ECONOMIC ANALYSIS OF DEREGULATION EFFECT ON OPERATIONAL EFFICIENCY OF OMNIBUS INDUSTRY IN JAPAN

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ABSTRACT

In Japan, deregulation of entry and exit omnibus service has been introduced in 2002. I analyse the deregulation impact for the management of omnibus industries from quantitative analysis by using econometric cost function. From my analysis, the impact of deregulation of entry and exit wasn't significantly found in Japanese omnibus industries, because omnibus operating companies' management environment didn't change compared to before deregulation. The background is that they had done their management more and more efficiently for long years without any reference to introduction of deregulation, and few competitive companies for exiting companies were newly entered into the competition.

Keywords: omnibus company, deregulation effect, competition, operating efficiency

1. INTRODUCTION

In 1996, the direction of the deregulation of supply and demand are shown for the transport sector by the Ministry of Transportation, and regulatory reform in omnibus industry occurred in 2002. In the same time, fare regulations have been also relaxed in the bus business.

Usually, after deregulation, for omnibus user, we expect that we can choose more various bus services such as fares and routes than before deregulation as a result of competition introduced among the bus companies. The other hand, for omnibus operators, they are going to face more competitive circumstances of operation (for example, entering new company in existing companies' own areas), and they need to

operate bus services more efficiently than before deregulation for winning competitions.

After deregulation, a few companies newly started omnibus services (for example, opening new routes, cheaper fare) , and competition of bus operators has occurred in some area. So, in some areas, operators' bus services are more improved than before, but some existing companies were nearly or fully bankrupt, or closed their branch and routes. Facing such situation, some existing companies criticized deregulation policies because they believed deregulation policy must make them worsen their business environment and have a negative impact for omnibus industries.

In order to evaluate the deregulation effect, not only we research the typical topics, but also we have to capture the effect quantitatively by disclosed data such as cost, passengers, and other operation data. In the UK, as Romily(2001) analyzed or Matsuzawa(2005) surveyed, the effect of deregulation was analysed quantitatively before and after introducing deregulation, but in Japan few research such as Kakimoto(2008) are existed in Japan, especially quantitative analysis[1].

Now, after 10 years from deregulation in Japan, I think that quantitative analysis of the impact of deregulation is very important in determining the direction of future policy. In this paper, I analyse the deregulation impact for the management of omnibus industries from quantitative analysis by using econometric cost function, for the future analysis of estimating economic welfare such as Romily(2001) and Mizutani(2003).

The rest of the paper is organized as follows. In Section 2, I review the literature on the cost of bus services to clarify the position of this analysis. In Section 3, as a preliminary step to perform quantitative analysis, I overview the basic data of Japanese omnibus industries. In Section 4, I estimate the cost function of private bus operators from existing data available, and we consider the effect on the cost side before and after deregulation. In Chapter 5, I summarize this analysis.

2. SURVEY OF PREVIOUS STUDIES

As a cost analysis of bus service are to be carried out in this paper, in Japan, Urakami(2002), Tanabe(2003), Mizutani and Urakami(2003), and the recent ones, Kakimoto (2008) treated this issue. I owe to these previous studies very much. However, except for Kakimoto(2008), they were published before deregulation and their objects of research were not the analysis on the impact of deregulation. In addition, Urakami(2002) and Tanabe (2003) analysed only public companies. Mizutani and Urakami(2003) analysed private companies, but only in the Kansai area, and including private businesses in order to compare difference of effciency between

[1] Mizutani(2003) analysed this kind of research in trucking industry, but in omnibus industry, most research are based on case studies, and there are very few quantitative research in Japan. See chapter 1 in Ooi(2010).

public and private. Only Kakimoto (2008) analysed the impact of deregulation, and my research is based on this analysis. However, estimated parameters of the input factor prices of labor has become negative, it does not satisfy the sign condition and it is not appropriate for microeconomic theory. So, for analysis of deregulation effect in Japan, I think that my analysis is the first case of quantatively analysis on deregulation.

This paper is intended to focus on the quantitative economic analysis of private bus operators in Japan by estimation of econometric cost function, as a first stage in the assessment of deregulation effect.

3. OPEREATIONAL CIRCUMUSTANCE OF JAPANESE OMNIBUS INDUTRIES BEFORE/AFTER DEREGULATION

Before analysis of the cost function, I overview the current status of bus service in Japanese private bus operators, from the point of the network output, the business environment of the costs on the basis of published data.

3.1 About the data

Since there is no published data of the individual private bus operators in Japan, I will use a data set for regional areas from Ministry of Land, Infrastructure, Transport and Tourism(1994-2009)[2] and Nihon Bus Association (1994-2008). These data are regionally aggregated operators' data, and extraction of representative private operators as a degree that has been recognized as sufficient investigation to reflect the trends by region in whole or in Japan. Although it is not exhaustive indicators of individual companies' cost or management data, I decided to consider the use of this data.

The observation used here, from which I estimate cost function, are from a pooled data set of 9 regions private bus operators' aggregated data for 12 years from 1994 to 2005, a total of 108 observations. It should be noted that, in the middle of the target period, change of office jurisdiction is made at Niigata area, which also changes the jurisdiction of Department of Transportation of the Tohoku and Chubu. However, it is not possible to modify the data because of the lack of data. From the fact that typical change is not seen as continuous data, in areas where there is a change of jurisdiction, during the period, Hokuriku Shin-Etsu and Niigata were analysed as the same area.

[2] Now I try to analyse other data set from "*Noriai Bus Hyojyun Genka Hyo* (standard cost table for calculating omnibus industries' operating cost and maximum fares in each regions)" in each 20 regions at the same period, but I cannot show the result in this paper. So, if possible, I will show the result on my presentation.

3.2 Network-related indicators for output

Here, I show the data of passenger-kilometres, the total running kilometres, vehicle kilometres per work days, which are used as network indicators in later analysis.

Though in Kanto region including Tokyo metropolitan area, Shikoku and Tohoku district passenger-kilometres of bus transport has been increasing slightly each year, we can see totally to tend to decrease as shown in Figure 1. In Kyushu, it has increased to nearly same level as that of Kinki area, in which there are much larger passengers carried than Kyushu or Shikoku. I think it is presumed that the high-speed bus is affected.

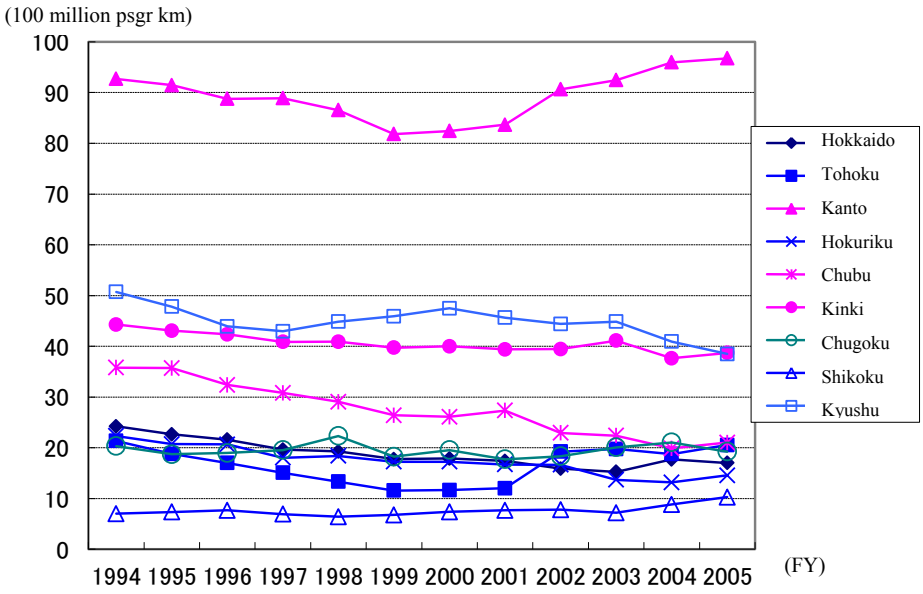

Figure 1 Trends in passenger-kilometre

(Note) Hokuriku = Hokuriku-Shinestu (before 2002, Niigata)(Ditto in Fig.2-8)

Next, I check the trend of the total running kilometres. As shown in Figure 2, that seems similar to trends of passenger-kilometre, relatively high in Kyushu and Tohoku. I think there are many high-speed buses and long-haul local buses in these areas.

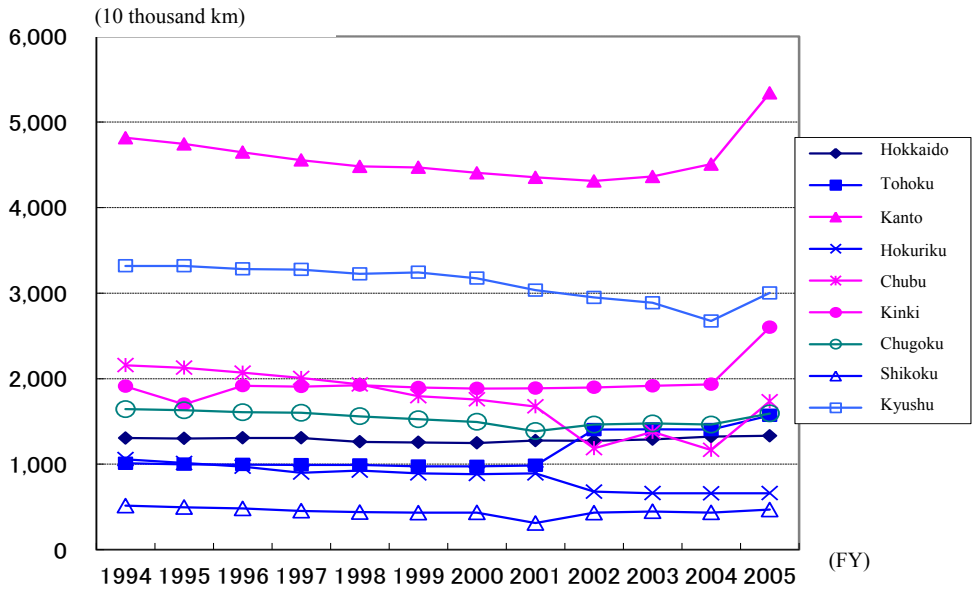

Figure 2 Changes in total running kilometres

Finally, I show data of traveling kilometres per work days per vehicle carrying passenger (Jishha atari Soko Kiro), which was calculated by the total running kilometres divided by the cumulative number of vehicles carrying passenger. This indicator is an indication of how these vehicle carrying passengers run daily. As shown the trend of this indicator in Figure 3, a large value is shown in rural areas such as Kyushu, Shikoku, and Hokkaido. Comparatively, a small value is shown in urban areas, such as Kanto and Kinki. I believe that in rural areas such as Kyushu and Shikoku there are many local routes and high-speed buses, and which route distance of each line is usually long, so these areas' data shows a high value. On the other hand, because there are a lot of short-range transport in the urban and suburban areas, urban area's data shows small value. Therefore, this indication will be considered as representing the status of network.

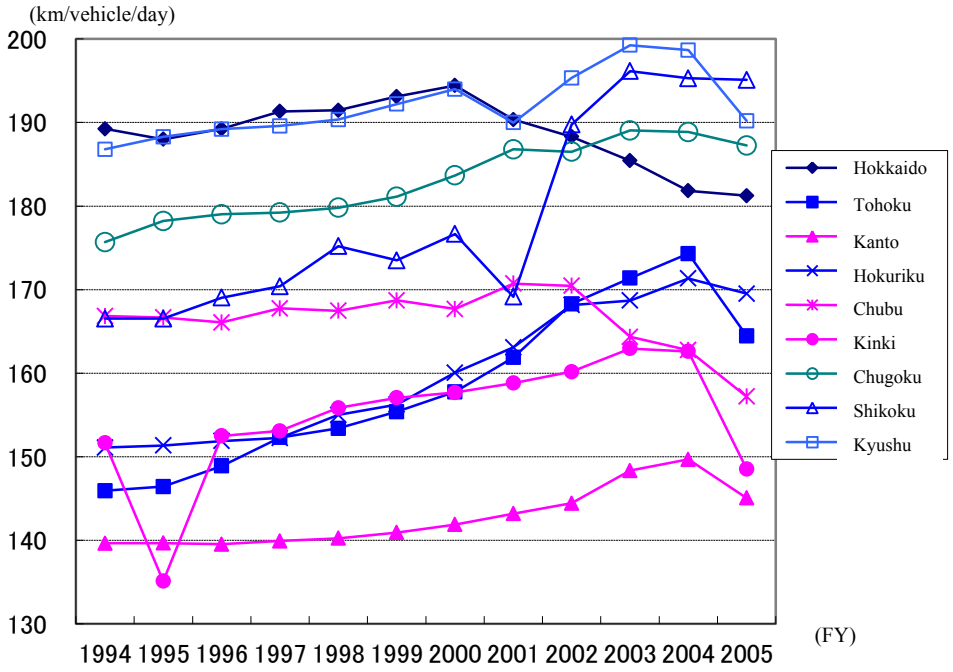

Figure 3 Trend of traveling kilometres per work days per vehicle carrying passenger (Jishha atari Soko Kiro)

As considered the data related to the network, that has been slightly changed because of the effect of high-speed bus entering. But significantly changes from the impact of deregulation is not seen.

3.3 Competitive environment and the level of service - About indicators on business environment

Then, I will look at changes in the level of service for affirmation of the changes in the competitive environment of the business.

(1) Changes in the level of Service

As representing the size of the level of service, I focus on data of working kilometres licenced by government. This data is length of all licenced routes except for abolition or suspension. Because it is not in Ministry of Land, Infrastructure, Transport and Tourism(1994-2009), I use Nihon Bus Association's data (1994-2008). The unit of data is in the country, because there is no regional data.

As shown in Figure 4, it shows almost no change before deregulation, and it is extended since the implementation of deregulation has been decided. The reason is that community buses' operators got the omnibus operators' licences (allowed under Article 4 of the Road Transportation Act) after deregulation, and some high-speed bus operators newly got the licences. However, as pointed out in Ooi(2008), many routes closed before deregulation rather than after deregulation. And as pointed out

by Terada(2005), in Japan, Most number of newly entering operators is not pure competitive entering, only because of licence scheme changes (ex. taxi or chartered bus operators operated regional bus services have to get omnibus licences under Article 4 of the Road Transport Act).

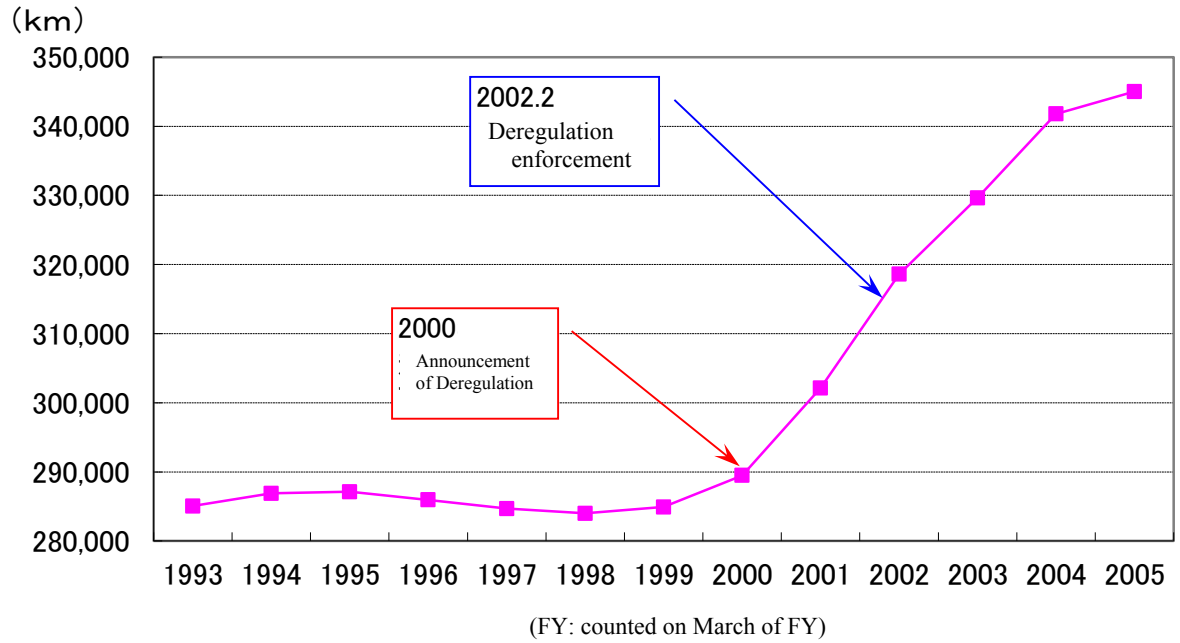

Figure 4 Trend of working kilometres licenced

(2) Changes in the number of operators - changes in the competitive environment

Then, to see changes in the competitive environment from the supply side, I focus on the data of the number of operators. Because MLIT data only captures limited operators, I use the data of Nihon Bus Association's data of the national unit. The results are shown in Figure 5.

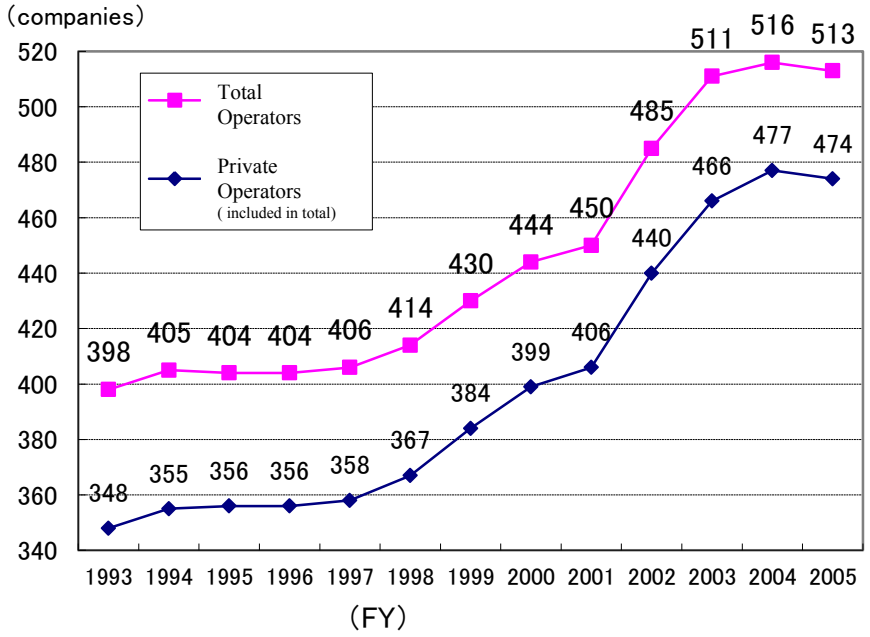

Figure 5 Trend of the number of omnibus operators licensed

Although we can see an increase in the number of companies around 2002, it is a trend continued from around 1998, not because of deregulation. As pointed out at Ooi(2008), the feature of newly entered companies is that their each working kilometres licenced is under 100km, and the number of vehicles working is 10 or less. On the other hand, as also pointed out at Ooi(2008), the number of large operators, which have 51 or more vehicles working and whose licenced working kirometers are over 1,000 km, also increased. As a background, not only the small companies are increased, but also existing companies divided their business by region or operated services(ex. high-speed bus, regional bus, chartered bus), both occurred before deregulation.

As pointed out Terada (2005) and Ooi(2008), the increase in the number of operators after deregulation is caused by the spin-off of existing companies or getting regional buses operators omnibus operating licenses. I think these data doesn't exactly show increase of competition or newly entering.

3.4 Indicators related to cost

Then, as an indicator related to the management, I'll look at the trend of the indicators of cost. Here, I check the two indicators of operating cost such as (1)total cost and (2)labor costs. In addition, in order to control the difference of scale, these data shown are divided by total running kilometres.

(1) Total costs

First, we consider the situation of the total cost. A situation of total costs, including non-operating expenses is shown in Figure 6.

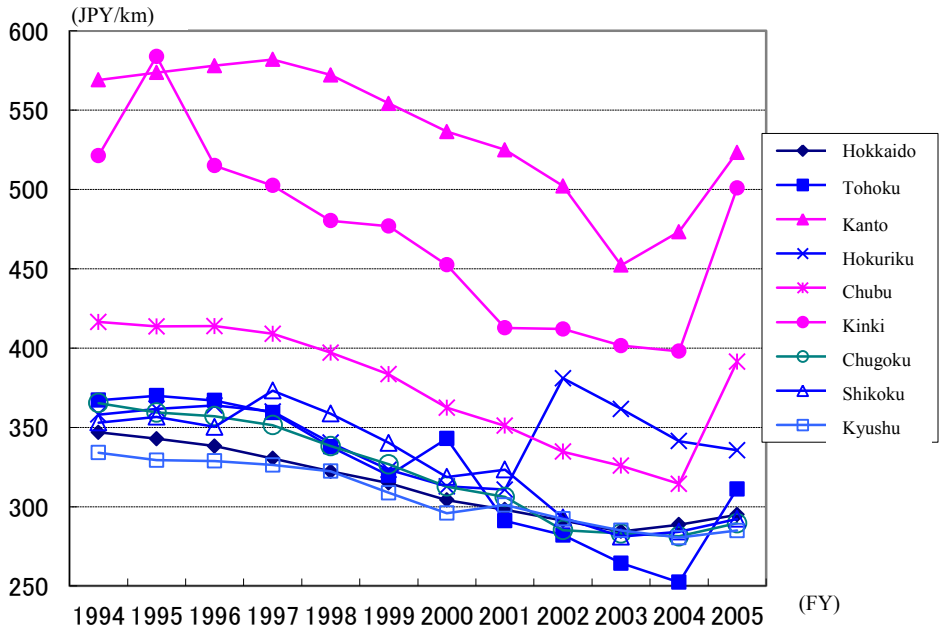

Figure 6 Changes in total cost of operators

It seems to be a higher cost in Kanto and Kinki where absolute transport volume is greater, because in these area labor cost is higher level than other area. For example, there are significant differences in the cost between metropolitan areas (Chubu, Kinki, Kanto) and other area. At the level of 2005, the total cost per total running kilometres is 523JPY/km in Kanto region, and that of Kyushu is 285JPY/km, so that of Kanto is about 1.8 times as large as that of Kyushu.

From 1994 to 2004, total cost tends to be reduced during the period with the exception of the Hokuriku district, so it is not necessarily said that there was a change due to deregulation. I think that the decreasing labor costs effects such trend. Although total cost of metropolitan areas increased rapidly in 2004 and 2005, I think this is the effect that the amount of vehicle kilometers decreased though cost was nearly the same level.

(2) Labor costs

Here, I mention the total labor cost (per total running kilometres) and the annual labor cost per employee.

First, the total labor cost is shown in Figure 7. According to this figure, the trend is similar to that of the total cost shown above. It is understood that it shows higher level in Kanto and Kinki where we believe labour cost in such area is higher, and that of rural areas is lower. For example, with data for the year 2005, total labour cost in

Kyushu area is 146JPY/km, and that in the Kanto region is 327JPY/km, so Kanto is more than twice than Kyushu.

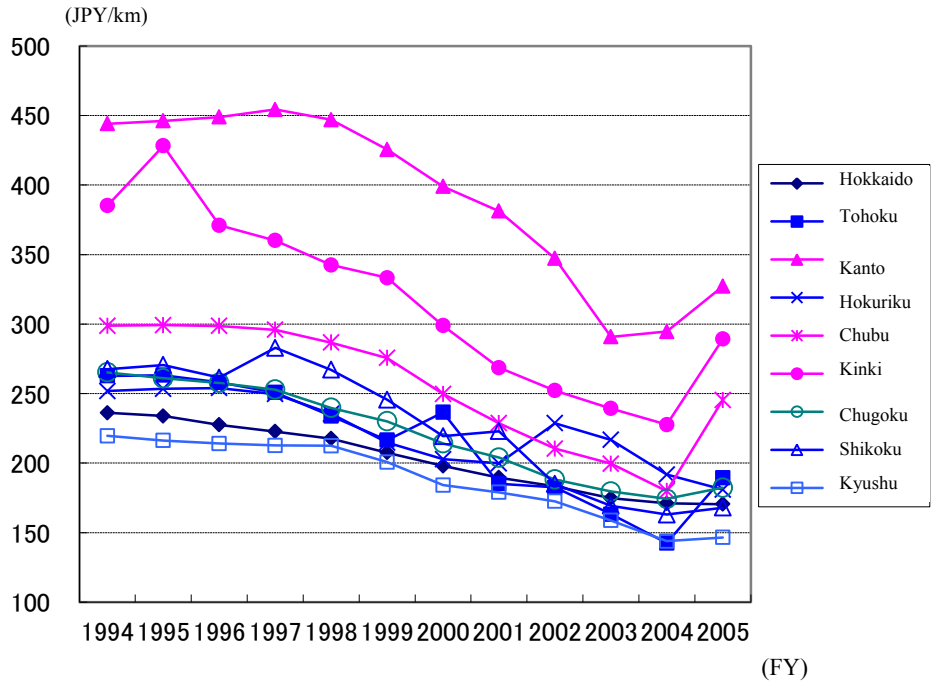

Figure 7 Trend of labor cost

In Figure 8, I show the data of annual labor costs per employee. Because there is no salary data published, I use this index instead of salary data. According to this data, it is understood that there is a difference by the region as shown in Fig.7. For example, in 2005, though Kanto is 7.51 million JPY/employee, Tohoku(the lowest area) is 4.65 million JPY/year/employee, so Kanto is 1.6 times much than Tohoku. In the recent years operators in metropolitan area cannot jointly operate high-speed bus services with operators in rural area, because of the difference in labor costs.

As long as checking on labor costs, it has not appeared a sudden change due to deregulation. As a factor in lowering labor costs, I assume that operators' improved management such as spin-off are effected for depressing cost. However the labor cost in urban areas shown in Fig.7 increased from 2004 to 2005, the salary levels in Fig. 8 didn't change much, so I assume the reason is that a decrease in working vehcles kilometers effect this data.

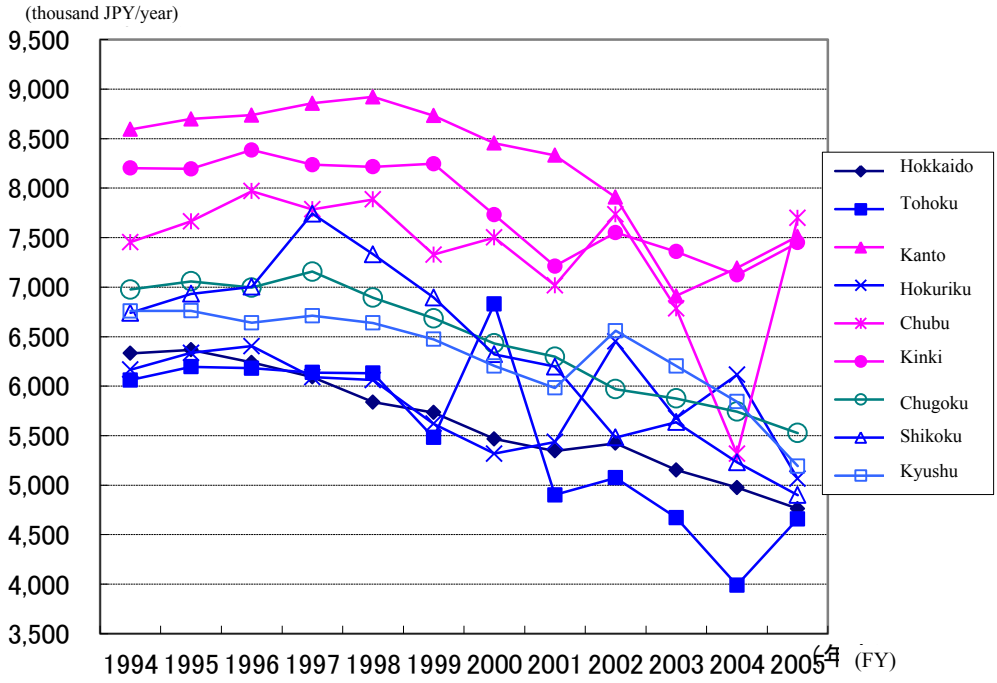

Figure 8 Changes in labor cost per employee

4. QUANTITATIVE ANALYSIS OF DEREGULATION EFFECT

Analysis in the previous section was intended only to grasp the trend of the existing data. Here, I try to quantitative analysis by using existing published data. When performing quantitative analysis, from the user(demand) side we analyse the demand function, on the other hand from the producer(supply) side we analyse the production function and the cost function. However, since there is a limitation of the data we can use in Japan, and it is necessary to make a comparison of previous research (such as Kakimoto 2008), I will estimate the cost function to achieve my object.

4.1 model

In my analysis, I estimate the total cost function, using analytical technique shown by Mizutani and Urakami (2003) or Kakimoto(2008). For my purpose of this research, I introduce a dummy variable which represent the effect of deregulation. In consideration of the result, I combine the results of statistical analysis to descript the management features of the omnibus industries in Japan.

I specified the cost function estimating in this paper as a single output cost function of passenger service, and the components of input factor are of five kinds: labour[L], fuel[E], related maintenance and material[M], capital[K], and other inputs[O]. As for the network variables, I employ one network factor, the total travel kilometres per vehicle per work days[N] (within the [ ] is a symbol used in the formula below).

The definition of variables is shown as follows. Total costs[TC] are sum of cost including depreciation, non-operational expense, taxes and so on. Output measure [Q] has adopted the passenger-kilometres following Urakami(2002). Labour price shows the unit price of labour and I used annual labor cost per employee. Fuel prices was calculated by total fuel costs divided by vehicle running kilometres, because the data of fuel consumption has not been published. So I assume fuel consumption will increase in proportion to the vehicle running kirometers. The price of related maintenance or materials and other factors, because there is no appropriate unit price and quantity data, the unit price of each was calculated by repair costs or other expenses divided by the vehicle running kilometres. Since there are more than 90% of the ratio of the vehicle in terms of value of the equity component according to Mizutani and Urakami (2003), the price of capital are calculated from the sum of the dues and tax depreciation divided by the number of vehicles.

The total running kilometres per vehicles work days is used as a network variable. In addition, in order to control the demand condition, following the previous research(such as Mizutani and Urakami 2003), the average length of trip [H1] (total passengers kilometres divided by the number of passengers) is includes as control variables. The network variable is, for example the number of route licenced or route kilometres licenced are used, but all the data required for the analysis is not sufficient. So I used traveling kilometres per work days per vehicle carrying passenger which represents a condition of demand [H2] (see 3.2) .

To represent impact of deregulation, I included a dummy variable[D] equal to 1 since 2002 (revised Road Transport Act enacted). In addition, the time trend [T] is introduced as a proxy variable for technological change (1994= 1, ..., 2005= 12). Considered with the impact of deregulation and innovation, time trend and dummy variables are assumed to be a negative sign condition.

Variables except for time trend and dummy variables are standardized by the sample mean. Also, only about the price variables are leveled the difference in price levels between regions by dividing the index "CPI regional indexes", and deflated by the GDP deflator in 2002 when deregulation has been made. Basic statistics of the variables used in this paper are as shown in Table 1.

Table 1 Basic Statistics

Parameter		Definition	Unit	Average	Std.Dev.	Min	Max
TC	Total Cost	Sum of Input Cost	thousand JPY	75,838,300	68,774,900	10,308,400	282,134,000
Q	Output	passengers kirometer	thousand psgr km	3,137,563	132,346	33,179	591,656
W_L	Labour Price	Annual Labour Cost per employee	thousand JPY/year	6626.76	1107.20	3990.00	8921.00
W_E	Fuel Price	Fuel Cost/Total Running km	JPY／km	21.69	2.65	17.78	30.87
W_M	Maitenance and Material Price	Maintenance Cost/Total Running km	JPY／km	16.63	3.34	11.95	26.27
W_K	Capital Price	(Depriciation＋Taxes) ／the Number of Vehicles	thousand JPY/Vehicle	1154.98	346.52	592.81	1952.79
W_O	Other Input Price	(Total Cost－Labor Cost－Fuel Cost－Maintenance Cost-Depriciation－Taxes)/Total Running km	JPY／km	52.34	13.43	37.49	107.39
H_1	Average Trip Length	passengers kirometer/passengers	km／psgr	13.22	5.59	6.14	35.41
H_2	Traveling kilometres per work days per vehicle carrying passenger	Total Running km／Vehicles on business	km／Vehicle	169.36	17.40	135.11	199.24

The functional form is specified as translog cost function following the previous studies such as Urakami(2002), Tanabe(2003), Mizutani and Urakami(2003) and Kakimoto(2008). So, in order to reflect the impact of deregulation, realities of cost structure, and the differences in the business environment, I estimated equation (1) modified from cost function models in previous research.

$$\begin{aligned}\ln TC = {} & \alpha_0 + \alpha_Q(\ln Q) + \sum_i \beta_i(\ln W_i) + \sum_m \gamma_m(\ln H_m) \\ & + 0.5\left\{\alpha_{QQ}(\ln Q)^2 + \sum_i \beta_{ii}(\ln W_i)^2 + \sum_m \gamma_{mm}(\ln H_m)^2\right\} \\ & + \sum_i \alpha_{Qi}(\ln Q)(\ln W_i) + \sum_i \sum_j \beta_{ij}(\ln W_i)(\ln W_j) + \sum_i \sum_m \beta_{im}(\ln W_i)(\ln H_m) \\ & + \gamma_{12}(\ln H_1)(\ln H_2) + \tau T + \delta D\end{aligned} \quad \cdots (1)$$

In this formula, $W_{i(j)}$ is the price of input factor i(j) (i ≠ j , i, j = L, E, M, K, O), H_m is the network or demand control factor(m=1,2) .

In this estimation of equation (1), I imposed the restrictions as follows:

(a) Symmetry constraint of parameters [for i, j = L, E, M, K, O (i ≠ j), m = 1, 2]

$$\alpha_{Qi} = \alpha_{iQ}、\ \beta_{ij} = \beta_{ji}、\ \beta_{im} = \beta_{mi}、\ \gamma_{12} = \gamma_{21}$$

(b)The homogeneous constraint on the input price
[for i, j = L, E, M, K, O (i ≠ j), m = 1, 2]

$$\sum_i \beta_i = 1 、\ \sum_i \beta_{ij} = 0 、\ \sum_i \alpha_{Qi} = 0 、\ \sum_i \beta_{im} = 0 .$$

And we apply Shepherd's Lemma from equation (1) and obtain the input share equation (2). [for i, j = L, E, M, K, O (i ≠ j), m = 1, 2]

$$S_i = \alpha_{Qi}(\ln Q) + \beta_i + \sum_j \beta_{ij}(\ln W_j) + \sum_m \beta_{im}(\ln H_m) \quad (2)$$

As for the estimation method, I apply SUR method for equation (1) and equation (2), I estimated equation(1) and (2) simultaneously. However, since the sum of the cost share is 1, I dropped input share equation on other factors (S_O).

4.2 data

As explained at 3.1, Since there is no published data of the individual private bus operators in Japan, I will use a data set for regional areas from Ministry of Land, Infrastructure, Transport and Tourism(1994-2009)[3] and Nihon Bus Association (1994-2008). These data are regionally aggregated operators' data, and extraction of representative private operators as a degree that has been recognized as sufficient investigation to reflect the trends by region in whole or in Japan. Although it is not exhaustive indicators of individual companies' cost or management data, I decided to consider the use of this data.

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4.3 result and analysis

Multiple patterns turning on the time trend and the dummy variable were analysed, where the result of a typical pattern of the total cost function (with time trend, dummy variables) is shown in Table 2. In addition, the sign condition and results were generally reasonable.

Table 2 Estimation Results of this analysis (Shown only the parameters of the first degree)

parameters	estimation result	Std. Err.	parameters	estimation result	Std. Err.
α_0	17.919 ***	0.042	γ_1	-0.654 ***	0.116
α_Q	0.732 ***	0.060	γ_2	0.471 ***	0.148
β_L	0.650 ***	0.004	τ	0.005	0.005
β_E	0.067 ***	0.002	δ	-0.029	0.039
β_M	0.051 ***	0.002			
β_K	0.069 ***	0.001	R-squared		0.978
β_O	0.163 ***	0.005	The Number of Sample		108

(Note) *** : Significant at 1% level.

As a precaution, the model was also estimated Cobb Douglas (log-linear). However, it is the sign of the parameter of the some input factor prices was incorrect. Since cross term of input factor prices and output of translog function was significant, and cross term between the elements was generally significant and not zero, so according to the indications of Mancuso et al. (2003), we employed translog functional form in this paper.

It should be noted that the trans-log cost function conditions to be satisfied, the homogeneous one has already been introduced as a constraint, the condition of monotonicity on input factor prices and output is satisfied as the sign of first degree parameters of input prices and output are positive and significant. However, I cannot satisfy the conditions of the concavity, which is the condition on profit maximization, at even the entire sample, also the sample mean. For solving this problem, some variables reduced from (1) to increase the degree of freedom, but I could not improve the results. I think the reason of such result is a possibility that corporate behaviour of operators did not meet the assumptions of the cost function of economics, or a data problem. But I cannot solve these problem now and these are the issue left to continue this research. So, though this estimation results are to use limited, we discuss the effects of deregulation from my estimation results.

4.4 Impact on the cost side by deregulation and the interpretation of the results estimated

In this paper, from a space constraint, I discuss limited two points, the impact on the cost side of deregulation and the interpretation of the estimation results, from the point of (1) the interpretation of the variable Dummy, and (2) the change in cost due to the deregulation.

(1) Interpretation of the (dummy variable) estimation results - effects of deregulation

the coefficients of the deregulation dummy variable shows negative sign, but it isn't significant. I tested other estimation by the function only introduced dummy variable and removed the time trend, but the coefficient of dummy variable did not become significant. Time trend was not significant, and took a positive value. From these results, changes in cost due to deregulation would not necessarily have been shown.

Kakimoto(2008) pointed out that structural changes can be seen in 1998 because the announcement of policy of deregulation in 1996 has influenced significantly. Before this time bus operators changed the fare level to make up for the decrease in revenue, then they stopped the change of fare level since 1998 until recently. In addition, some operators introduced low-price strategy such as 100JPY fare at first-ride. And for purposes such as improvement of the salary, some operators divided their branches or spin-off, or changed management style. Looking at the overall changes near 1998, I think it is appropriate that such estimation result resuted from the change in business conditions and circumstances rather than the effects of deregulation. Therefore, I think the dummy variable does not represents the effects of deregulation significantly.

(2)Cost comparison was not performed when a case where deregulation is made

Then according to the way shown in Mizutani(2003), I compared the effect of the introducing deregulation or not introducing deregulation in the following ways: First, using the estimation results of the model including the deregulation dummy variable, I substituted the cost data of each company for my estimated cost function, so we can obtain (a)the estimated cost occurred deregulation. Next, using the results of the estimation of model after removing the dummy deregulation (D = 0 in all period), I substituted the actual data, so we can obtain (b) the estimated cost no introducing deregulation. By comparing (a) and (b), I can see whether there is an effect of deregulation, or change of cost by deregulation.

Comparative analysis (a) and (b), including when considering the difference between the reginal scale, the change in the cost due to the influence of deregulation is not statistically significant.

5. CONCLUDING REMARKS

As a first step in the evaluation of business deregulation policies, focusing on the impact of deregulation in the change of cost, I analysed the omnibus industries' operating data and estimated the cost function.

As a result of introduction of deregulation, I cannot capture the deregulation effect of change in cost significantly. The reason is shown as follows; Firstly, many omnibus operators have been reducing their operation cost before and after deregulation, but their revenue has also declined, so operators' management circumstance wasn't

changed better, and they closed some unprofitable routes or branches in stages before deregulation; Secondly, the few competition occurred after deregulation except the niche markets (e.g. Limited area in Kyoto, Kagoshima, and Nagasaki(Sasebo)), so operational circumstances or conditions are not changed before/after deregulation.

As long as my research, it is very difficult to enter omnibus industries, because it costs too much to operate omnibus industries such as buying and maintenance of buses, labour costs, maintaining branches, setting bus stops. And for newly entered companies, markets are not competitive and operational conditions are not equivalent to existing companies, especially setting or using existing bus stops. In that sense, I think the market of omnibus industries in Japan is not economically contestable.

In this paper, I mentioned the deregulation impact of the operation(supply) side, but I could not analyse the deregulation impact of the demand side such as welfare effects of deregulation. In the future, it is necessary to analyse the welfare effects such as Romily(2001) and Mizutani(2003), so I try to extend the research of this paper.

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