Determinants of Profit in the Broadcasting Industry

- Evidence from Japanese Micro Data -

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The operating areas of each terrestrial broadcasting station in Japan are geographically divided by a licensing system and form oligopolies in each of their respective markets. These institutional constraints define the market structure, and as a result, affect the business performance of the broadcasting industry. The primary purpose for regulation is based on the “Media Ownership Rule,” a rule designed for preserving “plurality,” “diversity” and “localism” of stations. Similar rules exist in many countries, but benchmarks differ. To this end, if the regulative authority introduced a new regulation framework, it might be useful to improve the financial foundation of the licensed stations, thus preserving the original purpose of the rule. With the rapid progress of digital technology and the increasingly diversified selection of media types, the government needs to urgently review Japan’s old regulations with the aim of giving more freedom in the operation of terrestrial stations and so promote voluntary restructuring.

Based on the above viewpoints, we implemented an econometric analysis with respect to factors that affect on the business performance (especially on profit) of each station. We focus on the terrestrial broadcasting industry because it plays a central role in the Japanese broadcasting system. As a result, we ascertained the following points.

1. Structural parameters: market share of each station has a positive correlation with profit, although market concentration appears to have no correlation.

2. Geographical parameters: the number of households per station and the income per household have positive correlations.

3. Business parameters: the aired ratio of self-produced TV programs has a positive correlation with revenue, although it has a negative correlation with profit.

It is said that geographical environment is quite important for business performance in the broadcasting industry. This hypothesis is strongly supported by our results. Therefore deregulation and subsequent voluntary rearrangement may reinforce the operating basis of each station.

Keywords: Terrestrial Broadcasting Station, Determinants of profit, Principle of Media Ownership Rule, Audience Share, Oligopoly

(JEL Classifications: D43, L13, L82)
1. Background

Recently, it has been said that the business performance of terrestrial broadcasting stations will deteriorate in the near future with the coming drastic change in the business environment. In accord with these misgivings, the regulating authority (the Ministry of Public Management, Home Affairs, Posts and Telecommunications, hereinafter referred to as “MPHPT”) has reviewed the “Media Ownership Rule!” (hereinafter referred to as “MOR”)\(^2\). The MOR was originally designed to preserve “plurality,” “diversity” and ”localism” of the stations\(^3\). It regulates the geographical operating areas of stations; basically following prefectural boundaries as administrative units, and restricts the number of holding or controlling stations as one regulative principle\(^4\). Therefore, it can be said that the MOR and related regulation creates an oligopoly in each of the terrestrial broadcasting markets. Such framework of regulation on the basis of the operating area and the accumulation of station ownership hadn’t been changed at of this time review. On the other hand, the report also pointed out the necessity of discussion and examination in respect to the introduction of other benchmarks such as the number of households or audience share. These kinds of measures might be useful to improve the financial bases of the stations.

The traditional SCP hypothesis is that profit in the broadcasting industry comes from performance (P) in the market induced from market structure (S) and market conduct (C). In this sense, profits are the direct indicators of stable operating foundations for stations. Therefore, in this paper, with respect to terrestrial broadcasting stations, which play a central role in the Japanese broadcasting industry, we empirically estimate the various

\(^1\) The rule for regulating acquisitions or mergers between terrestrial stations forces stations to in principle operate within one prefecture, except for Tokyo, Osaka and the Aichi metropolitan areas. It also restricts the upper limit of the capital ratio: for a broadcasting station within the same service area, one-tenth of voting rights or less, whereas for a broadcasting station within a different service area, less than one-fifth of voting rights. Like this, it has prevented certain stations from having influential power in the mass communication field.

\(^2\) The report issued by the MPHPT (February, 2003) set out their policy that the MPHPT deregulate the MOR and allow mergers of two adjunct local stations, or the operation of a bankrupt station as a subsidiary. As we can see in their report, the MPHPT expects efficient operation and reinforcement of operating foundations, subsequent reservation of high-quality content, and smooth transition to digital broadcasting services by deregulation of the MOR. Especially the MPHPT looks at drastic deregulation of local stations with some conditions because their business performance might be worsened in the near future.

\(^3\) Originally the MOR was designed with two principles: one is the restriction of the number of stations considering the scarcity of frequency; the other is the decentralization of social influence through TV programming.

\(^4\) As an exception, one company is allowed to operate both a middle-wave radio station and a TV station in the same area.
(structural, geographical and business) factors affecting profit; thereby, examining effective institutional factors to enhance operating foundations.

The structure of our paper is as follows. In section 2, we survey previous research. In section 3, we briefly review the economic features of the terrestrial broadcasting industry. In section 4, we explain our base model for estimation. In section 5, we examine the estimation results, and in section 6 we overview the current business environment for each station. Finally, we summarize our results and state the political implications of this paper.

2. Previous Empirical Studies on Television Station Profitability

In discussing their economic analysis of the Japanese broadcasting industry, Takeuchi (1993), Mitsufuji (1995) and Yasuda (2000) used station-based data and focused on the determinants of profit / revenue.

Using the JNN network data, Takeuchi (1993) classified station revenue as main office revenue / branch revenue / key station revenue and showed that the “sum of branch and key station revenue of each station” has a significant positive correlation with the number of households and GRP (Gross Rating Point). He also showed that the “sum of station revenue in a certain prefecture” has a negative correlation with “the number of stations in that prefecture.” There are five major networks in Japan and it is well known that the key station in each network has to subsidize local stations to maintain a national broadcasting service. Thus, any reduction of revenue per station must be subsidized by the key station in the above situation. Based on this result, he pointed out that the power of a key station towards a local station will be enhanced if many terrestrial stations are set up.

Mitsufuji (1995) analyzed the effect of the entry of a new station on the operating revenue of an incumbent TV station. After regressing the sum of total operating revenue on GRP in a certain prefecture, he found that operating revenue is highly dependant on past revenue, and the entry of a new station increased revenue in that market by around 2

5 The word “branch revenue” means revenue from branch located in key station area or in quasi-key station area, whereas “key station revenue” means distributed revenue from key station (key station signs up for advertisement as a representative of network). It is said that the revenue ratio from main office / branch / key station is around 2:5:3. Of course it is favorable to analyze based on each kind of revenue respectively, but we couldn’t get revenue ratio data. It is remain to be solved in future.
billion yen. Yasuda (2000), using network based data, regressed annual ordinary revenue on an average network dependent rate, annual sales, previous ordinary revenue, nominal GDP (Gross Domestic Product) etc. and found that the higher the average network dependent rate, the greater the ordinary profit.

In the United States, on the other hand, analyses on determinants of revenue / profit have been implemented since '70. The reasons being: (1) The FCC (Federal Communications Commission) decided on a policy of licensing an increased number of broadcasting station, and so stimulated an open discussion, and (2) cable TV had become widely used and advertising using cable TV’s basic channels began to increase around that period. Greenberg (1969) provide one of the early analyses. He used 1960-62 data and showed that the profit of a station is positively correlated with audience size, network affiliation, and number of stations in the market. He also analyzed the cost advantage of UHF (Ultra High Frequency) / VHF (Very High Frequency) for to discuss whether the FCC’s licensing policy was correct or not; though no clear result emerged.

We can see that Greenberg’s success largely depends on his finding that revenue / profit is strongly correlated with number of households per station. After Greenberg’s paper, much research was implemented using this environmental variable. Webbink (1973) analyzed the relationship with a new entry into the area of an existing station. Besen (1976) considered the relationship with the price of advertising. On the other hand, Fisher et al. (1980) researched the relationship with advertisement revenue and subsidy from an affiliated network, using actual audience data as a replacement for a potential audience (=number of household). Although Fournier (1986)’s primary purpose was to measure the impact of VHF/UHF on business performance and to analyze the FCC’s licensing policy, his estimate equations had similar structures to the above research. Fournier tried to refine previous research by clarifying the definitions of “market” and "profit.”

More recent empirical research includes that by Ekelund et al. (2000a) and Ekelund et al. (2000b). The former empirically examined the relationship between market concentration and profit in the U.S. radio market, while the latter analyzes the relationship between each terrestrial broadcasting market based on advertising revenue. We refer to these reports again in section 5.

In the following section, we analyze the relationship between revenue / profit and the business environment surrounding the broadcasting industry in Japan, referring to previous research carried out in the United States.
3. The Characteristics of Terrestrial Broadcasting Industry

To clarify our hypothesis through empirical research, we take a brief look at the economic features of the revenue/cost/market structure of a broadcasting station.

3.1. Cost Structure

The operating cost of a broadcasting station can primarily be classified as content procurement costs and transmission costs. This cost structure is somewhat different between a key and a local station. In essence, production costs are higher for a key station while transmission costs are higher for a local station.

Because TV programming is an important input for determining the value of the advertisement service, broadcasting stations must prepare popular programs if they are to earn a profit. However, because program production is labor intensive, and needs a large initial cost but less marginal reproduction cost, there exists strong economy of scale in the process of program production. Therefore, it is quite important for a station to avoid or to decentralize this cost burden, or it must efficiently recover its cost. From this aspect, we can regard the current network affiliation system as a method to decentralize cost burdens to achieve the production of popular TV programs. In short, a key station is in charge of purchasing content or acquiring advertising revenue as a representative of its affiliated stations; on the other hand, affiliated local stations serve as a means of distributing TV programs and advertisements. Conversely, in respect to local TV programs, these bear a heavy cost burden for each station because it is difficult to decentralize their costs.

Transmission cost primarily consists of two kinds: (1) maintenance and management costs for the intermediary station used for transmitting the station signal, and (2) Costs for using micro wave links provided by telecommunications carriers, to distribute programs to local stations. The equipment used in a broadcasting service are mainly

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6 Although the 127 broadcasting stations in Japan are legally individual enterprises, most stations affiliate with the five major networks (NNN, JNN, FNS, ANN and TXN). Even in the case that stations are not affiliate with a network, these scales are quite small. In an actual market, the network affiliation system is allowed for the purpose of joint sales or joint production of TV programs, nevertheless MOR exists. So affiliated stations tend to depend on key stations for know-how on program production or advertisement sales. Capital relationships are also very complex.
one-way radio transmitters, which are suitable for distribution over a wide area. Therefore, it can be said that transmission costs tend to be digressive as target household density increases⁷.

3.2. Revenue Structure

Terrestrial broadcasting stations obtain revenue primarily from advertising; this revenue is classified as “time” or “spot,” and is further classified as “for national” “for local”⁸.

Revenue from time advertisements is proportional to the station cost because production and airwave costs for providing TV programs are basically financed by the revenue from advertising. On the other hand, the price for spot advertisements is determined based on the “cumulative audience rate” and “reach cost per thousand people,” so advertising revenue is affected by audience rate and the number of households in each operating area. Because advertising time is restricted, it is reasonable to consider that demand and supply are adjusted through the advertising prices. Therefore, the profit of each station depends largely on revenue from spot advertisement.

Considering the classifications of “for national” / “for local,” it can be seen that advertisement services are geographically differentiated. Therefore, it is easy to assume that the price for an advertisement is affected by structural parameters (audience (market) share) and geographical parameters (The number of households per station, and income per household)⁹.

3.3. Market Structure

Each broadcasting station provides CM (Commercial Message) time for advertisers as an opportunity to reach out to an audience. In this business model, the price for an advertisement functions as a signal for reflecting evaluation and/or outcomes in the

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⁷ It is sometimes pointed out that the diminishing rate of costs in the broadcasting industry is not so large compared to other public utility enterprises, such as Gas, Water and Electricity. Refer to Chapter 3, Sugaya and Nakamura ed. (2000).

⁸ “Time advertisement” means the sales method that commercial time is combined with a TV program (30min/60min). On the other hand, “spot advertisement” is televised during a “station break,” which is set between programs (1min in principle).

⁹ It is said that advertising revenue is a quadratic function of audience size, such that revenue increases at an accelerating pace with audience size. Refer to Mizuho Corporate Ginko (2002).
market. In addition, as a result of licensing system and entry regulation this terrestrial broadcast market forms an oligopoly in each prefecture. Therefore, from the viewpoint of advertisers, services provided by stations are differentiated in two ways. In short, a broadcasting service is geographically differentiated (the number of operating stations / the number of households / income) in a certain market as well as differentiated even within the same market: (TV program, program scheduling, and audience share). This differentiated oligopoly structure is a quite unique feature of the broadcasting industry. Thus, thorough advertisement revenue, the above factors greatly affect the business performance of each broadcasting station.

In the following section, we derive our estimation equation based on these economic features within the broadcasting industry.

4. Profit Equation in Oligopoly Market

In this section, we derive our estimation equation based on the theoretical relationship between profit and the proxy variable of market concentration, considering the fact that the operating areas of each station form an oligopoly in the market\(^{10}\).

At first, we assume that advertiser's demand for terrestrial broadcasting service is described by the following equation.

\[
p = f(X) = j_i X^{j_i} Z^{j_z}
\]

(1)

\( X \) shows the sum of the output of each station \((X = \sum x_i)\), whereas \( Z \) means the demographic indicators in each market. Average and marginal cost of the \( i \) th station is \( c_i \) and constant \((c_i \neq c_j, (i \neq j))\). Here, profit is shown by the following equation.

\[
\pi_i = f(X)x_i - c_ix_i
\]

(2)

Using the condition for profit maximization,

\[
\frac{\partial \pi_i}{\partial x_i} = \frac{\partial f(X)}{\partial x_i} x_i + f(X) - c_i = 0
\]

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\(^{10}\) A similar oligopoly structure is found in the banking industry and several reports have been done on this in Japan. The following theory and derived equations depend largely on Iwane (1990).
Here, if we describe total output such as \( X = x_i + X_{-i} \), separating the \( i \)th and the other stations, the above equations can be shown as follows.

\[
\frac{\partial \pi_i}{\partial x_i} = \frac{df}{dX} (1 + \lambda_i) x_i + f(X) - c_i = 0, \quad \lambda_i = \frac{\partial X_{-i}}{\partial x_i} \]

If we assume a Cournot market, a market in which other station do not change their output when the \( i \)th station changes its output, and the conjectural variation, \( \lambda_i \) shows zero, we can get the following equation (3).

\[
\frac{px_i - c_ix_i}{pX} = \left( \frac{x_i}{X} \right)^2 \left( -\frac{X}{dp} \right) \]

(3)

Summing up all the individual stations, and setting the Herfindahl index as \( HHI = X (x_i / X)^2 \), the price elasticity of demand as \( \eta \), the profit of the whole broadcasting industry can be shown as follows:

\[
\pi = px_i - c_ix_i = HHI \cdot (1/\eta) pX
\]

Substituting equation (1) into \( p \) and rearranging the equation, we get the following equation, which shows the profit level of a certain industry is closely related to the Herfindahl index.

\[
\pi = HHI \cdot (j_i \cdot j_i) X^{k+1} Z^{l}.
\]

In short, the profit level of all the industry is closely related to the HHI (Herfindahl Index), \( X \) (output of the whole industry) and \( Z \) (demographic variables). Because \( \pi \) in above equation is the profit of all the industry, we use an additional assumption that \( MS_i = (\pi_i / \pi)^\alpha \) for further transformation of this profit equation with respect to an individual station. In other words, we assume that market share \( (MS_i) \) is equal to the profit ratio of an individual station to the total broadcasting industry. Substituting it into the above equation and using a natural log, we can obtain the following equation.

\[
\ln \pi_i = a_0 \ln c + a_1 \ln MS_i + a_2 \ln HHI + a_3 \ln X + a_4 \ln Z
\]

Practically, we use \( RATE_i \) (annual average audience share of each station) as a proxy of
MS, (market share) and scale the variables of each station, \(\text{ASSET}_i\) (total amount of gross asset of the \(i\)th station)\(^{11}\) because the industrial output \(X\) is difficult to obtain directly. In addition, we introduce control variables to show geographical and business characteristics of each station. Finally, our estimation equation is shown as follows\(^{12}\):

\[
\ln \pi_i = \ln \alpha_0 + \alpha_1 \ln \text{RATE}_i + \alpha_2 \ln \text{HHI}_i + \alpha_3 \ln \text{ASSET}_i + \alpha_4 \ln (\text{HH} / N)_i + \alpha_5 \ln Z_i + \alpha_6 \ln \text{SELF}_i + \epsilon_i
\]

We use the following variables as the number of households per station, \((\text{HH} / N)_i\) and income per household, \(Y_i\) as “geographical parameters”. In addition, we adopt an aired ratio of self-produced TV programs, \(\text{SELF}_i\)\(^{13}\) as “business parameters.” Some of the explanatory variables, such as the number of households or audience share, are also used in other countries as a benchmark for judging the degree of concentration in MOR. We propose that we should examine the possibility of introducing these variables as a substitutable benchmark in the Japanese MOR\(^{14}\).

To obtain a stationary data set, we took a natural log of each variable. We used various data with respect to terrestrial broadcasting stations for three years, from FY 1998 to FY 2000\(^{15}\) \(^{16}\). Because we use panel data, the random/fixed effects are considered on

\(^{11}\) We also use “tangible fixed asset” instead of “gross asset” in our estimation model. However we don’t report them because these results are mostly similar to our already reported results.

\(^{12}\) “ln” means “natural logarithm.”

\(^{13}\) We treat \(\text{SELF}_i\) as a exogenous variable although it might be natural to be considered as an endogenous variable for each station. Because (1) each station cannot necessarily decide the aired-ratio by itself, and (2) it is difficult for new entry stations to procure self-produced TV programs because of the lack of production know-how. The regulation authority has a directed policy that “each station should broadcast self-produced TV programs for more than 10 % of the total hours,” at the time of license renewal. Actually if we focus on stations excluding key/quasi-key/backbone stations, (1) only 25.7% (49/191 sample) of stations satisfy the guidance criteria and (2) there are only 11 traditional (began operation before 1969) stations that broadcast self-produced TV programs for more than 10% of the total hours over a three year period. These facts strongly support our treating \(\text{SELF}_i\) as an exogenous variable.

\(^{14}\) As a benchmark of MOR, the number of potential households is adopted in the United States, the sum of the annual average audience share is adopted in Germany and the ratio of total national TV watching time in the United Kingdom. Refer to the final report of “Study Group on Broadcasting Policy (2003).”

\(^{15}\) Ms. Shiho Iwamoto, who also patiently consolidated all data, and Mr. Kentaro Yoshimura (Applied Research Institute, Inc) helped for data input and checking. We y appreciate greatly their help. With respect to financial data of stations, we refer to “Nihon Minkan Ho’so Nenkan” (edited by Nihon Minkan Ho’so Renmei, issued by Ko-ken syuppan) and “Tsu-shin Sangyo Jittai Cyo’sa Keiteitai zaimu Cyo’sa” (implemented by Jo-ho Tsu-shin Seisakukyoku, MPHPT). With respect to audience share data, we used the annual average rate data of each station from Video Research Inc. With respect to demographic data, we referred to “Zenkoku
estimation. We express explanatory variables as \( x_i \), and error terms as \( e_i = \beta + \varepsilon_i \). If \( \text{cov}(\beta_i, x_i) = 0 \), we should adopt a random effect model to preserve consistency and efficiency. If \( \text{cov}(\beta_i, x_i) \neq 0 \), then we should adopt a fixed effect model. Suitable models are determined by the \( \chi^2 \)-based Wu-Hausman test.

\[
\begin{align*}
RATE_i & : \text{annual average audience share of each station}^{17}. \\
HHI_i & : \text{Herfindahl index in the market where the } i \text{th station operates business} \\
(HH/N)_i & : \text{the number of households per station in the market where the } i \text{th station} \\
Y_i & : \text{income per households in the market where } i \text{th station operates business.} \\
SELF_i & : \text{capability for procurement of self-produced TV program by } i \text{th station}^{19}. \\
ASSET_i & : \text{total amount of gross asset of } i \text{th station.}
\end{align*}
\]

5. Estimation Results

Descriptive statistics and the correlation matrix for each variable are shown in tables 1 and 2, whereas the estimation result is shown in table 3. With respect to the dependent variable, \( \pi_i \), we primarily focus on operating profit (net base) because our model is

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\(^{17}\) We exclude some stations because of the lack of \( RATE_i \) data. (1) independent UHF stations (# 13) which are exempt from statistics, (2) stations which retain the right to audience share data (# 8), (3) stations which don’t have data before 2000 (#3).

\(^{19}\) At first, we used “the aired-ratio of self-produced TV program” as \( SELF_i \) like Uchiyama (1996) and Yasuda (2000). However, the correlation with \( (HH/N) \) was high, and it might cause a multicollinearity problem. Instead, we use “the aired-ratio of self-produced TV program” multiplied by “the number of years since its foundation” as \( SELF_i \). Although the correlation coefficient is still high (0.67), we confirm our results are robust through a further estimation from an equation- one is the case without \( SELF_i \), the other is the case excluding the large metropolitan areas.
induced based directly on profit. In addition, we also estimate an equation with respect to operating revenue (gross base), $R$, for comparison. It has sometimes been pointed out that the cost minimization principle is not applicable in the broadcasting industry. If this hypothesis is correct, it means that cost has importance in respect to companies’ behavior, and the suggested explanatory variables are directly connected with only revenue, not with profit ($= \text{revenue} \cdot \text{cost}$).

The results are shown as equations (i) and (ii). In the Wu-Hausman test, random effects are adopted with respect to the profit equation, whereas fixed effects are adopted with respect to revenue equation. A fixed effect model shows that each station has a specific individual effect while a random effect model shows that each station has no individual effect. In other words, revenue seems to be stable each year, but if we include costs in the consideration, it appears unstable. Generally, a business practice exists where key stations distribute revenue between affiliated stations; in this way revenue is adjusted to some extent. Our test results might reflect this fact. Equation (ii) shows greater $R^2$ (and Adjusted $– R^2$) and has a high power for explanation, although the signs of the coefficient and the degree of significance are similar. We examine our results individually.

First, we look at the relationship between the explanatory variable $RATE_i$ and $HHI_i$. The proxy of market share, $RATE_i$, is positively significant in both equations, whereas the proxy of the coefficient of market concentration, $HHI_i$, is significant only in equation (ii). Because our model directly shows the relationship between profit and $RATE_i$ or $HHI_i$, we emphasize the result of equation (i). This means that the general hypothesis, “the higher the coefficient of market concentration, the higher the profit,” would not be supported. This is consistent with Ekelund et al. (2000a), in which the relationship between market concentration and profit in U.S. radio market is empirically examined. To avoid the multicolinearlity problem, we also estimate $RATE_i$ and $HHI_i$ separately as (i’) and (i’’): our findings still holds. Ekelund et al. (2000b) analyzes the relationship between each terrestrial broadcasting market and points out that advertisement revenue tends to shift to another markets with an increase of the advertisement price in one market. The same mechanism would also be applicable in the Japanese market. This is a future issue for discussion.

Next, we take a brief look at the estimation results for $(HH/N)_i$ and $Y_i$. If there is no entry barrier in the market and perfect competition is realized, a new station will enter a
market where \((HH / N)\) is larger, and finally the number of households per station will be equalized, and the degree of correlation with \(\pi_i\) will be lower. Contrarily, if there is certain entry barrier in the market, we expect a positive correlation with \(\pi_i\) because the economic rent is reflected. In respect to \(Y_i\), we expect a positive correlation with \(\pi_i\). For an advertiser, because it is a better strategy to advertise to households who have strong purchasing power, demand for advertisement in a market with a high household income will increase, and as a result, \(\pi_i\) will increase. Coefficients of \((HH / N)\) and \(Y_i\) show a significant positive sign. This shows \(\pi_i\) is larger if the number of households per station in the market is larger, and if income per household in the market is larger. MPHPT assesses applications for broadcasting licenses considering the economic situation in the relevant operating area. In that sense, our result showing that there is some room for \(\pi_i\) increased by \((HH / N)\) and increases in each market is consistent with our expectation. This is also consistent with the analysis shown in Fournier (1986).

The variable \(SELF_i\), the aired ratio of self-produced TV programs by the \(i\) th station, shows a significant negative sign in equation (i) ((i) & (i)’’) with respect to operating profit, whereas it shows a significant positive sign in equation (ii) with respect to operating revenue. From the viewpoint of revenue and profit, \(SELF_i\) can be considered as the proxy for measuring the benefit from a network affiliation\(^{21}\). In other words, although the revenue of the station that must be procured its TV programs through a network (or they must be bought by another production company) is low, the station enjoys the benefits from its network affiliation if we consider the cost side. That is, the station whose TV programs are self-produced can acquire a larger amount of revenue, but it has to bear the corresponding cost burden. Therefore, the correlation sign is reversed if we estimate using an equation based on profit considering the cost side.

We also show another estimation result in equation (iii) (total sample 240), excluding large sized stations in three metropolitan area (Tokyo, Kansai and Cyu-kyo). Equation (iv) (total sample 189) shows the results excluding the three metropolitan area and other backbone stations (Stations in Hokkaido, Miyagi, Hiroshima and Fukuoka). Although \(R^2\) (and \(Adjusted – R^2\)) and the explanation power of the whole equation decreases, our above analysis of each variable is almost the same. In addition, the multicolinearity problem with \(SELF_i\) or \(ASSET_i\) is drastically improved. Therefore, we can say our estimation results are quite robust.

\(^{21}\) Yasuda (2000) concluded that “the higher network dependent rate, the larger ordinary profit,” using ordinary profit. Because ordinary profit is affected by cost, that result is consistent with ours.
From our analysis in this section, we see that the revenue and profit of each station tends to be equalized if market share, the number of households per station and income per household are equalized. Although market share is highly dependant on managerial effort by each station, the number of households per station and the income per household are exogenous variables, and can’t be changed under current regulation. If we introduce new benchmarks as used in some other countries for reviewing MOR in Japan, it is possible to improve the financial foundation of stations, thus preserving the original purpose of that rule. Practically, the merger of two adjunct local stations will occur with the highest possibility. Even in that case, we propose that the regulatory authority should consider the environmental equality of each station.

6. Operating Revenue/Profit, the Number of Households per Station and Income per Household.

In the previous section, we confirmed that \( \frac{HH}{N} \) and \( Y \) have a significantly positive effect on \( \pi \); therefore, we can say these are also important variables for considering the operating foundations of each station. Indeed, there is previous research from the viewpoint of entry and profit of stations in the United States, such as Webbink(1973)\(^{22} \). In this section, we briefly take a look at the current business environment of each station in Japan.

Table 4 places, the business environments for stations in order based on \( \frac{HH}{N} \) and \( Y \) in each fiscal year. We show two benchmark lines: one is the national average, the other is the average excluding three major-city areas. We can see that the order is quite different between the two benchmarks. As well, we show another rank based on the “combined index,” which is calculated based on our estimated coefficient of \( \frac{HH}{N} \) and \( Y \).

Looking at the case of Tochigi prefecture. There was only one entry during our targeting period, 1998-2000. In the Tochigi market, there were five terrestrial stations in FY 1998 that provided service for an average 130 thousand households per station. But after the entry of Tochigi TV (individual UHF station) in FY 1999, the number of average households per station decreased to 110 thousand. Although \( \frac{HH}{N} \) is lower compared to other markets, \( Y \) is larger than average. In that sense, Tochigi prefecture seems to be

\(^{22}\) Webbink (1973) analyzed new entrant behavior of terrestrial broadcasting stations in the United States and concluded that new entrants have a significant positive correlation with the number of households per station in the market.
a promising market. If we use our “combined index,” Tochigi is placed in a higher rank. Greenberg (1969) and Webbink (1973) primarily emphasized the effect from \( \frac{HHI}{N} \), Fournier (1983) pointed out that \( Y_i \) would be also important because it might show a “wealth effect.” We can interpret the Tochigi case as an entry emphasized on \( Y_i \) from the viewpoint of business performance.

Each station can attract advertisers by providing popular content (= TV program) and obtaining high market share (= audience share). However, it is not easy if we consider the cost burden. It will be necessary to seriously consider the efficient operation of terrestrial broadcasting stations in the near future, especially in respect to mergers and acquisitions. It will be important for this to be discussed while considering the environmental factors.

7. Conclusions.

We summarize our estimation results again with respect to the determinant factors of revenue and profit.\(^{23}\)

(1) Structural parameters: Market share of each station has a positive correlation with profit although market concentration appears to have no correlation.

(2) Geographical parameters: The number of households per station and the income per household have a positive correlation.

(3) Business parameters: The aired ratio of self-produced TV programs has a positive correlation with revenue, although it has a negative correlation with profit.

As we demonstrated in section 5, our estimation results show the profit of a broadcasting station is strongly affected not only by structural parameters (audience share and market concentration), but also by geographical parameters (the number of households and income per households) and business parameters (aired ratio of self-produced TV programs). Considering the later two parameters are determined by exogenous regulation, we find implications for the current broadcasting policy. Especially, our results (1) and (2) imply that these kinds of benchmarks might be useful to improve the financial foundation of stations, thus preserving the original purpose of the MOR. In addition, as we saw in section 6, it is also important to use a combined index of these benchmarks. However, a stable operating foundation doesn’t necessarily ensure the presentation of high-quality

\(^{23}\)It is sometimes said, that from an institutional aspect there are great differences between the broadcasting industries of Japan and the United States. However, the results in this paper are consistent with our expectations, and are similar to those of previous research. We need to focus more attention on the fact that we could obtain these results even in the Japanese broadcasting market, which includes the public broadcaster, NHK.
content or a smooth transition to digital a broadcasting service; though we think it is at least a necessary condition. Our analysis in this paper shows there is the potential for a restructuring that will achieve a system suitable for the Japanese terrestrial broadcasting system.

After the so-called “bubble crash,” the Japanese economy has struggled with a severe recession, one that has been mentioned as being “the lost decade.” The broadcasting industry is not an exception. As well, digitalization is expected to drastically change the current network affiliation system. It also promotes competition in the advertising market and lowers the entry barrier. Under these circumstances, profits of terrestrial broadcasting stations might decrease drastically if the old regulations continue to be applied. Regulations restrict the behavior of the regulated firms regardless of the purpose of the regulation. Therefore, the current business environment might be improved if the MOR measures are reviewed: being ones which are regulated from the viewpoint of a social aspect rather than an economic one. This is one of the primary points that we make in this paper. With a purpose to promote voluntary restructuring of each station, efforts to review old regulations, will also increase the economic welfare of the audience. After designing institutional arrangements with respect to the terrestrial broadcasting industry, it might be possible to present a grand design for the whole broadcasting industry, including pay-TV and network distribution.
【References】
“Current Situation of Operating Network on Japanese Terrestrial Broadcasting Industry.”


<table>
<thead>
<tr>
<th>variable</th>
<th>mean</th>
<th>standard deviation</th>
<th>minimum</th>
<th>maximum</th>
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<td>dependent variable</td>
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<td>-1.0292</td>
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<td>92565.0</td>
<td>2637072.0</td>
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<tr>
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The table above shows the correlation coefficients between various economic variables. The coefficients indicate the strength and direction of the relationship between each pair of variables. For instance, a positive coefficient suggests a positive relationship, while a negative coefficient suggests a negative relationship.
### Table 3: Estimation Results with respect to Determinants of Profit / Revenue

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<tr>
<th>dependent variable</th>
<th>ln(Profit)</th>
<th>ln(R i) Revenue</th>
<th>ln(R i)</th>
<th>ln(R i)</th>
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<td>InRATE</td>
<td>0.767 ***</td>
<td>0.618 ***</td>
<td>0.263</td>
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<td></td>
<td>3.539</td>
<td>3.235</td>
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<td>lnHHI</td>
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<td>-1.440</td>
<td>0.260</td>
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<tr>
<td>ln(HH/N)</td>
<td>1.046 ***</td>
<td>0.999 ***</td>
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<td>lnY</td>
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<td>3.150</td>
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<td>InSELF</td>
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<td>-0.182 ***</td>
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<td>lnASSET</td>
<td>0.392 ***</td>
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<td>3.498</td>
<td>4.117</td>
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<td>Constant</td>
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<td>-10.130 ***</td>
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<td>-6.034</td>
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<td>Wu-Hausman Test</td>
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<tr>
<td>Constant</td>
<td>Random</td>
<td>Random</td>
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<td>Fixed</td>
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</table>

*** : 1% critical value  
** : 5% critical value  
* : 10% critical value
| Year | KANTO AREA | FUKUI | FUKUI | MIYAZAKI | CHIBA | YAMAGUCHI | OKAYAMA/KAGAWA | SAITAMA | HIROSIMA | FUKUSIMA | CHIBA | YAMAGUCHI | IWATE | KAGOSIMA | SAGA | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | KANSAI AREA | YAMAGUCHI | 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