number of respects. Of particular importance to someone interested in the impact of cable are indications that additional audience is worth less to a large station than to a smaller one, and that distant audience is worth less than closer audience. Since cable growth will likely result in a loss of local audience to small stations and a gain of distant audience by large stations, both results suggest that the total value of audience may decrease as cable grows.

AGGREGATE RELATIONSHIPS

Fisher et al.,[2] and others as well, have reported a strong linear relationship between station broadcast revenues, R, and average prime-time[3] station audience, A_p:[4]

$$R = \beta_0 + \beta_1 A_p + u \qquad (4.1)$$

where β_0 and β_1 are parameters to be estimated and u is an error term. Using individual station data for 1963,[5] Fisher estimates the

[1] Most of the work reported in this chapter was performed at the FCC computer facility, Washington, D. C., in order to preserve the confidentiality of proprietary financial data.

[2] Franklin M. Fisher and Victor E. Ferrall, Jr., in association with David Belsley and Bridger M. Mitchell, "Community Antenna Television Systems and Local Television Station Audience," Quarterly Journal of Economics, May 1966, pp. 227-251.

[3] 7:30 p.m. to 11:00 p.m. in Eastern and Pacific time zones, 6:30 p.m. to 10:00 p.m. in Central and Mountain time zones, seven days a week.

[4] Defined as the number of households that tuned to that station during the average quarter-hour period during prime time.

[5] Revenue data are for 1963, audience data for March 1964.

relationship shown as line (1) of Table 4.1, and interprets it to mean "that an addition of one home to average prime time viewing (i.e., one home viewing three and one-half hours nightly) is worth on the average $26.63 in yearly revenue."

Table 4.1

REGRESSION OF REVENUE ON AUDIENCE:
AGGREGATE RELATIONSHIPS

	Year	Estimated Coefficients		R^2
		Constant	Prime-Time Audience	
(1)	1963 (Fisher)	103.3 (2.28)	26.63 (68.)	.897
(2)	1968	13.4 (0.22)	43.20 (81.34)	.924

Using 1968 data,[1] I estimate the relationship in line (2). This indicates that the value of an average prime-time viewing home increased over the five-year period to about $43, or about 10 percent per year compounded. (The method used for line (2) differs slightly from Fisher's in that satellite and parent stations' audiences and revenues are combined, and stations in operation only part of the year are excluded from the regression. Stations outside the 48 contiguous states are also excluded. A total of 543 observations remain. These changes have only a minor effect on the estimate.)

DISAGGREGATIVE RELATIONSHIPS

Upon reflection, it is apparent that the relationships shown in Table 4.1 may be inappropriately aggregated. By treating all stations alike, the relationships neglect a real difference between broadcast revenue of network stations and that of independents. Broadcast revenue reported by independents consists almost entirely of time

[1]Revenue for 1968, audience for March 1968.

sales to advertisers less commissions. For network stations, broadcast revenue also includes time sales to networks. This significant component of network stations' revenues -- about 18 percent on average in 1968 -- is understated relative to what an independent would report. The networks themselves sell time to advertisers and pass on only a part of the receipts to the stations -- 45 percent after commissions in 1968. They keep the rest as implicit compensation for programs that they supply to their affiliates without explicit charge. In other words, part of a network affiliate's real broadcast revenue is received in the form of free network programs, but this part of the revenue does not get recorded in the station's accounts. So there is at least one reason to expect that the audience-revenue relationship is different for network stations and independents.

Also, although Fisher did not find much evidence of curvature in the audience-revenue relationship,[1] I do not want to exclude the possibility that it may be curved. Accordingly, I specify the quadratic form

$$R = \beta_0 + \beta_1 A_p + \beta_2 A_p^2 + u \qquad (4.2)$$

and estimate it separately for 485 network stations and 58 independents.

The results, shown in Table 4.2, strongly confirm the expectation that the relationship is different for network stations and independents. As shown by the analysis of variance in Table 4.3, the separate equations, lines (2) and (3) in Table 4.2, explain significantly more variance than does the equation for all stations lumped together, line (1), at well beyond the .01 level.

The results also strongly indicate that the relationships are curved. The estimated coefficient of the squared term is significantly negative at the .01 level in all cases. A negative coefficient indicates that the marginal value of audience decreases as audience size increases. For example, consider the relation between network station revenue and prime-time audience, line (2) in Table 4.2:

[1]Franklin M. Fisher, et al., p. 232.

Table 4.2

REGRESSION OF REVENUE ON AUDIENCE: DISAGGREGATIVE, CURVED RELATIONSHIPS

Sample	Estimated Coefficients: Constant	Prime-Time Audience	Prime-Time Audience Squared	R^2
(1) All stations	-287.2 (-4.13)	50.45 (46.61)	-.01197 (-7.57)	.932
(2) Network stations	-327.2 (-5.53)	48.21 (53.43)	-.00937 (-7.31)	.957
(3) Independents	-35.7 (-0.17)	88.10 (16.05)	-.08017 (-5.20)	.931

Table 4.3

ANALYSIS OF VARIANCE: NETWORK/INDEPENDENT CLASSIFICATION

Source of Variance	R-Squared	Sum of Squares (10^6)	Degrees of Freedom	Mean Square	F Statistic
Explained by line 1, Table 4.2	.932	9067	2		
Additional explained by lines 2 and 3, Table 4.2	.020	194	3	64.7	73.8[a]
Total explained by lines 2 and 3, Table 4.2	.952	9261	5		
Unexplained residual	.048	471	537	.877	
Total	1.000	9732	542		

Note:

[a] $F_{3, 537, .01} = 3.82$.

$$\hat{R} = -327.2 + 48.21A_p - .009373A_p^2 \quad . \tag{4.3}$$

The estimated value of an incremental prime-time home is given by

$$\frac{d\hat{R}}{dA_p} = 48.21 - .018746A_p \quad . \tag{4.4}$$

Equations (4.3) and (4.4) are plotted in Figure 4.1 over the range of A_p actually experienced, between zero and one million homes. Over this range, the value of an additional prime-time home decreases from 48 to 30 dollars per year.

The curvature of the audience-revenue relationship is important in estimating the impact of cable on broadcasting. Larger stations may gain audience and smaller stations lose audience as a result of cable growth. If the audience-revenue relationship is curved as indicated, revenue lost by the smaller stations will exceed revenue gained by the larger stations.

PRIME-TIME AUDIENCE VERSUS NON-PRIME-TIME AUDIENCE

So far I have used average prime-time audience as the sole measure of audience size, as did Fisher. This usage does not imply an assumption that only prime-time audience is worth anything. Such usage would be perfectly valid if proportions of total audience during different time periods were the same for all stations. In that case, audience during any single period would be a sufficient measure of audience during all periods.

In fact, of course, although they are highly correlated, prime-time and non-prime-time audience do not have the same ratio for all stations. There is even enough independent variation in prime-time and non-prime-time audience to make possible rough estimates of separate values of the two. A priori, there is no reason to believe that they are worth the same. In fact, there are good reasons to expect some difference in value. For example, prime-time audiences consist largely of adults, while non-prime-time audiences may consist largely of children and distracted housewives. One could be more attractive to advertisers than the other.

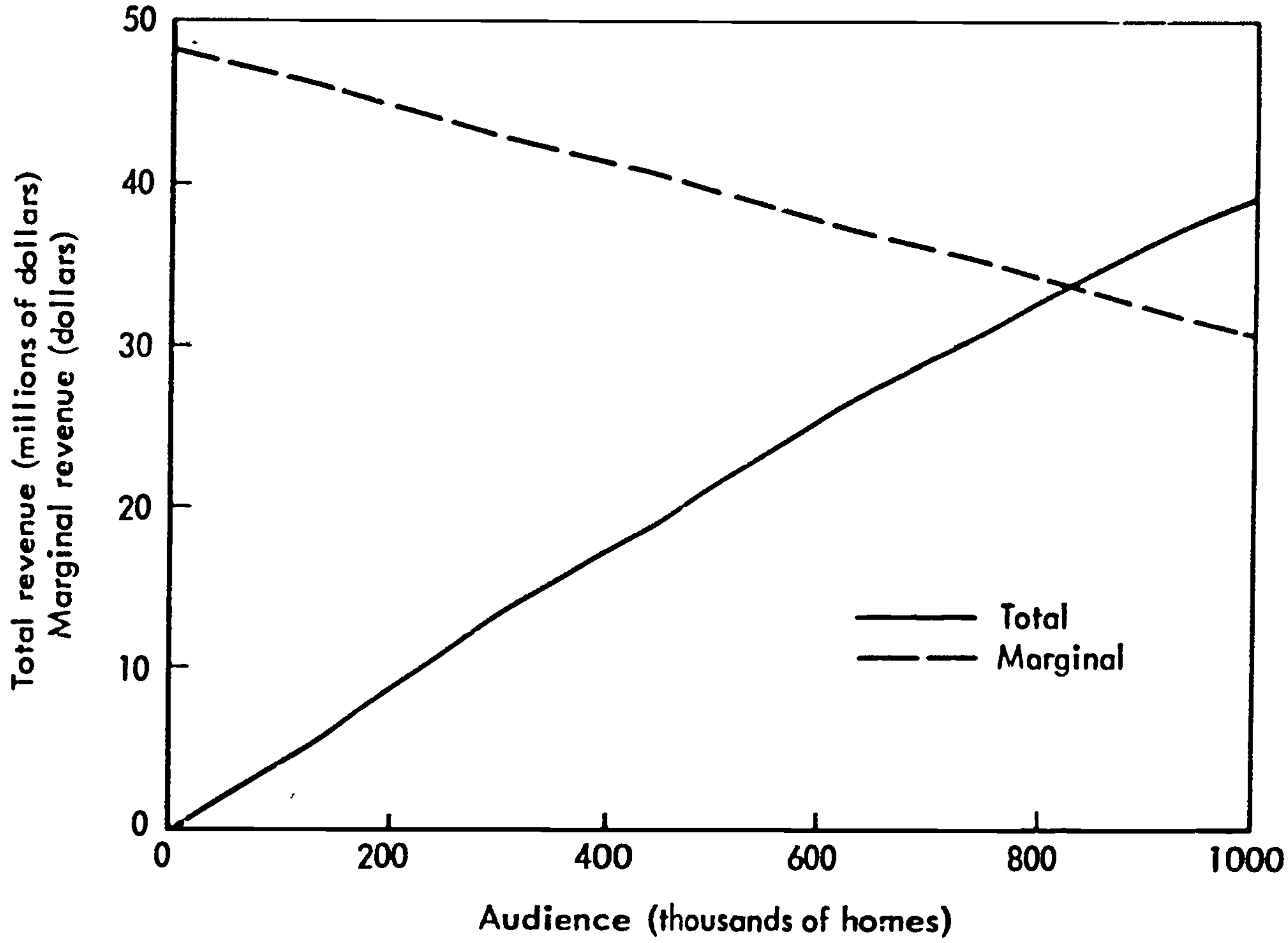

Fig.4.1—Value of prime-time audience for network stations

I hypothesize that stations derive revenue from the sale of two different products to advertisers: hours of prime-time viewing and hours of non-prime-time viewing. Denoting prime-time viewing hours by V_p and non-prime-time viewing hours by V_n, these quantities are related to average audience measures in the following way.

$$V_p = 3.5A_p \quad \text{and} \tag{4.5}$$

$$V_n = 15A_d - V_p \tag{4.6}$$

where A_p is average prime-time audience and A_d is average audience between 9 a.m. and midnight.

The relationship to be estimated is

$$R = \beta_0 + \beta_1 V_p + \beta_2 V_n + u \quad . \tag{4.7}$$

The results, shown in Table 4.4, indicate that a prime-time viewing hour brings in two to three times as much revenue for network stations as does a non-prime-time viewing hour. They also suggest that the difference is even greater in the case of independents. In fact, the estimated value of a non-prime-time hour to independents is not significantly different than zero.

The collinearity of the explanatory variables decreases the precision with which their separate effects are estimated, as is apparent from the low t values (relative to those in unreported regressions of the form $R = \beta_0 + \beta_1 A_d$).[1] (Coefficients of correlation are .961 for all stations, .984 for network stations, and .939 for independents.) This is particularly troublesome in the case of the relationship for independents, with its smaller sample size and larger error variance. The estimates for independents cannot be taken to be anything more than merely suggestive. For both network stations and independents, however, the results provide strong evidence that prime-time viewing hours are more valuable than non-prime-time viewing hours. In all cases, the

[1] J. Johnston, Econometric Methods, New York, McGraw-Hill Book Co., 1963, pp. 204-206.

Table 4.4

REGRESSION OF REVENUE ON AUDIENCE:
BETTER SPECIFIED (BUT HIGHLY COLLINEAR) MODEL

Sample	Estimated Coefficients: Constant	Estimated Coefficients: Prime-Time Audience	Estimated Coefficients: Non-Prime-Time Audience	R^2
(1) All Stations	-115.9 (-2.10)	6.93 (14.01)	4.24 (11.41)	.939[a]
(2) Network stations	-154.5 (-3.06)	8.21 (12.27)	3.14 (5.91)	.956[a]
(3) Independents	428.1 (1.82)	17.18 (7.27)	0.30 (0.28)	.897[a]

Note:

[a]Additional variance explained, relative to $R = \beta_0 + \beta_1 A_d$, is significant at the .01 level.

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equation in which the value of prime-time viewing hours is allowed to differ from the value of non-prime-time viewing hours explains significantly more variance than does the linear regression of R on A_d at well beyond the .01 level.

SPATIAL RELATIONSHIPS

The curvature of the audience-revenue relationship in Table 4.2 is one reason to expect that audience diverted from one station to another as a result of cable growth may be worth less to the gaining station than to the losing station. There are also other reasons for suspecting that this may be so. Say, for example, that a Los Angeles station carried by cable captures some audience from a Bakersfield station. The value of the lost audience to the Bakersfield station is presumably given by the relationships developed above. The value of the same audience to the Los Angeles station may be considerably less. Certainly the audience in Bakersfield is not worth as much to Los Angeles local advertisers as is the closer audience. In addition, it may not be worth much to national advertisers buying time on the Los Angeles station as they may have to buy a Bakersfield station in order to get sufficient coverage in that market.

In this section I develop some evidence that tends to support the hypothesis that distant audience is worth less to a station than is local audience.

The estimates here make use of data on audience within specified zones around each station.[1] If there are three zones, the relationship to be estimated is

$$R = \beta_0 + \beta_1 A_1 + \beta_2 A_2 + \beta_3 A_3 + u \qquad (4.8)$$

where A_1 is audience in the closest in zone, A_2 audience in the middle zone, and A_3 audience in the farthest out zone.

[1] From American Research Bureau, Day-Part Television Audience Summary, November 1968.

Zones used are based on American Research Bureau classifications.[1] ARB reports associate three nested areas with most television markets:

o Metro area, which corresponds roughly to the Department of Commerce's standard metropolitan statistical area (SMSA). Not all markets have a metro area.

o Area of dominant influence (ADI), in which the market's stations attract more than half of all television audience.

o Total survey area (TSA), which extends beyond the area of dominant influence to include roughly 98 percent of all viewing of the market's stations.

The corresponding zones assign audience in the metro area to A_1, audience in the ADI but not in the metro area to A_2, and audience in the TSA but not the ADI to A_3. Estimates based on this division are shown in line (1) of Table 4.5 using observations on all 527 stations for which complete information is available, and in line (2) for the 478 network stations separately. Separate regressions for independents consistently fail to explain significantly more variance than do corresponding equations in which all audience is valued the same regardless of location; these regressions for independents only are not reported.

The estimates show the expected pattern, with closer audience generally being valued higher than more distant audience.

Regressions that divide audience into two (rather than three) parts are also shown in Table 4.5. Lines (3) and (4) estimate value of audience within the metro area versus value outside the metro area. Lines (5) and (6) estimate value within the ADI versus value outside the ADI. All show the expected pattern of value decreasing with distance.

Four of the equations in Table 4.5 explain significantly more variance at the .01 level than do the corresponding equations in which

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[1] Michael Horn of Covington and Burling suggested using these classifications.

Table 4.5

REGRESSION OF REVENUE ON AUDIENCE: SPATIAL DISAGGREGATION

Sample	Estimated Coefficients						
	Constant	A_1	A_2	A_1+A_2	A_3	A_2+A_3	R^2
(1) All stations	216.8 (2.87)	43.07 (51.50)	34.23 (9.56)		27.81 (4.68)		.919[a]
(2) Network stations	55.9 (0.92)	40.88 (64.31)	40.97 (15.03)		26.39 (5.93)		.954[a]
(3) All stations	218.0 (2.87)	43.19 (52.49)				32.34 (11.37)	.919[a]
(4) Network stations	59.8 (0.98)	41.19 (65.56)				36.66 (16.67)	.953
(5) All stations	143.3 (2.12)			41.78 (71.47)	26.48 (4.47)		.918[b]
(6) Network stations	56.8 (1.08)			40.89 (93.07)	26.40 (5.96)		.954[a]

Notes:

[a]Additional variance explained, relative to $R = \beta_0 + \beta_1 (A_1 + A_2 + A_3)$, is significant at the .01 level.

[b]Additional variance explained, relative to $R = \beta_0 + \beta_1 (A_1 + A_2 + A_3)$, is significant at the .05 level.

all audience is valued the same regardless of location. Another explains significantly more variance at the .05 level. The results provide fairly strong support for the hypothesis that distant audience is worth less than closer audience.

SUMMARY

The value of audience to television stations grew at an average compounded rate of 10 percent per year from 1963 to 1968.

The audience-revenue relationship is different for network stations and independents. Both relationships are curved so that an additional viewing home is worth less to a large station than to a small one. Since large stations will likely gain and small stations lose audience as a result of cable growth, this is one reason to expect a negative impact on aggregate station revenue.

An additional household viewing one hour during prime time is apparently worth two to three times as much as is a household viewing one hour during non-prime time.

Distant audience is worth less than close audience. For example, audience outside the area of dominant influence (ADI) is worth about two-thirds as much as audience within the ADI. This is another reason to expect cable growth to have a negative impact on aggregate station revenue.

V. REVENUE-PROGRAMMING RELATIONSHIPS

One reason for concern over the possibility that cable growth may reduce the revenues of television broadcasters posits a relationship between revenues and programming performance. Should revenues decline, the argument goes, broadcasters would have to reduce the quantity and quality of public service and locally originated programming.[1]

To develop evidence on this point, I now explore relationships between programming and revenues in a cross section of stations during 1968.[2] The basic sample includes 567 stations. These are all the stations that have reported financial data for 1968 to the Federal Communications Commission (FCC), except for stations that operated only part of the year. Data for satellite stations are aggregated with those for their parents.

The results strongly support the view that both quantity and quality of local programming are positively related to station revenue.

QUANTITY: PUBLIC SERVICE AND LOCAL PROGRAMMING HOURS

The first set of results deals with the relationship between revenues and quantity of public service and local programming.

In a license renewal application form[3] filed with the FCC every three years, television stations are required to provide some information about their programming practices. Among other things, they

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[1]The implicit assumption seems to be that expenditures for public service and local programming are limited to some fraction (or more general function) of revenues; broadcasters cannot "afford" to spend more. A somewhat more sophisticated model would explain programming expenditures as a profit maximizing choice rather than a simple function of revenue. Such a model is the topic of a planned paper. The empirical work in this chapter, though, makes do with the simpler model.

[2]Most of the work reported in this chapter was performed at the FCC computer facility, Washington, D.C., in order to preserve the confidentiality of proprietary financial data.

[3]FCC Form 303, Application for Renewal of Broadcast Station License, on file in the public reference room at FCC headquarters, Washington, D.C.

report the time during a composite week[1] devoted to news, to public affairs, and to all other programs except for entertainment and sports. I take the sum of these three categories to be a measure of the quantity of public service programming broadcast by a station.

Information on these measures of programming is taken from the most recent application file for 291 stations chosen unsystematically[2] from the 567 stations in the basic sample. To investigate whether or not these measures of programming are related to revenue, I rank the 567 stations in the basic sample by revenue, then divide them into six groups of 94 or 95 stations each. Dummy variables are assigned to differentiate among the revenue sextiles, with $D_1 = 1$, $D_2 = \ldots = D_6 = 0$ if the station falls in the lowest sextile, and similarly for the others. Then to test for a relationship between, say, my basic measure of public service programming P and revenue, I estimate the β parameters in

$$P = \beta_1 D_1 + \ldots + \beta_6 D_6 + u \qquad (5.1)$$

where u is an error term.[3]

Public Service Programming

The results of this first regression are shown as line (1) in Table 5.1. Stations in the lowest sextile broadcast an average of 15 hours a week of public service programming. There is a steady increase through the ranks, with stations in the highest sextile

[1]The composite week consists of one Sunday, one Monday, etc., from the year previous to that in which the report is filed, selected by the FCC and made known only after the conclusion of the year it is to represent.

[2]These are the files that the FCC librarian fetched when asked for the most recent file on each commercial television station. Most are applications filed in 1968 and 1969, with a few from the last quarter of 1967.

[3]P is also estimated as a quadiatic function of revenue, but this form explains considerably less variance than do the revenue sextiles.

Table 5.1

PUBLIC SERVICE PROGRAMMING HOURS BY REVENUE SEXTILE

Sample	Dependent Variable[a]	Revenue Sextile: Lowest	Second	Third	Fourth	Fifth	Highest	R^2
(1) All stations	P	15.42 (14.46)	18.46 (19.27)	20.72 (18.79)	21.87 (21.38)	24.16 (24.32)	27.05 (24.24)	.208
(2) All stations	P_p	9.71 (13.31)	11.77 (17.96)	12.89 (17.09)	12.90 (18.44)	13.65 (20.10)	16.57 (21.71)	.140
(3) Network stations	P	16.20 (14.61)	19.32 (21.24)	21.02 (20.77)	22.41 (23.42)	24.72 (26.91)	28.26 (25.85)	.235
(4) Network stations	P_p	9.85 (13.99)	12.42 (21.50)	13.04 (20.29)	13.3o (22.03)	13.99 (23.99)	17.59 (25.34)	.205

Note:

[a]P is hours per week of all non-entertainment programming.

P_p is hours per week of news and public affairs programming.

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offering 27 hours of public service programming. In a second regression, line (2), the dependent variable is the sum of news and public affairs hours, excluding the catch-all "other programs except for entertainment and sports." Again, a steady increase is shown as revenue increases. Although there is a good deal of variation in public service programming within sextiles, as shown by the low R^2, the sextile means are accurately estimated, as indicated by the high t values.

One suspects that the relationship may be different for network and independent stations, so I also run separate regressions for the two groups. The results for the 263 network stations are shown in lines (3) and (4). There is some sharpening of the estimates (higher t values and R^2's) but the general pattern is little changed. Results for the 28 independent stations in the sample are not significant and not reported.

Local Programming

In the license renewal form, stations also report the time devoted to local programs (as distinguished from network and syndicated programs) during three time periods: 8:00 a.m. to 6:00 p.m., 6:00 p.m. to 11:00 p.m., and all other hours. The sum of these three categories is my basic measure of quantity of local programming.

Similar results concerning the relation of local programming hours to revenue are shown in Table 5.2. The relation for all stations, line (1), is much like that for public service hours. With the exception of an anomolous 14 hours in the lowest sextile, local programming rises consistently with revenue from an average of 11 hours per week in the second sextile to over 20 hours per week in the highest. The anomoly disappears in the regression for network stations only, line (3), indicating that a few low-revenue independents account for the bulge in line (1).

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Table 5.2

LOCAL PROGRAMMING HOURS BY REVENUE SEXTILE

Sample	Dependent Variable[a]	Revenue Sextile						R^2
		Lowest	Second	Third	Fourth	Fifth	Highest	
(1) All stations	L	13.82 (8.89)	10.82 (7.74)	11.97 (7.44)	14.95 (10.03)	15.40 (10.63)	20.56 (12.63)	.078
(2) All stations	L_p	4.31 (7.09)	3.81 (6.99)	3.98 (6.33)	4.72 (8.10)	3.76 (6.64)	4.97 (7.82)	.012
(3) Network stations	L	9.91 (8.87)	11.01 (12.01)	12.04 (11.80)	14.90 (15.46)	15.69 (16.95)	19.86 (18.02)	.190
(4) Network stations	L_p	3.43 (5.25)	3.74 (6.98)	4.00 (6.70)	4.66 (8.26)	3.75 (6.91)	4.64 (7.20)	.014

Note:

[a] L is total hours per week of local programming.

L_p is hours per week between 6:00 p.m. and 11:00 p.m. of local programming.

Local Programming During Prime-Time

Lines (2) and (4) show the results for local programming during the 6:00 p.m. to 11:00 p.m. period. In contrast to total local programming, prime-time local programming shows no significant relation to revenues; the six revenue classes do not account for a statistically significant portion of the variance in prime-time local programming. Stations with higher revenues broadcast more hours of local programming, but the additional hours fall outside of prime time.

Revenue Means

In the next section it is useful to know revenue means in the sextiles, so these are recorded in Table 5.3. They are computed by regressing revenue on dummy variables for the revenue sextiles, so t values and R^2's are also reported. The sextiles are those used throughout this chapter, partitioning all 567 stations as one group. Thus, for example, 10680 is the mean revenue for independents in the highest overall sextile, not the highest sextile for independents alone.

Table 5.3

MEAN BROADCAST REVENUE IN REVENUE SEXTILE

	Sample	Revenue Sextile						R^2
		Lowest	Second	Third	Fourth	Fifth	Highest	
(1)	All stations	243 (0.86)	652 (2.30)	1053 (3.73)	1597 (5.66)	2881 (10.21)	9438 (33.26)	.569
(2)	Network stations	272 (0.78)	652 (2.14)	1058 (3.60)	1587 (5.30)	2871 (9.65)	9256 (29.87)	.543
(3)	Independents	177 (0.41)	653 (0.84)	955 (0.82)	1734 (1.96)	3034 (3.18)	10680 (15.82)	.751

QUALITY: EXPENDITURES PER HOUR OF LOCAL PROGRAMMING

Relationships in the previous section indicate that quantity of local programming increases with revenue. This section develops a measure of quality of local programming and investigates its relation to station revenue.

I take expenditures per hour of local programming to be a rough measure of quality. It is surely not a perfect measure. It uses cost of inputs as an index of output, and there is room for many a slip between the two, but surely there is a strong general tendency for higher cost local programming to be better local programming.

A Measure of Expenditure for Local Programming

The first task, then, is to extract some measure of local programming expenditure from available data. Annual reports filed by television stations with the FCC[1] include a variety of financial data that can be used for this purpose.

The starting point is total programming expenditures. From these are deducted certain reported expenditures for non-local programming. The major item deducted is film and tape rental; minor items are fees for use of records and transcriptions, and the cost of outside news services. The resulting measure, which I denote by E, overstates local programming expenditures somewhat. It includes, for example, all expenses incurred in selecting and contracting for syndicated material. These expenses are not separately reported, so there is no way to deduct them.

This measure of local programming expenditure is highly correlated with revenue, as shown in Table 5.4. Local programming expenditures are expressed as a quadratic function of revenue.[2] Separate

[1]FCC Form 324, Annual Financial Report of Networks and Licenses of Broadcast Stations.

[2]The quadratic form explains roughly twice as much variance as do sextile means, indicating that there is considerable systematic variation of expenditures within sextiles.

Table 5.4

LOCAL PROGRAMMING EXPENDITURE AS FUNCTION OF BROADCAST REVENUE

	Sample	Dependent Variable[a]	Estimated Coefficients			R^2
			Constant	Revenue[b]	Revenue Squared	
(1)	All stations	E	49.27 (3.74)	.1651 (33.57)	$.5036(10^{-6})$ (2.81)	.917
(2)	Network stations	E	58.18 (5.60)	.1513 (38.96)	$.8601(10^{-6})$ (6.00)	.950
(3)	Independents	E	91.75 (1.53)	.2115 (18.48)		.844

Notes:

[a]E is expenditure for programming net of film and tape rental fees and certain other outside expenses, in thousands of dollars.

[b]In thousands of dollars.

regressions for [illegible] network stations and [illegible] independents, lines (2) and (3) in Table 5.4, are plotted in Figure 5.1. For the network stations, the relation is concave upward; the coefficient of the squared term is significantly positive at well beyond the .01 level. For independents, however, the relation shown is a linear one; in a previous, unreported regression the t statistic for the squared term is less than one in absolute value. Since the linear hypothesis is not rejected at any conventional significance level, the squared term is dropped in the reported regression.

Local programming expenditures increase proportionately much more rapidly with station revenue than do local programming hours. Average hours approximately double from the lowest to the highest revenue sextile.[1] For comparison, line (2) estimates network station local programming expenditures to be $99,000 when evaluated at lowest sextile mean revenue,[2] and $1,563,000 at the highest sextile mean, a more than fifteen-fold increase. Similarly, estimated expenditures for independents show an eighteen-fold increase from the lowest to the highest sextile mean revenue. This strongly suggests that my measure of local program quality, expenditure per hour, also increases with station revenue.

Also shown in Figure 5.1 are the marginal relations implied by lines (2) and (3) of Table 5.4. These indicate that a network station at the lowest revenue sextile mean spends about 15 cents of an additional revenue dollar on local programming; at the highest sextile mean, 17 percent of marginal revenue goes for local programming. For all independents, the estimated relationship implies that 21 cents of a marginal revenue dollar is spent on local programming on average.

<u>Quality Regressions</u>

The evidence so far hints that quality of local programming increases as station revenue increases. In this subsection I examine

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[1]Table 5.2.

[2]Table 5.3.

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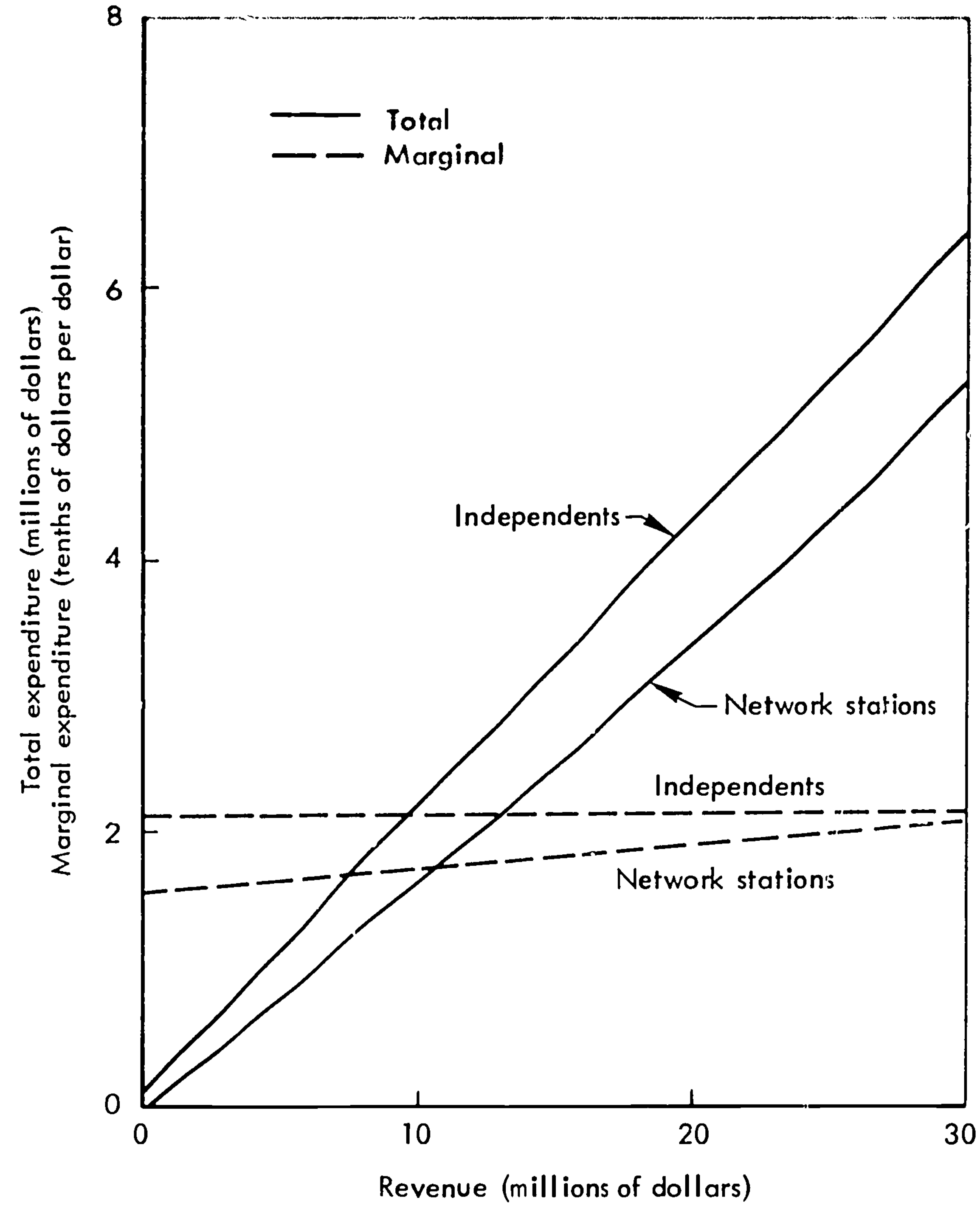

Fig.5.1—Local programming expenditure

directly the relationship between revenue and my index of quality, and confirm that there is a positive correlation between the two.

Relevant regression results are shown in Table 5.5. The quality index, expenditure per hour of local programming, is estimated as a

Table 5.5

QUALITY REGRESSIONS

	Sample	Dependent Variable ($/hr)	Estimated Coefficients: Constant	Revenue ($ Thous.)	Revenue Squared	R^2
(1)	All stations	1000E/52L	277 (6.57)	.132 (8.37)	.929(10^{-6}) (1.75)	.667
(2)	Network stations	1000E/52L	265 (6.47)	.132 (8.51)	1.034(10^{-6}) (2.04)	.712
(3)	Independents	1000E/52L	427 (2.21)	.124 (3.75)		.370

quadratic function of station revenue. The regression for all stations is based on 288 observations for which all necessary data are available. Lines (2) and (3), which show separately the results for 262 network stations and 26 independents, are plotted in Figure 5.2.

The relationship for network stations is concave upwards; that for independents is taken to be linear because the coefficient of the revenue squared term in an earlier, unreported regression is not significantly different than zero. (Its t statistic is less than one in absolute value.)

Both network stations and independents show a striking increase in quality index as revenue increases. The quality index for network stations goes from $301 to $1,511 per hour when line (2) is evaluated at the lowest and highest revenue sextile means. That for independents increases from $449 to $1,751 per hour when evaluated in the same way.

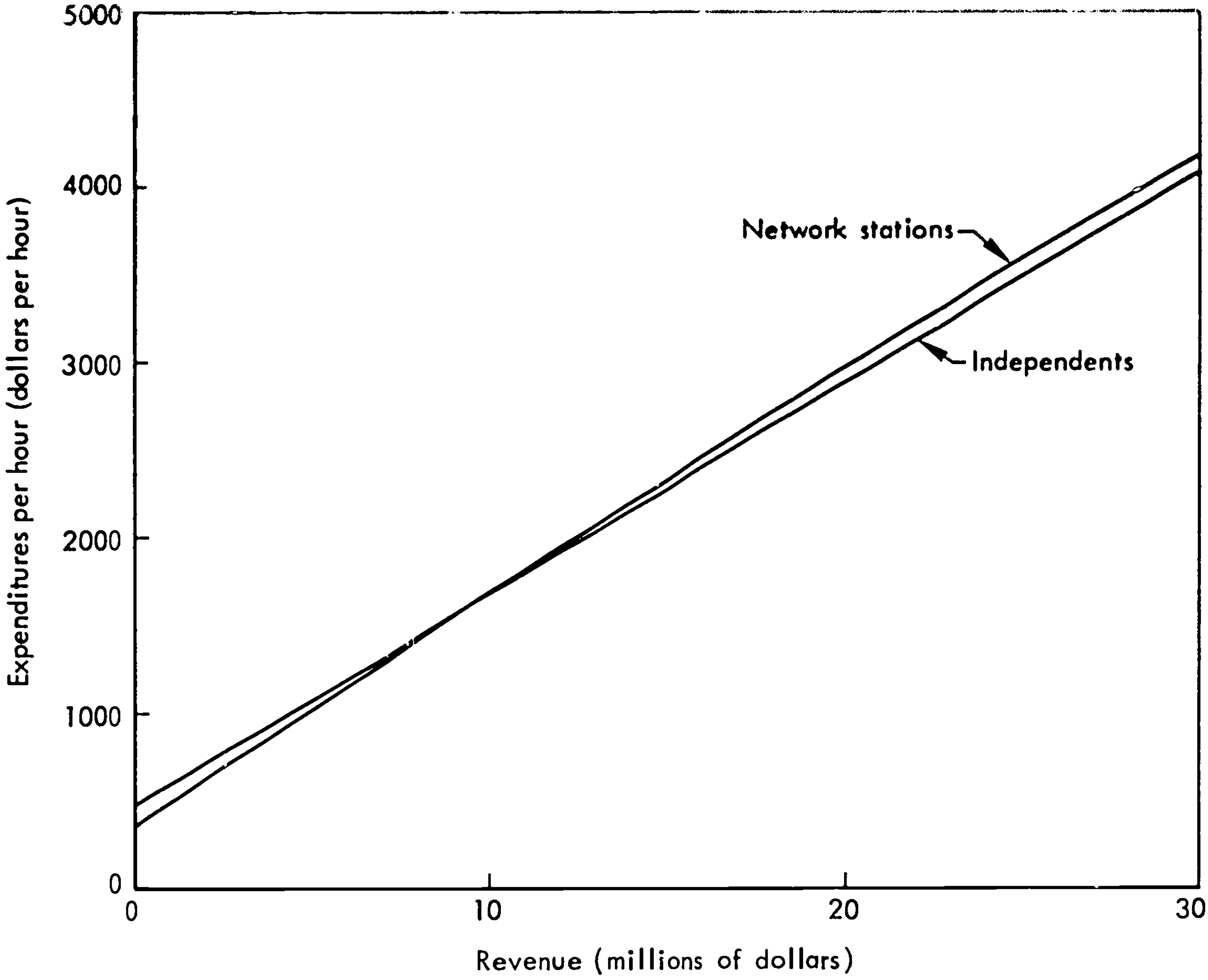

Fig.5.2—Quality of local programming

SUMMARY

Relationships between quantity and quality of public service and local programming, on one hand, and station revenue on the other, are explored in a 1964 cross section of television stations. In almost all cases, strong positive relationships are found.

Stations in the highest revenue sextile broadcast, on average, roughly twice as many hours per week of both public service and local programming as do stations in the lowest sextile. Local programming hours <u>during prime time</u>, however, are not significantly related to revenue.

Expenditure per hour of local programming is defined as a rough index of local program quality. This quality index also increases markedly with revenue, at least quadrupling from the lowest to the highest revenue sextile.

VI. IMPACT MODEL

Although some of the work reported in Chapters II through V is of interest in itself, the more important reason for it is to build the impact model in this chapter. Chapters II through V are the pieces out of which the impact model is constructed.

THE MODEL

We have in hand average relationships between service provided over the cable and cable penetration (Chapter II), between station audience and revenue (Chapter IV), and between revenue and local programming expenditure (Chapter V). We also have a method for predicting audience shares (Chapter III). This section describes how they fit together to form the impact model.

Cable Penetration

The impact model compares television station audience, revenue, and local programming expenditure with and without cable. For the "without cable" case, cable penetration is zero. For the "with cable" case, ultimate penetration levels as estimated in Chapter II are used. Specifically, it is the values recorded in Figure 2.3, as translated in Figure 2.4, that are used. That is, cable penetration is expressed in terms of fraction of audience expected ultimately to subscribe to cable.

The use of these values is somewhat conservative, in the sense that it tends to overestimate the impact of cable. The penetration estimates really apply only to fairly well built up areas, such as those included in my sample. Penetration is likely to be less in more sparsely populated areas, even zero in some. Penetration estimates on the high side lead, of course, to impact estimates on the high side.

(Throughout, I use "conservative" to describe assumptions that tend to increase estimated cable impact. Most of the assumptions used are conservative, making it likely that the impact estimates are upper bounds. That is, one can be reasonably confident that impact will not exceed the estimates reported here, at least under the circumstances envisioned.)

Audience Shares

The method described in Chapter III is used to assign "attractiveness" indices a_i to all commercial stations in the markets encompassed by the impact model. These a_i indices are used to calculate audiences in the two cases, one with cable and one without cable.

The model encompasses the top 200 markets[1] excluding 14 unusual ones. Seven of the 14 are excluded because home market stations have no area of dominant influence (ADI), thus grossly deviating from my assumption of autarkic markets. Most of the others are excluded because they have more than three network stations (not counting satellites) or none at all.

The autarkic market, or no audience overlap, assumption means that all audience is treated as though it can receive only those stations serving that market. In fact, of course, signals from two or more markets can be received by many television homes, particularly those located near edges of markets. My assumption is thus a conservative one, tending to increase the estimated impact of cable. To see this, consider a one-station market into which an equally attractive distant signal is imported. In the model, half of the cable audience is lost to the local station. But say some homes at the edge of the market can receive a signal from a neighboring market. Local station audience among cable subscribers in such an area declines only one-third, from one-half to one-third of total audience. Thus, impact of cable would tend to be overestimated in the model.

Another mildly conservative assumption is that total audience is fixed for each market, taken to equal the sum of audience for all stations in the market. Total audience splits differently when distant

[1]Ranked by American Research Bureau (ARB) net weekly circulation for March 1968, as listed in Television Factbook, pp. 54a-56a.

signals are brought into the market, but does not increase. To the extent that additional signals induce additional viewing, this assumption is conservative.

Revenue

The calculation of revenue from local audience is based on prime-time audience using lines (2) and (3) of Table 4.5; that is, by applying estimated curved relationships separately to network and to independent stations.

The model could be (perhaps should be, perhaps will be) improved by basing revenue on non-prime-time audience in addition to prime-time audience.[1] Doing so would probably tend to increase somewhat the estimated impact of cable. We know that independent stations on average have larger shares of the audience during non-prime time than during prime time. Thus, distant signals can be expected to make larger inroads into local audience during non-prime time than during prime time. Further, the evidence of Chapter IV is that non-prime-time audience contributes substantially to revenue, at least for network stations. From Table 4.4, a household viewing continuously during 3.5 hours of prime time is worth 3.5 x 8.21 = \$28.74 per year, and a household viewing continuously during 11.5 hours of non-prime time is worth 11.5 x 3.14 = \$36.11. Since prime-time audience is on the average about twice as large as non-prime-time audience, the latter accounts for almost 40 percent of revenue: 36.11/(2 x 28.74 + 36.11) = .385. For independent stations, it is less clear that disaggregation would lead to a noticable change in estimated impact; the evidence of Table 4.4 is that non-prime-time audience is of little value to independent stations.

The above deals only with revenue from local audience. Calculation of revenue from distant audience makes use of relationships reported in Table 4.5, in a way described below.

[1]Pressure of time precluded working out the improved model for this Report.

Local Programming Expenditure

The impact model also compares local programming expenditure, as a combined indicator of quantity and quality of local programming, with and without cable. Line (2) of Table 5.4 is used to calculate local programming expenditure for network stations, line (3) for independents.

THE RESULTS

In this section I present results on the impact of cable in three different environments:

o 1960's environment, in which UHF set penetration by market is as reported for November 1968 by Television Factbook,[1] and UHF handicap due to antenna, transmitter and tuner differences is as estimated in Chapter III using 1968 data.

o 1970's environment, in which UHF set penetration is assumed to reach 100 percent, but UHF handicap due to the other factors remains unchanged.

o 1980's environment, in which technological improvements are assumed to have eliminated UHF handicap entirely. This is an extreme assumption. Although almost all receivers in use in the 1980s will undoubtedly have comparable UHF tuners, this, together with other technological advances, is not likely to eliminate the UHF handicap entirely.

In each of these environments, I examine the effect of cable carrying the following set of distant signals:

In all markets, sufficient network signals (if necessary) to provide three-network service;

In the top 100 markets, four other signals are carried equivalent to the strongest independent from New York, Chicago, and Los Angeles, respectively, plus the second strongest independent in New York;

In the second 100 markets, only three of these independent signals are carried.

[1]Television Factbook, pp. 22a-25a.

This is an extremely strong lineup of distant signals. At least for the near term, its use is certainly conservative. It tends to overestimate impact of cable, since most lineups will not really be that strong. In the longer term, popular independents may act more and more like cable networks, increasing attractiveness of their programming, possibly so much so that distant signal lineups may even exceed in strength the one assumed here.[1]

One is interested in the incidence of cable impact, as well as its overall magnitude, so the results are presented in fairly disaggregated form. Along one dimension, I distinguish among four types of station: network VHF, network UHF, independent VHF, and independent UHF, using the symbols listed in Table 6.1 to denote each type. Along another dimension, I distinguish among markets in two different ways. First, by market rank; results are reported for top 50, second 50, third 50, and fourth 50 markets. Second, based on number and type of stations in the market; the different types of market are as defined in Table 6.1. In overview, markets of types I-IV all have three network VHF stations, but decreasing levels of independent service. Types V, VI, VII all have three network stations, one, two, or all three of which, respectively, are UHF. Type VIII has two network stations, both VHF. Type IX has a single network station, a VHF. Other types defined in the table are less common.

Table 6.2 shows the number of stations in the model that fall into each classification using market rank. Table 6.3 shows number of stations by type of market.

Impact of Cable in a 1960's Environment

My 1960's environment, recall, is characterized by UHF set penetration and UHF handicap both at 1968 levels.

Before turning to the tabulated results, I stress that they reflect only effect on local audience. Stations carried by cable into distant

[1] Prospects for cable networks, formal and informal, are analyzed in a planned paper.

Table 6.1

DEFINITION OF SYMBOLS

Symbol	Definition
Type of Station	
NV	Network VHF
NU	Network UHF
IV	Independent VHF
IU	Independent UHF
Type of Market	
I	3 NV, 2 or more IV
II	3 NV, 1 IV
III	3 NV, 0 IV, 1 or more IU
IV	3 NV only
V	2 NV, 1 NU
VI	1 NV, 2 NU
VII	0 NV, 3 NU
VIII	2 NV, 0 NU
IX	1 NV, 0 NU
X[a]	1 NV, 1 NU
XI[a]	0 NV, 2 NU
XII[a]	0 NV, 1 NU
XIII[b]	All others

Notes:

[a]Market types X, XI, and XII are not reported in detail because classifications contain fewer than five stations, but they are included in the totals.

[b]Markets of type XIII, which have four or more network affiliates not counting satellites, or no network stations, are excluded from the model.

Table 6.2

NUMBER OF STATIONS IN MODEL BY MARKET RANK

Type of Station[a]	Market Rank				
	1-50	51-100	101-150	151-200	1-200
NV	135	93	90	65	383
NU	6	34	18	3	61
IV	19	1	1	1	22
IU	38	5	3	0	46
All	198	132	112	69	512

Note:

[a]See Table 6.1 for definitions.

Table 6.3

NUMBER OF STATIONS IN MODEL BY TYPE OF MARKET

Type of Station[a]	Type of Market[a]												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	All
NV	9	39	42	147	24	8	0	79	32	3	0	0	383
NU	0	0	0	0	12	16	24	0	0	3	4	2	61
IV	9	13	0	0	0	0	0	0	0	0	0	0	22
IU	5	11	20	0	3	0	2	5	0	0	0	0	46
All	23	63	62	147	39	24	26	84	32	6	4	2	512

Note:

[a]See Table 6.1 for definitions.

markets have, in addition, distant audience that also contributes to revenue. The magnitude and incidence of revenue to be expected from distant audience are discussed below.

Results shown in Table 6.4 by market rank and in Table 6.5 by type of market exhibit some striking patterns. I discuss them in terms of revenue, which is probably of most interest; patterns of impact on audience and local programming expenditure are similar, although numerical values differ.

Overall, when cable reaches ultimate penetration and carries the strong set of distant signals described above, station revenue (attributable to local audience) is reduced to 82 percent. There is, though, considerable variation among markets and among different kinds of stations.

Generally, stations in smaller markets are harder hit than those in larger markets. Those in the top 50 markets retain, on average, 86 percent of their without-cable revenue; in the fourth 50 markets they retain only 45 percent, on average. This structure shows up even more strongly in Table 6.5. Stations in markets of type I, those with two or more VHF independent stations, retain on average 90 percent of without-cable revenue. Stations in other markets with full network service, types II through VII, retain about 80 to 85 percent of without-cable revenue. Markets with only two network stations, type VIII, drop to 57 percent; those with only one, type IX, drop to 35 percent.

The reasons that stations in smaller markets are harder hit are easy to see. Most importantly, distant signals capture a smaller share of audience when competing with a large number of local signals than they do in less well endowed markets. Also, cable penetration is expected to be higher in markets with fewer local signals. Third, additional network signals are assumed to be brought into markets with fewer than three network stations. Tending to work in the other direction is the assumption that only three independents are brought into the second 100 markets, compared with four in the top 100. On balance, though, it certainly seems reasonable that the smaller markets should be harder hit.

Table 6.4

IMPACT OF CABLE IN A 1960's ENVIRONMENT BY MARKET RANK

Type of Station[a]	Market Rank				
	1-50	51-100	101-150	151-200	1-200
			Audience[b]		
NV	83	79	75	64	81
NU	139	88	97	c	94
IV	86	c	c	c	86
IU	150	163	c	c	150
All	85	81	77	65	82
			Revenue[b]		
NV	83	76	68	45	79
NU	155	84	95	c	92
IV	89	c	c	c	89
IU	151	180	c	c	151
All	86	78	70	45	82
			Local Programming Expenditure[b]		
NV	83	79	76	67	81
NU	138	88	97	c	94
IV	89	c	c	c	89
IU	133	119	c	c	132
All	87	81	79	68	85

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable, expressed as percentage of value in absence of cable. All figures reflect the effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

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Table 6.5

IMPACT OF CABLE IN A 1960's ENVIRONMENT BY TYPE OF MARKET

Type of Station[a]	Type of Market[a]									
	I	II	III	IV	V	VI	VII	VIII	IX	All
					Audience[b]					
NV	87	84	81	84	76	70	c	66	52	81
NU	c	c	c	c	141	102	84	c	c	94
IV	88	84	c	c	c	c	c	c	c	86
IU	163	160	150	c	c	c	c	121	c	150
All	88	85	84	84	84	84	84	66	52	82
					Revenue[b]					
NV	89	84	81	81	73	66	c	56	35	79
NU	c	c	c	c	167	103	81	c	c	92
IV	91	85	c	c	c	c	c	c	c	89
IU	168	164	149	c	c	c	c	122	c	151
All	90	85	86	81	82	79	80	57	35	82
					Local Programming Expenditure[b]					
NV	88	84	81	84	76	71	c	67	56	81
NU	c	c	c	c	138	102	85	c	c	94
IV	91	87	c	c	c	c	c	c	c	89
IU	129	132	136	c	c	c	c	109	c	132
All	90	86	88	84	85	84	85	69	56	85

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable, expressed as percentage of value in absence of cable. All figures reflect the effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

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There are also striking differences in how different kinds of stations are affected. Generally, UHF stations are less harmed (sometimes even benefited) by cable than are VHF stations. Network affiliated UHFs in the model retain, on average, 92 percent of without-cable revenue, and revenue of the UHF independents actually rises to 151 percent of its without-cable level.

Reasons for this differential impact are also clear. With cable, UHF stations are on an equal footing with VHF stations. It does not matter whether the cable subscriber has a UHF receiver, or a UHF antenna, or lives where UHF reception is poor. He gets UHF stations with the same click-stop tuning as VHF stations. Thus, the audience gain from achieving technical parity with VHF tends to offset, and in some cases more than offsets, the loss from audience fragmentation.

Why, though, are network affiliated UHF stations harmed, while independent UHFs are helped? One reason is that network UHFs are mostly found in smaller markets than are independent UHFs (see Table 6.2), and smaller markets are generally harder hit by cable growth. Another reason is that the principal competition of independent UHFs is VHF stations, while many UHF network stations compete with one or two other UHFs (see Table 6.3). Independents thus have more to gain than network stations from achieving technical parity with VHF stations on the cable.

Again, the discussion above reflects only the effects of cable on local audience. In the model, distant audience exactly equals loss in local audience. Distant audience has some value, tending to offset some of the revenue losses discussed.

How big is the offset? We know from Chapter IV that distant audience seems to be less valuable than local audience. In Table 4.5, audience outside the area of dominant influence (ADI) is estimated to be worth $26.48 per year, compared to $41.78 for audience within the ADI. On this ground, then, distant audience is worth about two thirds as much as local audience.

We also know from Chapter IV, because of the curved relationships between audience and revenue, that additional audience is worth less to large stations than to small ones. Without knowing exactly which stations will be carried into which distant markets, it is impossible to be precise about the magnitude of the effect. It seems likely, though, that stations carried as distant signals will tend to be fairly large ones with strong programming, certainly larger on average than the local stations whose audience they capture. A reasonable guess is that the curvature effect reduces the value of distant audience by a further 25 percent.

The combined effect of curvature and distance is then to make distant audience worth about half as much as local audience (.67 x .75 = .50). The net overall revenue loss due to cable is then 9 percent -- half of the 18 percent loss in revenue based on local audience is gained back by stations carried as distant signals.

If, as seems likely, distant signals are taken largely from larger markets, the differential impact of cable in large and small markets, apparent in the tables, is accentuated. Large market stations, which lose the least in terms of local audience, stand to gain the most in terms of distant audience.

Profit Impact

Table 6.6 translates the revenue impact shown in Table 6.5 into impact on profit, using very simple assumptions. Each station's revenue is assumed to change by the factor given in Table 6.5 for that type of station and market. For example, revenue for each network VHF station in a Type I market is reduced to 89 percent of its 1968 level. Expenses are assumed to unchanged. This latter assumption is clearly unrealistic. Stations will certainly react to reduced revenue by cutting costs. Thus, Table 6.6 figures are definitely conservative, overstating the profit impact of ultimate cable penetration.

The general pattern shown in Table 6.6 is probably quite realistic, however. VHF network affiliates in large markets generally have

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Table 6.6

PROFIT IMPACT IN A 1960'S ENVIRONMENT BY TYPE OF MARKET

Type of Station[a]	Type of Market[a] I	II	III	IV	V	VI	VII	VIII	IX	All
					Actual Percent Profitable[b]					
NV	100	95	100	83	100	100	c	86	88	89
NU	c	c	c	c	25	63	79	c	c	62
IV	67	69	c	c	c	c	c	c	c	68
IU	20	0	5	c	c	c	c	0	c	4
All	70	73	69	83	69	75	73	81	88	77
					Percent Profitable With Ultimate Cable[d]					
NV	100	85	88	50	63	63	c	4	0	46
NU	c	c	c	c	67	75	8	c	c	38
IV	56	54	c	c	c	c	c	c	c	55
IU	16	18	20	c	c	c	c	0	c	20
All	74	67	66	53	59	71	8	4	0	43

Notes:

[a]See Table 6.1 for definitions.

[b]Based on financial reports for 1968.

[c]Classifications with fewer than five stations are not reported in detail but are included in totals.

[d]Calculated as percent that would have been profitable in 1968 if revenue were changed by factors shown in Table 6.5 and expenses were unchanged. Reflects the effect on local audience only; including revenue due to distant audience would tend to increase percentages of profitable stations.

sufficient profit cushion so that most could absorb projected revenue losses and still remain profitable. Stations in smaller markets typically have smaller profit margins, and suffer larger revenue losses due to cable. Loss of revenue would make many of them unprofitable, at least unless expenses were drastically reduced. This is particularly true of stations in markets with three UHF stations, type VII, and in one- and two-station markets, types VIII and IX. It seems likely that many stations in smaller markets would be forced either to go off the air or to continue operation only as satellites of stations in larger markets.

UHF independents have their revenue increased substantially by cable, but their profit position remains quite bleak. Because most have losses that are too large to be offset by projected revenue increases, only 20 percent would be profitable even with the help of cable.

Impact of Cable in a 1970's Environment

For the second case to be investigated, UHF set penetration is assumed to reach 100 percent, but UHF handicap due to the other factors mentioned remains at the 1968 level.

Results for this case are shown in Table 6.7 by market rank and in Table 6.8 by type of market. The differential impact of cable across markets is the same as in the 1960's environment: stations in smaller markets are hurt the most (or helped the least) by cable.

The differential impact by type of station is changed, however. When all homes have UHF receivers, the advantage to UHF stations of carriage by cable is reduced. Thus in my 1970's environment, cable harms network UHFs slightly more than in the 1960's environment, reducing their revenue to 86 percent of its non-cable level. Similarly, independent UHFs are helped less by cable, with revenue rising to 119 percent of the non-cable level.

I should point out, though, that even UHF network stations are as well off in the 1970's environment with cable as in the 1960's

Table 6.7

IMPACT OF CABLE IN A 1970's ENVIRONMENT BY MARKET RANK

Type of Station[a]	Market Rank 1-50	51-100	101-150	151-200	1-200
			Audience[b]		
NV	83	79	76	64	81
NU	109	86	91	c	89
IV	87	c	c	c	86
IU	120	117	c	c	119
All	85	80	77	64	82
			Revenue[b]		
NV	83	76	69	45	80
NU	112	82	85	c	86
IV	89	c	c	c	89
IU	120	120	c	c	119
All	85	77	70	44	82
			Local Programming Expenditure[b]		
NV	83	80	77	68	81
NU	109	86	91	c	89
IV	89	c	c	c	89
IU	114	107	c	c	84
All	87	81	79	68	84

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable expressed as percentage of value in absence of cable. All figures reflect effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

Table 6.8

IMPACT OF CABLE IN A 1970's ENVIRONMENT BY TYPE OF MARKET

Type of Station[a]	Type of Market[a]									
	I	II	III	IV	V	VI	VII	VIII	IX	All
					Audience[b]					
NV	87	84	82	84	78	72	c	66	52	81
NU	c	c	c	c	110	97	83	c	c	89
IV	88	84	c	c	c	c	c	c	c	86
IU	124	124	120	c	c	c	c	96	c	119
All	88	85	84	84	84	84	83	66	52	82
					Revenue[b]					
NV	89	84	82	81	75	67	c	56	35	80
NU	c	c	c	c	113	96	80	c	c	86
IV	91	85	c	c	c	c	c	c	c	89
IU	125	125	120	c	c	c	c	96	c	119
All	90	85	86	81	81	79	80	57	35	82
					Local Programming Expenditure[b]					
NV	88	84	82	84	78	73	c	67	56	81
NU	c	c	c	c	109	97	84	c	c	89
IV	91	87	c	c	c	c	c	c	c	89
IU	114	115	116	c	c	c	c	98	c	114
All	90	86	87	84	85	84	84	69	56	84

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable expressed as percentage of value in absence of cable. All figures reflect effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

environment without cable. The combined effect of cable and 100 percent UHF set penetration is to multiply UHF network stations revenue by .99.[1] The loss due to cable is almost exactly offset by the gain due to increased UHF set penetration.

Impact of Cable in a 1980's Environment

Tables 6.9 and 6.10 show results when the UHF handicap is assumed to have been overcome by technological advance. Differential impact across markets is of course unchanged from the two previous cases.

In the 1980's environment, UHF stations have technical parity with VHF stations in over-the-air broadcast. Carriage on the cable, then, does nothing to improve UHF position relative to VHF, so one expects cable to harm UHF and VHF stations equally. This expectation is generally confirmed by the results. The minor differences in impact are due to differences in size and distribution of UHF and VHF stations, not to the UHF/VHF difference itself.

Even though UHF stations are harmed by cable in a 1980's environment, they are very much better off than in a 1960's environment with no cable. The impact of cable is more than offset by 100 percent UHF set penetration and elimination of the UHF handicap. The combined effect is to multiply UHF network stations' revenue by 1.16, and UHF independents' revenue by 2.38.

CONCLUSION

Concern over the potential impact of cable growth on television broadcasting appears to be misdirected on several counts.

First, the overall impact is perhaps not large enough to justify any great concern. Overall revenue loss due to cable is estimated to be about 9 percent. This loss is small enough so that it would be wiped out by one year's normal revenue growth.

[1] For UHF independents, the corresponding figure is a whopping 1.72.

Table 6.9

IMPACT OF CABLE IN A 1980's ENVIRONMENT BY MARKET RANK

Type of Station[a]	Market Rank				
	1-50	51-100	101-150	151-200	1-200
			Audience[b]		
NV	84	80	76	65	82
NU	83	81	83	c	82
IV	87	c	c	c	87
IU	84	83	c	c	83
All	84	80	77	64	82
			Revenue[b]		
NV	84	77	69	45	81
NU	81	77	76	c	77
IV	89	c	c	c	89
IU	83	80	c	c	81
All	85	77	70	44	81
			Local Programming Expenditure[b]		
NV	84	81	77	68	82
NU	83	82	84	c	82
IV	90	c	c	c	90
IU	88	93	c	c	88
All	85	81	79	68	83

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable expressed as percentage of value in absence of cable. All figures reflect effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

Table 6.10

IMPACT OF CABLE IN A 1980's ENVIRONMENT BY TYPE OF MARKET

Type of Station[a]	Type of Market									
	I	II	III	IV	V	VI	VII	VIII	IX	All
					Audience[b]					
NV	88	85	83	84	84	84	c	66	66	82
NU	c	c	c	c	84	84	83	c	c	82
IV	88	85	c	c	c	c	c	c	c	87
IU	88	85	84	c	c	c	c	71	c	83
All	88	85	83	84	84	84	83	66	52	82
					Revenue[b]					
NV	89	84	83	81	81	79	c	57	35	81
NU	c	c	c	c	81	79	80	c	c	77
IV	91	86	c	c	c	c	c	c	c	89
IU	87	84	84	c	c	c	c	70	c	83
All	90	85	83	81	81	79	80	57	35	81
					Local Programming Expenditure[b]					
NV	88	85	83	84	84	84	c	67	56	82
NU	c	c	c	c	84	84	84	c	c	82
IV	91	87	c	c	c	c	c	c	c	90
IU	93	91	87	c	c	c	c	84	c	88
All	89	85	84	84	84	84	84	68	56	83

Notes:

[a]See Table 6.1 for definitions.

[b]All figures are value in presence of cable expressed as percentage of value in absence of cable. All figures reflect effect on local audience only. Distant audience increases values in some cases; see text.

[c]Classifications with fewer than five stations are not reported in detail, but are included in totals.

Second, concern currently centers on protecting stations in the larger markets. These are, however, the stations that will be least affected by cable growth. Any serious attempt to protect television stations from the impact of cable should deal with the problem in the smaller markets, where the impact will be much more severe.

Third, UHF stations, and particularly UHF independents, are the objects of particular concern. But these are the stations that need protection least of all. Cable growth will harm UHF network stations very little, and help UHF independents substantially.

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