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A MODEL OF ENTRY INTO SELECT U.S. RADIO MARKETS BETWEEN 1973 AND 1978

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A MODEL OF ENTRY INTO SELECT U.S. RADIO MARKETS BETWEEN 1973 AND 1978

By

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ABSTRACT

A MODEL OF ENTRY INTO SELECT U.S. RADIO MARKETS
BETWEEN 1973 AND 1978

By

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The Federal Communications Commission has held for over 40 years that competition between radio stations is desirable, and that the public interest is best served by competing broadcast stations. Over the same period, however, the FCC allowed existing stations to protest, and thereby delay, the entrance of new stations into a market based on a claim of "economic injury."

It wasn't until 1964 that the Commission adopted formal pleadings requirements and developed criteria for the evaluation of the economic impact of new station entry on an existing station. Unfortunately, the Commission failed to indicate the precise standards by which a determination of economic injury might be made, leaving it up to the courts to decide when sufficient "potential revenue" existed to warrant the addition of a new station without detriment to the public interest. This study addresses some of the station and market characteristics that are determinants of new station entry, and recognizes the need for management, entrepreneurs and students alike to accurately predict growth opportunities where they exist.

Select market and station variables were measured over a six-year period, 1973-1978, in 218 radio markets across the United States. Relationships between market and station variables were analyzed, covariations noted, and a factor analysis employed to eliminate as much collinearity as possible. The reduced variable list was then used in both static and dynamic regression models to predict the number of radio stations a market was capable of holding. A new list of dynamic variables, those dealing with the relationships between variables or among variables over time, were derived from the original variable set, and were employed in a discriminant analysis in an attempt to predict the point (year) of entry.

The results of this study demonstrate and confirm the strong relationship between station and market variables. This study also disclosed that most variations between these variables were coincident over time, and therefore impractical for use in time series applications. Use of dynamic variables, however, proved more satisfactory and demonstrated that entry was dependent upon the degree of change in market and station variables during preceding years.

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KEY TO SYMBOLS

AMREV	- Total revenue for AM and AM/FM combination stations in the market
AVGPOP	- Average total radio revenue per capita (see Equation (9))
AVGREV	- Average total radio revenue per market
BPI	- Buying power index
COMPIN	- Competition index
DIST	- Distance between test market and next closest market of equal or greater population
DIVER	- Diversity index
ENTRY	- Entry of a new station into a test market
FMREV	- Total revenue for independent FM stations in the market
ID	- Unique market identification code
IMI	- Individual market index (see Equation (2))
NINDX	- Normality index
NUMSTA	- Total number of radio stations in a test market
PERCHG	- Percentage change in total radio revenue from one year to the next (see Equation (7))
POTREV	- Potential radio revenue in a test market
PRFREV	- Percentage of total radio revenue captured by FM stations in a test market (see Equation (12))
RANK	- Population rank of test market

RDINDX	- Radio-dollar index
REVPOP	- Total radio revenue per capita (see Equation (8))
SMPOP	- SMSA population of test market
STAPOP	- Number of radio stations per 100,000 population (see Equation (10))
STATRS	- Number of radio stations per $1,000,000 in total retail sales for test market (see Equation (11))
TCOMP	- Total number of competing media units in the test market (radio, television, newspaper)
TOTREV	- Total radio revenue in test market
TRS	- Total retail sales in test market

CHAPTER I

INTRODUCTION

In the broadcast industry, as in many industries, the proper evaluation of market conditions is necessary for future economic growth. This dissertation reports the results of a study into the growth of radio broadcasting between the years of 1973 and 1978, and attempts to identify those market variables which, when combined, constitute favorable conditions for new station entry.

As this analysis demonstrates, economic success in the marketplace may be increasingly dependent upon positive action based on the proper evaluation of select market conditions. Further, the correct analysis of market conditions is likely to have the additional benefit of promoting the efficient utilization of limited spectrum space, and maximization of local service to each respective community. This may especially be true with expansion of services to markets, where existing stations may provide a barrier to entry, and thus new competition, by raising the question of economic injury.

While the Federal Communications Commission (FCC) reviewed a proposal to reduce the standard AM channel width from ten kilohertz to nine kilohertz in order to allow additional stations into the AM band,[1] ironically it was another FCC decision in September 1969 that changed the status of FM radio. The 1969 proposal called for nearly all future radio expansion to be put into FM.

> Major reasons cited for the change included the fact that FM was a full-time service whereas AM was increasingly daytime-only service (especially for most new stations), and that FM stations could still be assigned without the interference or problems which plagued the addition of almost any AM outlet.[2]

Regardless of whether future radio expansion is in the AM or FM band, two factors dominate the case for economic analysis. Initially, each station owner is concerned with the overall performance of his or her station as weighed against competition and market conditions. Second, for the existing station owner, the possibility of additional competition through new station entry compounds all factors related to the existing competitive equilibrium, and calls for increasing levels of expertise to maintain a profitable market share. Likewise, any outside individual interested in constructing a new station in the market must consider these same performance characteristics.

The proper evaluation of current market conditions is necessary to determine the validity of "economic injury." A claim of "economic injury" by the existing station owner makes it possible for him or her to protest, and thereby delay, the entrance of a future station on the basis that the market will not economically support the additional station, and that entrance of the new station will only lead to the overall reduction of public service to the community.

Action by the FCC in the matter of economic injury goes back to the 1930's, when "the Commission regularly took into account the nature and extent of economic injury which would be caused to existing stations by the grant of a new applicant."[3] In fact, the position of the FCC at that point in time was strongly in favor of competition, and it proclaimed on more than one occasion, "Where the economic situation of a community permits, the public interest is best served by competing broadcast facilities."[4] Where the Commission clearly indicated its preference for competition, it failed to indicate the standards by which determinations of economic injury were made. Even under similar market conditions, uniform court decisions did not always result.[5]

In 1938, the Commission denied an application for a construction permit for a second station in Fall River, Massachusetts, on the grounds that no showing of need and market advertising support were apparent, even though the existing station was enjoying some degree of financial success.[6] It is also the only case where the FCC refused to grant a construction permit based on economic injury.

The first major court test of the issue of economic injury, and precedent for future cases, is based on the Supreme Court's 1940 landmark decision in FCC v. Sanders' Brothers Radio Station.[7] Here the court held that the Communication Act was neither intended nor designed to protect licensees against competition. The court noted:

> ...resulting economic injury to a rival station is not, in and of itself, ...an element the partitioner must weigh, and as to which it must make findings, in passing on an application for a broadcast license.[8]

At the same time, the court added that competition should not be disregarded as it could cause not only financial hardship to the existing complaining station, but also an overall reduction of "public service" to the community.

Expanding upon this position, the U.S. Court of Appeals (D.C.) held in the 1958 case of Carroll Broadcasting Co. v. FCC,[9] that economic injury to an existing station is not in and of itself a matter of public concern; however, it becomes vital when it spells diminution or destruction of overall service. The court stated:

> When an existing licensee offers to prove that the economic effects of another station would be detrimental to the public interest, the Commission should afford an opportunity for presentation of such proof and, if the evidence is substantial (i.e., if the protestant does not fail entirely to meet his burden), should make a finding or findings.[10]

Where Carroll established the relevance of economic injury to the public interest, it did not determine how detailed, or what specific evidence the protesting licensee would need to offer as "proof" to entitle him or her to a hearing. The initial Commission response was to set for hearing any case where the protestants alleged economic injury, and offered to prove that the public interest would be adversely affected. The Commission established no pleading guidelines but gave the protestant the benefit of the doubt. Due to the ease with which these hearings were then granted, this policy provided an inefficient use of the Commission's time, and energy. As one might expect, the FCC's policy opened the floodgates and nearly every case was set for hearing.

Congress, in 1960, amended the Communication Act of 1934 to create the "petition to deny." The statute[11] provides a petition to deny must:

> ...contain specific allegation of fact sufficient to show ... that a grant of application would be prima facie inconsistent with (the public interest, convenience and necessity)...[12]

The statute also states that if:

> ...there are no substantial and material questions of fact and a grant of the application would be consistent with the public interest the petition shall be denied and the grant made without hearing.[13]

The 1960 amendments were viewed as a congressional response to the lax methods by which the Commission granted hearings. Thus, Congress provided that a "petition to deny" filed under Section 309(d) must make a "substantially stronger showing of greater probative value than (was previously) necessary."[14]

The Commission finally reacted to the 1960 amendments in late 1962 when it began requiring petitioners to plead a prima facie case of injury to the public "before" it would set a hearing.[15] In implementing this policy, however, the Commission failed to specify, in reasonably precise terms, the type of information necessary to entitle a petitioner to an evidentiary hearing on the Carroll issue.

Problems surrounding the vague nature of the Commission's policy were first encountered by the courts in KGMO Radio-Television, Inc., v. FCC,[16] in which the court reversed a Commission order denying a Carroll hearing because the petitioner failed to plead sufficient factual data to make out a prima facie case. While the court noted that it was within the Commission's authority to require more information, it held that since the petitioners had "no notice... that more would be required, the petition should not have been denied on the ground that more was not furnished."[17]

On remand of KGMO, the Commission established precise pleadings requirements calling for analysis of existing station's economic loss based on specific criteria, and as set forth in Missouri-Illinois Broadcasting Company.[18] See Appendix A.

Rigid application of the Commission's criteria for pleadings, as established in Missouri-Illinois, apparently went too far and led to a near extinction of the right of a petitioner to a hearing on the Carroll issue. During this period, the U.S. Court of Appeals (D.C. Cir.) held that the Commission abused its discretion in denying virtually every petition for a hearing, which made judicial intervention necessary in Southwestern Operating Co. v. FCC.[19] Here the Court ruled that although the Commission can insist on more than general and conclusory allegations, it may not use its pleadings requirements as a means to justify complete disregard of evidence before it.

The Court, in Southwestern, did not intend to overrule the Commission's pleadings rules. The Court recognized that since competition is, in fact, a favored element in broadcasting, then:

> ...the temptation to an existing licensee to postpone as long as possible the advent of competition warrants special care by the Commission in the scrutiny of requests for hearing in Carroll circumstances.[20]

The effect of the Southwestern decision was that it opened decisions to the particular circumstances of each individual case, and it placed a burden upon the petitioner to plead specific factual data sufficient to establish a prima facie case of injury to the public interest in order to meet the requirements for a hearing.

Another limitation on the Commission's pleadings requirements came out of the court's decision in Folkways Broadcasting Co. v. FCC,[21] where the petitioner's request for a hearing was denied, in part, because he failed to allege the particular advertisers that would be lost and the particular public service programming that would have to be taken off the air as a result of increased competition. The court in Folkways held:

> ...a Carroll hearing may not be limited to a case in which preknowledge of the exact economics of the situation is necessarily available. Requiring such precision would eliminate the doctrine as a practical matter.[22]

Thus, the Commission modified its Missouri-Illinois requirements to eliminate the need for "preknowledge," but at the same time continued to insist upon specific factual data rather than generalized and conclusory allegations of public injury.

In early 1972, the court reaffirmed the Commission's requirements as set in Missouri-Illinois, when it ruled in WLVA v. FCC.[23] The court stated:

> Specifically, the petitioner must raise substantial and material questions of fact as to whether (1) the revenue potential of the market is such that a grant will cause the petitioner to suffer a significant loss of income; (2) the effect of this loss will be to compel the petitioner to eliminate some or all of its public service programming; and (3) this loss of programming will not be offset by the increased non-network programming proposed to be offered by the applicant. Since these three aspects of the Carroll issue are essentially interdependent, a failure to satisfy any one of the three is likely to be dispositive of the petitioner's claim to a hearing.[24]

While the WLVA case supported the Commission's requirements as outlined in Missouri-Illinois, it also added the concept of "future economic injury" to the list. The court said:

> For even in the typical Carroll situation, the Commission must consider not only existing, but also future competitive conditions. What may appear in the short run to be a substantial financial loss may often pale to insignificance when the overall revenue potential of the market is taken into account.[25]

Thus, the court required the petitioner to demonstrate sound reasoning to indicate that the market would not improve its economic standing to the point where the second station "might" become viable in the near future.

Finally, in 1974, another restriction was placed on the pleadings requirements, this time indicating that the petitioner must not only provide necessary data, but also establish the accuracy of that data. The Commission, in Lenawee Broadcasting Co.,[26] found:

> Lenawee's estimate of $581,000 requirement in advertising revenue to support this station has not been challenged. Nevertheless, to successfully raise the Carroll issue, the petitioner must establish some basis for determining the accuracy of its projected figure of $550,000 in anticipated market revenue potential.[27]

This would seem to indicate that not only must the information presented be complete, but it also suggests that projections made by the petitioner with regard to "potential" revenue in the marketplace must be verified in some manner if they are to be a part of the petition.

In summary, a petitioner must provide the basic statistical evidence originally set forth in Missouri-Illinois, but later modified and restated in WLVA and Folkways, to exclude the conditions of "preknowledge" and "exact calculations." This data must be linked to specific arguments concerning public service programming, while projections and findings concerning the "potential" revenue available in the marketplace must be verified as to accuracy as indicated in Lenawee.

Scope of the Study

This dissertation reports the results of an investigation into the performance and characteristics of over 200 select radio markets throughout the United States between 1973 and 1978, the existing radio stations therein, and the possible introduction of additional stations into these markets. It is anticipated that this study will provide a base upon which an additional body of knowledge about the future growth and performance of radio broadcasting throughout the United States can be formulated.

Several related, but fundamental, measurement and analysis tools will be utilized, with the following objectives in mind:

1. To establish the amount of average "potential" radio revenue available in each market as a function of total retail sales and other select market characteristics.
2. To determine if select market variables play a significant role in the economic performance of radio stations therein.
3. To examine the interrelationship between radio revenue and the proximity of the select market to other markets of similar or larger populations.
4. To project these findings in order to generate a model which will ascertain the probable economic viability of new station entry into each market.

5. To identify individual variables and groups of variables which merit more detailed analysis.

The need for research of this type is centered over three major areas of discussion. First, the term "economic injury" as presented in Carroll and later defined in Missouri-Illinois is sufficiently vague as to allow the determination of new station entry based on existing station income, perceived injury, and some measure of "total advertising revenue potential" in the marketplace. Second, unlike television where, in most markets, oligopoly conditions insure product (programming) standardization, radio stations are forced through competition to address programming to segmented markets.

The pleadings requirements in Missouri-Illinois concentrate on "public service" programming which generates no direct revenue for the station and, in turn, probably has little bearing on the ultimate "financial success" of either the existing or proposed station. In reality, public service programming goes with the territory (license), and the ultimate question must be whether there is economic room for survival of both the new and existing broadcasting stations? Finally, the study of the viability of new station entry to markets across the United States is germane to recent concerns over increased minority ownership in the broadcast industry. As a general rule, the cost of entry is much lower for new stations where there are no premiums to be paid in a purchase price for intangibles such as goodwill.

A major criticism of a study of this type might center on the appropriateness of economic research which deals with new station entry. It has been suggested that there are fewer and fewer channels or frequencies available for new stations to occupy, and that this type of analysis will not be relevant for very long. In response, the current table of frequency assignments[28] was developed by the FCC in the late 1940's. Given that it is technically possible for a community to have up to 50 FM stations through the modification of that table on a station-by-station basis, coupled with current discussion at the Commission over decreasing the channel width in the AM band to allow additional stations on-the-air, the argument that we are reaching a saturation level in radio station growth is technically incorrect.

Limitations

This dissertation has some specific limitations which should be brought out at this time. First, this study does not attempt to define the overall "success" of any given individual station. This research is solely concerned with the relationship of select market and aggregate station variables, on a market-by-market basis.

Second, this study is primarily quantitative in nature, and in no way accounts for all the qualitative aspects of some of the variables included. For example, levels of management expertise in some markets will exceed that in other markets. While this will have a bearing on the economic performance of the individual stations therein, it is not a part of this study.

Finally, this study is limited by the sometime inaccurate and incomplete nature of some of the data. In particular, the reporting methods of the FCC are highly suspect and will be addressed later in this paper. In response, if a particular variable was in question, it was coded as missing data.

FOOTNOTES

[1]"Where Things Stand," Broadcasting, XCVII (October 1, 1979), p. 10.

[2]Christopher H. Sterling, "Decade of Development: FM Radio in the 1960s," Journalism Quarterly, XLIIX (1971), pp. 229-230.

[3]Frederick W. Ford, "Economic Considerations in Licensing of Radio Broadcast Stations," Federal Communications Bar Journal, XVII (1961), p. 192.

[4]In the Matter of Arthur Lucas, 5 FCC 464 (1938). See also, In the Matter of Wichita Falls Broadcasting Company, 3 FCC 386 (1936); In the Matter of James E. Davidson, 4 FCC 594 (1937); and In the Matter of Dorrance D. Roderick, 5 FCC 563 (1938).

[5]Frank J. Kahn, "Regulation of Intramedium 'Economic Injury' by the FCC," Journal of Broadcasting, XIII, No. 3 (Summer, 1969), p. 224.

[6]In the Matter of Fall River Herald News Publishing Company, et al., 5 FCC 483 (1939).

[7]309 U.S. 470 (1940).

[8]Ibid.

[9]103 U.S. App. D.C. 246 (1958).

[10]Ibid.

[11]74 Stat. 889.

[12]47 U.S.C. 309(d) (1).

[13] 47 U.S.C. 309(d) (2).

[14] S. Rep. No. 690, 86th Cong., 1st Sess., 3 (1959). See also, H.R. Rep. No. 1800, 86th Cong., 2d Sess. 11 (1960).

[15] Tri-Cities Broadcasting Co., 24 R.R. 691 (1962). See also, Rhinelander Television Cable Corp., 37 FCC 1071 (1964).

[16] 119 U.S. App. D.C. 1 (1964).

[17] Ibid, at 3.

[18] 3 R.R. 2d. 232 (1964).

[19] 122 U.S. App. D.C. 137 (1965).

[20] Ibid, at 138 n. 2.

[21] 126 U.S. App. D.C. 123 (1967).

[22] Ibid, at 127.

[23] 459 F 2d. 1286 (1972).

[24] Ibid, at 1297.

[25] Ibid, at 1298.

[26] 48 FCC 2d. 1181 (1974).

[27] Ibid, at 1182.

[28] 47 CFR 73.202; Sec. 316, 66 Stat. 717; 47 U.S.C. 316.

CHAPTER II

REVIEW OF LITERATURE

Previous studies in the area of broadcast economics have either been inconclusive, eroding in validity with the passage of time, exclusive of FM station growth, or in need of further testing with larger samples.

In 1971, Levin[1] published a study which examined the pattern of new station entry during the period 1939 to 1950. The results are listed in Table I on page 17.

Analysis of the Levin study suggests that construction of new stations during the period 1945-48 correlates positively with the changes in per-station income from the previous time period of 1939-45. Likewise, the pattern of new construction during the period 1948-50 correlates positively with the change in per-station income during the preceding time period, 1945-48.

Rank-order techniques used by Levin suggest that AM station entry during a current time period (T_0) depends somewhat on the rate of change in per-station income in the marketplace during the preceding time period (T_{-1}), which in turn decreases per-station income during the current time

TABLE I

CORRELATION OF NEW AM STATION ENTRY AND PER STATION INCOME IN COMMUNITIES OVER 50,000 POPULATION BETWEEN 1939 AND 1950

	Stations On-The-Air		
	1939-45	1945-48	1948-50
Per Station Income			
1939-45	.10	.38	
1945-48		-.66	.49
1948-50			-.10

Source: Harvey J. Levin, The Invisible Resource: Use and Regulation of the Radio Spectrum (Baltimore, 1971).

period. Based on a revised profit picture, a new pattern of station entry would emerge during the next time period (T_{+1}).

Unfortunately, the Levin study was conducted in communities of 50,000 people and over, and dealt solely with AM stations. Since the 1940's, the regulatory policies of the FCC have changed to limit the growth of AM while allowing FM to become an independent growth medium.[2] Today, while there may still be a positive correlation between the change in per-station income during the current time period and entry of new stations in some future time period, changes in FCC policy have a significant impact on the present applicability of the Levin research. In addition, attempts to explain entry variance with only one financial variable, per-station income, and new station construction under current FCC policy would seem a waste of time.

The selection of "income" as a variable also provides cause for concern. The employment of different accounting methods with regard to depreciation, amortization, and capitalization, make this criterion variable meaningless without the removal of extraneous expense items (e.g., corporate country club membership, private airplanes, cars, etc.). A much better predictor variable would be gross revenues where little variance can be expected station-to-station.

Another problem area in the Levin research seems to be the significance of the findings. While all correlations are significant at the .05 level of reliability, the highest correlation (rho = .49) accounts for only a quarter of the variance (rho^2 = .24). This would indicate that there are a number of unexplained factors that contribute to the pattern of new station entry within any given market. The unexplained factors are not discussed in the Levin study.

In 1966, Wagner[3] published a study which attempted to find a relationship between the characteristics and growth of the broadcast industry. The Wagner study briefly touched on some factors, which for 30 years (1936-66), have influenced the growth patterns of broadcasting. In conclusion, Wagner stated:

> Competition between media has always been intense, but the growth of broadcasting has made it more so in the past 30 years. The data reviewed in this study suggest that this competition is now in a period of intensification, and as further growth becomes more difficult to achieve, other factors, such as skill of management and efficiency in operation, more and more will provide the formula for success.[4]

Late in 1966, Saunders and Till[5] took the first quantitative look at some of the unexplained correlations of the financial behavior of broadcasting stations. Their results, sampled from 2,082 AM stations in 1964, are listed in Table II on page 20. While the Saunders-Till study was perhaps the most exhaustive national research at that time, the authors were cognizant of the limitations of their research. For example, the authors state in the last chapter of their study, "As is typical in preliminary studies of this type, the conclusions are necessarily limited, and the recommendations are rather extensive."[6]

One area where the Saunders-Till research was valuable was to eliminate a number of variables that are unrelated or reflections of more meaningful measures of the financial behavior of a radio station. Recommendations in the Saunders and Till study included:

1. With the exception of the four variables mentioned above (term of ownership, per capital effective buying power, per household effective buying power, and market quality index), each independent variable employed in this study should be examined in detail using more sophisticated methodology to specify the direct effects of each variable.

TABLE II

CORRELATES OF FINANCIAL BEHAVIOR OF AM RADIO STATIONS IN 1964

Sample: N = 536	Network Revenue	National Revenue	Local Revenue	Total Revenue	Total Expense	Income	Financial Efficiency Index
STATION CHARACTERISTICS							
No. Years on Air	.35	.34	.47	.44	.48	.25	.10
MARKET CHARACTERISTICS							
Population	.33	.51	.55	.58	.62	.34	.00
Households	.33	.51	.55	.58	.62	.34	.00
Retail Sales	.32	.50	.54	.57	.62	.34	.00
Personal Income	.32	.50	.55	.57	.62	.34	.01
Per Household Eff. Buying Power	.13	.21	.30	.27	.31	.13	-.04

Source: James G. Saunders and Arthur R. Till, <u>An Investigation of Possible Correlates of the Financial Behavior of Broadcasting Stations</u> (Athens, 1966), pp. 14-15.

2. The correlation matrices resulting from this analysis should be used as raw data for studies using factor analytic and multiple regression techniques. From such analysis it might be possible to develop formulas to predict the profitability of broadcasting stations from their known characteristics.[7]

None of the previously mentioned studies on the financial indices of radio broadcasting has attempted to explain the variance contributed by correlates of financial behavior of broadcasting stations, nor were any data applied to the future growth of radio broadcasting. With no scientifically based data generated to explain the future growth of radio, a new study was undertaken in 1975 by this author.[8]

In 1966 Saunders and Till maintained that a majority of the independent variables included in their study (e.g., population, households, retail sales, and personal income) correlate meaningfully with the dependent variables (e.g., network revenues, national revenues, local revenues, total revenues, total expense, and income) and warrant further investigation. The Saunders study was repeated in 1975 by this author using 1973 data from ten single-station small markets in Oklahoma. The reasons for reducing the sample to single-station markets was twofold. First there were extreme administrative problems in obtaining per-station financial data from the FCC. Second, by studying single-station markets, any problem associated with separation of the effects of competition on the data set were eliminated.

The purpose of the 1975 exploratory study was to help determine which dependent and independent variables were the best possible indices of financial and market characteristics, and which variables account for a majority of the variance between the two groups in single-station markets. The results were then compared with the Saunders study of 1966. In addition, it was possible to develop a formula through multiple regression techniques, to predict the total radio revenue assumed by an existing station within a single-station market, when only market characteristics are known. Finally, using the Levin and Saunders studies as a model, it was possible through the introduction of new variables to account for a majority of variance when a new station was introduced to an existing, single-station market.

Prior to the initial construction of a correlation matrix in his 1975 study, this author felt that one or more additional variables needed to be generated and tested. In order to weigh the economic performance of an existing station within a particular market, parameters must be established. In this case, it became necessary to examine the economic variability of the station against some measure of potential revenue.

To generate this new variable, it was first necessary to select an index of relative market strength, and then examine its relationship to existing station revenue data. One well-known barometer of market activity is the variable "total retail sales." The other criterion variable, revenue data from the top 300 radio markets in 1972, was published by the FCC. Therefore, it was possible to establish a relationship between total retail sales and the broadcast financial variable, total radio revenue, within each respective market sampled.

The concept of developing a constant to describe the average potential radio revenue available in the marketplace was not new. In 1960, Chapman[9] first suggested that total retail sales be used as a predictor of average potential radio revenue in the marketplace. Chapman arbitrarily divided all markets into four distinct groups based on market size (e.g., major market, metropolitan, medium, and small), and calculated the ratio of retail sales to total radio broadcast revenue as reported each year by the FCC for each group. While Chapman repeated his study in 1972,[10] in neither case was there an attempt made to analyze or statistically treat the data beyond the mere reporting of ratios.

In the Yadon study of 1975, a random sample (i.e., N = 30) of the top 300 radio markets was studied because of internal properties of the larger markets. Factors such as the number of stations per market, and therefore the corresponding level of competition, suggest that total radio revenue in these markets should be nearly identical to the total potential radio revenue available. In select cases, total radio revenue in some markets will exceed the average potential revenue predicted, probably at the expense of advertising revenue from some other medium. Likewise, in some cases, the inverse would be true. Finally, there was always the possibility that some unexplained market characteristic influenced the ability of radio stations to capture the average potential radio revenue predicted for their market.

The correlation coefficient between total retail sales and total radio revenue in the sample ($r = .95$), indicated a relationship that was positive and very strong. In addition, the coefficient was significant at the .001 level, with over 90 percent of the common variance accounted for ($r^2 = .91$). Thus, total retail sales and total radio revenue showed a greater than chance relationship 999 times in 1,000.

Given the nearly one-to-one linear relationship of the two criterion variables, total retail sales and total radio revenue, it was possible to project these findings to other markets with the generation of a constant. By testing for the standard error of the mean (SE_M), where $M = .3963$, one could be 95 percent confident that if all 300 markets were included in the study, the new variable, average (mean) potential revenue, should fall between .3476 and .4450 percent of the other variable, total retail sales. By using the new constant ($K_{pr} = .0039$) in a single station market where $N = 1$, it is possible to generate an estimate of the average potential radio revenue available per market.

Using essentially the same variables considered by Saunders in 1966, a correlation matrix was generated to show the relationship of market variables to the dependent or financial variables. Table III on page 26, shows how the coefficients generated by this author in 1973 correspond to the Saunders study of 1966 (see Table II, page 20). Based on the national probability sample of Saunders, and the results reported by this author in 1975, it would be safe to say that the four independent variables common to both studies (i.e., population, total retail sales or potential revenue, households, and personal income) would continue to show a positive relationship with a majority of the financial variables if the Yadon study were repeated in other markets. Differences in the strength of relationships between the two studies may be attributed to the data set utilized by each researcher. Saunders utilized individual station data, while Yadon used aggregate station data per market, and thus reported higher correlations.

Only those variables indicating a station's gross profit margin, and efficiency of assumption of potential revenue (i.e., financial efficiency index, and radio-dollar index) showed a consistent negative or negligible relationship with the four independent market variables. The negative relationship between the independent market variables and the dependent radio-dollar index was expected. This may suggest that the larger the single-station market gets, the less likely the existing station is of capturing the potential radio revenue available. Or, it could also suggest that the constant (K_{pr}) decreases as market size and level of competition increase. Regardless of market size, one

TABLE III

CORRELATES OF THE FINANCIAL BEHAVIOR OF SELECT OKLAHOMA AM RADIO STATIONS IN 1973

Sample: N = 10	National-Regional Revenue	Local Revenue	Total Revenue	Total Expense	Income	Financial Efficiency Index	Radio-Dollar Index
MARKET CHARACTERISTICS							
Population	.71	.80	.82	.79	.66	.06	-.72
Households	.68	.77	.79	.75	.64	.06	-.75
Potential Revenue*	.77	.90	.92	.88	.72	.05	-.72
Personal Income	.72	.88	.89	.87	.66	.04	-.67

*Potential revenue is a function of total retail sales.

Source: Robert E. Yadon, "Financial Behavior of Oklahoma Single Station Radio Markets in 1973." An unpublished M.S. thesis, Oklahoma State University, 1975.

can expect that once the distance between the total radio revenue assumed by the existing station and the potential radio revenue available becomes great enough, the market would become viable for new station entry. This would warrant further study in markets of different size over time.

The negligible relationship between the independent variables and the dependent financial efficiency index is consistent with the Saunders study. While profits tend to increase along with relative market size, the relationship between total radio revenue and total net income (profit) remains fairly static. This may be due, in large part, to the fact that expenses tend to increase at a near linear rate with relative market size. Beyond this, the measurement of income (profit) and expense, and their ultimate inclusion in any study is not recommended.[11]

Covariations between dependent variables and the independent variables alike suggest that near linear relationships exist. For example, the four independent variables were so highly related that no rotation was possible with factor analytic techniques. Due to collinearity, any one market variable (i.e., population, total retail sales, households, or personal income) may be selected to describe the overall covariation of market characteristics to financial dependent variables. Likewise, the number of dependent variables may be reduced in a similar fashion. The linear relationship that exists between national/regional revenue, local revenue, total revenue, and total expense, suggest that any one variable could explain adequately the variance of this group. The strength of the factor loadings in the 1973 study by this author would tend to support the contention by Saunders that radio is primarily a local and/or regional advertising medium.

Another quantitative look at the relationship between radio revenues and total retail sales was made in 1975 by Paul Kagan.[12] While examining AM stations only, Kagan came to the following conclusion concerning the application of the potential revenue constant:

> In may be that some station buyer decides to enter a market precisely because it is under the national average, and thus seems to have more potential for increasing its share-of-market. On the other hand, radio is a mature business in most locations, and one must raise serious questions about markets that fall far below the average. It cannot all be accounted for in the management column. It may well have to do with the characteristics of the stations in the area (power, frequency, etc.), the competing media, and the media habits of the populace.[13]

While Kagan is correct in his warning concerning the application of national average, across the board, to markets of differing characteristics, there are a number of problems with his research. First, the study only examined AM, and AM/FM combination revenues. While AM, AM/FM revenues clearly account for a majority of total radio revenue in the United States in 1975, the increasing impact of independent FM radio cannot be discounted as indicated in Table IV below. Second, it may well be true that differences between the potential of a market and the existing station revenues cannot all be accounted for in the management column; however, some of the factors which Kagan cites as alternative explanations are concerns indirectly related to station management. For example, factors such as competition and media habits of the populace are items which the manager of a radio station must consider in the day-to-day operation of the station, and may even control, to some degree. Other factors, such as station power and frequency, while meaningful and related to potential of the station, are technical in nature and are beyond the direct control of management.[14]

TABLE IV

TOTAL REVENUES BY STATION TYPE
(In millions of dollars)

Year	AM, AM/FM Revenue	% of Total	Ind. FM[1] Revenue	% of Total	Total Revenue
1973	1,316.1	.90	153.6	.10	1,469.7
1974	1,369.3	.88	193.4	.12	1,562.7
1975	1,430.2	.85	245.3	.15	1,675.5
1976	1,622.6	.83	332.5	.17	1,955.1
1977	1,761.4	.80	428.7	.20	2,190.1
1978	1,974.9	.78	570.5	.22	2,545.4

[1]Includes revenues from FM stations associated with AM stations, but reporting separately.

Source: FCC Annual Report, 1978.

Based on the conclusions and recommendations of both Saunders in 1966, and this author in 1975, Yadon continued his investigation of market and financial characteristics in March 1976.[15] This time, however, the author drew his sample (N = 63) from large markets, representing data from over 1,000 AM and FM stations over each of the two sample years, 1971 and 1973.

Using essentially the same variables considered by Saunders in 1966, and by this author in 1975, a correlation matrix for each test period (e.g., 1971 and 1973) was generated to show the relationship of market variables to the dependent or financial variables. In addition, new factors included the distance of the individual test market from the next largest SMSA, and a measurement of internal test market efficiency (e.g., marginal propensity to consume). Table V and Table VI on page 31, show relationships for 1971 and 1973 which range from positive, with a definite to very dependable correlation, to negative with a definite relationship.

As the two tables would seem to indicate, the variables total retail sales and consumer spendable income were judged the best possible individual predictors of total radio revenue. However, due to the vast amount of collinearity between the independent variables, either one would adequately represent market variance when using regression equations.

Other independent variables in the study correlate meaningfully with the dependent total radio revenue. Our new independent variable, distance index, supports the contention of this author that the distance between the test

TABLE V

CORRELATES OF THE FINANCIAL BEHAVIOR OF SAMPLED RADIO MARKETS IN 1971

Sample: N = 63	Total Number of Stations	AM Revenues	FM Revenues	Total Revenues
MARKET CHARACTERISTICS				
Distance Index	.40	.42	.29	.41
Marginal Propensity to Consume	-.32	-.38	-.38	-.38
Population	.80	.75	.68	.74
Total Retail Sales	.89	.98	.96	.98
Consumer Income	.88	.98	.96	.98

TABLE VI

CORRELATES OF THE FINANCIAL BEHAVIOR OF SAMPLED RADIO MARKETS IN 1973

Sample: N = 63	Total Number of Stations	AM Revenues	FM Revenues	Total Revenues
MARKET CHARACTERISTICS				
Distance Index	.54	.49	.36	.47
Marginal Propensity to Consume	-.32	-.35	-.31	-.35
Population	.87	.78	.70	.77
Total Retail Sales	.85	.96	.96	.96
Consumer Income	.86	.98	.96	.98

Source: Robert E. Yadon, "Economic Behavior of Differentiated U.S. Radio Markets, 1971 & 1973." Unpub. Report, Dept. of Telecomm., MSU, March 1976.

market and the next larger SMSA varies directly with total radio revenue. In other words, the proximity to competition in larger markets also seems to be important.

The other new variable, marginal propensity to consume, shows an inverse relationship with the dependent variable. This internal market indicator, which is an index of the relationship between annual growth of total retail sales and consumer spendable income, suggests that as the marginal propensity to consume index increases, the amount of total radio revenue tends to go down. Differences between retail sales and consumer spendable income may be partially accountable to capital investments of various forms, or indicative of spending outside the respective marketplace. Since retail sales and consumer spendable income show a near linear relationship with total radio revenue, the efficiency index may well be a better predictor of market activity and the effect it has on total broadcast revenues.

Because of differences in the economic structure of radio and television, much of the published work in television economics is not directly applicable to this study. At the same time, some of the previous work supports some of the positions of this author, and therefore justification for this dissertation, and deserves mention.

Park, for example, claims that beyond the study of gross revenues of stations, as reported to the FCC annually, other financial variables such as station expenses and net income (profit) are meaningless and inherently weak:

> The large variation observed in the profits of apparently equally situated stations suggests that financial data filed by individual stations have little usefulness for policymaking purposes...comparisons of individual station performance are questionable because of differences in station operating modes and other factors that cannot be systematically taken into account.[16]

Others, such as Webbink,[17] support the use of discrete variables to predict entry, while Besen and Hanley[18] use a regression model to predict the number of households needed to support a given number of television stations.

In summary, it should be apparent that past research into the relationship of market characteristics and the economic performance of radio stations therein is limited. This dissertation will attempt to resolve some of the issues and lay the groundwork for predicting the viability of market entry.

FOOTNOTES

[1]Harvey J. Levin, The Invisible Resource: Use and Regulation of the Radio Spectrum (Baltimore, 1971), pp. 358-368.

[2]Lawrence D. Longley, "The FM Shift in 1945," Journal of Broadcasting, XII (1968), p. 360.

[3]Paul H. Wagner, "Changing Growth Patterns in Broadcasting," Journal of Broadcasting, X (1966), p. 337.

[4]Ibid.

[5]James G. Saunders and Arthur R. Till, An Investigation of Possible Correlates of the Financial Behavior of Broadcasting Stations, Report No. 1, Ohio University Center for Research Broadcast Management and Economics (Athens, 1966).

[6]Ibid., p. 31.

[7]Ibid, pp. 32-33.

[8]Robert E. Yadon, Financial Behavior of Oklahoma Single Station Radio Markets in 1973. An unpublished M.S. thesis, Oklahoma State University, 1975.

[9]"How Much Volume Should You Do?," Broadcasting, LIX (July 11, 1960), pp. 82-84.

[10]"Finding Par for Business at Radio Stations," Broadcasting, XXCII (June 19, 1972), pp. 39-40.

[11]"How Much of Radio's 'Spot' Leaks into 'Local?'" Television/Radio Age (February 4, 1974), p. 32.

[12]Paul Kagan, Communications Investor, No. 89 (February 4, 1975).

[13]Ibid, p. 3.

[14]David E. Schutz, "Is That Station Really a Bargain?," BM/E (July 1978), pp. 82-87.

[15]Robert E. Yadon, "Economic Behavior of Differentiated U.S. Radio Markets, 1971 & 1973." An unpublished report, Department of Telecommunication, Michigan State University, March 1976.

[16]Rolla Edward Park, Leland L. Johnson and Barry Fishman, Projecting the Growth of Television Broadcasting: Implications for Spectrum Use (Santa Monica: Rand Corp., 1976), p. ix.

[17]Douglas W. Webbink, "Regulations, Profits and Entry in the Television Broadcasting Industry," Journal of Industrial Economics, XXII (1973), p. 167.

[18]Stanley M. Besen and Paul J. Hanley, "Market Size VHF Allocation, and the Viability of Television Stations," Journal of Industrial Economics, XXIV (1975), pp. 41-54.

CHAPTER III

METHODOLOGY

This study employs a relatively large number of variables, based on recommendations and findings of Saunders and Till[1] in 1966, Levin[2] in 1971 and this author[3] in 1975 and 1976. New variables, not previously considered were also introduced.

The Variables

Previous research regarding the station and market characteristics of radio suggest that there are at least two distinct groups of variables for examination.[4] First, there are the aggregate station variables of those radio stations currently in each test market as reported annually by the FCC. These station characteristics would include total radio revenue, AM and AM/FM combination revenue, independent FM revenue, and a new variable, average station revenue, generated internally by the computer. Items such as station expense and net income (profit) are excluded from this study for reasons previously cited.[5]

The second group of variables, characteristics of the individual sampled markets over the test period, include total retail sales, population (rank), buying power index, total number of commercial radio broadcast outlets in the market, distance to the next largest SMSA, a discrete variable indicating entry of a new station in the market, and an index for competition.

Specification of Variables

The following are some of the variables and terms used in this dissertation that may require additional definition:

1. Sample Market

   For purposes of this dissertation, a sample or test market will consist of those radio markets, be they an SMSA or county, that also qualify for inclusion in the FCC's Annual Report for each year between 1973 and 1978, inclusive. As such, between 1973 and 1977, only those markets with three or more AM, AM/FM combinations, and/or independent FM stations, meet this criteria. As of January 1, 1973, there were only 218 markets with commercial radio broadcast properties that qualified for inclusion in this study.[6] See Appendix B.

   In 1978, the FCC changed its reporting procedures to combine revenue data on all stations (e.g., AM, AM/FM combinations, and independent FM) under one heading, and list the total, aggregate number of stations per market. While this caused some confusion in comparisons of markets over time, it also eliminated the need to code revenue data on some markets as "missing data" because there was less than three stations in one or more of the reporting categories (e.g., AM, AM/FM combination, or independent FM).

2. Total Broadcast Revenue (TOTREV)

Total broadcast revenue consists of total radio time sales plus talent and program sales, plus other incidental broadcast revenues, less commissions, as reported annually by the FCC.

This figure will include revenues reported for both AM and AM/FM combinations, plus independent FM revenue data where appropriate. In cases where either AM, AM/FM combination revenue or independent FM revenue is missing due to less than three stations reporting, or where not all stations in the market reported on time, total broadcast revenue and that specific variable will be coded as missing values.

The variable "Total Broadcast Revenue" is the sum of the following two variables, "AM and AM/FM Revenue," and "Independent FM Revenue."

3. AM and AM/FM Revenue (AMREV)

AM and AM/FM revenue represents data from individual AM stations, and AM/FM combinations that report financial information as a single station, and consists of total time sales plus talent and program sales, plus other incidental broadcast revenues, less commissions, and as reported annually by the FCC.

In the aggregate, this figure will exclude nearly 700 independent FM stations and over 400 FM stations associated with AM stations but reporting separately each year.

4. Independent FM Revenue (FMREV)

Independent FM revenues consist of data reported by nearly 700 independent FM stations plus over 400 FM stations that are associated with AM stations by reporting separately each year. This figure represents total time sales plus talent and program sales, plus other incidental broadcast revenue, less commissions, as reported to the FCC on an annual basis.

5. Average Station Revenue (AVGREV)

A term used to identify the average or mean total revenue generated in a sample market per station. This figure will be generated in the computer based on the actual number of stations per market. If total broadcast revenue is coded as a missing value, or where the precise total number of radio stations on-the-air is impossible to ascertain, this variable will be coded as a missing value.

6. Total Retail Sales (TRS)

This variable includes all sales or cash receipts of businesses within the Standard Metropolitan Statistical Area (SMSA) of the sampled markets, and as estimated annually in Spot Radio Rates and Data.

7. Buying Power Index (BPI)

Annually, Sales and Marketing Management magazine reports the relative buying power of each SMSA across the United States. This index is comprised of a weighted measure of a market's population, effective buying income, and total retail sales, and is expressed as a percentage of the nation's total buying power.

8. Total Number of Stations (NUMSTA)

In most markets, the total number of radio stations on-the-air will not equal the total number of stations reporting revenue to the FCC for inclusion in their annual report.

For example, in 1977 the FCC reported seven AM and AM/FM combinations, and one independent FM station, in the Lansing, Michigan market (SMSA). In truth, this represented a total of 14 individual stations, comprised of one individual AM station, six AM/FM combinations, and one independent FM station. Thus, eight stations reporting revenues for Lansing, actually amounted to 14 individual stations in the aggregate. Further, because the FCC only reported the number of AM and AM/FM combinations in a market, versus the number of similar combinations reporting revenues, it was impossible to calculate exactly how many stations, in the aggregate, were actually in the market or the actual number reporting.

In 1978, the FCC changed reporting procedures and combined the separate independent FM report with the AM and AM/FM combination data. Further, they began reporting the total aggregate number of stations per market. They forgot, however, to report the aggregate number reporting revenues as in previous reports. Thus, the problem shifts from trying to calculate the aggregate number of stations per market, to one of trying to determine if all stations reported revenue figures on time for inclusion in the annual report. Because 1978 was the first year for the FCC to report under the new procedures, and the 1978 report included 1977 data, it was relatively easy to compare reports to determine if all stations in the market reported revenue figures for 1978. In 1982, all the above reporting problems were eliminated when the FCC decided to no longer collect financial data from stations.

For purposes of this study, the number of radio stations in a market will be the aggregate number of individual stations on-the-air in each sampled market during the test period, where such information may be accurately determined, regardless of whether part of an AM/FM combination.

9. Individual Market Index (IMI)

The individual market index may be defined as the percentage of total retail sales in a market captured by the total aggregate number of existing radio stations on an annual basis. Thus, the IMI is simply the total radio revenue of a market divided by total retail sales, with the result multiplied by 100. Individual indices over the six-year test period may then be compared and contrasted to develop operational parameters for expected or potential radio revenue in markets of different size.

10. Potential Revenue (POTREV)

It is anticipated that the performance of existing radio stations, and in turn the entry of new stations into each market, will be based to some degree on the efficiency of those existing stations in capturing the potential radio revenue available.

In previous studies, only one constant (K_{pr}) was developed using the mean IMI of all markets under study, and this constant was used to project potential revenue as a percentage or function of total retail sales. Chapman,[7] however, recognized the markets of different size, due to competitive differences, would perform in different ways. Thus, he suggests using different constants (K_{pr}'s) for each group or subset, based on market population or rank.

Potential revenue, therefore, is a variable which is generated internally by the computer using the mean IMI of a subset of markets as a constant, in order to project the average potential revenue available as a function of total retail sales.

11. Normality Index (NINDX)

If the average potential revenue available in a market is calculated, then parameters may be developed to describe a "range of normality" in which markets within each group or subset can be expected to operate. This range can be arbitrarily established as one standard deviation above and below the mean IMI, or K_{pr}, for that group of markets.

For purposes of discrimination, markets falling below the normative range will be coded "-1", while those within the range will be coded "0", and those above the range will be coded "+1". The performance of each market, in terms of total radio revenue, will be measured against the above parameters and the proper value encoded for each year of this study.

12. <u>Radio-Dollar Index</u> (RDINDX)

A market's total radio revenue reported as a percentage of the average potential radio revenue projected for the sample market.

13. <u>Distance Index</u> (DIST)

This variable will be a measurement, in miles, of the distance from the city of license for a majority of stations in one market, to the next largest city of license.

14. Entry of a New Station (ENTRY)

Entry of one or more new radio stations into a market during one or more of the test years will be indicated with a discrete variable during the year of entry where "0" indicated no entry during the year under study, and "1" indicates entry of a new radio broadcast station.

15. Competition Index (COMPIN)

Radio is primarily a local or regional advertising medium. It should therefore follow that a good deal of the competition for advertising revenues in the marketplace will come from the local daily newspaper(s), and the local television station(s). Therefore, some method must be developed to express the relative strength of newspaper and television advertising, and, in turn, the level of competition in each select market.

Television revenues for most markets are published by the FCC annually. In turn, Dessart[8] recommends using the total advertising linage per year of each daily paper, as reported by Editor and Publisher, to project the annual revenues of newspapers in each market.

The problem with using dollar (revenue) estimates, the actual revenue figures, or for that matter an aggregate count of the number of papers and television stations in the market, is that the larger markets will always generate larger revenues due to a greater number of daily newspapers and television stations. Thus, there will be a problem with collinearity with the other predictor variables unless this measure can be expressed in some other fashion.

One suggestion might be to express the total number of radio stations in the market as a weighted percentage of the total number of competing units (e.g., television, radio and newspaper). In effect, this will generate a variable which will indicate the level of competition between the three media. The higher the ratio, in theory, the better the chance radio has of fractionalizing the market and, in turn, capturing a larger percentage of total advertising revenue available.

Some thought has been given to extending this concept to include a weighted value for one additional radio station. The problem here, however, is that this research centers on aggregate variables and ascertaining whether there is room for one additional station. The issue of "impact" of an additional radio outlet is too closely related to the respective management expertise of that outlet, and is therefore outside the scope of this research.

For purposes of this study, newspapers were counted only if published on a daily basis from within the respective radio market as defined earlier in this section. Television stations, on the other hand, were counted only if the main studio and transmitter were located in the radio market under study.

Hypotheses

A number of major questions are left unanswered by previous research. For example, it is known that as markets become larger, there is normally a proportional increase in the number of radio outlets. This does not, however, suggest that large market stations, in the aggregate, perform the same as those in a smaller market. Thus, the research question becomes whether the relationship between a select market variable such as total retail sales, and the aggregate performance of radio stations in a given market as indicated by total radio revenue, is consistent regardless of market size or number of individual radio outlets?

Hypothesis 1:

There is a difference in the relationship of total retail sales to total radio revenues, represented by the individual market index (IMI), in markets of different size.

All markets are not alike in media buying habits, or levels of radio station management expertise. In turn, these differences could be expected to explain a portion of the level of competition in these markets. In short, the level of competition goes beyond the aggregate number of stations per market, and includes the sophistication of market media buyers, and the aggressiveness of station management and local sales personnel. These differences might be demonstrated through the examination of the proximity of aggregate radio revenues in the market to some measure of "potential" market radio revenues based on comparison of the test markets to similar markets throughout the United States. Using the normality index described earlier in this section, it is possible to segregate stations into three discrete classifications; those that fall above or below one standard deviation of the mean IMI for a market in a given year, and those that fall within one standard deviation above and below the mean IMI.

<u>Hypothesis 2:</u>

New station entry will occur more often in markets that fall one standard deviation or more below the mean IMI, as measured by the normality index (NINDX), than in markets that are within or above one standard deviation.

As explained earlier, as market size increases the level of competition, or aggregate number of stations, also increases. Yet, competition can be both "inter" and and "intra" market for available advertising dollars. Thus, by comparison of the relative statutory distance of the test market to markets of similar or greater population, the impact of cross-market competition on market revenues should be evident.

Hypothesis 3:

The closer a test market is to another market of equal or greater population, the less likely the specific market will be of capturing available radio advertising revenue.

The arbitrary classification of test markets by the normality index may not be sufficient to discriminate among predictor variables for purposes of identifying those markets ripe for entry by a new station. If actual radio revenue for a test market, as reported by the FCC, were taken as a percentage of the predicted radio revenue available, then this new variable, radio-dollar index, might be employed to demonstrate if a relationship exists.

Hypothesis 4:

The greater the difference between potential radio revenue (POTREV) and actual radio revenue (TOTREV), *ceteris paribus*, the greater the likelihood of new station entry (ENTRY).

While there is no doubt that larger markets have more radio outlets than smaller markets, there remains a question as to when a market demonstrates sufficient "economic" room for entry. Certain conditions must exist within the marketplace to insure the new station an adequate chance for survival. At the very least, it would not be prudent for an entrepreneur to enter a market with the preknowledge that a new radio station had little chance for success. Therefore, there must be certain "signals" a market exhibits to indicate it is ripe for entry. In other words, there are select market variables which, in the right combination, indicate the potential for entry by a new radio outlet. It is the identification of these variables which is paramount.

Hypothesis 5:

Entry of a new radio station into a market will be dependent upon changes in relationships within and among select market and station variables over time.

Analysis of Data

The variables for all the 218 markets reported will be punched on data processing cards. The cards will then be read into the Michigan State University's Cyber 750 computer system, and the data tabulated and treated according to various Statistical Package for the Social Sciences (SPSS) computer programs.[9]

Coefficients of correlation will be computed to describe the magnitude and direction of relationships between each of the station (dependent) variables and each of the market (independent) variables. With pairs of continuous variables, the Pearson product-moment coefficient of correlation (r_p) will be used. For comparisons involving one continuous variable and one discrete variable, such as "entry of a new station," a rank-order coefficient of correlation will be used.

A one-way analysis of variance will be performed on the variable "individual market index" by market identification (ID) to test for significant differences in the amount of total retail sales assumed in markets of different size. A *a posteriori* contrast test, such as Least Significant Difference (LSD) will be used in an attempt to define groups of markets that are homogeneous. The result may be that groups of markets will be divided into subsets where differences between their mean IMI's will not be significant at the .05 level or greater. The alternative is, that no differences exist in the aggregate performance of stations across time. The 218 markets will be examined individually. Therefore, it is possible that over 100 subsets could develop. While it is expected that significant differences exist between markets, fewer than 50 subsets should materialize.

It is from this *a posteriori* analysis that parameters defining the normality range of operation for each subset can be developed should differences exist. If subsets among the 218 markets are identified, a new mean IMI would be calculated for each group or subset and the standard deviation above and below the mean IMI calculated for each subset. Classification of a market which operates within, or outside the range will be beneficial in the later determination of criteria for new station entry.

Multiple Regression Analysis

A method of multivariate analysis, multiple regression allows a researcher to study the collective and separate contributions of two or more independent variables to the variation of a dependent variable. As such, the major purposes of regression analysis are prediction and explanation.[10]

The output of the SPSS regression package used in this study is designed to supply regression weights (b) which serve as a means to identify the relative contribution of independent (exogenous) variables to a dependent (endogenous) variable. Therefore, the sample regression coefficient, or weight, becomes the estimate of the population.[11]

The general format can be expressed as:

$$Y_i = f(X_1, \ldots, X_n) \qquad (1)$$

where the Y_i are the station (endogenous) variables, and X_n are the market (exogenous) variables. Regression analysis will be valuable for a number of reasons. First, it allows the researcher to ascertain the contribution of the independent market variables to the dependent total radio revenue in markets of different size. Second, it allows one to examine the relative role of these independent variables to the aggregate performance of stations as differentiated by the normality and radio-dollar indices.

Discriminant Analysis

In order to study the entry of a new station into a market, discriminant analysis will be employed to identify those variables which determine when a market is ripe for new competition. Through the classification of markets that added stations, or did not add stations, over the six-year test period, it is possible to identify a group of variables which dictate whether entry is probable.

By coding each of the 218 markets with a discrete variable where "1" indicates entry of a new station occurred, and "0" where no new entry took place, it is possible to examine markets in terms of the potential for future entry based on the past performance of these same markets.

The discriminant program in the SPSS package will form a linear combination of those market and financial variables with respect to the sample market that added a station during the six-year test period. The computer will then establish a set of classification functions which will be used to produce the probability of membership of each sample market in the "entry" or "no entry" groups. Thus, the output contains regression coefficients which become the estimates of the probability of entry. The final stage of analysis is the review of the original data to determine how many markets were correctly classified based on the variables selected for discrimination. In this manner, it is possible to determine the relative accuracy of the formula for prediction in other markets over time.

In the case of this study, Rao's V will be used as the stepwise criterion for selection and inclusion of independent variables in the discriminant analysis. Rao's V is a generalized distance measure, which means it is an indication of which independent variables contribute the largest change in the value of V when added to the variables already selected. A decrease in the value of V would indicate that a variable contains a large amount of information already explained by variables previously selected. Independent variables are tested for retention in the model at each step, based on their partial multivariate F ratio. The minimum F ratio to avoid removal in stepwise analysis is 1.0. Evaluation of the discriminating power of the discriminant function will be based on the canonical correlation, or ability of the function to separate the groups, ENTRY (0,1). Wilks' Lambda, and its associated chi-square test of statistical significance, indicates the discriminating power in the variables being used.

FOOTNOTES

[1]James G. Saunders and Arthur R. Till, An Investigation of Possible Correlates of the Financial Behavior of Broadcasting Stations, Report No. 1, Ohio University Center for Research Broadcast Management and Economics (Athens, 1966).

[2]Harvey J. Levin, The Invisible Resource: Use and Regulation of the Radio Spectrum (Baltimore: The Johns Hopkins Press, 1971).

[3]Robert E. Yadon, Financial Behavior of Oklahoma Single Station Radio Markets in 1973, an unpublished M.S. thesis, Oklahoma State University, 1975. Robert E. Yadon, "Economic Behavior of Differentiated U.S. Radio Markets, 1971 & 1973," an unpublished report, Department of Telecommunication, Michigan State University, March 1976.

[4]Saunders, op. cit.

[5]"How Much of Radio's 'Spot' Leaks into 'Local'?" Television/Radio Age (February 4, 1974), p. 32.

[6]FCC Annual Report, 1973.

[7]"Finding Par for Business at Radio Stations," Broadcasting, XXCII (June 19, 1972), pp. 39-40.

[8]George Dessart, ed., Television in the Real World: A Case Study in Broadcast Management (New York: Hastings House, 1978), p. 151.

[9]Norman H. Nie, et al., Statistical Package for the Social Sciences, 2nd ed. (New York: McGraw-Hill, 1975).

[10]Fred N. Kerlinger and Elazar J. Pedhazur, Multiple Regression in Behavioral Research (New York: Holt, Rinehart and Winston, 1973), p. 4

[11] W. J. Dixon, *BMD*: *Biomedial Computer Programs* (Berkeley: University of California Press, 1970), pp. 15-21.

CHAPTER IV

RESULTS

The discussion which follows first examines bivariate relationships among aggregate station and market variables measured in 218 test markets over a six-year period. Next, specific hypotheses are addressed and discussed. Finally, models are presented and discussed with respect to entry of new outlets in radio markets of varying market characteristics.

Introduction of Market Indices

Prior to the initial construction of a correlation matrix, a number of variables must be generated and tested. First, in order to weigh the strength of a market, parameters must be established. In the case of this study, it is necessary to examine the aggregate relationship of station viability in a test market to the marketplace itself.

To generate such a variable, it is first necessary to select an index of relative market strength and then examine its relationship to existing radio revenue data. One well-known barometer of market activity is the variable total retail sales. The other criterion variable, total radio revenue in each test market, is published by the Federal Communications Commission (FCC) on an annual basis. Therefore, it is possible to establish a relationship between total retail sales (TRS) and total radio revenue (TOTREV).

As is suggested in earlier studies, a strong relationship exists between the criterion variables. In fact, when all 218 markets in this research were examined over the six-year test period, a total of 1308 individual observations (cases), the positive relationship between total retail sales and total radio revenue ($r = .9726$) indicates that this combination is nearly linear, significant at the .001 level, with nearly 95 percent of the common variance explained ($r^2 = .9460$). Therefore, total retail sales and total radio revenue show a greater than chance relationship 999 times in 1,000.

Individual Market Index

While a strong relationship exists between the market variable total retail sales (TRS) and the aggregate station variable total radio revenue (TOTREV), differences may manifest themselves between markets over time. In order to test this proposition, a new variable must be created that exhibits the relationship of these criterion variables on a market-by-market basis.

$$\text{Individual Market Index (IMI)} = \frac{TRS}{TOTREV} \times 100 \qquad (2)$$

The new Individual Market Index (IMI), was calculated for each market over the six-year test period. This index simply represents total radio revenue for a market as a percentage of total retail sales. A one-way analysis of variance was performed on the data between IMI and the discrete market identification variable (ID). As Table VII indicates, using the Least Significant Difference (LSD) test for *a posteriori* contrasts, with alpha set to .001, significant differences did appear between markets. Unfortunately, while 24 homogeneous subsets were identified, those subsets were not unique and extensive overlap of markets between subsets preclude meaningful analysis at this time. It should be sufficient at this point to state that differences do exist in the aggregate performance of individual radio markets as measured by the IMI index, and that in the future each market should be treated as a separate entity. While unique subsets were not apparent, the IMI index will be retained in this study as a meaningful variable. The results of this analysis support the first research hypothesis, that a difference exists in the relationships between total retail sales (TRS) and total radio revenue (TOTREV), represented by the individual market index (IMI), in markets of different population.

TABLE VII

ONE-WAY ANALYSIS OF VARIANCE BETWEEN IMI AND MARKET ID

Source	df	s.s.	m.s.	F	(Prob.)
Between Groups	206	5.3357	.0259	17.877	(.001)
Within Groups	671	.9722	.0014		
TOTAL	877	6.3079			

Normality Index

If the new variable IMI is helpful in measuring the aggregate performance of stations with respect to the marketplace itself, then this new index may also be useful in establishing parameters upon which to gauge this performance. Should the parameters prove meaningful, they may be used later in this research to discriminate between markets that add a new station and those that do not add a new station.

To generate these parameters, a new variable was created which establishes an artificial range of normality as a measure of market performance. To generate this range, the first step is to examine the data on a year-by-year basis to determine if differences exist between mean IMI's. Table VIII below indicates that differences do exist between markets over time. Thus, it is relatively easy to use the mean IMI for each year to establish artificial performance standards.

TABLE VIII

ONE-WAY ANALYSIS OF VARIANCE BETWEEN IMI AND YEAR

Source	df	s.s.	m.s.	F	(Prob.)
Between Groups	5	.3650	.0730	10.771	(.0001)
Within Groups	898	6.0865	.0068		
TOTAL	903	6.4515			

Table IX below indicates the mean IMI for each year under study, plus the arbitrary range of one standard deviation above and below the mean used to establish the upper and lower limits to the new variable, normality index (NINDX).

TABLE IX

MEAN IMI AND RANGE OF NORMALITY, BY YEAR

Year	Mean IMI	S.D.	Upper Limit	Lower Limit
1973	.3072	.0858	.3930	.2214
1974	.3024	.0785	.3809	.2239
1975	.2836	.0788	.3624	.2048
1976	.2948	.0721	.3669	.2227
1977	.3257	.0858	.4115	.2399
1978	.3439	.0908	.4347	.2531

For example, if the IMI for a specific market fell within plus or minus one standard deviation of the mean IMI for that year, the new variable (NINDX) would be coded "0"; and if the IMI was above one standard deviation the market was coded "+1"; and finally should the IMI fall one standard deviation below the mean IMI, the market was coded "-1".

In order to ascertain whether the new variable, NINDX, exhibits a significant relationship with the dependent ENTRY, two statistical tests were performed. First, the nonparametric Spearman rank-order coefficient of correlation (r_s) and Kendall's tau (τ) were computed ($r_s = -.0326$; $\tau = -.0314$). In each of the 962 cases analyzed, however the relationship was small, negative and not significant at the .05 level of confidence.

The second test was to determine if differences exist between NINDX groups (-1, 0, +1), and the dependent ENTRY. Distribution of the 692 cases over the NINDX groups was as follows: -1 = 207; 0 = 407; and +1 = 78. Table X below indicates that significant differences do not exist between the three NINDX groups based on the ENTRY index (0,1). In that these are two nonparametric variables, the Kruskal-Wallis Test was also used to confirm the relationship. Again, the results indicate that there is not a significant relationship between the NINDX coding scheme and entry of new stations into a market. Obviously, the results of these tests do not support the second research hypothesis that ENTRY will occur more often in markets that fall one standard deviation below the mean IMI as measured by the normality index (NINDX).

TABLE X

ANALYSIS OF VARIANCE BETWEEN NINDX AND ENTRY

Source	df	s.s.	m.s.	F	(Prob.)
Explained	2	.067	.034	.551	(.577)
Residual	689	42.007	.061		
TOTAL	691	42.074	.061		

Potential Revenue

Given the nearly one-to-one linear relationship of the two criterion variables, total retail sales and total radio revenue, it is possible to develop another arbitrary means of evaluating radio markets. By using the mean IMI figures presented in Table IX, it is possible to generate a dollar-figure for the "estimated" average potential revenue available per market, per year. Simply stated, the mean IMI per year can be multiplied by total retail sales in each market for that same year to create an index upon which to evaluate the assumption of potential revenue available by the aggregate stations per market.

$$\text{Potential Revenue (POTREV)} = \text{TRS} \times \text{Mean IMI} \qquad (3)$$

Because the mean IMI per year changes over time, the new variable (POTREV) can be applied to the changing revenue climate per market to estimate the efficiency of each market in capturing, vis-a-vis other markets, potential revenue available. In its raw form, the new POTREV variable would be little more than a mirror of the relationship between total retail sales and total radio revenue. Thus, additional treatment is required to make this new variable meaningful.

Radio-Dollar Index

The application of the potential revenue variable (POTREV) per market allows a new index of revenue assumption to be generated. The new variable, radio-dollar index (RDINDX), is the percentage of average potential revenue assumed by the aggregate stations in a given market.

$$\text{Radio-Dollar Index (RDINDX)} = \frac{\text{TOTREV}}{\text{POTREV}} \qquad (4)$$

In retrospect, it is possible to generate a dollar estimate for average potential revenue in each test market, and at the same time calculate the percentage of assumption by the existing stations.

Relationship Between Station and Market Characteristics

Using essentially the same variable considered in earlier studies, plus those generated herein, a correlation matrix was generated to demonstrate the relationship of market variables and station variables. Table XI indicates relationships which range from positive with a very dependable correlation, to negative with a moderate to marked relation. Where the correlation coefficient was not significant at the .05 level of confidence, the letters "N.S." were entered into the matrix.

Even a casual review of the coefficients presented in Table XI suggest the immediate problem of

TABLE XI

CORRELATION MATRIX OF STATION AND MARKET CHARACTERISTICS 1973 TO 1978

	ENTRY	SMPOP	RANK	NUMSTA	TRS	BPI	DIST	MEANIMI	TOTREV	IMI	TCOMP	COMPIN	AVGREV	DIVLR	POTREV	RDINDX
ENTRY	X	074	-067	158	107	069	114	246	N.S.	N.S.	221	169	097	116	125	N.S.
SMPOP	074	X	-570	781	979	997	639	N.S.	944	N.S.	819	-124	854	130	967	N.S.
RANK	-067	-570	X	-746	-573	-560	-192	N.S.	-562	140	-734	N.S.	-584	-237	-567	139
NUMSTA	158	781	-746	X	807	783	334	106	797	078	987	N.S.	636	089	801	N.S.
TRS	107	979	-573	807	X	980	563	063	973	N.S.	844	-126	864	135	997	N.S.
BPI	069	997	-560	783	980	X	619	N.S.	943	N.S.	819	-122	855	131	968	N.S.
DIST	114	639	-192	334	563	619	X	N.S.	614	088	373	-113	557	091	555	090
MEANIMI	246	N.S.	N.S.	106	063	N.S.	N.S.	X	079	238	112	N.S.	216	114	104	N.S.
TOTREV	N.S.	944	-562	797	973	943	614	079	X	091	833	-104	898	080	974	.075
IMI	N.S.	N.S.	140	078	N.S.	N.S.	088	238	091	X	084	-077	209	N.S.	N.S.	969
TCOMP	221	819	-734	987	844	819	373	112	833	084	X	-101	682	110	839	N.S.
COMPIN	169	-124	N.S.	N.S.	-126	-122	-113	N.S.	-104	-077	-101	X	-209	-207	-128	-087
AVGREV	097	854	-584	636	864	866	557	216	898	209	682	-209	X	221	864	159
DIVER	116	130	-237	089	135	131	091	114	080	N.S.	110	-207	221	X	133	N.S.
POTREV	125	967	-567	801	997	968	555	104	974	N.S.	839	-128	864	133	X	N.S.
RDINDX	N.S.	N.S.	139	N.S.	N.S.	N.S.	090	N.S.	075	969	N.S.	-087	159	N.S.	N.S.	X

N.S. = Not significant at the .05 level of confidence. Decimal points omitted.

multicollinearity; that is, the intercorrelation of independent variables. While this problem was anticipated, it is compounded by the fact that some of the new variables created in this study, like potential revenue (POTREV) and competition index (COMPIN) are functions of other independent variables like total retail sales (TRS) and total competition (TCOMP). Therefore, one task is to reduce the variable set and thereby eliminate as much intercorrelation as possible.

Prior to the reduction of the matrix, it would be helpful to examine one of the specific relationships, the variable distance (DIST) to select market variables. In Table XII below, the specific correlation coefficients are duplicated from Table XI and presented here in a reduced format for easier examination.

The relationships expressed in Table XII between distance (DIST) and select market variables are positive, range from small to moderate, and are highly dependable. It is obvious from these coefficients that larger markets tend to be located further away from other markets of similar or greater population. As the IMI and RDINDX relationships suggest, distance (DIST) has a positive, albeit small, effect on the index of total retail sales to total radio revenue. Radio stations in markets isolated from other similar or larger markets tend to capture a larger percentage of the retail advertising dollar, and also seem to be more efficient in capturing potential radio

TABLE XII

RELATIONSHIP BETWEEN DISTANCE (DIST) AND SELECT MARKET CHARACTERISTICS

Variable	r_p	t-test (Sig.)
IMI	.088	.008
TOTREV	.614	.001
POTREV	.555	.001
NUMSTA	.334	.001
SMPOP	.639	.001
AVGREV	.557	.001
RDINDX	.090	.004

advertising dollars. The results support, therefore, the third research hypothesis, that a closer a test market is to another radio market of equal or greater population, the less likely the test market will be in capturing available radio advertising revenue.

The impact of the variable RDINDX on new station entry (ENTRY), was less convincing. The nonparametric correlation coefficients ($r_s = -.0293$; $\tau = -.0247$) were not significant at the .05 level of confidence. Thus the fourth research hypothesis was not supported, that the greater the difference between potential radio revenue (POTREV) and actual radio revenue (TOTREV), the greater the likelihood of new station entry.

Reduction of the Correlation Matrix

In most instances, it is impossible to find a data sample where all independent variables exhibit a large amount of independent variation. While high correlations may not affect the expected value of the estimated coefficients, they will influence the variance of these estimated coefficients. In the end, large gains in precision are possible only with the elimination of highly collinear variables. This reduction is necessary prior to treatment of data using stepwise regression.

Examination of the coefficients listed in Table XI indicate a high degree of multicollinearity. To remedy this problem, all variables in the r-matrix, excluding the dependent ENTRY and NUMSTA, and excluding the variable constant MEANIMI, were used in a factor analysis. With the application of the principal components method of factor analysis with varimax rotation, it is possible to reduce the data set to one or more factors wherein one or more variables would be descriptive of each factor. By estimating an arbitrary limit for entry into the factor matrix (V = .5), it is possible to analyze the matrix. Due to the wide variance involved in the r-matrix, factor rotation was possible and three select factors appeared. These factors are presented in Table XIII.

Looking at the three factors in Table XIII, a number of high factor loadings appear. In the first factor, the

TABLE XIII

ROTATED FACTOR MATRIX

Variable	Factor 1	Factor 2	Factor 3
SMPOP	.92709	.35376	-.06034
RANK	-.29089	-.80974	.14497
TRS	.90422	.40394	-.05230
BPI	.92323	.35472	-.06137
DIST	.66223	-.00158	.08572
TOTREV	.90395	.38013	.07041
TCOMP	.60985	.67758	.04861
COMPIN	-.13295	-.04038	-.09577
AVGREV	.78198	.41662	.17684
IMI	.01515	.01532	1.00117
DIVER	.06907	.20599	.05189
POTREV	.89731	.40200	-.04736
RDINDX	.00716	.00260	.96706
Variance Explained	73.1%	20.8%	6.1%

linear dependency of SMPOP, TRS, BPI, TOTREV, AVGREV and POTREV is evident. In fact, had these same six variables been factor analyzed separately, no rotation would be possible due to the high degree of intercorrelation. It is doubtful that all six variables are needed, nor is it advisable to retain them. Therefore, all but one of the six variables can be dropped from further study.

In Table XIV, a correlation sub-matrix of these six variables in the first factor is presented. As is clearly evident, the variables are highly intercorrelated. By examining these correlation coefficients with respect to the dependent NUMSTA, and the individual factor loadings presented in Table XIII, the variable SMPOP was selected to represent the first factor in the development of estimating equations.

TABLE XIV

CORRELATION SUB-MATRIX FOR FACTOR ONE

	SMPOP	TRS	BPI	TOTREV	AVGREV	POTREV
SMPOP	X	.979	.997	.944	.854	.967
TRS	.979	X	.980	.973	.864	.997
BPI	.997	.980	X	.943	.855	.968
TOTREV	.944	.973	.943	X	.898	.974
AVGREV	.854	.864	.855	.898	X	.864
POTREV	.967	.997	.968	.974	.864	X
NUMSTA	.781	.807	.783	.797	.636	.801

In the second factor of Table XIII, only two variables demonstrate high factor loadings, RANK and TCOMP. In this case, the variable with the highest loading, RANK, was selected to represent the second factor. This choice was also based on the concurrent loading of TCOMP on factor one.

Finally, in the third factor two variables demonstrate high loadings, IMI and RDINDX. Here the choice is relatively easy in that RDINDX is a function of IMI, therefore the index IMI was selected.

In the end, the number of criterion variables has been reduced from 13 to three. The relationship of these three variables with the dependent NUMSTA is presented in a reduced r-matrix format in Table XV. In examining the table, it would appear that there is a moderate degree of intercorrelation between the independent RANK and SMPOP. This condition is not alarming, for the reduction in the variable set was to reduce as much multicollinearity as possible not eliminate it; the latter task being virtually impossible.

TABLE XV

REDUCED R-MATRIX AFTER FACTOR ANALYSIS

	SMPOP	RANK	IMI
SMPOP	X	-.570	N.S.
RANK	-.570	X	.140
IMI	N.S.	.140	X
NUMSTA	.781	-.746	.078

N.S. = Not significant at the .05 level of confidence.

Regression Coefficients

Given the variables selected for inclusion in this study, it should be possible to specify the estimating equation. While Table XV indicates the individual relationships between the independent variables and NUMSTA, it does not indicate what any given combination of the three variables would do in predicting the number of stations per market.

Looking back at Table XI, it is easy to identify one or more market variables that may account for a majority of variance with the dependent NUMSTA. The highest independent correlation coefficient is between total retail sales (TRS) and number of stations (NUMSTA), where $r = .807$ ($r^2 = .651$). The relationship between NUMSTA and TCOMP ($r = .987$) is discounted because TCOMP is a function of NUMSTA. Thus, one would expect the three independent variables identified through factor analysis to improve on the amount of variance explained by any single variable in the r-matrix.

Using 1978 as a typical year, it is possible to test the linear combination of independent variables. With the stepwise selection procedure of multiple regression analysis, all three market variables met the required .5 significance level of entry into the regression model. The variables, SMSA population (SMPOP78), market rank (RANK78), and individual market index (IMI78), account for more than 78 percent of the variance of the dependent variable number of stations (NUMSTA78) in the market (r^2 = .78921).

Table XVI indicates the analysis of variance between the regression coefficients, or b values, and the variables within the regression model.

TABLE XVI

ANALYSIS OF VARIANCE OF REGRESSION MODEL PREDICTING THE DEPENDENT NUMSTA78

Source	df	s.s.	m.s.	F	(Prob.)
Regression	3	5073.076	1691.025	76.127	(.001)
Residual	61	1355.000	22.213		
TOTAL	64	6428.076	1713.238		

Looking at Table XVI, the F-ratio of 76.127 between the two dimensions was significant at the .001 level, or a probability of chance occurance less than .001. This implies that differences as large as those obtained between the regression coefficients and the stepwise fit of market characteristics to NUMSTA78, would be expected to occur by chance less than one time in 999.

For 1978, the three-variable model, SMPOP78, RANK78 and IMI78, is the best combination of variables found by the maximum common variance improvement procedure to describe the total number of radio outlets in the market. Table XVII below indicates the final stage of regression analysis, the assigning of regression coefficients, or b values.

TABLE XVII

REGRESSION COEFFICIENTS OF MARKET VARIABLES PREDICTING THE DEPENDENT NUMSTA78

Variable	b	s.e.	F	(Prob.)
SMPOP78	.48342 E-05	.64986 E-06	55.337	(.01)
RANK78	-.58918 E-01	.93082 E-02	40.065	(.01)
IMI78	15.68432	6.63345	5.590	(.02)
CONSTANT	14.17996	2.55627	30.770	(.01)

Future prediction of the dependent variable, NUMSTA78, is now possible through utilization of the regression weights for the three independent variables, and the constant, in a weighted equation. Consider the possibility of expressing total number of stations in a market in 1978 (NUMSTA78) as a function of the three independent variables where:

$$\text{NUMSTA78} = 14.179 + (.00000483 \times \text{SMPOP78}) + (-.058918 \times \text{RANK78}) + (15.68432 \times \text{IMI78}). \quad (5)$$

Application of the regression formula for total number of stations in a market in 1978 should provide a reasonable approximation of the aggregate radio outlets per market.

When compared to the actual number of stations per market in 1978, it may be possible to draw some conclusions concerning the status of the market vis-a-vis future entry by additional outlets. In its current form, however, the estimating equation provides only a method of evaluating the status quo, and little useful information concerning the future entry of radio outlets.

Lagged Regression Model

In 1971, Levin suggested that AM station entry during a current time period (T_0) was related to the rate of change of per-station income during a preceding time period (T_{-1}). While documenting the leading indicator relationship, he used "income" as an independent variable, and the problems inherent to the selection of "profit" as a predictor have been covered.

In order to incorporate "time" as a variable in the model, it is necessary to examine the lagged relationships that exist between the dependent NUMSTA78, and the independent variables from previous years. In Table XVIII, lagged correlation coefficients are presented in a reduced format.

In examining Table XVIII, it appears that two of the independent variables (SMPOP and RANK) are leading the dependent NUMSTA, not lagging. On the other hand, the independent IMI is clearly a lagging variable. In order

TABLE XVIII

RELATIONSHIPS BETWEEN NUMSTA78 AND LAGGED MARKET CHARACTERISTICS

Variable	r	t-test (Sig.)
SMPOP75	.7957	.001
SMPOP76	.7969	.001
SMPOP77	.7997	.001
RANK75	-.7442	.001
RANK76	-.7443	.001
RANK77	-.7543	.001
IMI75	.1196	.086
IMI76	.2324	.002
IMI77	.0188	.362

to test the linear combination of these independent variables, all observations for SMPOP, RANK and IMI were used for the years 1973 through 1977, and entered into the stepwise selection procedure of multiple regression with the dependent NUMSTA78. The first three independent variables to meet the .5 significance level for entry into the regression model were SMPOP77, RANK77 and IMI75. These three variables account for more than 80 percent of the variance of the dependent NUMSTA78 (r^2 = .80106).

Table XIX shows the analysis of variance between the regression coefficients and the variables within the regression model.

TABLE XIX

ANALYSIS OF VARIANCE OF LAGGED REGRESSION MODEL PREDICTING THE DEPENDENT NUMSTA78

Source	df	s.s.	m.s.	F	(Prob.)
Regression	3	5149.245	1716.415	81.872	(.001)
Residual	61	1278.831	20.964		
TOTAL	64	6428.076	1737.379		

The F-ratio in Table XIX of 81.872 between the two dimensions was significant at the .001 level, indicating a probability of chance occurrence less than .001. This means that differences as large as those obtained between the regression coefficients and the stepwise fit in this lagged model would be expected to occur by chance less than one time in 999.

For 1978, SMPOP77, RANK77 and IMI75 are the best combination of variables found to describe the dependent NUMSTA78. Table XX below provides the final stage of regression analysis, the development of regression coefficients.

Under the weighted model, prediction of the dependent NUMSTA78 is possible through utilization of weighted regression coefficients for the new three independent variables and the constant. The estimating form of the model can now be written as:

$$NUMSTA_t = a + b_1 SMPOP_{t-1} + b_2 RANK_{t-1} + b_3 IMI_{t-3} + u_t, \quad (6)$$

where "u_t" is a random error term, assumed to be distributed normally with a mean of zero.

TABLE XX

REGRESSION COEFFICIENTS OF LAGGED MARKET VARIABLES PREDICTING THE DEPENDENT NUMSTA78

Variable	b	s.e.	F	(Prob.)
SMPOP77	.48048 E-05	.62775 E-06	58.583	(.001)
RANK77	-.58606 E-01	.89924 E-02	42.475	(.001)
IMI75	24.26036	7.30733	11.022	(.002)
CONSTANT	12.65729	2.47171	26.223	(.001)

Finally, to demonstrate the differences between the lagged and unlagged models, Table XXI displays the corresponding statistics.

TABLE XXI

COMPARISON BETWEEN LAGGED AND UNLAGGED MODELS

Statistic	Unlagged Model	Lagged Model
Multiple R	.88837	.89502
R Square	.78921	.80106
Adjusted R Square	.77884	.79127
Standard Deviation	4.71308	4.57870

As Table XXI indicates, the lagged model provides a better fit, albeit small difference, with the dependent NUMSTA78. Therefore, given the models as specified, the reasonable choice would be to use the last estimating equation (6) to predict the number of radio outlets per market.

Entry as a Dependent Variable

In order to ascertain which markets are ripe for entry by a new radio outlet, all markets were coded with a discrete variable (0,1) to signify that entry had, or had not occurred in that market on a year-by-year basis between 1973 and 1978. Discriminant analysis was then employed.

The initial task in discriminant analysis is to determine if a significant relationship exists between the exogenous variables introduced, and the dependent variable ENTRY. The nonparametric Spearman correlation coefficients

(r_s) between ENTRY and the 15 independent variables previously discussed are duplicated in Table XXII, along with the respective t-test significance levels. On the right hand of the table are the lagged coefficients between ENTRY78 and the highest individual independent variable for the previous five years of the study (1973-1978). Again, the t-test significance levels are posted.

Examining Table XXII, it is obvious that the current list of exogenous variables provide little help in explaining the variance of the dependent ENTRY in either the combined or lagged coefficients. In most cases, the lagged independent variables displayed relationships which were not significant at the .05 level of confidence. This is due, in large part, to the reduced number of variables (N) under consideration in the lagged example. Thus, overall, there is little hope in discriminating between markets based on this variable set.

Discriminating Variables

In discrimination analysis, the researcher selects a group of variables that measure areas on which the groups can be expected to differ. From a theoretical perspective, it is necessary to generate a new variable set that will better explain differences that exist between markets where entry does and does not occur. ENTRY is not highly correlated with most market variables in their current

TABLE XXII

NONPARAMETRIC CORRELATION COEFFICIENTS FOR ENTRY IN COMBINED AND LAGGED MODELS

COMBINED				LAGGED			
Variable	N	r_s	t (Sig.)	Variable	N	r_s	t (Sig.)
SMPOP	692	.074	.026	SMPOP77	218	.065	.172*
RANK	692	-.067	.039	RANK77	218	-.065	.172*
NUMSTA	469	.158	.001	NUMSTA77	218	.107	.059*
TRS	692	.107	.003	TRS77	218	.057	.203*
BPI	692	.069	.002	BPI77	218	.062	.182*
DIST	692	.114	.002	DIST77	218	.114	.047
MEANIMI	692	.246	.001	--		(CONSTANT)	
TOTREV	692	.046	.116*	TOTREV73	137	.092	.142*
IMI	692	.002	.478*	IMI77	162	-.109	.085*
TCOMP	692	.221	.001	TCOMP77	218	.097	.078*
COMPIN	692	.169	.001	COMPIN75	62	.185	.075*
AVGREV	692	.097	.006	AVGREV77	162	-.106	.091*
DIVER	692	.116	.002	DIVER75	62	.057	.203*
POTREV	692	.125	.001	POTREV77	218	.057	.203*
RDINDX	692	.029	.221*	RDINDX77	162	-.109	.085*

*Not significant at the .05 level of confidence.

functional form. New stations will enter markets of different size, differing economic characteristics, and at different points over time. Thus, variables like SMPOP, RANK, TRS, BPI, etc., offer little to identify those points at which markets are ripe for entry.

In Table XXII, market variables show a decline in correlation strength between the combined and lagged examples. On the other hand, indices like IMI and RDINDX, regardless of significance levels, show a marked improvement in variance explained. Therefore, it is not the individual market variables that are important, but the relationships between variables that seem to be significant.

Using essentially the same variable set, it is possible to generate six new, additional variables to assist in the discrimination analysis.

1. Percentage Change (PERCHG)

   The percentage change in total radio revenue, year-to-year.

$$PERCHG_T = (TOTREV_T/TOTREV_{T-1}) - 1 \quad (7)$$

2. Revenue Per Capita (REVPOP)

   Total radio revenue in the marketplace, allocated to total population.

$$REVPOP_T = TOTREV_T/SMPOP_T \quad (8)$$

3. Average Revenue Per Capita (AVGPOP)

The average radio revenue per station, allocated to total population.

$$AVGPOP_T = AVGREV_T/SMPOP_T \tag{9}$$

4. Number of Stations Per 100,000 Population (STAPOP)

Number of radio stations in the marketplace, allocated per 100,000 population.

$$STAPOP_T = (NUMSTA_T/SMPOP_T) * 100{,}000 \tag{10}$$

5. Number of Stations Per $1,000,000 in Total Retail Sales (STATRS)

$$STATRS_T = (NUMSTA_T/TRS_T) * 1{,}000{,}000 \tag{11}$$

6. Percentage FM Revenue (PRFREV)

Percentage of total radio revenue in marketplace allocated to FM stations.

$$PRFREV_T = FMREV_T/TOTREV_T \tag{12}$$

Rather than combining this new variable list with the group of independent variables previously generated, only those market and station characteristics related to ENTRY were selected as discriminating variables. Thus, in addition to the six new variables generated above, IMI, COMPIN, AVGREV and RDINDX will be retained for analysis.

Discriminant Analysis

Stepwise discriminant analysis was selected in order to eliminate the "less" useful variables in the list prior to performing the actual analysis. The criterion selected for entry into the discriminant model was Rao's V, a generalized distance measurement which allows the greatest separation between the dependent groups--ENTRY (0,1).

Because each market does not have an equal prior probability of entry, adjustments must be made before analysis. In this case, the author elected to allow the data set to be used to estimate the population distribution. The prior probability for ENTRY was 16 percent, and for NO ENTRY it was 84 percent.

Again, ENTRY78 was used as the dependent variable in the model, and measures of all ten independent discriminating variables were collected between 1975 and 1977. Prior to 1975, the number of missing values reduced the valid observations to a level that makes analysis difficult. In addition, previous research presented indicates that a clear majority of variance is accommodated in these three years.

Table XXIII indicates that only eight of the original 30 independent variables entered were actually selected, and only seven variables were retained for analysis. At Step 9, the independent variable REVPOP76 was removed from the model when the change in Rao's V became negative and

TABLE XXIII

STEPWISE DISCRIMINANT SELECTION PROCEDURE

Step	Variable Entered	Variable Removed	Wilks Lambda	Sig.	Rao's V	Sig.	ΔV	Sig.
1	PRFREV76		.86535	.0712	3.5786	.0585	3.5786	.0585
2	PERCHG75		.77545	.0610	6.6601	.0358	3.0815	.0792
3	REVPOP76		.63680	.0214	13.1177	.0044	6.4576	.0111
4	PERCHG77		.57726	.0215	16.8430	.0021	3.7253	.0536
5	STATRS75		.54255	.0290	19.3920	.0016	2.5490	.1104
6	PRFREV75		.50126	.0333	22.8837	.0008	3.4917	.0617
7	STATRS76		.45464	.0339	27.5894	.0003	4.7057	.0301
8	REVPOP75		.42276	.0415	31.4038	.0001	3.8144	.0508
9		REVPOP76	.43769	.0261	29.5483	.0001	-1.8555	.1731

nonsignificant. In the end, seven variables were analyzed.

In Table XXIV, canonical discriminant functions are analyzed. With 100 percent of the variance accommodated in the single function for the model, as specified, a canonical correlation of .7498 for the single function, and a Wilks' Lambda of .43769, this list of discriminating variables provides a very good degree of separation between the dependent groups, ENTRY (0,1). With two groups, only a single function is possible. The Wilks' Lambda of .43769 corresponds to a chi-square of 16.112 with a significance of .0241. A lambda of this size or smaller has a .0241 probability of occurring by chance. If the canonical correlation (R_c = .74987) were squared (R_c^2 = .56231), it would indicate the amount of variance in the single function explained by the two discriminant groups, ENTRY (0,1).

Table XXV displays the unstandardized and standardized canonical discriminant function coefficients. The unstandardized coefficients are used to obtain a discriminant score for the single function by multiplying each coefficient by the respective variable value, and summing the products plus the constant, market by market. Standardized coefficients represent the number of standard deviations that variable is away from the mean for all variables in the single function. Further, the standardized coefficients represent the relative contribution of the variable to the function. In the end, markets are classified into the group with a pattern most like its own.

TABLE XXIV

CANONICAL DISCRIMINANT FUNCTIONS

Percent of Variance	Canonical Correlation	Wilks Lambda	Chi-Squared	DF	Sig.
100.0	.7498715	.4376927	16.112	7	.0241

TABLE XXV

CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

Variable	Standardized Coefficients	Unstandardized Coefficients
PERCHG75	1.51339	16.10863
PERCHG77	.58397	7.51070
REVPOP75	- .82899	- .26936
STATRS75	- 4.12087	- 800.06640
STATRS76	3.55897	753.24180
PRFREV75	4.76402	37.75887
PRFREV76	- 5.97474	- 42.23632
(CONSTANT)		3.16520

Of the 218 cases (markets) processed for ENTRY78, unfortunately 193 had at least one missing discriminating variable, leaving a total of 25 cases used in the analysis. Appendix C identifies the 25 markets and their respective discriminant scores. Table XXVI displays the output of the discriminant analysis, and shows that all markets were correctly identified in this model.

TABLE XXVI

CLASSIFICATION RESULTS

Actual Group	N	Predicted Group Membership 0	Predicted Group Membership 1
NO ENTRY (0)	21	21 (100.0)	0 (0.0)
ENTRY (1)	4	0 (0.0)	4 (100.0)

Percent of Grouped Cases Correctly Classified -- 100%

Table XXVII shows the classification function coefficients required to apply the discriminant model on a market-by-market basis. Measures from the seven discriminating variables, plus the constant, are used to generate a classification score for each of the ENTRY and NO ENTRY groups. The classification equation for either group can be expressed as

$$C_i = c_{i1}\ \text{PERCHG75} + c_{i2}\ \text{PERCHG77} + c_{i3}\ \text{REVPOP75} + c_{i4}\ \text{STATRS75} + c_{i5}\ \text{STATRS76} + c_{i6}\ \text{PRFREV75} + c_{i7}\ \text{PRFREV76} + k_i \quad (13)$$

where C_i is the classification score for either the ENTRY or NO ENTRY group, c_i are the coefficients listed in Table XXVII, and k_i is the constant. There will always be a separate classification score calculated for each group, ENTRY/NO ENTRY, with the market assigned to the group with the highest classification score.

TABLE XXVII

CLASSIFICATION FUNCTION COEFFICIENTS FOR ENTRY78

Variable	0	1
PERCHG75	-44.1305	3.6394
PERCHG77	-.3092	21.9637
REVPOP75	1.6322	.8334
STATRS75	2433.4080	60.8185
STATRS76	-1456.7040	777.0270
PRFREV75	-104.2404	7.7331
PRFREV76	131.4837	6.2322
(CONSTANT)	-16.9292	-12.1911

Based on the results of the regression analysis of NUMSTA78 and this analysis of ENTRY78, the entry of new radio station outlets in a market is directly proportional to the activity of that market. The regression and discriminant analysis support the fifth research hypothesis, that entry of a new radio station into a market is dependent upon changes in relationships within and among select market and station variables over time.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this exploratory study was to determine which market and station characteristics were the best predictors of the number of stations per market (NUMSTA), and the entry of new stations into the marketplace (ENTRY). In addition, another purpose of this study was to test specific relationships that exist in radio markets, and in turn what bearing these relationships have on the dependent variables.

Earlier studies into the behavior of broadcast stations maintain that market variables play a significant role in determining the financial behavior of radio properties, and the pattern of new station entry. For example, Saunders examined the relationships between market characteristics and station financial variables in 1964.[1] Unfortunately, this study was limited to a single year, precluding all but a simplistic look at the correlations between individual station and market variables. Thus, the problems of collinearity, or benefits of developing a lagged model were never addressed.

In 1971, Levin published a study of new station entry in markets of over 50,000 population between 1939 and 1950.[2] For his study, entry was not a discrete variable but simply the aggregate number of stations on-the-air. The other criterion variable, per-station income, was used to demonstrate a "lagged" relationship between the two variables. The conclusion was, that the rate of change in per-station income during a previous time period would have a positive effect on AM station entry during the current time period. In turn, the entry of a station in the current time period would tend to decrease per-station income.

The problems of using "income" have been covered by this author and others, and as with the Saunders study, Levin only examined AM stations. Since 1970, a clear majority of the growth in this industry has been in the FM service. The exclusion of FM data in previous research is only one justification for renewing this investigation. Another is the overall simplicity of these earlier efforts. For example, Saunders attempts to explain the performance of radio stations using simple correlations between station and market variables which display an extremely high degree of multicollinearity. Levin, on the other hand, uses a single lagged variable in an attempt to explain new station entry. As his own research demonstrates, the largest amount of variance explained within his model comes from a rank-order correlation of $r = .49$ ($r^2 = .24$).

The door was essentially open to a more exhaustive treatment of market-station relationships, and ultimately the investigation of new station entry. Using most of the variables employed in earlier studies, this research examines 218 radio markes over a six-year period, 1973 to 1978. In turn, a number of new variables not introduced in previous research were covered.

The relationships between station and market variables in this study were, overall, as expected. In a majority of cases, correlations were strong, very dependable, and consistent with earlier research. However, because this study incorporates variables not previously considered, with more extensive treatment, additional discussion is called for.

First, previous studies document the close relationship between market variables like population, households, total retail sales and personal income, and the financial performance of broadcast properties. Yet these earlier studies did not address whether these relationships were consistent market-to-market, regardless of size. Because of the collinearity of these market variables, it is unnecessary to test every relationship. For this study, only total retail sales (TRS) and total radio revenue (TOTREV) were selected for initial study.

The Pearson correlation coefficient between TRS and TOTREV is strong and highly dependable (r_p = .973). It would be reasonable to assume that a single variable, total retail sales (TRS), is an adequate predictor of total radio revenue (TOTREV) in the market. Yet, this bivariate correlation says nothing about the relationship between these two variables, market-to-market. If a new index were generated by dividing total retail sales by total radio revenue, and multiplying the resultant by 100, the product would be the percentage of retail sales captured by the aggregate stations in each market, or individual market index (IMI). If total retail sales were a good predictor of total radio revenue, one would expect the percentage to vary little, market-to-market. If, on the other hand, one expected differences in levels of radio station management expertise between markets, differences in levels of cross-media competition, or differences in market economics, then another conclusion might be warranted. As was demonstrated in this study by the one-way ANOVA between individual market index (IMI) and the market identification variable (ID), significant differences do exist in these relationships between markets over time.

Second, if significant differences do exist between markets based on the relationship of retail sales to radio revenue, then this index might be used as a relative measure of new station entry. If the variable IMI were calculated for all 218 markets over the six-year period (1973-1978), a total of 1308 observations, then some assumptions could be made concerning the impact of this index. For example, relative to the mean IMI per year, do those markets that fall below the mean have a higher probability of new station entry?

In order to test this proposition, markets with IMI's falling one standard deviation below the mean IMI for that year were coded "-1." Those markets between one standard deviation below and one standard deviation above the mean were coded "0", and those with an IMI above one standard deviation were coded "+1." This classification scheme developed a new variable, the normality index (NINDX). Both rank order correlation coefficients and an analysis of variance demonstrate that no significant difference exists between market IMI's with respect to the NINDX classification and new station entry (ENTRY).

Third, it is recognized that no radio market operates in a vacuum. That is, the relationship of one radio market to the next closest radio market could have a bearing on the financial behavior of the market under study, especially if the market next door is larger. If the number of radio stations a market can support is based, to some degree, on the ability of the market to support those stations, then any factor which would tend to diminish or siphon off radio revenues would also tend to have a negative impact on new station entry.

To test this proposition, the distance between each of the 218 test markets and the next closest market with equal or greater population was noted. This became the new variable for distance (DIST). It then became a relatively easy matter to correlate the relationships between DIST and the various market and station characteristics. As was demonstrated in this study, DIST had a positive effect on both the total radio revenue available in a market, and the overall efficiency of stations in capturing available revenue.

Fourth, as indicated earlier in Table IX, the mean IMI fluctuates year-to-year, probably in response to the aggregate pressures of the national and local economies. At the same time, this figure provides a reasonable annual index of the aggregate performance of radio stations across the country with respect to their individual, local economic environment (e.g., total retail sales). Thus, if the mean IMI is used, year-by-year, to develop a "potential" radio revenue figure for each market, this new variable (POTREV) could be measured against the actual revenue figure (TOTREV) to document the performance of each station in the 218 test markets. In the end, the potential radio revenue figure (POTREV) would be compared to the actual radio revenue reported (TOTREV), and a new index indicating the assumption of potential radio revenue generated (RDINDX). In theory, one might expect that those markets that show the greatest distance between the actual radio revenue generated, and the expected or potential revenue calculated, to be the "best" candidates for new station entry.

Unfortunately, the relationship between ENTRY and this new variable RDINDX was extremely small, negative and not significant at the .05 level of confidence. Thus, the level of potential revenue assumption, using a national index, was demonstrated to be unrelated to new station entry.

Finally, the question of new station entry was approached in a direct manner. Given a substantial list of market and station variables, it should be possible to identify a group or subset of variables which influence the aggregate number of radio stations in a specific market. This can be accomplished in two ways. First, it may be possible to estimate the number of stations a market is capable of holding. When compared to the actual number of stations on-the-air, some assumptions might be made concerning the introduction of a new radio outlet. Second, it may be possible to identify the specific point at which a market becomes ripe for entry, regardless of the current number of stations on-the-air.

In order to accommodate the large number of variables employed in this study, a method was needed to reduce the variable set and thereby eliminate as much multicollinearity as possible. Factor analysis was used to examine the entire variable set, with the application of the principal components method and varimax rotation. In the end, three select factors appeared. A single variable was selected, one from each factor, to be representative of all loadings within each factor. Those three variables were the population of the SMSA (SMPOP), market rank (RANK), and the individual market index (IMI).

The importance of the three select variables deserves some discussion. First, market SMSA population (SMPOP) provides the model with a continuous measure of market size, an obvious factor in the number of stations per market. The second variable, market rank (RANK), is almost the inverse of population, but more correctly identifies the importance of a specific market to media buyers at the national level, since some advertisers make buys according to rank (e.g. buy stations in the top 50 markets). The final variable, the individual market index (IMI), is the ratio of retail sales to total radio revenue. This variable reflects the interaction of station and market revenues.

With 1978 as a typical year, the three variables were used in a regression equation as independent variables to examine their collective impact on the variance of the dependent number of stations (NUMSTA78). Analysis indicated that these three variables account for more than 78 percent of the variance of the dependent NUMSTA78 ($r^2 = .78921$) for 1978. Thus, this three-variable model would provide a reasonable approximation of the aggregate number of radio outlets per market.

The obvious problem is in using the independent variables from a single year to predict a dependent variable from that same year. If the amount of variance accounted for in a lagged model of these same three variables could not improve on the single year regression equation, then application of this model, as specified, would be relatively useless.

The three independent variables were tested over a three-year period prior to 1978, and entered into the step-wise procedure of multiple regression with the dependent NUMSTA78. The results indicated that three variables, SMPOP77, RANK77 and IMI75, accounted for more than 80 percent of the common variance with the dependent NUMSTA78 (r^2 = .80106). Thus, the lagged model provided a better fit, although marginal difference, with the dependent variable.

Finally, it may be possible to identify the point of entry for new stations within a test market. To do so, it requires a new variable set to be generated. As previous correlation matrices demonstrated, the discrete variable ENTRY (0,1) was not highly correlated with most market variables (e.g., SMPOP, TRS, BPI, RANK, etc.). If the original variable set offers little to identify those points in time where entry is likely to occur, new variables must be generated. In this case, the new independent variables are actually indices or relationships among the variables already discussed. For example, percentage change in total radio revenue (PERCHG), radio revenue per capita (REVPOP), average radio revenue per station (AVGREV), the number of radio outlets per 100,000 population (STAPOP), the number of stations per $1,000,000 in total retail sales (STATRS), and the percentage of total radio revenue going to FM radio stations (PRFREV). Rather than using this new list of independent variables along with all those previously generated, only IMI, COMPIN, AVGREV and RDINDX were retained from the original list for further analysis.

Using discriminant analysis, it is possible to test this new set of ten independent variables and select those which allow for the greatest separation between the dependent groups ENTRY (0,1). Again, 1978 was used as the base year for the dependent ENTRY, with the independent variables examined over the previous three years (1975-1977). The discriminant analysis produced seven variables that provided a good degree of separation between the dependent groups, with over 50 percent of variance of these variables explained by the two discriminant groups (R_c^2 = .56231). The discriminating variables were PERCHG75, PERCHG77, REVPOP75, STATRS75, STATRS76, PRFREV75, and PRFREV76.

In the end, the discriminant model was tested against the original data set. Of the 25 cases where there was no missing values in any of the discriminating variables, the model correctly identified the point (year) of entry, with 100 percent of the grouped cases correctly classified.

Conclusions

This study found that most independent variables correlated meaningfully with the dependent NUMSTA. Based on previous research, and the findings of this study, it is safe to assume that most market characteristics would continue to show a positive, very dependable relationship with the number of stations in a market (NUMSTA) in the future. Only those variables indicating the relationships between total retail sales and total radio revenues on a national and local scale (MEANIMI, IMI), the level of media competition (COMPIN), the diversity of radio station ownership in a test market (DIVER), and the level of assumption of potential radio revenue (RDINDX), demonstrated a negligible or insignificant relationship with the dependent variable. The negative relationship between number of stations in a market (NUMSTA) and market rank (RANK) was expected.

Covariations between the dependent variable NUMSTA and independent variables suggest that linear relationships exist. The high degree of interrelationship between the independent variables was evident in the r-matrix (see Table XI). This multicollinearity was demonstrated when a clear majority of the market variables loaded on a single factor during factor analysis. For example, six independent variables were so highly related that rotation would have been impossible with factor analytic techniques had these same variables been examined exclusively. Any one of the six variables (SMPOP, TRS, BPI, TOTREV, AVGREV, POTREV) could be selected to describe the over-all covariation of market characteristics. Three variables previously thought to be indicative of station activity in the marketplace (e.g., TOTREV, AVGREV and POTREV), are actually more descriptive of the over-all market behavior and therefore were dropped from further consideration.

A general conclusion from this analysis might be that aggregate station financial performance is directly related to the economic performance of the marketplace. A linear relationship does exist; however, this conclusion is too broad and does not recognize unique differences that exist between markets. This concern was addressed when the relationships between two highly correlated variables, total retail sales (TRS) and total radio revenue (TOTREV), were examined in 218 markets over the six-year test period. The results of the a posteriori contrasts test revealed that unique subsets of markets, based on the IMI, do not appear. It is therefore impossible to say with any degree of certainty, as was suggested by Chapman,[3] that markets can be identified and grouped together. Markets previously recognized as outliers, or those markets with extremely low IMI's relative to the national average, may perform this way for many reasons, some of which are outside the scope of this study. For example, levels of radio station management expertise, market unemployment trends, etc. Therefore, while the IMI variable may be a good index of aggregate station-to-market performance, it can only be applied on a market-to-market basis.

If an index like the IMI variable is helpful in describing the relationship of station and market variables, it may also be of assistance in identifying the year of entry for a new radio outlet. In order to use the IMI as a measurement tool, a point or points of reference must be established. In this study, the mean IMI for each year was used for this function, and boundaries established that correspond to one standard deviation above and below the mean set to identify outliers. This established a range, or index of normality (NINDX). Markets that fell one standard deviation below the mean IMI for a given year were coded "-1", those within one standard deviation below and above the mean were coded "0", and those markets with an IMI above one standard deviation were coded "+1". The research question was whether markets classified or coded as "-1", demonstrated a greater probability for new station entry? In other words, in markets that might be described as "less efficient" in generating advertising revenue, is there a greater propensity for entry?

The conclusion, based on analysis of variance, is that no significant difference between markets exists using the NINDX coding scheme (-1,0,+1), when evaluating these same markets for entry of a new station (ENTRY). It would seem that markets which consistently generate lower IMI's do so because there are, in fact, fewer advertising dollars available in the marketplace. Examination of these markets over the six-year test period (1973-1978), indicates that poorer performance relative to the national mean IMI is consistent, not an anomaly, and probably not due to the aggregate incompetence of station management in these markets.

One reason for the poor performance of stations in these markets may be the proximity of the test market to other radio markets of similar or greater population. In other words, there may be a shift in advertising revenue to the larger radio market if it is too close. Media buyers may tend to allocate advertising budgets in a disproportionate manner to stations in these close, but larger markets. To test this proposition, the distance between test markets and the next closest market of equal or greater population was noted. This new variable, called the distance index (DIST), was correlated with select market characteristics. The results, listed in Table XII, demonstrate the distance is related positively to the individual market index (IMI), and to the estimated efficiency of the market in capturing projected advertising revenue (RDINDX). The conclusion is, therefore, that distance between markets has a small, positive impact on the aggregate ability of radio stations to generate advertising revenue. This does not suggest that radio stations in these outlier markets are not profitable, only that their ability to generate advertising revenue is capped, to a certain extent, by their proximity to a larger market. In the end, the greater the distance between radio markets, the greater the relative earning potential for stations in the smaller market.

Finally, there is the question of how to determine the number of stations a market is capable of holding, or the point (year) at which a new station can enter a market?

There are two ways to approach this question. In the first, it may be possible to "predict" the number of outlets a market is capable of supporting through examination of select existing station and market characteristics. The second approach is to estimate the point of entry through the study of changes in relationships between variables, or changes in the variables themselves over time.

The results of this study indicate that the number of stations in a market is determined, to a large extent, on the economic characteristics of the marketplace. The only question being what form these characteristics or variables take? Referring to Table XI, the dependent variable number of stations (NUMSTA) is highly correlated with most of the market variables (e.g., total retail sales, buying power index, SMSA population, etc.). Therefore, the link between market characteristics and the number of radio outlets is established.

Unfortunately, a majority of the independent variables are also highly correlated among themselves. The immediate problem in dealing with this variable set was one of multi-collinearity. To deal with this problem, the r-matrix was subjected to factor analysis with varimax rotation. The results were that the original variable set loaded on only three factors. One variable was selected to represent each factor, and those three variables were used in a regression equation to estimate the dependent NUMSTA.

The results of the initial regression analysis, using measures from 1978 only, demonstrated that the linear combination of the three variables identified in the factor analysis (e.g., SMPOP78, RANK78, and IMI78) were an improvement over the bivariate coefficients. The largest single correlation with the dependent NUMSTA reported in the r-matrix was with the variable TRS ($r = .807$), where slightly over 65 percent of the common variance was explained ($r^2 = .65125$).* Looking at the first regression equation, over 78 percent of the variance in the dependent NUMSTA78 was accounted for ($r^2 = .78921$), for a net increase in variance explained of nearly 14 percent. Thus, in a static model, where both the dependent and independent variables are from the same year, the linear model provides a very good estimation of the number of stations for that same year.

The application of a static regression model provides little information about the future. It is only a tool to evaluate what has already happened. In this case, the analysis would be ex-post-facto, up to a year later when measures of market variables from the previous year were finally published and available. Therefore, to address the question of predictability, the three independent variables (SMPOP, RANK and IMI) were lagged up to three years in an attempt to improve upon the amount of variance explained.

*Variables like TCOMP were excluded from comparison with NUMSTA because they are functions of that variable.

All measures of the three independent variables were entered into the stepwise selection process of multiple regression for the years 1975 through 1977. Again, the dependent variable was the number of stations in a test market in 1978 (NUMSTA78). The results indicated that SMPOP77, RANK77 and IMI75 met the requirements for entry into the regression model, and these three variables accounted for slightly more than 80 percent of the variance in the dependent NUMSTA78 ($r^2 = .80106$).

In regression analysis, it is possible to test for autocorrelation (e.g., that the residuals are not independent from one observation to the next). For each model, the Durbin-Watson statistic was calculated. With 132 observations, it is safe to say that statistics as high as those calculated for both the static (D.W. = 2.0749) and dynamic (D.W. = 2.0258) regression models demonstrate, at the .01 level of significance, that positive autocorrelation is not a problem.

The results of the lagged model were not the improvement hoped for over the static equation. They did, however, provide valuable information concerning the interaction of market variables over time. The results indicate that market variables in their static, functional form are not good predictor variables. While the amount of common variance explained in both the standard and lagged models was very good and significant at the .05 level of confidence, the lagged model suggested that market variables were, at best, coincident indicators not leading indicators of NUMSTA. This conclusion is based on Table XVIII, where both SMPOP and RANK coefficients demonstrate a progressive correlation over time with the dependent variable NUMSTA78. In other words, no single lagged measure provided an ideal or "best fit" solution with the dependent variable. This progression indicates that had the measures for 1978 for these two variables, SMPOP and RANK, been entered into the model as in the first equation, they would have been selected by the stepwise procedure. The small improvement in variance explained in the lagged equation obviously comes from the independent variable IMI75, a ratio of total retail sales to total radio revenue.

The only conclusion warranted is that market variables cannot be used in lagged models. The reason rests with the fact that they are not leading indicators of market activity, but at best are coincident indicators, or those whose movement coincides roughly with the current performance of economic activity.[4] Therefore, unless the model is changed, the best the current list of variables can accomplish is to provide the ex-post-facto system of checks and balances on the number of stations in a market.

Where a dynamic process like "entry" is examined, it must be done with dynamic variables (e.g., those that measure relationships between variables, or among variables over time). To explain differences that might exist between markets where entry will and will not occur, the existing variable list was modified to generate new indices of economic activity. In addition to the four indices already incorporated in the study (e.g., IMI, COMPIN, AVGREV and RDINDX), six new variables were generated. These were measures of change in total radio revenue year-to-year (PERCHG), total radio revenue per capita (REVPOP), average radio revenue per capita (AVGPOP), radio stations per 100,000 population (STAPOP), radio stations per $1,000,000 in total retail sales (STATRS), and percentage of total radio revenue captured by FM stations (PRFREV).

The four existing variables, plus the six new indices, were measured over three years between 1975 and 1977, and entered into stepwise discriminant analysis. Of the original 30 variables entered, only seven variables were retained for analysis and used to discriminate between the two groups, ENTRY78 (0,1). The seven variables retained were PRFREV76, REVPOP75, PERCHG75, PERCHG77, STATRS75, PRFREV75 and STATRS76.

The results of the discriminant analysis indicated that these seven variables provided a very good degree of separation between the dependent groups, with over 50 percent of the variance explained (R_c^2 = .56231). Of the 218 cases processed, only 25 were used in the discrimination, but all 25 were correctly identified later during the classification phase of the analysis.

The value of discriminant analysis rests with the ability of the researcher to test the contribution of select variables in explaining the difference between two groups.

In the case of this analysis, the seven discriminating variables did a very good job in distinguishing between the ENTRY and NO ENTRY markets. There are two methods available to the researcher in applying a discriminant model. First, it is possible to utilize the canonical discriminant function coefficients to generate discriminant scores. By comparing the discriminant scores to the group centroids, it may be possible to classify markets into the ENTRY or NO ENTRY groups. The second, and preferred method is to utilize the classification function coefficients for each group (ENTRY and NO ENTRY), whereby the market is assigned to the group with the highest classification score.

Upon examination, the seven discriminating variables employed in this research fall into two categories. First, there is the variable PERCHG, indicating a percentage change in a single variable, total radio revenue, year-to-year. Second, there are the variables like REVPOP, STATRS and PRFREV, that demonstrate relationships between two variables within a given year. Further, three variables, PRFREV, PERCHG and STATRS, entered the discriminant model twice, at different points in time, which may indicate that they too should be measured year-to-year.

With only 25 out of 218 radio markets entering the discriminant model, a major concern must be systematic bias in the selection process. The number of markets analyzed was restricted due to the FCC reporting techniques and does not appear to be systematic in any way. Further, the 25 markets would seem to cover a wide cross-section of the country, ranging in market rank from Indianapolis, Indiana (33) down to Sherman, Texas (308).

Regardless, the discriminant model presented lends itself to the conclusion that entry of radio stations in markets is predicted on a dynamic process, and can only be determined through the examination of changes in total radio revenue, radio revenue per capita, number of stations per $1,000,000 in total retail sales, and the percentage of total radio revenue captured by FM stations. In conclusion, entry into radio markets by new stations is dependent upon the relationships between station and market variables, as well as the dynamic economic activity of the marketplace.

Recommendations

The recommendations which can be drawn from this study fall into two general categories. The first category deals with application of the various results and their impact on telecommunication policy. The second deals with further research in the area of radio markets, and the entry of new radio station outlets in those markets. The policy recommendations are considered first.

Since the late 1950's, the Federal Communications Commission (FCC) has attempted to define the term "economic injury." The pleadings requirements to raise the *Carroll* issue are set forth in *Missouri-Illinois*, but were later modified and restated in WLVA and Folkways to exclude the conditions of "preknowledge" and "exact calculations." These criteria are presented in Appendix A.

What should be evident after reading the pleadings requirements as developed in Missouri-Illinois, is that the thrust of these guidelines surround a determination of the impact of new station entry based on (1) existing radio station income, (2) perceived injury, and (3) some measure of total advertising revenue potential in the marketplace. This last point seems to be paramount. If there is sufficient potential revenue in the marketplace for the addition of a new radio outlet, then can there be a sustained case for economic injury? The answer, based on previous court rulings, would be an unqualified no. The court in Southwestern placed the burden on the petitioner to plead specific factual data sufficient to establish a prima facie case of injury to the public interest in order to meet the requirements for a hearing. Thus, if it were demonstrated that sufficient "economic" room existed for a new station, claims of injury to the public interest would be speculative at best.

The models developed in this study directly address the problem of economic injury. Rather than trying to predict the amount of potential revenue available, they examine market characteristics to ascertain when sufficient room exists for increased competition. In support of this approach, the FCC has stated on numerous occasions that, economic conditions permitting, the public interest is best served by competing broadcast stations.[5]

Of course the application of both the non-lagged regression and the discriminant models are predicted on the availability of both market and station data in the future. While market data are available from a number of sources, station financial information was disseminated on a controlled basis by the FCC. In 1982, as part of an overall move toward de-regulation, the FCC stopped requiring radio stations to file annual financial reports (FCC Form 324). The loss of this valuable source of information was quickly noted by a number of professional broadcast organizations, and a movement is currently underway to independently poll stations for financial data. This effort is being sponsored by a consortium comprised of the National Association of Broadcasters (NAB), the Television Bureau of Advertising (TvB), the Broadcast Financial Management Association (BFM), and others. Their ultimate success in this effort, and the validity of their results, remain a question.

Regardless of which group collects the information, there are a number of lessons to be learned. Certainly station reporting techniques can be improved. First, each station should be counted as a separate entity. The previous FCC policy of allowing AM/FM combinations to be reported as a single entity rendered much of the financial information useless. Second, the aggregate count of stations in the market should reflect the exact number of outlets in the SMSA, regardless of simulcasting. Finally, markets with missing data (e.g., some stations failed to file data) should be identified in the report. Only through accurate reporting techniques can this data be utilized in the future.

With de-regulation also comes the question as to whether economic injury remains a salient issue. Research presented in this study would tend to support the free market concept, and thereby endorse the de-regulation movement. Radio stations, in the aggregate, direct their efforts in an attempt to satisfy their clients, at a profit. Their performance is related to the economic activity of the marketplace, and therefore subject to positive and negative shifts in demand. Their ability to react accordingly will dictate, to a large degree, their success and ultimate survival.

A major argument used by the FCC in promoting de-regulation was that the marketplace was capable of controlling the "business" of radio broadcasting. In a growth economy, those radio stations not attentive to the needs of their various publics would suffer the competitive consequences. In turn, if the public interest is best served by competition, then under de-regulation the issue of "entry" is that much more compelling.

While the Carroll Doctrine may no longer be politically important, the economic realities of competition keep the issue alive for current and future broadcast station owners.

Adoption of the models presented in this study could help to insure that radio markets remain in equilibrium, expanding only as fast as market conditions dictate. Existing station owners could anticipate the arrival of new competition, while entrepreneurs could gauge the filing of construction permits on dynamic market conditions.

Radio broadcasting exists in a monopolistic competition market structure. Positive profit by existing stations will trigger entrance of new broadcast outlets which, in turn, will drive down price to the zero profit level. Conversely, if the existing stations are already at a negative profit level, some stations may be forced off the air, leaving more business for the survivors. The result is that demand and prices go up. Traditionally, if entrance to the broadcast industry were free, the long-run equilibrium would be in a zero profit position. Of course in broadcasting, entry is not free. At some point the market will no longer respond due to technical considerations, that is there are no available frequencies left. Excess profits in this case will likely encourage new technologies to enter the marketplace as close substitutes.

The second category involves the continuation of research into radio markets and the aggregate performance of stations therein. The results of this study are obviously not exhaustive, and as with most exploratory research are plagued by a few problems. One of the major concerns of the author was the volume of missing aggregate station financial data, in large part created by questionable FCC reporting techniques. Until 1978, the FCC allowed FM stations associated with AM stations (e.g., AM/FM combinations) to report revenues as a single entity. Further, independent FM stations were reported separately. Because the FCC required a minimum of three stations to report revenues in order to publish financial data, this requirement often provided an inaccurate picture of radio economic activity in small to medium markets.

In that a number of new variables were created within this study as a function of aggregate station financial data, the problem was compounded. Where pairwise treatment of data were possible, the problem was accommodated within the SPSS computer package. However, where listwise treatment was required, as in discriminant analysis, the impact was obvious. To remedy this problem in the future, it is recommended that the researcher (1) gain access to per-station data on FCC computer tapes, or (2) plan an extended visit to the Washington, D.C., area in order to ascertain the actual aggregate count of stations per market and related financial data.

Sufficient information is contained in this study to support continued research. A detailed analysis of the impact of the individual market index (IMI) is recommended. While the relationship between retail sales and radio revenue has been documented, differences in the aggregate performance of stations as measured by the IMI index were not addressed. These differences could help explain why some markets perform better than others, and to establish potential revenue per market, absent future FCC reporting of financial information. Where this study did disclose the impact of distance (DIST) on the aggregate performance of broadcast stations, other factors were not discussed. Factors which may explain differences in the performance between markets include the specific demographics of the markets (e.g., age, sex, education, minority populations, etc.). Furthermore, if competition (TCOMP and COMPIN) were indexed more meaningfully than was possible in this study it might become a factor in the differences.

A new lagged regression model (linear or log/linear) to estimate the number of radio stations in a market at some future time is required. Recognizing the inappropriate use of static market variables in lagged models, it is recommended that future research investigate the possibility of employing a lagged dependent variable (NUMSTA) within the new model. Another possibility would be to employ the dynamic variables utilized in the discriminant analysis in future regression models. The success Levin enjoyed in using a single dynamic variable, per station income, lends support to this proposal.

Finally, additional research is called for to identify new variables that might explain additional variance in the discriminant model presented in this study. While the model presented here was extremely successful in identifying the ENTRY and NO ENTRY groups, the canonical correlation and Wilks' Lambda suggest that a good deal of unexplained variance remains. The functional form of the independent variables employed in this study might be changed. For example, rather than examine relationships between two variables from a given year, it may be more helpful to examine these same relationships over time. The change in a single variable, or relationship between variables, year-to-year may provide additional information as to which dynamic characteristics of a market contribute to growth.

Until such time that new research in this area is undertaken, the formulae presented in this study may be utilized to examine radio markets, expand existing service where appropriate, and initiate new service to communities throughout the United States.

FOOTNOTES

[1]James G. Saunders and Arthur R. Till, An Investigation of Possible Correlates of the Financial Behavior of Broadcasting Stations, Report No. 1, Ohio University Center for Research Broadcast Management and Economics (Athens, 1966).

[2]Harvey J. Levin, The Invisible Resource: Use and Regulation of the Radio Spectrum (Baltimore, 1971).

[3]"How Much Volume Should You Do?," Broadcasting, LIX (July 11, 1960), pp. 82-84.

[4]G. H. Moore and J. Shiskin, Indicators of Business Expansions and Contractions, (New York: National Bureau of Economic Research, 1967), pp. 8-28.

[5]5 FCC 464 (1938); 3 FCC 386 (1936); 4 FCC 594 (1937); and 5 FCC 563 (1938).

APPENDIX

APPENDIX A

CRITERIA FOR ECONOMIC INJURY

The following presents the pleadings requirements as presented in Missouri-Illinois, 3 R.R. 2d 232 (1964).

(1). What is the total amount of retail sales in the community and in the area for the preceding three years? If sales are in a decreasing pattern, set forth the reasons which should include information as to any unusual economic conditions in the area.

(2). What is the total number of businesses in the community and the area?

(3). What is the total advertising revenue potential in the community and the area?

(4). What is the amount of local advertising revenue actually earned by your station in the community and the area?

(5). Set forth, for at least the three preceding years, your total revenues, total expenses, net profit or loss and the average number of employees.

(6). How many of the existing businesses in the community and the area do not now advertise on the radio?

(7). State, in detail, the specific advertisers that would shift their advertising to the proposed station. How many advertisers will split their advertising time between the existing station or stations and the proposed station?

(8). What are the other competing advertising media in the community and the area?

Appendix A

(9). State, in detail, how a grant of this proposal would cause a net loss or degradation of program service to the area.

(a). What public service spot announcements do you now broadcast?

(b). How many public service spot announcements do you broadcast each week?

(c). What public service programs would have to be discontinued? Spot announcements?

(d). What public service programs will have to be shifted to other time segments? Spot announcements?

(e). As to (c) and (d) what percentage of the total broadcast time is represented by the public service programming?

(f). What is the cost of carrying these programs and what saving will be effected in dropping or shifting this programming? What is the cost of carrying the public service spot announcements and what saving will be effected in dropping or shifting spot announcements? What programming personnel changes will be required?

(10). What information, if any, do you have that some or all of the public service programming will not be carried by the proposed station?

(11). Will a grant of the proposal require you to make substantial changes in your total present program format and policies? State full details.

(12). Set forth any other information which is sufficiently related to the economics of broadcasting, including the specific relationship between any assumed losses in revenue to the withdrawal of particular programs or program services in support of the question raised in petition to deny concerning the inability of the area to support another broadcast station without loss or degradation of program service to the area.

APPENDIX B

RADIO MARKETS INCLUDED IN STUDY

Abilene, TX
Akron, OH
Albany, GA
Albany, NY
Albuquerque, NM
Alexandria, LA
Allentown, PA
Amarillo, TX
Anchorage, AK
Ann Arbor, MI
Anniston, AL
Appletown-Oshkosh, WI
Asheville, NC
Atlanta, GA
Atlantic City, NJ
Augusta, GA
Austin, TX
Bakersfield, CA
Baltimore, MD
Baton Rouge, LA
Battle Creek, MI
Beaumont, TX
Billings, MT
Biloxi, MS
Binghamton, NY
Birmingham, AL
Bloomington-Normal, IL
Boise, ID
Boston, MA
Bridgeport, CT
Buffalo, NY
Burlington, NC
Canton, OH
Cedar Rapids, IA
Champaign, IL
Charleston, SC
Charleston, WV
Charlotte, NC
Chattanooga, TN
Chicago, IL

Appendix B

Cincinnati, OH
Cleveland, OH
Colorado Springs, CO
Columbia, SC
Columbus, OH
Corpus Christi, TX
Dallas/Ft. Worth, TX
Davenport/Rock Island, IA/IL
Dayton, OH
Daytona Beach, FL
Denver/Boulder, CO
Des Moines, IA
Detroit, MI
Duluth/Superior, MN/WI
El Paso, TX
Elmira, NY
Erie, PA
Eugene/Springfield, OR
Evansville, IN/KY
Fargo/Moorhead, MN/ND
Fayetteville/Springdale, AR
Fitchburg-Leominster, MA
Flint, MI
Florance, AL
Fort Smith, AR/OK
Fort Wayne, IN
Fresno, CA
Ft. Lauderdale, FL
Ft. Myers, FL
Gadsden, AL
Gainesville, FL
Galveston, TX
Gary/Hammond/E. Chicago, IN
Grand Rapids, MI
Great Falls, MT
Green Bay, WI
Greensboro/Winston Salem, NC
Greenville/Spartanburg, SC
Hamilton/Middleton, OH
Harrisburg, PA
Hartford, CT
Honolulu, HI
Houston, TX
Huntington/Ashland, WV/KY
Huntsville, AL
Indianapolis, IN
Jackson, MI
Jackson, MS
Jacksonville, FL
Johnstown, PA

Appendix B

Kalamazoo, MI
Kansas City, MO/KS
Kileen/Temple, TX
Kingsport/Bristol, TN/VA
Knoxville, TN
LaCrosse, WI
Lafayette, LA
Lake Charles, LA
Lakeland/Winter Haven, FL
Lancaster, PA
Lansing/E. Lansing, MI
Las Vegas, NV
Lewiston/Auburn, ME
Lexington, KY
Lima, OH
Lincoln, NE
Little Rock, AR
Lorain/Elyria, OH
Los Angeles, CA
Louisville, KY/IN
Lubbock, TX
Lynchburg, VA
Macon, GA
Madison, WI
Manchester, NH
McAllen, TX
Melbourne, FL
Memphis, TN/AR/MS
Miami, FL
Midland, TX
Milwaukee, WI
Minneapolis, MN/WI
Mobile, AL
Modesto, CA
Monroe, LA
Montgomery, AL
Muskegon, MI
Nashville, TN
Nassau-Suffolk, NY
New Britain, CT
New Haven, CT
New London, CT
New Orleans, LA
New York, NY
Newark, NJ
Newport News, VA
Norfolk, VA
Northeast Penn, PA
Odessa, TX
Oklahoma City, OK

Appendix B

Omaha, NE

Orlando, FL

Oxnard, CA

Parkersburg, WV

Pensacola, FL

Peoria, IL

Petersburg, VA

Philadelphia, PA

Phoenix, AZ

Pine Bluff, AR

Pittsburgh, PA

Pittsfield, MA

Portland, ME

Portland, OR

Poughkeepsie, NY

Providence, RI

Provo, UT

Pueblo, CO

Raleigh, NC

Reading, PA

Reno, NV

Richland, WA

Richmond, VA

Riverside, CA

Roanoke, VA

Rochester, MN

Rochester, NY

Rockford, IL

Sacramento, CA

Saginaw, MI

Salem, OR

Salinas, CA

Salt Lake City, UT

San Angelo, TX

San Antonio, TX

San Diego, CA

San Francisco, CA

San Jose, CA

Santa Barbara, CA

Santa Rosa, CA

Sarasota, FL

Savannah, GA

Seattle, WA

Sherman, TX

Shreveport, LA

Sioux City, IA

Sioux Falls, SD

South Bend, IN

Spokane, WA

Springfield, IL

Appendix B

Springfield, MO	Tyler, TX
Springfield, MA	Utica-Rome, NY
St. Cloud, MN	Vineland, NJ
St. Joseph, MO	Waco, TX
St. Louis, MO	Washington, D.C.
Stockton, CA	Waterbury, CT
Syracuse, NY	Waterloo, IA
Tacoma, WA	W. Palm Beach, FL
Tallahassee, FL	Wheeling, WV
Tampa, FL	Wichita, KS
Terre Haute, IN	Wichita Falls, TX
Texarkana, TX	Williamsport, PA
Toledo, OH	Wilmington, DE
Topeka, KS	Wilmington, NC
Trenton, NJ	Worcester, MA
Tucson, AZ	Yakima, WA
Tulsa, OK	York, PA
Tuscaloosa, AL	Youngstown, OH

APPENDIX C

RADIO MARKETS INCLUDED IN THE DISCRIMINANT ANALYSIS BETWEEN ENTRY AND NO ENTRY IN 1978

	Market	Actual Entry	Predicted Entry	Discriminant Scores
1.	Alexandria, LA	1	1	2.0385
2.	Allentown, PA	0	0	.0366
3.	Anniston, AL	0	0	.5998
4.	Appletown-Oshkosh, WI	0	0	-.3459
5.	Baton Rouge, LA	0	0	-.2925
6.	Beaumont, TX	1	1	1.6850
7.	Cedar Rapids, IA	0	0	-.7894
8.	Champaign, IL	0	0	-1.7775
9.	Charlotte, NC	0	0	-.3489
10.	Des Moines, IA	0	0	-2.2364
11.	Elmira, NY	0	0	-.2428
12.	Evansville, IN/KY	0	0	-.6615
13.	Fayetteville, AR	0	0	.2287
14.	Ft. Lauderdale, FL	0	0	.3633
15.	Gadsden, AL	0	0	-1.5553
16.	Indianapolis, IN	0	0	-.2024
17.	Johnstown, PA	0	0	.4601
18.	Kileen/Temple, TX	1	1	3.6947
19.	Provo, UT	1	1	2.5459
20.	Salem, OR	0	0	.9658
21.	Sherman, TX	0	0	-.5024
22.	Southbend, IN	0	0	-2.6849
23.	St. Joseph, MO	0	0	.4737
24.	Trenton, NJ	0	0	-1.9353
25.	Wichita Falls, TX	0	0	.4831

Group Centroids: $E_0 = -.47448$; $E_1 = 2.49101$

SELECTED BIBLIOGRAPHY

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Books, Periodicals and Reports

Besen, Stanley M., and Paul J. Hanley, "Market Size VHF Allocation, and the Viability of Television Stations." Journal of Industrial Economics, XXIV (1975), pp. 41-54.

Dessart, George. Ed. Television in the Real World. New York: Hastings House, 1978.

Dixon, W. J. BMD: Biomedical Computer Programs. Berkeley: University of California Press, 1970.

"Finding Par for Business at Radio Stations." Broadcasting, XXCII (June 19, 1972), pp. 39-40.

Ford, Frederick W. "Economic Considerations in Licensing of Radio Broadcast Stations." Federal Communications Bar Journal, XVII (1961), p. 192.

"How Much of Radio's 'Spot' Leaks into 'Local'?" Television/Radio Age, (February 4, 1974), p. 32.

"How Much Volume Should You Do?" Broadcasting, LIX (July 11, 1960), pp. 82-84.

Kagan, Paul. Communications Investor, No. 89 (February 4, 1975).

Kahn, Frank J. "Regulation of Intramedium 'Economic Injury' by the FCC." Journal of Broadcasting, XIII, No. 3 (Summer, 1969), p. 224.

Kerlinger, Fred N., and Elazar J. Pedhazur. Multiple Regression in Behavioral Research. New York: Holt, Rinehart and Winston, 1973.

Levin, Harvey J. The Invisible Resource. Baltimore: The Johns Hopkins Press, 1971.

Longley, Lawrence D. "The FM Shift in 1945." Journal of Broadcasting, XII (1968), p. 360.

Moore, G. H., and J. Shiskin. Indicators of Business Expansions and Contractions. New York: National Bureau of Economic Research, 1967.

Nie, Norman H., et. al. Statistical Package for the Social Sciences, 2nd ed. New York: McGraw-Hill, 1975.

Park, Rolla Edward, Leland L. Johnson and Barry Fishman. Projecting the Growth of Television Broadcasting: Implications for Spectrum Use. Santa Monica, Calif.: Rand Corporation, 1976.

Saunders, James G., and Arthur R. Till. An Investigation of Possible Correlates of the Financial Behavior of Broadcasting Stations. Athens, Ohio: Ohio University Center for Research Broadcast Management and Economics, 1966.

Schutz, David E. "Is That Station Really a Bargain?" BM/E, (July, 1978), pp. 82-87.

Sterling, Christopher H. "Decade of Development: FM Radio in the 1960s." Journalism Quarterly, XLIIX (1971), pp. 222-230.

Wagner, Paul H. "Changing Growth Patterns in Broadcasting." Journal of Broadcasting, X (1966), p. 337.

"Where Things Stand." Broadcasting, XCVII (October 1, 1979), p. 10.

Yadon, Robert E. "Economic Behavior of Differentiated U.S. Radio Markets, 1971 & 1973." Unpublished report. East Lansing, MI: Department of Telecommunication, Michigan State University, 1976.

Yadon, Robert E. Financial Behavior of Oklahoma Single Station Radio Markets in 1973. M.S. thesis. Stillwater, OK: Oklahoma State University, 1975.

Court and FCC Decisions

Carroll Broadcasting Co. v. FCC, 103 U.S. App. D.C. 246 (1958).

FCC v. Saunders' Brothers Radio Station, 309 U.S. 470 (1940).

Folkways Broadcasting Co. v. FCC, 126 U.S. App. D.C. 123 (1967).

In the Matter of Arthur Lucas, 5 FCC 464 (1938).

In the Matter of Dorrance D. Roderick, 5 FCC 563 (1938).

In the Matter of Fall River Herald News Publishing Company, et. al., 5 FCC 483 (1939).

In the Matter of James E. Davidson, 4 FCC 594 (1937).

In the Matter of Wichita Falls Broadcasting Company, 3 FCC 386 (1936).

KGMO Radio-Television, Inc. v. FCC, 119 U.S. App. D.C. 1 (1964).

Lenawee Broadcasting Co., 48 FCC 2d. 1181 (1974).

Missouri-Illinois Broadcasting Co., 3 R.R. 2d. 232 (1964).

Rhinelander Television Cable Corp., 37 FCC 1071 (1964).

Southwestern Operating Co. v. FCC, 122 U.S. App. D.C. 137 (1965).

Tri-Cities Broadcasting Co., 24 R.R. 691 (1962).

WLVA v. FCC, 459 F. 2d. 1286 (1972).