FOCUS

ON THE CANADIAN BROADCASTING CORPORATION'S COSTS OF OPERATION

THE FRASER INSTITUTE

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TABLE OF CONTENTS

The Fraser Institute is pleased to publish Professor Liebowitz's study and thus make the findings available to the general public. Because of the independence of the author, however, the views expressed by Professor Liebowitz may or may not conform singly or collectively with those of the members of the Institute.

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ABOUT THE AUTHOR

Professor Stanley J. Liebowitz received his B.S. in Social and Behavioural Science from The Johns Hopkins University in 1971. He completed his M.A. in 1975 and Ph.D. in Economics in 1978 at the University of California at Los Angeles. Prior to assuming his present position as Assistant Professor of Economics in the Graduate School of Management at the University of Rochester, Dr. Liebowitz was Research Director of the Centre for the Economic Analysis of Property Rights at the University of Western Ontario and an Assistant Professor in the Economics Department at that University. He was awarded the Olin Law and Economics Fellow in the Law School at the University of Chicago for 1985-86.

The Bureau of Corporate Affairs in Ottawa has published two monographs by Dr. Liebowitz. They are entitled Copyright Obligations for Cable Television: Pros and Cons and The Impact of Reprography on the Copyright System. Dr. Liebowitz's many articles have appeared in the American Economic Review, Canadian Journal of Economics, Southern Economic Journal, Journal of Law and Economics, Economic Inquiry, Journal of Economic Literature and the Journal of Political Economy. He has participated in numerous conferences and seminars concerned with copyright law.

CHAPTER 1

PREFACE AND SUMMARY

I. INTRODUCTION

Access to unique information

In 1981 the Department of Communications hired me to perform a study evaluating the efficiency of the broadcasters owned by the Canadian Broadcasting System. I was provided with access to an otherwise confidential data set which appeared to have been constructed in order to compare the private and public broadcast stations in Canada. The purpose of the confidentiality was to protect the competitive positions of the private stations which were otherwise reluctant to provide sensitive information without such protection.

I was most interested in comparing the performance of CBC-owned stations in selling advertising time since previous research of mine had focused on this particular activity. The Department of Communications suggested that I broaden my study somewhat to include a comparison of the relative costs of the CBC-owned affiliates and those of other private television stations. The Department of Communications insisted that the study be completed in a fairly short period of time, and it was.

Startling results

The results of the study were fairly startling, particularly the comparison of costs of doing business.

I doubt that the results of the cost comparison could have been much of a surprise, however, to anyone who had ever looked at the raw data, since the differentials in performance were so great that sophisticated statistical analysis was not at all necessary to discern the direction of cost differentials. In a nutshell, the CBC-owned stations had costs which were much higher than those of private CBC affiliate stations or those of stations affiliated with other networks. The CBC-owned stations also appeared to be doing an inferior job selling their advertising messages compared to the private stations, although this result was not nearly as powerful as the cost comparisons.

Need to make public

In April of 1981, after completing the study, I asked the Department of Communications if I could publish the results of the study in an academic journal. The Department said no, adding that they might change their minds some time in the future. They claimed that the results were sensitive and that they didn't want them generally distributed. They also claimed that an internal review of the paper would take place and that their position might change. Approximately six months later I wrote again, but received no reply. I tried again two months later, again receiving no answer. At that point I turned my attention to other activities.

The recent public discussions regarding the budget deficit and CBC spending call out for information which might better inform the debate. Waste and inefficiency should be kept to a minimum at all times, but in a time of budgetary restraint even greater vigilance seems warranted. For these reasons, I have decided to make public my report on the efficiency of the CBC. Not wishing to waste any more time in bureaucratic mazes, I sent a copy of my report to the Fraser Institute, which suggested that the report be published. The paper prepared for the Department of Communications, with some minor updates, is presented in Chapters 2-10. The next

section contains a summary of the main findings and a non-specialist discussion of the results.

II. SUMMARY OF THE REPORT

Comparing the television networks

I first examined the performance of the CBC-owned (hereafter referred to as CBCO) stations in selling advertising time. The CBCO stations were compared to the private CBC affiliates (CBCA), CTV affiliates (CTV), and other independent stations (IND) which included Global and TVA. All of these stations sell their advertising time based on the size and demographic characteristics of the viewing-audience.

Advertising and audiences

There is a fairly well-defined relationship between these audience characteristics and the price which advertisers are willing to pay for the broadcast of their advertisements. By estimating this relationship for all stations, it is possible to predict what the price of advertising on CBC stations should be, or would have been, if the CBCO stations acted in a manner similar to their private counterparts.

The statistical technique used to perform this task is known as regression analysis, which allows us to decompose the effects of the audience characteristics on advertising revenues and rates. The audience characteristics of interest were: size, income, diversity of tastes, distance of viewers from transmitter, and language spoken. The variations in these audience characteristics (particularly audience size) are capable of explaining a great deal of the differences in broadcast rates and revenues that exist across stations. I found, for example, that stations with larger audiences had higher advertising rates and revenues, that stations with higher income audiences had higher rates and revenues, that stations with diverse

audiences had lower rates and revenues, that distant viewers were worth less than close viewers, and that French speaking audiences seemed to be worth less to advertisers than were English speaking audiences. Most of these findings are consistent with the findings reported in other studies examining the relationship between broadcast revenues and audience.

What the CBC should earn from advertising

Using the measured relationship between these audience characteristics and advertising rates and revenues, it becomes possible to predict what the advertising rates and revenues for any particular station would be if one knew its audience characteristics. Therefore, it is possible to predict what the advertising rates and revenues should be for the CBCO stations, and to compare these predictions with the actual advertising rates and revenues. This is, in fact, what I did.

The results using advertising rates were very interesting. The private stations had advertising rates that were higher than those of CBCO stations, regardless of the network affiliation of the private stations. The differences ranged from approximately 20 percent higher rates for private CBC affiliates to approximately 70 percent higher rates for private independent stations. It should be mentioned that all these results were not large enough for a statistician to have 95 percent confidence that CBCO rates were not just randomly lower than those of private stations, as opposed to being lower due to some fundamental difference between CBCO and private stations.

What it actually earns

Comparisons of advertising revenues gave results which were similar to those using advertising rates. CBCO stations generally earned lower revenues than private stations did, after controlling for differences in the audiences. Using advertising revenues is somewhat more

difficult than using advertising rates because the measurement of advertising revenues for network affiliates is complicated by the fact that the networks sell advertising time for the affiliates and do not return most of the revenues to the affiliates. The data, therefore, were adjusted to take account of these circumstances and it is not clear how successful these adjustments were. Additionally, the revenue data were confidential and were not publicly available. Nor was detailed documentation of the derivation of these numbers made available to me. Still, the results are generally consistent with those found for advertising rates, which are publicly available.

The cost of CBC operations

The examination of cost differentials provided further evidence that CBCO stations were behaving in a manner likely to lead to unnecessarily large grants from the taxpayer. The Department of Communications collected data on costs and revenues from television broadcasters. It is to be expected that stations serving a large audience will incur greater costs (larger transmitter, staff, etc.) than one serving a small audience. Other variables which might influence the cost of broadcasting included: the amount of original programming created by the station, the average wages paid to employees, and the degree of competition for the audience. The technique of regression was used once again to estimate the relative influence of each of these variables on the costs of broadcasters. All the audience characteristics had the expected signs: larger audiences were associated with increased costs, greater amounts of original programming increased costs, increased competition was associated with higher costs, and stations in high wage cities had higher costs.

CBC stations cost 233 percent more

These regression results were then used to predict the costs incurred by hypothetical stations with

characteristics identical to those of CBCO stations with actual CBCO costs. The results were startling. CBCO stations had costs which were approximately 30-233 percent higher than those of their private counterparts. The best estimate of the cost differentials of the CBCO stations compared to the private CBC affiliates was 233 percent. These figures indicate massive differences in costs between actual CBCO stations and what these stations' costs would have been if these stations had been privately owned.

With CBCO stations charging lower advertising fees and incurring higher costs of operations, one would expect that the profitability of CBCO stations would be below that of private stations, and the data indicate with a vengeance that these expectations are correct. This is most graphically illustrated by the short-run (excluding the depreciation costs of physical capital) profitability of private stations and the lack of short-run profitability of CBCO stations. As a group, CBCO stations lost between $26 million and $48 million in 1978, whereas private stations earned short-run profits of between $80 and $86 million (including $23 million in short-run profits for the private CBC affiliates).

Savings from efficient operation

Comparing the public and private CBC affiliates will further highlight these differences. The average CBCO station lost $1.4 million in short-run profits in 1978 but the average private CBC affiliate made $1.1 million. If the CBCO stations were to perform in a manner identical to the private affiliates, we would expect their short-run profitability to have increased by at least $2.5 million in 1978, which for the 19 CBCO stations comes to a total of at least $48 million. The average size of the CBCO, however, was 58 percent higher than that of the private affiliates, indicating that the true difference in performance is actually larger than these average figures indicate since larger stations are

expected to earn higher profits. The yearly increase in profits caused by transformation of CBCO to private affiliates should be in the range of $63-78 million (taking account of the larger size of CBCO stations) in 1978 dollars.

But even this last figure underestimates the true differential since it only measures short-run profit. There is no reason to believe that the CBCO stations are more efficient in their use of depreciable capital than they are with variable cost inputs. Since the short-run measure of profits does not take capital costs into consideration, one would expect the long-run profit differentials to be even greater than the short-run differentials. If so, the profit differentials could be far greater than those measured in my study. In addition, to determine the current extent of inefficiency one should adjust these 1978 figures for inflation which would likely raise them by an additional 72 percent. Converting the CBCO stations to private affiliates could save the taxpayer between $108 and $134 million per year with the present value of the sum of future savings in the range of $1-$2 billion.

Caveats

There are several important caveats which should be kept in mind when reading this study. First, and most importantly, the CBCO stations might perceive their mission differently than the private affiliates do, and might attempt to provide different (and more expensive) services than those of the private CBC affiliates. This issue is not one of pure economics, although it should be noted that if the CBCO stations do provide more expensive services, they do not appear to be greatly valued by viewers since their audiences do not grow proportionately with these extra expenses. It might be wise to have a public discussion of the appropriate tasks to be undertaken by the local affiliates of the CBC. Second, the data used in this study, although compiled in order to make these types of comparisons,

might be less comparable than we would hope or expect, and the results emanating from these data might not accurately reflect the true state of nature in this industry. This is particularly true of the cost data. Further investigation of the data would probably be warranted.

Policy implications

The appropriate public policy, if the caveats of the previous paragraph are found not to play an important role, would seem to be a privatization of the CBCO stations. This would eliminate the yearly drain on revenues and provide a one-time increase in revenues when the stations were sold off. This suggestion was made in my 1981 report and I think, in light of current economic conditions, has even greater validity now.

National role for CBC not an issue

Finally, the reader should note that this study has no direct bearing on the workings of the CBC at a national level. I suspect, however, that many of the results found for CBCO stations would exist at the national level for the CBC network in its various activities. If so, the losses generated at the national level might dwarf those found for the local broadcasters. Canadians might wish to re-examine the entire functioning of the CBC to determine what its mandate should be and what portion of its expenses should be covered by the taxpayer.

CHAPTER 2

PURPOSE OF THE STUDY

I. INTRODUCTION AND OVERVIEW OF THE TECHNICAL FEATURES

The behaviour of privately owned firms relative to managerial or government controlled organizations has been a topic of great interest to both academics and those responsible for public policy. Crown corporations that require government subsidy, such as the CBC, are particularly worthy of investigation since any lack of efficiency must be made up through taxation of the citizenry. Inefficient private corporations, on the other hand, are not burdens on the public at large, but only to their stockholders, who have voluntarily assumed the risk of ownership. The purpose of the research presented in this paper has been to examine in some detail the performance of CBC-owned television stations. Since efficiency is a concept acquiring meaning only when comparisons can be made, an efficiency yardstick of some sort is required. In this paper the performance of CBC-owned and -operated stations is compared to their private counterparts, both those affiliated with the CBC and those independent of the CBC.

The concept of efficiency is multidimensional, of course, and we would like to be able to answer such questions as whether or not the CBC system is efficient at producing shows, administering the broadcast facility, hiring employees, buying equipment, etc. Unfortunately, many of these latter considerations, while very important, are very difficult to measure in detail, particularly since the goals of the CBC need not be the same as, say, the CTV network. A profit maximizing broadcast network is interested in maximizing

type of programs created and broadcast, or the type of employees hired by the CBC could differ from the programs created or employees hired by private systems, without indicating a lack of efficiency.

However, there are several aspects of broadcasting which should not differ across public and private broadcasters. In particular, those parts of the CBC which are primarily engaged in the transmission of programs should be very similar to their private counterparts. I refer, of course, to the local stations. The activities of television stations can be divided into two components, the first being program creation, essentially carried on at the national level and the second being the re-transmission of broadcasts (which is essentially carried on at the local level), the origination of local programs (e.g. news) and the sale of advertising time. This paper examines the efficiency of stations in these latter activities.

The sale of advertising is done at the national level by the CBC. However, a portion of the revenues is transferred back to the stations based to some degree on that station's contribution to total revenues (this is discussed in detail in Chapter 5). For private stations, some or all advertising is done at the local level, and for those stations affiliated with CTV or CBC, some advertising is done by the network with a portion returned to the stations. Focusing on the sale of advertising time is one of the primary concerns of this paper. The evidence in Chapters 7 and 8 indicates that public broadcasters appear to be less efficient at this activity (usually 20 percent or more) than their private counterparts although the result is not statistically significant.

The other area of consideration, broadcasting costs, is also examined at the level of the station. Since much of a network station's activities consist in re-transmitting the programs of the network, variations in programming quality between stations should not be

large. Most of the audience consists of prime-time viewers and the only significant local programming in this period usually consists of news presentations. Thus, although one of the goals of the CBC was to enhance a national cultural identity, it is unlikely that programming at the local CBC level could be a tool in this endeavour. Therefore, the cost of local programming for the CBC-owned stations should not differ much from that of private stations and these cost differentials are what this study attempts to measure. Expenditures were compared between private and public stations, controlling for several other variables through the technique of regression analysis. The results of these regressions indicated that CBC-owned and -operated stations had very much higher costs of operation, with enough statistical power to warrant a high degree of confidence in this conclusion. A reasonable inference from these results would be that public ownership has led to double or triple the costs of operation for these broadcasters, a rather startling conclusion with strong policy implications.

The final test consisted of examining a variation of the profit rate. Private stations were found to have much greater short-run profits than their public counterparts. CBC-owned stations lost at least $26 million on the whole, while the private stations earned at least $80 million. These results, of course, were not surprising, given the results on revenues and costs.

All of these tests were conducted after making several corrections to the raw data. These corrections were always performed in a manner thought to be more than sufficient to compensate the CBC-owned stations for institutional constraints on their profitability. For this reason it is likely that CBC-owned and -operated stations perform somewhat less efficiently than indicated with the adjusted data.

These results warrant further investigation to determine the reason behind them. We cannot rule out a problem of data comparability although many attempts were made to ensure such comparability. A detailed examination of the accounting practices of the CBC would be useful in this regard.

The final section of this report contains recommendations and conclusions. Besides the above recommendation calling for further study, several others were made based on the empirical results. It was felt that detailed public disclosure by the CBC of its various component operations would tend to force an increase in efficiency. A more radical alternative, with a greater probability of increasing efficiency (or at least not forcing taxpayers to shoulder this inefficiency) would be for the CBC to divest itself of its broadcasting operations, in essence making all CBC broadcasters private affiliates. Other alternatives, such as greater public scrutiny or new watchdog agencies are also discussed. The conclusions of this report can be put in two statements, the second conditional on the first.

1. Further investigation of possible extenuating factors which could possibly negate the findings of this study.

2. Barring such factors, remedial action be taken to bring the efficiency of CBC-owned and -operated stations up to the level of their private counterparts. Divestiture of broadcasting operations should be given serious consideration.

CHAPTER 3

THE AUDIENCE-REVENUE RELATIONSHIP — EXPLAINING BEHAVIOUR

I. INTRODUCTION

One of our purposes is to determine if CBC-owned stations generate advertising revenues in an efficient manner. To this end we shall compare the performance of CBC-owned stations with groups of private stations. The ability to generate advertising revenue, independent of the efficiency of the sales effort, will depend on the characteristics of the viewing audience. Factors such as size of the audience, income of the viewers, distance from the transmitter, intensity of viewing etc. will all influence the price that can be charged and the revenues which can be earned.

We shall attempt, by the use of statistical methods, to determine the advertising rates (or revenues) which could be generated for an audience with any given set of characteristics. The relationship between the price of an item and the characteristics determining the price is known as a hedonic price function. Economic analyses of this particular relationship often refer to it as the audience-revenue relationship. Our first examination will use price of advertising time as the variable to be explained by audience characteristics. In a later section we will examine this relationship for advertising revenues. The nature of the statistical estimation will be identical for both variables.

The form of analysis used is known as regression analysis. Using this analysis allows us to examine the relationship between any single explanatory (independent) variable and the variable to be explained (dependent variable) as if all other variables were held

constant. For our first set of regressions the thirty-second spot advertising rate will be the dependent variable. The next section describes in detail the various independent variables to be used in the analysis.

II. EXPLANATORY VARIABLES

1. Audience Size

It is rather obvious that advertisers, wishing to increase sales by convincing a large number of people to buy a certain product, will value larger audiences more than smaller audiences, if the other audience characteristics are equivalent. Audience size of a given television station is reported by the Bureau of Broadcast Measurement (BBM). Through the use of individual diaries which record an individual's viewing for a particular week, the BBM is able to estimate the total number of viewing man-hours for individual stations, decomposed into the various localities in which people live.

By examining these data we can separate viewers into two groups based on distance from the transmitter to their residences. Those viewers located within a station's B contour (defined as all areas where reception occurs 90 percent of the time for 50 percent of televisions) are classified as local, those viewers located outside this contour are classified as distant. This contour roughly approximates a circle with a radius of 50 miles. Since measurements are in terms of viewing hours, AUDL measures the weekly viewing man-hours of a station for residents within the station's B contour while AUDD measures the weekly viewing man-hours for residents outside the B contour.

2. Audience Size Squared

This variable, which is the squared sum of AUDL plus AUDD, is included to pick up possible non-linearities in

the relationship between audience size and advertising rates. There is good evidence, from preceding work, that this relationship is non-linear. Park [1968,1979], Fisher, McGowan and Evans (FME) [1980] and Liebowitz [1980, 1982a] all found significant non-linearities. Park and Liebowitz found this term to be significantly negative, indicating that advertising revenue increases at a decreasing rate as audience increases. FME thought they had found the opposite effect but see Liebowitz [1981] for a demonstration that FME's results are consistent with a decreasing increase in advertising rates (revenues).

3. Income

This variable is measured as the per capita income reported on income tax forms by geographic region. It is calculated for a television station's audience by weighting the income of each area in which viewers of the station reside, by the number of viewing hours in that area. This procedure is considerably more involved than the usual one [used in Park, FME, and McFadyen, Hoskins and Gillen (MHG)] which consists of assigning the income of the city of broadcast origination to the station. In these data more than 40 percent of viewers do not live in the city of broadcast origination, with this percentage sometimes in the range of 70-80 percent. Thus the likelihood is that the measurements used here are more representative of the actual values than was the case with previous studies.

As the average viewer's income increases, it is thought that advertisers value the viewer more highly, leading to an expected positive coefficient. Past studies have usually found a positive coefficient.

4. Audience Segmentation

This variable measures the concentration of groups into which viewers segment themselves through their

viewing habits. The first use of this variable to date has been in Liebowitz [1982]. Audience segmentation is defined as the negative of the squared sum of audience shares in a given area, or:

$$ASj = -\Sigma S_i j^2 \quad j = 1,..x \text{ the number of areas}$$

$$S_i j = \text{ the market share of station } i \text{ in area } j$$

To calculate AS for a particular station the AS for every area in which a station has viewers is included in a weighted average identical to that used in constructing the income variable.

Audience segmentation is thought to influence the desirability of an audience to advertisers for several reasons. First, when viewers have a large number of alternative programs to choose from, they are more likely to find one to which they pay attention and enjoy. This may make them more receptive to advertising messages. Second, viewers are likely to make program choices along certain taste or socio-economic lines. Groups of people with homogeneous tastes make it easier for advertisers to reach particular types of people than groups with more heterogeneous tastes. For example, people who enjoy following sports may be the target for a sports magazine advertising to increase its circulation. If a sports event is the only program available, many viewers are likely to not have a great interest in sports. When several other choices of programming are available, however, many viewers will watch the alternatives, leaving an audience for the sports show which has a greater average interest in sports and which is more receptive to the idea of buying a sports magazine. Thus, <u>for a given size audience</u>, the magazine would pay more for an audience which chose to watch sports when there were alternative choices than for an audience which had fewer alternatives.

The AS variable used here will indicate program diversity under certain conditions but may not indicate

diversity in others. When creating models of taste diversity, economists often assume a population which can be broken up into a small number of perfectly homogeneous groups. Then one can construct a world where AS does not measure "true" diversity. E.g., assume that there are two types of people, 90 percent of whom value comedy and 10 percent of whom value news. Let there be two television stations. If both show identical quality comedies, they will equally share the 90 percent of viewers who value comedy, so that the AS variable will give a value of $-.5 = -[(.5)^2 + (.5)^2]$. However if the second station were to show news, the AS variable will give a value of $-.82 = -[(.9)^2 + (.1)^2]$ indicating less diversity. However, we as model builders know that diversity has increased. This last example is dependent on several stringent assumptions: (1) each audience group is perfectly homogeneous; (2) each comedy or news program is identically valued by viewers in a given group. Such assumptions are very implausible and empirically counterfactual.

Unfortunately, some economists have used such models to make judgements about program diversity [see P. Steiner, 1954]. In these models programs are divided into category (western, comedy, drama, news, etc.) and the addition of a new show is thought to increase diversity only if it opens a previously empty category. The assumption that all shows in a given category are identical can be easily tested--do viewers randomly choose among them? If Dynasty is run against Dallas will they split the audience equally and will the audience composition change from week to week? Both are predictions of the model and it is well known that both are false. One must admit that there is diversity even among shows which could be put in the same category.

Is the diversity of shows within a category greater or less than that between categories? We must acknowledge methodological difficulties even in just asking this question. Is diversity determined by the model builder or by the perceptions of viewers? Can

we compare perceived diversity between different viewers? Is it not like comparing utilities?

The approach taken in this paper is to remain agnostic regarding the absolute diversity of programs. The variation in tastes between geographic areas is assumed to be similar (although the tastes themselves might be very different) and each viewer is given equal weight. This can be best illustrated by an example. Assume there exists only one network station in a city and everyone watches it. Now compare the increase in viewing intensity which occurs with the importation of either an educational station or another network station. Let us assume that the educational station would take about 10 percent of the audience whereas the other network would take about 50 percent. In the former case 10 percent of the audience has greater viewer intensity while in the latter case 50 percent has greater viewer intensity. Since we do not know the perceived difference in diversity or the true increase in viewing intensity per viewer, we assume that with five times as many viewers with increased intensity, the network station increases total viewing intensity more than the educational station does. The AS measure takes the number of viewers affected into account whereas previous commentators took only their own model building preferences into account. In the end, this measure must be judged empirically, not through a priori reasoning.

It should also be pointed out that the AS measure should be negatively related to monopoly power, since it is also a measure of market concentration. In the study by MHG this measure had a negative coefficient. However, they did not calculate AS for all stations in an area but merely for those broadcasting locally. This local measure was then applied to all broadcasters, regardless of the percent of viewers not located locally. Thus their AS measure is different than the one in this paper.

5. Network Affiliation

Stations were categorized according to network affiliation. Dummy variables were included for CBC-owned (CBCO), CBC-affiliated (CBCA), CTV-affiliated and independents (IND). Independents include the Global and TVA mini-networks.

The inclusion of dummy variables allows the intercept of the regression to vary between network affiliation. Since it is also possible that the slope of the relationship between audience size and advertising rates (revenues) also differs between network affiliations an interaction term between the network dummy and audience was created for each network where

$$INT1 = CBCO \times (AUDD + AUDL)$$
$$INT2 = CBCA \times (AUDD + AUDL)$$
$$INT3 = CTV \times (AUDD + AUDL)$$
$$INT4 = IND \times (AUDD + AUDL)$$

6. Language of Broadcast

A dummy variable was included to take account of possible differences between French and English speaking audiences by advertisers. The variable FR equals one if the broadcast is in French.

CHAPTER 4

RATES VERSUS REVENUES - THEORY

I. INTRODUCTION - THREE POSSIBLE SCENARIOS

Advertising rates and revenues are variables which, if properly constructed, correspond to different economic concepts. Advertising rates correspond to prices, which in equilibrium are determined by supply and demand. Advertising revenues are equal to price times quantity, also determined by supply and demand. The determination of rates and revenues can be illustrated under the alternative possibilities of competition or monopoly power. We shall examine three.

1. Nationally determined advertising rates

If advertising rates are determined competitively on a national basis, we would expect all stations to charge a price proportional to the size and quality of its audience. Given its audience characteristics, each station would face a horizontal demand curve such as D_1 in Figure 1. The height of the demand curve would depend on the size and quality of the audience, so that two stations with different size and quality audiences would have different demand curves. Since a station could not raise its price above that represented by the demand curve without losing its audience, it would be content to sell all the commercials it could at the going rate as long as these commercials did not alienate and reduce the size and quality of the audience. Programs allow only a fixed amount of time for commercials, and government rules limit the amount of time which can be devoted to commercials. Thus the supply of commercial time which the station can sell is fixed. Because of these institutional constraints it is not likely that individual stations can influence their audience (and demand for advertising) by changing

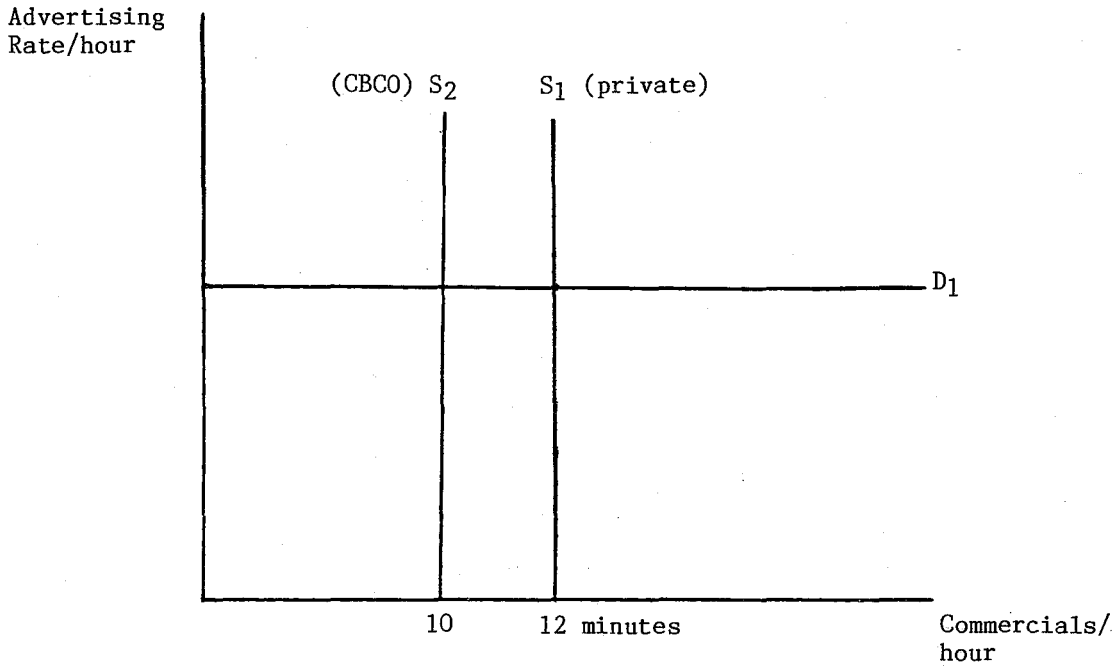

FIGURE 1

the number of commercials they sell. If, for example, a station sold less than its allowed maximum, it would have to fill the remaining time with other messages or announcements amenable to being shown in very short time intervals (as educational networks often do). Since these non-commercial messages are as likely to offend viewers as commercial messages, since the programming is interrupted in either case, the station will maximize profits by selling all available time. Private stations, which were allowed twelve minutes of advertising in 1978 would have had larger revenues than CBC-owned stations, which were only allowed ten minutes per hour, even if the audiences were identical in size. This smaller supply of advertising time for CBCO stations is represented by S_2 in Figure 1. If one makes adjustments to alter revenue data to compensate for the different amounts of advertising time available, both revenues and advertising rates (if properly measured) would give identical results. This nationally competitive market is incompatible with a non-linear relationship between audience size and advertising rates (or revenues).

2. Local monopoly determination of advertising rates

A different scenario emerges if we assume that each station faces a downward sloping demand for its advertising time. We have already argued that the institutional constraints are such that no station can unilaterally reduce the number of non-program minutes the networks provide in their program feed to the stations. The station, however, can choose, between advertising its own programming (thus increasing its audience) or advertising someone's product. The marginal cost of providing a message then becomes merely this opportunity cost of a foregone increase in future audience. The profit maximizing position for a station under these circumstances is illustrated in Figure 2. This diagram is somewhat more complex than the standard demand-supply diagram. The demand curve is a usual <u>ceteris paribus</u> demand which means that audience size

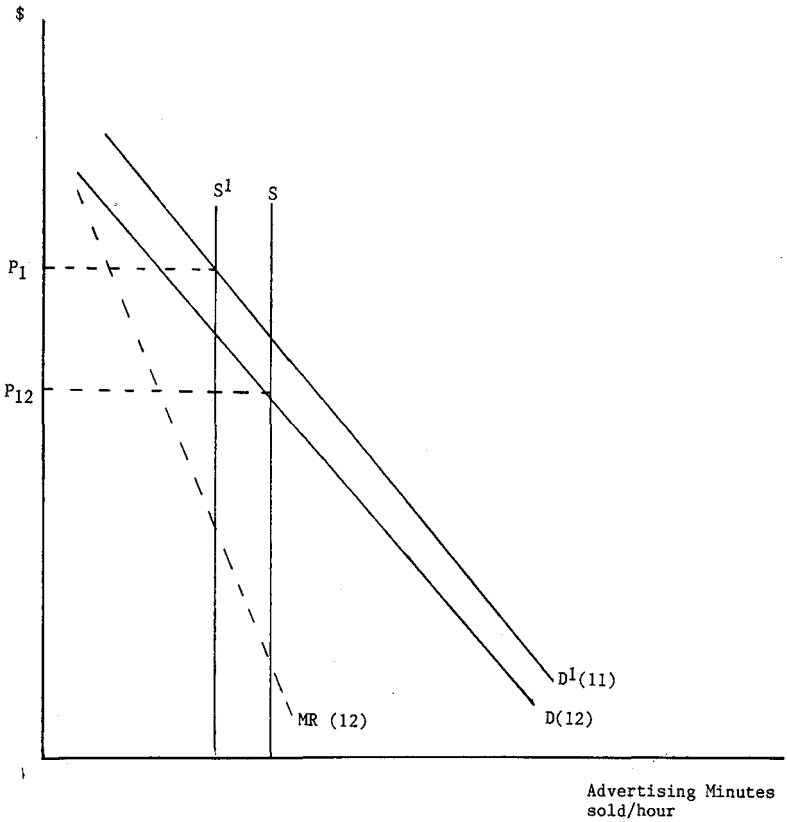

FIGURE 2

and characteristics are held constant along the curve. The particular demand drawn in the diagram is that which exists for the audience which watches this station when it sells twelve minutes of advertising per hour. If the station were to sell eleven minutes and use one minute to advertise its own programs, the demand would increase because of the larger audience caused by advertising one's own programming. The increase in price from the greater demand and smaller supply of advertisements may either increase or decrease revenues.

This analysis illustrates an interesting consideration. When the profit maximizing number of advertising minutes sold is greater than the legal limit, the station will try to sell all the time available. When the profit maximizing quantity of advertisements occurs at a quantity less than the legal limit the firm will sell less than its permitted quantity. In this latter case the advertising rates (P) will not be perfectly correlated with revenues, whereas in the former case they were (assuming all stations carry the same amount of programming hours).

If small stations have their marginal revenues (and perhaps demand) intersecting the quantity axis to the left of the vertical supply more often than those of large stations, they would have higher ratios of price/revenue than large stations. Also, a non-linear (a decreasing increase) relationship between advertising rates and audience size would be expected (and indeed, this type of statistical relationship does exist). Since small stations would not be constrained by S, they would have greater scale adjusted revenues and profits than the larger stations so that a non-linear revenue relationship is also possible, though it would probably be somewhat less pronounced.

3. Local competitive determination of advertising rates

It might be the case that rates are determined competitively within local markets. This is rather simple to analyze. Each station in a city takes the price, determined competitively within that city, as given and thus each station sells all its possible advertising time. The competitive price within one city is determined by demand and supply within the city. Since this is likely to differ between cities, different prices likely will be established in different cities. In different cities, otherwise identical stations would have different advertising rates and revenues.

Empirically, the number of stations does not increase proportionally with increase in city size so that large stations are usually located in large cities. From the former observation we might expect the advertising rate per viewer in large cities to be higher than that in small cities since the number of advertising minutes per viewer is lower in large cities. This would imply an audience-revenue (rate) relationship which was non-linear with an increasing positive slope as audience size increased. This implication will be shown to be counterfactual in the following chapters.

CHAPTER 5

RATES VS. REVENUES - MEASUREMENT

I. INTRODUCTION - THE REALITY OF IMPERFECT MEASUREMENTS

The economic magnitudes of price and revenues are well defined and in principle amenable to measurement. However, the reality is such that both advertising rates and revenues are rather imperfect measures.

II. PROBLEMS WITH ADVERTISING RATES

Published advertising rates reflect list prices when the important economic magnitudes are transaction prices. Rate cards often state various discount policies but it is impossible to compute an index number which correctly reflects these discounts without knowing which discounts are consumed, and how often, such data being unavailable. The other difficulty with rates is that some stations may not sell all available advertising time, in which case relative rates may not fully reflect the true market conditions. Another simple difficulty is that some stations have longer broadcast days than others so that for two stations with the same advertising rates (and audience per hour) the station with the longer broadcast day will have a larger total audience. Since our audience measure is weekly person-viewing hours, revenues would better reflect total audience size under these circumstances.

III. PROBLEMS WITH ADVERTISING REVENUES

Revenue data, unfortunately, also suffer from many imperfections, making comparability between stations difficult. Total revenue is divided into five

categories: local time sales; national time sales; network payments; syndication revenue and other revenue. These last two categories do not reflect advertising revenues and thus must be eliminated from the revenue regressions. Local and national time sales reflect advertising sold by the station to either national or local advertisers but since this distinction is artificial and not universally applied these two categories are best merged into one.

The last category, network payments, presents the most difficulty. Both the CBC and CTV networks sell advertising on a network basis, with a certain number of advertising slots being allocated for these purposes. The revenues generated can be allocated to the various member stations in several possible ways. CTV redistributes these revenues in proportion to the relative revenues generated by the member stations.

CBC redistributes its payments according to a formula, the details of which they would not divulge except to say that stations are broken up into three size categories and that small stations were more highly reimbursed than large stations (a result borne out by the later empirical work). This latter factor is a minor problem compared to the network policy of keeping a large fraction of network sales as compensation for providing programming to the stations. Mr. Bruce Parks, of CTV, estimated that the network only paid back to the station 16.5 percent of the revenues generated through network advertising. Mr. Payette of the CBC estimated that network's average payback at 25 percent. Thus the revenues of those stations affiliated with these networks are understated because the network payment component is much smaller than the advertising revenues generated. For this reason, network payments should be multiplied by a factor of 1/.165 for CTV affiliates, and 1/.25 for CBC stations. One must also realize that expenditures for programming are also affected by these policies and symmetrical adjustments (detailed below) must be made with this variable.

Another serious difficulty with revenue data consists of the institutional restrictions imposed on the CBC. First, CBC-owned stations were only permitted ten minutes of advertising per hour in 1978, whereas private stations could show twelve minutes. For a given audience, this would reduce advertising revenues for CBC-owned stations (we assume an elastic demand curve since private stations seem to take advantage of the extra two minutes available to them). Multiplying CBC-owned stations' revenues by a factor of 1.2 (and the network payments for CBC affiliates by the same factor) should, however, be more than enough to compensate for this differential.

An additional problem arises with the CBC network policy of not allowing commercials during certain types of programming (public affairs and drama). There were about five to seven hours per week of prime or near-prime time programming which fall into this category. Since this represents slightly less than 15 percent of prime time programming (most revenue is generated during prime time), multiplying the already corrected revenues by 115 percent should more than compensate for this institutional constraint on the revenues of CBC stations.

Another minor problem with revenues is that they are net of agency commission and these commissions may not be identical for all transactions or all networks.

Fortunately, even with these problems, advertising rates and revenues perform in a similar manner. The simple correlation between rates and revenues is .92 unadjusted and .91 adjusted. (The simple correlation between adjusted and unadjusted revenues is .93.) The regression results are very similar using either of these variables and so no choice need really be made between them. Such a choice, if one had been necessary, would have been contentious since there is no clear-cut superiority in either one.

CHAPTER 6

THE PROBLEM OF HETEROSCEDASTICITY

I. INTRODUCTION - A QUESTION OF ASSUMPTIONS

There are several assumptions underlying the use of regression analysis which if they do not hold are likely to cause misinterpretation of our results. One of these assumptions is known as homoscedasticity, or a constant variance in the distribution of the error terms. The estimation of the relationship between a dependent variable and several independent variables is assumed to be handicapped because of random fluctuations such that the value of the dependent variable fluctuates around the value implied by the values of the independent variables. If there were no such fluctuations, a regression which included all the variables influencing the dependent variables would be able to predict the value of the dependent variable associated with every observation. These random fluctuations are assumed to have the same (normal) distribution regardless of the values of the variables. In many instances, the range of values of the variables is so great that it is unlikely that the variance of the distribution of error terms is constant. For example, if the random fluctuations were in the range of 1 percent of the value of the dependent variable, then one would expect the variance of the error term to quadruple whenever the dependent variable doubled. When the variance increases in this manner it is called heteroscedasticity.

The difficulty of assessing accuracy

Heteroscedasticity is quite common in cross-section studies, of which this is one. The problem caused by heteroscedasticity concerns confidence we have in the precision of our estimates. It is well known that even

with heteroscedasticity, our estimated coefficients are unbiased, which means that the estimated coefficient centres on the true underlying value. One difficulty is that estimators are no longer efficient, which means that another linear unbiased estimator exists which would have greater precision. Of more importance is the fact that the estimated standard error (the distribution of possible values for a coefficient) is now biased such that we cannot be sure how precise our estimates really are. In a homoscedastic world one can use the standard errors to determine the range of values within which the true coefficients would likely lie (confidence interval) or the likelihood that true values could be zero for some non-zero value of the estimated coefficients (significance test). In other words, our t-statistics are biased. There are ways to try to correct for heteroscedasticity. However, because the uncorrected results (ordinary least squares or OLS) are unbiased, they are still quite useful.

II. TESTING FOR PROBLEMS

We tested for heteroscedasticity using a Goldfeld-Quandt test with our advertising rate data. Because of the large range of audience sizes in our data it was likely that the random fluctuations of advertising rates were greater for large audiences than for small audiences. The Goldfeld-Quandt test requires that we rank our observations by audience size, remove some of the observations in the middle and compare the estimated variance of disturbance terms for the low group and the high group. If heteroscedasticity occurs, the estimated variance of the high group will be larger than that of the small group.

Thus we ranked the 72 stations by audience size, removed the middle 16 and ran separated regressions of the following form[1] on the 28 largest and the 28 smallest stations:

(1) ADRT=K+a AUDL+b AUDD+c ASQ+d INC+e AS+f FR+g CBCO+u

where u is the random error and all the other variables are as previously defined.

The sum of the squared residuals divided by the number of observations is an estimate of the variance of the disturbance terms. The ratio of the values from the large and small audience groups forms an F-test such that any value greater than 3.00 indicates that there is less than a 1 percent chance that heteroscedasticity is not present. Our calculated value was 19.07, indicating an overwhelming likelihood of heteroscedasticity.

III. SOLVING THE PROBLEM

A technique for alleviating heteroscedasticity is to use generalized least squares (GLS). The variable thought to be associated with the variance of the disturbance term (s) is used to deflate all the observations. For example, a common assumption would be $E(u^2) = s^2X^2$; that is, that the variance of the random error (the mean of u is zero) grows with the square of some exogenous variable X. Multiplying each variable of each observation by X^{-1} would remove the heteroscedasticity.[2] Sometimes it is assumed that this variance grows directly with X, and then we would multiply each observation by $X^{-1/2}$.

A somewhat more satisfying approach is to measure the relationship between $E(u^2)$ and X. To this end we disaggregated the data into 6 groups of 12 stations, with stations again ranked by size of audience since audience size is assumed to be the variable related to the variance of the disturbance term. A regression such as (1) was run for each group. The squared sum of residuals (the estimator of $E(u^2)$) was calculated, along with the mean value of audience size (MAUD). The results from these six regressions allowed us to run the following regression:

(2) $\log RESQ = a + b \log MAUD$

Using the six available observations (2) was estimated as:

$$\log RESQ = -1.7 + 1.30 \log MAUD \quad R^2 = 0.64$$
$$(.99) \quad (2.67)$$

t-statistics are in parentheses.

Thus, dividing all data by $1/(AUD)^{.65}$ should remove heteroscedasticity. The standard error of b is such that the likelihood that b could be less than 1 is approximately 30 percent, while the likelihood that it is more than 2 is 15 percent. Thus we examined several possible corrections for heteroscedasticity and include some of the more successful ones below. Fisher, McGowan and Evans (1980), used a slightly different correction for heteroscedasticity. They assumed $E(u^2)$ grew with the square of the number of potential television households.[3] We can make a similar correction using data from the A.C. Neilson Company on the number of television households (HH) in a given locality and assuming that a station's potential number of viewers is based only on its city of origination. This correction is less appealing from a theoretical vantage because there is no compelling reason why the number of households should be related to the variance of the error term, except that the size of a station is related to potential audience.

Thus there are four possible corrections which have been used. The corrections consist of deflating all data by either 1/AUD, $1/(AUD)^{.65}$, $1/(AUD)^{.5}$, or 1/HH. These results will be presented along with the OLS results. One might ask how successful these corrections were at removing the heteroscedasticity. The answer is not all that successful. The Goldfeld-Quandt test was applied after each of these corrections to the data after ordering the observations by the size of AUD/c where c is the particular correction used. In each case the ratio of the sums of squared residuals dropped

significantly from the original value of 19.04 to a value in the neighborhood of 4 (4.16 for $1/(AUD)^{.65}$, 3.38 for AUD^{-1}, 2.21 for $(AUD)^{-1/2}$, and 3.78 for HH). In each instance we still reject the assumption of homoscedasticity since the likelihood of a ratio greater than 2.94 (2.16) is less than 1 percent (5 percent) if the errors really were distributed homoscedastically. The measured standard errors and t-statistics are still likely to be somewhat biased.

The correction for heteroscedasticity will leave the estimated coefficients unbiased as long as it is not correlated with the error terms. However, it will often be the case that some correlation will in fact exist (particularly when a new variable such as HH is introduced), and thus he GLS regressions may introduce a bias of their own. Thus changes in the coefficients, introduced by the switch from OLS to GLS should be viewed with some suspicion. If we believe that OLS represents the proper specification of the model then we would tend to favour the OLS results.

CHAPTER 7

AN APPROACH USING ADVERTISING RATES

I. THE MODEL

The regression that was run had the following form:

$$ADRT=K+a\ AUDL+b\ AUDD+c\ ASQ+d\ AS+e\ INC+f\ FR+g\ INT2+$$

$$h\ CBCA+i\ INT3+j\ CTV+k\ INT4+l\ IND$$

The coefficients g-l are those of primary interest since they allow us to determine how the various categories of broadcasters differ from one another. For example, the coefficient g measures the difference between CBC-owned and CBC-affiliate stations in the slope of the relationship between audience size and advertising rate, while the coefficient h measures their difference in intercepts. Figure 3 demonstrates several possibilities. The line CBCO represents the relationship between audience size and advertising rates holding all other variables (such as income or AS) at their mean values. The line represented by R_1 has both a higher slope and intercept (both g and h are positive) than CBCO. This indicates that for any given audience size the advertising rate will be higher for stations on R_1. The line R_2 (g positive, h negative) indicates that small (less than AUD_2) CBC-owned stations have higher advertising rates than small stations on R_2, with the opposite being true for large stations. A line such as R_3 (g positive, h negative) indicates that for audiences smaller than AUD_3, stations on R_3 change more but for audiences greater than AUD_3 they change less. A line such as R_4 (both g and h negative) indicates that stations on R_4 always charge less than CBC-owned stations.[4]

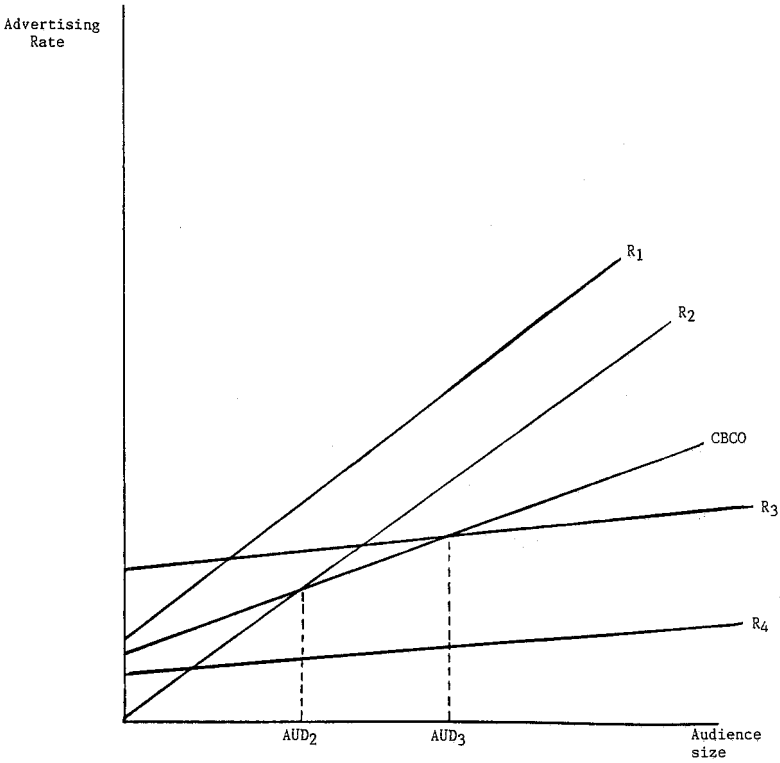

FIGURE 3

II. THE REGRESSION RESULTS

Table 1 lists the regression results for each of our five regressions. The results are generally in line without expectations. Larger audiences increase advertising rates with local viewers worth more than distant viewers. The relationship between advertising rates and audience increases at a slightly decreasing rate, but the difference from linearity is not significant. Higher incomes of viewers increase advertising rates, although the result is not always significant for our various corrections. Increased audience segmentation increases advertising rates, and except for the HH correction the coefficient is significant. The French binary variable is always negative but significant only for the HH correction.

In the OLS equation every intercept and slope coefficient is positive. Since the CBC-owned stations do not have dummy variables in these regressions, they are the base results for which the coefficients g-1 give the deviations. Thus every non-CBCO television category is like R1 in Figure 3. The only coefficient which approaches significance is that of the intercept for independent stations. However, the test for significance requires the joint effect of both the slope and intercept terms for each station category. This test is conducted by examining the increase in explanatory power (R^2) of the regression where the two variables are added to the regression. Thus, for example, to determine the significance of CTV station's rate differentials we must run the regression without INT3 and CTV and then with them. The appropriate test statistic then becomes[5]

$$F(T-P,N-T) = \frac{R_T^2 - R_P^2}{1-R^2} \times \frac{N-T}{T-P}$$

where T = the total number of independent variables, P = the partial number of independent variables and N = the number of observations. In this case T = 13, P = 11 and

TABLE 1

REGRESSION WITH INTERCEPTS AND INTERACTION TERMS;
VARIOUS CORRECTIONS FOR HETEROSCEDASTICITY; DEPENDENT VARIABLE
= ADVERTISING RATES

Variable	No Correction	$(AUD)^{.65}$ Correction	$(AUD)^{.5}$ Correction	$(AUD)^{1}$ Correction	HH Correction
AUDL	0.0332***	0.03056***	0.0311***	0.0284***	0.0276***
	(6.72)	(5.2)	(5.77)	(4.07)	(3.46)
AUDD	0.0169**	0.02054*	0.0199*	0.0215*	0.0195*
	(2.31)	(2.06)	(2.19)	(1.84)	(2.34)
ASQ	$-0.19E^{-6}$	$-0.3699E^{-6}$	$-02.29E^{-6}$	$-0.51E^{-6}$	$-0.214E^{-6}$
	(1.18)	(1.52)	(1.44)	(1.28)	(0.91)
AS	181.0***	149.0***	157.0***	112.0***	26.0
	(2.78)	(3.51)	(3.40)	(3.35)	(1.01)
INC	0.0200**	0.0043	0.0065	0.0022	0.0058*
	(2.00)	(0.81)	(1.04)	(0.65)	(2.32)
FR	-12.9	-19.6	-19.7	-18.2	-41.9
	(0.63)	(1.54)	(1.44)	(1.58)	(4.33)
INT2	0.0049	0.0055	0.0055	+0.0056	0.0111
	(0.70)	(0.74)	(0.76)	(0.68)	(1.65)
CBCA	4.72	-1.39	-0.99	-0.43	12.16
	(0.16)	(0.09)	(0.06)	(0.03)	(0.63)
INT3	0.0066	0.0127**	0.0114**	0.0147**	0.0066
	(1.58)	(2.27)	(2.28)	(2.02)	(1.01)
CTV	21.5	-14.47	-11.2	-17.9	1.49
	(0.62)	(0.87)	(0.58)	(1.35)	(0.08)
INT4	0.0042	0.0126	0.00897	0.0239	0.0067
	(0.91)	(1.80)	(1.42)	(2.74)	(0.95)
IND	73.2*	45.7*	57.9**	19.4	17.6
	(1.97)	(1.97)	(2.23)	(1.07)	(0.91)
K	-10.7	56.4	47.8	56.0	-1.7
	(0.17)	(1.65)	(1.32)	(2.21)	(0.07)
R^2	0.901	0.527	0.646	0.800	0.888
N of observations	72	72	72	72	72

* - 90% confidence level
** - 95% confidence level
*** - 99% confidence level

AUDL - Local Audience; AUDD = distant audience; ASQ = total audience squared; AS = Audience Segmentation; INC = Income; FR = French Broadcast; INT2 = CBA x Audience;CBCA = CBC Affiliate; INT3 = CTV x Audience; CTV = dummy for CTV;INT = IND x Audience; IND = dummy for independent or TVA.

N = 72. Table 2 gives the calculations for each category for each regression.

Examination of the other columns of Table 1 indicates that the intercept terms for CTV and CBCA are sometimes negative, leading to relationships such as R2 in Figure 3. However, the interaction (slope differential) terms are positive in all regressions.

One can see from the OLS regressions in Table 2 that it is not possible to reject (at the 95 percent level of confidence) the hypothesis that CTV (or IND) stations charge different advertising rates than CBC-owned stations since the F-statistic for both groups is greater than the critical value of 3.15. CBC-affiliates do not differ in a statistically significant way. This result is also generally confirmed with the various AUD corrections, except that CTV is sometimes not significant. The results are somewhat different with the HH correction where we find that CBC-affiliates have the most significant differentials from CBC-owned stations with independents having somewhat less significant (but still greater than 95 percent) differentials, and CTV having insignificant differentials.

In Table 2 we also calculate the percentage change in advertising rates which we would expect from an average CBCO station if it had been in another category with the same size audience.

When examining Table 2 one result stands out consistently: CBC-owned stations charge less than other categories of station, quite independent of measured audience characteristics. While this difference is not always significant, its consistency under alternative specifications of our regressions indicates a robustness independent of the individual tests of significance. It seems fair to conclude, given the audience characteristics of CBC-owned stations, that they would be able to increase their rates by between 18 percent

TABLE 2

IMPACT OF NETWORK AFFILIATION ON ADVERTISING
COMPARISON IS WITH CBC-OWNED STATIONS

Network Affiliation	OLS	$(AUD)^{.65}$	$(AUD)^{.50}$	AUD	HH
IND	8.24* +67%	10.24* +74%	9.89* +72%	11.50* +92%	4.31** +35%
CBCA	.80 +20%	.51 +19%	.56 +18%	.56 +19%	11.60* +45%
CTV	4.82** +38%	2.70 +32%	2.99 +29%	2.07 +35%	1.77 +23%

Upper figure is F statistic indicating the increase in explanatory power when the intercept and interaction terms for a given network are included in a regression of the form

$$NRT = K + a\ AUDL = bAUDD + cINC + dASQ + eAS + fINT_j + gINT_k + hNET_x + iNET_z$$

where $INT_{j,k}$ and $NET_{x,y}$ refer to the other two networks not being examined.

Lower figure is the estimated advertising rate differential based on the coefficients from the regressions in Table 1 given the average size of CBC-owned stations. In other words it measures the change in advertising rate which would occur if CBC-owned stations priced their advertising time in the same manner as the indicated network. These figures are based on the mean audience size of CBC-owned (4496) and mean advertising rate of CBC-owned (137).

* indicates 1% level of significance

** indicates 5% level of significance

and 92 percent if they were to behave as privately owned stations.

Allowing the intercepts to differ from zero, as we have done, implies that an audience of zero size could be consistent with a positive or negative price. In fact, the intercepts are generally insignificantly different from zero. The economic rationale for a non-zero intercept are rather hard to come by so that one could argue that all intercepts should be forced through the origin. The results of such regressions are given in Table 3. The results of Table 3 are not much different than those of Tables 1 and 2. CBC-owned stations still charge less than other networks.

We might conclude from this last finding that CBC audiences are somehow less valuable than others. The CBC network does in fact make this claim. A spokesman for the CBC (Mr. Payette) claims that many viewers of the CBC programs are over 49 years of age and that these viewers are less highly valued by advertisers than younger viewers. In addition, much of the CBC program caters to people interested in unusual and non-commercial type programming and it is quite possible that these people are not very responsive to advertising messages. Since both CBC-owned and affiliated stations carry much of the same programming, this logic would imply that they both should do worse than the other networks in selling advertising time. This logic also implies that CBCO and CBCA stations should perform equally well at this task, but our results indicate that CBCA stations charge higher prices for equivalent audiences.

TABLE 3

REGRESSIONS - FORCED THROUGH ORIGIN

Variable	No corr.	$(AUD)^{.65}$	$(AUD)^{.5}$	$(AUD)^{1}$	HH
AUDL	.0344*** (8.5)	.0337*** (6.38)	.0342*** (6.92)	.0320*** (5.55)	.0244*** (4.96)
AUDD	.0191*** (2.84)	.0212** (2.14)	.0207** (2.31)	.0242** (2.11)	.0171** (2.40)
ASQ	$-.364E^{-9}$*** (2.91)	$-.56E^{-6}$** (2.35)	$-.50E^{-6}$ (2.61)	$-.65E^{-6}$ (1.58)	$-.17E^{-6}$ (.73)
AS	+18.8*** (3.81)	82.7*** (3.24)	99.4*** (3.26)	58*** (3.59)	11 (.91)
INC	.0203*** (4.85)	.0117*** (5.73)	.0132*** (5.41)	.0094*** (7.16)	.0068*** (6.50)
FR	-14.4 (.71)	-14.9** (2.02)	-18.4* (1.89)	-9.4** (2.23)	-45.4*** (5.12)
INT2	.00326 (.74)	.00427 (.84)	.00379 (.77)	.00651 (1.25)	.01489*** (4.84)
INT3	.00846*** (3.07)	.01082*** (2.28)	.01032** (2.46)	.00884 (1.49)	.00731* (1.99)
INT4	.01123*** (3.67)	0.02012*** (3.73)	.01720*** (3.58)	.02807*** (4.29)	.01172*** (2.83)
R^2	.91236	.46469	.60027	.77153	.88161
IND	+37%	+66%	+56%	+92%	+39%
CBCA	+11%	+14%	+12%	+21%	+49%
CTV	+28%	+36%	+34%	+29%	+24%

These lower figures imply the percentage change in advertising rates which would be charged if CBC-owned stations behaved according to the estimated result for the other networks.

* = 90% confidence level
** = 95% confidence level
*** = 99% confidence level

CHAPTER 8

AN APPROACH USING ADVERTISING REVENUES

I. APPLYING THE SAME MODEL

Regressions identical to those of the last chapter were run with advertising revenues as the dependent variable. Because of the differing network policies regarding advertising revenues (discussed above) several adjustments were made to the data before the regressions were run. See Chapter 5 for details. In addition, data were unavailable for several stations and others had to be excluded because data were aggregated for stations with single ownership but different network affiliations, reducing the number of observations from 72 to 63.

As was the case with advertising rates, heteroscedasticity was thought to be a strong possibility and thus a Goldfeld-Quandt test was performed. The results indicated a strong likelihood of heteroscedasticity (F = 34.2). Using a procedure similar to that of the last section, the relationship between audience size and the variance of revenues was estimated with the following results:

$$\log RESQ = \underset{(6.07)}{6.49} + \underset{(3.53)}{1.45} \log MAUD \qquad R^2 = .89$$

As before, we shall report regression results for several possible corrections and will report the extent to which our attempts to remove heteroscedasticity have succeeded. The Goldfeld-Quandt test gave values of 2.90 for $(Aud)^{.725}$, 3.08 for Aud, 6.06 for $Aud^{.5}$ and 28.84 for HH. Because the HH adjustment had virtually no effect on heteroscedasticity it was felt that results from such a deflation would be of no value and thus they are not reported in the following tables.

II. Comparing the results

The coefficients in Table 4, based on advertising revenues, tell the same general story as those using advertising rates, which is not surprising since there is a high correlation between rates and revenues. Larger audiences increase revenues, with local viewers being worth 1.3 to 3.3 times as much as distant viewers (a slightly more pronounced difference than those with rates). The non-linearity is always negative but never significantly so. To aid the comparison of the revenue and rate regressions, Table 5 presents elasticities, which are not influenced by the units of the dependent variable. The elasticities give the ratio of the percentage change in the dependent variable from its mean when the independent variable is changed some percentage from its mean value. From this we can see that the revenue non-linearity is larger than the rate non-linearity with the OLS estimate but the opposite result holds with our optimum GLS estimates. We conclude that the non-linearity is not distinguishable between those cases. Essentially the same thing can be said for audience segmentation, which is again always positive and significant. The impact of income is also similar to the rate regressions, being always positive but often insignificant.

Given the high correlations between rates and revenues, it would be surprising if the impact of network affiliations were much changed. Of some interest is the nature of the difference in revenues as audience size changes. All three groups of private stations have steeper curves relating revenue and audience than CBCO. Independent and CBC affiliates have curves like R_2 in Figure 3 whereas CTV has a curve more like R_1. This means that large private stations do better than large CBCO stations but that small private stations sometimes do worse making it impossible to state which profile leads to the highest revenues without specifying the size of station being considered. Part of the reason for the flatter CBCO profile might reflect a conscious

TABLE 4

REVENUE REGRESSIONS

	OLS	$1/(AUD)^{.725}$	$(Aud)^{1}$	$Aud^{.50}$	Unadjusted Revenues
AUDL	1532***	1272***	1242***	1310***	940***
	(4.72)	(4.75)	(4.48)	(4.74)	(3.86)
AUDD	432	676	903	528	287
	(.91)	(1.50)	(1.93)	(1.18)	(.81)
ASQ	-.0170	-.0058	-.0069	-.0065	-.0130
	(1.47)	(.47)	(.43)	(.61)	(1.5)
AS	+10208**	+5468***	5197***	5934***	7167**
	(2.56)	(3.12)	(3.90)	(2.62)	(2.40)
INC	1027	138	48	272	644
	(1.66)	(.59)	(.29)	(.84)	(1.40)
FR	-1594527	-1711352***	-1580248***	-1830135**	-940588
	(1.25)	(3.00)	(3.63)	(2.46)	(.98)
CBCA	-827977	-809786	-624729	-947927	-233,899
	(.46)	(1.12)	(1.04)	(1.03)	(.17)
INT2	263	343	306	358	49
	(.62)	(1.06)	(.953)	(1.06)	(.15)
CTV	1111350	-138732	-916175	391840	1940,005
	(.37)	(.05)	(.26)	(.14)	(.87)
INT3	353	470	541	426	282
	(1.18)	(1.16)	(1.07)	(1.19)	(1.26)
IND	-3679976	-400914	-219968	-765344	-1289763
	(1.56)	(.45)	(.35)	(.65)	(.77)
INT4	494	53	10	136	790***
	1.65)	(.18)	(.31)	(.45)	(3.51)
K	161144	2555880	2732823***	2233180	-448364
	(.04)	(1.91)	(2.89)	(1.20)	(.16)
R^2	.85762	.49432	.60326	.63103	.88047
N of observations	63	63	63	63	63

* significant at 90% confidence level
** significant at 95% confidence level
*** significant at 99% confidence level

TABLE 5

ELASTICITIES FOR RATE AND REVENUE REGRESSIONS

	OLS		GLS $1/(Aud)^{.725}$	
	Rates	Revenue	Rates	Revenue
AUDL	.66	.79	.55	.62
AUDD	.11	.08	.11	.11
ASQ	-.06	-.14	-.06	-.03
AS	.27	.36	.41	.37
INC	.43	.54	.17	.13
FR	-.01	-.04	-.04	-.07
CBCA	.01	-.03	-.01	-.08
INT2	.02	.03	.04	.06
CTV	.02	.03	-.02	0
INT3	.06	.09	.08	.08
IND	.06	-.07	.04	-.01
INT4	.03	.08	.05	0

policy by the CBC to reduce the variance of revenues it returns to its stations. The CBC would not reveal its payback formula for its owned and operated stations but a spokesman for the CBC claimed that the network paid less than a proportionate amount of network sales back to its large affiliates and a more than proportionate amount to its small affiliates. The average size of stations differs greatly by station affiliation, so that this is not a minor problem. The mean audience for the various groups is CBCO: 4727, CBCA: 2965, CTV: 9773, IND: 8425.

It is possible to compare the relatively profitability for stations which are of the average CBCO size. The details are given in Table 6. The relationship between CBCO and CBCA is almost identical with those found using rates--i.e., CBCA seems to earn 10-15 percent greater revenues[6] but the results are not significant. The relationship with CTV is also very similar to the previous results, with CTV earning 25-40 percent higher revenues (for the average CBCO audience) with this result being on the border of statistical significance. The major surprise concerns the relative performance of the (smaller) independent (including TVA) stations. Whereas these stations charged rates about 70 percent above those of CBCO, always a statistically significant difference, their revenues appear to be lower than those of CBCO stations, with a difference of -22 percent with OLS and an average point estimate of -2 percent and a complete lack of statistical significance with the GLS estimate.

The last columns of Tables 4 and 6 refer to results with unadjusted revenues. By unadjusted we mean that the network payments are added directly to local and national time sales of the station. Since the network payments are no longer multiplied by a factor greater than one, the stations which have small or zero network payments (independents) would be expected to rise in the relative revenue rankings. In fact this happens, with independents shifting from a 22 percent inferiority

TABLE 6

IMPACT AND SIGNIFICANCE OF NETWORK AFFILIATION ON ADVERTISING REVENUES - COMPARISON WITH CBC-OWNED STATIONS

Network Affiliation	OLS	$Aud^{.725}$	$Aud^{.50}$	Aud	Unadjusted Revenues
IND	1.55 -22%	.12 -2%	.21 -2%	.10 -3%	10.23** +41%
CBCA	.19 +7%	.67 +14%	.62 +12%	.56 +14%	.12 +8%
CTV	3.83* +46%	2.42 +35%	3.00 +40%	1.65 +27%	7.05** +55%

Upper value is F-statistic indicating the increase in explanatory power when the interaction and intercepts are allowed to vary for a particular network affiliation.

Lower value is the estimated rate differential between the network of interest and CBCO, as if the CBC-owned stations were to behave in a manner analogous to the particular private network. These figures are based on the average CBCO audience (4727) and the mean advertising revenues of CBCO stations ($6,000,000).

* 95% level

** 99% level

(OLS) compared to CBCO, to a position of 41 percent advantage. Obviously this revenue adjustment has an important influence on our results.

The conclusions to emerge from this section are mixed. CBC-owned and -operated stations appear to do somewhat worse than equivalent sized CBC affiliates or CTV stations but better than equivalent sized independent stations. The overall impression, when heteroscedasticity is accounted for, is that CBCO charge less than their private counterparts but that this difference is not very great. The comparison with CBCA is most important because of the almost identical programming carried on the two as well as their similar audience sizes.

CHAPTER 9

OTHER TESTS OF EFFICIENCY

I. INTRODUCTION - FACTORS AFFECTING EFFICIENCY

There are many aspects of efficiency other than those involved in the selling of advertising time. The economic literature on the cost efficiency of regulated or publicly owned firms is replete with examples of excessive costs for these firms compared to their private counterparts. This cost differential has often been estimated to be in the range of 100 percent.

These studies have the difficult task of trying to compensate for differentials between firms. Most firms sell slightly different products, operate in different locations, use slightly different production processes, etc. This poses great difficulties for the researcher interested in comparing production costs. In order to allow greater comparability, profitability is often used as a proxy for efficiency.

For the purposes of this study detailed comparisons of each component of cost are not possible, mainly because data from the CBC-owned and -operated stations are extremely aggregated and allow only a general examination of costs. On the plus side, however, is the fact that the industry under examination is well defined, narrow in scope and fairly homogeneous both in its product and in its production technology which should enhance the value of the results which are obtained.

Measuring the cost efficiency of CBCO stations requires data on costs, and on variables which influence cost. For example, a station with a small transmitter

and a small staff, which may serve a small community, may be just as efficient at its task as a large station in a large city. A station is efficient if it achieves a given audience at the lowest possible cost.

There are several reasons to expect that these costs will increase less than proportionately as station (audience) size increases. Such a relationship between size and costs, where average costs fall, is known as economies of scale or increasing returns to scale. Such economies seem likely because the cost of transmitters increases less than proportionately with an increase in effective broadcasting power. Also, television cameras, lights and studios are not perfectly divisible so that there is a minimum cost of operating, no matter how small a station. A small station in Medicine Hat will require at least one camera, a cameraman, and an announcer if it is going to broadcast local news. A station in Toronto, with a much larger potential audience, requires no more than this, although it may choose to buy more cameras and hire more people for its news. The relationship between costs and size is in fact an empirical proposition.

Other variables may influence the cost of broadcasting. A station which engages in much original programming will have higher costs since creating programs is usually more costly than buying them. These higher costs should be balanced by syndication revenues. We shall measure program creation by the percentage of revenues made up of syndication revenues (called VI). Another variable of interest is average income of viewers, which may indicate the cost of doing business in the station's home city (e.g., higher wages paid to employees) and thus may influence broadcasting costs.

The final variables which may influence costs are the nature of ownership. This is determined by the affiliation of the station, i.e., CBCO or one of the private categories. Economic theory implies that private ownership leads to the most efficient use of

resources (although under a regulatory regime this may no longer be true) so that CBCO stations may be less efficient than their private counterparts but would not be expected to be more efficient.

II. COMPARING EFFICIENCY

The usual method for comparing efficiency is to examine profitability. Profits are not directly available for our data, nor are assets, which are used to normalize profits. The only variables available are the already discussed revenue data and a variable called total expenditure. Total expenditure is defined for private stations as employee remuneration, program acquisition, technical, sales and administrative costs.[7] Capital costs are not included. One must be careful in comparing these values between networks however. Independent and TVA stations pay directly for all their outside programming whereas CTV and CBCA stations pay for their network programming indirectly when the network sells advertising time for the station but does not return the full value. Thus, all else equal, because of these institutional arrangements, a CTV station would appear to have lower revenues and lower costs than independents. This was taken account of when we ran the revenue data. A similar adjustment can be made for the expenses.

A measure of profitability sometimes used in industry studies is the profit/assets ratio. A similar variable, called the price-cost margin (a misleading term--see Liebowitz [1982b]) is constructed using only variable costs, instead of total cost, when determining profits. That is to say the price-cost margin equals (TR-VC)/TR, where VC is variable cost and TR is total revenue, whereas (TR-FC-VC)/TR is the profit/sales ratio where FC is fixed costs. The price cost margin is inferior to profit/sales ratios because variations in depreciation (fixed) costs are an important economic factor in true profitability. However, for our

purposes, with a well defined industry where firms have (hopefully) very similar capital/sales ratios, the price-cost margin (PCM) should be informative regarding relative efficiency. Use of the PCM does not negate the difficulty caused by network policies in costing programs to their affiliates. CTV, by loading the program costs into reduced revenues, will cause its affiliates to have higher PCMs than independent stations which treat these costs in a manner leading to both higher revenues and costs. The numerator is the same, regardless of which costing procedure is used but loading costs into decreased revenues lowers the denominator for CTV stations. Thus the PCMs cannot merely use the total revenue and total expenditure data.

The approach we have taken is to rearrange the data so that all stations can be directly compared to independents. This was done in the following manner. Total revenue was adjusted in the same manner as it was in Chapter 8 where network payments by CTV and CBC to their affiliates and owned stations were multiplied by a scale factor to determine the total advertising revenue generated by a station's audience in network sales. To this was added local time sales and national time sales to get a variable called REVT, which is total advertising revenue, as used in the previous section. To this we add syndication (SR) and other revenue (OREV) to get adjusted total revenue. Adjusted total expenditure (TE1) consists of nominal total expenditure reported in the data plus the imputed payments to the network for the use of its programming. This imputed payment equals the amount of revenue held back by the station (REVT - local time sales - national time sales - network payments). Since independent stations (including TVA) report all revenues generated by their station and consider all payment for shows as a direct expenditure, they need no adjustment.

III. THE RESULTS

The expenditure regressions are presented in Table 7. The regressions are estimated for both unadjusted and adjusted expenditures. We also show the adjusted regression with a correction for heteroscedasticity. A Goldfeld-Quandt test gave a value of 7.82 for the adjusted expenditures. An examination of residuals gave the following regression:

$$\log RESQ = 9.66 + .8 \log MAUD \qquad R^2 = .77$$
$$(10.70) \quad (3.19)$$

Thus dividing all variables by $(AUD)^{.40}$ should correct for heteroscedasticity. In fact, the Goldfeld-Quandt F dropped to 2.23 when this was done indicating that the likelihood of heteroscedasticity is much lower.

Examination of the regression coefficients does not generate any surprises. Expenditures increase at a decreasing rate with audience size, as we suspected (this result is not quite significant). VI (vertical integration) measures a station's production of programs as indicated by the percentage of total revenue constituted by syndication revenue. As one would expect this variable has a very significant positive impact on costs. Audience segmentation has a somewhat different interpretation in expenditure space as opposed to revenue space. It now indicates the amount of competition that a station faces for its audience. As this competition increases (as AS increases) a station may spend more to keep its market share (remember that viewers are now worth more as AS increases). In fact, audience segmentation has about the same impact on expenditures as it does on revenues. The positive (but not significant) coefficient on income indicates weak increasing costs of doing business in high income areas.

The most interesting and surprising results concern the network affiliation variables. These variables

TABLE 7

EXPENDITURE REGRESSIONS

	TE1	TE	$1/AUD^{.40}$ TE1
AUD	758** (2.52)	416 (1.67)	1083*** (3.50)
ASQ	-.0225* (1.94)	-.0174* (1.82)	-.0116 (.89)
VI	$6.60E^{7}$*** (5.48)	$4.14E^{7}$*** (4.90)	$4.288E^{7}$*** (3.28)
AS	13209*** (3.40)	10051*** (3.13)	9397*** (3.05)
INC	684 (1.1)	463 (.90)	550 (1.2)
CBCA	$-5.227E^{6}$*** (2.85	$-4.199E^{6}$*** (2.77)	$-3.766E^{6}$*** (2.93)
INT2	160 (.37)	86 (.24)	-92 (.21)
CTV	$-6.035E^{6}$** (2.14)	$-4.811E^{6}$** (2.06)	$-3.869E^{6}$ (1.15)
INT3	676 (2.30)	494 (2.03)	246 (.57)
IND	$-8.456E^{6}$*** (3.68)	$-5.738E^{6}$*** (3.02)	$-2.525E^{6}$ (1.52)
INT4	794** (2.64)	950*** (3.84)	-132 (.72)
K	$6.008E^{6}$ (1.62)	$4.970E^{6}$ (1.63)	$3.868E^{6}$ (1.47)
R^2	.81881	.80251	.58028
N	63	63	63
Mean of Dependent Variable	$7.723E^{6}$	$5.424E^{6}$	$7.723E^{6}$

TE1: Adjusted Expenditure TE: Unadjusted Expenditure

AUD = audience; ASQ = $(AUD)^2$; VI = vertical integration; AS = Audience segmentation; INC = income; CBCA = CBC affiliate; INT2 = CBCA x AUD; CTV = CTV affiliate; INT3 = CTV x AUD; IND = Independent of TVA; INT4 = IND x AUD

* - 90% level of confidence
** - 95% level of confidence
*** - 99% level of confidence

indicate very significant differences between CBCO and private networks in the costs of broadcasting. Referring back to Figure 3, and re-labelling the revenue as expenditure, each private network has an expenditure curve like R_1, i.e., lower intercepts but usually steeper slopes. When the correction is made for heteroscedasticity, independents and CBCA have curves like R_4. Such results indicate that small CBCO stations have much higher costs than private stations while large enough CBCO stations would have lower costs. The catch-up point occurs at a considerably larger audience size than that of the average CBCO. According to Table 8 for the average size CBCO station costs run from a minimum of 59 percent higher than CTV to 203 percent higher than independents using the OLS regression of TE1. The uncorrected expenditure regressions imply a range of from 54 percent to 117 percent. The corrected regressions give a range from 30 percent to 233 percent. The most important comparison (for reasons discussed in section 9) is that with CBC affiliates. The CBC-owned stations have estimated cost differentials ranging from 117 percent to 233 percent. All in all, CBCO stations seem to have expenses that are much greater than equal sized private stations. This result, in conjunction with the estimated revenue differentials, indicates a strong likelihood that CBCO stations will be considerably less profitable than their private counterparts. The regressions reported in Table 9 bear this out with a vengeance.

Of the non-network regressions included in the price-cost margin regressions, only audience has a significant impact. The other variables are quite insignificant so that we shall not examine them in detail. The positive coefficient on audience indicates increased profitability for large stations, which is not too surprising given the existence of economies of scale (which appear stronger than any non-linearity in the audience revenue relationship).

TABLE 8

	TE1	TE	TE1/(AUD)$^{.40}$
CBCA	-58 %	-54 %	-70 %
CTV	-37 %	-35 %	-46 %
IND	-61 %	-41 %	-41 %

The numbers represent the percentage decrease in costs which would accrue to average CBCO broadcasters if they performed with equal efficiency to private stations.

	TE1	TE	TE1/(AUD)$^{.40}$
CBCA	+138% 33,000	+117% 49,000	+233% no catch-up
CTV	+ 56% 8,900	+ 54% 9,740	+ 85% 15,700
IND	+203% 10,600	+ 69% 6,040	+ 69% no catch-up

These values represent the increase in costs which would occur if private stations of a size equal to an average CBCO station were to perform with the efficiency of CBCO stations. The lower values give the catch-up audience sizes. The average CBCO is 4,727. The four largest VBCO audiences in descending order are 21,000; 11,500; 6,637; 6,318.

Column 1 represents the adjusted expenditure (cost) data. Column 2 gives results for unadjusted data. Column 3 gives results for adjusted data after the correction for heteroscedasticity has been made.

TABLE 9

PCM REGRESSIONS

	PCM3	PCM1
AUD	.0078***	.0148**
	(2.42)	(2.42)
ASQ	$-.8E^{-7}$	$-.6E^{-8}$
	(.80)	(.03)
INC	.00003	.002
	(0)	(.21)
AS	-.020	.055
	(.49)	(.72)
VI	-20.6	53
	(.23)	(.31)
CBCA	95.3***	234***
	(5.97)	(7.74)
INTC	-.0081**	-.0171**
	(2.11)	(2.34)
CTV	74.3***	228***
	(3.07)	(4.96)
INT3	-.0051**	-.0137***
	(2.03)	(2.87)
IND	59.1***	227***
	(2.99)	(6.07)
INT4	-0.0033	-.0133***
	(1.29)	(2.76)
R^2	.57888	.75184
N	63	63
Mean	2.49	-28.65

PCM3 - adjusted price-cost margin
PCM1 - unadjusted price-cost margin

* - significant at 90% confidence level
** - significant at 95% confidence level
*** - significant at 99% confidence level

Once again, the most interesting results lie in the network coefficients. These coefficients have a familiar pattern. Small CBCO stations have lower PCMs than private stations while large CBCO stations would have higher PCMs than large private stations. However, the size required for CBCO stations to achieve parity is in the vicinity of 15,000 more viewing units per week. Of nineteen CBCO stations, only one has an audience larger than 15,000. For the average size CBCO station, the PCM is very much below those of private stations. In fact, the average PCM of CBCO stations is negative! The average CBCO adjusted PCM (PCM3) is -.375, and unadjusted (PCM1) is -1.503. This latter figure implies that for every advertising dollar sold a CBCO station loses $1.50. The adjusted PCM obviously improves the CBCO results but they are still very different from those of the private sector which average +.20. The unadjusted numbers indicate that CBCO stations as a group lost $48 million in 1978. The adjusted figures indicate a loss of $26 million. Compare this to profits of $86 million (adjusted) for all private broadcasters (including $23 million for CBC private affiliates or $80 million unadjusted). The efficiency of the CBC seems far inferior to that of private broadcasters. The increase in profits which would come about if the CBCO stations were transformed into CBCA stations would seem to be in the range of $63-78 million per year.

CHAPTER 10

CONCLUSIONS AND CAVEATS

Does the CBC get all the low profit locales?

There are several objections which could be raised tc the findings of this paper, several of which we shall try to answer here. Firstly, one could claim that CBC-owned stations serve a different function than that of private stations. In particular, since the government has desired that CBC be available to all Canadians, perhaps the CBC has set up operations which were known to be uneconomic but which helped bring CBC programming to all Canadians. One might suspect that the government set up stations in remote areas when private entrepreneurs were unwilling. Such behaviour might be expected to lower the reported profits of CBCO stations. However, this belief is fallacious. The early history of the CBC was such that the government wished to own all CBC broadcasters, and it was only because the public demanded television at a time when CBC did not have sufficient funds to provide it that CBC relinquished some control and allowed private affiliates to join the CBC network (no non-CBC broadcasts were allowed in an area until it was already served by a CBC station). In its early history the CBC took most of the major metropolitan centres (Toronto, Vancouver, Calgary, Edmonton, Winnipeg, Ottawa, Montreal) for itself, leaving the private affiliates many of the less attractive locations. Table 10 lists the sizes of all CBC-owned and -affiliated stations. The claim that CBC-owned stations function in less profitable circumstances is clearly not justified.

Results not affected by "cultural" programming

A second objection to the findings of this study concerns the difference in program quality carried by

TABLE 10

AUDIENCE SIZES OF CBC-OWNED VS. PRIVATE STATIONS
WEEKLY PERSON VIEWING HOURS (IN THOUSANDS)

CBCO (Public)	CBCA (Private)
597	451
1241	465
1301	742
1309	983
1558	1453
1576	1600
2071	1730
2300	1773
3188	2147
3400	2169
3638	2556
4049	2600
5663	2722
5887	3138
6318	3150
6586	3187
6637	3708
11500	6313
21000	6480
	7040
	7855

different stations. One could claim, with some justification, that CBC programming is of a different nature than that of private broadcasters and that CBC broadcasters do not fully pay for it. In other words, the CBC expects to lose money in its production of programs and the losses it generates (covered by a government subsidy in the hundreds of millions of dollars) could never be absorbed by its broadcasters, thus they are charged an arbitrary amount much less than the true cost of programming. Affiliates of the CTV network, on the other hand, pay the full cost of the programming which they broadcast. Because the payment which the CBC charges to its broadcasters for its programming must be arbitrary, one could claim direct comparisons of the costs of CBC and CTV stations must be meaningless. Such an argument, though quite forceful, does not affect the findings of this paper since the arbitrary cost of programs charged by the CBC is paid by both CBC-owned and CBC-affiliated stations. Thus a comparison between these two groups is of greatest interest and it is the comparison with the private CBC stations where the public CBC stations do the worst, with costs double or triple those of the private affiliates.

The final objection, which cannot be ruled out at this time, concerns the nature of the data. We have done our best to ensure comparability between the network categories. The advertising rate data suffer no comparability problems. The revenue data, if our sources of information are correct, have been made comparable by the adjustments made. The expenditure data for CBC-owned stations appear, by the nature of the terms used in their construction (wages and salaries, transmission costs, administration, program and production costs, etc.) to be comparable to that of private stations. However, the CBC-owned stations report their figures only to the CBC whereas the private stations report their figures in detail to Statistics Canada every year. For the purposes of this study CBC provided an expenditure figure for each station but the

detailed information regarding the magnitudes of the various cost components (which are available for private stations) was not available. It is possible that such detailed information might alter the conclusions of this study. However, full disclosure would be the best way for the CBC to demonstrate that the conclusions of this paper might be reversed. Since the CBC is a public organization, there would seem to be no confidentiality rules which would be jeopardized by such disclosure.

Conclusions and Implications

In closing, there are several recommendations which we can make given our empirical findings. First, these results are so powerful as to warrant investigation of the reasons why CBC-owned and -operated stations appear to function so inefficiently. An examination of accounting procedures could quickly verify or explain the results of this paper. If these results are upheld two major courses of action are possible.

The first would attempt to remove inefficiency within the present arrangement of public ownership of broadcasters. Full disclosure, closer monitoring of individual stations, accounting and administrative reforms are all likely to have some effect, at least temporarily. Profit incentives for managers or a no subsidy rule might also be effective.

The second possible course of action would be to privatize the CBC-owned and-operated stations. Since they are usually in large and profitable markets there would likely be willing buyers who would then become private CBC affiliates. Private broadcasting would seem to present no threat to the cultural objectives of the CBC which would then be able to use more of its revenues for program production instead of subsidizing broadcasters. It would also allow the CBC to concentrate all its efforts on the production of programming. If there were future plans to eliminate

advertising, this solution would of course be incompatible with them.

Whatever the future unfolding of events, the findings of this paper unambiguously call for some action on the part of the authorities involved.

NOTES

1 These regressions are slightly different than the ones occurring later in the paper. However, the important relationship is between audience size and advertising rates and the slight difference in specification will not alter this relationship.

2 See Johnston (1972), p. 214 or Kmenta (1971), p. 256 for more complete discussions of these points.

3 Their correction was somewhat unusual in that they did not deflate all the data by 1/X. For a criticism of their approach, see Liebowitz (1981a).

4 This approach assumes a linear relationship between advertising rates and audience size. Past research has indicated a slight non-linearity (Liebowitz [1982b]; Park [1970, 1979]) of statistical significance. The results of Table 1 indicate that the non-linearity (the coefficient of ASQ) is not statistically significant, although of the same sign as the previous studies. Liebowitz (1982a) demonstrated the minimal impact of this non-linearity on advertising rates. Thus the assumption of a linear relationship should do little violence to the results.

5 See Kmenta (1971), p. 370.

6 Revenues for CBC affiliates are partly generated by network sales. If the CBC is less efficient at

selling advertising it would be reflected in lower revenues for CBCA stations as well. Adjusted network payments make up 43 percent of adjusted CBCA revenues. Thus we should multiply any difference between CBCA and CBCO stations by a factor of 1.75 to achieve more realistic appraisal.

7 The definition of total expenditures for CBCO stations appears to be virtually identical. Total expenditures for CBCO consists of the same categories and unless some major variation in accounting exists between CBCO and private stations, these results should be comparable.

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