THE KYOTO UNIVERSITY ECONOMIC REVIEW

MEMOIRS OF THE FACULTY OF ECONOMICS
IN THE KYOTO UNIVERSITY

Vol. XXXVIII, No. 1 APRIL 1968 Whole No. 84

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PUBLISHED BY
THE FACULTY OF ECONOMICS, KYOTO UNIVERSITY
SAKYO-KU, KYOTO, JAPAN

URBAN TRANSPORTATION PROBLEM IN CONTEMPORARY JAPAN

— AN INTRODUCTORY ANALYSIS —

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I Development of Urban Transportation Problem

The urbanization and motorization which have been making striking developments in the period of rapid economic growth in this country since World War II, particularly after 1955, have exerted a tremendous influence both on the Japanese economy and the whole of Japanese society, and they are having a particularly decisive influence on urban transportation; so it has recently become a major concern of Japanese life and public policy.

The single dominating mean of transport in Japan used to be the railway, from the prewar period until quite recently. It is ture that the railway facilities were devastated by the war and that the traffic difficulties caused by the absolute lack of railway facilities immediately after the war were steadily overcome by transport investment chiefly in rolling stocks, but as far as urban transportation is concerned, a new type of traffic problem has arisen. Particularly since the beginning of rapid economic growth in this country, the demand for transportation has increasingly begun to exceed progress in reinforcing transportation capacity and the absolute lack of fixed transportation facilities has brought about serious problems related to urban traffic difficulties in an ever-aggravating phase of late. This presents an extremely complex phase, such as overcrowded phenomena like passengers jammed in commuter trains, road accidents with motor vehicles and frequent traffic congestion on the one hand, and stagnant phenomena like the decline of demand for streetcar and bus and the financial crisis in public transportation enterprises on the other.

Needless to say, the causes of these circumstances must be sought, fundamentally speaking, in the peculiar characteristics of Japan's economic development itself during the postwar period. The Japanese economy has been developing in a pattern mainly composed of the activities of private production through investment for industrial equipment since the end of the war and as a result Japanese economy has been left behind in the relative accumulation of so-called social overhead capital in spite of the fact that the absolute level of public investment has not always been low. At the same time, the lack of government policy with respect to regional development and urban transportation must also be pointed out in this connection.

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The present study intends to analyse the existing conditions of urban transportation problems and to suggest what urban transportation policy should be. Therefore, it is necessary to clarify recent trends in the concentration of population in urban areas, to start with.

II Recent Trends in Urbanization

Let us first see how the cityward movement of population is taking place. Its characteristic features may be summarised as follows: first of all one of the most outstanding features is the rapid population movement from rural communities to urban communities. In Table 1 the rates of population increase for rural and urban areas are compared, which show that the urban population increased 10% in the five year period 1960–65, in contrast to the rural population which decreased a little more than 5%[1].

Table 1. Increase in Population for Urban and Rural Areas (Unit: %)

	Urban District	Rural District	Total Population
1955–60	9.4	−2.7	4.6
1960–65	9.9	−5.4	5.2

Source: Economic Planning Agency, *Present Conditions in National Life and Living* (in Japanese), 1965, p. 67.

The next notable point is the fact that the larger the size of cities happens to be, the more rapid movement of the concentration of population is found to be and the trend is especially conspicuous in the case of Tokyo, Osaka and Nagoya. The reason is because this concentration, giving rise to the "benefits of agglomeration" as concentration makes headway and in turn by stimulating further concentration, is creating a phenomenon called "concentration drawing concentration". Nevertheless, at the same time this trend of concentration has brought about the serious illeffects of excessive density, such as traffic difficulties, public nuisances, etc., and as a result the lack of social overhead capital has come to be keenly felt recently[2]. Partly owing to this circumstance the degree of concentration in the three cities just mentioned of economic indices other than population showed some decrease after 1960 as shown in Table 2[3].

At the same time some change has also taken place in the composition of urbanized population since 1960, which means that the population in mammoth

1) Economic Planning Agency, *Present Conditions in National Life and Living* (in Japanese), 1965, pp. 67–68.

2) It is since social overhead capital was taken up for the first time in *The Annual Report on Japanese Economy for 1960* (in Japanese) that social overhead capital has become the topic for discussion in this country.

3) It becomes possible to expect from Table 2 that changes were entailed in the cityward movement of population lagging in time to some extent behind other economic indices.

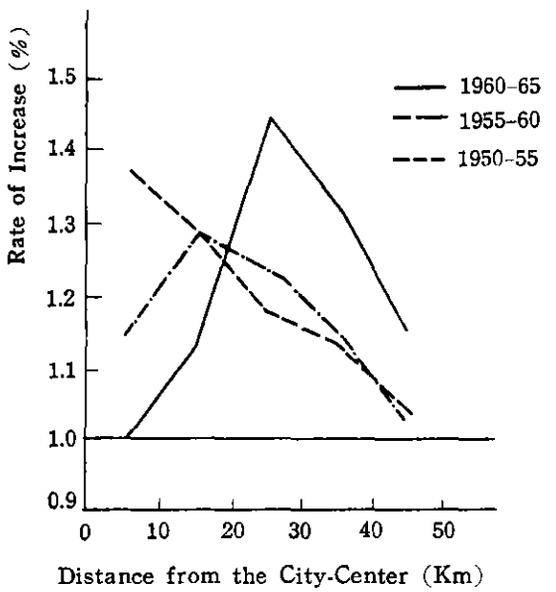
Table 2. Degree of Concentration in Metropolitan Areas (Proportions for Tokyo, Oska and Aichi (Nagoya) Prefecture in National Total)

	1955	1960	1964
Population	18.4%	20.8%	*22.7%
Employees in Manufacturing Industry	33.7%	36.2%	34.1%
Value of Shipments from Establishments	31.4%	38.2%	35.4%

Source: Investigation Bureau of Economic Planning Agency, *Handbook of Community Economy* (in Japanese), 1966. * Figures for 1965.

cities like Tokyo, Osaka and Nagoya made such a conspicuous increase in the outskirts that this tendency came to be distinctly noted as a new movement called "urban sprawl". As shown in Figure 1 the population of Tokyo increased by the greatest number in an area within approximately 5 kilometers of the city center for the period 1950–55, within 10–20 kilometers for the period 1955–60, within 20–40 kilometers (the greatest increase being 25 kilometers) for the period 1960–65, and moreover this sprawl has been taking place in an extremely disorderly manner.

Figure 1. Changes in the Growth Rate of Population in the Outskirts of Tokyo



Source: *White Paper of the Ministry of Construction* (in Japanese), 1966.

Concurrently with this sprawling tendency the population in the central area of the city during nighttime began to decrease and as a result what may be called doughnut-phenomena began to be noticeable after 1960, which can be seen in Table 3. In this connection we can conclude that the population in the central city is fluctuating between stagnation and decrease and that the rate of population increase in the city proper is growing less, gradually reaching its saturation point. Forming

Table 3. Population of Largest Cities and Their Suburban Area (Unit: 1,000)

(a) Tokyo

	Central City (6 wards)	City Proper (23 wards)	Tokyo Metropolis	Tokyo Commuting Area
1950	1,187.7	5,385.1	6,239.6	10,479.3
55	1,444.4 (121.6%)	6,969.1 (129.4%)	7,996.5 (128.2%)	12,896.5 (123.1%)
60	1,537.2 (106.4%)	8,310.0 (119.2%)	9,645.1 (120.6%)	15,370.5 (119.2%)
65	1,415.9 (92.1%)	8,900.0 (107.1%)	10,841.0 (112.3%)	18,483.1 (120.8%)

(B) Osaka

	Central City (4 wards)	City Proper	Osaka Prefecture	Osaka Commuting Area
1950	202.1	2,015.4	3,795.7	7,031.3
55	271.2 (134.2%)	2,547.3 (126.4%)	4,549.0 (119.8%)	8,202.6 (116.6%)
60	291.2 (107.4%)	3,011.6 (118.2%)	5,504.7 (121.0%)	9,567.1 (116.6%)
56	253.3 (87.1%)	3,156.2 (104.8%)	6,657.1 (120.9%)	11,290.7 (118.0%)

Source: Ministry of Transport, *Annual Report of Urban Transportation* (in Japanese), 1964.
Note: Figures in parentheses are ratios to the previous period.

a striking contrast with this tendency, the population in commuting areas within a radius of 50 kilometers from the city center increased at a strikingly rapid rate. Moreover, it has come to our notice that this commuting radius is growing; it extends further than 50 kilometers these days. This expansion of the cities and the sparse population in the central city are the third characteristic features of the present urbanization.

The fourth characteristic ascribable as a result is the fact that the difference in the population during daytime and nighttime is growing ever larger and larger and that the number of commuters who flow into the central business district (CBD)

Table 4. Daytime and Nighttime Population (Osaka)

	1955	1960	1965
Nighttime Population (A)	2,547.3 (100.0)	3,011.6 (118.2)	3,156.2 (123.9)
Inflowing Population	373.4 (100.0)	578.1 (154.8)	882.3 (236.3)
Outflowing Population	62.6 (100.0)	102.1 (162.9)	176.2 (281.5)
Daytime Population (B)	2,858.1 (100.0)	3,487.6 (122.0)	3,862.3 (135.1)
B/A	1.12	1.16	2.22

Source: Planning Bureau of Osaka City, *Statistical Returns of Daytime Population of Osaka City, 1965,* (in Japanese) 1966.
Note: Daytime population = Nighttime population + Inflowing population − Outflowing population.

to work is increasing at a strikingly rapid rate. Taking Osaka for an example, as shown in Table 4, the total of the inflowing population in 1965 reached as much as approximately 2.4 times that in 1955, naturally giving rise to increased demand for transportation facilities to transport such a vast flow of people. Especially as this commuting population is obliged to make trips at certain hours of the day, it is making the problem more and more aggravated.

III Changes in Demand for Urban Transportation

What effects do the trends in urbanization as described above have on the transport demands of passengers in densely populated cities?

First of all let us see the relationship between the population of a mammoth city and the number of transit passengers. In Table 5 is shown the relationship between the population living within the commuting areas of Tokyo, Osaka and Nagoya and the number of rail transit passengers. In contrast to the comparative ratio of the population of these three areas, which stands at 3:2:1, the number of passengers carried by railway transit correspondingly indicate a fairly close rate to 9:4:1. It is quite safe, therefore, to say that the number of passengers increase in proportion to square of the population. This rule is found to be particularly true in the case of the total number of passengers for the rail rapid transits. This fact is highly suggestive of the justifiability of the gravity-model.

Table 5. Population of Mammoth Cities and Actual Traffic Volume (Unit: 1 million)

Commuting Area	Population	Rail Transit (Total)	Rail Rapid Transits[2]		
			Commuter Ticket Holders	Others	Total
Tokyo	15,370 (3.37)	5,493 (7.84)	3,091 (11.2)	1,638 (9.20)	4,658 (10.4)
Osaka	9,567 (2.10)	2,951 (4.20)	1,424 (5.29)	712 (3.97)	2,136 (4.76)
Nagoya	4,561 (1.00)	701 (1.00)	269 (1.00)	179 (1.00)	449 (1.00)

Source: Ministry of Transport, *Annual Report of Urban Transportation* (in Japanese), 1964.
Note: 1. Rail transits include national railways, private railways and public streetcars.
2. Rail rapid transits include national railways and private railways.
3. Figures in parentheses are values on the assumption of 1.00 for the Nagoya commuting area.

These results obtained from the cross-section data can of course be confirmed on the basis of time series data. In other words, as shown in Table 6, the number of people carried is found to expand approximately in proportion to square of the population. In addition, when the elasticity of the number of passengers with respect to population is calculated by comparing two different years, the findings for 1955–60 stand at 2.0–2.4, the same figures for 1955–60 stand at 3.15–3.5, showing a sharp contrast in increase. In this connection it is very noticeable that the difference

Table 6. Changes in Urban Population and Number of Passengers (Unit: 1 million)

Commuting Area	Year	Population	Passengers	Elasticity
Tokyo	1955	12.896 (1.00)	5,142.2 (1.00)	
	1960	15.370 (1.19)	7,501.1 (1.46)	2.42
	1965	18.483 (1.43)	10,221.7 (2.38)	3.15
Osaka (includes Kyoto, Kobe)	1955	8.203 (1.00)	2,934.1 (1.00)	
	1960	9.567 (1.17)	3,992.0 (1.30)	2.00
	1965	11.291 (1.38)	6,405.9 (2.18)	3.50

Source: The same as in Table 5.
Note: 1. The number of passengers represents the total of the number of passengers carried in commuting areas.
2. Elasticity means percentage change of passengers divided by percentage change of population.
3. Figures in parentheses represent values on the basis of 1.00 for the year 1955.

according to years is far greater than that according to areas, and it is also very interesting to find that the relationships in which the number of passengers changes in proportion to square of the population indicate far stabler results. Hence, it follows that the transportation demand of any large city can be studied in the light of the above-mentioned relationships existing between urban population and the number of passengers.

Next, we need to see how urban transportation demand is distributed among different transportation facilities. It is observed from Table 7 that the total number of passengers in the Tokyo commuting area increased to approximately twice its previous level in the period 1955–65, but the pattern in use for urban transportation facilities has been rapidly changing. First of all, subways made the greatest increase, which was an increase of 4.4 times. Buses and taxis come next in the ranking order, indicating a conspicuous increase of approximately 2.7 times. In contrast to these figures, the use of the streetcar came to be in a state of stagnation after the period 1955–60 and it began to show a definite tendency to decline during the period 1960–65. The number of people carried by subway, streetcar and bus was 34–35%, without showing much fluctuation, the fact of which shows that transportation demand within the city has shifted from the use of the streetcar to that of taxi, bus and subway.

As to the transport facilities between suburban areas and the central city, in contrast to the stabilizing share on the part of private railways, it is noteworthy that the share on the part of the national railways shows a gradual decline, the fact of which means that the transportation capacity of the national railways, which have the largest share in the Tokyo commuting area, has reached the saturation point.

The total number of passengers in the Osaka commuting area increased by 1.8 times as a whole and among all the various means of transport the use of taxis

Table 7. Changes in the Number of Passengers and Share of Transportation, By Types of Service

(A) Tokyo Commuting Area

	Total Number of Passengers (million) (index)	National Railways Share (index)	Private Railways Share (index)	Subway Share (index)	Streetcar Share (index)	Bus Share (index)	Taxi Share (index)
		%	%	%	%	%	%
1955	5,142.2 (100.0)	36.1 (100.0)	22.7 (100.0)	2.9 (100.0)	16.3 (100.0)	15.3 (100.0)	6.6 (100.0)
1958	6,384.5 (124.2)	34.4 (118.0)	23.5 (128.3)	3.4 (144.7)	12.9 (99.1)	17.7 (143.3)	8.2 (153.8)
1960	7,501.1 (145.9)	34.6 (139.5)	23.3 (149.8)	4.2 (208.6)	11.1 (100.0)	19.2 (182.3)	7.6 (167.5)
1962	8,848.6 (172.1)	32.7 (156.2)	23.8 (180.6)	5.2 (305.9)	8.8 (93.7)	20.8 (234.0)	8.4 (219.4)
1964	10,270.3 (199.7)	32.4 (178.9)	23.8 (209.0)	6.5 (443.3)	6.9 (85.3)	21.4 (278.4)	9.0 (271.9)

(B) Osaka Commuting Area

1955	2,934.1 (100.0)	15.0 (100.0)	38.4 (100.0)	5.1 (100.0)	23.3 (100.0)	12.8 (100.0)	5.4 (100.0)
1958	3,474.1 (118.4)	16.1 (127.5)	33.7 (103.8)	5.8 (134.5)	22.6 (115.2)	15.0 (138.7)	6.7 (146.6)
1960	3,922.0 (133.7)	16.5 (147.3)	32.1 (111.5)	5.9 (155.3)	20.7 (119.1)	17.4 (181.7)	7.4 (182.9)
1962	4,706.1 (160.4)	17.1 (183.6)	31.5 (131.5)	6.2 (195.1)	17.2 (118.7)	18.9 (236.4)	9.0 (268.1)
1964	5,383.1 (183.5)	17.1 (209.6)	34.0 (162.3)	6.5 (233.2)	13.2 (103.9)	20.3 (290.5)	9.0 (304.2)

Source: Ministry of Transport, *Annual Report of Urban Transportation* (in Japanese), 1964; *Statistical Handbook of Transportation Economy* (in Japanese), 1965.

Note: 1. 'Share' means the percentage of the number of passengers for each transportation facility in proportion to the total number of all passengers carried.

2. Streetcar includes trolley bus.

made the greatest increase, carrying approximately 3 times more people. Then the use of bus and subway comes next in the ranking order. The use of the streetcar showed a declining tendency after 1960, which clearly indicates that the demand also in this case was being shifted from the streetcar to taxi, bus and subway.

As to transportation carrying passengers from the suburbs to the central city, its share shows a gradual decrease in 1955–60 and a gradual increase in 1960–65. This tendency is conspicuously characteristic of the private railways which hold the greatest share in the Kyoto-Osaka-Kobe area. It can be seen that all these findings are results arising from the increasing tendency of the rapid growth of population in the outskirts of big cities and the progress of new regional development undertaken by private railway enterprises.

So far it has been shown, as far as transportation within cities is concerned, that the demand for the streetcar has shifted to that for motor car and subway, but in addition another important change in this connection is now taking place. In Table 8 are shown the peakyears of this transportation demand based on the data collected up to 1965 concerning the number of passengers carried by streetcar and bus in the six largest cities.

Table 8. Peakyears in which the Greatest Number of Passengers were carried by Streetcar and Bus

	Streetcar			Bus		
	Commuter Ticket Holders	Others	Total	Commuter Ticket Holders	Others	Total
Tokyo	1960	1960	1960		1963	1963
Osaka	1961	1961	1961	1964	1964	1964
Nagoya	1957	1955	1955		1963	
Yokohama	1963	1961	1961		1964	1964
Kyoto	1963	1961	1961		1964	1964
Kobe	1961	1961	1961		1964	1964

Note: Years on the list are preceding years in which the declining tendency appeared to become decisive. Hence, they do not always coincide with the year of the greatest number of passengers.

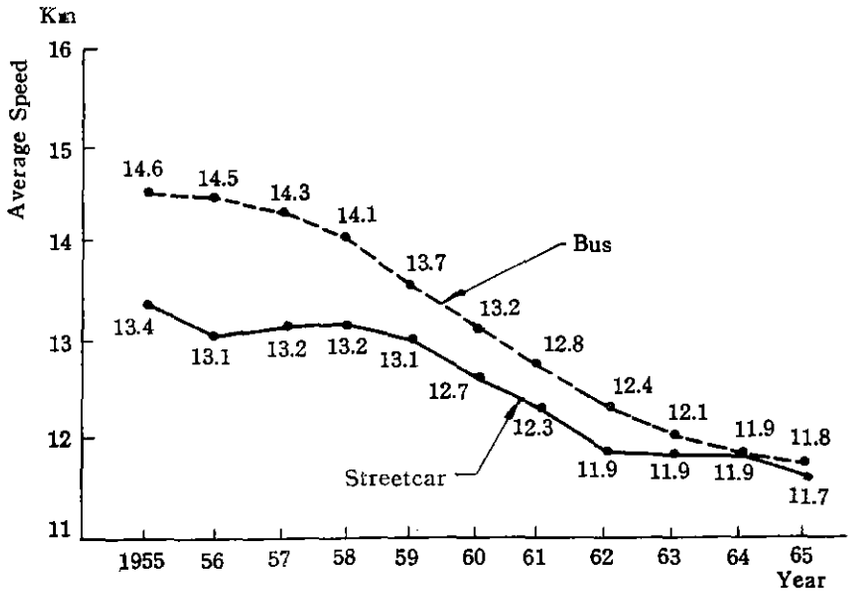
The streetcars in all these cities, with the exception of Nagoya, reached their peakyears in the period 1960–61, and thereafter they began to follow a decisively declining trend. Nagoya, being provided with favourable conditions for motor traffic by city planning, had already reached its peakyear in 1955, which is an eloquent illustration of one of the major influences upon urban transportation brought about by motorization.

As against it, the demand for buses appears to be making a normal increase when seen from Table 7. But bus transportation in the six biggest cities, too, begins

to decline after reaching its peakyear during the period 1963–64 as shown in Table 8. Although the number of commuters showed an increase even in 1965, with the exception of Osaka, judging from the facts that there was to some extent a lag between the number of commuters and other ordinary passengers in the case of streetcars and that the population of the central city began to decrease, it follows that the number of commuters will not increase further in the future. For these reasons it can safely be concluded that the motorization trend in the city has been launched into its second stage, involving automobile transportation such as taxis and private automobiles after passing through the initial stage of streetcars and buses.

In the meanwhile, one of the most important factors which has produced the above-mentioned shifting in the transportation demand within large cities is that the state of traffic jams affecting surface transportation has become worse and worse (as shown Figure 2) as the number of private automobiles has increased and hence the speed of streetcars and buses was inevitably forced to be lowered[4].

Figure 2. Average Speed of Streetcars



Source: Transportation Bureau of Osaka City, Present Conditions of Osaka Municipal Transport Business, *The Studies of Urban Problems* (in Japanese), Vol. 18, No. 11, Nov. 1966.

Thus, the lowering of speed brought about a decrease in the passengers' demands urging them to make more use of taxis or private automobiles, and at the same time caused a decrease in the efficiency of the facilities owing to the decline of the total running mileage per car per day. This immediately means a decrease

4) See *Annual Report of Local Public Enterprises* (in Japanese), No. 13, Table 61 about the speed of streetcars in each city. It may be added that it was in Osaka that the severest rate of lowering of the average speed was reported.

Table 9. Passengers and Capacity in Most Congested Areas in the Rush Hour Peak Period (1 hour)

			Transportation Capacity		Passengers carried		Ratio of Passengers to Capacity
			Number of People A	Indices	Number of People B	Indices	B/A (%)
Tokyo Commuting Area	National Railways (13 lines)	1955	164,415	(100.0)	460,790	(100.0)	280.3
		1960	219,728	(133.6)	614,314	(133.3)	279.6
		1964	277,730	(168.9)	729,800	(158.4)	262.8
	Private Railways (13 lines)	1955	86,172	(100.0)	168,411	(100.0)	195.4
		1960	140,319	(162.8)	295,998	(175.8)	210.9
		1964	206,662	(239.8)	414,143	(245.9)	200.4
	Subways (2 lines)	1955	16,220	(100.0)	26,598	(100.0)	163.4
		1960	30,600	(188.7)	70,097	(263.5)	229.1
		1954	44,438	(273.8)	85,065	(319.8)	191.4
Osaka Commuting Area	National Railways (7 lines)	1955	53,421	(100.0)	121,239	(100.0)	227.0
		1960	62,794	(117.5)	146,204	(120.6)	232.8
		1964	79,528	(148.8)	178,254	(147.0)	224.1
	Private Railways (10 lines)	1955	75,399	(100.0)	141,218	(100.0)	187.3
		1960	120,936	(160.4)	223,443	(158.2)	172.7
		1964	161,028	(213.6)	334,268	(236.7)	207.6
	Subway (1 line)	1955	11,520	(100.0)	25,825	(100.0)	224.2
		1960	20,160	(175.0)	45,323	(175.5)	224.8
		1964	25,920	(225.0)	52,736	(204.2)	203.5

Source: Ministry of Transport, *Annual Report of Urban Transportation* (in Japanese), 1964, 1966.
Note: In transportation capacity is included not only sitting seats but standing room (straps).

in productivity and corresponding decrease in payability and it indicates that public transportation enterprises of streetcar and bus are being forced into a vicious circle, from which it is by no means easy for them to get away. Furthermore, because the population in the central city is decreasing as already pointed out, streetcars and buses within the city area are being forced into a hard-pressed situation.

In sharp contrast, the demand for rapid transit such as national railways, private railways and subways is still increasing, and the state of hectic bustling particularly during rush hours remains aggravated without any sign of improvement, in spite of various projects to reinforce the transportation efficiency, the truth of which is clearly seen from Table 9. It is true, as is seen from the comparison of the indices for the number of passengers and the transportation capacity, that the transportation capacity was reinforced, but in fact it was only to an extent barely sufficient to cope with the increased number of passengers. Particularly, the congestion on the national railways has almost been driven to extremity and this tendency is so conspicuous in the Tokyo commuting area that five lines out of thirteen show as high a ratio as in 1964.

It must be said that such circumstances have been caused by the absolute lack of investment for adequate commuter transportation facilities to cope with the recent cityward population movement and particularly the tendency of rapid expansion towards the outskirts of big cities, and it is also seen in Table 10 that the increase in investment for commuter transportation countermeasures, with the exception of subways, is by no means sufficient and that the national railways stand the lowest in the amount of investment for this purpose. Therefore, it leads us to the conclusion that, as far as investment for transportation capacity remains the same as before, there will be no hope in the future for any immediate solution of the prevailing rush hour difficulties. Accordingly, the key to this hard problem lies in the way of carrying out effective improvements in existing transportation facilities solely to meet this urgent demand.

Table 10. Amount of Investment for Commuter Transportation Facilities

(Unit: ¥ 100 million)

	1961		1962		1963		1964	
	Amount	(Indices)	Amount	(Indices)	Amount	(Indices)	Amount	(Indices)
National Railways	114	(100.0)	107	(93.9)	95	(83.3)	117	(102.6)
Private Railways	308	(100.0)	390	(126.6)	443	(143.8)	486	(157.8)
Subways	290	(100.0)	343	(118.3)	475	(163.8)	569	(196.2)
Total	712	(100.0)	840	(118.0)	1,013	(142.3)	1.172	(164.6)

Note: 1. Government railway materials are used.
2. The amount of investment for private railways represents the total sum put together for the 12 leading enterprises, which includes investment other than that for rush hour transportation.

Now, attention must lastly be given to the demand for automobile transportation, such as taxis and private autos. As shown in Table 7, the number of passengers carried by taxis has made rapid increases in both the Tokyo and Osaka commuting areas, showing conspicuous growth of late.

As to the traffic volume of private automobiles, because of the unavailability of data concerning urban areas, "indices of the numbers of passengers carried by private automobiles in all Japan" were used to make a comparison with other types of transportation. As shown in Table 11, the increase in transportation activities of private autos made the greatest growth. Again the trend to increase is becoming more and more conspicuous than ever, and this trend, coupled with the increasing demand for taxis, appears to be one of the most important reasons for the declining demand for streetcars and buses.

Table 11. Passenger Transportation Activity Indices, By Types of Service

	Total Transportation Activity	Passengers Carried by Different Types						
		Total	Natinoal Railways	Private Railways		Buses	Taxis	Private Autos
				Commuter Ticket Holders	Others			
1955	52.9	54.2	72.6	66.8	83.4	52.7	44.6	27.2
1965	216.7	234.3	142.3	145.8	122.6	156.3	223.8	473.9

Source: Statistical Section of Ministry of Transport, "Transportation Activity Indices", *Monthly Research Bulletin of Transportation* (in Japanese), Vol. 8, No. 5, 1966.

The possible future change in the demand for different types of transportation can be estimated by examining the elasticity of transportation activities with respect to National Economic Indices.

In view of the above-mentioned tendency, let us see what changes are expected to take place in urban transportation in the furture. In this connection careful consideration should be given to the fact that the elasticities of the private railways' passengers other than commuters with respect to consumption expenditures are as small as 0.55 in contrast to the figure of private autos (3.76). This means that travelling for purposes other than regular commuting, such as shopping, recreation, etc., most of which is now being done by means of railway trains, is likely to be done by means of private automobiles as the level of individual income goes up. Needless to say, the tempo will be limited by the rate of increase in purchasing power over automobiles which will be created by growing income and the rate of progress of road construction, but it can safely be said that the shift from railways to private autos cannot be avoided sooner or later.

What should be taken into consideration is whether or not private automobiles should come to be used as the main means of commuting, which is the case in some

Table 12. Elasticities of Transportation Activities with Respect to National Economic Indices

	GNP	Consumption Expenditures
Indices for Total Transportation Activity	1.39	1.95
Passengers Carried (Total)	1.37	1.94
National Railways	0.65	0.92
Private Railways	0.52	1.09 (Commuters)
		0.55 (Others)
Buses	1.15	1.62
Hired Cars and Taxis	1.50	2.11
Private Autos	2.66	3.67

Source: Statistical Section of Ministry of Transport, "Transportation Activities in the Last 10 Years and Future Estimates", *Monthly Research Bulletin of Transportation* (in Japanese), Vol. 8, No 4, 1966.

Note: Elasticities are calculated by estimating equations linear in logarithms.

countries advanced in motorization these days. On this point it is necessary for us to pay careful attention to the fact that even in the U.S.A. recent reflections have the deep implication that it would by no means be economical to substitute the private autos for the rail transit as the means of commuter transportation, because roads would always be inadequate however many might be constructed. Such reflections made the U.S.A. preceive the economic efficiency of mass transportation facilities anew, resulting in the 'Urban Mass Transportation Act of 1964' and the construction of the 'San Francisco Bay Area Rapid Transit' system. In view of these experiences, it naturally follows that the future picture of urban transportation in this country should be of twofold development, i.e. commuter transportation by means of mass transportation and travelling other than commuting by means of private autos. It is not desirable merely to depend on more road construction, even if a relatively long period is taken into account. Therefore, a definite policy for urban transportation should be laid down so that the fullest and most economic use of rapid transits as the means of mass transportation can be made in this country, where rapid transits have registered comparatively successful development.

IV Changes in Cost and Supply of Urban Transportation

Now, let us turn to what kind of changes in the conditions of cost and supply of transportation enterprises have occurred in order to cope with the changes in the demand for urban transportation. To do so, changes in the components of costs are analysed according to the type of transportation facility. Table 13 shows the costs per car-kilometer classified according to each factor of production, their per-

Table 13. Changes in the Costs of Urban Transportation Facilities

		Costs per Car-Kilometer				65/60	Shares of Increase in Total Costs
		1960	%	1965	%	%	
Public Buses	Labor Costs	48.53	(61.2)	83.63	(68.0)	172.3	80.2
	Power Costs	7.57	(9.6)	9.17	(7.5)	121.1	3.7
	Others	12.94	(16.3)	14.49	(12.6)	119.7	5.8
	Depreciation	8.78	(11.1)	10.18	(8.3)	116.0	3.2
	Interest, etc.	1.46	(1.8)	4.56	(3.7)	312.3	7.1
	Total	79.28	(100.0)	123.03	(100.0)	155.2	100.0
Street-cars	Labor Costs	97.98	(69.9)	181.84	(70.9)	185.6	72.1
	Power Costs	6.15	(4.4)	7.83	(3.1)	127.3	1.4
	Others	25.10	(17.9)	41.70	(16.3)	166.2	14.4
	Depreciation	7.24	(5.2)	15.14	(5.9)	209.1	6.8
	Interest, etc.	3.71	(2.6)	9.81	(3.8)	264.4	5.2
	Total	140.18	(100.0)	256.52	(100.0)	183.0	100.0
		1960	%	1964	%	64/60	
Private Electric Trains	Labor Costs	44.25	(44.4)	57.52	(40.3)	130.0	30.8
	Power Costs	7.13	(7.2)	8.78	(6.1)	123.1	3.8
	Others	23.91	(24.0)	29.30	(20.5)	122.5	12.5
	Depreciation	12.65	(12.7)	20.06	(14.0)	158.6	17.2
	Interest, etc.	11.79	(11.8)	27.22	(19.1)	230.9	35.8
	Total	99.74	(100.0)	142.88	(100.0)	143.4	100.0
Subways	Labor Costs	55.41	(27.7)	63.86	(27.6)	115.3	27.1
	Power Costs	9.71	(4.9)	11.61	(5.0)	119.6	6.1
	Others	30.86	(15.4)	24.30	(10.5)	78.7	12.1
	Depreciation	42.77	(21.3)	46.39	(20.1)	108.5	11.6
	Interest, etc.	61.54	(30.7)	85.26	(36.8)	138.5	76.2
	Total	200.28	(100.0)	231.42	(100.0)	115.6	100.0

Source: About buses and streetcars (six largest cities) above figures are calculated from Ministry of Autonomy, *Annual Report of Local Public Enterprises* (in Japanese), No. 13; and about private railways and subways from the Railway Supervising Bureau of the Ministry of Transport, *Annual Statistical Report of Private Railways*, 1960.

Note: 1. 'Private railways' include the 14 biggest enterprises, and 'subways' include one in Tokyo and another in Osaka.

2. 'Interest, etc.' includes the non-operating expenses that are administratively allotted in addition to payments of interest.

centage to total cost, their comparison between 1960 and 1965, and each item's relative share of the increase of total cost.

It can be seen, based on the figures for total cost per car-kilometer, that the costs of streetcar enterprises are extremely high, and it is strikingly noteworthy that their costs are rising of late and higher than the costs of subways now. As shown in Table 13, the principal reason lies in the rise of wage and it can easily be understood that streetcars are the most uneconomic means of transport these days, because the shortage of labor is becoming more and more serious and because further growth of labor productivity is impossible on account of the technological structure of streetcars. As a result the labor costs for streetcar enterprises in the six largest cities, as shown in Table 14, exceeded business earnings in 1964, thus driving them into such an extremely bad financial state that business earnings were not sufficient even to cover labor costs.

Table 14. Ratio of Total Expenditure and Wage Payment for Streetcar and Bus Enterprise (in the Six Largest Cities) to Business Earnings

(%)

		1961	1962	1963	1964	1965
Streetcars	Total Expenditure	121.4	125.4	139.0	152.3	171.3
	Wage Payment	85.8	86.5	94.4	107.3	121.4
Buses	Total Expenditure	107.0	113.2	121.5	128.1	122.1
	Wage Payment	67.8	74.8	80.7	87.4	83.0

Source: Ministry of Autonomy, *Annual Report of Local Public Enterprises* (in Japanese), No. 13.

As to bus enterprises, they are in the same situation, if not worse than streetcar enterprises. The total expenditure for buses per car-kilometer is about half that of streetcars, but a little less than private railways. Needless to say, the reason can also be sought in high labor costs. In particular labor costs for buses per car-kilometer are above that of private railways and subways. Therefore, when their relatively low transport capacity is taken into account, the estimated rising labor costs in the future will constitute a grave threat to the administration of bus enterprises as they already have in the case of streetcar enterprises.

Streetcar enterprises have been obliged to run under deficit financing since 1958 and the total expenditure in 1965 amounted to 171.3% of business earnings. Similarly the total expenditure of bus enterprises, being driven into deficit financing since 1961, turned out to show 122% of business earnings. Since such unbalanced finance between revenue and expenditure is caused partly by maintaining low fares and partly by the decreased number of passengers, it can be seen that public surface transportation enterprises these days have been driven into extremely grave financial difficulties.

It comes out, judging from the cost structures as shown in Table 13, that there

are, roughly speaking, the following two types of transportation enterprise which play an important role in urban transportation. One is the type which is characterised by the large percentage of labor costs, like buses and streetcars, whose labor costs occupy 60–70% of the total expenditure, and the other is the type which has a relatively small percentage of labor costs, like private (and national) railways and subways, whose capital costs, like depreciation and interest, amount to by far the greater sum. These two types are clearly distinguishable. Generally speaking, a transportation enterprise which constitutes a part of social overhead capital requires an enormous provision of fixed capital and for that reason it is naturally regarded as a capital-intensive industry. But the structure of its cost within its category is not always of uniform nature[5]. It follows, therefore, the factors leading to an increase in passenger fares vary depending upon the circumstances in each enterprise.

Now, in the first type which is characterised by the high percentage of labor costs, the rate of increase in labor costs caused by the recent rise of wages is conspicuous and correspondingly its share of the increase in total expenditure also stands as high as 70–80%. Therefore, it can be seen that in this type the wage increase has the greatest influence upon the increase of fares due to increased costs. In this connection what should be noted is the fact that the first type has a greater rate of increasing labor costs than the second type. This means that, since it can be considered that there is not much difference in the change in wage rates between the first type and other enterprises[6], it is not so easy for the first type to substitute capital for labor and therefore, once wages rise, they are immediately reflected as an increase in costs. In addition another factor which is forcing greater increases in costs for the first type than for the second type can be attributed to the fact that the lowered running speed on account of traffic jams has a bad effect on the rate of utilization of the vehicles.

In sharp contrast to this, the rate of increase in labor costs in the enterprise of the second type, which is characterised by a relatively low percentage of labor costs, is found to be far smaller in comparison with the first type, and correspondingly its share of the increase in total expenditure also stands somewhere around 30%. In the case of the second type capital costs, like depreciation and interest payment, are found to have a greater weight than labor costs, and so their share of the increase in total expenditure in the case of private railways stands at 53% and in the case of

5) According to the Input-Output Table of Japan, transportation industry is, generally speaking, the industry characterized by a relatively high percentage of labor input. From this viewpoint the transportation industry stands in a specific position in social overhead capital. However, it is possible that transportation business may be divided into one kind characterised by a relatively high percentage of labor input and the other by a low percentage.

6) It may be true that public bus and streetcar enterprises are confronted with higher rates of wage increases because the workers engaged in public transportation facilities are relatively more ad vanced in age, but it may well be considered that the weight of this factor is comparatively small.

subways at 87.8%. In short, this means that to meet required reinforcement of transportation capacity to cope with the increasing demand, huge investments for facilities were made during this period[7] and moreover the greater part of funds for such investments was raised by loans. Nevertheless, as already pointed out, these expenses for capital will have to be further increased in view of the existing circumstances, under which further investment is still required on a far greater scale in order to reinforce transportation capacity, since the congestion during the rush hour is not only far from being relieved, but in some cases getting worse, due to the ever increasing demand for transportation. As far as the second type is concerned, therefore, the increase in capital costs is found to be the greatest factors in bringing forth pressure to raise passenger fares, which in turn will be followed by increases in labor costs. Consequently what course of change the respective weight of these two factors will take in the future will be determined by the extent to which labor is to be replaced by capital.

In this connection it is noticeable that among capital costs the rate of increase in interest is very high, so that its relative weight also runs very high. Particularly in the case of subways, its share of increase in cost even runs as high as 76.2%, showing how heavy an obligation it is for subway enterprises to pay interest. Table 15 clarifies this situation in detail.

Not merely the payment of interest but also the redemption of enterprise loans

Table 15. Financial Condition of Subway Enterprises, Their Earnings, Redemption and Interest Payment (Unit: 1 million)

		1960	1961	1962	1963	1964	1965
Earning of Fares	A	3,440.4	4,299.6	4,938.1	6,140.1	7,680.2	9,686.7
Expenditure for Construction and Improvements	B	11,595.7	14,266.1	17,529.2	21,354.1	28,397.5	32,038.1
Redemption for Enterprise Loan	C	604.3	470.1	1,068.9	1,884.3	2,228.7	7,352.7
Converted Loan	D	326.0	—	302.0	820.8	550.0	4,920.0
C−D=E		278.3	470.1	766.9	1,063.5	1,708.7	2,432.7
Interest for Enterprise Loan	F	967.7	1,619.5	2,132.4	3,065.4	3,943.8	5,235.4
E+F=G		1,245.9	2,089.6	2,899.3	4,128.9	5,652.5	7,668.1
E/A×100		8.1	10.9	15.5	17.3	22.2	25.1
G/A×100		36.2	48.6	58.7	67.2	73.6	79.2

Source: *Annual Report of Local Public Enteprises* (in Japanese), No. 13.
Note: Above figures concern all subways in Japan.

7) The fiscal years 1961–63 happen to be the period during which the first transportation capacity reinforcement project was put into practice.

Table 16. Trend in the Profits of Leading Private Railway Enterprises (Division of Railway Business)

	Business Earnings	Business Expenses	Business Profits	Rate of Profit	Non-operating Earnings	Non-operating Expenditure	(Interest)	Estimated Net Profit	Ratio of Net Profit to Earnings	Ratio of Interest to Earnings	Ratio of Interest to Earnings
Oct. 1961～ Mar. 1962	38,669	34,307	4,362	11.3%	2,101	4,516	4,237	1,947	5.3%	11.0%	97.2%
Apr. 1962～ Sep. 1962	42,250	37,979	4,271	10.1	2,209	4,961	4,760	1,947	3.6	11.3	111.4
Oct. 1962～ Mar. 1963	46,015	39,710	6,305	13.7	2,314	5,496	5,210	3,123	6.8	11.3	82.6
Apr. 1963～ Sep. 1963	51,949	43,715	8,234	15.9	2,775	6,350	6,136	4,659	9.0	11.8	74.5
Oct. 1963～ Mar. 1964	52,879	44,147	8,732	16.5	2,872	6,886	6,658	4,718	8.9	12.6	76.2
Apr. 1964～ Sep. 1964	57,118	48,583	8,535	14.9	3,564	7,896	7,632	4,203	7.4	13.4	89.4
Oct. 1964～ Mar. 1965	55,987	48,328	7,659	13.7	3,751	8,229	7,735	3,181	5.7	13.8	101.1

Source: The Investigation Section of the Sumitomo Trust and Company, "Problems of Private Railway Enterprises", *Report* (in Japanese), No. 750.
Note: 1. Non-operating accounting is based on the proportional distribution of business earnings.
2. Based on Reports on Valuable Securities of the 14 leading private railway enterprises.

are becoming heavy obligations for the finance of subway enterprises and the relative weight of these two items against the earning of passenger fares is increasing from year to year, amounting to as much as approximately 80% of it in 1965. As a result, they are being driven into worse and worse financial circumstances, in which they have to get new loans only to pay back their previous loans. Particularly in 1965 they were as a matter of fact so hard pressed that they had to raise funds on their converted loans totalling as much as ¥ 5,000,000,000 and only by so doing could they barely manage to keep the amount of redemption of principal and interest payment within 80% of the earning of passenger fares.

Similarly, in the case of private railway enterprises the relative weight of expenditure for interest payments to the increase in total expenditure stands the highest among others, but the ratio of interest payments to total expenditure is not so much as in the case of subways. In order to clarify this point in detail reference is to be made to Table 16, which shows the recent trend of profitability in the division of railway business of the 14 leading private railway enterprises. To start with, their business earnings with the exception of the semiannual period ending in March 1965, has shown a comparatively normal growth solely because of the raised passenger fares put into effect since November 1962.

However, the rates of business profit repeat such a curve as keeps rising during the period of one and half years or so immediately after the raise in passenger fares and then begins to decline until the original profit rate is restored by the time of the next raise in passenger fares. In other words this means that the profitability of private railway enterprises is governed, fundamentally speaking, by the raise in passenger fares. Of course the cause, needless to say, lies in the increase in all categories of expenditure due to the rising prices of commodities, but as shown in Table 13, it should be noted that the increase in the weight of depreciation and interest payments has a particularly important meaning. In connection with the expenditure for interest payments it comes to light that, although the ratio of interest payments to the business earnings is a little over 10%, it is gradually and steadily increasing every year. Furthermore what is particularly characteristic is the fact that expenditure for interest payments almost counterbalances railway business profits, and that it actually exceeded business profits in the period immediately prior to the year when the raise in passenger fares was put into effect.

It can be concluded, therefore, that the recent tendency indicates that the net profit of railway business, exclusive of non-operating revenues, remained in surplus during the period immediately after the raise in passenger fares but gradually declined to zero. For this reason it follows that sub-business occupies a very important position in the administration of private railway enterprises.

Now, then, let us see what significance sub-business may have in the management of private railway enterprises. Needless to say, the problem of sub-business is one of the most important points constituting the difference in the content of ad-

ministration between private and public enterprises. By clarifying to what extent sub-business is supplementary to main business it becomes possible to grasp how the so-called external economy brought about on account of urbanization is enjoyed by private enterprises and how the external economy which they bring about is internalized to their advantage. Now, sub-business may be classified into inside sub-business and outside sub-business (the latter is administrated through investments and loans to affiliated companies). Table 17 shows some data with respect to inside sub-business.

The weight of railway business to total business earnings used to stand at ap-

Table 17. Business Earnings and Business Profits according to Different Divisions of Business of Leading Private Railway Enterprises (Unit: ¥ 1 million)

(1) Component Percentage of Business Earnings

	Main Business	Sub-Business				Total	
	Railways	Bus	Real Estate	Others	Subtotal		
Oct. 1961 ~Mar. 1962 A	55.8%	20.0%	11.2%	13.0%	44.2%	¥69,266	100.0%
~Sep. 1962	55.5	21.0	11.1	12.4	44.5	76,138	100
~Mar. 1963	55.0	19.3	12.3	13.5	45.0	83,724	100
~Sep. 1963	56.4	19.7	11.3	12.6	43.6	92,150	100
~Mar. 1964	53.7	16.9	13.1	16.3	46.3	98,386	100
~Sep. 1964	53.3	17.4	15.7	13.6	46.7	107,081	100
~Mar. 1965 B	49.4	16.9	18.0	15.7	50.6	113,138	100
B/A	1.45	1.38	2.62	1.97	1.87	1.64	

(2) Component Percentage of Business Profits

Oct. 1961 ~Mar. 1962 A	48.2%	11.9%	32.8	7.1%	51.8%	9,055	100%
~Sep. 1962	44.5	14.4	34.6	6.5	55.5	9,600	100
~Mar. 1963	53.4	4.7	32.0	9.9	46.6	11,805	100
~Sep. 1963	60.8	6.7	24.2	8.3	39.2	13,553	100
~Mar. 1964	56.9	0.6	30.3	12.2	43.1	15,345	100
~Sep. 1964	50.5	0.4	44.0	5.1	49.5	16,911	100
~Mar. 1965 B	44.2	0.4	52.4	3.0	55.8	17,324	100
B/A	1.76	0.07	3.05	0.81	2.06	1.91	

Source: The aforementioned data prepared by the Investigation Section of the Sumitomo Trust and Company.

proximately 55%, but it kept declining, passing through the peak term which ended in September 1963 when the raise in passenger fares were in full play, and it declined as low as less than 50% during the semiannual term ending in March 1965. This tendency is more conspicuous with respect to their business profits, indicating a decrease from 60% to 44% during the same period. In contrast to the trend of their main business, the decrease in the weight of bus business and the rapid increase in the weight of real estate business were conspicuous.

Although bus business occupied an important position for private railway enterprises during the period prior to 1961–62 when surface traffic began to become congested, their payability since then began to be acutely aggravated and the bus business profits of most of these enterprises turned out to be in deficit. As a result their business profit for the semiannual term ending in March 1965 was no less than 7% of that for the term ending in March 1962.

On the other hand the division of real estate business showed rapid growth in the weight of business, gaining 2.6 times more business earnings and 3 times more business profits during these three years. Particularly their business profit was way above that of main railway business during the semiannual term ending in March 1965, gaining over 50% of all business profits. Needless to say, this was made possible by the increased population in the urban outskirts and the unexpected rise in land prices, and it can safely be concluded from this aspect that private railway enterprises are taking full advantage of the external economies brought forth by the urbanization movement and at the same time they are successfully internalizing the external economies which their railway business brings forth by operating real estate business as sub-business under the management of their main business. Furthermore, real estate business serves the function of a safetyvalve through which the necessary profits can be adjusted as their administrative policy requires. In other words, there is a tendency to narrow down the profit of real estate business when railway business is making a large profit, and to swell out the profit of the real estate division when main business is in depression. From this viewpoint it can be said that real estate business holds the most important position among the essential divisions of diversified management if the existing railway enterprises are to survive as private concerns.

Among "others" categories of diversified management, are included recreation centers, department stores, hotels, etc. Although their business earnings show a gradual increase, business profits show a rapid decline with the peak of the semiannual term ending in March 1964, the fact of which is suggestive of the relative decline in their significance.

Making a long story short, we can reach the conclusion that one of the most important categories of diversified administration of sub-business is none other than real estate and that growing importance will be attached to this particular business, in which they can enjoy to the fullest extent the external economies brought forth

as a result of the recent urbanization movement, as long as it remains continuous.

Next consideration will be given to outside sub-business. As is well known, the number of affiliated companies of 14 leading private railway companies amounts to the enormous figures of as many as 602 companies, which they listed on valuable securities list. A leading company has as many as 43 affiliated companies on the average and a maximum of as many as 93. The total amount of loans to and investment in their affiliated companies amounts to approximately 1.2 times of their paidup capital (¥97,100,000,000) as of the semiannual term ending in March 1965. These facts show that they form a gigantic group of enterprises.

Now, let us turn to Table 18 to see the result of investment in and loans to affiliated companies in the light of dividends and interest received. In the first place the rate of return on their investment fluctuates above and below 4% and the rate of return on their loans is 7.2% on the average, resulting in 6.0% in total figures. On the other hand, because the average rate of interest payment for long and short term loans and debentures is approximately 8.6%, the balance is on the minus side, showing that the expected profit has not been obtained, thus making little contribution to the overall profit.

Table 18. Investment in and Loans to Affiliated Companies (Unit: ¥)

	Investment and Loans			Revenues and Rate of Return					
	Stock A	Loan B	Total C	Dividend Received D	2D/A %	Interest Received E	2E/B %	Total F	2F/C
Oct. 1961 ~Mar. 1962	25,966	43,385	69,351	488	(3.7)	1,664	(7.7)	2,152	6.2
~Sep. 1962	28,648	48,515	77,163	694	(4.8)	1,618	(6.7)	2,321	6.0
~Mar. 1963	31,254	53,828	85,082	566	(3.6)	1,876	(7.0)	2,442	5.7
~Sep. 1963	34,969	58,796	93,765	810	(4.6)	2,012	(6.8)	2,822	6.0
~Mar. 1964	39,540	64,937	104,477	718	(3.6)	2,249	(6.9)	2,967	5.7
~Sep. 1964	43,096	68,958	112,054	898	(4.2)	2,566	(7.4)	3,464	6.2
~Mar. 1965	45,764	68,560	114,324	679	(3.0)	2,920	(8.5)	3,599	6.3
Average					(3.9)		(7.2)		(6.0)

Source: Prepared from the aforementioned data, Sumitomo Trust and Company.
Note: Estimated from 'Valuable Securities Report' of 13 companies.

Nevertheless, the figures quoted above are strictly concerned with averages and among them many companies with varied backgrounds are naturally included, such as those that were affiliated because of their financial difficulties, those that are not at the stage of making a profit because of their recent start in business, those that are playing an important role in spite of low payability, as feeders for main business, etc. Therefore, it is not justifiable to underevaluate the position of outside sub-business merely on the grounds of the above figures, because a more accurate analy-

sis should be made on the basis of consolidated balance sheets. On the contrary, it can be considered, in view of the prevailing indications of the stagnant financial state of main railway business, that more and more significance will be attached to further investment in and loans to affiliated concerns on an increasing scale as both necessary and preliminary provisions for the future development of tertiary industry, particularly service industry[8].

V Problems of Passenger Fares and Urban Transport Policy

It has become clear from the foregoing discussions that there exists a great difference in conditions which exert considerable influence upon demand and upon supply, depending on the different means of urban transportation. It is impossible, therefore, to discuss the urban transportation policy without giving due consideration to the particular difference in the above-mentioned conditions, and it is necessary before doing so to give some consideration to several theoretical issues concerning such problems.

The question which must be taken up in the first place is "To what extent do passenger fares perform a function of price, i.e. adjustment of demand and supply, or efficient allocation of economic resources?". Of course there is no doubt that passenger fares as prices, discharge a function of adjusting demand and supply and allocating economic resources to some extent, but the actual prices, being under strict government control[9] fixed without any change for a considerable period of time, are deprived of the performance of being modified in accordance with changes in the conditions of demand and supply. This price-fixing policy has been adopted mainly for political reasons in the economic circumstances of the rises in prices of commodities caused by a rapidly growing economy. So the prices of transport services have been simply left way below the supposed-to-be current level. This tendency is particularly conspicuous in the case of public transportation and has the effect of hindering the adequate functioning of prices in the form of fares.

This naturally leads to the opinion, in view of these circumstances, that the original function of prices should by all means be restored by correcting inadequately fixed prices[10]. On the contrary, there is another opinion holding that the solution of urban transportation problem has no room for any pricing policy and that urban

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8) Great number of the companies affiliated with private railway enterprises belongs to service industry.

9) It requires a decision of the Diet to revise the passenger fares of the government railways and a decision of the city assembly to revise those of the various means of public transportation, and it requires government approval to revise those of private railways. In any case, raise in fares is not an easy task and is extremely inflexible.

10) See Ryohei Kakumoto, *Fundamental Policy of Urban Transportation* (in Japanese), 1961; and *Urban Transportation* (in Japanese), 1963.

development policy is of decisive importance, and consequently that keeping down prices of transport services is unavoidable in order to prevent rises in prices of commodities. But even if it is impossible to find a fundamental solution solely by raising passenger fares, it is also obvious that numerous other bad influences have arisen brought about by keeping the fares low. Taking public transportation for an example, because of low fares that were maintained for a long period of time without even covering costs, deficits came to amount to an enormous sum and yet they had no other way to deal with them than to depend on loans. Under these circumstances they are driven into a worse and worse vicious circle and can barely find a way just to pay the interest. In this way most public transport enterprises these days are forced into a state of financial failure. On the other hand, it is true that the low rates of passenger fares tend to have the effect of aggravating the state of the existing excessive demand as they lessen resistance to the cityward movement of population. Moreover, even if some appropriate urban development policy is put into practice, this unbalanced level of passenger fares will after all have the effect of reducing the merits of the policy. Consequently, it follows that the rates of passenger fares should be so adjusted, concurrently with the enforcement of an appropriate urban development policy, that they could bring about the efficient allocation of economic resources. In addition, it is practically confirmed by input-output analysis of price changes[11] that the influence of increase in prices of transport services upon commodity prices is not so marked as commonly imagined, excepting its psychological effect. Therefore, it is not necessarily wise to carry out a price policy by fixing some prices at a low level, but what is rather desirable is to give passenger fares the right place in the existing scale of commodity prices. On this subject, it may be added that the most important issues of price policy is a cutting-down of monopolistic prices, reduction of distribution costs by modernization of physical distribution, stabilization of agricultural product prices, etc.

While considering things in this way, the next problem to be taken up is "What kind of criterion should be adopted for a passenger fare policy?". The actual rule of pricing adopted by most enterprises is based on the "principle of average cost pricing" in a broad sense under the system of self-supporting accounting, laying aside the question whether it is being carried out authentically or not. Needless to say, this principle is so conceived as to make it possible for an enterprise above all other things to redeem the capital invested without being subsidized. At the same time this principle is also designed to acquire further capital by guaranteeing a fair rate of return, thereby to enforce rational administration of its own

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11) See, Statistical Section of Ministry of Transport, "Input-Output Analysis of the Transport Sector", *Monthly Research Bulletin of Transportation* (in Japanese), Vol. 7, No. 1, 1965. As to questions concerning these analyses, see Hiroyuki Yamada, "Input-Output Model about the Effects on Prices of Freight Rates Change", *Monthly Research Bulletin of Transportation* (in Japanese), Vol 8, No. 4, 1966.

enterprise. The question put forth in this connection, however, is the point that this principle is conceived to determine the prices without giving due consideration to the aspect of the optimal allocation of economic resources.

In contrast to this principle there is what is called the "principle of marginal cost pricing" which is desirable from the aspect of the optimal allocation of economic resources. While the "principle of average cost pricing" takes the redemption of invested capital as the standard of pricing from the standpoint of individual enterprises, the "principle of marginal cost pricing" takes the most efficient allocation of resources as the standard of price determination from the aspect of the maximum welfare of the whole society. Consequently, no questions arise as far as the two standards are in agreement. But when they are not, the latter should receive priority from the standpoint of society as a whole. Nevertheless, when it comes to the actual application of this marginal principle, there are not a few problems to be pointed out, and so only some of them of particular importance will be taken up next.

Firstly, if the price is to be determined in accordance with the principle of marginal cost pricing, it does not always follow that enterprises are self-supporting, and under such circumstance the loss has to be supplemented by taxes, the fact of which gives rise to redistribution of incomes.

Secondly, this principle is not entirely free from the criticism that there is very little possibility of successfully applying it to existing economic activities which are making dynamic progress, because it is only to economic activities of a static nature that its main point is applicable.

Thirdly, what gives rise to another question is that in the real economy where market imperfection exists, monopolistic enterprises exercise price control in the field of its own business to its exclusive advantage and that the marginal condition is no longer fulfilled in these sectors. Now, the most sophisticated point of this argument against marginal cost pricing is the theory of "Second Best" which urges us to seek the best possible conditions under a particular circumstance where such a marginal condition is lacking in some part of the economic system, and it holds that applying this principle of marginal cost pricing in any public sector with market imperfection might hinder the second best way of resource allocation. Consequently, it follows that marginal cost pricing is in need of modification under such circumstances[12].

As far as these questions are involved in the principle of marginal cost pricing, we may safely say that its elaborate application is not always practicable, but we can insist that it is preferable, in view of the aspect of efficient allocation of resources and effective utilization which the marginal principle originally intended to achieve, to determine the price in accordance with particular conditions in

12) Cf. R.G. Lipsey and R.K. Lancaster, "The General Theory of Second Best", *Review of Economic Studies*, No. 63, 1956.

individual enterprises without sticking to the principle of self-supporting accounting, and this last point after all is one of the most significant implications of the "principle of marginal cost pricing".

In this connection it should be pointed out that there is another important factor which is detrimental to the effectiveness of the price mechanism. That is to say, there is an effect which may be termed external economy or diseconomy. For instance, it is well known that the increased price of land in the area of a newly constructed railway or road is one of the most typical examples of external economy. On the other hand such loss that is caused by the decreased speed of streetcars due to the increased number of motor vehicles is none other than one kind of external diseconomy. In the case of the former example, if the railway enterprise already owned the land, whose price went up and got the profit from it, such an enterprise could make good use of such external economy to their own advantage. In fact many private railway enterprises carry on real estate business of their own as sub-business as already described, to internalize such external economy.

On the contrary, public streetcar enterprises are not allowed to engage in any sub-business and suffer a great loss from the said external diseconomy caused in proportion to the increased number of motor vehicles, without being favoured with an opportunity to make use of the profit which might come from such external economy. Therefore, it leads to the conclusion that an urban transportation policy should be formulated with due consideration of these points.

Now, with these theoretical issues in mind we shall proceed to see what the passenger fare policy for urban transportation and how urban transportation policy should be determined. To do so it is desirable to classify existing urban transportation facilities into the following three types, because of different conditions in demand and supply:

(a) First type..... Public surface transportation facilities
(b) Second type..... Rapid transits (subways, private railways and government railways)
(c) Third type..... Individual means of transportation (automobiles; taxis and privately owned cars)

The first type is characterised by the distinctive features that demand shows a declining or stagnant tendency on the one hand and the weight of labor costs to total expenditure is rather great on the other, that it is not so easy to substitute capital for labor and lastly that the pressure of increased wages has a direct influence. Consequently, there is no necessity for further investment in public transportation facilities of this type, since the demand for them shows a downward trend and it is desirable that the passenger fares should be determined with due consideration for making efficient use of the existing tracks.

However, as to streetcars we may say that there is no longer a good reason for insisting on their continued operation, as far as there is a possibility of substitution

by bus or subway, because their running costs are higher these days than those of buses or subways.

In the case of rapid transits belonging to the second type, demand exhibits a pronounced increase and investment for facilities to reinforce their transportation capacity is being made in increasing amounts. For these reasons the composition of their total costs shows a greater weight of expenses for capital, such as depreciation and payment of interest, which at the same time constitutes the main factors for their higher cost. As previously seen, the reason why the demand is growing is because of the increased number of commuters; the number of ordinary passengers being rather stagnant and the ratio of commuters to total passengers showing an ever-increasing tendency. It appears that this tendency will grow more and more pronounced as the demand is shifted to the use of automobiles in the future. For these reasons it can be assumed that commuter transportation will become the principal function of urban rapid transits. Therefore, the existing rates of passenger fares fixed on the basis of cost of transporting ordinary passengers will have to be gradually revised so as to be based on that of commuters.

If all expenses arising out of the enormous amount of additionally invested capital were to be collected from the fares of commuter under such circumstances, the fares would become extremely expensive. However, it is by no means adequate to charge all the expenses involved in the construction of new facilities to the users of that particular means of transportation (=direct beneficiaries). The reason is that there are also indirect beneficiaries who share the benefits of external economy brought forth by additional investment. There is a good reason to say that those beneficiaries, like land owners in areas newly developed by railway construction, should share some of the construction expenses. In the case of private enterprises all such 'development benefits' are by themselves enjoyed by managing to carry out real estate business as already discussed—a mechanism to internalize such external economy is built in their administration. On the contrary, in the case of public enterprises they are confronted with very unfavourable circumstances because of the lack of such a mechanism. Consequently it can reasonably be considered that new construction expenses should be shared in the way of collecting an additional tax for real estate.

Individual means of transportation classified as the third type are making the most striking developments these days and it is expected that, the more handsome the income earned is, the greater the demand for them will be. However, although they are means of transportation that have the highest costs, it cannot always be said that individual means of transportation, generally speaking, have such high costs if the speed and value of time which can be saved by door-to-door transportation are taken into consideration. Speaking of privately owned cars, when it is taken into consideration that driving one's own car in itself gives the driver pleasurable satisfaction, the simple comparison of the cost with that of other means of transportation

is rather meaningless. Moreover, the purchase and utilization of private cars are completely left to the free choice of the consumer and it is not too much to say that what the government is concerned with is only the scale of investment for roads. Therefore, the problem is "To what extent should the construction, improvement and maintenance of roads be carried out?", but it can safely be said in this connection, as mentioned before, that it is not desirable to make plans so that private cars can be utilized for the purpose of commuting as practised in the U.S.A. As we have learned from American experience, it would require an inconceivably enormous amount of funds, and, what is worse, traffic congestion would still remain, if it were not actually aggravated— the spiral of cars and roads. Therefore, I can hardly avoid the conclusion that to utilize private cars for the purpose of commuting is extermely uneconomical from the aspect of the national economy, that high speed mass transportation is most suitable for the purpose which is characterized by a voluminous stream of transportation for a limited duration of time, and that it will be a natural course of events for trips other than for commuting purposes to be made more and more frequently by private cars in the future. Therefore, adequate road construction should be duly expedited to cope with the expected future demand.