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# CFS Discussion Paper Series

## Japanese National Railways Privatization Study II:

Institutionalizing Major Policy Change  
and Examining Economic Implications

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The World Bank  
December 1994



# **Japanese National Railways Privatization Study II:**

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## **Foreword**

The hard work of restructuring a state-owned enterprise and preparing it for privatization goes on well after the initial heady reorganization—which marks the beginning of the process—has ended. Even after final plans have been developed and agreed to, a need persists for flexibility and fine tuning in the tactical planning process, which proceeds in parallel with the implementation of restructuring of a large state enterprise. This volume allows us to look inside the process of enterprise restructuring. With unique clarity and insight it explains the responses and resourcefulness of Japanese authorities in continuing to guide one of the largest state-owned enterprises—Japanese National Railways—through the thickets and challenges of privatization. It allows us to measure the progress which has been made since ambitious privatization plans were agreed to in 1986 and explains the ongoing need for fine tuning of restructuring efforts in response to unanticipated shifts in the business and competitive environments. The need to run a railroad on a day-to-day basis further complicates the process.

This paper is part of a series published by CFS, and is a sequel to an earlier volume on the privatization and “zero stage” reorganization of Japanese National Railways. The series is intended to communicate the experience and insights of privatization practitioners to their colleagues around the world, and this most recent volume accomplished these objectives admirably. On behalf of CFS I would like to thank the authors for their valuable contribution to the art and science of privatization.

Inder Sud,  
Director,  
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## **Acknowledgements**

The authors express special thanks to Messrs. Takayuki Nakaya and Akira Sato of the Japan Development Bank, who formed a team with authors and assisted in the completion of this study. The authors would also like to thank two Professors of Harvard University, Dr. John R. Meyer and Dr. José A. Gómez-Ibañez for their constructive advice. This paper was initiated as a component of the World Bank Study entitled "Comparative Analysis of Railroad Privatization," managed by Mr. Ron Kopicki of Co-financing and Financial Advisory Services, the World Bank, but also has been completed as an independent study and constitutes the sequel to the already published World Bank Discussion Paper, "Japanese National Railways Privatization Study; Japanese Experience and Lessons for Developing Countries" (No.172, 1992). The authors express their appreciation for the insightful suggestion of Messrs. Louis Thompson, Kevin Young and Dhruva Sahai of the World Bank, Hiromichi Toya and Kunio Kishimoto of the Ministry of Transport in Japan, Shuichiro Yamanouchi of JR East, and Yasushi Tanahashi of JR Freight.

The authors also express appreciation for the informational support of Messrs. Akio Koike of JR Hokkaido, Kunio Aoki and Toshikuni Nagasawa of JR East, Katsumi Miyazawa, Masaya Sakata and Masahiko Emura of JR Central, Makoto Shibata, Masashi Nonaka and Koji Nakura of JR West, Hachiya Hirono and Michinobu Sogawa of JR Shikoku, Masahiro Imamura and Kenji Mori of JR Kyushu, Yasuo Kikuchi and Takashi Abe of JR Freight, Minoru Suzuki, Masahito Mori and Yuji Segawa of JNR Settlement Corporation, Yoshiaki Komatsu of the Kinki Nippon Railway, Yasuhiro Kato of the Nagoya Railroad, and Fumihiro Miyashita, Hideki Nagao and Shigeyoshi Fujiwara of the Japan Development Bank.

The authors finally would like to express their gratitude for the generous support of Miss Ayano Takei and other staff from the International Cooperation Department of the Japan Development Bank.

## Introductory Note

This report follows an earlier report by the same authors investigating the results of the “privatization” of Japanese National railways (JNR). It takes a longer range view of the outcome: what happened, why, what succeeded and what did not? Observers of the railway restructuring scene are fortunate to have these reports because they finally permit an answer to these questions. It is no longer necessary to say: “Results look promising, but it is premature to claim success.” Now, for some questions, there are answers.

By any realistic measure the process was a success. Traffic has grown strongly on all parts of the new system because a profit orientation has made indifference to customers a luxury the new companies (JR's) cannot afford. With revenues up, huge deficits have been converted into solid profits through increased attention to cost control. A bloated labor force has been reduced and labor productivity has grown rapidly. One of the railways (JR East) is well along toward true privatization, and credible plans to sell shares in two more (JR West and JR Central) have been established. Mechanisms have been established to permit public-private partnerships to finance the heavy burden of new capacity expansion. If the Government had not chosen to intervene in the sale of railway assets (because the real estate market was overheated) and if the stock of the three Honshu JR's had been sold before the “bubble” economy had burst (rather than waiting for the current market which is too weak), all of the original JNR debt would also have been repaid instead of falling more than \$100 billion short. All in all, it is doubtful if even the original proponents of privatization actually hoped for results as favorable as actually happened. Certainly there are few governments elsewhere in the world that took on such a large problem and made so much progress.

The reasons for success, while always hard to implement, are simple in concept. Define objectives clearly and credibly, and build a consensus for reaching them. Where an adequate market exists, adapt the solution to the demands of that market rather than remaining in a government mode of operation: in particular, make maximum use of the pressures of competition and the techniques of the private sector. Finally, identify winners and compensate losers.

But the report also highlights a series of important issues that remain to be resolved. These are:

- *Tariff Regulation.* When and how will the Government allow the JR's to have more rate flexibility so they and the large private railways can expect to earn adequate profits?
- *The three Honshu Railways.* Will privatization be completed? How (unlike the private railways which are predominantly urban passenger oriented) will the Honshu JR's continue to manage a mixture of suburban and intercity passenger services which might be better handled by separate entities, or even transferred in part to the private railways or local governments?
- *The three island railways.* The revenue stabilization fund mechanism is unstable (because of fluctuations in interest rates) and is a barrier to privatization: should it be replaced by a contract for public services which would be predictable and could easily be transferred to a private operator? Should the local governments of the three islands be asked to make a contribution to the contract payments needed?
- *The Freight Railway.* Is there a rational cost-sharing formula between freight and passenger which would not price freight off most main lines? Is there any hope that freight could afford to pay for capacity expansion — and can the country afford to pay for more highway capacity expansion? Is there a better balance between private and public roles in rail freight services, and (give an agreed method for line operating cost allocation) would it not be possible, even imperative, to privatize JR Freight through a limited auction or even a competitive, private placement?

There is much the Bank and its borrowers can learn from the Japanese experience and, given the issues which still remain, there will be good reason to keep a close eye on developments.

Louis S. Thompson  
Railways Adviser  
The World Bank

## Executive Summary

The first half of the present century was something of a golden age for railways in many countries. In Japan the first railway was built between Tokyo and Yokohama in 1872 by the Government. New line construction followed in various areas and by the turn of the century the mileage of privately-run railway lines exceeded that of Government owned lines. Immediately after the Russo-Japanese War (1904-1905), the Japanese Military became convinced of the railway's strategic importance and lobbied for nationalization. The Railways Nationalization Law was enacted in 1906 and existing lines, both private and public, were integrated into a nationwide network under Government control. Thereafter, massive construction of new lines continued throughout the country. The development of the railway network provided the basis for a more mobile society and workforce. It also facilitated the spread of a more homogeneous lifestyle, rapidly eliminating traditional regionalism.

In the latter half of this century, especially over the past two decades, the railway sector has experienced tough competition from different, increasingly sophisticated modes of transportation. State-operated railway systems almost universally began to lose money and to require subsidies. The situation continued to deteriorate at an accelerated pace. Thus, restructuring of railway systems, including the abolition of services, has become a high priority issue worldwide. The Japanese case presents an interesting example of restructuring railways, not only in its size and methodology but also in its philosophy that the railways must continue to play an important role in the future, that the burden to the nation must be minimized, and that this type of restructuring should not occur again. Seven years after the successful restructuring, this paper examines the remaining and newly arising issues, and makes an economic analysis of railway privatization.

### *Brief Description of Japanese National Railways Privatization*

As in many other countries which have achieved or are considering privatization of the railway sector, privatization of Japanese National Railways (JNR) was triggered by the financial crisis of the Japanese Government in the latter half of the

1970s. In particular, the deficits generated by JNR, the Foodstuff Control Special Account, and the National Health Insurance System posed a real problem for government finance. Expenditures for these three items alone accounted for nearly 10% of the total budget. In March 1981, the Provisional Committee on Administrative Reform was appointed under the Cabinet's jurisdiction and charged with devising drastic measures necessary to achieve fiscal reform without raising taxes. In 1982 the Provisional Committee proposed the privatization of Japan's three largest public corporations—JNR, Japan Monopoly Corporation (tobacco and salt), and Nippon Telephone and Telegraph Public Corporation. The committee also suggested that private initiative be employed in the construction of social infrastructure, which in the past had been achieved primarily through public works.

Of all the Provisional Committee's tasks, by far the largest in scale and most critical was the privatization of JNR, Japan's largest public corporation. In 1980, JNR employed nearly 414,000 workers, out of which about one half were considered to be redundant, and the corporation's huge annual losses and accumulated debts were increasing yearly. On the other hand, JNR maintained superb engineering and operating techniques and the transition had to be handled in a way that did not diminish its technical strength. The Provisional Committee recommended the establishing of a Supervisory Committee for JNR Reconstruction, to formulate and implement concrete policies for the corporation's reorganization. In 1987, in line with the Supervisory Committee's proposal, JNR was broken up into six regionally-based railway passenger companies and a seventh company to handle freight transportation for the entire country (These concerns are referred to as the JR's in this paper). About two thirds of JNR's debt, which had reached \$337 billion by the end of 1986, was reassigned to the JNR Settlement Corporation along with any surplus real estate of JNR and the shares of the newly created JR's. The elimination of the redundant workforce was carried out smoothly, aided in part by economic growth and by the very low unemployment rate of the latter 1980s.

The performance of JR's since restructuring has been remarkable, especially until 1990. The annual increase in passengers and cargo has been 5% and

10% respectively. The number of employees was drastically reduced to 191,000 by 1990 and transportation efficiency has improved remarkably. In 1991, the JRs as a whole paid \$4.0 billion in tax and contributions to the government, even though rail fares had not been increased since 1987. JRs are making efforts to respond better to local needs and their corporate image has improved dramatically. In September 1993, 62.5% of JR East's shares were offered to the public. The remaining shares of JR East, as well as shares in JR Central and JR West, are scheduled to be sold during fiscal 1995 and later. The restructuring and privatization of JNR can be judged to have been successful, although the growth of passengers and profitability began to stagnate from 1992 owing to the prolonged economic recession, and there exist remaining or newly arising issues.

#### *Debts of the JNR Settlement Corporation*

One unique characteristic of the JNR privatization is the way in which JNR's debts were allocated to various bodies. JNR debts totaled \$337 billion, including future liabilities. The JNR Settlement Corporation inherited a total of \$232 billion, out of which \$26 billion was secured as a future lease fee in respect of Shinkansen (bullet trains). According to the initial plan, the Corporation was expected to repay the remaining \$206 billion through the sales of surplus assets (\$70 billion) and newly created JRs' shares (\$11 billion) with the balance of \$125 billion to be born by the Government.

Soon after the formation of the JNR Settlement Corporation in 1987, the price of land in Japan began to soar and greatly appreciated during 1987 and 1988. Had all the land been sold without constraint by the peak of the economic boom in 1990, the proceeds would have met the liabilities of the Corporation. However, land sales have been carried out at a much slower pace than initially planned, owing to the Government's decision in October, 1987 to prohibit competitive bidding for the real estate of the Corporation. The Government made its decision at the expense of and against the objectives of the Corporation, because it was thought that such bidding might push general land prices up further. Therefore, the sale of real estate has been limited. The sale of JR shares has been delayed also, owing to the depressed stock market. It was only in September, 1993 that 62.5% of JR East's shares were offered to the public for the first time.

As a result, the proceeds from the sale of assets have not covered interest payments, which totaled \$56 billion between FY1987 and 1992. In fact, the liabilities of the JNR Settlement Corporation had increased to \$242 billion by the end of the FY1992. In 1991 land prices peaked out and showed sharp decline subsequently. According to the figures released by the JNR Settlement Corporation, the value of this land based on the posted price as of April 1993, was roughly \$76 billion. In the light of this, the Government has lifted the ban on competitive bidding, but the outlook of land prices is still bleak and sales of the Corporation's land are still slow in spite of various measures to promote land sales. The repayment of debt, the major remaining issue to be resolved, must be carried out rapidly through the sale of shares and land, or by the maximization of profits from the development of real estate.

#### *Sales of JRs' Shares*

It was planned that as soon as the JRs met the listing requirements of the Tokyo Stock Exchange, their shares would be listed and sold and privatization would be completed. Three of the JRs (JR East, JR Central and JR West) already met the requirements by FY1991 and sales of their shares were planned to begin in FY1992. However, though the basic principle of the JNR Supervisory Committee that all the shares of JRs be listed and sold to the public has not changed, the time schedule was delayed because of anxieties that a massive release of new stocks might further depress the already weak stock market.

In September, 1993, 62.5% of JR East's Shares were offered to the public, as noted above. The remaining 1.5 million unsold JR East shares, as well as those of the JR Central (2.24 million shares) and the JR West (4 million shares), were scheduled to be sold from fiscal 1994 onwards. In December 1993, the Vice Minister for Transportation announced that only one of JR West and JR Central would be sold off in fiscal year 1994, indicating the abandonment of the intention of the Ministry to list both companies on the stock exchange simultaneously. In June 1994 the Asset Disposal Council of the JNR Settlement Corporation concluded that only JR West should be listed in Fiscal 1994. This decision was made in light of the postponement of the sale and listing of Japan Tobacco Inc., (another Government-owned company) from fiscal 1993 to fiscal 1994. In October 1994, one third of Japan

Tobacco's shares were offered to the bidders and public, but a substantial portion of these shares remained unsold because the selling price was too high. On November 15, 1994 the Government decided the sales of JR West's shares should be postponed until Fiscal 1995. The Government considered that the absorption ability of the stock market for privatized companies was not sufficient. Owing to this decision, the completion of sale procedures for the shares of the three Honshu JRs has been delayed still further.

As far as the sale of stocks of the three Island JRs is concerned, in addition to the weakness of the companies' profit base owing to falling yields on the Management Stabilizing Fund, the argument still remains unresolved over whether or not the listing of a company that is not deriving operating profits from its main business is appropriate. Because of these problems, the timing of the disposal of the three Island JRs' stock is not clear at present. As regards JR Freight, in addition to the need for maintaining a certain level of profits in order to achieve listing on the exchange, many other issues remain unsolved, such as cost sharing with passenger JRs, the burden of new investments, competition with trucks, restrictions on expanding business, and others. This will make stock disposal difficult in the near future.

### *JRs' Recent Performance*

In the first four years up to 1990, the respective annual increase in passengers and cargo had been 5% and 10% - marking a clear contrast with the declining trend up to 1986. In 1991 the growth of passengers still showed an increase of 4.9%. In 1992, however, the rate of passenger growth slowed down drastically with the end of "bubble" economic growth in Japan. JR Central suffered most among the three Honshu passenger JRs, as it relies heavily on business passengers using bullet trains. As a result, the company registered its first negative growth in passengers. In that year the growth of passenger traffic for the passenger JRs as a whole was only 1.0%. The prolonged recession continued in 1993 and three passenger JRs (JR Hokkaido, JR Central and JR Kyushu) experienced slight declines in passenger growth. The passenger growth for passenger JRs as a whole was a mere 0.2%.

The Japan Freight Railway Company, which registered negative growth for three consecutive years, was most severely hit, as it had to compete against commercial vehicles which have experi-

enced excess capacity in the past few years (though demand was above the capacity of existing fleets during the period of the "bubble" economy). The situation worsened in 1993 owing to the confusion of cargoes caused by unusually frequent typhoons in the southern part of Japan and to the drastic reduction of rice crop transportation caused by the abnormally cold summer.

In line with operating volumes, the revenue of the JRs also increased remarkably up to FY 1991 and then stagnated, because fares had not been adjusted since 1987. On the other hand, certain cost components of the JRs continued to increase, resulting in the decline of both operating profit and retained earnings for the most of the companies during the past two years. In addition, in the case of the three Honshu JRs, the purchase of Shinkansen lines in 1991 has had a significant negative impact on their profit. For the three island JRs, recent low interest rates have decreased the yield on the Management Stabilizing Fund.

Thus, the environment affecting each JR has increasingly diverged. In FY 1993 the three Honshu JRs still achieved adequate profits, though in the case of the three island JRs, their profit level has declined almost to break-even level. JR Freight recorded its first deficit in FY 1993. Nevertheless, efforts to respond better to local needs and an improved performance in general have been observed in each JR. This is clearly the positive side of privatization.

### *Issues of New Line Construction*

Railway business, regardless of ownership, has some public aspect by nature. In the days of JNR, this public aspect was emphasized. Since the restructuring in 1987, however, the pendulum has swung to the opposite extreme and privatized JRs are reluctant to undertake new line construction. This is one important area where the conflict of public interests is growing between those who bear the cost of, and those who receive benefit from, the new Shinkansen lines, metropolitan commuting lines and intercity lines.

In the case of the Shinkansen network, a development plan was formulated in 1973 to add to the existing four lines. This plan was temporarily put on hold in 1982 during the process of JNR restructuring. Since then, demands have been raised repeatedly by local interests and by a majority of Diet members for the rapid implementation of the plan. In 1989 the Government prioritized eight projects

and construction started. The principle of burden sharing for JRs is that; (a) the JR concerned bears 50% of the construction cost and (b) lease payments by the JR concerned are commensurate with the benefit which the new line concerned produces. For other remaining projects, which are estimated to cost some \$50 billion, neither construction period, nor priority, nor the fund source were determined.

In the case of metropolitan commuting lines, private railway companies in Japan traditionally developed new lines and internalized external economies of surrounding real estate appreciation. Nowadays, external economies are divided among many concerns and it is impossible for railway companies to recover construction costs. In addition, negotiations to further develop the network have become increasingly complicated and involve many interests. For this reason, the concept of "Public-Private Partnership" has become common in constructing new metropolitan lines, where a newly established corporation jointly owned by local governments and private concerns constructs and operates the constructed line. In many cases, railway companies will not agree even to become operators, suspecting that future financial obligation might fall on them. Thus, actual projects are limited, although the need exists, owing to the rapid spread of metropolitan areas. As for intercity lines, large needs there still exist for the speeding up and capacity expansion of lines. Here, "Public-Private Partnership" is also sought, as JRs usually ask for financial support from and participation of local governments.

### *Issues of Freight Transportation*

The freight sector had accounted for substantial portion of JNR's total operational deficit throughout the 1970s and up to 1986. By the time of restructuring in 1987, railway freight was playing only a marginal role and the perception grew that it was difficult, if not impossible, for this sector to be profitable. For this reason, in 1987, JR Freight assumed responsibility only for rolling stock, in order to minimize capital costs. It was decided that Passenger JRs should own the infrastructure and payments by JR Freight for rail lease were deemed to be an "avoidable cost", which is basically the cost of incremental electricity and maintenance caused by freight traffic. From about the same time when JR Freight began to operate, traffic congestion on the road and the shortage of truck drivers became serious. This led to a rapid increase in freight railway traffic and in 1992, JR Freight agreed to bear the capital cost

necessary for any railway freight capacity increase. Accordingly, the lease rate was increased, which had a major negative impact on the profit of the company. JR Freight also has to continuously renew rolling stock. At the same time, competition with trucks has been intensified in the past few years owing to the prolonged recession and viability of the railway freight has been called into question again.

In the face of external diseconomies and long-term labor shortages affecting road freight, the Government has examined measures for a modal shift of freight traffic from road to railway, or marine, and for the achievement of multi-modal transportation. In 1991, the Government decided to promote a modal shift to rail through interest subsidies and tax reductions on certain types of investment by JR Freight. Further steps, however, would raise questions about the long-term viability of rail freight in comparison with other traffic modes, especially with trucks. The issue is complicated by alleged cross subsidization existing both in train and truck transportation. Further complications arise if externalities such as congestion and pollution are taken into account.

Using current market prices and without considering externalities, an indicative economic comparison is attempted in this study between railway and road freight in the case of long-distance freight, where railways may have relative advantages. The result shows that the cost of railway is a little lower than that of road freight. In other words, rail freight can compete with trucks in the long distance market on the basis of current costs. Thus, the recent predicament of JR Freight is seen to arise from a lack of marketing ability, or bargaining power with the final clients, because container freight by rail must use trucks anyway at both ends. JR Freight also has another constraint in that it cannot expand operations of its own will when a conflict arises with passenger trains for the usage of rail.

### *Comparison of Productivity between JRs and Private Railways*

Few people disagree with the success of JNR restructuring, comparing the efficiency of JRs and JNR. However, the question remains as to what extent JRs are operating efficiently in comparison with private railway companies (PRs). In Japan, there is a large number of private railway companies in addition to JRs. PRs have historically recorded stable profit levels (despite inflexible fare regulation), thanks to complementary side businesses

such as real estate development. Among them, the largest fifteen private PRs (Large PRs) in the three metropolitan areas (Tokyo, Osaka and Nagoya) have played an important role in transporting people to work and school. (The achievement of management on a par with that of Large PRs was one of the guidelines for the JNR privatization).

A comparison of the three Honshu JRs and Large PRs using simple average figures in 1991 shows that the former had almost caught up in efficiency in certain key respects. In terms of car-km, the JRs were able to decrease their number of employees per unit to a level similar to that of the large PRs. In terms of passenger-km per employee, while still below that of the Large PRs, the JRs were able to decrease the difference from 46% in 1987 to 16% by 1991. In terms of cost per car-km, JRs' costs are still higher than those of the Large PRs, however. Regarding fares, the JRs have not raised them from 1987, while the Large PRs have raised theirs by roughly 20% from 1987. As a result, the difference in fare levels has been declining. In some areas, the JRs are carrying passengers at lower fares than the Large PRs.

Labor productivity (passenger-km etc.) of all passenger JRs was generally enhanced by a factor about three times between 1981 and 1991. The improvement by job type is also examined in this study. The analysis indicates that JRs improved productivity in station and car maintenance activities and less so in truck maintenance and administrative activities. JRs' productivity was still about 20% lower than Large PRs, but in the case of operators and conductors it was about the same.

Simple average comparisons such as these could be misleading, however, since the JRs and the Large PRs have different operating environments. For this reason, the study also employed economic analysis using regression techniques which take into account differences in networks and services. The results suggest that passenger JRs still retain workers per unit of output 20% to 30% in excess of those employed by Large PRs in most activities except operators and conductors. However, this difference could be explained by more usage of contracting-out by Large PRs, or greater congestion in Large PRs' cars at the cost of passengers.

### *Benchmark Competition among JRs and Private Railways*

The regional break-up of passenger JRs has introduced indirect competition among the com-

panies. At the same time the local orientation of JRs has also introduced direct competition with PRs, especially in parallel commuting lines in major cities where a JR and a PR provide competitive services. On these lines, competition has contributed to improved service quality in terms of train frequency and load factor, and has helped to hold down the pressure for fare increases. It is worth examining to what extent this intramodal competition, or benchmark competition, has been intensified, or has contributed to the growth of market share for JRs.

Regarding the frequency at peak hours on selected lines, the study shows that JRs more than doubled the frequency between 1975 and 1992 on lines where competition is strong, whereas the increase was only 19% for lines where competition is weak. Further, the study selects three commuting areas where a JR and a PR are operating in parallel in order to assess how benchmark competition has influenced market share, or passengers, of JRs. In these lines JRs have kept fares relatively low, have improved congestion problems by upgrading cars, and have increased train frequency. The result shows that JRs are acquiring more passengers than before, in some cases doubling their market share. The relative increase in train frequency seems to be the key to success, since there does not exist any price war between JRs and PRs. Thus, benchmark competition has improved the level of service quality in the commuter market and the benefits of the improvement have been passed on to commuters.

### *Economic Analysis of JR Freight*

In Japan, passenger JRs own railway infrastructure and JR Freight pays user lease fees based on the avoidable cost. In this situation, one important question in the economic sense is whether user lease fees cover the relevant cost of track use, or marginal cost, from the standpoint of efficiency. In this study, the cost function of passenger and freight services is examined and the marginal cost of JR Freight is estimated, using an econometric model. The study shows that the marginal cost of JR Freight is much higher than the user lease fee, indicating that JR Freight is cross-subsidized by passenger JRs. However, the extent of subsidization that can be inferred from the result must be treated as indicative only, since data used in the time-series analysis represent the period of drastic JNR restructuring and may not reflect the actual relation of freight volume and incremental cost.

The current avoidable-cost method is tied to the particular railway policy to maintain rail freight. On the other hand, trucks are also cross-subsidized by passenger cars. Further, if external costs are associated with road transportation, there are sound economic reasons for railways to deviate from marginal-cost pricing. Indicative economic comparison between rail and truck freight in the preceding section shows that rail freight can be competitive cost-wise over long distances, indicating the validity of the current policy for rail freight.

### *Lessons of JNR Privatization*

This study focuses primarily upon the various issues arising seven years after the initial restructuring of JNR in 1987 and upon economic implications of its privatization. For those countries which are considering restructuring now, the really important lessons derived from the initial restructuring in Japan, which are examined in detail in a preceding study ("Japanese National Railways Privatization Study—The Experience of Japan and Lessons for Developing Countries", World Bank Discussion Papers 172 ), are still valid. These include impartial planning, prioritization of issues, creation of incentives for efficient management, and compensation for losers. However, even with the initial restructuring successfully completed, many countries may eventually face similar issues to those which are discussed in this study.

Our economic analysis shows that the productivity of JRs has been greatly improved by the privatization, which has made the nation the biggest beneficiary. It also shows that the quality of services has been improved by competition and

that the benefit of the improvement has been passed on to passengers. Freight rail transportation is still cross-subsidized by passenger rail, but this issue must be considered in the context of more comprehensive inter-modal comparison, since trucks are also cross-subsidized by passenger cars in terms of low highway tolls and fuel taxes.

The restructuring of railway systems, including the abolition of services, is a phenomenon which has occurred in many parts of the world during the past twenty years. In Japan, this has been caused mainly by the rapid development of automobiles, which overwhelmed railways in many areas, and by the massive migration of population to metropolitan areas (especially to Tokyo), which has made many local lines unprofitable. Similar phenomena have been observed worldwide.

In the long run, however, the viability of the railway sector in comparison with automobiles must be analysed with care, when external diseconomies of automobiles, the toughest competitor of railways, are taken into account such as congestion, pollution, destruction of nature and global warming. At the same time, over-concentration of population in Tokyo has caused intolerable problems for both metropolitan and rural inhabitants and there exists increasingly a strong demand for more balanced development of the Japanese archipelago. Here, railways can play an important role, consistent with the commercial principles of JRs. The restructuring and privatization of JNR has been based on the philosophy that railways must play an important long-term role. In each country, decisions made today could have far-reaching effects upon later generations.

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# ***I. Privatization of Japanese National Railways***

1.1 As in many other countries which had to consider, or are considering, privatization of the railway sector, privatization of Japanese National Railways was triggered by the financial crisis of the Japanese Government in the latter half of the 1970s. Snowballing debts and deficits of JNR and the resulting financial burden on Government had reached an enormous and unacceptable level by 1980. The relative decline of the railway sector was in a sense inevitable due to the development of different, increasingly sophisticated modes of transportation. JNR could not cope properly with this change, which accelerated the deterioration of JNR's financial health. After the failure of reconstruction plans by JNR management and frequent strikes by JNR labor unions in the 1970s, there existed a widespread perception by 1980 that the restructuring was essential. On the other hand, JNR maintained superb engineering and operating techniques, as was conspicuously shown in the bullet train network especially. The transition had to be handled in a way that did not diminish JNR's technical strength.

## **Privatization in Japan in the 1980s and its Background**

1.2 By the latter half of the 1970s, government finance in Japan had reached a crisis. In order to respond to this crisis, in 1975 the government began issuing special bonds (so-called deficit bonds) to help cover administrative expenditures. These bonds were in addition to the construction bonds the government was already issuing to cover investment expenditures. By 1979, bonds had been issued for a total of US \$521 billion (¥57.3 trillion)<sup>1</sup> and the government's dependence on them had

reached 39.6% of its total budget. This level was extremely high when compared with that of other leading Western countries, whose dependence ratios in 1979 ranged from 5.6% (United States) to 14.2% (West Germany).

1.3 Three factors contributed directly to this crisis: first, prices and wages in Japan had increased dramatically in the wake of the oil crisis of 1973, resulting in greatly increased expenditures for social security, education, and other areas where Japan was just beginning to achieve parity with the advanced countries of the West, second, in 1974, Japan experienced negative economic growth for the first time since World War II. After 1976, in an effort to achieve a more stable level of growth, the government greatly increased the number of public works projects undertaken, third, the slowdown in economic growth led to a reduction in tax revenues, which in turn led to increased government expenditures. In order to cover these expenditures, the government had to issue more bonds. As a result, the government was confronted with an increased burden in meeting principal and interest payments on the bonds.

1.4 In addition to the economic and social changes which occurred after 1973, another factor contributing to the fiscal crisis was the continuation of spending practices which had been greatly expanded during the period of high economic growth. The country's financial structure was inflexible and consequently it was very difficult to reduce expenditures. In particular, the deficits generated by the Japanese National Railways (JNR), the Foodstuff Control Special Account, and the

<sup>1</sup> Hereinafter, US\$ is abbreviated as \$. An exchange rate of \$1=¥110 is used.

National Health Insurance System posed a real problem for government finances. Expenditures for these three items alone accounted for nearly 10% of the total budget.

1.5 In response to these problems, the Ministry of Finance presented a fiscal reform plan to the Diet in 1979, the stated goal of which was to "reduce the issuance of special government bonds to zero by 1984." In support of this plan, the Ohira Cabinet, composed of Liberal Democratic Party (LDP) members, tried to introduce a general consumption tax. But public opinion was strongly against such a tax. Complaints were voiced that the Government had not made sufficient efforts to streamline its own operations, particularly when compared to the effort that the private sector had made in overcoming the oil shock. The public felt that there was considerable administrative waste and that reducing government expenditures should be made a priority. As a result, the LDP suffered serious setbacks at the polls.

1.6 Thus, public opinion made it difficult to rebuild government finances through large tax increases. In 1980, however, the LDP won the general election by a landslide, and the Suzuki Cabinet gained a stable majority in the Diet. In March 1981, the Provisional Committee on Administrative Reform (the Provisional Committee) was appointed under the Cabinet's jurisdiction and charged with devising the drastic measures necessary to achieve fiscal reform without raising taxes. The Committee was headed by Mr. Toshio Doko, honorary chairman of the Federation of Economic Organizations (Keidanren), who had an excellent record of successfully rebuilding private enterprises. The Committee also included experts from various fields, including finance, government, and labor.

1.7 The Provisional Committee discussed how to achieve an effective, flexible administrative system that would be able to accommodate changes in social and economic conditions. In addition to recommending radical reform of Japan's administrative system, the Committee also proposed the privatization of Japan's three largest public corporations—JNR, Japan Monopoly Corporation (tobacco and salt), and Nippon Telegraph and Telephone Public Corporation. They also suggested that private initiative be used to construct social infrastructure, which in the past had been achieved primarily through public works.

1.8 Based on these recommendations, the following steps were taken; (a) all items that required

administrative approval and government funding were reviewed, (b) the three public corporations mentioned above were privatized, and (c) large projects, such as the Tokyo Trans-Bay Highway and Kansai International Airport (in Osaka), were implemented on the basis of private initiative.

1.9 Of all the Provisional Committee's tasks, by far the largest in scale and most critical was the privatization of JNR, Japan's largest public corporation. In 1980, JNR employed nearly 414,000 workers and its huge annual losses were increasing yearly. The Provisional Committee concluded that restoring JNR's financial health was impossible as long as it was operated as a centralized, nationwide public corporation. The Provisional Committee recommended establishment of a Supervisory Committee for JNR Reconstruction to formulate and implement concrete policies for the corporation's reorganization. In 1987, JNR was broken up into six regionally-based railroad passenger companies and a seventh company to handle freight transportation for the entire country (referred to as the JR's in this paper). The major portion of JNR's debt which had reached \$337 billion by the end of 1986, was reassigned to the Japan National Railways Settlement Corporation along with any surplus real estate of JNR and the shares in the newly created JR's.

1.10 In addition to these administrative reforms, the tax system was also reformed in 1988, and the national consumption tax that had been proposed earlier was implemented. These actions, coupled with favorable economic conditions, made it possible for the government to achieve its goal of discontinuing the issuance of special bonds by 1990, albeit six years later than originally planned. The 1980s thus represent a transition period between the high-growth economy of the postwar years and the present, stable-growth economy. As such, it was also a period of reevaluation and reform of the government's administrative, finance and tax systems.

### Crisis within JNR and its Causes

#### *Development of Crisis*

1.11 In 1980, Japan had approximately 27,000 kilometers of rail lines which were operated jointly by JNR and more than a hundred private railway companies. With control of 80% of the total number of rail lines throughout Japan, JNR was by far the largest nationwide operator. Private railway

networks operated throughout Japan, with the largest ones concentrated in the three metropolitan areas of Tokyo, Osaka and Nagoya. JNR was in direct competition for the commuter market with private concerns operating in these areas.

1.12 JNR had enjoyed virtual monopoly status until the 1950s. Gradually, however, competition from automobiles, aircraft and coastal shipping intensified and JNR lost its competitive edge in all geographic regions except both in the metropolitan areas and in the bullet train networks. But even in the metropolitan areas, repeated fare hikes in JNR's final years as a public corporation resulted in fares that were higher than those charged by the private rail lines. JNR's share in passenger transport volume dropped sharply from 55% in 1955 to 23% in 1985. The share of freight transport volume dropped more drastically from 52% to 5% over this same period. Meanwhile, JNR's investments in infrastructure only increased its debt burden. Road transport, on the other hand, benefited from financial resources obtained primarily from the gasoline tax.

1.13 JNR could not compete with the other modes of transportation which were being introduced during this period. After 1964, the year when JNR posted its first single-year loss of \$273 million, reconstruction plans were formulated, abandoned and then replaced by new plans. These attempts at reform by JNR management all ended in failure due to mistaken assumptions, lack of sensitivity to the changing transportation environment, and delays in approval by the Diet.

1.14 In the 1970s, JNR's management introduced a large-scale productivity improvement drive for the workforce, but the largest labor union within JNR claimed the drive to be an unfair labor practice designed to undermine the union. Some of the claims were upheld by a government arbitration agency, and the mass media supported the union by criticizing the drive. The productivity improvement drive ended in total defeat for management, resulting in a negligible reduction in the work force and an unprecedented deterioration of employee discipline.

1.15 Performance continued to decline throughout the 1970s and early 1980s. In 1985, JNR's annual loss before subsidies approached \$22 billion. The causes of the deficit were: (a) abnormally high personnel expenses (amounting to 78% of total revenues at their peak, compared with about 40% for private railways), and (b) the burden

resulting from excessive capital investment and interest accruing on the large volume of debt. JNR's consistent policy was to continue to cover its deficits by borrowing and, as a result, its total debt continued to snowball.

1.16 In spite of its financially precarious situation, JNR continued to maintain excellent railway engineering and operating techniques, owing to its history of recruiting officers and engineers of high caliber and morale. JNR's management remained confident that it was the only group capable both of running JNR and of reorganizing it. JNR was opposed until the last moment to the Government's proposed break up and privatization of the corporation. The largest labor union within JNR which was socialist-led, also considered its role as part of a political struggle and was actively opposed to the privatization movement. But frequent strikes along with scathing attacks from the press turned the public against JNR by 1980, leaving the general impression that restructuring was essential. Because of these circumstances, the implementation of the privatization process involved the dismissal of most of the JNR management and of the intransigent union's leaders (this union subsequently collapsed). These were rather drastic measures for Japan. The other minority labor unions within JNR chose to cooperate with the privatization process.

#### *Reasons for JNR's Managerial Failure before Restructuring for Privatization*

1.17 JNR's managerial failures prior to privatization can be attributed to a number of causes, classified into the three categories below.

2. Problems inherent in the public corporation system such as:
  - i. Control of the Government and intervention of outsiders. In return for JNR's monopoly status as a public corporation providing a key public service, it was subject to strict governmental and congressional supervision and control. For example, the approval of the Minister of Transport was required in order to construct any new line and the JNR budget had to be approved by the Diet. As a result, outsiders, including politicians and the Government, often interfered in its management and forced JNR to invest in unprofitable routes.

- ii. Lack of incentives for efficient management. JNR management made little effort to maximize profits by reducing costs and raising productivity. This behavior can be attributed to 1) a lack of managerial discretion, itself the result of considerable outside interference, and 2) the absence of profit-motivation under the public corporation system.
  - iii. Slow reaction to intensified competition. Public corporations generally function effectively in a monopolistic environment. However, as a result of a rapid increase in competitive modes of transportation such as automobiles and aircrafts, the Japanese railway industry gradually lost its monopolistic position and market share. JNR management could not cope with this situation without having the power to take appropriate measures, such as the swift elimination of unprofitable lines.
  - iv. Labor unions' lack of sense of crisis. Even after JNR began to run at a deficit, the labor unions refused to appreciate the scale of the crisis and continued to pursue political issues. They also refused to cooperate with management's efforts to rationalize and reduce costs. This attitude resulted in the disruption of work-place discipline and a deterioration in the quality of services.
- b. Size of JNR and insensitive reaction to local needs. The nationwide concern was simply too large to be adequately managed by a single managerial entity. Those in the railway industry must be sensitive to local demands and provide convenient services for their customers. Under unified, nationwide management, JNR was unable to provide locally-based service and consequently lost its competitive position vis-a-vis the private railways.
  - c. Lack of profit from related businesses. Given its public nature, the railway industry is regulated in determining its fares. Even private railways do not generally expect high profit levels. Indeed, related businesses such as real estate development account for a substantial proportion of the total profit of most companies. As a public corporation with specific objectives, JNR was limited with respect to the scope of its business. Thus it could not rely on related businesses for profits, and failed to improve the profitability of the corporation as a whole.
- Privatization Process of JNR**
- Restructuring and Commercialization in 1987*
- 1.18 In July 1985, the Supervisory Committee submitted its written opinion concerning the restructuring of JNR to the Prime Minister. In April 1987, as the first and most important part of the privatization process, the corporatization and division of JNR were carried out virtually in line with the Supervisory Committee's report. The main results of these steps were:
- a. The passenger railway division was divided into six companies; three on the main island of Honshu and one each on the three islands of Hokkaido, Shikoku, and Kyushu. A seventh firm handled freight for the entire country. The profitability of each new company was carefully measured and steps were taken to ensure that these companies maintained solid managerial bases. The three bigger Honshu-based companies and the freight company assumed only \$42 billion of JNR's total debt. The Shinkansen (Bullet train) Holding Corporation was established and assumed \$52 billion of JNR debt. It leased bullet train networks to Honshu-based companies with the rental fees adjusted to correct the profit disparity between old and new bullet train networks. The smaller passenger companies in Hokkaido, Shikoku and Kyushu did not assume any of the JNR debt. The Management Stabilizing Fund was created for these smaller passenger companies to offset the imbalance between revenues and expenditures. The Japan National Railways Settlement Corporation (JNRSC) provided the capital for this Fund.
  - b. The remaining \$232 billion liabilities were assumed by the JNRSC, established as the successor to the old JNR. It also received shares of the JRs and the surplus real estate of JNR as well as the redundant workers. The redemption of debts assumed by the JNRSC was to be achieved as far as possible by the repayment of the Shinkansen Holding Corporation, sales of the marketable pieces of JNR-owned real estate, and sales of JR stocks. The remaining debt is expected to be born by the general budget account.

- c. JNR had about 200,000 redundant workers in 1980. By 1985, the number of JNR employees had already been reduced to 280,000 (through prior restructuring) compared with 414,000 in 1980. However, there were still an estimated 93,000 redundant workers. The Government actively promoted various measures to secure job changes for these workers. The public sector was asked to employ JNR workers, without increasing total employees, and the private sector voluntarily accepted some JNR workers. The elimination of the redundant work force largely by job-transition was carried out smoothly, aided in part by economic growth and by the very low unemployment rate of the late 1980s. As a result, the number of JNR employees ultimately transferred to the JNRSC in April, 1987 was 23,660, most of whom found jobs in other places by April, 1990. A total of only 1,050 employees were ultimately dismissed because they refused to move to newly allotted placements.
- d. Chairmen of the new JR's were chosen from among influential leaders in the local business community. The first Presidents of the JR East and JR West Company, the two largest of the JR companies, were former high-ranking officials of the Ministry of Transport and had been supporters of privatization. The Presidents of the other JR's were selected from JNR management members who had not opposed privatization. Other leaders within JNR who had promoted privatization (though as a minority at the beginning) were appointed to influential management posts at the new JR's.

### *Sales of Shares*

1.19 Since April 1987, the JR's have operated as commercialized stock companies, but all of the shares except 62.5% of JR East's shares which were sold to the public in September, 1993, were still owned by the JNR Settlement Corporation. As soon as the JR's met the listing requirements of the Tokyo Stock Exchange, their shares were expected to be listed and sold to the public, and the transition to private enterprise would be completed.

1.20 On April 1st, 1992, all of the JR's celebrated their fifth anniversary, one of the requirements for the listing. By this date, three of the JR's (JR East, JR Central, and JR West) had also met all of the other requirements. The Government's and the JNR Settlement Corporation's objective was to

list these companies and to start selling shares beginning in FY 1992, completing the sale of all stocks within four to five years. However, the stock market was deeply depressed throughout 1992 and concerns were raised that the offering of JR's stocks to the public in a massive scale would further damage the condition of the market. For this reason the Government postponed the initial sales of shares until September 1993 in spite of the desire of these three companies for an earlier offering.

1.21 In September 1993, 62.5% of JR East's shares were offered to the public. The remaining shares of JR East, as well as shares of JR Central and JR West, are scheduled to be sold from Fiscal 1995 onwards. The remaining three island companies have poorer operational bases and have been profitable only due to the added revenue from the Management Stabilizing Fund, but the yield of this Fund has been lower during the past two years because of low interest rates. Among them, however, JR Shikoku has already met the required profit standard. JR Kyushu and JR Hokkaido have not yet met this standard. The current profit of the freight company is still below the required level. These three island companies and the freight company are also striving to achieve the earliest possible listing, but the time schedule is uncertain as yet.

### *Performance following JNR Restructuring*

1.22 The performance of JR's since restructuring had been remarkable especially in the period up to 1990, thanks partly to the economic growth which occurred in Japan during the period when restructuring was carried out. The annual increase in passengers and cargo was 5% and 10%, respectively between 1987 and 1990. The number of employees was drastically reduced to 191,000 by 1990. As a result, transportation efficiency has improved remarkably. The profitability of the new JR's has been improved due to the reduction of the work-force and liabilities. Transportation volume has been increased by JR's own efforts and by favorable economic environment. The amount of annual profit improvement for the new JR's as a whole is estimated to have reached \$25 billion in 1989 (excluding the contribution of the favorable economic environment). Of this improvement, \$12.5 billion in profits are estimated to be due to efficiency gains resulting from restructuring.<sup>2</sup> La-

<sup>2</sup> See Koichiro Fukui, *Japanese National Railways Privatization Study: The Experience of Japan and Lessons for Developing Countries*, World Bank Discussion Paper 172.

bor-management relations have also been improved. JR's are actively expanding their businesses to areas outside transportation, as a result of deregulation, and their corporate image has improved dramatically.

1.23 While the JR's have demonstrated better performance, the biggest beneficiary of this restructuring is the Government which benefits from the reduction of its fiscal burden. Before restructuring, annual subsidies from the Government to JNR reached about \$5.5 billion on average. After restructuring, the annual subsidy to JR's has been drastically reduced. In 1991, for example, the subsidies to JR's was only \$1.0 billion, including that to the JNRSC. This year, profitable JR's paid \$4.0 billion in tax and contributions to the Government, resulting in an overall surplus paid to the Government of \$ 3.0 billion (See Chapter III).

1.24 Rail passengers have also benefited from an improvement in service quality (without fare increases). On the other hand, certain segments of the society such as equipment suppliers and other private railway companies face more competition from JR's commercialization. Passengers in the separated remote lines pay higher fares in some cases. However, there have been no obvious losers except for the former JNR management and radical union leaders, as well as the 1,050 employees who were dismissed in April 1990. The privatization process of JNR can be judged to have been successful, even though the JNRSC still has outstanding debts.

1.25 Since 1991, with the prolonged and increasingly serious economic recession in Japan, the performance and outlook of each JR has begun to differ. In 1991 JR passenger figures still showed a demand increase of 4.9%, but JR Freight's demand for cargo leveled off. In 1992 the demand increase of JR passengers as a whole slowed to 1.0% and JR Freight's demand showed a decline of 1.9%. Among JR passengers, this year, JR Central (which relies heavily on business passengers of Tokaido Shinkansen) and JR Shikoku (which faces tougher competition from newly opened highways) experienced decline in passengers for the first time. JR Freight faces increasing competition from trucks, and is also suffering from recession. The recession continued in 1993 and three passenger JR's (JR Hokkaido, JR Central and JR Kyushu) experienced a slight decline in passenger growth. This year the growth of total passenger JR's was only 0.1%, while JR Freight registered another decline of 4.5%. (See

Chapter III). The performance and outlook of each JR affects the time schedule of stock sales needed to finalize privatization.

#### Remaining Issues

1.26 With the creation of the JR's in 1987, the first phase of the JNR privatization was completed. At that time, the following longer-term issues remained to be resolved. (See Chapter II.).

#### *Debts of JNRSC*

1.27 A major portion (\$232 billion) of JNR's liabilities were reassigned to the JNRSC along with the real estate and shares of the JR's. These liabilities are expected to be repaid by the sale of real estate and shares. Just after the formation of the JNRSC in 1987, the price of land in Japan began to soar and greatly appreciated during 1987 and 1988. However, the land sales have been carried out at a much slower pace than initially planned owing to the Government's decision in October, 1987 to prohibit competitive bidding for the real estate of the JNRSC. The Government made its decision at the expense of and against the objectives of the JNRSC, because it was thought that such bidding might push general land prices up further. Therefore, the sale of real estate has been limited. The sale of JR shares has been delayed longer than initially expected due to the depressed stock market.

1.28 As a result, the proceeds from the sale of assets have not covered interest payments, which totaled \$56 billion between FY1987 and 1992. In fact, the liabilities had increased to \$242 billion by the end of the FY1992. In 1991 land prices peaked out and showed a sharp decline subsequently. According to figures released by JNRSC, the value of its land (based on the posted price of April 1993) was roughly \$76 billion. Therefore, the Government has lifted the ban on competitive bidding, but the outlook for land prices is still bleak and sales of Corporation's land are still slow in spite of various measures to promote land sales (See the next section.). The repayment of debt, the major remaining issue to be solved, must be carried out rapidly through the sale of shares and land, or by the maximization of profit through the development of real estate holdings.

#### *Uncertainty concerning Sales of JR's Shares*

1.29 As soon as the JR's meet the listing requirements of the Tokyo Stock Exchange, their shares were expected to be listed. Three of the JR's (JR

East, JR Central and JR West) had already met the requirements by FY1991 and the sales of their shares was planned to begin in FY1992. The basic principle of the JNR Supervisory Committee that all the shares of JRs be listed and sold to the public has not changed, but the time schedule has been delayed for fear that the massive release of new stocks might further depress the already weak stock market.

1.30 In September 1993, 62.5% of the JR East's Shares were offered to the public for the first time. The remaining 1.5 million unsold JR East shares, as well as those of the JR Central (2.24 million shares) and the JR West (4 million shares), were scheduled to be sold from fiscal 1994 and later. In December 1993, the Vice Minister for Transportation announced that only one of JR West and JR Central would be sold off in fiscal year 1994, indicating the abandonment of the intention of the Ministry to list both companies on the stock exchange simultaneously. In June 1994 the Asset Disposal Council of JNRSC concluded that only JR West should be listed in Fiscal 1994. This decision was made in light of the postponement of the selling off and listing of Japan Tobacco Inc. (another Government-owned company) from fiscal 1993 to fiscal 1994. In October 1994, one third of Japan Tobacco's shares were offered to the bidders and

public, but a substantial portion of these shares remained unsold because the selling price was too high. Subsequently the Government decided the sales of JR West's shares should be postponed until Fiscal 1995. The Government considered that the absorptive ability of the stock market for privatized public companies was not big enough. Owing to this decision, the completion of the sale of shares in the three Honshu JRs has been delayed still further.

1.31 Regarding the selling off of the stocks of the three Island JRs, in addition to the weakening of the companies' profit base (due to falling yields of the Management Stabilizing Fund) the argument still remains unsolved as to whether the listing of a company that is not deriving operating profits from its main business is appropriate, or not. The timing of the disposal of the three Island JRs' stock is thus unclear at present.

1.32 Concerning JR Freight, in addition to the need for maintaining a certain level of profits in order to achieve listing on the exchange, most analysts agree that many questions remain unsolved, such as cost allocation with passenger JRs, the burden of new investments, competition with trucks, restrictions on expanding business, and others. This renders stock disposal difficult in the near future.

## **II. Recent Developments Affecting the Remaining Issues**

### **Issues of the Japanese National Railways Settlement Corporation**

2.1 One unique characteristic of the JNR privatization is the way JNR's debt was allocated to various bodies. The debt included the liabilities accruing in the future, such as the expected future deficits of the three Island companies and future pension payments, as well as the enormous amount of outstanding debt. All this reflects the principles of the Supervisory Committee for JNR Reconstruction, that the railroad sector must continue to play an important role in the future and new JRs must have a solid managerial basis, that the burden to the nation must be minimized, and that this type of restructuring should not occur again. As an important measure to achieve these principles, the Japanese National Railways Settlement Corporation (JNRSC) was created and assumed the majority of the JNR's debt as well as the surplus assets and the shares of the new JRs. Since one major problem of JNR was the existence of the accumulated debt, the evaluation of JNRSC constitutes the important factor of the JNR privatization itself.

### ***Debts of JNRSC***

2.2 JNRSC was created primarily to repay the long-term debt held by JNR through the sales of surplus assets and of newly created JRs' shares. To this end, following the April 1987 privatization of JNR, it received 8,180 hectares of land from JNR, equal to 13% of the 65,380 hectares of JNR's total land, and 630 hectares from the Japan Railway Construction Public Corporation (JRCPC), totaling 8,810 hectares of land, as well as the entire shares of the new JR companies and about 54%

shares of the Teito Rapid Transit Authority, which operates the majority parts of the subway in Tokyo. These various financial resources were allocated to JNRSC to finance debt redemption.

2.3 The JNR-related long-term debt requiring settlement totaled \$337 billion (¥37.1 trillion), including the liabilities accruing from such bodies as JRCPC, the Honshu-Shikoku Bridge Authority and future pensions, in addition to the direct \$227 billion of JNR's debt. Of this \$337 billion of liabilities, JNRSC inherited a total of \$232 billion, including future expenses of \$52 billion such as pension liabilities. But this figure did not include future interest payments on its liabilities, which were calculated as \$72 billion. Four JRs (East, Central, West and Freight), the Shinkansen Holding Corporation (SHC) and JRCPC inherited the remaining of \$105 billion of liabilities.

2.4 Of the \$232 billion inherited by JNRSC, a total of \$26 billion was scheduled to be paid in the time period up to fiscal year 2016 by the three Honshu JRs (JR East, JR Central, and JR West) for the rent of the Shinkansen facilities through SHC. Therefore, the amount of debt the JNRSC itself had to redeem was \$206 billion.

2.5 The Four JRs inherited \$42 billion of their own debt and, in addition, had to pay \$89 billion, originally inherited by SHC, JNRSC and JRCPC, making the total \$131 billion.

2.6 Since their birth, these four JRs have repaid some debt, but at the same time undertaken new borrowing. So, it is not clear how much of the originally acquired \$131 billion liabilities still remain. However, according to a report by the Ministry of Transportation in October 1992, the original

mentioned above, \$26 billion, which will be paid by three Honshu JRs, was to be passed on to the Shinkansen Holding Corporation (reorganized in October 1991 into the Railway Development Fund) in the form of a loan from the JNRSC to that company, \$70 billion was to be earned from the sale of land, and \$11 billion from the sale of shares (calculated at a face value of \$5 billion for the JRs' stocks and at revalued \$6 billion for the Teito Rapid Transit Authority) for an envisaged total redemption of \$107 billion. The remaining \$125 billion was to be financed by the General Budget Account. This was supposed to be the final burden to the nation. However, the calculation did not include future interest on JNRSC's liabilities.

2.9 Following this settlement in 1987, the JNRSC has proceeded with debt redemption through the sales of land, 54% of the equity in the Teito Rapid Transit Authority, and other asset

sales. Although debt redemption by the end of fiscal 1992 amounted to \$61 billion, new debt was added, totaling \$56 billion including interest payments, plus, pension and other expenses, leaving a debt balance of \$242 billion. Out of this amount, \$17 billion will be collected from three debt JRs through the Railway Development Fund. So, JNRSC actually owed \$225 billion at the end of FY 1992. This amount is \$19 billion more than JNRSC inherited at its birth. However, this amount would be \$167 billion without interest payment — \$39 billion less than it inherited.

2.10 By comparing the amount of subsidies received from the national government with the amount of taxes and contributions paid by JNR and succeeding institutions to the national government and to municipal bodies, one may observe the burden borne by tax-payers before and after the privatization of JNR.

**Table II-1: Trends in the Long-Term Liabilities of JRs (US\$ billions)**

End of FY	Beginning of 1987	1987	1988	1989	1990	1991	1992
JNRSC	206	211	219	228	221	223	225
JRs	131	128	122	117	115	115	n.a.
JRs themselves	42	40	35	34	32	31	n.a.
owed to SHC* & JNRSC	78	78	76	74	74	74	n.a.
owed to JRCPC	11	10	10	10	10	10	n.a.
<b>Total</b>	<b>337</b>	<b>339</b>	<b>341</b>	<b>345</b>	<b>336</b>	<b>337</b>	<b>n.a.</b>

\* Shinkansen Holding Corporation was reorganized as the Railway Development Fund in October 1991.

Note: In this table, final debtors (payers) are shown. The data therefore differs from that for inherited debtors.

**Table II-2: Taxes, Contributions and Subsidies (US\$ millions)**

Fiscal Year	Taxes and Contributions	Subsidies	Balance
1982	320	6,631	-6,311
1983	348	6,380	-6,032
1984	421	5,885	-5,465
1985	435	5,455	-5,021
1986	455	3,433	-2,977
1987	2,006	1,761	245
1988	2,234	1,918	315
1989	2,092	5,755	-3,664
1990	2,722	1,428	1,294
1991	4,039	984	3,055

Note: For taxes, contributions and subsidies following the privatization of JNR, figures represent a total of those from the individual JRs, JNRSC, the Shinkansen Holding Corporation, and the Railways Maintenance Fund.

2.11 The Ministry of Transportation revealed such figures in October, 1992. According to these, before privatization, the amount of subsidies paid to JNR far exceeded the amount of taxes and contributions received from JNR (as a public corporation, JNR was not required to pay federal taxes). It was estimated that the administration of JNR imposed a burden on tax-payers in the order of \$5.5 billion annually.

2.12 Following the privatization of JNR, however, the individual JR companies were required to pay federal taxes such as the corporate tax, and the amount of such taxes paid was quite considerable, reflecting the favorable management conditions of these companies. The amount of such taxes collected came to exceed the amount of subsidies paid to JNRSC etc., implying that the privatization of JNR has brought considerable benefits to the Japanese tax-paying public in subsequent years. (In 1989 the amount of subsidies paid by the government exceeded the amount of taxes and contributions received, due to special pension-related reasons, which will not occur again.) In 1991, the net balance from JNR inheritance to the government reached \$3.0 billion.

2.13 Moreover, if we look at the overall balance sheet of JNR revealed by the Ministry of Transportation, in the five year period from fiscal 1982 to

1986, total losses amounted to about \$73 billion, but in the five years following privatization from 1987 to 1991, despite the fact that the sale of land and stocks has not proceeded as smoothly as was foreseen, total losses have fallen sharply to \$18 billion, including those of the JNRSC.

#### *Assets of JNRSC*

2.14 Out of the assets that the JNRSC inherited as financial resources for debt repayment, by the end of fiscal 1992, it had sold fixed assets, such as 3,917 hectares of land, plus rail cars and other assets, for a total of \$29 billion. As a result, the amount of land held by the JNRSC fell to 5,314 hectares. On the other hand, 421 hectares of land have been returned by the JRs because they do not need them for their activities. At the time the original debt redemption plan was formulated, JNRSC had planned to repay \$70 billion through the earnings from land sales (the value of the land that could be sold off from the total 8,810 hectares inherited).

2.15 Immediately after the formation of the JNRSC in 1987, the price of land in Japan began to soar and greatly appreciated during 1987 and 1988. By the beginning of 1990, the appraised value of the land held by the JNRSC had risen to about \$136 billion. During these years, land sales have

**Table II-3: Financial Status of JNR (FY 1982 - 1986) and JRs (1987-91) including JNRSC (US\$ millions)**

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Operating Revenue	26,812	26,915	28,206	30,095	31,062	32,117	34,554	35,907	38,588	40,140
<i>% change from previous period</i>	(4.2)	(0.4)	(4.8)	(6.7)	(3.2)	(3.4)	(7.6)	(3.9)	(7.5)	(4.0)
Operating Expense	35,249	36,701	36,330	38,420	34,298	29,784	30,710	32,195	33,077	35,418
<i>Personal Expense</i>	(18,704)	(19,219)	(19,035)	(20,931)	(19,229)	(16,220)	(15,563)	(16,811)	(15,862)	(16,470)
Operating Profit	-8,436	-9,786	-8,125	-8,324	-3,237	2,334	3,844	3,712	5,511	4,722
Current Profit	19,470	27,633	22,065	23,492	17,815	12,052	11,891	11,696	9,495	10,248
Extraordinary Profit	7,243	7,909	7,349	6,980	6,467	3,411	4,635	9,083	17,645	9,640
<i>Gains from Sale of Fixed Assets</i>	(643)	(1,510)	(1,392)	(1,404)	(2,927)	(1,207)	(1,850)	(2,265)	(7,373)	(7,065)
Extraordinary Loss	307	371	287	279	926	590	1,038	1,238	1,940	2,107
Net Profit	12,525	15,095	15,004	16,798	12,578	9,231	8,295	3,925	6,211	2,715
<i>Seven JRs</i>						(1,399)	(1,991)	(2,632)	(2,750)	(2,784)

Source : Ministry of Transport

been carried out at a much slower pace than initially planned, owing to the Government's decision in October, 1987 to prohibit competitive bidding for the real estate of the JNR Settlement Corporation. The Government made its decision at the expense of and against objections from the JNR Settlement Corporation, because it was thought that such bidding might push general land prices up further. Therefore, JNRSC missed the opportunity of selling real estates in an extremely favorable environment.

2.16 In 1991 land prices peaked out and showed sharp decline subsequently. According to the figures released by JNRSC, the value of this land based on the posted price of April 1993, was roughly \$76 billion. The outlook for land prices is still bleak and the sales of JNRSC's land is still slow in spite of various measures to promote land sales (See following section.).

2.17 Similarly, regarding the sales of stocks, the original plan assumed the sales revenue to be \$11

billion, out of which \$5 billion would represent the shares of the JRs, calculated at face value. Had the three Honshu JRs been listed on the stock exchange at the peak of the so called Bubble Economy, prices as high as ¥1 million per share, twenty times as much as the face value, were suggested. At this price, the total 8.24 million shares of these three companies would have fetched \$75 billion. However, given the collapse of the Bubble Economy, were all the shares to be sold in the present situation of weak share prices, (taking the ¥380 thousand selling price of JR East shares as of August 1993), the figure for the three JRs would be only \$29 billion. (Actual sale of JR East shares: 2.5 million for ¥1 trillion; JR East remaining shares: 1.5 million, JR Central: 2.24 million shares, JR West: 2 million shares, total: 5.74 million shares times ¥380 thousand = \$20 billion or ¥2.2 trillion)

2.18 Thus, if JNRSC were to sell all of its land holdings at the posted price of April, 1993, as well as all the shares from the three Honshu JRs at the

**Table II-4: Trends in Land Price (Commercial District): Percent Change from Preceding Year (Percent)**

Area	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Tokyo	5.5 (106)	7.2 (113)	12.5 (127)	48.2 (189)	61.1 (304)	3.0 (313)	4.8 (328)	4.1 (341)	-6.9 (318)	-19.0 (257)
Osaka	3.9 (104)	5.0 (109)	7.0 (117)	13.2 (132)	37.2 (181)	35.6 (246)	46.3 (360)	8.1 (389)	-19.5 (313)	-24.2 (237)
Nagoya	2.7 (103)	2.7 (106)	3.3 (109)	6.4 (116)	16.8 (135)	21.0 (164)	22.4 (201)	19.1 (239)	-7.6 (221)	-13.7 (191)
Local	2.8 (103)	2.6 (106)	2.5 (108)	2.9 (111)	5.4 (117)	7.6 (126)	15.4 (146)	16.3 (169)	0.4 (170)	-5.6 (161)

Note: The number in parenthesis: the price in 1983 = 100

**Table II-5: Trends in Share Prices (Yen)**

	Nikkei Stock Avg.	Nippon Telegraph and Telephone Co.	Tokyo Electric Power Co.	Seibu Railway
Face Value		(50,000)	(50)	(50)
April 1, 1988	26,104	2,370,000	6,050	4,300
April 3, 1989	33,042	1,520,000	5,950	5,280
April 2, 1990	28,002	1,080,000	3,600	4,850
April 1, 1991	26,007	1,020,000	3,810	3,800
April 1, 1992	18,581	615,000	2,800	2,200
April 1, 1993	19,099	977,000	3,670	3,000

price given above for JR East shares (¥380 thousand), it would be able to pay back some \$105 billion (¥11.6 trillion)—only about half of the long-term liabilities outstanding as of the beginning of fiscal 1993. This would still leave roughly \$118 billion of unpaid long-term debt, the repayment of which would have to be borne by the General Budget Account.

2.19 At the peak of the economic boom in 1990, had all the land been sold off without being constrained by regulations at the current price given above, and had all the shares of the three Honshu JRs been sold at ¥1 million per share, which was then suggested, a total of more than \$200 billion would have been made available for debt redemption. This would have met the liabilities JNRSC had to pay, so that a much smaller amount than expected would be borne by the General Budget Account.

#### *Land Sales of JNRSC*

2.20 The results of sales of land, train carriages and other assets since the inception of JNRSC are given below. For a number of reasons, the sale of land since the inception of JNRSC has not progressed smoothly. First, JNRSC needs to take many steps before it can complete sales of land, such as coordination with local government and neighborhood people, particularly in case of large scale land in urban areas. Second, as part of the government's policy against the spiraling price of land, the usual system of Open Competitive Bidding was effectively frozen. Third, demand for land has fallen sharply because of the recent recession and the declining trend in land prices.

2.21 As a result of land disposals up to fiscal 1992, the JNRSC was still in possession of 5,314 hectares of land at the beginning of fiscal 1993, and

was actively continuing its efforts to sell the remainder.

2.22 According to the regulations given in the JNRSC law, in order to ensure a fair and appropriate execution of the land sales, such sales are to be carried out by competitive bidding. In the case of supplying land for public use, official use or public utilities, the sale may be conducted according to free contract, as stipulated in JNRSC Law.

2.23 However, at the time that the JNRSC was formed, land prices were already appreciating rapidly, and, in response, the Emergency Land Countermeasures Plan was enacted by the Government in October, 1987. Under this plan, in those areas where the price of land was already appreciating beyond reasonable levels (apart from land being supplied for public or official use) sales would be deferred, and, in addition, the system where land could be disposed of without the disclosure of land prices would be brought under review. Accordingly, a study for land disposal measures without disclosing land price was carried out and recommended several measures shown below.

#### *Policies to Ease Regulations Concerning the Disposal of Land*

2.24 According to the JNRSC Law, land disposal through free contract was to be allowed only in the following circumstances.

- i. In the case of the transfer of land to the state or corporations for public use, official use, or public utilities.
- ii. In the case of the transfer of land to local governments for public use, official use, or public utilities.
- iii. In the case of the transfer of land to public enterprises for public use, official use, or public utilities.

**Table II-6: Results of Sales of Fixed Assets by the JNRSC (US\$Millions)**

FY	Land (hectares)	Method of Sale			Total
		Open Competitive Bidding	Free Contract	Other Assets	
1987	271	194	1,013	1	1,208
1988	966	255	1,595	5	1,855
1989	519	335	1,929	252	2,516
1990	810	212	7,161	4	7,375
1991	593	205	6,861	255	7,320
1992	758	301	7,824	73	8,197
<b>Total</b>	<b>3,917</b>	<b>1,502</b>	<b>26,382</b>	<b>589</b>	<b>28,473</b>

- iv. In the case of the transfer of land for use by corporations in areas of business that had been recognized by the Compulsory Purchase of Land Law, or in the case of arbitration based on the Civil Conciliation Law.
- v. In cases where there are no bidders during competitive bidding in either the first or second round of bidding and also when a contract is concluded at a higher price than had been originally envisaged.
- vi. In the case that the successful bidder does not conclude a contract and also when the contract price is higher than that offered by the successful bidder.
- vii. In the case of the sale of land where the price envisaged does not exceed \$27 thousand (¥3 million).
- viii. In the case that competitive bidding is unsuitable.

2.25 In response to the Emergency Land Countermeasures Plan in October, 1987 following rapid inflation of land price, the Asset Disposal Committee in May 1988 decided to establish the following methods with the revision of the JNRSC law regulating land disposal through free contract: i) the Sales of Developed Real Estate Method, ii) the Small-lot Sales of Trust Beneficiary Rights Method, iii) the Loan Convertible into Real Estate Method. Furthermore, based on decisions made by the same Committee in September 1991, in order to avoid overly inflating the price of land, the competitive bidding system with a cap price was introduced. In addition, in order to facilitate the sale of large-scale real estate with high asset value, the JNRSC law was revised to include the Corporate Bonds Convertible into Stock Method. Preparations to implement the new methods are currently in progress. Furthermore, a new scheme called the Joint Sales of Land and Housing with Private Company Method was approved by the Committee in February, 1994.

2.26 As a result of the introduction of these new methods, land sales through free contract have increased since FY 1990, especially in Tokyo metropolitan area.

2.27 In addition to the establishment of these new methods, the following policies have been also adopted to ease regulations and facilitate land sales.

- October 1991 A widening of the definition of public utilities.
- September 1992 Permission for local governments to acquire real estate without the usual requirement

of immediate construction on that land.

- September 1992 Easing of regulations concerning business and commercial uses of land.

2.28 Moreover, the Government decided in March 1993 to remove the regulation deferring the sale of land through open competitive bidding. However, owing to poor economic conditions the sale of land through resumed open bidding has not worked well. In addition, local governments of many cities are unwilling to permit land sale through open bidding in their areas because they are still wary of a flare-up in land prices.

#### *Measures for Land Disposal without Disclosing Land Prices*

2.29 At the time of the Bubble Economy, which caused a rapid appreciation in land prices, there existed the anxiety that sales prices of JNRSC's land would accelerate land price inflation in general. For this reason, various methods were sought not to disclose the land price directly. An outline and evaluation of these methods for land disposal without disclosing land prices is given below.

##### *i. Sales of Developed Real Estate*

2.30 This involves the sale of land on which the JNRSC has erected apartment buildings or other constructions, where the land and building are sold together as partial ownership rights. As the sale involves not just the land itself but also construction costs, the price at which the land is sold is not clear. The first such sale was made in the suburbs of Tokyo in September 1991, and further sales involving 548 properties had been made by June, 1994.

##### *ii. The Small Lot Sales of the Trust Beneficiary Rights*

2.31 This method involves the entrusting of land to trust banks in exchange for trust beneficiary rights, which are subsequently subdivided and sold off to general investors through the mediation of trust banks. The total sum of the sale of the trust beneficiary rights, which is given by the present value of the trust dividends received while the land is in trust and the money received from the sale of the land and the building constructed by the trust bank after the trust has matured, does not give a clear figure for the price paid for the land itself.

2.32 Following the first such sale in December 1989, a total of six sales has now taken place, concentrated mainly in areas along the railway tracks (In addition, one case was canceled owing to

the withdrawal of the main tenant, and another was not completed due to the lack of subscribers). However, in addition to the weakening of the real estate market, (owing to the amendment of tax laws imposing a greater burden on investors than before) the sale of the trust beneficiary rights for each of the pieces of real estate has proved difficult, and land disposal through this method is not planned to extend it.

### *iii. Loan Conversion into Real Estate*

2.33 In this method, funds equivalent to the land development project's costs are paid in the form of a long-term, low-interest loan in return for the future right to joint ownership of the piece of real estate in question. In return for supplying low interest funds, after a certain period of time has elapsed, the investor is able to exercise the conversion right, thus acquiring the right to joint ownership of the real estate.

2.34 In the period from 1990 to June 1994, five such loans have been received for prime real estate in Tokyo and other areas from companies constructing offices and commercial facilities. In addition, from December 1992 a system has been established whereby the Japan Development Bank, a government financial institution, supplies long-term, fixed-interest rate loans to subscribers to the joint ownership rights.

### *iv. Joint Sales of Land and Housing with Private Company*

2.35 Under the "Sales of Developed Real Estate Method," private companies are selected to construct residential buildings on land held by the JNRSC, and the individual residences and land belonging thereto are subsequently sold off individually. Under this system, in the event that not all of the individual lots are sold, the private developer will be required to purchase the remainder. This enables the JNRSC to complete the disposal of the land in question, even in the eventuality of unsold residences. As of March 1994 two sites had been selected for this system, and the respective private companies were chosen by July, 1994.

### *v. Corporate Bonds Convertible into Stock*

2.36 This method, currently under review, concerns large tracts of land with high asset values. A company is created through investment in kind in the land in question. The same company then raises funds for the construction of buildings and projects. Bonds with the right to future stocks in the said

company are then issued. The redemption of these bonds is conducted by converting them into the stock of the said company after the elapse of a given period of time.

2.37 As the first sale of land under the above system, the sale of land at Shiodome, located within the Tokyo area, has been planned, and Shiodome Development Inc., the company that is to receive the investment in kind and develop the real estate, was created in October 1992. At present, the company is in the process of formulating concrete development plans.

### *Issues Concerning Sales of JR's Shares*

2.38 Since April 1987, newly created JRs have operated as commercialized, commercialized-stock companies, but all of the shares except 62.5% of JR East's shares have been owned by the JNR Settlement Corporation. The basic principle of the JNR Supervisory Committee that all the shares of JRs be listed and sold to the public has not changed, but, as noted above, the time schedule has been delayed. In addition, since the collapse of the bubble economy and the advent of a prolonged recession, the operational outlook for some JRs has deteriorated. When all the shares are sold to the public, the transition to private enterprise will be completed. Until then, the sales of shares continues to be an important element of JNR privatization.

### *Policies for the Sales of JR's Shares*

2.39 The JRs, which are six passenger railways and one freight service, were born from the privatization and subdivision of JNR. Regarding these companies, the Government decided to "transform them into privately owned companies as early as possible, following the fulfillment of several conditions such as the stabilization of management." Its intentions, as explained by the Minister of Transportation and other Ministry members to the Diet, were as follows:

- a. The government would aim at the complete privatization of the JRs through the selling off of all shares, which are presently owned by the JNR Settlement Corporation (the JNRSC).
- b. It would not be necessary for the Government to retain a controlling share of the JRs, which are planned to be privatized.
- c. A basic principle of the privatization, in accordance with Government policies, is that the JRs be transformed into pure private companies in order to act freely.

d. The Government is currently studying the timing and content of the amendment or abolition of the JR law, which will be required, if the JRs are to be privatized through the sale of the shares and their listing on the Tokyo Stock Exchange.

2.40 Following the reorganization of the JNR and subsequent establishment of the JNRSC, the stocks issued by the seven JRs were transferred to the JNRSC. The number of stocks issued and capital of the JRs are given below.

2.41 As the stocks of the JRs were designated as important assets, serving as financial resources for the repayment of JNR liabilities by the JNRSC Law, the disposal of these stocks should require discussion and authorization by the Asset Disposal Council, a committee established within the JNRSC. In accordance with this law, the Council began its deliberation in April, 1992 and presented its report in July of the same year, regarding the sell-off of the stocks of the three Honshu JRs, which already met all the requirements for listing on the Tokyo Stock Exchange. The stock of these three JRs was subsequently planned to be sold off according to the above recommendations of the report.

2.42 The requirements for the listing of each of the JRs on the Tokyo Stock Exchange are shown in Table II-8. All of the Honshu JRs have already met these requirements for the listing in fiscal 1993.

#### *Initial Sales of JR East's Shares*

2.43 Based on the July 1992 report of the Council, the selling off of the three Honshu JRs' stocks was examined concretely. However, the stock market at that time was in bad condition. The Nikkei Stock Average of major 225 stocks had come down to as low as 15,790 yen in August 1992, less than half of the average level of the peak year

1989. For this reason, the Government and JNRSC were forced to consider limiting the volume of shares sold in consideration of the impact on the market. Regarding the volume, the Government decided to sell off a half of JR East's stock. As the stock market continued to be bearish throughout August, 1992, the sale of the company's shares was eventually postponed to fiscal 1993 or later for the fear of causing further disturbance to the stock market.

2.44 In 1993, the Government and JNRSC again decided to carry out the share sales operation for JR East, and the sale was implemented according to the following schedule:

#### *August:*

- Sales of 600 thousand shares by bidding.
- Pricing for open tender to general investors according to weighted average of tender prices of above-mentioned 600 thousand shares.

#### *September:*

- Application for the shares from general investors

#### *October:*

- Allotting of Stocks applicants selected from above by lottery.
- Listing on the Tokyo Stock Exchange

2.45 When the shares were offered to general investors in September, a total of 10.48 million bids were received for 1.4 million shares to be released. Therefore, buyers were chosen by lottery. When the JR East shares were listed on the Tokyo Stock Exchange, they were popular beyond expectation, necessitating the release of an extra 570 thousand shares that had been held in reserve to act as a brake on the rising share price. The combined revenue of the initial bidding, the open tender and the selling on the stock market of the extra shares as a brake reached (for a total of 2.5 million shares) ¥1

**Table II-7: Summary of The JR Stocks**

	Par Value (thousand yen)	Stock Issue (thousand)	Capital (billion ¥)
JR Hokkaido	50	180	9
JR East	50	4,000	200
JR Central	50	2,240	112
JR West	50	2,000	100
JR Shikoku	50	70	3.5
JR Kyushu	50	320	16
JR Freight	50	380	19
<b>Total</b>		<b>9,190</b>	<b>459.5</b>

**Table II-8 Listing Requirements**  
(¥ Billion)

			Hokkaido	East	Central	West	Shikoku	Kyushu	Freight
Stockholder's Equity (Net Assets)	Standards	Required Net Assets as of the end of the preceding fiscal year	18	400	224	200	7	32	38
	Net Assets as of the beginning of FY 1987		259	297	166	155	104	311	34
	Net Assets as of the end of FY 1992		264	544	399	260	120	320	46
	Requirements Qualification		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Profits (the less profit of current profits and profits after tax)	Standards	Three Years Earlier	2.7	60	33.6	30.0	1.1	4.8	5.7
		Two Years Earlier	2.7	60	33.6	30.0	1.1	4.8	5.7
		Preceding Fiscal Year	3.6	80.0	44.8	40.0	1.4	6.4	7.6
	FY 1990		1.6	107.8	117.2	60.5	7.4	3.0	6.1
	FY 1991		1.3	108.0	117.0	66.1	7.0	2.4	1.9
	FY 1992		6.0	100.9	67.6	55.7	3.5	3.5	0.2
Requirements Qualification		No	Yes	Yes	Yes	Yes	No	No	
Dividend	Standards	Dividing at the Preceding Fiscal Year (Fiscal Year 1991)	No	Yes	Yes	Yes	No	No	No
Other	Standards	Operating More Than 5 Years After Establishment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Requirements on the listing for Tokyo Stock Exchange			No	Yes	Yes	Yes	No	No	No

Source: Ministry of Transport

Notes: Net assets of the Three Island JRs are calculated after deducting of the Management Stabilizing Funds.

trillion. This amount far exceeded the ¥150.4 billion, the amount planned by the JNRSC as revenue in its budget in the beginning of the fiscal year 1993.

2.46 Regarding the sale and the listing of the JR East stock, dissatisfaction was expressed over the fact that some major issues such as the fare regulatory system, which will affect the stock price, remained unsolved. These are, in a sense, problems existing in any business of a public nature, but in the case of JRs the relation with the Government is the matter to be settled in the future. These issues are likely to affect the future management of the company.

#### *Time Schedule for Future Share Sales*

2.47 The remaining 1.5 million unsold JR East shares, as well as those of the JR Central (2.24 million shares) and the JR West (2 million shares), were scheduled to be sold from fiscal 1994 and later. In December 1993, the Vice Minister for Transportation announced that the stock of only one of JR West or JR Central would be sold off in fiscal year 1994, indicating the abandonment of the intention of the Ministry to list both companies on the stock exchange simultaneously. This decision was made in light of the postponement of the selling off and listing of Japan Tobacco Inc., another Government-owned company from fiscal 1993 to Fiscal 1994.

2.48 In June 1994, based on the report of the Asset Disposal Council, the Ministry of Transportation and JNRSC chose JR West to be the company listed in Fiscal 1994, while the schedule and number of stocks sold-off were to be still examined. In October 1994, one third of Japan Tobacco's shares were offered to the bidders and public, but a substantial portion of these shares remained unsold because the selling price was too high. On November 15, 1994 the Government decided the sales of JR West's shares should be postponed until Fiscal 1995. The Government considered that the absorptive capacity of the stock market for privatized-public companies was not big enough. Owing to this decision, the completion of the selling off procedures for the shares of the three Honshu JRs has been delayed still further.

#### *Share Sales for Non-Honshu JRs*

2.49 The question of what to do regarding the sale of the remaining JRs' stock is yet to be decided. The three Island JRs (JR Hokkaido, JR Kyushu,

and JR Shikoku) were expected to make losses in their railway businesses from the initial plan and, in order to cover the deficit, the Management Stabilizing Fund (Hokkaido ¥682.2 billion, Shikoku ¥208.2 billion, Kyushu ¥387.7 billion) was allotted to them. The return on the investment of this fund is then used to cancel out the railway business losses. Thus, management's responsibility in these Island JRs' has been to restrict losses made from railway business to within the amount generated from the investment fund. Until 1989 the Management Stabilizing Fund was lent to the JNRSC, guaranteeing a yield of 7.3%, according to the scheme created at the time of JRs' creation. After 1989, each of the JRs would receive the gradual repayment from the JNRSC to invest by itself. Operating losses of Island JRs' in fiscal year 1993 decreased from those of 1987 because of the increase of operating revenues, despite a decrease in the profit from of the Fund. However, falling yields due to recent low interest rates, together with the limitation of increases in the operating revenue, will weaken Island JRs' profit base and become a serious problem for these JRs'.

2.50 Regarding the selling off of the stocks of the three Island JRs, in addition to measures concerning the weakening of the companies' profit base due to falling yields, the argument remains unresolved as to whether the listing of a company that is not deriving operating profits from its main business is appropriate. For example, there is a question as to whether their provision of railway services is obligatory or not; that is, whether or not they can decide to discontinue some of their money-losing railway services.

2.51 Another issue arose concerning the nature of the Management Stabilizing Fund. The equity capital of the three island companies is relatively small, which makes the takeover easier in these cases, and the amount of the Management Stabilizing Fund is considerably larger. For this reason, fears have been voiced regarding the acquisition of the companies for the purpose of controlling the huge amount of the Management Stabilizing Fund, in the case that the stocks are sold off without any restriction on stock-holders. Considering these issues, the timing of the disposal of the three Island JRs' stock is not clear at present.

2.52 Concerning JR Freight, in addition to the need for maintaining a certain level of profits in order to achieve listing on the exchange, most analysts agree that many questions remain unre-

solved, such as cost allocation with passenger JRs, the burden of new investments, competition with trucks, restrictions in expanding business, and oth-

ers. All this making stock disposal problematical in the near future.

**Table II-9: Market Condition before and in 1992**

Average	Trading Volume (million stocks per day)	Trading Value (billion ¥ per day)	Nikkei Stock Avg. (225) (¥)
1988	1,021	1,025	27,039
1989	877	1,309	34,059
1990	484	717	29,437
1991	373	435	24,295
1992 Jan.-June	261	250	19,416
July	228	189	16,278
Aug.	311	251	15,790

Note: Trading Volume and Trading Value are based on the Tokyo Stock Exchange's first section.

**Table II-10: Trends in Profit and Loss for the Three Island JRs  
(billion yen)**

	Hokkaido		Shikoku		Kyushu	
	FY 1987	FY 1993	FY 1987	FY 1993	FY 1987	FY 1993
Operating Revenue	92	106	35	50	130	173
Operating Loss	-54	-47	-15	-11	-29	-27
Revenue from MSF	50	44	15	14	28	25
Current Profit	-2	1	1	2	2	1

### III. JRs' Recent Performance and Newly Arising Issues

3.1 The performance of the newly created JRs has been remarkable, although the growth of passengers and the profitability began to stagnate from 1992 owing to the prolonged recession and other reasons. The environment surrounding each JR differs, but the improved response to local needs and the better performance, which is commonly observed in each JR is clearly the positive side of the privatization. On the other hand, new issues are arising. Among them, one major issue is the question of new line construction. Railroad business has some public aspects by nature, regardless of owner-

ship. During the days of JNR, this public aspect had been emphasized. After the restructuring in 1987, as a reaction to the past experiences, the pendulum has swung to the opposite extreme and commercialized JRs are reluctant to undertake new line construction. Another issue is the predicament of JR Freight in the last few years. When the recession set in and the redundant capacity of existing truck fleet emerged, JR Freight's lack of marketing ability in the competition against trucks became visible. The issue is complicated by the alleged cross subsidization existing both in train

**Table III-1: Operating Results of JRs during the First Seven Years of Operation**  
(Million Passenger-km, %, Million ton-km, %)

	1987	1988	1989	1990	1991	1992	1993
JR Hokkaido	3,920	4,457	4,373	4,631	4,800	4,869	4,800
	-	13.7	-1.9	5.9	3.6	1.4	-0.9
JR East	104,491	109,796	113,185	117,643	125,974	128,486	128,900
	-	5.1	3.1	3.9	7.1	2.0	0.3
JR Central	41,148	45,085	46,302	51,051	52,110	51,200	51,000
	-	9.6	2.7	10.3	2.0	-1.7	-0.4
JR West	45,782	48,227	48,885	52,125	53,690	54,423	54,600
	-	5.3	1.4	6.6	3.0	1.4	0.4
JR Shikoku	1,674	2,119	2,034	2,074	2,123	2,070	2,100
	-	26.6	-4.0	2.0	2.4	-2.5	0.7
JR Kyushu	7,664	7,904	7,893	7,994	8,333	8,600	8,600
	-	3.1	-0.1	1.3	4.2	3.2	-0.2
JR Passengers	204,677	217,586	222,671	235,518	247,030	249,600	250,000
Total	3.2	6.3	2.3	5.8	4.9	1.0	0.2
JR Freight	20,113	23,131	24,769	26,819	26,791	26,300	25,100
Total	0.0	15.0	7.1	8.3	-0.1	-1.9	-4.5

Note: Figures of the second line show the percentage change from the previous year.

Source: Ministry of Transport, JRs.

and truck transportation. Further complication arises if externalities such as pollution and congestion are taken into account. Regulation by the government of the privatized JRs is another issue. This chapter deals with these issues as well as JRs' recent performance.

### JR's Recent Performance

#### *Recent Development of JRs' Operation*

3.2 The growth of JRs' passengers since the privatization is remarkable, although the rate of growth slowed down in 1992 and was almost static in 1993. Freight transportation also grew in the period up to 1990, but has declined since 1991.

3.3 Since the privatization of the JNR in April 1987, the JRs have made enormous efforts to rationalize their operation and management. First, they dramatically reduced their employees at the time of privatization (from 277,020 employees to 200,650) and then continuously made efforts to cut their labor forces mainly in the railway operations (from 164,671 employees of the seven JRs in FY 1987 to 136,081 in FY 1992).

3.4 Secondly, JRs have reviewed their investment strategies, according to the market characteristics in each region of operation. During the final years of the JNR, total investment had been reduced to a minimal level due to the huge deficit in operations. Further, investment decisions had been made at the headquarter in Tokyo. The result was that investment decisions did not reflect local needs. Since the privatization, each JR has seen responsible for its own investment planning.

- a. investment in traffic capacity and service improvement (e.g. frequency, new type of coaches) in such metropolitan areas as Tokyo (JR East), Nagoya (JR Central), and Osaka (JR West) has seen a great success compared to that of the PRs (private railways).
- b. accelerated investment in trunk lines of the JR Shikoku and the Tokaido Shinkansen has improved the competitiveness of the railway against other modes of transport, i.e. road and airway.
- c. railway's direct access to an airport at Chitose in Hokkaido has encouraged the total traffic demand, as well as strengthened the railway's competitiveness against road transport.
- d. investment in new type of rolling stocks for freight has encouraged a modal shift to

railroad freight. In addition, containers of new type owned by shippers have also contributed to the traffic increase; a 30 feet container, a cool container, a small 2 ton container, a "car pack" (for automobiles), and a large tank container.

3.5 Besides these efforts made by the JRs, two outside factors contributed to the growth of railroad passengers. One is the inauguration of the "Seto Ohashi" bridge between the main island of Honshu and Shikoku in 1988 and "Seikan" tunnel between Honshu and Hokkaido in 1989, which connected these islands by railways for the first time. The other is the favorable economic environment up to FY 1990. As a result, the achievement has been impressive compared to those in the years of the JNR and even to the PRs during the same period.

3.6 In 1992, however, the rate of passenger growth slowed down drastically with the burst of "bubble" economic growth. The JR Central suffered most among the three Honshu passenger JRs, as it relies heavily on the business passengers of the bullet train, and registered the first negative growth of operation. In this year the growth of total passenger JRs was 1.0%. The prolonged recession continued in 1993 and three passenger JRs (JR Hokkaido, JR Central and JR Kyushu) experienced slight declines in passenger growth. The growth of total passenger JRs fell to only 0.2%.

3.7 The Japan Freight Railway Company, which registered a negative growth in three consecutive years, was most severely affected, as it had to compete against trucks with excess capacity in the last few years, although their demand had been above the capacity of existing fleets during the period of the "bubble" economic growth. The situation worsened in 1993 owing to the cargo uncertainties caused by unusually frequent typhoons in the southern part of Japan and to the drastic reduction of rice crop transportation caused by the abnormally cold summer.

#### *Profitability and Major Concerns of JRs*

3.8 In line with operating volumes, the revenue of the JRs also increased remarkably up to FY 1991 and then stagnated, because fares have not been changed since 1987. On the other hand, some cost components of the JRs continued to increase, resulting in the decline of both operating profit and retained earnings for the most of the JRs during the past three years.

3.9 Along with the stagnant transportation demand for the JRs, several factors are responsible for the decline of their profit and earnings. These factors are discussed hereafter by each group of the JRs. For the three Honshu JRs, the purchase of the Shinkansen lines in FY 1991 has had a significant negative impact on their profit (although operating profits appeared to be increasing, current profits decreased), as is shown by the illustrative figures in Table III-4.

3.10 For the three island passenger JRs, decline in revenues from the Management Stabilizing Fund (the Fund hereafter) has been one of the most important factors behind their profit decline. The Fund provided for each company amounts to : ¥682.2 billion for the JR Hokkaido, ¥208.2 billion

for the JR Shikoku, and ¥387.7 billion for the JR Kyushu. The profit arising from the Fund will be used to supplement their revenues.

3.11 The Law Concerning Passenger Railway Companies and the Japan Freight Railway Company (the Law hereafter) provides the Fund in the form of debt owed to the three Island JRs by the JNR Settlement Corporation for a redeemable period of 10 years (with a grace period of 2 years) and a semiannual installment repayment plan (with an interest rate of 7.3%). The rationale for providing a one-time fund rather than providing a subsidy each year is to give the JRs' management incentives for efficiency improvement. The fund sets a ceiling amount of compensation for the loss from the lines which have to be in operation from the view point

**Table III-2: Revenue, Operating Profit and Retained Earnings of JRs**  
(¥ Billion, %)

FY		1987	1988	1989	1990	1991	1992	1993
JR Hokkaido	Revenue	92	94	100	105	106	105	106
	Profit	-54	-53	-53	-49	-48	-47	-45
	(Ratio)	(-58.5)	(-56.7)	(-52.8)	(-46.7)	(-45.4)	(-44.4)	(-42.8)
	Earnings	1	2	0	1	1	0	0
JR East	Revenue	1,566	1,664	1,736	1,852	1,950	1,981	1,974
	Profit	296	323	281	292	355*	439*	417
	(Ratio)	(18.9)	(19.4)	(16.2)	(15.8)	(18.2)	(22.2)	(21.1)
	Earnings	27	41	57	58	57	57	57
JR Central	Revenue	875	969	1,003	1,103	1,131	1,111	1,114
	Profit	72	102	114	133	288*	405*	391
	(Ratio)	(8.2)	(10.6)	(11.3)	(12.1)	(25.4)	(36.4)	(35.1)
	Earnings	17	35	67	53	56	33	26
JR West	Revenue	763	807	834	892	917	923	938
	Profit	71	79	91	122	128*	144*	137
	(Ratio)	(9.3)	(9.8)	(10.9)	(13.7)	(13.9)	(15.6)	(14.6)
	Earnings	2	5	26	30	36	32	30
JR Shikoku	Revenue	35	44	44	48	51	51	50
	Profit	-15	-11	-12	-9	-9	-11	-11
	(Ratio)	(-42.4)	(-24.7)	(-26.4)	(-18.1)	(-17.8)	(-21.5)	(-22.6)
	Earnings	0	2	4	4	4	2	1
JR Kyushu	Revenue	130	140	144	151	160	167	173
	Profit	-29	-29	-29	-29	-28	-27	-27
	(Ratio)	(-22.2)	(-20.4)	(-20.0)	(-19.0)	(-17.5)	(-16.4)	(-15.5)
	Earnings	1	1	4	1	2	2	0
JR Freight	Revenue	173	183	192	205	215	216	206
	Profit	11	11	10	11	7	6	2
	(Ratio)	(6.5)	(5.8)	(5.1)	(5.5)	(3.1)	(2.6)	(0.9)
	Earnings	2	3	3	3	1	0	-3

**Notes:**

Operating Revenue: Revenue from railway business (fare revenue and other revenue) and side-business, not included subsidies

Operating Expenditure: Labor, energy, repair, miscellaneous expenses, tax (not included corporate tax) and depreciation

(Ratio): Ratio of Operating Profit to Operating Revenue

\* Operating profit for JR East, JR Central and JR West in 1991 and 1992 increased due to the decrease of Shinkansen lease payment (as is discussed below).

of the service for the "national minimum." And this ceiling amount has been recognized as a kind of management target by both management and employees. The Fund has worked very well as a management incentive for these three companies until recently.

3.12 Nevertheless since FY 1989, when the redemption of the principal began, the three island JR's have taken the responsibility for the management of the Fund, in order to maintain the principal and interest yield at a level somewhere around the annual rate of 7.3%. The general economic situation has since changed drastically in Japan, and interest rates have declined significantly; the average bank lending rate has declined from 7.7% in FY 1990 to 7.3% in FY 1991, to 5.3% in FY 1992, and further to 4.1% in FY 1993. Thus the revenue from the Fund for the three companies has decreased and is expected to decline significantly

further as the proportion of the Fund managed by the three Island JR's increases. The "Case" in Table III-4 illustrates how large the impact of the interest rate for the profit of these three Island JR's will be when all the Fund is managed by the JR's with market rates.

#### *Profitability of Diversified Business*

3.13 The other uncertainty for the JR's management is the profitability of the diversified business. Although the diversified business has contributed to reducing the number of employees in the railway operation of the JR's, the profitability of the business has neither increased nor reduced their total profit significantly, especially for the three Island JR's as is shown in Table III-5.

3.14 Furthermore, it should be noted that many diversified businesses have already been separated from the JR's and nested in to affiliated or unaffili-

**Table III-3: Incremental Cost for the Shinkansen Purchased  
(¥ Billion)**

	JR East	JR Central
Operating Expenditures	84.5	134
Depreciation	78.8	101
Fixed Property Tax, etc.	5.7	33
Other Expenditures	198.4	314
Interest Payment	198.4	314
Total Expenditure (A)	282.9	448
Lease for Shinkansen (B)	210.3	416
Incremental Cost (A - B)	72.6	32

**Table III-4: Operating Loss and Fund Revenue  
(¥ Billion)**

	1987	1988	1989	1990	1991	1992	1993	Case*
JR Hokkaido Operating Loss	-53.8	-53.3	-52.7	-49.0	-48.3	-46.8	-45.4	-45.4
Revenue**	49.8	49.8	49.6	49.0	49.0	46.9	44.4	28.0
Difference	-4.0	-3.5	-3.1	0.0	0.7	0.1	-1.0	-17.4
JR Shikoku Operating Loss	-14.9	-10.8	-11.6	-8.7	-9.0	-11.0	-11.3	-11.3
Revenue**	15.2	15.2	15.2	15.0	14.2	14.1	13.5	8.5
Difference	0.3	4.4	3.6	6.3	5.2	3.1	2.2	-2.8
JR Kyushu Operating Loss	-28.8	-28.5	-28.7	-28.7	-28.1	-27.5	-26.8	-26.8
Revenue**	28.3	28.3	28.3	28.2	27.9	27.5	25.2	15.9
Difference	-0.5	-0.2	-0.4	-0.5	-0.2	0.0	-1.6	-10.9

\* Case assumes the situation of FY 1993 if the interest rate of 4.1% (actual rate in FY 1993) is applied for the revenue from the Fund. All of the Fund will be redeemed to the three Island JR's in FY 1996.

\*\* Revenue from the Fund.

ated subsidiary companies. Thus the financial statements of the JRs do not provide a performance of their diversified businesses as a whole.

#### *Capital Expenditures and External Financing of the JRs*

3.15 As is shown in the table above, major categories of JRs' investments during the first three to four years are "maintenance" and "rolling stocks" in order to make up the shortfall of these investments during the final years as the JNR. Since then, the JRs have rapidly increased their investments in "improvement of infrastructure," for example the improvement of electric facilities, advanced ATS (Automatic Train Stop), ATC (Automatic Train Control) and CTC (Centralized Traffic Control), and railway technology development. This trend clearly shows that the JRs have changed their emphasis in investment from currently urgent projects to investments with a long-term perspective.

3.16 Almost all the JRs have restrained their investment amount to the amount of their depreciation, or to the internal sources of funds, i.e.,

depreciation and retained earnings (see the Table III-7) in order to improve their financial condition. The only exceptions are the JR Central and the JR Freight, which have not owned a large proportion of their rail track as assets and thus have not registered sufficiently large amounts of depreciation.

3.17 The Law provides that an approval by the Minister of Transportation is required for (a) new stock issues, (b) bond issues, and (c) long-term borrowings with a maturity of more than one year, for all the JRs. Nevertheless the Law does not allow the three Island JRs to issue bonds, and instead provides the Management Stabilizing Fund to strengthen their financial basis.

3.18 The Law provides some favors to the JRs. Until the Commercial Law was revised (effective from 1993), a provision in the Law had allowed a higher ceiling for the amount of bond issues by the three mainland passenger JRs and the JR Freight; these JRs can issue bonds up to ten times amount of the net capital value of the last available balance sheet (in general, the amount of bonds is restricted up to the net capital value). The Law also stipulates

**Table III-5: Revenue and Profit of Diversified Business**  
(¥ Billion, %)

		1987	1988	1989	1990	1991	1992	1993
JR Hokkaido	Revenue	19.4	12.9	18.9	19.3	16.9	14.9	15.7
	Profit	-0.2	-1.8	-2.0	-0.7	-0.5	0.3	0.2
	Ratio	-1.3	-13.9	-10.4	-3.4	-2.9	1.9	1.4
JR East	Revenue	30.6	50.9	62.7	69.7	74.1	79.7	81.1
	Profit	8.3	7.1	3.8	8.1	9.3	7.6	5.8
	Ratio	27.1	14.0	6.0	11.6	12.5	9.5	7.1
JR Central	Revenue	6.3	2.8	3.7	4.0	4.3	5.2	8.7
	Profit	0.5	1.0	1.3	0.2	0.6	1.5	2.3
	Ratio	7.6	35.5	35.5	5.9	13.8	28.4	26.4
JR West	Revenue	16.2	12.6	11.2	12.7	15.4	16.5	23.3
	Profit	0.7	0.8	2.3	4.0	6.5	7.2	8.1
	Ratio	4.4	6.1	20.4	31.6	42.0	43.7	34.7
JR Shikoku	Revenue	4.6	3.1	2.9	3.1	8.0	9.5	7.8
	Profit	-0.9	-1.0	-1.6	-1.6	-4.1	-4.2	-3.0
	Ratio	-19.5	-32.2	-55.7	-50.9	-50.8	-43.6	-27.4
JR. Kyushu	Revenue	3.2	3.7	14.2	19.3	23.9	23.3	28.3
	Profit	-0.7	-0.8	-5.5	-7.8	-7.6	-6.7	-5.4
	Ratio	-23.0	-22.7	-38.9	-40.5	-31.9	-28.5	-18.9
Total	Revenue	80.3	85.9	113.5	128.3	142.7	149.1	164.9
	Profit	7.6	5.2	-1.7	2.3	4.2	5.7	8.0
	Ratio	9.4	6.1	-1.5	1.8	2.9	3.8	4.9

Note: Profit is the margin only after direct cost, and includes such indirect cost as interest payment. Ratio represents profit or loss over revenue.

**Table III-6: Capital Expenditures\* by the JRs**  
(¥ Billion)

FY	1987	1988	1989	1990	1991	1992(Plan)	1993 (Plan)
Maintenance	74	86	103	107	150	178	157
Improvement	22	41	93	133	153	211	211
Capacity Expansion	34	48	49	63	103	123	92
Rolling Stock	65	163	198	208	172	180	156
Others	15	14	16	18	20	22	24
<b>Total</b>	<b>208</b>	<b>353</b>	<b>459</b>	<b>528</b>	<b>598</b>	<b>714</b>	<b>640</b>

\* This expenditure does not include the purchase of Shinkansen Lines.

**Table III-7: Investment Compared to Depreciation by the JRs (1987 - 1991)**  
(¥ Billion)

	Investment	Total	Internal Funds	
			Depreciation	Retained Earnings
JR Hokkaido	87	92	88	4
JR East	788	1,390	1,183	208
JR Central	702	598	405	193
JR West	309	558	476	82
JR Shikoku	53	58	45	13
JR Kyushu	103	127	118	8
JR Freight	105	74	63	11
<b>Total</b>	<b>2,147</b>	<b>2,898</b>	<b>2,378</b>	<b>520</b>

**Table III-8: Long-Term External Financing by Some JRs**  
(¥ Billion)

		1987	1988	1989	1990	1991	1992	Total
JR East	Bond*	106	97	96	94	62	120	575
	Loan	42	342	461	35	46	81	1,007
	<b>Total</b>	<b>148</b>	<b>439</b>	<b>557</b>	<b>129</b>	<b>108</b>	<b>201</b>	<b>1,582</b>
JR Central	Bond**	19	20	19	20	18	20	116
	Loan	16	48	83	38	58	73	316
	<b>Total</b>	<b>35</b>	<b>68</b>	<b>102</b>	<b>58</b>	<b>76</b>	<b>93</b>	<b>432</b>
JR West	Bond**	39	35	36	39	15	16	180
	Loan	18	50	62	20	46	49	245
	<b>Total</b>	<b>56</b>	<b>85</b>	<b>98</b>	<b>59</b>	<b>61</b>	<b>65</b>	<b>424</b>
JR Freight	Bond***	2	5	8	9	12	0	36
	Loan	1	1	4	3	19	16	44
	<b>Total</b>	<b>3</b>	<b>6</b>	<b>12</b>	<b>11</b>	<b>31</b>	<b>16</b>	<b>79</b>

\* Bond issues include bonds guaranteed and subscribed by the Government.

\*\* Bond issue in FY 1992 is a foreign market bond, and all the others are domestic bonds guaranteed by the Government.

\*\*\* All the bonds are guaranteed by the Government

that up to the fifth year of operation, the Government can provide a guarantee for the JR's bond issues up to the amount approved by the Diet.

#### *Financial Burden on Government*

3.19 The financial burden on the government concerning the JNR and the JR's has been drastically reduced since the privatization of the JNR, and the JR's have paid more taxes than subsidies received. Table III-9 shows the amount of subsidies received from the central government, and the amount of taxes and contributions paid by the JNR and succeeding institutions to the central and local governments.

3.20 Before privatization, the amount of subsidies paid to the JNR exceeded the amount of taxes and contributions received from the JNR (as a public corporation, the JNR was not required to pay federal taxes). The amount of annual net financial burden to the government reached almost ¥600 billion.

3.21 Following the privatization of the JNR, however, the JR companies were required to pay federal taxes such as the corporate tax, and the amount of such taxes paid was quite considerable, reflecting the favorable management conditions of the JR's. In addition, the amount of subsidies has decreased. As a result, the amount of taxes came to exceed that of subsidies paid to the JR companies, implying that the privatization of JNR has decreased the financial burden to the government and

brought considerable benefits to the Japanese tax-paying public in subsequent years.

#### *Efforts and Managerial Problems of JR's*

##### *Three Honshu JR's*

##### *JR East*

3.22 Backed by the largest market of the Tokyo metropolitan area, the JR East has the largest operating basis among the JR's. The revenue from the Tokyo metropolitan area reaches about half of the company's revenue from railway business. Of the remaining half, about half comes from the two Shinkansen lines. Thus the primary strategy of the company's investment is the improvement of transportation capacity and services in the Tokyo metropolitan area. For example, the company has introduced double-deckers and increased the numbers of trains with air conditioning. The second priority of its investment is the rational use of the existing trunk lines and Shinkansens. A good example is the Yamagata Shinkansen which directly connects the existing trunk line with a Shinkansen to accelerate the speed of the train. And the company has actively promoted the corporate image as a private railway company. Besides these efforts by the company, the strong economic growth during the initial five years of its operation has contributed to the company's impressive performance. This allowed the company to be successfully listed to the stock market in September 1993.

**Table III-9: Taxes and Subsidies**  
(¥ Billion)

Fiscal Year	Taxes and Contributions	* Subsidies	Balance
<i>Under JNR</i>			
1982	35.2	729.4	- 694.2
1983	38.3	701.8	- 663.5
1984	46.3	647.4	- 601.1
1985	47.8	600.1	- 552.3
1986	50.1	377.6	- 327.5
<i>Under JR</i>			
1987	220.7	193.7	27.0
1988	245.7	211.0	34.7
1989	230.1	** 633.1	- 403.0
1990	299.4	157.1	142.3
1991	444.3	108.2	336.1

Note: This table also appears in Chapter II. For taxes, contributions and subsidies following the privatization of JNR, figures represent a total of those from the JR's, JNRSC, the Shinkansen Holding Corporation, and the Railway Development Fund.

\* Because the JNRSC carries liabilities in addition to those of JNR, some subsidies to the JNRSC did not exist in the JNR years.

\*\* In 1989 the amount of subsidies paid by the government increased rapidly due to a special measure concerning pensions.

Source: Ministry of Transport

3.23 Nevertheless the financial burden taken over from the JNR and additional burden charged from the purchase of the Shinkansens remains the company's major concern. The company's net worth ratio declined to 8.1 percent in March 1993 after it had been improved to 12.8 percent in March 1990. And fixed liabilities amount to about three times its turnover. Thus the company has been limiting its investment amount to the internal sources of funds, in order to strengthen its financial condition. With the listing on the stock market, the company expects to expand its fund raising capability.

3.24 The other concern is regulation, especially the tariff system. In order to secure a sound operating profit and to respond to a variety of demands, flexibility of tariff system is a crucial factor for the company's management. Now that it has been listed to the stock market, the company advocates much more flexible tariff regulation than before. Lastly, the diversified business is one of the important factors to strengthen the company's profit basis, although the current level of revenue is only a marginal part of the total turnover of the company.

#### *JR Central*

3.25 The principal business of the company is the Tokaido Shinkansen which has the largest single-line demand in Japan in terms of passenger-km, second only to the Tokaido line which runs parallel to the Shinkansen. The revenue share of the Tokaido Shinkansen out of the total turnover of the company is as high as 87 percent. Thus the crucial issues for the company are: (a) maintenance, improvement, and capacity expansion of the existing Tokaido Shinkansen and (b) investment for the new Chuo Shinkansen line which is expected to employ "Linear Motor" technology. This technology, using a superconducting magnet, has been tested by the "Miyazaki Testing Line" of 7 km in Kyushu, achieving 517 km per hour, and will be further tested in the "Yamanashi Testing Line" of

42.8 km which is currently under construction between Otsuki and Kofu.

3.26 The other strategic investment which has been implemented during the initial several years of its operation, is improvement of the railway capacity and services in the Nagoya metropolitan area, which is the only metropolitan within the operating area of the company. The company has introduced new types of trains which accommodate commuting passengers and has improved railway infrastructure which provides frequent services. Nevertheless, Nagoya city has been primarily dominated by road transportation and also well developed with the local railway network by the PRs. Thus the demand for the existing JR lines seems to be saturated, or to increase only in line with population growth along the lines, after a rapid increase since the privatization of the company.

3.27 As is the case with JR East, the low net worth ratio is another concern for the company from a financial aspect, especially after the purchase of the Tokaido Shinkansen. Fixed liabilities have increased to five times the company's turnover in March 1993. Nevertheless the current profit ratio was as high as 10.4 percent in FY 1991 and still remains 6.1 percent in FY 1992 which is quite high compared to those of the PRs. Based on this solid profitability, the company hopes to be listed to the stock market as soon as possible.

#### *JR West*

3.28 Two major sources of revenue for the JR West is the Shinkansen and Osaka metropolitan area, which is similar to the JR East. Nevertheless, the traffic density of the JR in the Osaka metropolitan area is much less than that in the Tokyo metropolitan area, mainly because of the less equipped railway network in the region. Although the total route length of the JR West in the Osaka metropolitan area is 70 percent of that of the JR East in the Tokyo metropolitan area, the track runs around in the region with a less dense traffic demand. As a result,

**Table III-10 : Route Length and Traffic of JR East (FY 1992)**  
(km, million passenger-km, million)

	Route Length (A)	Passenger-km (B)	Density (B/A)
Shinkansen	839	16,244	19.4
Tokyo Met. Area	1,097	76,755	70.0
Other Lines	5,566	35,487	6.4
<b>Total</b>	<b>7,502</b>	<b>128,486</b>	<b>17.1</b>

Source: JR East, *Kabushiki Todokede Toroku Mokuromi Sho (Prospectus)*, 1993

the demand (density) for the JR West in the Osaka metropolitan area is only half of that for the PRs. This is a good contrast to the JR East in the Tokyo metropolitan area which shares the dense railway market almost equally with the PRs. The other characteristics of the JR West is its large share of the local lines, compared to the other Honshu JRs. In addition, its trunk lines have a relatively small traffic demand. In other words, the company is a typical organization which still has an internal "cross subsidization."

3.29 Strategy on the positive side for the JR West is thus focused mainly on the speed up of the Shinkansen and the development of the urban network in the Osaka metropolitan area. In order to compete against the airway, development of a new train for the Shinkansen named "WIN350" which has achieved a 350 km per hour is currently being undertaken. As for the development of the urban network in the Osaka metropolitan area, the company has been constructing several lines and expanding the line capacity by double tracking and electrification. Residential development in the Osaka metropolitan area has been spreading out to the region where the PRs do not have an operating infrastructure. Good examples are, (a) construction of a new line called "Katafuku line" which connects the east gate of the Osaka city (Katamachi and Kyobashi) and the west of the Osaka city (Amagasaki), and (b) the double tracking of part of the "Fukuchiyama line" where the spreading out of the residential area is very active.

3.30 The other side of the strategy for the company is rationalization of the local line management. The JRs acknowledge their obligation to provide railway services on local lines that are not profitable. The tariff on these local lines is allowed to be only 10 percent higher than the normal tariff. Thus there is no other choice for the JRs than to minimize the operating loss from these local lines. Thus the company has established railway admin-

istration which is similar to the railway administration office of the JR Hokkaido and the JR Kyushu. The idea is not to increase profit ability, but to reduce the loss, mainly through (a) labor saving by integrating the labor functions and (b) reduction of maintenance cost by applying different standards of maintenance among lines.

### *Three Island JRs*

#### *JR Hokkaido*

3.31 Located in the most sparsely populated area of northern island in Japan, the JR Hokkaido has an inherently difficult management environment both for railway business and for railway related business and the viability of the railroad sector itself has been repeatedly questioned. At the time of privatization some unprofitable lines were abolished, or separated from JR Hokkaido, but it also had to acquire many unprofitable lines which could not be abolished from the viewpoint of "social minimum". Thus it has the weakest financial structure among the six passenger JRs and relies heavily on such factors as the Management Stabilizing Fund and favorable tax treatment.

3.32 Nevertheless the company has achieved a better operating result during the first six years than was expected. With the success of the new airport access line which connected Chitose Airport and Sapporo (the largest city) and which overwhelmed the bus service, the company is now confident that the railroad sector continues to be viable in certain trunk lines originating from Sapporo. The airport access line is one example of the successful aspects of privatization. With the expansion of air passengers, the terminal of Chitose Airport was planned to move to an adjacent area. When the initial plan of the new airport was disclosed in the early 1980s, the reaction of the JNR management was slow. They argued that air passengers would use taxis to and from the nearby train station because the new terminal was too far to walk. The new management

**Table III-11: Route Length and Traffic of JR West (FY 1992)**  
(km, million passenger-km, million)

	Route Length (A)	Passenger-km (B)	Density (B/A)
Shinkansen	645	16,161	25.1
Osaka Met. Area	765	25,419	33.2
Other Trunk Lines	2,046	10,932	5.3
Local Lines	1,603	1,910	1.2
<b>Total</b>	<b>5,059</b>	<b>54,422</b>	<b>10.8</b>

Source: JR West, *JR Nishi Nihon Kaisha Yoran (Profile of JR West)*, 1993

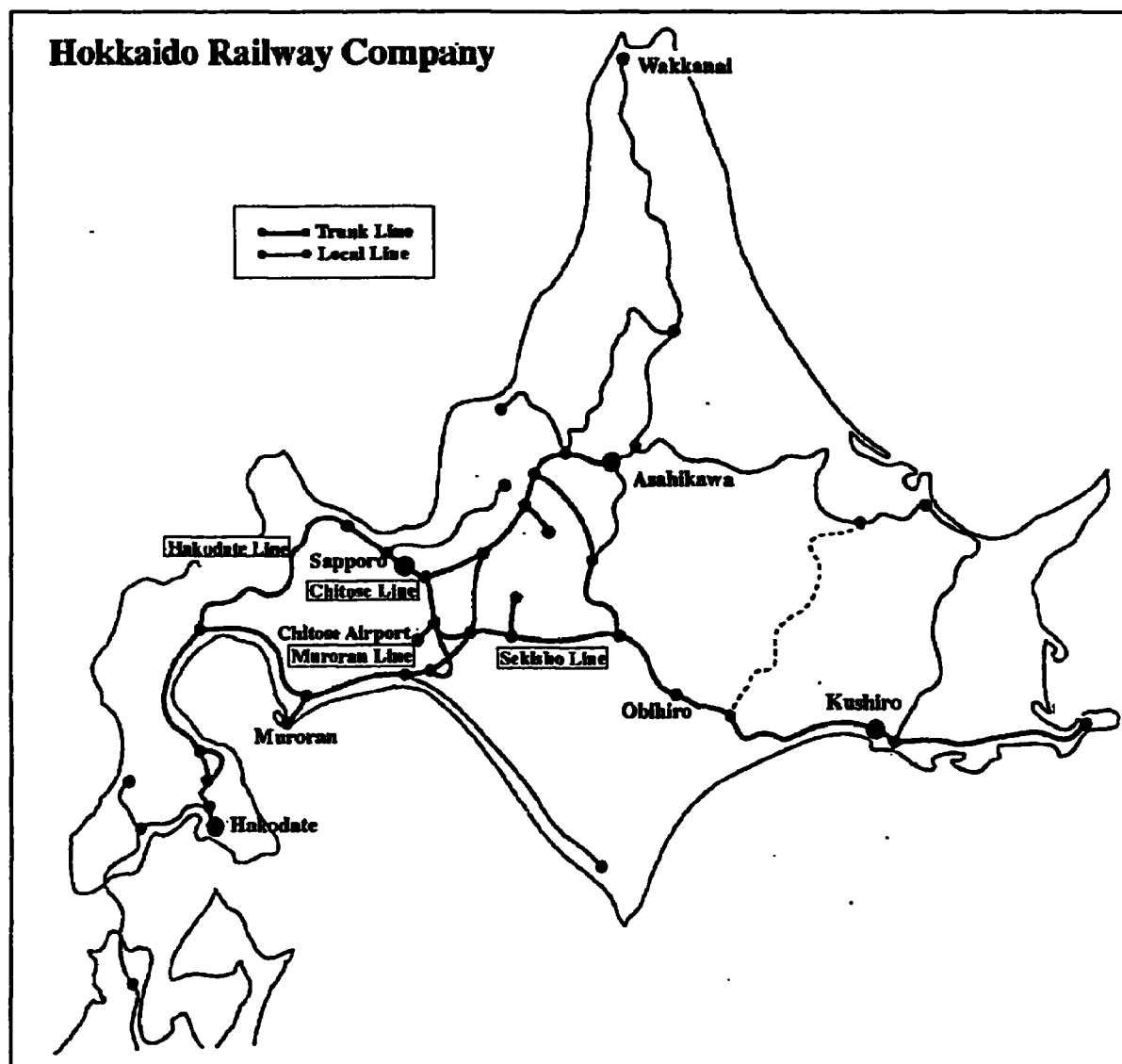
of JR Hokkaido, which was naturally keen on local demand, realized that all air passengers would use bus service both timewise and moneywise if the alternative was the combination of train and taxi. In the first years after the privatization, the construction of the airport access line and the investment in new rolling stock for this line became the first priority of JR Hokkaido and the line turned out to be a great success once the new airport was opened in July 1992.

3.33 The company's business strategy has in principle two aspects. The first one is active investment and competitiveness improvement for the major lines (trunk lines and an airport access line) that originated from Sapporo. About ninety percent of the total passenger-km of the company is transported by these major trunk lines. Since the investment fund resource of the company has been in principle limited to the internal sources of funds,

its investment has been effectively allocated to those lines with comparatively dense traffic demand, namely the lines which connects Asahikawa, Hakodate and Kushiro with Sapporo.

3.34 The other aspect is management efficiency improvement in the other local lines, which continue to lose money. In return for the existence of the Management Stabilization Fund, the company has the responsibility of passenger train operation and the idea is to respond to local needs and to minimize the loss. One example is establishment of a railway administration office for independent local lines, as the JR West and the JR Kyushu do, which can be described as "Autonomous Marginal Line Management". The advantages of this scheme are, (a) more flexible time scheduling reflecting the local needs and (b) labor saving by integrating various functions necessary for train operation.

Chart III-1



3.35 Current major concerns of the company are, (a) declining revenue from the Management Stabilizing Fund (mentioned in the preceding section), (b) increase of tax burden at the time of expiration of the special tax treatment in FY 1997, and (c) heavy investment requirement for the maintenance of rail track in the "Seikan" tunnel 10 to 15 years from now. The financial impact of the second factor is estimated to amount to ¥7.4 billion, whereas the company's net earnings in FY 1992 amounted to ¥0.3 billion. Expected investment for the third factor exceeds ¥100 billion, whereas total investment during the first five years amounts to ¥87 billion.

#### *JR Shikoku*

3.36 At the time of privatization, the JR Shikoku had the least developed railroad infrastructure in terms of shares of electrification and double tracking. In addition, hampered by the mountains, the routes of the lines are forced to have a lot of curves. Since then the company has promoted the train speed both by electrification and by introduction of new trains that can tilt on curves while maintaining speed (tilting trains). The share of the electrified route length of the company has been increased from only 6.4 percent in April 1987 to 27.5 percent in March 1993. In the meantime, the "Seto Ohashi" bridge, which connects the Shikoku island with the Honshu (mainland) by rail and road, has been inaugurated in April 1988 and contributed to a significant increase of passengers, 27 percent increase of passenger-km in FY 1988. As for the efficiency improvement of the local line management, operation without a conductor has been encouraged, and minor stations have been closed on the weekend. As a result, supported also by the revenue from the Management Stabilizing Fund, the company has registered a constant profit since 1987.

3.37 Nevertheless the major challenge for the company is competition from road traffic since FY 1992, owing to the inauguration of the two highways which covers major traffic market in the Shikoku island, between Takamatsu and Kouchi, and between Takamatsu and Saijo, which run almost parallel to the company's two trunk lines (See Chart III-2). As a result, and also owing to the recession, the passenger-km in FY 1992 has been decreased by 2.5 percent. Required strategies of the company are; (a) further speed-up investment for the trunk lines in competition with highways, (b) further efficiency improvement for the local lines,

and (c) improvement of profitability of the diversified businesses.

3.38 The company's efforts for the speed-up to compete against highways are remarkable and must be noted as the visible positive side of the privatization. The electrification of Yosan line, one of the trunk line which connects Takamatsu and Matsuyama, has been completed in March 1993. In October 1993, double-tracking has been completed between Sakaide and Marugame, part of the Yosan line and the part where the traffic density is relatively high. The Dosan Line, the other trunk line, which connects Takamatsu and Kouchi, runs through a mountainous area with winding rail tracks. Here, efforts have been concentrated on the introduction of new tilting trains, which tilts at the curve to make each car more resistant to the centrifugal force, thus enabling the train to maintain the speed. The other efforts in this Dosan Line is the straightening of one track in each station. The Dosan Line is still single-tracked, but in each station it becomes double-tracked, making each track curved to both sides of a platform. Until recently, when an express train passed each station, it had to reduce the speed unnecessarily due to the curve of the track. Now one track has been changed to be straight at each station and an express can pass through with higher speed.

3.39 As a result of these efforts, passengers of the company did not decrease in 1993 and has shown a slight increase of 0.7% in spite of the inauguration of two directly competing highways. The morale behind these efforts has been supported by the sense of crisis that the company can not rely on the nation any more after privatization. Both the management and the labor realized the local situation and has made efforts for the survival of the railroad sector in Shikoku.

3.40 The company on its own has the highest share of revenues from diversified business among the passenger JR's. Although these diversified businesses have been making losses, the company has been able to realize synergy effects with the main business of railway, for example residential development (as the PRs do). In addition, by operating highway buses in certain selected routes, the company has sought ways to compensate for the decline of the railway passengers shifting to the road traffic.

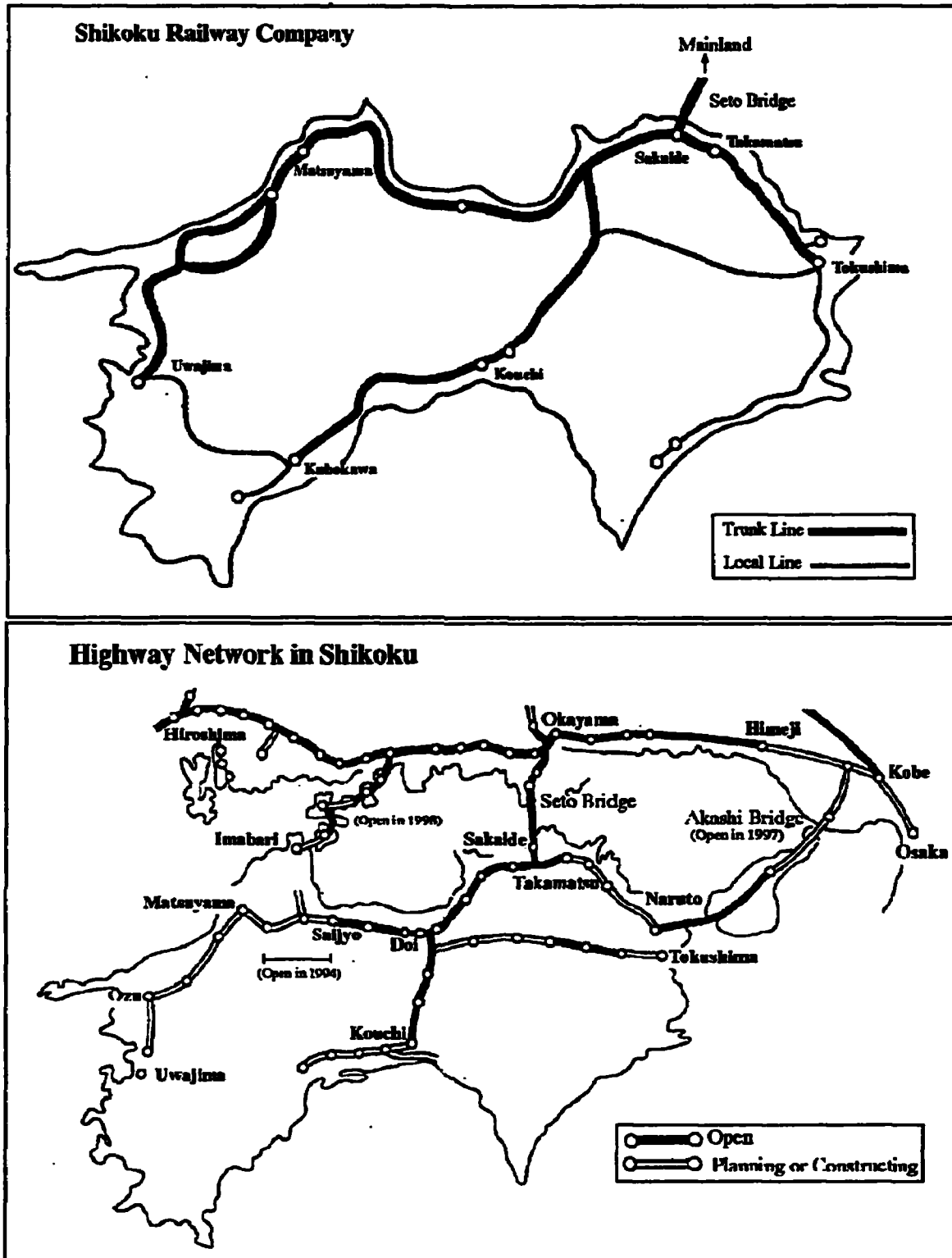
#### *JR Kyushu*

3.41 Among the three small Island JR's, the JR Kyushu has the best market for the railway busi-

ness. The island has two large cities with a population of over one million, and also has several medium size cities. Especially in Fukuoka metropolitan area, the population has been growing and the residential area has been spreading out. In order to utilize these advantage of the market, the company has increased both the number of stations by

10% and frequency of trains by 40% from 1987 to 1992 to serve better the commuting demand. Almost one fifth of 1,500 rolling stock unit are newly built, and feature improved accommodation. Thus the company has achieved a stable increase of passenger demand. The number of passengers has increased at a greater rate than passenger-km, be-

Chart III-2



cause short-distance travel passengers in metropolitan areas are growing.

3.42 Like other JRs, JR Kyushu's business strategy has two aspects. One is the concentration of investment on strategically important lines and on lines where railroad can be viable with efforts. These currently consists of new Miyazaki Airport access line, speed up between Fukuoka and Oita with new rolling stock in each case, and new Kyushu Shinkansen. For instance, it will take 60 minutes from Nobeoka to Miyazaki airport with the inauguration of airport access line and the completion of new rolling stock, 13 minutes faster than the present journey time. In the case of the airport access line, using funds from central and local governments, the company has been able to provide ¥1 billion of the total ¥6 billion project cost. Thus in these lines the company is preparing to compete with roads.

3.43 The other factor is the efficiency improvement of money-losing local lines. In order to improve the local line management, the company has introduced railway administration as the JR Hokkaido and the JR West do. Labor functions are integrated to reduce labor forces, and an operation without a conductor has been encouraged. Thus the company has registered an almost constant profit during the first six years of operation, supported by the revenue from the Management Stabilizing Fund.

3.44 Nevertheless, regarding the important lines, competition against both highways and airways, especially highways is expected to be formidable in the Kyushu island. For example, currently between Fukuoka and Oita it takes 147 minutes by train, 30 minutes faster than by highway bus. However, when the highway between Fukuoka and Oita is completed in 1995, buses will connect two cities in 140 minutes. In order to compete against highways, the company is improving the speed of train, and with the completion of new rolling stocks, it will take 133 minutes between two cities.

3.45 Thus the company has a plan to further improve the speed of trains on the intercity lines, including the development of the new Shinkansen. The first stage of the new Shinkansen is planned to be completed in 2001 in southern Kyushu. When this Shinkansen between Yatsushiro and Kagoshima is inaugurated, it will decrease the time between Fukuoka and Kagoshima from 250 minutes to 150 minutes. Then, JR Kyushu thinks that train will be more advantageous than air travel. In addition, in

the urban lines, the company will further improve the railway service for commuting passengers, capturing the spreading out effect of the residential area.

### *JR Freight*

#### *Recent Performance of JR Freight*

3.46 The JR Freight is the only railway freight company with a nationwide network in Japan. Contrary to the general pessimistic forecast for railway freight, the company has registered a tremendous growth during the initial four years of its operation, and has almost always exceeded the projected figures by the Government. The reasons for the revival of the railway freight can be attributed to following factors;

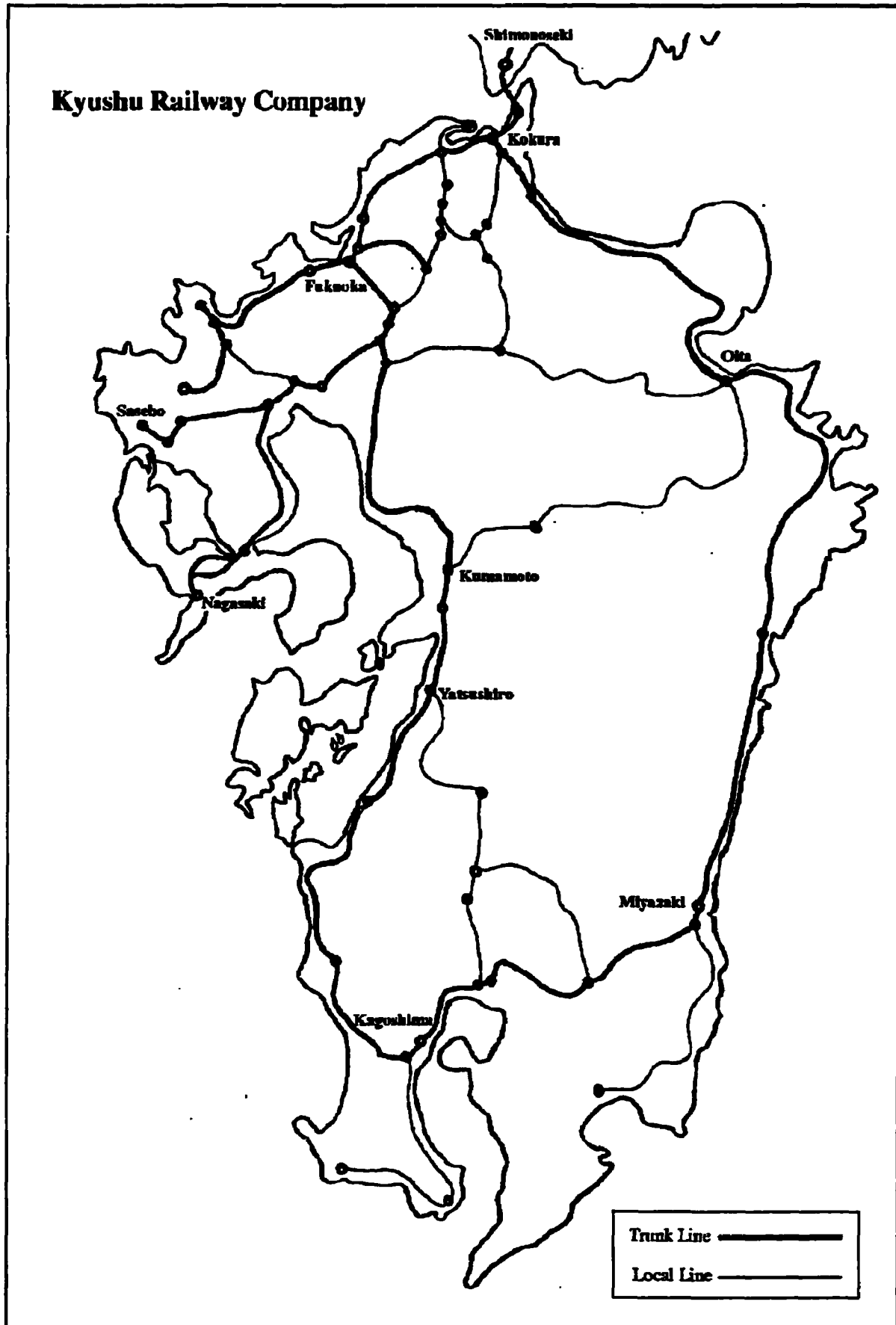
- a) the strong freight traffic demand in general, due to the rapid economic growth
- b) the modal shift from the road sector, because of the shortage of the truck drivers and road traffic congestion
- c) the completion of the "Seto Ohashi" bridge and the "Seikan" tunnel which connect the Honshu (mainland) and Shikoku and Hokkaido islands by rail
- d) the restraint from the tariff increase, despite the truck tariff increase
- e) service improvement, for example increase of the number of despatches, introduction of various types of containers and wagons

3.47 Nevertheless, as the Japanese economy has fallen into recession, railway freight demand has again declined by 1.9% in FY1992 and the profit of the company decreased to barely zero, even though the company has been subsidized by the "avoidable cost" principle (described in the section from 3.104 on). The situation worsened in 1993 due to the decrease of cargoes caused by unusually frequent typhoons in the summer and by the sharp drop of governmentally purchased rice crops, resulting in the loss of 3 billion yen in this year.

#### *Marketing and Competition*

3.48 The most important issues are the marketing and the competition from the road traffic. While the key strategy for the company is shifting the railway freight business from bulk cargoes to containers, the company does not have a direct contact with clients. Instead, it relies on a single freight forwarder, i.e., Nittsu (the biggest freight transportation company), for pickup and delivery services, and for marketing as well. Besides, Nittsu

Chart III-3



itself is facing a severe competition from other forwarders by road traffic. As a result, from the balance of bargaining power, the company is forced to provide a large discount. Thus it is desirable for the company to strengthen marketing and to select and carry out only profitable business. Another issue is to reduce the labor forces to an extent that is compatible with profitable operations.

#### *Investment Required: Rolling Stock*

3.49 Although the company's financial base is weak, it is required to invest a large amount for rolling stock and infrastructure. During FY 1989 to 1992, the total investment by the company amounted to ¥123 billion, whereas the internal source of funds amounted to only 60 billion, of which 53 billion came from depreciation. This shortfall in the internal fund source resulted in an increase of the long-term debt; outstanding amount of bonds and long-term loans has increased from ¥78 billion in March 1989 to ¥93 billion in March 1993. On the other hand, since the JNR hardly invested in the rolling stock during its last several years (and actually the investment in the freight sector was allocated the least priority in the last ten years of JNR), investment in rolling stock has been and continues to be an urgent priority for the company.

3.50 In order to alleviate its financial burden for rolling stock investment, the company has partly

leased such facilities as containers and forklifts. Thus it is estimated that the real investment during the first five years should have been ¥120 to 130 billion rather than the actual figure of ¥105 billion, if the leased facilities are taken into account.

3.51 The company leases almost all of the rail track from the passenger JRs (the leased track reaches 9,978 km, whereas the company's own track reached only 76 km at the end of March 1993). The company and the passenger JRs have reached agreement that the passenger JRs should make track available for the company (at the second priority together with super express and express trains as the same order, only second to the bullet trains and commuting trains in the metropolitan areas as the first priority.) Nevertheless, as the demand for the passenger JRs has increased significantly during the first several years after privatization, it has become difficult for the passenger JRs to make a track, especially of the Tokaido line, sufficiently available for the freight traffic.

3.52 Thus the capacity increase of the Tokaido line, which has the largest demand (about thirty percent) for the railway freight, has become an important strategy for the company. The company has a plan to invest ¥30 billion for this project, of which ¥11 billion will be invested for the first stage during FY 1993 to 1996. Capacity expansion of the power substations costs about half of the 11 billion, and the remaining amount will be invested for

**Table III-12 : Capital Expenditures by the JR Freight  
(¥ Billion)**

FY	1987	1988	1989	1990	1991	1992	1993 (Plan)
Maintenance*	0.9	1.6	3.2	7.3	20.5	20.3	6.7
Improvement	1.5	2.0	2.0	3.9	4.6	6.2	11.6
Rolling Stock	2.0	11.9	15.0	17.4	10.7	11.8	12.2
Total	4.4	15.5	20.2	28.6	36.0	38.4	30.5
Internal Fund	12.1	16.7	15.5	16.1	13.9	14.1	n.a.
Depreciation	10.3	13.6	12.6	13.3	13.3	13.9	n.a.
Retained Earnings	1.8	3.1	2.9	2.8	0.6	0.2	n.a.

\*"Maintenance" figures in FY 1991 and 1992 include investment for warehouses which amounts to more than ¥10 billion annually.

**Table III-13 Container Investment: Purchase and Lease  
(¥ Billion)**

FY	1987	1988	1989	1990	1991	Total
Purchase	3.0	7.7	5.3	3.0	0	19.0
Lease	0	0	5.0	9.2	7.0	21.2
Total	3.0	7.7	10.3	12.2	7.0	40.2

expansion of the freight terminal and of the side-track. This project has been authorized by the Railway Development Fund and thus the financing that the company is responsible for will cover about two thirds of the total investment cost. The remainder will be financed from the Fund, by an interest-free loan, from the "Fiscal Investment and Loan Programs," and from bond issues by the JRCPC (Japan Railway Construction Public Cooperation).

3.53 The first stage of the investment will increase the number of the 1,300 ton freight trains. By the second stage investment, the train speed will be improved further. And lastly, by the third stage investment, a 1,600 ton freight train will be introduced.

3.54 Another potential projects for the capacity increase is the "Nanpo Kamotsu Sen (Southern Freight Line)" in the Nagoya area. Its construction started in 1967 is yet to be finished with completion of about 95 percent; Ohfu - Inazawa of 21 km. The rest of the most congested area for Tokaido Line, i.e., Tsurumi - Odawara (about 60 km) in Tokyo area and Ibaragi - Nishiakashi (about 70 km) in Osaka area, has been equipped as quadruple tracking. Thus the Nagoya area has become the bottleneck for the capacity increase of the Tokaido line. But the additional investment cost is estimated to ¥10-20 billion that the company cannot easily bear.

#### *Retaining the Nationwide Freight Railway Network*

3.55 Another serious problem in the future is related to the New Shinkansen Line Development Plan discussed below. When all the planned Shinkansen lines are built, part of the current local trunk lines may be abandoned by the passenger JR's. Thus the company may have to purchase and operate that specific part of the abandoned trunk lines and to bear the whole cost of the capital, maintenance, and operation in order to maintain its unified nationwide track system. But it incurs a huge amount of cost for the company to own the rail track only for the freight traffic. Thus it is critical for the company to avoid this additional burden, while keeping the rail track available. One example is the Shinetsu line which is important for the company to transport oil from Nagoya to the Nagano prefecture. However, the JR East will abandon a part of this line when the Hokuriku Shinkansen starts operation. The local government of Nagano has decided to retain this line and to establish a "Public-Private Partnership" (described

in the following section 3.60) to operate the abandoned part of the line, which the company leases by paying the current "avoidable cost."

#### **New Line Construction and Conflicts of Public Interest**

##### *Growing Conflicts of Interest*

3.56 Since it usually costs a huge amount of money to construct a new railway line, it is impossible to transfer the whole construction cost directly to the tariff of the new line. In addition, it is also difficult to get consensus to transfer the construction cost of a specific line to the general tariff of the railway service. On the contrary, the railway development provides external economies for the real estate business around the railway, residents around the railway stations, and the local municipal government in the form of increase of tax revenues. Thus there always exists a conflict of interest among those who bear the cost and those who receive benefit. In other words, some schemes for sharing the development profit, or arrangement for the internalization of external economies should be examined.

##### *Internalization of External Economies*

3.57 These schemes are classified in principle into three types. The first one is an internalization of external economies within a railway company which develops a new line together with land. The second one is a direct transfer of the external economies from the beneficiary to the developer of a new line. And the last one is an indirect transfer of the external economies by imposing an extra tax for the benefit.

3.58 The following examples have been implemented in the U.S., aiming principally to reduce financial burden for the local governments who are the important investors for urban railways, especially after the "Tax Reform Act of 1986"; (a) Increase of sales tax in the concerned region; (b) Establishment of "Special Financing Districts" where a special tax is levied; (c) "Exaction" of funds or lands from developers and/or other beneficiaries.

3.59 Although these arrangements are not as well established in Japan as in the U.S., some schemes of internalization have been implemented and are summarized as follows:

2. Burden sharing by developers: This scheme is a kind of an "Exaction," and has several variation; burden sharing scheme by new town developer which has been agreed by

the Ministry of Transport, the Ministry of Construction, and the Ministry of Finance; burden sharing by developers who invest in real estate developments along the railway, which is stipulated in the land development guideline; ad hoc agreement between the railway company and developers

- b. Internalization within a railway company: As they are engaged in the urban development business, major Japanese private railways by themselves have a capability to internalize the external economies indirectly from developing a new railway line.

#### *Government Involvement*

3.60 Nevertheless, since these arrangements in Japan are rather ad hoc and are not sufficient to finance such big projects as the new Shinkansen or urban line construction, the central Government and/or local governments are expected to participate in these infrastructure development projects. Public involvement can be classified as follows: (a) establishment of a public enterprise, (b) financial supports by governments to a project, and (c) establishment of a "Public-Private Partnership (PPP)."<sup>3</sup> These examples of public involvement aim to transfer a general source of funds of taxes and so on to the new line constructor and operator. The defects of these types of transfer are that, (a) the real beneficiary is not specified and thus the "benefit theory" is not appropriately materialized, and that (b) there also exists an imbalance of the level of the public support among railway development projects.

3.61 Among these transfer measures, as the JNR has been privatized in Japan, railway development by a public enterprise is not likely scenario. However a municipality involvement is still active, namely the public corporations of a municipality for subway development, which receive a huge amount of financial support, about seventy percent of the construction cost. The second alternative has been broadly implemented by the Railway Development Fund which has been established to provide various financial supports for general projects of the railway development. The Shinkansen development, which is supported both by the national Government and by local governments currently by up to fifty percent as a whole, is the principal project of this alternative. The third alternative, the PPP, has been also important in Japan and in fact many PPPs have been established, especially for constructing urban lines. Arguments about the

PPP is discussed in the following section (Metropolitan Commuting Lines).

3.62 In addition, these examples of public involvement have accorded well with the "vertical separation" (separation of a ownership and an operation of railway) concept and the "BTO" (Build-Transfer-Operate) convention. The following simplified scheme of the railway development in Japan illustrates this accord;

- a. the JRCP constructs a new line, using both public and private funds (Build)
- b. the JRCP transfers the constructed line to a PPP who is invested both by public and private sector and receives a financial support from the public sector (Initial Transfer)
- c. 1) the PPP operates the new line (Operate)  
2) the PPP leases the line to other railway operator (Secondary Transfer & Operate)

3.63 This arrangement has been made possible by the Railway Business Law of 1986, which has effectively introduced the principle of "vertical separation" in the Japanese railway business, by providing three types of railway business licenses. As a summary, Table III-14 illustrates the public and private involvement in a railway development in Japan.

#### *Functions of the Railway Development Fund*

3.64 The Shinkansen Holding Corporation, which was established solely to hold and lease these lines, was dissolved at the end of September 1991. On the basis of the funds raised from the sales of the Shinkansens, the Railway Development Fund was established to implement the comprehensive support policy for the railway development. In addition, the Fund is in charge of repayment to the JNR Settlement Corporation, as in the case of the existing Shinkansen lines.

3.65 The Railway Development Fund has two major supporting measures as follows, classified principally according to the source of funds;

- a. The funds for the first category of supporting measures come from the sales of existing

<sup>3</sup> Public-Private Partnership is named as "Sansoku" in Japanese, which literally means "The Third Sector." However the "Sansoku" or "Public-Private Partnership" has a different origin and characteristics from "The Third Sector" in the Western countries. In general, "The Third Sector" represents a Non-Profit Organization in the U.S. and the Europe, which is independent both from the first sector of "Public" and from the second sector of "Private." "Sansoku" is an organization jointly funded by "Public" and "Private," and thus is profit conscious and public-interest oriented.

Shinkansens to the three Honshu JRs, which amounted to ¥9,200 billion. This category of supporting measures consists of, (i) a grant and subsidy for the Shinkansen Development and (ii) an interest free loan to projects authorized by the Railway Development Fund Law. The projects for the second measure include, (i) capacity expansion of the Tokaido Shinkansen, (ii) improvement of the existing trunk lines, for example connecting with the Shinkansen, (iii) capacity expansion of the freight railway, (iv) new line construction in metropolitan area, and (v) capacity expansion of the urban lines, for example double tracking.

- b. The funds for the second category of supporting measures come in principle from the general national budget. Measures of this category include, (i) a subsidy using the general national budget, and (ii) an interest free loan using the special funds raised from the sales of NTT (Nippon Telephone and Telegraph Co.) stocks. Projects appropriate for these measures are, (i) projects of Shinkansen Development Plan, (ii) construction of local lines, (iii) research for development of Chuo and Shikoku Shinkansens, (iv) improvement of the existing trunk lines, (v) construction and improvement of urban railways, (vi) R

& D for the "Linear" technology, and (vii) investment for railway security improvement.

3.66 Its FY 1993 budget amounts to ¥1,336 billion, of which project support budget amounts to ¥258 billion, and almost all the rest is for the repayment to the JNR Settlement Corporation as for the existing Shinkansen lines. Projects covered and each budget size in FY 1993 are as follows:

- New Shinkansen line construction (¥100 billion)
- Other trunk line development (¥28 billion),
- Development of urban lines, including subways (¥122 billion),
- Railway technology development (¥6 billion),
- Security improvement investment (¥4 billion)

3.67 The main customers for these supporting measures are Japan Railway Construction Public Corporation (JRCPC), Teito Rapid Transit Authority, and railway companies, including the JRs and the PRs.

#### *Transfer of Shinkansen Lines*

3.68 The Shinkansen Holding Corporation Law provided that after the lease period of 30 years, all the assets of the Shinkansen facilities should be

**Table III-14: Public and Private Involvement in Railway Development**

	Investment			Subsidy**		Charge Private
	Central G.	Local Gs.	Private	Central G.	Local Gs.	
JRs	No	No	(Yes)*	Yes	Yes	No
Subways						
Public	No	Yes	No	Yes	Yes	No
Transit Authority	No	No	(Yes)*	No	No	No
New Town Line						
Public	No	Yes	No	Yes	Yes	Yes
PPPs	No	Yes	Yes	Yes	Yes	Yes
PRs	No	No	Yes	No	No	Yes
Other PRs	No	No	Yes	No	No	No
Other PPPs	Yes	Yes	Yes	No	No	No
JRCPC						
Local Lines	Yes	No	No	Yes	No	No
Trunk Lines	No	No	No	Yes	No	No
Private Lines	No	No	No	Yes	Yes	No
Shinkansen	No	No	No	Yes	Yes	No

Source: Japan Society of Civil Engineers (Doboku Gakkai), *Kotsu Seibi Seido (Transportation Development System)*, 1991.

\* (Yes) indicates that the JRs and Transit Authorities are not owned by the government, but by other public agencies.

\*\* Subsidy for subways of PPPs by central government and local governments is planning to establish in 1994.

transferred to the three Honshu JRs. But the law had some shortcomings as follows:

- (a) The law did not provide the total transfer value of the Shinkansens, nor the allocation of the total value among each line or among each JR.
- (b) The Honshu JRs had to pay the maintenance cost for the lines, without registering the depreciation for the whole assets of the line.

#### *Financial Constraints for the JR Central*

3.69 The second issue concerning depreciation had a major impact on the JR Central's financial condition, because the company raises 84% of its total revenue from a single line of the Tokaido Shinkansen. During the initial three years of its operation, the investment by the company had amounted to about ¥330 billion (of which three quarters are estimated to relate to the investment for the Shinkansen), while the company could have registered only ¥190 billion of depreciation, and consequently the long-term debt (outstanding amount of bonds and loans) had increased by ¥36 billion. While the company had been registering one of the highest profit-levels among the JRs, i.e., the company is the only passenger railway JR that had been spending more for the investment than the internal source of fund, or the amount of the depreciation and retained earnings, and thus weakening its financial condition. In order to resolve this financial deterioration, the company insisted on purchasing the assets of the Tokaido Shinkansen.

#### *Value of the Existing Shinkansen Lines*

3.70 After some disputes about the total value and its allocation for each line, the four existing Shinkansen lines, the Tokaido line, the Sanyo line, the Tohoku line, and the Joetsu line, have been transferred to the JRs, JR East, JR Central, and JR West, from the Shinkansen Holding Corporation in FY 1991. The total value of these four lines has been determined as ¥9,177 billion, which is ¥1,083 billion above the then book value, considering the appreciation of the value during the four years since the JNR was privatized or the book value was lastly determined. The total amount, ¥9,177 billion has been divided in principle by the ratio of lease payment for these assets among three Honshu JRs. The JR East owes ¥3,107 billion for the Tohoku and Joetsu lines, the JR Central owes ¥5,096 billion for the Tokaido line, and the JR West owes ¥974 billion for the Sanyo line.

### *Shinkansen Networks*

#### *Shinkansen Development Plan*

3.71 On the basis of the National Shinkansen Railway Development Act of 1970, two series of Shinkansen Development Plans were drawn up in 1971 and in 1973. From those projects in the 1971 Plan, the Tohoku line between Tokyo and Morioka and the Joetsu line between Tokyo and Niigata have been already constructed and are in operation. However, the 1973 Plan was temporarily put on hold in September 1984, mainly because of (a) mounting fiscal budget deficits, (b) construction cost increase owing to the inflation, and (c) managerial problems of the JNR. Then backed by the request from the local concerns, the 1973 Plan was reexamined in January 1987. In August 1988, priority among the projects of the 1973 Plan was determined jointly by the Government and the then leading party (LDP), allowing for a review within five years, in the light of economic and social conditions.

#### *Development Scheme*

3.72 Then in January 1989, the Government announced its decision on the developer, operator, and fund sources for these priority projects as follows:

- a. JRCP constructs and owns the new lines which the JRs lease and operate.
- b. Average allocation of construction cost is as follows:
 

JRs	50%
Central Government	35%
Local Governments	15%

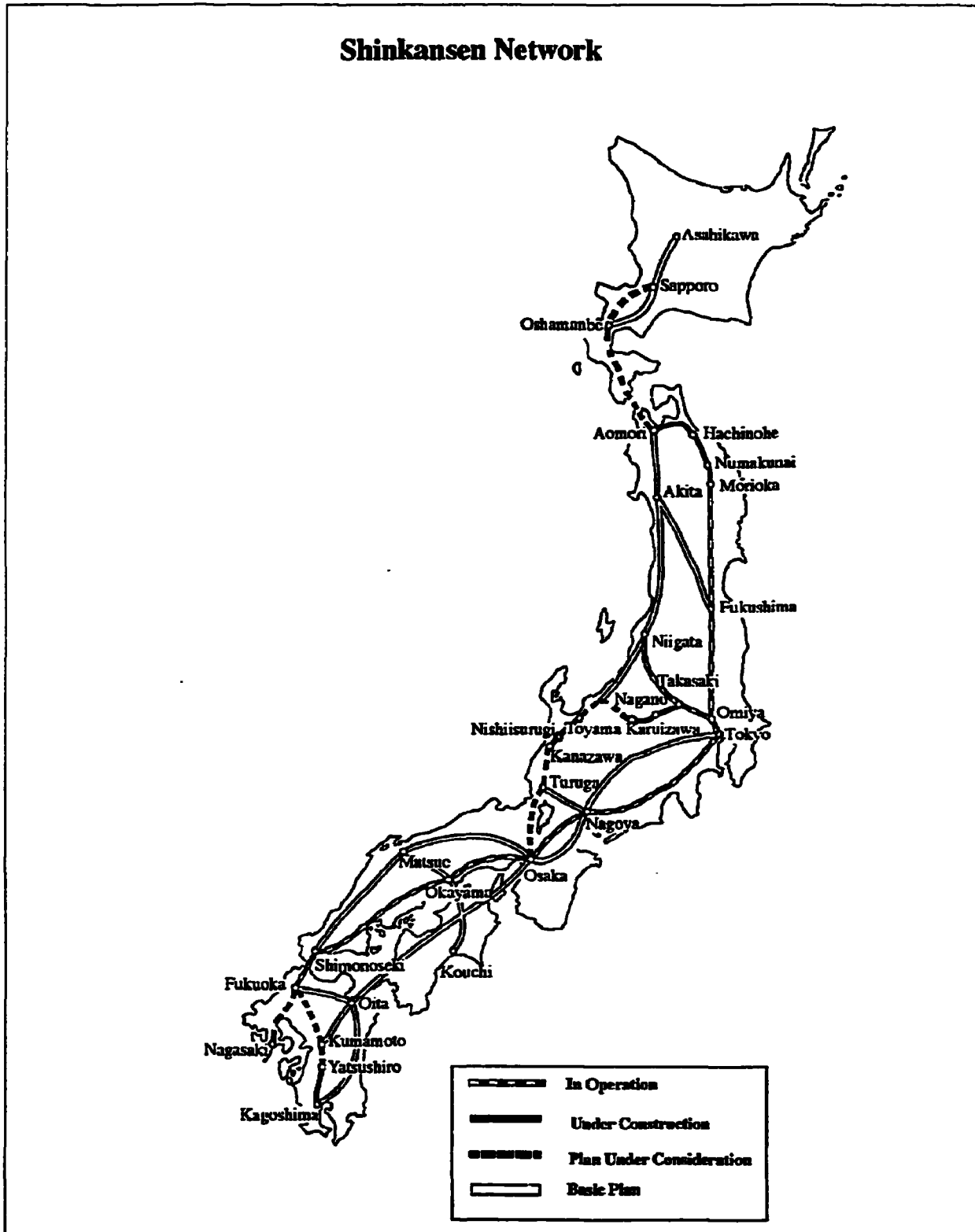
- c. The JRs bear the cost in the form of
  - i) the additional payment of ¥1,083 billion which has been already paid for the purchase of the existing Shinkansen lines owing to the re-appreciation of their value,
  - ii) the lease payment for the new Shinkansen lines after starting operation
- d. The rule for the amount of lease payment for the new Shinkansen lines has been agreed on in December 1990 as follows: the amount of the lease payment will be set with the limitation of the net benefit amount that the operator, i.e., a JR, would receive by operating the new Shinkansen line, and will never be an additional burden for the operator. The net benefit is defined as,

- i) a benefit from operation of the new Shinkansen line itself,
- ii) a net benefit by separating the other line abreast, if any,
- iii) a benefit from the side effect on the other lines connected to the new Shinkansen line.

*Variations of Shinkansens*

3.73 Since then, construction of all the priority projects has been authorized and started. In the meantime, in April 1991, the National Shinkansen Railway Development Act of 1970 was amended to apply the basic scheme of the Shinkansen develop-

Chart III-4



ment, including supporting measures, to variations of Shinkansens, namely "Mini Shinkansen" and "Super Express." Standard Shinkansen or "Full Shinkansen" represents a line with an infrastructure of the operating Shinkansen standard (maximum speed of 260 km per hour). "Mini Shinkansen" represents a line with a gauge of the operating Shinkansen size, added adjacent to the existing track, but with a train of small size (maximum speed of 130 km per hour). "Mini Shinkansen" scheme has been developed to minimize the construction cost by utilizing an existing infrastructure of trunk lines. "Super Express" represents a new line with a narrow gauge but with all the other infrastructure of the "Full Shinkansen" standard (maximum speed of 160 to 200 km per hour), considering a future project of a gauge expansion for the "Full Shinkansen" standard. "Super Express" standard is used for developing a line which has a direct service with ordinary trunk lines at present, that have a chance to be converted into a "Full Shinkansen" standard.

#### *Outline of Shinkansen under Construction*

3.74 Outline of the whole projects under construction, namely the Tohoku line, the Hokuriku line, and the Kyushu line, is shown in Table III-15 below.

#### *Construction Cost of the Shinkansens*

3.75 Estimated construction cost of the current Shinkansen projects under construction, amounts to ¥1,795 billion (see Table III-15). Among these projects, the Karuizawa - Nagano route of the Hokuriku Shinkansen had been planned, until the

end of 1990, to be constructed as a "Mini Shinkansen" which was estimated to cost about ¥60 billion. Then the plan was reviewed, taking into account of hosting the 1998 Winter Olympic Game in Nagano, and has been decided to be built as a "Full Shinkansen" which is estimated to cost six times the previous estimation. Thus the construction cost has been increased, whereas the amount of the lease payment for the new Shinkansen lines by the JR's has been set under a rule as above, which has little relevance to the construction cost.

#### *Remaining Projects in The Shinkansen Development Plan of 1973*

3.76 The Government decided in February 1994 to postpone reviewing the development plan of the remaining projects<sup>4</sup> in the Shinkansen Development Plan of 1973, which have been temporarily put on hold since 1982, until the currently undertaken Shinkansen projects are 50% completed (in about three to five years time). Before then the policy committee of secretary-generals of the ruling parties (of the coalition government) had reexamined the remaining projects and recommended at the end of January 1994 to construct all the projects in the 1973 Plan by the "Full Shinkansen" standard. In addition, the committee has recommended that the "Mini Shinkansen" standard of the Tohoku Shinkansen currently un-

<sup>4</sup> The remaining projects in the 1973 plan are, the Hokkaido line between Aomori and Sapporo (about 300 km), the Kyushu line both between Fukuoka and Nagasaki (about 120 km) and between Fukuoka and Yatsushiro (about 130 km), and the Hokuriku line both between Osaka and Kanazawa (about 240 km) and between Nagano and Nishi-isurugi (about 170 km).

**Table III-15: Shinkansens under Construction**

Line	Route	Mode* of Shinkansen	Operator	Estimated Cost (¥ Billion)
Tohoku	Morioka - Numakunai	Mini		38
	Numakunai - Hachinohe	Full		237
	Hachinohe - Aomori	Mini		112
	Total		JR East	387
Hokuriku	Takasaki - Karuizawa	Full		201
	Karuizawa - Nagano	Full		387
	Uozu - Itoigawa	Super		188
	Nishi-isurugi - Kanazawa	Super		174
Total		JR East and West **	951	
Kyushu	Yatsushiro - Nishi-kagoshima	Super	JR Kyushu	457
<b>Total</b>				<b>1,795</b>

\* "Mini" represents a "Mini Shinkansen," "Full" represents a "Full Shinkansen," and "Super" represents a "Super Express."

\*\* JR East is in charge of the area east of Joetsu, and JR West is in charge of the area west of Joetsu.

der construction should be converted into the "Full Shinkansen" standard.

3.77 Nevertheless, the committee had specified neither construction period, nor priority among the projects, nor the fund source. Construction cost has been estimated by the committee as ¥5,000 billion, which should result in an additional huge burden for the national budget, as the committee has recommended that the burden sharing by the Government and local governments should be augmented to alleviate the financial burden for the JRs, set as fifty percent for the currently undertaken projects. Negotiation for the national budget as for these projects therefore has been tough under the current fiscal budget condition.

### *Metropolitan Commuting Lines*

#### *Private Railways and Capacity Expansion*

3.78 In the metropolitan area of Japan, the PRs have a dominant share of about two thirds in terms of route length, against the JRs. Nevertheless since the construction cost of a new line has increased dramatically, the PRs are barely able to construct a new full line by themselves. However, congestion in trains has become severe in the metropolitan area, especially in the morning and evening, reaching as high as two hundred percent of the designed capacity. Thus the law to promote railway capacity expansion investment in metropolitan areas was enacted in 1986. The law allows those PRs, that have a plan to expand railway capacity to set aside

certain amount of revenue for the expansion investment with a tax exemption.

#### *New Line Development and PPPs*

3.79 A PPP has long been a familiar scheme for urban railway development in Japan, especially for the development of monorails and commuting lines for new towns, whereas a public corporation has been popular both for development and for operation of subways in the metropolitan areas. Owing to a remarkable increase in the construction costs in recent years, a private sector involvement has been encouraged from a fund raising point of view. Besides, owing to the spreading out of metropolitan residents, metropolitan railway networks have become much more complicated and it is required to negotiate among many concerns to further develop the network. Thus it has been decided to accelerate the establishing of PPPs, which have better access to public support than the PRs or the JRs. The following are several examples from current or planned projects which are undertaken by PPPs.

3.80 The high cost of new-line construction makes the public support called "P Line Method"<sup>5</sup>

<sup>5</sup> "P Line Method," which accords with a BTO scheme by the JRCP, has been applied for a new line construction in metropolitan areas. This support scheme includes (a) allow a transferee/operator to redeem the construction cost to the JRCP in 25 years after the operation starts, and (b) subsidize the cost for interest payment which exceeds five percent, equally by the nation and the local governments.

**Table III-16: New Line Development**

Name of Line	Construction Period	Construction		Operating Entity	Local Governments
		Cost (¥ Billion)	Length (km)		
Tokyo Subway #12	1989 - 1996	683	28.8	Tokyo	Tokyo
Rinkai Fukutoshinsen	1991 - 1995	128	4.9	PPP	Tokyo
Joban Shinsen	1992 - 1999	800	58.3	PPP	Tokyo, 3 others
Saitama Subway #7	1994 - 1999	259	14.5	PPP	Saitama, 3 cities
MM21 Line	1992 - 1998	195	4.3	PPP	Yokohama city
Chiba Express	Completed in 2000	93	10.9	PPP	Chiba, Matsudo city
Toyo Express	1984 - 1994	220	16.2	PPP	Chiba, 2 cities
Kamiida Line	1995 - 2000	70	3.1	Nagoya	Aichi, Nagoya city
Tozai Line	1989 - 1995	61	3.5	Kyoto	Kyoto city
Katafuku Line	1988 - 1996	330	12.3	JR West	Osaka, Hyogo, 2 cities
Osaka Sotokanjo Line	1994 - 2000	135	20.4	JR West	Osaka, others

Source: Chiho Koei Kigyo no Shin Tenkai Nado ni Kansuru Kenkyuu Kai (Study Committee for the Local Public Enterprise Development), *Toshi Tetsu Kido no Seibi no Arikata ni Tsuite (Study on Urban Railway Development)*, December 1993

insufficient to make projects feasible. Average construction cost of a new line (see Table III-16) in the center of metropolitans exceeds ¥20 billion per km. Even in the suburban area, it reaches about ¥10 billion per km. The Chart III-5 illustrates the feasibility of the typical projects currently undertaken in metropolitan areas; the Joban Shinsen in Tokyo and the Katafuku Line in Osaka. This analysis indicates that further financial support from the nation or the local governments is required to construct a new line in a metropolitan area, given the current tariff system.

3.81 In addition, these two projects of the Joban Shinsen and the Katafuku Line show a good contrast in terms of the JR's attitude to and its involvement in the project; while the JR East has declined to own the track or to operate the Joban Shinsen, the JR West has been eager to operate the Katafuku Line. The rest of this section discusses this issue of the JRs' involvement.

#### *a. Joban Shinsen*

3.82 This project was first recommended in a report by the "Council for Transport Policy" of the Ministry of Transport in July 1985. This new urban commuting line with a 58.3 km length will combine the Tsukuba city, one of the major research centers in Japan, with the center of the Tokyo metropolitan (Akihabara), by 45 minutes. The major purpose of this project, however, is to promote residential development along the line, constructing about 170 thousand houses. It is expected to start operation in FY 2000.

3.83 The report also recommended an establishment of a PPP for this huge project. Then a bill concerning promotion of Joban Shinsen has been passed in June 1989. Nevertheless it took a long time to formulate a PPP, because of a growing, cautiousness of JR East which was assumed to be a major participant. JR East eventually declined to own the track and even to operate the new line, based on the findings of a feasibility study, examining the profitability of the line with a then assumption of the construction cost of ¥700 billion (in 1987 price). The arguments by the JR East was that the company cannot transfer the huge development cost to the general customers of other lines and that those who can gain the external economies from the railway development should bear the cost and risk of the project.

3.84 Then at last, a PPP called "Shutoken Shin Toshi Tetsudo (Metropolitan Intercity Railway)"

was established in March 1991, by the concerned four local governments and twelve municipalities. Capital from the concerned public sector amounted to ¥130 billion, whereas that from the private sector amounted to ¥30 billion. The PPP was licensed in January 1992 under the first category of railway business to authorize a company to operate a railway business with its own track.

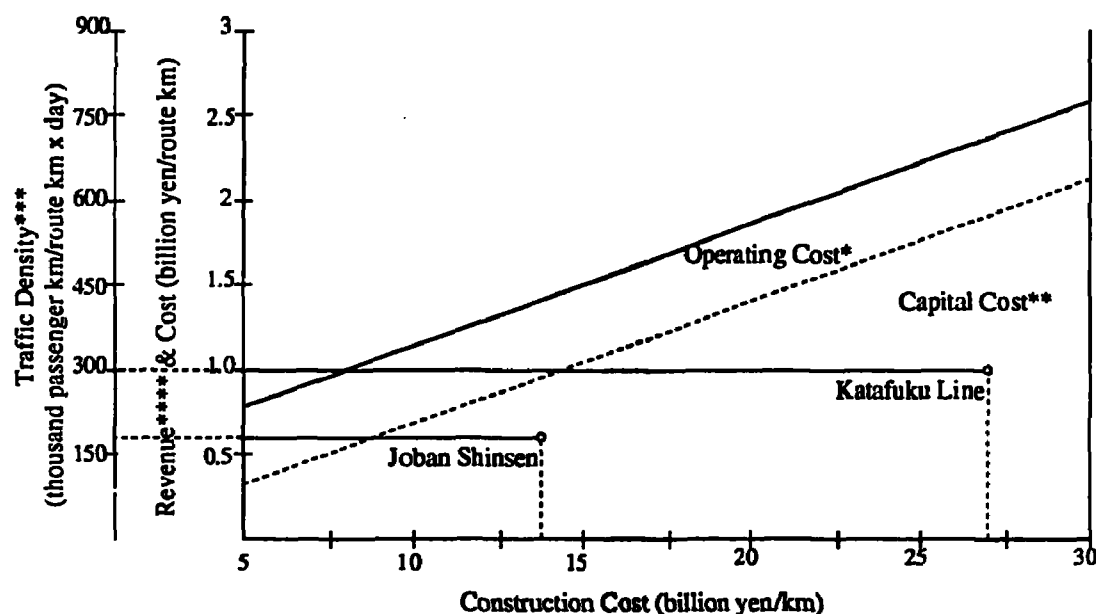
3.85 The current estimate of the railway construction cost amounts to ¥800 billion. The PPP's paid-in capital both from the public and private sectors amounts to 160 billion, and the PPP is currently raising funds for this project through interest free loans both from the Railway Development Fund and from the local governments. Nevertheless, since the cash flow required is increasing, the Ministry of Transport considers to provide loans from the FILPs (Fiscal Investment and Loan Programs) from FY 1994, which in turn is expected to attract investors from the private sector.

#### *b. Katafuku Line*

3.86 The project of a 12.3 km new line was authorized by the Ministry of Transport in April 1981. This line will connect directly the east and west part of the Osaka metropolitan area, via the central business district of the city through underground. In other words, this project is the key for the urban railway network development in the Osaka metropolitan area (see Chart IV-2 of the railway network in Osaka area). JR West has been always enthusiastic about this project, although this is one of the most expensive lines currently undertaken in Japan. In addition, new town development has been encouraged around the Osaka area, specifically in Sanda city which is located in the extension of this line, and thus made this project further prospective.

3.87 The other key issue of this project is the use of a PPP. A PPP called "Kansai Kosoku Tetsudo (Kansai Rapid Railway)" has been established in May 1988 to construct this new line and to lease the track to the JR West. The principal investors are the Osaka local government, the Osaka municipality, and the JR West who own 22.9 percent of the stocks respectively. As a whole, the public sector and the private sector equally share the stocks. The major private investors are the Kansai Electric Power Co., the Osaka Gas Co., and other companies based in the area.

3.88 The principal incentive for using a PPP is to realize better access to the interest free loan from

**Chart III-5: Feasibility of New Line Construction in Metropolitan Area in Japan: Illustrative Analysis**

Source: Produced based on *Joban Shinsen ni Tsuite Kangaru (Examining the Joban Shinsen)* by Masatake Matsuda, Unyu to Keizai (Transportation & Economy), October 1989.

#### Notes:

- \* Operating Cost is assumed as ¥0.41 billion per km, based on the average figure of the major PRs in the Tokyo area in FY 1991.
- \*\* Capital Cost is calculated assuming, in principle "P Line Method," that (a) 30 percent of the construction cost is covered by paid-in capital which requires 10 percent ROI (return on investment), (b) all the other finance is subsidized if the interest rate exceeds 4 percent, and (c) the asset is depreciated in thirty years.
- \*\*\* Traffic Density for the Joban Shinsen assumes 189 thousand passenger-km per route km per day, based on that for the other suburban JR line in the Tokyo area. Traffic Density for the Katakuku Line assumes 300 thousand passenger-km per route km per day, based on that for the densest subway lines in the Osaka and Tokyo metropolitan areas; 353 thousand for the Tozai line in Tokyo, 343 thousand for the Chiyoda line in Tokyo, and 334 thousand for the Midosuji line in Osaka.
- \*\*\*\* Revenue assumes ¥9.2 per passenger-km, based on the average figure of the major PRs in the Tokyo Metropolitan area in FY 1991.

the government's special fund of the NTT stock sale than the JR itself does. Equally important, a PPP can arrange smooth negotiation among various concerns to promote the construction, since those concerns are actually involved in the projects as investors. In addition, JR West has not had an experience to construct a subway, for which the Osaka municipality has a good experience.

3.89 The construction had been temporarily halted by an accident, and its inauguration has been postponed from FY 1995 to FY 1997. And the construction cost has been augmented from the original ¥288.5 billion to ¥330 billion. By the original investment plan, 61.4 percent of the total cost is covered by the JRCP, and only 7.4 percent is covered by the loan from private banks. The rest is covered by the entity's own capital and other public financial supports.

#### *Intercity Lines*

3.90 As the railway network in Japan has been already well established, there are only few projects to construct new intercity railway lines, except for the Shinkansens. Nevertheless there still exist large needs for the speeding up and capacity expansion of the existing lines. The following projects show a basic scheme for railway development and management; fund raising, subsidy from the Government (the Railway Development Fund), establishment of a PPP (local government involvement), and operation arrangement.

##### *a. Yamagata Shinkansen*

3.91 Although it is termed as a Shinkansen, the Yamagata Shinkansen is not a full standard Shinkansen, nor is it included in the national

Shinkansen Development Plan. This project aims to achieve a speed up of the intercity transport between Yamagata and Tokyo, through (i) upgrading the existing trunk line between Fukushima and Yamagata (90 km) and (ii) connecting the trunk line directly to the Tohoku Shinkansen at the Fukushima station.

3.92 The project cost amounted to ¥51.3 billion, including ¥24.0 billion investment for the rolling stocks. In order to construct a track and to purchase rolling stocks, a PPP called "Yamagata JR Chokko Tokkyu Hoyo (Yamagata JR Direct Express Holding Co.)" was established in May 1988 and was capitalized equally by the local governments and the JR East group. The Railway Development Fund provided a subsidy to the PPP with twenty percent of the construction cost approved by the Railway Development Fund.

3.93 Leasing the track and rolling stocks from the PPP, the JR East began to operate the upgraded line in July 1992, connecting with the Tohoku Shinkansen. The time required from Yamagata to Tokyo has been reduced by 42 minutes to 2 hours and 27 minutes. Thus the railway has become competitive against the air journey, which takes 55 minutes for the same trip. The number of air passengers between Yamagata and Tokyo decreased by around one quarter in the first nine months since the Yamagata Shinkansen started operation.

#### *b. Hokuetsu North Line*

3.94 The construction of this new local line was resumed in 1985 to make a shortcut in the route from Tokyo to such major cities in the north coast of the Honshu (mainland) as Toyama and Kanazawa. The route length will be shortened by about 55 km, through this new bypass route of 59 km, and the time required will be reduced by 20 minutes.

3.95 A PPP called "Hokuetsu Kyuko (Hokuetsu Express Co.)" was established in August 1984. The local governments and private companies hold 83 percent and 17 percent of the stocks respectively and the amount of the paid-in capital is expected to be increased to ¥4 billion before the operation starts. In addition, the Railway Development Fund provides a subsidy and the JR East provides ¥15.8 billion as a burden charge to the PPP. The cost amounts to ¥24.0 billion for the new route construction, and upgrading cost of the existing lines of the JR East amounts to ¥79.4 billion. And the PPP will operate the newly constructed route by a direct service connected with tracks of the JR East.

#### *c. Sekisho Line*

3.96 This project will upgrade one of the major trunk lines of the JR Hokkaido and introduce a new express train with a maximum speed of 130 km per hour. Thus it will reduce the time required from Sapporo to Kushiro by 40 minutes to 3 hours and 40 minutes. The route length upgraded by this project reaches 304 km.

3.97 The construction cost amounts to ¥10.7 billion, excluding rolling stock investment born by the JR Hokkaido. A PPP called "Doto Kosoku Tetsudo Kaihatsu (East Hokkaido Express Railway Development)" was established in January 1994 to construct and lease the track to the JR Hokkaido. The JR Hokkaido and a group of the local governments each provides ¥2 billion for the capital. And the Railway Development Fund provides ¥2 billion as a subsidy.

### Issues of Freight Transportation

#### *Argument of Modal Shift*

3.98 It was a general perception at the time of the privatization that the railway freight served only a marginal role in the Japanese freight traffic market and that the profitability of railway freight was difficult to justify. However such phenomenon emerged just after the privatization as the rapid growth of the railway freight demand, the traffic congestion in the road, and the labor shortage of truck drivers, encouraged the argument of modal shift. Besides, railway freight is thought to have an advantage in terms of energy efficiency<sup>6</sup> of transportation and of environmental external cost, although the advantage has not yet been wholly examined in Japan as has been done in the argument of "infrastructure fare" in the Nordic coun-

<sup>6</sup> Advantage in the energy efficiency of railway freight against the road freight has been broadly advocated in Japan. Nevertheless some profound studies on this issue do not necessarily support this general perception, when the railway freight is compared to the road freight of the long distance, which is the real competitor of the railway. For example, Hidaka concludes that on the basis of line haul energy, which includes both running energy and indirect energy, the proportion of energy per ton-km consumed by the railway to that by the truck is 100 to 70-80, and that there is not so much difference of energy efficiency ("Energy Economics" vol. 19 No. 16 by the Institute of Energy Economics, Japan). Contrary, the road freight of the short distance, i.e., the inner city traffic, is the major problem of the inefficiency of the freight traffic, either in terms of the energy consumption, or in terms of the social cost of pollution and congestion.

tries which takes into account external cost of congestion, accidents, noise and air pollution.

3.99 Nevertheless the modal shift can be justified only in a certain area of the freight traffic. Specifically, in a short and medium term, the Government expects the modal shift in principle from the long distance truck transport to the marine and the railway freight. In order to achieve this modal shift, the Government recommends for the freight railway to develop, (a) a multi modal transport, e.g., by promoting variety of types of containers, (b) a high speed freight railway, and (c) a freight railway capacity and services. In a long term, the Government expects to develop a "techno-superliner," a special system for freight transport, and a transport system through a very deep underground. In order to support these visions of the Government, especially for the short and medium term vision, the Government has implemented several measures to preserve the railway freight. The first one is the move to consolidate the financial structure of the JR Freight. The other is measures to promote the modal shift or inter modal services.

#### *Favors Provided for the JR Freight*

3.100 In order to strengthen the financial structure of railway freight business, several favors are provided for the newly established JR Freight. Firstly, in order to minimize the capital cost for the company, the track infrastructure has been decided to be owned by the passenger railways and be leased to the company, and the other assets owned by the company have been reevaluated at the minimum value. Secondly, the operation in stations, maintenance, and repair shops is consigned to the passenger railways. And the rail lease and operating cost paid to the passenger railways have been decided to be based on the "avoidable cost" principle, which requires the company to bear only the cost inherent to freight operation (issues related to the "avoidable cost" will be discussed later). Lastly, on top of these cost alleviation measures, the rail track sharing (timeschedule) between passenger trains and freight trains should be negotiated fairly among the passenger railways and the company by the committee."

#### *Government Policy for Promoting Modal Shift*

3.101 In addition, the Government has examined measures for the modal shift of freight traffic from the road traffic to the rail and marine traffic. In 1991, the Government decided to provide some

measures to promote the modal shift by the JR Freight. One of the measures is a provision of interest free loans from the Railway Development Fund to improve the capacity for container transportation. Projects covered are construction and expansion of sidetrack (by-pass lines) for freight traffic, of electric substation, and so on. The loan covers up to thirty percent of the authorized project cost.

3.102 The other is a special taxation measure for, (a) a fixed asset tax of containers owned by JR Freight's customers, (b) an automobile acquisition tax of piggyback trains, and (c) a special depreciation method for such energy efficient equipment as a "Push Pull Forklift," a high efficiency locomotive, and a rotation controller.

3.103 Besides these direct measures for the modal shift, the Government has amended laws for the freight forwarding business. New legislation has been enforced in December 1990 as a "Freight Forwarding Business Law" and a "Truck Business Law." This legislation aims to promote a safe freight transportation by both truck and multi-mode transport, by unifying the control over the business as a forwarder who makes use of various modes of transport. Before then every mode of freight transport business has been controlled by a specific law for each mode of transport. Thus a freight forwarding business has been recognized as an official business criterion first time in Japan, and is expected to promote a multi-mode freight transport, and consequently railway freight traffic.

#### *Avoidable Cost Method*

3.104 The concept of an "Avoidable cost", which pays attention only to the incremental costs, has been used for calculating the rail track lease payment both by Amtrak in the U.S. and by VIA in Canada. Major feature of the avoidable cost concept is an assumption of plural services carried out by one line of a rail track. Although many European railways also pay for a same kind of rail track lease payment, the "avoidable cost" in the North America and Japan is different from the European type of lease payment because of a difference of a rail track ownership between these countries. While the rail track in Europe is owned (in case of Sweden) or financially managed (in case of many other countries) by the Government, that in the North America and in Japan is owned by private railway(s). Thus the "avoidable cost" inherently requires a negotiation among the private companies (lessor and lessee

of the rail track) without involving a national subsidy.

3.105 In Japan the report, "Ararashii Kamotsu Tetsudo no Arikata ni Tsuite (report on the new management of JR Freight)" announced by Ministry of Transport in December 1985, provides an "avoidable cost" principle for the rail track lease payment by the JR Freight, aiming to reduce financial burden for the company. Only such variable costs as energy (electricity) and maintenance for rail tracks and electric wire are classified as an avoidable cost and shared among the passenger JRs and the JR Freight based in principle on the share of their traffic volume. In other words, the Japanese concept of the avoidable cost includes only short term marginal costs. The rate of the lease payment should be reviewed in every October.

3.106 The basic scheme of the Japanese "avoidable cost" is as follows:

- a. In principle, only two items as follows are included in the "avoidable cost"
  - i) Electricity tariff which is consumed for the railway traffic, except for the basic tariff, maintenance cost for the power substations, and capital cost for the power stations owned by the passenger JRs.
  - ii) Maintenance cost for rail tracks, trolley lines, signal relays, and what is consumed by the traffic.
- b. For the (ii), all the capital cost is born by the passenger JRs.
- c. All the direct labor cost for (ii) is born by the passenger JRs, and only the material cost and subcontract cost is included in the base for the "avoidable cost"

d. These two items, (a)(i) and (c), are shared among the passenger JRs and the JR Freight to calculate the "avoidable cost," based on their volume of traffic.

e. The track lease payment is determined as this "avoidable cost" plus one percent margin.

f. All the passenger JRs report the amount of lease payment by their own calculation to the Minister of Transport, and the Minister examines the validity of the calculation and provides an approval. Then the JR Freight pays the amount approved by the Minister.

#### *Growing Conflict of Interests*

3.107 In October 1992, the lease rate was increased, which had a major impact on the profit of the company. The amount of the lease paid by the company has increased from ¥15.6 billion (7.2% of the total revenue) in FY 1991 to ¥19.1 billion (8.8%) in FY 1992 and expected to exceed ¥22 billion in FY 1993. Since the amount of lease payment is significant both for the JR Freight and for the passenger JRs, especially for the three Island JRs, the rule for the avoidable cost is an important issue.

3.108 Since it was difficult to anticipate such rapid increase of freight railway traffic at the time of privatization in 1987, the original concept of the avoidable cost does not explicitly set a rule for a burden sharing of additional investment costs which are required to increase the freight traffic capacity. After the discussion between the passenger JRs and the JR Freight, it is decided that the JR Freight should bear the capital cost specific to the freight traffic capacity increase. Thus the avoidable cost has changed its feature from the short term one to

**Table III-17: Status of Separations of the National Railways by Country**

	Vertical Separation	Line-of-Business Separation*	Regional Separation
Japan (JRs)	(No)**	Yes	Yes
U.S.(Conrail)	(No)**	Yes	No
Canada (CN)	(No)**	Yes	No
Sweden (SJ)	Yes	No	No
Norway (NSB)	Yes (by financial separation)	No	No
Finland (VR)	Yes (by financial separation)	No	No
Swiss (SBB)	Yes (by financial separation)	No	No
Austria (ÖBB)	Yes (by financial separation)	No	No
Germany (DBAG)	(Yes)***	(Yes)***	No

Source: *Tetsudo no 'Joge Bunri' ni Tsuite ('Separation' in Railway)* by Masamichi Hori, Unyu to Keizai (Transportation & Economy), April 1992. Others.

Notes: \* Line-of-business Separation is a separation by a passenger railway and a freight railway business.

\*\* (No) indicates that the rail track are not vertically separated from all the railway, but are separated from some railway.

\*\*\* DB (Deutsche Bundesbahn) and DR (Deutsche Reichsbahn) in Germany had been separated, but was unified in January 1994. Rail track holding, the freight business and passenger business are separated inside DBAG (organizational separation) and are expected to be completely separated and managed by individual companies in 1997.

the long term one. In addition, the avoidable cost still has such a disputable issue as exclusion of the direct labor cost for maintenance cost (only the material cost and subcontract cost are included).

### *Competition With Trucks and Indicative Economic Comparison*

3.109 The argument of the modal shift and the actual environment surrounding JR Freight inevitably arouses the discussion of the viability of freight train transportation in Japan in the long run. The central issue here is the competitive edge of train in comparison with other traffic modes, especially with trucks. The issue is complicated by the alleged cross subsidization existing both in train and truck transportation. The issue is further complicated if externalities such as pollution and congestion are taken into account.

3.110 In the last couple of generations, the edge of freight trucks has exceeded that of freight railway, though the railway is considered to have advantages over the truck for long-distance freight. The reason is not considered to be that the cost of JR Freight is high, but rather that the marketing of JR Freight is weak, as is discussed in the earlier section. To compare these two freight modes, the costs of the road freight and railway freight are calculated in this part.

3.111 The cost comparison of road freight and railway freight is difficult for the following reasons; on the one hand passenger railways have given advantages to JR Freight based on the avoidable cost principle. In addition, it is said that the real avoidable cost is greater than the line lease expense which JR Freight actually pays to passenger JR's. On the other hand, it is said that freight trucks do not pay the appropriate costs for their road construction and distraction. For example, the oil tax is specifically spent to the road construction and maintenance. However, tax for light oil, which many trucks use as fuel in Japan, is cheaper than that for gasoline, which many passenger cars use. Moreover, trucks are said to distract roads in the order of tens of thousand times more than passenger cars do.

3.112 Here we focus on one route, between Tokyo and Osaka (580 km) — because between Tokyo and Osaka, 1) freight demand is biggest in Japan, and 2) although it is said that a turning point of trucks and railway freight is 400-600 km, the share of railway (5%) is much lower than that of trucks (51%) — in order to estimate the cost competition of road freight and railway freight without subsidy. First, in order to compare the current cost

competition, we compare the operating cost per ton-km (see Table III-18). The cost of railway freight is almost half that of road freight. It is estimated that currently railway freight has advantage on cost between Tokyo and Osaka, and the reason why freight trucks have exceeded railway freight is the inconvenience and the weak marketing of JR Freight.

3.113 Second, we compare the operating cost on equal footing, which exclude cross subsidization, and which do not include construction costs. In the case of road freight traffic, the costs of road construction and maintenance are considered to be subsidized to some extent by passenger cars. Therefore, 1) we exclude tax (including oil tax) and highway fee expenses, by which trucks share road construction and maintenance cost, from the operating cost. 2) we add estimated maintenance cost of road, in which the burden sharing of passenger cars is eliminated (assuming only trucks pay it), between Tokyo and Osaka. In case of railway freight traffic, we assume that the real avoidable cost (line lease payment of JR Freight to passenger JR's) is 4 times as much as the line lease payment which JR Freight currently pays to passenger JR's. As a result, the operating cost on equal footing of railway freight is lower than that of road freight. Although the estimated operating cost on equal footing is very sensitive, it may be safe to say that railway freight can compete road freight on cost without cross subsidization.<sup>7</sup>

## Regulation of the Government

### *Privatization and Regulation*

3.114 Although regulations are important to secure sound management of and safe operation by

<sup>7</sup> Estimated Cost Comparison including Construction Cost: When building and extending freight transport network, one must compare costs including operating cost and construction cost. Both road and railway line construction costs which exclude burden sharing by passenger cars and railways must be considered. Construction cost per ton-km of road freight is 1/4 that of railways, since road usage is 5 times higher than that of railway track. Total cost of road freight is 1/2-1/3 that of railway freight, so railway freight cannot compete with road freight on cost if freight railway alone, rather than both freight and passenger railways, is the reason for construction of new lines. See Table III-19 following. This estimate is based on specific conditions of freight transportation in Japan. First, the track usage of JR Freight is restricted by passenger JR's because of high train frequency on the Tokaido line. If there is no restriction, JR Freight can increase the number of freight trains. Second, construction cost of road and railway is extremely expensive in Japan due to the high land price and labor expenses. Therefore the competition in other countries may be different from the one in Japan.

**Table III-18: The estimated cost comparison of the road freight (Tomei highway and Meishin highway) and railway freight (Tokaido line) between Tokyo and Osaka (¥ per ton-km)**

	Road	Railway
Operating Cost (A)*	14 - 16	8
Tax and Highway Expenses/ Line Lease Payment (B)	4 - 3	0.8
Estimated Maintenance Cost (C)	1.1	3.2
Operating Cost on Equal Footing (A)-(B)+(C) **	11 - 14	10.4

\* Operating Cost

- Operating cost for road, for the long-distance truck with 10-20t loading capacity, is based on the data in 1983. We assumed that cost increased from 1983 to 1991 by 13%. (Sources: "Torakku no Ogataka ni Kansuru Chosa Kenkyu Hokoku Sho (Study Report on Larger-size Trucks)," 1983, Institute of Transportation Economics, "Jidosha Unso Jigyo Keiei Shihyo (Financial Data of Auto Express / gent)," by Ministry of Transport) The operating cost excludes costs for pickup and delivery of cargo, and terminal.
- Operating cost for railway is the average operating cost of JR Freight. Average operating cost is influenced by the freight traffic distance. However, average freight traffic distance of JR Freight is 470 km and the distance between Tokyo and Osaka is 580 km. Therefore the average operating cost between Tokyo and Osaka is considered to be almost the same as the average operating cost of overall JR Freight.

\*\* Operating Cost on Equal Footing: Operating cost which excluded cross subsidization

- Road: Cross-subsidization for the trucks is considered to be mainly road maintenance cost and road construction cost, of which passenger cars share large part. We subtract the tax (including oil tax) and highway fees (¥4 - 3), by which road are maintained and constructed, from operating cost. Then we add the estimated maintenance cost (¥1.1) of the road between Tokyo and Osaka, assuming only trucks pay it.

Tax and Highway Expenses	¥ per ton-km	4 - 3
Maintenance Cost **1 (D)	¥ million per km	80
Road Usage **2 (E)	million ton per km	73.5
Estimated Maintenance Cost (D)/(E) ¥ per ton-km		1.1

\*\*1 Maintenance Cost: The maintenance cost for Tomei highway is not publicized. Here it is assumed to be as much as the maintenance cost of highway in metropolitan areas such as Tokyo and Osaka because the traffic density of Tomei highway is high, though the Tomei highway is operated by Japan Highway Public Corporation.

Japan Highway Public Corp.	¥47 million / km
Metropolitan Expressway Public Corp.	¥176 million / km
Hanshin Expressway Public Corp.	¥165 million / km

Maintenance cost is smaller than the costs above which include improvement expense and restoration expense. (Source: Japan Highway Public Corporation Annual Report)

\*\*2 Road Usage: Road Usage, at 73.5 million ton per km per year, is calculated by the total truck operating length on the Tomei highway (small freight trucks 3,371 thousand km per day, medium and large freight trucks 13,559 thousand km per day) and the average loading of each truck (small freight trucks 0.6 ton, medium and large freight trucks 5.0 ton). (Source: "Tasks of the 12th National Urban Expressways for 1990 Fiscal Year" by Fukuoka-Kitakyushu Expressway Public Corporation from "Expressways and Automobiles" 5/92 and 6/92, Expressway Research Foundation of Japan)

• Railway

Line Lease Payment **3 (F)	¥ million per km	10.3
Track Usage **4 (G)	million ton per km	13.7
Line Lease Payment (F)/(G)	¥ per ton-km	0.8
Estimated Real Avoidable Cost **5	¥ per ton-km	3.2

\*\*3 Line Lease Payment: ¥20 billion (the actual line lease payment of JR Freight) x 0.3 (assuming that tonnage of Tokaido line is 30% of the total tonnage of JR Freight) / 580 km (route length of the Tokaido line) = ¥10.3 million per km per year.

\*\*4 Railway Track Usage, at 13.7 million ton per km per year between Tokyo and Osaka, is calculated assuming that the tonnage on the Tokaido line is 30% of the total tonnage of JR Freight.

26.3 billion ton-km x 0.3 / 580 km = 13.7 million ton per km.

\*\*5 We assume that real avoidable cost of JR Freight is 4 times as much as the line lease payment.

railways, considering that the JRs are going to be fully privatized or sold to the public, it is also important to minimize the regulations or at least to disclose procedures of these regulations. The primary legislature for the railway business is the "Railway Business Law" (the Business Law hereafter) which stipulates railway companies' development plan, operation, general management of railways, technological standards, and so on. Nevertheless the PRs are also required to follow this law, and thus these regulations are not specific for the JRs.

3.115 The Law Concerning Passenger Railway Companies and the Japan Freight Railway Company stipulates regulations specific for the JRs. Clauses of the law require an approval by the Ministry of Transport, concerning external financing, appointment of CEO and auditors, annual business plan, transfer and mortgaging of important property, revision of the articles in the incorporation, disposition of profit or loss, and merger and dissolve of the company. All the clauses listed above, however, are also important items for private companies who are responsible for the shareholders, but not for the Government. Thus the bottom line for the regulation argument is whether the Government considers the importance of the sound management of the JRs as much as the general public does for private railway companies. Among these items, the most straightforward of regulations affecting the JRs' management are (a) tariff system, and (b) investment.

#### *Tariff System*

3.116 As for the tariff system, the Business Law provides a common principle both for the PRs and

for the JRs. The major points of the relevant articles in the Business Law are, (a) the tariff should compensate the adequate cost under the efficient management, and (b) the tariff should cover the appropriate profit margins. The first problem on this tariff issue is that these concepts of adequate cost, efficient management, and appropriate profit margins are not precisely defined and are vulnerable to the occasional government control, or political considerations. Furthermore, since operational environment is so different among the JRs, and between the JRs and the PRs, it is difficult to presume a benchmark for these management indicators.

3.117 The other issue on the tariff system is the timing of the tariff revision. The experience of a PRs' tariff revision shows that a tariff increase is permitted (i.e., has to be accepted by the Ministry of Transportation (MOT)), only if the railway companies make loss or are expected to make loss from their railway business. Nevertheless, it should be noted that the profitably diversified business of PRs makes this revision rule possible, assuring their profit bases. On the contrary, diversified business of the JRs is in its infancy and can not contribute sufficiently to their total profit. As for the electricity tariff in Japan, operating loss of public utility companies is not a prerequisite for the tariff revision.

3.118 Tariff revision requires the approval of MOT. However, currently Japanese government is promoting deregulation of domestic industry. As part of this effort, the Government is decreasing the number of regulations that MOT controls, including railway, road, airway and ship, by 20%

**Table III-19: Cost Comparison including Construction Cost**

	Road	Railway
Construction Cost (H) (¥ million per km)	962	770
Road Usage (I) (million ton per km)	73.5	13.7
Est. Construction Cost on Equal Footing (J) = (H)/(I) (¥ per ton-km)	13.1	56.2
Operating Cost on Equal Footing (K) (¥ per ton-km)	11-14	10.4
Total Cost (J)+(K) (¥per ton-km)	24-27	66.6

Notes: The average cost for road (¥962 million per km per year) and for railway (¥770 million per km per year) are calculated assuming that: a) construction cost entails 5% interest expense annually; b) assets are depreciated in 30 years; and c) unit construction costs are the following: ¥15 billion per km for road (the same unit cost as the Tokaido highway) and ¥12 billion per km for railway (the average unit cost of railway construction is slightly less than the unit cost of road construction.)

Source: Japan Highway Public Corporation Annual Report.

within 3 years from 1993. Regarding railway tariff system, in 1994 MOT is expecting to amend the Business Law that railway companies can discount tariff of facility services, such as first class seats and sleeping berth, without approval of MOT. JR and PRs can increase or decrease tariffs on facility services at their own discretion.

#### *Investment Decision*

3.119 The issue of investment relates mainly to the construction of new lines, especially those for bullet trains or urban transport. In both cases, a huge amount of funds is required. Since a railway company inherently has two different characteristics, that of a profit oriented business entity and that of a public service supplier, investment decisions for railway companies must take account of the public interest, and are likely to be vulnerable to political pressure.

3.120 The history of the upgrading of the Hokuriku Shinkansen line shows that the operator (in this case JR East) was fully involved in the decision making process for the new line construction, which required a huge amount of funds. Otherwise profitability or effective operational management would be assured. Another example of operator involvement in the investment decision making process is the Joban Shinsen, a 58.3 km long new urban commuting line in the Tokyo metropolitan area. After examining the feasibility of the new line, JR East decided against being an operator or an investor. Thus the project has been initiated by a PPP.

3.121 Since the JNR was privatized, the JR have had to be responsible for their profitability and financial management. At the same time, however, railways represent an important public goods in the national economy and society. Such a big project as the Joban Shinsen is a good example of improving national welfare. Thus there always exists a conflict of interest between that of commercial entity and that of public service carrier. But as is indicated in the above two cases, it is necessary for the JRs to reserve their own decision-making right on important investment projects or involvement in such projects in order to avoid becoming, in effect, another JNR.

#### *Union Problems and Elimination of Union Regulations*

3.122 At the time JNR was established in 1949, a special labor law (Public Corporation and Labor

Relations Arrangement Law) was enacted to be applied to public corporations. Under this law, JNR employees were given the right of collective bargaining, but were not allowed to strike. Union membership was on an open-shop basis and workers could choose not to join, but most did join. The National Railway Workers' Union, or Kokuro, was the biggest and most powerful, and represented all types of workers. Politically, it had close ties with the Japan Socialist Party and frequently led illegal actions for the right to strike in the 1970s, which turned the public against JNR. Three other unions split from Kokuro and duly registered in order to negotiate with the management. The National Motive Power Union, or Doro, represented solely motive drivers, but there were also many motive drivers who remained within Kokuro. The Japan Railway Workers Union, or Tetsuro, was politically milder and supported the Japan Democratic Socialist Party. The All National Railways' Permanent Way and Construction Labor Union, or Zenshiro, politically supported another centrist party, Komeito.

3.123 JNR management negotiated with each of these unions on issues such as pay and changes in train schedule, though pay rises usually ended in the same increase as was recommended each year for public servants by National Personnel Authority. The salary standard was in principle universal in all crafts with minor differentiation by type of crafts. Retirement age was decided by agreement between the management and each union and was basically the same as that for public servants. Politically, the leaders of Kokuro and Doro were influenced by Marxism, but in many cases a new worker tended to choose the union which was dominant in the division or district he was first assigned to. Kokuro opposed to the break-up and the privatization of JNR until the last minute and subsequently collapsed. The other three unions chose to support the break-up and privatization.

3.124 In the final days of JNR, three unions (except Kokuro) inaugurated the Japan Confederation of Railway Workers' Union (JR Soren). After restructuring in 1987, separate workers' unions were organized in the new JR with JR Soren as the supreme body. These unions and JR signed joint declarations and established stable labor-management relationships. They are legally constituted unions, which are not subject to the special labor law for public corporations, and are given the right to strike as well as the right of collective bargaining. Each union negotiated with the management sepa-

rately and consequently the rate of pay rises began to be differentiated from the first year of 1987.

3.125 In 1990 confrontation over hegemony within JR Soren between the old Doro and Tetsuro unions came to the surface. In July 1991 the union of JR West seceded from JR Soren and the union of JR Central followed suit in November. The unions of JR Shikoku and JR Kyushu also seceded around the same time. They formed another supreme body, the Japan Railway Trade Unions Confedera-

tion (JR Rengo) in May 1992. In these unions, the old Tetsuro group was dominant. Consequently, the old Doro group formed additional minority unions in JR West, JR Central and JR Kyushu. On the other hand, those who are against the current leadership of the old Doro group in the union of JR East formed a minority Union and joined JR Rengo in January 1994. Thus, the rivalry between JR Soren and JR Rengo has been increasingly intensified.

# **IV. Market Structure of Transportation and Comparison of JRs and Private Railways**

## **Market Structure of Railroad Sector in Japan**

### ***Railroad System in Japan***

#### ***Railroad Route Length by Region***

4.1 The railroad system in Japan has following characteristics. Firstly, passenger traffic, not the freight traffic, is the main business since long time (in FY 1991 400 billion passenger-km versus 27 billion ton-km). Secondly, in addition to the subways, the private railways are concentrated mostly (about fifty percent of the total route length of the private railways) in such metropolitan areas as Tokyo, Osaka, and Nagoya, and thus operate in the most populated areas. On the contrary, the JRs have their track infrastructures in both populated metropolitan area (only about eight percent of the total route length of the JRs) and also intercity areas (trunk lines). Thirdly, the railroad in the three small islands is overwhelmingly dominated by the JRs (86% of the total route length, whereas 71% in the Honshu), where few large cities are located and the population is less dense. Among the three islands, railroad in Hokkaido is located in the most sparse area in terms of square kilometer and of population.

#### ***Electrification and Double Tracking***

4.2 The geography of Japan is characterized by large mountainous area and scattered metropolitans on the coast. Thus electrification of the railroad, which can provide a stronger traction or acceleration power of trains, is an important factor for speed up and consequently for the competitiveness of the railroad. Since the Hokkaido island occupies less mountainous and fewer metropolitan

areas, electrification in this region is not urgently required. Among the rest of the regions, the share of electrification in the Shikoku island is far behind the average of the other regions. Since the privatization of the JNR, the JR Shikoku has constantly and eagerly undertaken electrification projects to be competitive against road traffic.

4.3 Double tracking is also an important factor for speed up and railroad capacity. The JRs in the Honshu (mainland), where the large volume of traffic is expected, have a relatively high share of double tracking in terms of route length. On the contrary, since the railroad in the three small islands are located in the less densely populated areas, the JRs in these regions have a low share of double tracking, as low as less than one quarter.

#### ***Railroad Traffic Characteristics***

##### ***Passenger Traffic by Distance***

4.4 According to the Table IV-3 following, travelers on the bullet train and the other trunk lines without a commuter pass have a long trip distance on average and thus can be grouped as a different type of customers from the short distance travelers. The market structure of railroad in Japan will be reviewed hereafter by type of the market, i.e., the long distance passenger market, the commuter passenger market in metropolitan areas, and the freight market.

##### ***Long Distance Passenger Market***

4.5 Table IV-4 following shows that the majority of long distance passengers by railroad are business travelers. For the private purposes of travel, travel by car is much more popular. Thus the demand for long distance travel by railroad should be af-

**Table IV-1: Route Length of Japanese Railroad in March 1993**  
(km, %, km/000 sq.m., person/km)

	JRs		PRs*		Total	Density (Area)**	Density (Pop)***
Three Islands	5,584.8	85.6	942.1	14.4	6,526.9	45.2	3,545
Hokkaido Island	2,628.3	92.3	218.6	7.7	2,846.9	34.1	1,984
Shikoku Island	855.8	82.5	181.9	17.5	1,037.7	55.2	4,035
Kyushu Island	2,100.7	79.5	541.6	20.5	2,642.3	62.7	5,034
Honshu (Mainland)	14,555.8	69.9	6,281.2	30.1	20,837.0	90.2	4,784
East	7,502.0	71.6	2,979.6	28.4	10,481.6	80.7	5,157
Center	1,994.7	58.1	1,441.4	41.9	3,436.1	117.3	4,157
West	5,059.1	73.1	1,860.2	26.9	6,919.3	96.4	4,529
Total	20,140.6	73.6	7,223.3	26.4	27,363.9	72.9	4,488
Metro Area****	1,631.0	30.9	3,639.2	69.1	5,270.2	n.a.	n.a.
Three Metros	1,587.4	37.3	2,664.4	62.7	4,251.8	272.0	11,722

Source: Institute of Transportation Economics, *Toshi Kotsu Nenpo (Metropolitan Traffic Annual)*, Ministry of Transport, *Tetsudo Yoran (Railroad Almanac)* and *Tetsudo Yuso Tokei Nenpo (Railroad Traffic Statistics Annual)*. Others.

\* PRs include Eidan (Teito Rapid Transit Authority) and other publicly owned railways, and allocated in each region by the area of the "Transportation Administration" which is not wholly compatible with the area covered by the corresponding JR.

\*\* Area Density indicates route length (km) per thousand square meter.

\*\*\* Population Density indicates person per route length (km).

\*\*\*\* Metro Area represents such major metropolitan areas as Tokyo, Osaka, Nagoya, and other city areas with a population of over million (Data from *Tetsudo Yuso Tokei Nenpo*).

Three Metros are Tokyo, Osaka, and Nagoya metropolitan areas (Data in March 1990 from *Toshi Kotsu Nenpo*).

Note: The next right columns of JRs and PRs represent the percentage shares of JRs and PRs in the total route length.

: Area of the surface space and the population are not wholly compatible with the area covered by each JR.

: Population figure is an estimate as of October 1991 based on the national census.

**Table IV-2: Electrification and Double Tracking\* for JRs**  
(Percent)

	Electrification		Double Tracking	
	April 1987	March 1993	April 1987	March 1993
Hokkaido	9.5	16.5	18.7	25.5
Shikoku	6.4	27.5	3.9	6.1
Kyushu	45.2	52.0	21.7	24.4
East	(65.4) 69.2	(70.3) 73.6	(47.7) 53.4	(49.4) 55.1
Center	(67.0) 76.1	(62.1) 72.6	(46.0) 60.9	(42.5) 58.4
West	(50.0) 52.5	(53.2) 59.1	(32.1) 40.3	(36.4) 44.5
Total	(47.5) 52.5	(53.5) 58.2	(33.9) 40.1	(37.3) 43.6

Source: Ministry of Transport, *Tetsudo Yoran (Railroad Almanac)*.

Figures in ( ) exclude Shinkansen lines. \* Double Tracking includes double tracking and more than double tracking.

**Table IV-3: Average Trip Distance by Rail (FY 1992)**  
(km/trip)

		Average	Pass*	Non-Pass
JRs	Trunk	56.2	23.8	101.1
	<i>Bullet Train</i>	264.2	87.6	278.5
	<i>Others</i>	32.1	22.9	48.4
	Metropolitan	14.6	15.9	12.2
	Other Local	17.3	13.2	25.2
PRs	Metropolitan	11.2	11.9	9.9
	<i>Subway</i>	6.7	7.5	5.5
	<i>Others</i>	13.7	14.2	12.8
	Other Local	9.0	8.5	9.5

Source: Ministry of Transport, *Tetsudo Yuso Tokei Nenpo (Railway Traffic Statistics Annual)*.

Note: \*Pass represents commuter pass passengers. Trunk represents all the trunk lines outside the metropolitan area.

ected more significantly by the level of business activities rather than by that of household sector activities.

4.6 In this category of travel, air is the strong competitor for railroad. The competitive advantage between the air and the railroad can be summarized as follows;

1. The railroad is competitive, if the difference of the travel time required by railroad and by air is less than 150 minutes (eg., three hours forty minutes by bullet train, and one hour and twenty minutes by air).
2. The air is competitive, if the difference of the travel time required by railroad and by air is larger than 200 minutes.

#### *Passenger Market in Metropolitan Areas*

4.7 Passengers in the metropolitan area are dominated by passengers with commuting purposes, i.e., business men and women and students. The share of commuter pass passengers is about two thirds both for the JRs and for the railroad as a whole. Although the purpose of travel by the passengers with a commuting pass is not necessarily its genuine purpose, a large share of the passengers with a commuting pass ensures that the railroad demand in the metropolitan area can be much more stable than that for long distance travel by railroad.

#### *Freight Market*

4.8 Road (truck) is the leading mode of freight traffic in Japan, which has a share of over fifty percent in terms of ton-km. Since the freight traffic by road is mostly concentrated in a short distance traffic, its share in terms of tonnage reaches as much as ninety one percent. Although commodities transported by road have a large variety, gravel and waste

have a share of as much as forty percent in terms of total tonnage.

4.9 Since Japan is surrounded by ocean and many industrial sites are located close to a port or coastal area, ocean shipping has also been fairly common mode for long distance freight and has about forty five percent of the total freight traffic in terms of ton-km. Most of the remaining five percent is transported by railroad, and air freight has only a nominal share.

4.10 Among the railroad freight traffic, freight traffic by bulk cargoes and containers have different characteristics. Firstly, the average distance of traffic for the bulk cargoes (207 km) is much shorter than that for the containers (924 km). Secondly, lines of commodities transported are different. About 30% of the total tonnage by the bulk cargoes is for petroleum and petroleum products, about 20% for cement, and about 15% for limestone, and thus these three commodities of basic materials add up to two thirds of the total tonnage. These commodities are transported by special cargoes mostly owned by shippers. On the other hand, commodities transported by the containers are much more varied and value added, in other words, processed goods or consumer goods; about 20% for chemical products, about 16% for food products, and about 12% for textile and agricultural products respectively.

4.11 Competition and shares among the modes of freight traffic in Japan are summarized as follows;

1. Truck (freight traffic by road) is the dominant (over 50%) mode of freight traffic with a distance of less than 500 km, but with a distance of over 1,000 km, the share of truck is decreased to only about 20 percent. In other words, 88 percent of the total tonnage by truck is a traffic with a shorter distance than 100 km.

**Table IV-4: Purpose of Long Distance Travel in One Autumn Day  
(Number of Travelers/Percent)**

	Share	By Air	By Rail	By Car	By Others
Business	28.3	10.4	36.8	50.6	2.2
Sightseeing	42.7	n.a.	5.0	92.6	n.a.
Other Private	13.6	n.a.	12.7	80.4	n.a.
Others	2.8	8.1	37.6	48.1	6.2
Not Specified	12.6	n.a.	n.a.	n.a.	n.a.

Source: Moroboshi, "Kansen Ryokiyaku Katsudo no Sogo Haaku ni Kansuru Chosa (Research on the Trunk Traffic for Passengers),"

Japan Port & Harbor Association, Kowan, March 1993

Period of Research: FY 1990 and 1991

Column "Share" indicates the share of travelers with each purpose of travel in the total number of travelers.

Column "By Air", "By Rail" and so on indicate the share of travelers by each traffic mode in the specific purpose of travel.

"n.a." in the table indicates that data is not available or that the figure is negligible.

2. For a traffic with a distance of over 500 km, the total traffic by railroad and marine exceeds that by road in terms of tonnage. Among railroad and marine, traffic by marine forms is always much larger than that by railroad, as much as ten times of that by railroad. Thus railroad for the long distance freight traffic, which is dominated by containers, is no more than a marginal carrier which has a competitiveness only for the inland traffic.

4.12 By origin and destination of traffic, railroad has a relatively higher share in the traffic to and from Hokkaido, Niigata, and Tohoku regions.

Since Hokkaido is a northern island isolated by road network, the share of road is less than nine percent. Although Niigata is located adjacent to a big market of Kanto area, the distance between these two regions by ocean route is much longer than that by railroad, and thus the marine traffic between these two regions has only a nominal share. Those geographic conditions partly determine the advantage of the railroad traffic.

4.13 In the case of commodities transported a long-distance (except for ocean shipping), railroad container freight has a majority share only for textile products. All the other commodity transported is dominated by a road traffic. Especially for

**Table IV-5: Share of Commuter Pass Passengers in Metropolitan Areas in FY 1990 (Percentage)**

	All Railways	JRs
Tokyo Area	65.4	66.0
Nagoya Area	56.6	43.6
Osaka Area	61.2	63.6
Three Area Total	63.8	64.6

Source: Institute of Transportation Economics, *Toshi Kotsu Nenpo (Metropolitan Traffic Annual)*.

**Table IV-6: Freight Traffic Share by Mode and by Distance (FY 1991) (Thousand tons, km)**

Distance (km)	Total	JR Freight		Truck*	Marine	Total
		Container	Bulk			
1 - 100	15,421	103	15,313	5,395,351	135,387	5,546,159
101 - 200	11,986	273	11,713	336,933	75,987	424,906
201 - 300	5,921	433	5,488	135,407	53,389	194,717
301 - 400	2,978	1,439	1,539	78,658	53,424	135,060
401 - 500	2,276	1,249	1,027	50,582	48,276	101,134
501 - 1,000	10,893	8,846	2,047	96,916	124,599	232,408
1,001 -	8,826	8,213	613	19,718	68,965	97,509
Total	58,301	20,561	37,740	6,113,565	560,027	6,731,893
Ave. Dist.	465	924	207	45	434	81

Source: Institute of Transportation Economics, *Unyu to Keizai (Transportation & Economy)*, September 1993. *Kotsu Kyokai (Transport Association)*, *Kotsu Nenpo (Traffic Annual)*.

**Table IV-7: Long Distance Freight Traffic by Road and Rail and by Commodity (Data in FY 1990) (Thousand ton, %)**

	Total	Truck	Container	Share of container
Mining Products	122	65	57	46.7
Wood Products	197	160	37	18.8
Agricultural Products	1,027	780	247	24.1
Chemical products	1,047	648	399	38.1
Machinery Products	1,292	1,159	133	10.3
Food Products	904	576	328	36.3
Textile Products	299	80	219	73.2
Other Products	1,909	1,783	126	6.6
Others	2,598	2,123	475	18.3
Total	9,395	7,374	2,021	21.5

Source: Ministry of Transport, *Kamotsu Chūki Ryūdo Chosa, Ryōkyaku Chūki Ryūdo Chosa (Inter Area Freight and Passenger Traffic Statistics)*. Data for "Truck" is arbitrary calculated based on the distance between regions. Other Products include iron and steel, paper and pulp, and so on.

machinery products and other products, the railroad has only a nominal share. Those may be the potential categories of commodities for the modal shift from the road traffic to the railroad traffic. Nevertheless such service qualities as frequency and flexibility of traffic schedule are important considerations for the choice of mode of traffic.

### *Passenger Traffic*

#### *Demand Elasticity of Traffic*

4.14 Passenger traffic demand in Japan shows several features. Firstly the demand during the second half of 1980's grew much more rapidly than the general economy; the demand elasticity to the GNP reaches as high as two, which is quite high compared to those of the other periods. The other feature is the stable elasticity of demand for the PRs throughout the period. Since most of the PRs operate in the metropolitan areas, the demand for the PRs is mostly concentrated on the commuting and daily traffic which may not fluctuate much throughout the period. On the contrary, since the JRs rely much more on the long distance travel, the demand for the JRs is much more vulnerable to the change of economy, business activities, and the people's taste for the leisure time. The demand for the bullet trains seems to be a typical example for the long distance travel, even though its operation result may be overstated because of its constant development throughout the period. Other JRs than the bullet trains have recovered only to the level of the PRs even during this prosperous period.

#### *Long Distance Passenger Traffic*

4.15 During the second half of 1980's, the Japanese economy has grown rapidly. Both the business sector and the household sector have expanded their expenditure significantly. The real private final consumption expenditure (in the National Accounts) has grown by 4.4 percent per year on average. In addition, two days off a week has become much popular business custom and the free time has increased for many Japanese. Owing to these income and time factors, the long distance travel during the period has increased rapidly.

4.16 Among three major modes of traffic, air and road have achieved a remarkable growth. The success of road traffic is attributed to 1) development of highways, 2) increase of the ownership of private cars, and 3) decrease of the real gasoline prices, on top of those factors mentioned above. As for air, the average air fare has been decreased even

in nominal term during this period, by abolishing the Passenger's Tax of 10% (net of about 6.5% decrease together with the introduction of the Consumption Tax of 3%) since April 1989 and by introducing various discount tickets since FY 1990, resulting in the decrease of about 17% in real term compared to that in ten years ago. Therefore travel by air has also increased significantly by 9.5 percent per year. Travel by railroad has also achieved a good result of 4.9 percent growth per year during this period.

4.17 After the strong economic growth period, the increase of free time and impetus for leisure has also been saturated and thus the long distance travel has recently stagnated.

#### *Passenger Traffic in Metropolitan Area*

4.18 During the second half of 1980's, passenger traffic in the metropolitan area has also been increasing with a fairly strong pace of 3.7 percent per year, if not so strong as the long distance travel. Among the modes of traffic, travel by private cars have increased with a marvelous pace of 7.0 percent per year, supported by the increase of the ownership of private cars and the decrease of gasoline prices. Except for the private cars, the JRs achieved a better performance than any other competitors.

4.19 Passenger-km data also support the good results for the JRs during this period. Owing to the efforts by the JRs and thus the improvement of their competitiveness among the railroad traffic, the JRs have achieved strong success during FY 1987 to 1992 in the metropolitan market, compared both to the PRs and to the subways. The success by the JRs is attributable both to the increase of number of travelers and to the average trip distance by travelers. Due to the spread of the metropolitan area and thus the expansion of commuting distance, the average trip distance by metropolitan residents has been expanded during this period. In this regard, the JRs have captured this expansion effect most successfully.

### *Freight Traffic*

4.20 Freight traffic in Japan has been characterized by a huge share, about fifty percent, of traffic by marine forms throughout the period, owing to its geographic condition. Within the remaining half of the traffic, share has shifted from the railroad to road traffic.

#### *Long Term Review on the Freight Traffic*

4.21 During the period of early 1980's, even the total freight traffic declined and truck traffic in-

**Table IV-8: Passenger Traffic Demand (Passenger-km) Elasticity of Private Final Consumption Expenditures**

FY	Total*	Railroad	JRs**	Bullet	Other JRs**	PRs
'75 - '80	0.525	-0.169	-0.660	-1.587	-0.404	0.611
'80 - '85	0.669	0.323	0.150	1.221	-0.221	0.581
'85 - '90	1.877	0.820	0.936	1.637	0.630	0.635

Data Source: Economic Planning Agency, Annual Report on National Accounts, Ministry of Transport, White Paper on Transport.

\* Total indicates all modes of traffic.

\*\* JRs before 1987 is JNR.

**Table IV-9: Traffic Distance of Passenger (Billion Passenger-km, cars per day)**

	1987	1988	1989	1990	1991	1992	1992/1987
Rail	95.3	103.2	103.9	112.4	116.4	114.8	1.205
Air	38.5	41.1	47.1	51.6	55.4	56.7	1.473
Highway*	n.a.	54.7	n.a.	91.7	n.a.	n.a.	n.a.
Highway**	3,525	3,894	4,220	4,550	4,701	4,917	1.395

Source: Data for Rail are "Trunk Line outside of metropolitan area" traffic data except for commuter pass passengers, Ministry of Transport, Tetsudo Yuso Tokei Nenpo (Railway Traffic Statistics Annual). Data for Air: Kotsu Kyokai (Transport Association), Kotsu Nenkan (Traffic Annual). Data for Highway\* are in billion passenger-km, including drivers of trucks, Miyaoka and Kato, Heisei 2 Nendo Doro Kotsu Sensasu ni Miru Kosoku Doro no Riyo Jintai, Express Highway Research Foundation of Japan, Kosoku Doro to Jidosha (Expressways and Automobiles), May 1990. Data for Highway\*\* are in cars per day in highways and toll roads, Japan Road Public Corporation.

**Table IV-10: Metropolitan Traffic by Mode (Million Passengers)**

	1985	1986	1987	1988	1989	1990	1990/1985
Railroad	16,523	16,966	17,311	18,047	18,436	18,974	1.148
JRs	5,556	5,730	5,907	6,213	6,307	6,608	1.189
PRs	7,318	7,483	7,620	7,799	7,975	8,089	1.105
Subways	3,649	3,753	3,784	4,035	4,154	4,277	1.172
Tram	113	112	108	110	109	110	0.973
Bus	3,576	3,558	3,567	3,583	3,577	3,605	1.008
Taxi	1,482	1,504	1,524	1,544	1,511	1,412	0.952
Car	9,689	9,863	11,015	12,197	13,455	13,590	1.403
Total	31,384	32,002	33,525	35,481	37,089	37,691	1.201

Source: Institute of Transportation Economics, *Toshi Kotsu Nenpo (Metropolitan Traffic Annual)*.

Note: Metropolitan here indicates Tokyo, Osaka, and Nagoya metropolitan areas.

**Table IV-11: Railroad Traffic in Metropolitan\* Areas (Billion Passenger-km, km per Trip)**

	Traffic			Trip Distance	
	1987	1992	1992/1987	1987	1992
JRs	70.8	88.5	1.249	14.0	14.6
PRs	108.3	116.9	1.079	13.8	13.7
Subways	28.2	31.6	1.123	6.7	6.7
Total	207.3	237.0	1.143	12.1	12.3

Source: Ministry of Transport, Tetsudo Yuso Tokei Nenpo (Railway Traffic Statistics Annual).

Note: \*Metropolitan here indicates such big city areas as Tokyo, Osaka, Nagoya, and other cities with a population of over one million.

**Table IV-12 Share of Freight Traffic by Mode (Million ton-km, %)**

FY	Total	JR	PRs	Truck	Marine	Air
1965	186,346	30.3	0.5	26.0	43.3	0.0
1970	350,656	17.8	0.3	38.8	43.1	0.0
1975	360,490	12.8	0.2	36.0	50.9	0.0
1980	438,792	8.4	0.2	40.8	50.6	0.1
1985	434,160	4.9	0.1	47.4	47.4	0.1
1990	546,785	4.9	0.1	50.2	44.7	0.1

Source: Ministry of Transport, White Paper on Transport.

creased less than the total economic activities. The reason for this weak demand can be attributed to, 1) outsourcing of bulky materials from abroad, 2) product shift to lighter, smaller one with a higher value added, 3) efficiency improvement of distribution and delivery system, and 4) increasing share of service industry in the whole economic activities. Although many of these factors seems to be effective throughout the recent years, the elasticity figure during the second half of 1980's does not confirm it and the freight traffic has started to jump again in the second half of 1980's.

4.22 Railroad freight traffic in Japan has constantly reduced its volume of transport and also its share among modes of traffic up to the first half of 1980's. Besides JNR management problems, changes in lines of commodities and of distribution system in Japan caused the decline of railroad freight traffic during this period. Plasticization and diversification of commodities provides advantage for the traffic by road and by container. As for the distribution system, high quality of service has been required to accord with a "Just-on-Time" system of producers. These changes have promoted downsizing of orders and promptness and certainty of delivery, and consequently incurred the decline of railroad freight.

#### *Recent Development of the Railroad Freight Competitiveness*

4.23 During the second half of 1980's, total freight traffic increased faster than the economic growth. Railroad freight traffic, which had been constantly declining, had started increasing once again by an almost parallel pace with the real GNP growth during this period. On top of the favorable economic situation, the shortage of truck drivers and the congestion on road had encouraged some freight traffic shifting from road to railroad.

4.24 In addition, in order to accord with the changes in the business environment, marshaling yards were abandoned and instead traffic centers were established in February 1984. Furthermore the traffic centers have also been abandoned since

November 1986 and all the railroad freight service has been converted into the direct services. And as the railroad has concentrated its investment strategy on containers and intermodal facilities, most of the traffic increase for the railroad freight has come from the traffic by containers, not by bulk cargoes.

4.25 Nevertheless the competitiveness of railroad freight traffic has improved by uneven amounts among regions.

4.26 In terms of origin of freight traffic, railroad has achieved an impressive increase in its competitiveness from Shikoku, owing to the inauguration of the railroad bridge between the Shikoku island and the Honshu (Seto Ohashi) in April 1988. Next largest success for railroad is the traffic from Niigata, for which the total traffic has decreased, whereas the railroad traffic has kept increasing. The decrease of freight traffic from Niigata is attributable to the traffic shift from Niigata to Hokuriku which is adjacent to Niigata, owing to the start in full service of Hokuriku Highway in July 1988 which connects the Hokuriku area with Chubu and Kinki areas. On the contrary, this results in the loss of railroad competitiveness in the traffic from Hokuriku.

4.27 In terms of destination of traffic, Shikoku is also the big winner for railroad freight. Same as the traffic by origin, Niigata is the second success for railroad. Contrary to the traffic by origin, railroad has gained its competitiveness in the freight traffic to Hokkaido, owing to the inauguration of the "Seikan Tunnel" in March 1988 which connects the Hokkaido island with the Honshu.

#### *Comparison of Performance between JR's and Private Railways*

4.28 Few people dispute the success of JNR's restructuring. Efficiency gains of new railway entities compared with the old JNR are analyzed in detail in the World Bank publication "Japanese National Railways Privatization Study." However, the question remains as for to what extent JR's are operating efficiently in comparison with private

**Table IV-13 Freight Traffic Demand (Ton-km) Elasticity of Real GNP**

	Total	JR Freight	Truck
'70 - '75	0.139	-1.766	-0.243
'75 - '80	0.902	-1.323	1.390
'80 - '85	-0.063	-4.192	0.771
'85 - '90	1.019	0.985	1.232

Sources: Economic Planning Agency, *Annual Report on National Accounts*, Ministry of Transport, *White Paper on Transport*.

Table IV-14: Competitive Indicator of Railroad Freight by Area (1987 to 1991)

		Destination of Traffic										
		Area	Hokkaido	Tohoku	Kanto	Niigata	Hokuriku	Chubu	Kinki	Chugoku	Shikoku	Kyushu
Origin of Traffic	Hokkaido		45	-23	40	38	24	-57				-5
	Tohoku	1		-14	1	-59	-29	4	37	-54		-6
	Kanto	16	6		57		15	17	-12		2	19
	Niigata	3	48	47		-22	1	25			9	27
	Hokuriku	19		19	24		-419	-103	30		-103	-129
	Chubu		14	10		-1		12	24	8	26	19
	Kinki		44	20	43	-58	-13		40		29	16
	Chugoku	14	29	-29		25	8	-8			-21	1
	Shikoku		30		-14	12		10	38		-12	
	Kyushu		40	19	13	27	37	-22	-2	36		16
Total	34	19	5	39	-4	-8	4	25		23	9	

Data Source: Ministry of Transport, *Kamotsu Chiiki Ryudo Chosa, Ryokiyaku Chiiki Ryudo Chosa (Inter Area Freight and Passenger Traffic Statistics)*.

Notes: • Competitiveness indicator is the difference between the increase rates of freight traffic in tonnage by railroad and that by the total modes of traffic. Years of data used are FY 1987 and 1991.

- Traffic within these areas is neglected, because these distances are too short to use the railroad freight.
- Competitive indicator suggests

	: more than 50
	: between 0 and 50
	: less than 0

railway companies. In Japan, in addition to JRs, there is a large number of private railway companies. Among these private companies, the largest 15 companies (in terms of capital, route length and passengers) are referred to as the Large Private Railways (Large PRs). The achievement of management on a par with the Large PRs was one of the guidelines of the JNR privatization. In this section, following a brief outline of the Large PRs, we consider the effects of JNR privatization by comparing the JRs to the Large PRs. The data in 1991, the year when detailed data is available, is used in this chapter unless otherwise specified. Later, in Chapter V, an attempt is made to establish the methodology of economic approach using regression analysis on this topic, taking into account the network condition and service output.

#### *Large Private Railways*

4.29 The names of the 15 Large PRs by region are: *Tokyo Area (8 Railway Companies):* Tobu Railway, Seibu Railway, Keisei Electric Railway, Keio Teito Electric Railway, Odakyu Electric Railway, Tokyu Corp., Keihin Electric Express Railway, Sagami Railway.

*Osaka Area (5 Railway Companies):* Kinki Nippon Railway, Nankai Electric Railway, Keihan Electric Railway, Hankyu Corp., Hanshin Electric Railway.

*Nagoya Area (1 Railway Companies):* Nagoya Railroad

*Fukuoka (1 Railway Companies):* Nishi-Nippon Railroad

#### *History of the PRs in Japan*

4.30 The first private railway (Nihon Tetsudo) opened between Ueno and Kumagawa in 1883, 11 years after the inauguration of the first state-owned railway, Japanese National Railway. The Meiji government, which wanted to "catch up" with industrial countries in Europe and America, promoted the construction of transportation network. Since the government lacked sufficient financial resources to establish a transportation network, and because of its policy avoiding dependence on funds from overseas, it encouraged the private sector to invest in railways. Following the success of Nihon Tetsudo, private entrepreneurs constructed railways one after another. It is noticeable that the private railways at that time constructed intercity lines.

4.31 After the 1892 recession, the second boom of private railway construction began. This time

many small lines were constructed in local areas. By 1905, the route length of private railways reached 70% of total railway route length in Japan (private railways 5,231 km, public railways 2,413 km).

4.32 During the recession of the early 1900s following the Russo-Japanese War, these small private railways faced bankruptcy. At the same time the Japanese military became convinced of the railway's strategic importance and lobbied strongly for the nationalization. In 1906, a railway nationalization act was passed due to the financial problems of small private railways and military considerations in spite of the opposition of many private operators. After that, the main intercity railways were operated by state-owned railways, managed by the Ministry of Railways, and private railways were limited to urban and local railway transportation.

4.33 During the Taisho era (from 1912 to 1926), as the population grew rapidly in the centers and suburbs of large metropolitan areas such as Tokyo and Osaka, the demand of private railways increased as the agent of innercity commuter transportation. However, the recession in the beginning of the Showa era (from 1926) and the spread of bus transportation brought about a reorganization of private railways. Large private railways took over small private railways. The remaining railway companies found their way into such other businesses as real estate and tourism.

4.34 After World War II, transportation demand in large cities increased sharply. Private railways reorganized and 14 large private railway companies came into existence (the number of large PRs became 15 in 1990, when Sagami Railway, classified as small private railways until then, was added to the large private railways). With high economic growth in the 1950s and 1960s, population became concentrated in large metropolitan areas. The increase in population in the suburbs of large metropolitan areas made private railways indispensable as high-speed mass transportation system. In addition, the population increase gave private railway companies opportunities to participate in side-businesses such as real estate development, because housing demand increased along private railway lines and private railways sold off the land and residences which they developed. They also opened department stores and amusement facilities in front of the stations, which boosted the advantages of private railway lines.

Tokyo Area Railway Network Map

Chart IV-1 Railway Network in Tokyo Area

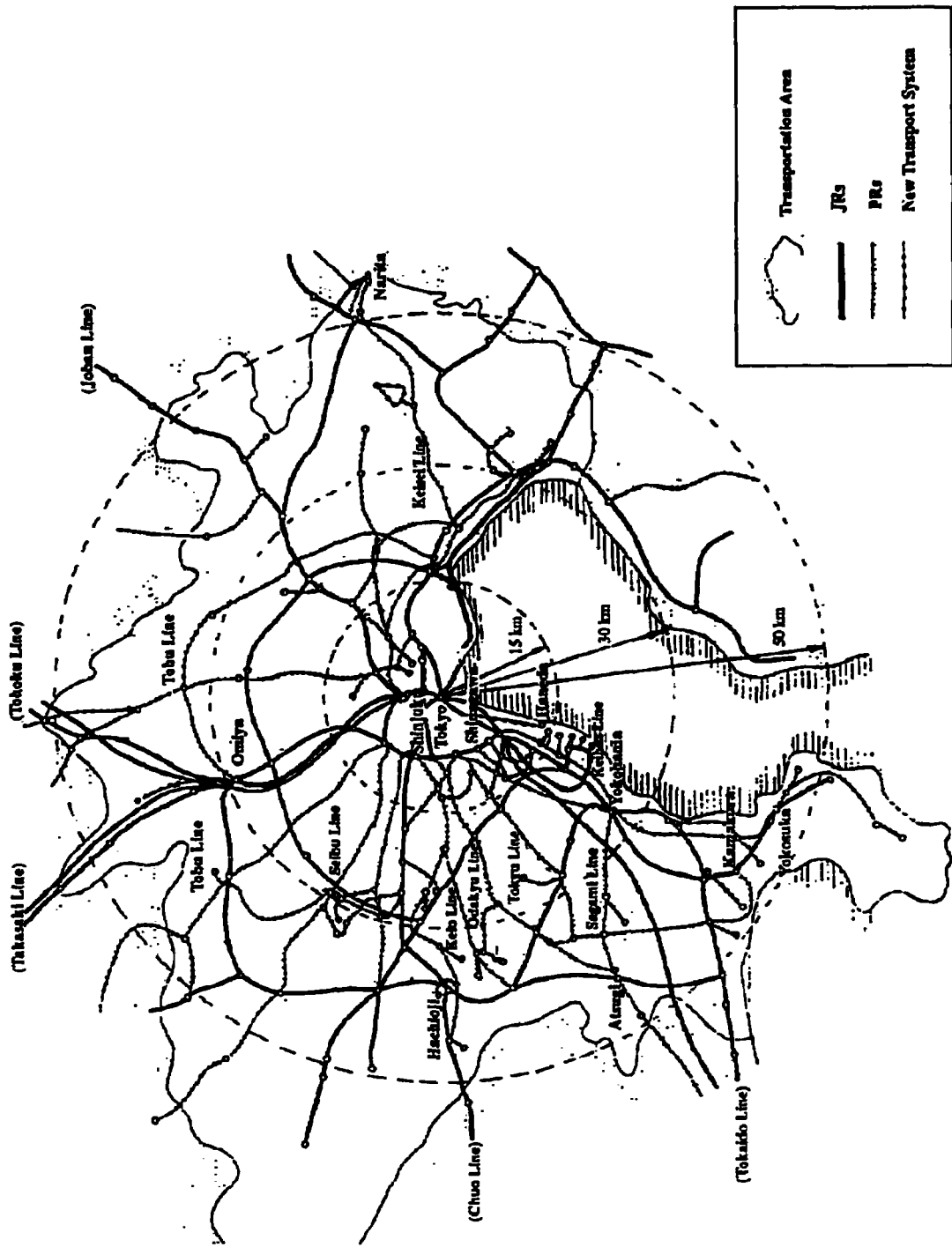
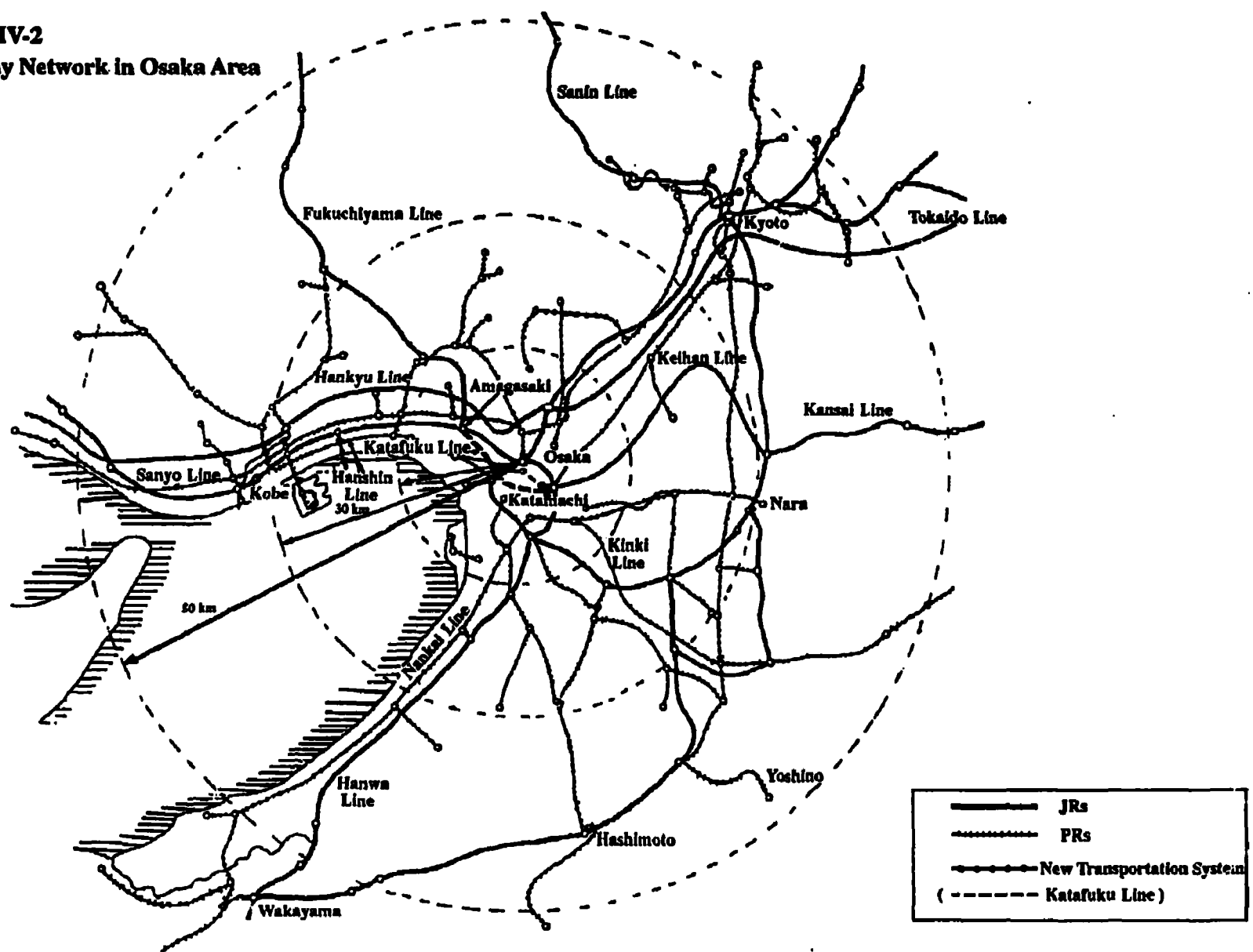


Chart IV-2  
Railway Network in Osaka Area



4.35 After the oil crisis of the mid 1970s and the end of high economic growth, the situation changed. Population growth in metropolitan areas slowed. Furthermore, with the end of the land development boom, private railways have not earned profits from real estate development as much as they once did.

4.36 In 1987 Japanese National Railways was privatized and once again the private sector came to operate most of the railways in Japan.

#### *Characteristics of PRs*

4.37 The Large PRs mainly transport people commuting to work and school in the three main metropolitan areas (the Tokyo, Osaka and Nagoya areas) and Fukuoka, where the population density is high. In the three main metropolitan areas, the share of passengers transported by the private railways is greater than that of the JRs. As the major transporter in the large cities, the Large PRs have maintained relatively steady profits. The Large PRs receive no subsidy for their railway operation.

4.38 The Large PRs have actively moved into many other areas of business besides railways. The amount of revenue earned by such activities averages 50% of total revenue. These diversified business activities include bus operation, housing and real estate development, the rental of office buildings, tourism and leisure, and other businesses. Diversified business related those living close to the railway is mutually complementary to their railway business, shaping the growth of the private railway companies. The Large PRs also create separate companies to implement their diversified policies, and the group of these companies forms conglomerate.

The consolidated sale of the Large PRs is two to three times as much as that of parent companies based on the consolidated financial statements, and would be more than that if including group companies not covered in consolidated financial statements.

4.39 Fares are regulated by the fare regulatory system, leading to rigidity of revenue flow in the railway business. Its profitability is strongly affected by the timing and size of fare increases. In the context of such negative aspects of the railway business, the diversified business sector gives the Large PRs stable earnings. For example, in the case of development of such areas along the railway tracks through the selling off of real estate, the companies themselves have been able to regulate the amount of land and residences sold, and hence the flow of revenue and profit. Many of the Large PRs increase the selling off of land when railway business is poor, and restrict it when conditions improve. Thus they have been able to ensure a steady flow of profit available for dividends over each fiscal year. However, because the supplements that can be obtained from the real estate business are limited, their profitability has begun to decline recently.

4.40 As a result of the lack of available land and increasing construction costs in the large cities, the Large PRs have made few additions or extensions to their current train lines. Rather the Large PRs concentrate on the investment for quadruple tracking and other capacity expansions to relief the congestion in metropolitan lines.

4.41 The Large PRs are all listed companies. In addition, apart from the Large PRs, there are also

**Table IV-15: Diversified Business**  
(¥ Billion)

Fiscal Year		Honshu JRs		Large PRs	
		1987	1991	1987	1991
Railway*	Revenue	3,191	3,891	921	1,110
	Profit	429	754	135	147
Bus	Revenue	29	-	241	259
	Profit	-7	-	0	-6
Real Estate	Revenue	-	-	363	506
	Profit	-	-	126	205
Others	Revenue	23	93	280	408
	Profit	17	16	5	4
Total	Revenue	3,192	3,984	1,805	2,284
	Profit	439	770	266	351

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

Note: Profit is operating profit.

\* Railway Operating Revenue: Fare revenue and other revenue, not included subsidies. Railway Operating Expenditure: Labor, energy, repair, miscellaneous expenses, tax (not included corporate tax) and depreciation.

several other private railway companies listed on the stock exchange. Thus the private railways in Japan have firm basis, as one of the leading companies, in their own business areas.

#### Financial Performance

4.42 In fiscal 1991, the operating revenue for the Large Private Railway Companies came to ¥2.3 trillion. Operating profit was ¥351 billion, and current profit was ¥125 billion. If we disaggregate the ¥351 billion operating profit, we see that ¥147 billion, 42% of total operating profit, is derived from the railway business, while ¥205 billion, 58%, comes from the real estate business. Thus profit from the real estate business clearly exceeds that of the railway business. The ratio of current profit to total sales is 5.5%, higher than both the average for

all Japanese industry (3.0%) and for all manufacturing industry (4.3%). For the railway business, the ratio is roughly equivalent to the all industry average at 3.2%. However, the ratio for the other business areas is high (7.6%), boosting the Large PRs' overall profit ratio. Regarding these estimates, data for operating revenue and expenditure of railroad sector are public. Non-operating revenue and expenditure of railroad sector are calculated by multiplying total non-operating revenue and expenditure, which are released publicly in financial statements, by the ratio of the railway fixed assets to total fixed assets.

4.43 Profit and loss in the railway business are strongly related to changes in fare prices. In fiscal 1991, the operating profit of the railway sector was ¥147 billion. However, due to the fact that 13 of

**Table IV-16: Profit and Loss of the Large Private Railway Companies**  
(¥ Billion, Percent)

Fiscal Year	1987	1988	1989	1990	1991	1992
Operating Revenue	1,805	1,908	2,031	2,186	2,284	2,329
Operating Expenditure	1,540	1,614	1,738	1,864	1,932	1,990
Operating Profit/Loss	265	294	293	322	351	339
(Ratio of Profit to Revenue)	(14.7)	(15.4)	(14.4)	(14.7)	(15.4)	(14.6)
Non-Operating Revenue	67	67	85	98	102	99
Non-Operating Expenditure	231	231	241	297	329	318
Current Profit/Loss	101	130	136	123	125	119
Extraordinary	-3	-17	-20	-9	4	-2
Revenue/Expenditure						
Corporate Taxes	51	57	57	51	64	55
Net Profit/Loss	47	56	60	63	65	62

Source: Ministry of Transport, *Tetsudo Tokei Nenpo* (Annual Railways Statistics).

**Table IV-17 Operating Profit of the Large PRs: Railroad Sector and Other Sectors**  
(¥ Billion)

Fiscal Year	1988	1989	1990	1991	1992
Railway	159	143	135	147	193
Others	135	151	188	204	146
Total	294	293	322	351	339

Sources: Ministry of Transport, *Tetsudo Tokei Nenpo* (Annual Railways Statistics).

1992: Private Railway Companies

**Table IV-18: Scale of Railway Business**

		Honshu JRs *	Large PRs **
Route-km ***	(km)	14,545	2,870
Passenger	(million persons)	8,199	8,009
Passenger-km	(billion person-km)	231.8	112.7
Traffic Share	(percent)	17.4	8.5

Sources: Ministry of Transport, *Tetsudo Tokei Nenpo* (Annual Railways Statistics), Institute of Transportation Economics, *Suiji de Miru Tetsudo '93* (Rail Face Book '93).

\* Honshu JRs: The total of the three JR companies located on Honshu (mainland Japan)

\*\* Large PRs: The total of the fifteen large private railway companies

\*\*\* Route-km: One way, non-duplicating total kilometers

Note: The figures are in 1991

the 15 Large PRs raised their prices in 1991, the operating profit for fiscal 1992 jumped to ¥193 billion. As costs tend to rise in the long term, the Large PR's income from their railway business tends to realize continuously declining profits in the periods following price adjustments. The railway business, strongly influenced by changes in fare prices, is compensated for by other areas of side business, especially real estate. The following shows the trend of operating profit of the Large PRs. In 1989 and 1991 when the operating profit of railroad sector declined, operating profits of non-railroad sectors, almost all of which is contributed by real estate, increased. However, in 1992 when the operating profit of railroad sector rose, operating profits of the non-railway sectors decreased.

4.44 As mentioned above, in the long term, the stable railway business and the complementary nature of the other side businesses of the Large PRs have meant they have been able to realize stable dividends of between 8-10% in each period. However, their profitability has begun to decline recently because the supplements that can be obtained from the real estate business are limited.

#### *Issues Concerning the Large PRs*

4.45 As discussed above, the Large PRs have a long history as an important transportation system for people living in the metropolitan cities, developing in line with their needs. The scale and growth of Japan's Large PRs is unique among the private railways throughout the world's large cities. However, the Large PRs are presently faced with a difficult situation: Over-congestion during peak period is serious in metropolitan railways, especially in the Tokyo area. Many PRs in the Tokyo area carry twice as many passengers as they are designed for. This problem requires heavy investment in order to relief the congestion and to quicker transportation through such measures as quadruple tracking. However, due to the residential crowding in Tokyo, the acquisition of land for such quadruple tracking has proven difficult. Moreover, the rise in land prices in the inner city has meant that immense sums of money to finance such construction are required.

4.46 In order to promote quadruple tracking and other such large-scale investment by private railway companies within the metropolitan area, a new investment-promoting system was established by the government in 1986. Under this system, construction is partially financed in advance by an

increase in fares, the extra proceeds from which are retained free of tax by the company concerned and allocated to such projects. On completion of the project (completion must be within 10 years) the fund is dismantled over a period of ten years, and in the end the money gained from this returned to the users. While the funds allocated are restricted to 25% of the cost of the project and must eventually be returned to the users, it makes possible the raising of interest free funds. At present, of the Large PRs, 5 companies (Tobu, Seibu, Keio, Odakyu and Tokyu) are using this system. In FY 1994 the amount of loans is expected to increase from 25% of the project cost to 50%, and the target of projects to include new line construction.

#### *Comparison between Honshu JRs and Large PRs*

4.47 In this section performance is compared between the three Honshu JRs (JR East Japan, JR Central Japan and JR West Japan) and the fifteen Large PRs in order to assess the effect of JNR's privatization. In the case of JRs the three Honshu JRs are selected from the 6 JR passenger companies, because their operating areas are mainly confined to the three major metropolitan areas and coincides with the Large PRs. The sum of the three Honshu JRs' data and the sum of the fifteen Large PRs' data are compared here. One difficulty in making a comparison between the JRs and PRs is that while the Large PRs are heavily concentrated in the major metropolitan areas, the JRs operate many local train lines. In this context, there is an obvious difference in the traffic density of the two groups, making a close comparison problematic. Because of this, we analyze the different nature of the Honshu JRs and the Large PRs, while making a comparison of the performance of the two groups following JNR's privatization.

4.48 To compare the productivity of the two groups, simple average comparison method by actual figures is used in this chapter. Later, in Chapter V, economic approach by using regression analysis is sought, which considers the difference of network and service. As a rule, the period of comparison will cover the five years between JNR's privatization in 1987, and 1991 when detailed figures (Annual Railways Statistics) were published.

#### *Basic Figures for the Honshu JRs and the Large PRs*

4.49 The total route-km of the Honshu JRs comes to 14,545 km, compared to 2,870 km for the Large PRs. The route-km of the Large PRs is small,

**Table IV-19 Characteristics of Traffic**

	Honshu JRs		Large PRs	
	FY 1987	FY 1991	FY 1987	FY 1991
Average Traveling Distance (km)	27.5	28.3	14.1	14.1
Traffic Density * (thousand persons per km)	35.4	43.5	100.2	107.3
Average Passenger per Car (persons per km)	51.9	53.5	66.3	63.4

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Traffic Density: Passenger-km per Route-km per Day

**Table IV-20: JR East Japan (1991)**

	Traffic Density (thousand persons/km)	Rail Revenue (¥ Billion)
Shinkansen	52.4	428
Conventional Line	45.1	1,290
Metropolitan	187.1	935
Local	17.2	455
Total	45.9	1,718

Source: JR East Japan

**Table IV-21: Transport Volume**

	Honshu JRs		Large PRs	
	FY 1987	FY 1991	FY 1987	FY 1991
Passenger-km (billion person-km)	191.4	231.8	104.4	112.7

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

**Table IV-22: Car Frequency**

	Honshu JRs		Large PRs	
	FY 1987	FY 1991	FY 1987	FY 1991
Car Frequency * (thousand times)	249.7	297.6	553.2	619.9
Average Car per Train (car)	8.1	7.8	5.5	5.9

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Car Frequency: Car-km per Route-km per Year

**Table IV-23: Employee per Unit**

	Honshu JRs		Large PRs	
	FY 1987	FY 1991	FY 1987	FY 1991
Rail Employee* (thousand persons)	151	134	56	56
Employee per Route-km (persons per km)	10.2	9.2	19.6	19.5
Employee per Car-km (persons per km)	40.9	31.0	35.5	31.4
Employee per Passenger-km	** (1.15)	(0.99)	(1.00)	(1.00)
Employee per Passenger-km (persons per million person-km)	0.79	0.58	0.54	0.50
	** (1.46)	(1.16)	(1.00)	(1.00)

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

Notes: In this Chapter, we compare the number of employees per unit in order to analyze labor productivity. This method is generally used in Japan. In Chapter V, the labor productivity of all JR companies is compared to Large PRs, while in this chapter that of the three Honshu JRs (JR East, JR Central and JR West) is analyzed.

\* Rail Employee: permanent employee, not included part-time employee

\*\* The figures in parenthesis is the ratio to the figures for the Large PRs

reaching only 20% of the Honshu JRs. The reason that the route-km of the Large PRs is short relative to the Honshu JRs is that while the private railways' main train lines are within the large cities, the JRs' train lines are a combination of innercity routes, intercity trunk routes and local line routes.

4.50 The number of passengers carried per year by both the Honshu JRs and Large PRs comes to 8 billion. However, in terms of passenger-km, the Large PRs carried 113 billion, not even half of Honshu JRs' figure (232 billion). Longer traveling distance per passenger for the JRs than that for the Large PRs contributed to this difference.

4.51 As a share of total domestic transport services (in terms of passenger-km), the railways as a whole hold 30.1%, 17.4% of which is held by the Honshu JRs, and 8.5% by the Large PRs. In the three major metropolitan areas, the railways' share is considerably higher at 50.6%, reflecting the importance of its function as means of transportation for the residents of the large cities. The average number of passengers transported per day by the private railways (including small private railways) totals 22 million people, 21.5% of all transportation in the large cities. In these large cities, the share of passengers transported by private railways is greater than that of the JRs (17.5%).

4.52 The average trip distance of passenger is longer for JRs (Honshu JRs: 28 km, Large PRs: 14 km). This reflects the situation described above where the Large PRs are concentrated within cities, while the JRs serve those traveling between cities, making traveling distance per passenger much longer.

4.53 The traffic density (the passenger-km per route-km per day) of the Honshu JRs is low, only 40% of the figure of the Large PRs, owing to the fact that the JRs have many local train lines while the Large PRs serve mainly inner city commuters (Large PRs: 107 thousand persons per km, JRs: 44 thousand persons per km). If we divide JR East Japan's conventional lines into those within the Tokyo metropolitan area and local lines, the metropolitan lines have a traffic density of 187 thousand persons per km, a level similar to that of the 8 Large PRs in the Tokyo area (153 thousand persons per km), while for the local lines the figure is very low at 17 thousand persons per km. Because of the local lines, the traffic density of JR East Japan is lower than that of the Large PRs.

4.54 In terms of the average number of passengers per car-km, the figure for the Large PRs is also

higher than that for the Honshu JRs (Honshu JRs: 54 persons per km, Large PRs: 63 persons per km). [Comparison over the period from 1987 to 1991]

#### *Transport Volume*

4.55 The number of passengers the Honshu JRs carried has grown from 191 billion person-km in 1987 to 232 billion person-km in 1991, at an average rate of 4.9% over the 5 year period. This growth rate is higher than that of the Large PRs (from 104 billion person-km to 113 billion person-km, 1.9% increase per year).

#### *Improvement in Service*

4.56 The Honshu JRs' frequency of car operation (car-km per route-km) is low compared to that of the Large PRs and the average number of cars connected to form one train tends to be high. In response to the increase in transport volume over the 5 year period, however, while the Honshu JRs have decreased the average number of cars per train (from 8.1 cars per train in 1987 to 7.8 cars per train in 1991), they have increased their car frequency (car-km per route-km) by 19% (from 250 thousand times in 1987 to 298 thousand times in 1991). In comparison, the response of the Large PRs was to increase not only the car frequency (by 12%) but also the number of cars per train (from 5.5 cars per train in 1987 to 5.9 cars per train in 1991) during this period. The increase in car frequency can be seen as an improvement in passenger service, further increasing transport demand.

#### *Number of Employees per Unit*

4.57 The Honshu JRs reduced the number of employees in the railroad sector during this period, resulting in a reduction of 17 thousand workers over the 5 years (from 151 thousand in 1987 to 134 thousand in 1991). The number of employees at the Large PRs was almost unchanged over the same period.

4.58 In terms of the number of employees per route-km, the figure for the Honshu JRs is below that of the Large PRs (Honshu JRs: 9.2, Large PRs: 19.5). This reflects the different nature of their respective routes; while the Honshu JRs operate innercity lines, intercity lines and local lines, the Large PRs operate only innercity lines. For example, JRs' distances between stations (average distance between stations: Honshu JRs 4.3 km, Large PRs 1.6 km) are longer than those of the Large PRs.

4.59 If we look at number of employees per car-km, in 1987, immediately after privatization, the figure of the Honshu JRs was 15% higher than that of the Large PRs. However, if we compare the two in 1991, the number had become roughly equal (Honshu JRs: from 40.9 in 1987 to 31.0 in 1991, Large PRs: from 35.5 to 31.4). The JRs' initial inferiority to the PRs in terms of employees per car-km was a result of their low car frequency, despite their low number of employees per route-km. In the 5 years following JNR's privatization, the JRs were able to increase their car frequency, while decreasing the number of employees. Thus the JRs were able to raise their labor productivity, operating their cars with a similar number of employees to that of the Large PRs.

4.60 Comparing the employees per passenger-km, the Large PRs, which operate with high traffic density, high car frequency and high average passengers per car, have a lower ratio. In this respect, their productivity is greater than that of the Honshu JRs. However, over the 5 year period, the Honshu JRs were able to increase their transport volume (passenger-km) by 21%, at the same time reducing their work force by 11%. As a result, the ratio of the Honshu JRs to the Large PRs fell from 1.46 in 1987 to 1.16 in 1991. This decline represents a shrinking of the gap in labor productivity between the JRs and the Large PRs.

4.61 In conclusion, analyzing number of employees per unit by the simple average comparison, the productivity of the Honshu JRs improved greatly in the five years following JNR's privatization and reached on a par with Large PRs in certain indicators. However, the gap between the JRs and the Large PRs still exists in employee per passenger-km, although this does not necessarily mean that JNR is less efficient. This indicator could reflect the two factors<sup>8</sup>; (a) JRs operate local lines, too, and (b) PRs have not been as eager as JNR for the expansion of transportation capacity, resulting in more crowded cars at the expense of passengers. Later in Chapter V, we compare productivity of the two by regression analysis which takes into account of the difference of network and service.

#### *Costs*

4.62 Below, we compare the cost structure of the Honshu JRs and the Large PRs. In making this comparison, it is important to bear in mind that the difference in operating conditions between the two

is reflected in the figures. In particular, the JRs operate many local lines, which, by nature, have low traffic density and therefore relatively high unit costs. In this context, a close comparison of costs between the JRs and the Large PRs suffers from the same difficulties of the productivity comparison.

#### *Cost per Passenger-km*

4.63 In terms of the average cost of transporting one passenger over one kilometer, JRs' figure is higher. Comparing 1992 in order to avoid the influence of the Shinkansen's lease fee, the Honshu JRs required ¥12.5 per passenger-km compared to ¥8.9 for the Large PRs. Breaking down costs, we can see that JRs' unit costs for personnel expenses, repair expenses and depreciation costs were higher (1991 figures). There was little differences in power expenses or the amount of tax paid.

#### *Cost per Car-km*

4.64 In terms of cost per car-km, JRs' unit cost is also higher than that of the Large PRs (Honshu JRs: ¥725 thousand, Large PRs: ¥541 thousand). However, breaking down the aggregate costs, we find that JRs unit costs for personnel and power are lower than those of the Large PRs. In the previous comparison made in terms of transporting one person over one km, the unit cost for the JRs was higher due to the low number of average passengers per car and low car frequency. However, comparing costs per car-km, which serves to exclude the difference of average passenger per car, there is a reverse in some of the items.

#### *Personnel Costs per Employee*

4.65 In the period immediately following JNR's privatization, JRs' personnel cost per employee was lower than that of the Large PRs. However, by 1991 the figure had risen to the almost same level of the Large PRs. The average age of employees was 3 years greater at the Honshu JRs (all sectors including side businesses) in 1991. While the average age rose at the JRs over the 5 year period due to the 5 year extension of retiring age, at the Large PRs it declined. A number of JR's aged workers will begin to retire 5 years later and restructuring will go on the way.

<sup>8</sup> See "Dai Toshi Ken Shitetsu no Setsubi Toshi ni Tsuite (Investment of Private Railways in Metropolitan Areas)," 1991, and "Tetsudo Unchin, Shushi to Setsubi Toshi (Railroad Fares, Profitability and Capital Investment)," 1992, by Hideki Moriya, the Japan Development Bank.

**Table IV-24: Cost per Passenger-km**

(#)

Fiscal Year	Honshu JRs			Large PRs		
	1987	1991	1992	1987	1991	1992
Operating Expenditure	14.2	13.5	12.5	7.5	8.5	8.9
Personnel Expenses	4.2	4.3	4.5	3.6	3.8	4.0
Repair Expenses	1.6	2.5	2.2	0.9	0.9	1.0
Power Expenses	0.6	0.6	0.6	0.6	0.6	0.6
Other Expenses	5.5	3.7	2.2	0.9	1.2	1.2
(Lease on Shinkansen)*	(3.7)	(1.6)	(—)	—	—	(—)
Taxes	0.3	0.4	0.5	0.4	0.4	0.5
Depreciation	1.9	2.1	2.5	1.3	1.6	1.7

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Lease on Shinkansen Expense is from the financial statements of the Shinkansen Holding Cooperation.

**Table IV-25: Cost per Car-km**

(# Thousand)

Fiscal Year	Honshu JRs		Large PRs	
	1987	1991	1987	1991
Operating Expenditure	735	725	499	541
Personnel Expenses	218	230	236	241
Repair Expenses	82	131	57	59
Power Expenses	33	32	38	36
Other Expenses	287	199	59	74
(Lease on Shinkansen)*	(193)	(83)	—	—
Taxes	14	21	25	28
Depreciation	101	111	83	103

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Lease on Shinkansen Expense is from the financial statements of the Shinkansen Holding Cooperation.

**Table IV-26 Personnel Cost and Age**

(# Million, Year)

Fiscal Year	Honshu JRs		Large PRs	
	1987	1991	1987	1991
Average Personnel Cost *	5.3	7.4	6.7	7.7
Average Age **	37.8	41.2	40.0	38.3

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics), JRs and Private Railways.

\* Average Personnel Cost = Personnel Costs/Number of Employees of Railroad Sector

\*\* All Sectors including railroad and other side businesses

**Table IV-27: Fare Rate**

(# per km)

	Honshu JRs		Large PRs	
	1987	1991	1987	1991
Pass *	6.8	6.6	5.2	5.7
	(1.31)	(1.16)	(1.00)	(1.00)
Non-Pass	21.1	22.0	14.7	16.3
	(1.44)	(1.35)	(1.00)	(1.00)
Total	15.2	15.6	8.3	9.2
	(1.83)	(1.70)	(1.00)	(1.00)

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Pass: Commuter pass passenger

Notes: Fare Rate = Passenger Revenue / Passenger-km. The figures in parenthesis is the ratio to the figures for the Large PRs

*Fare Rate*

4.66 In terms of fare rate, given by passenger revenue divided by passenger-km, the figure for the Honshu JRs is higher at 1.7 times that of the Large PRs (Honshu JRs: ¥15.6, Large PRs: ¥9.2). One of the reasons behind JRs' relatively high figure is the premium paid on express travel and the Shinkansen. In order to achieve a more suitable comparison, we look at the fare rate of commuter pass passengers. Here the figure is ¥6.6 for the Honshu JRs and ¥5.7 for the Large PRs, decreasing the difference given above to less than 1.2 times. Moreover, if we compare the figures for 1987 and 1991, we can see that the gap has been shrinking as a result of the Large PRs' fare increases.

4.67 Prior to privatization, in order to improve their revenue position, JNR implemented a series of price hikes. As a result, their fares became expensive as compared to similar lines operated by the private railways within the metropolitan areas. The increase in fares caused passengers to shift away from JNR, necessitating further fare increases and thus forming a vicious circle. Since privatization (from 1987 to 1992), the JRs have not increased their fares, apart from an increase for the introduction of the consumption tax in 1989. On the other hand, the Large PRs have raised their fares twice in

the same period, increasing fare prices by roughly 20%. As a result, the difference between the fares of the Honshu JRs and the Large PRs in urban areas has been decreasing.

4.68 Along certain lines where the JRs compete directly with the private railways, they have introduced a special fare discount system. Following the two price rises implemented by the Large PRs over the five year period, within these certain lines the JRs presently offer cheaper travel in some cases.

*Financial Performance: Operating Revenue*

4.69 The operating revenue of the Honshu JRs grew at an average rate of 5.5% annually over the five year period. This was due to the strong growth in the number of passengers (4.9% average annual growth in terms of passenger-km). For the Large PRs, the average rate of growth over the same period was 4.9% per year. This was due mainly to the effect of the increase in fares (fares increased by a yearly average of 3.4%).

*Operating Costs*

4.70 The sum of the Honshu JRs' operating and non-operating costs grew at an average annual rate of 5% through the period. The reasons behind this relatively modest growth were downsizing in

**Table IV-28: Fare Rate**

(¥)

Between	Ticket Type		1986 *	1987	1991	1992
Ueno	One Way	JRs	280	280	290	290
		PRs	230	250	260	280
Ichikawa	Pass (one month)	JRs	8,400	8,400	8,650	8,650
		PRs	8,600	9,400	9,690	10,900
Shibuya	One Way	JRs	180	200	210	210
		PRs	140	140	170	190
Kichijoji	Pass (one month)	JRs	5,400	6,000	6,180	6,180
		PRs	4,700	4,700	5,560	6,600
Shibuya	One Way	JRs	310	360	270	270
		PRs	160	160	250	270
Yokohama	Pass (one month)	JRs	9,300	10,800	8,030	8,030
		PRs	6,580	6,580	8,330	9,620
Nagoya	One Way	JRs	440	440	450	450
		PRs	430	480	490	540
Yokkaichi	Pass (one month)	JRs	13,200	13,200	13,600	13,600
		PRs	11,500	13,270	13,570	15,800
Osaka	One Way	JRs	440	440	450	450
		PRs	410	480	460	480
Nara	Pass (one month)	JRs	13,200	13,200	13,600	13,600
		PRs	11,620	13,180	13,570	15,350

Source: Institute of Transportation Economics, *Suji De Miru Tetsudo (Rail Fact Book)*.

\* JRs for 1986 are JNR.

order to curb the increase in personnel costs, a lighter debt burden due to progress in the repayment of debt inherited from JNR, and falling interest rates. Current profit grew from ¥170 billion in fiscal 1987 to ¥293 billion in fiscal 1991. On the other hand, for the Large PRs, the sum of operating and non-operating costs grew at an average annual rate of 5.4% over the same period. The increase in depreciation costs and interest payments following such large scale investment projects as quadruple tracking were the major factors behind this growth rate. Current profit fell from ¥42

billion in fiscal 1987 to ¥26 billion in fiscal 1991 (although in fiscal 1992 it recovered to ¥81 billion as a result of the increase in fare prices).

#### *Ratio of Current Profit to Revenue*

4.71 At 7.5%, JRs' ratio of current profit to revenue in 1991 was high relative to the Large PRs (2.8%) as well as to the average of all Japanese industry (3.0%). Its ratio fell in fiscal 1991 due to lower profits caused by increased costs from the purchase of the Shinkansen line, but if we look at the five year trend it is apparent that the ratio has

**Table IV-29: Railway Profit and Loss of the Honshu JRs**  
(¥ Billion, Percent)

Fiscal Year	1987	1988	1989	1990	1991	1992
Operating Revenue *	3,139	3,361	3,483	3,746	3,891	3,899
Operating Expenditure **	2,710	2,865	3,004	3,210	3,137	2,927
Operating Profit/Loss (Ratio of Profit to Revenue)	429 (13.7)	496 (14.8)	478 (13.7)	536 (14.3)	754 (19.4)	972 (24.9)
(Ratio of Profit before Depreciation to Revenue)	(25.5)	(28.1)	(24.6)	(24.1)	(31.8)	(40.0)
Non-Operating Revenue/ Expenditure ***	-259	-259	-200	-155	-461	-705
Current Profit/Loss (Ratio of Profit to Revenue)	170 (5.4)	237 (7.1)	278 (8.0)	380 (10.2)	293 (7.5)	267 (6.8)

**Table IV-30: Railway Profit and Loss of the Large PRs**  
(¥ Billion, Percent)

Fiscal Year	1987	1988	1989	1990	1991	1992
Operating Revenue *	921	988	1,012	1,053	1,110	1,196
Operating Expenditure **	786	828	869	918	963	1,003
Operating Profit/Loss (Ratio of Profit to Revenue)	135 (14.7)	159 (16.1)	142 (14.1)	135 (12.8)	147 (13.6)	193 (16.2)
(Ratio of Profit before Depreciation to Revenue)	(28.8)	(30.4)	(29.9)	(28.9)	(30.1)	(32.1)
Non-Operating Revenue/ Expenditure ***	-94	-91	-84	-109	-116	-110
Current Profit/Loss (Ratio of Profit to Revenue)	42 (4.5)	69 (6.9)	59 (5.8)	26 (2.5)	32 (2.8)	83 (6.9)

Source: Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics).

\* Operating Revenue: Fare revenue and other revenue, not included subsidies

\*\* Operating Expenditure: Labor, energy, repair, miscellaneous expenses, tax (not included corporate tax) and depreciation

\*\*\* Non-Operating Revenue/Expenditure is estimated by multiplying total Non-Operating Revenue/Expenditure by the ratio of the railway fixed assets to total fixed assets.

**Table IV-31: Business Profit to Total Capital**  
(Percent)

Fiscal Year	1988	1989	1990	1991	1992
Honshu JRs	9.2	8.9	9.7	7.5 *	6.6 *
Large PRs	5.1	4.8	5.0	5.0	4.4

Source: • Ministry of Transport, Tetsudo Tokei Nenpo (Annual Railways Statistics). 1992: JRs and Private Railways

Notes: Figures are total business results including railway business and other side businesses. Total Capital = Current Assets + Fixed Assets + Deferred Assets + Notes Discounted and Endorsed. Total Capital: the average of the beginning and the end of fiscal year. Business Profit = Operating Profit + Interest and Dividends Received

\* Business Profit to Total Capital of the Honshu JRs declined in 1991 and 1992 due to the increase of both costs and fixed assets by acquiring the Shinkansen line.

been improving. While the unit costs of the JRs are higher than those of the Large PRs, they have been able to remain higher profitability with their higher fare rate.

#### *Return on Assets*

4.72 In terms of business profit to total capital, which measures the return on assets, the Honshu JRs (1992:6.6%) outperform the Large PRs (4.4%). Although the 1992 ratio for the Honshu JRs is influenced to some extent by the purchase of the Shinkansen line, which tripled JRs' assets, this proved to detract little from its profitability.

#### *Financial Position*

4.73 While the JRs have been able to achieve relatively stable profitability, their financial position weak. In 1991, when the assets and liabilities of the Shinkansen were added on JRs balance sheet following JRs' acquisition of the Shinkansen line in that year, JRs ratio of net worth to total capital became 7.3%. This is well below that of the private railways (17.3%), though the ratio for these companies is low relative to other industries.

#### *Conclusion*

4.74 In the 5 years following privatization, the Honshu JRs have seen a 21% increase in passenger demand. While the strong economy during this period is behind this increase, JRs' own efforts can be seen to stimulate demand. For example, the increase in car frequency achieved, while decreasing the average number of cars per train, shows an improvement in service, contributing to the increase in demand.

4.75 In the same period, the JRs were also able to downsize their work force by 11% and greatly increase labor productivity. Due to the difference in the nature of the railways operated by the JRs and the Large PRs, it is not possible to make a simple comparison of their performance. However, looking at the average for the Large PRs and three Honshu JRs in 1991, in terms of car-km, the JRs were able to decrease their number of employees per unit to a level similar to that of the Large PRs. In terms of passenger-km, while still below that of the Large PRs, the JRs were able to decrease the difference in number of employees per unit from 46% in 1987 to 16% by the end of the period. (In this chapter, simple average method is used for the comparison of the two, and in Chapter V productivity is compared by regression analysis which takes into account the network condition and service output.)

4.76 In terms of unit cost, JRs' costs are still higher than that of the Large PRs. By compensating for their higher costs through setting higher fares, the JRs have been able to maintain a higher profitability than the Large PRs. However, over the 5 year period under consideration, while the JRs have not raised their fares, the price of fares for the Large PRs has risen by roughly 20%. As a result, the difference in fare prices between the two groups has been declining, and, within some areas served by both, the JRs are now carrying passengers at lower fares than that of the private railways.

4.77 In comparing the performance of post-privatization JRs and the Large PRs, we can see that, in terms of service, productivity and fares, the JRs are approaching the standard set by the Large PRs.

**Table IV-32: Balance Sheet of the Honshu JRs**  
(¥ Billion)

Fiscal Year	1987	1988	1989	1990	1991	1992
Current Assets	629	543	557	675	676	669
Fixed Assets	5,433	5,286	5,334	5,446	14,636	14,566
Total Assets	6,062	5,830	5,891	6,121	15,312	15,235
Current Liabilities	1,183	1,254	1,241	1,281	1,494	1,403
Fixed Liabilities	4,216	3,831	3,756	3,805	12,695	12,629
Total Liabilities	5,399	5,085	4,997	5,086	14,189	14,032
Capital Stock	412	412	412	412	412	412
Legal Reserve	205	205	205	205	211	215
Retained Earnings	46	127	277	418	499	576
Shareholder's Equity	663	744	894	1,035	1,123	1,203
Ratio: Net Worth to Total Capital	10.9%	12.8%	15.2%	16.9%	7.3%	7.9%

**Table IV-33: Balance Sheet of the Large PRs**  
(¥ Billion)

Fiscal Year	1987	1988	1989	1990	1991	1992
Current Assets	1,848	2,057	2,016	2,180	2,225	2,209
Fixed Assets	4,504	4,870	5,375	5,918	6,467	7,101
Deferred Assets	2	2	1	0	0	0
Total Assets	6,354	6,929	7,392	8,098	8,692	9,311
Current Liabilities	2,167	2,216	2,266	2,440	2,606	2,727
Fixed Liabilities	3,287	3,458	3,694	4,132	4,517	4,963
Reserves	0	15	34	48	64	79
Total Liabilities	5,454	5,689	5,993	6,619	7,187	7,769
Capital Stock	478	640	710	742	745	753
Legal Reserve	338	506	583	620	630	643
Retained Earnings	83	94	106	117	130	146
Shareholder's Equity	899	1,240	1,399	1,479	1,505	1,541
Ratio: Net Worth to Total Capital	14.2%	17.9%	18.9%	18.3%	17.3%	16.6%

Source: Ministry of Transport, *Tetsudo Tokei Nenpo (Annual Railways Statistics)*.

Note: Ratio of Net Worth to Total Capital = Shareholder's Equity / (Total Liabilities + Shareholder's Equity)

**Table IV-34: Ratio of Net Worth to Total Capital (1991)**  
(Percent)

Honshu JRs	Large PRs	All Industries	All Manufactures
7.3	17.3	28.8	38.2

Source: Ministry of Transport, *Tetsudo Tokei Nenpo (Annual Railways Statistics)*, *Handbook of Industrial Financial Data 1993* by the Japan Development Bank

# **V. Economic Analysis of Productivity and Performance of Privatized Japanese Railways**

## **Productivity Comparison between JRs and Private Railways**

### *Analytical Methods of Productivity Comparison between JRs and Private Railways*

5.1 One of the peculiar features of the Japanese railway system is the coexistence of privatized railways and public railways. There are several types of ownership, from municipal-owned subways or the semi-public local railways to purely private owned railways. Against this background, an important question is whether or not the JRs have been able to improve their productivity following privatization when compared with private railways, since productivity of public railways is said to be lower than that for private railways. There is a common impression that productivity in JRs in fact has been enhanced by a combination of privatization and deregulation. To help understand what factors might contribute to make Japanese-style privatization distinct from that of other reforms, it is essential to analyze how much JRs have been able to improve productivity. The following sections address the question what changes in productivity of JRs have emerged following privatization of JNR.

5.2 Usually there are three different inputs to assess productivity growth of JRs, such as (1) labor, (2) energy, (3) rolling stock. Since railways are characterized as a labor intensive industry, we will focus on labor productivity, as measured by service output per one employee. Although changes in labor quality and capital as well as technology might affect labor productivity, they are not taken into account because data is not readily available.

5.3 There are two analytical methods for studying productivity in this research: (1) simple average comparison and (2) regression analysis. The simple average comparison is the most common way to measure productivity, in which passenger-km per employee and car-km per employee, and train-km per employee are often used. Since this method does not take into account network characteristics, it provides only a general indication of productivity growth. The advantage of regression analysis is that productivity measurement reflects explicitly the differences in network, frequency of service, load factor, and ownership.

### *Labor Productivity Growth*

5.4 There is no doubt that, following privatization of the Japan Railway companies have been increasing productivity remarkably. Here we will examine how productivity of JRs has improved and whether or not their productivity has reached the level of Japanese large private railways, which are considered the most efficient organizations in the railway industry.

5.5 Table V-1 shows that labor productivity of JRs after privatization has increased dramatically under any kind of measurement: passenger-km, car-km, and train-km per employee. Generally speaking, JRs' productivity has improved by a factor of around three times from 1981 to 1991. For example, the productivity of the Japan National Railways in 1981 was only 509 thousand passenger-km per employee, which was less than one third that for large private railways, but it had increased to 1558 thousand passenger-km by 1991. Compared with the productivity growth of large

private railways from 1981 to 1991, which increased by less than 20%, productivity growth of JR's is surprisingly high. Certainly privatization could be one important element in JR's remarkable productivity growth.

5.6 The productivity growth of JR's was not even and has varied from one period to another. Furthermore, productivity of JR's started to improve several years before privatization. In fact, the productivity growth rate before privatization was larger than that afterward. For example, the JR's growth rate of productivity during the five years from 1985 to 1989, which includes years before and after privatization, was 79.3% in passenger-km, 77.1% in car-km, and 91.1% in train-km per employee. However, in the post-privatization period (from 1987 to 1991) these figures were 37.4%, 34.5%, and 37.9% respectively. It proved that high productivity growth occurred several years before privatization. The reduction of employees had already begun in the late 1970s and the number of employees was reduced at about 10% every year. This high productivity growth could be attributed to the effect on employees in JNR of the announcement that Japan National Railways would be privatized sooner or later. The anti-privatization side may have had provide an incentive to improve productivity in order to show that privatization was not necessary while for the pro-privatization side, it might have provided an opportunity to promote the rationalization plan. During the few years be-

fore privatization, organizational reforms, especially labor rationalization, were implemented. Relatively speaking, JR's after privatization were free to pursue their own development as the large private railways do and they are endeavoring to increase productivity.

5.7 Although the productivity of JR's has increased sharply since the mid-80s, the productivity level is still lower than that of large private railways. In fact, the productivity of JR's is about 23% lower in passenger-km, 6% lower in car-km, and 22% lower in train-km per employee less than those for large private railways. However, data in Table V-1 do not pay attention to any difference in network conditions between JR's and large private railways.

#### *Labor Productivity by Activity*

5.8 To evaluate what types of activity are responsible for productivity increases, rail service activities are divided into five categories: 1) rail operation, 2) station, 3) track maintenance, 4) car maintenance, and 5) administration and engineering at headquarters. The questions are; whether privatization could improve productivity in each activity equally, and, if not, which of activity improved the most and which is the least, and also in what activities JR's have caught up with large private railways. Here we define labor productivity by activity difference as service output per employee in each activity.

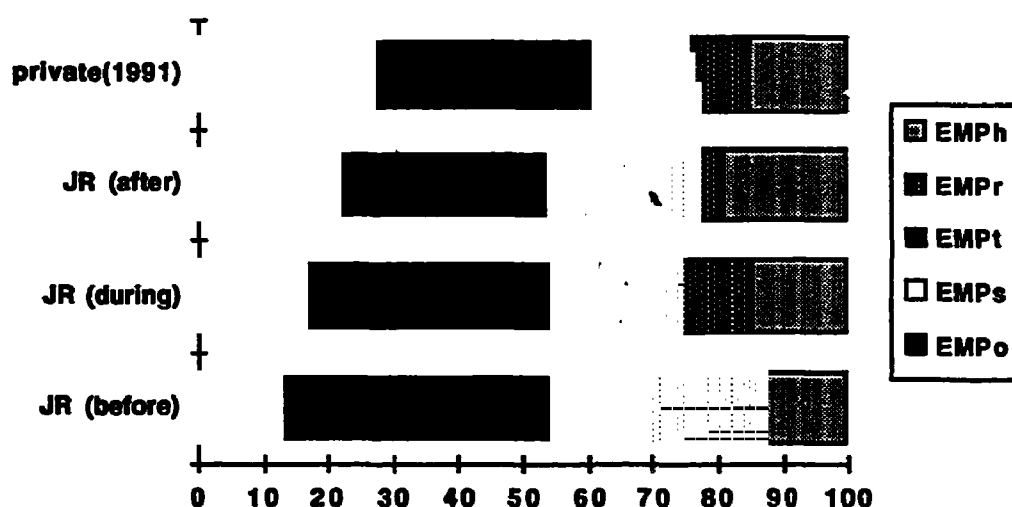
**Table V-1: Labor Productivity Comparison between JR and Large Private Labor Productivity by Activity**

Year	Passenger-km per employee (thousand)		Car-km per employee (thousand)		Train-km per employee (thousand)	
	JR	Large Private	JR	Large Private	JR	Large Private
1981	509 (0.30)	1693 (1.00)	11.7 (0.45)	25.8 (1.00)	1.36 (0.27)	5.05 (1.00)
1982	524 (0.31)	1710 (1.00)	12.0 (0.46)	26.1 (1.00)	1.41 (0.28)	5.07 (1.00)
1983	573 (0.33)	1738 (1.00)	12.8 (0.48)	26.5 (1.00)	1.52 (0.30)	5.08 (1.00)
1984	633 (0.36)	1751 (1.00)	13.6 (0.50)	27.2 (1.00)	1.68 (0.33)	5.13 (1.00)
1985	758 (0.42)	1793 (1.00)	15.7 (0.57)	27.6 (1.00)	2.02 (0.39)	5.15 (1.00)
1986	929 (0.51)	1837 (1.00)	19.4 (0.70)	28.1 (1.00)	2.56 (0.50)	5.15 (1.00)
1987	1134 (0.61)	1863 (1.00)	22.3 (0.79)	28.2 (1.00)	3.06 (0.60)	5.12 (1.00)
1988	1281 (0.67)	1922 (1.00)	25.0 (0.89)	29.3 (1.00)	3.55 (0.68)	5.25 (1.00)
1989	1359 (0.70)	1939 (1.00)	27.8 (0.92)	30.2 (1.00)	3.86 (0.73)	5.30 (1.00)
1990	1496 (0.75)	1985 (1.00)	29.6 (0.98)	31.1 (1.00)	4.11 (0.79)	5.19 (1.00)
1991	1558 (0.77)	2019 (1.00)	30.0 (0.94)	31.9 (1.00)	4.22 (0.78)	5.41 (1.00)
% change (1981-85)	48.9%	5.9%	34.2%	7.0%	48.5%	2.0%
% change (1985-89)	79.3%	8.1%	77.1%	9.4%	91.1%	2.9%
% change (1987-91)	37.4%	8.4%	34.5%	13.1%	37.9%	5.7%

Table V-2: Proportion of Employees by Activity Difference

Year	EMP <sub>o</sub> (Operator & Conductor)		EMP <sub>s</sub> (Station)		EMP <sub>t</sub> (Track main- tenance)		EMP <sub>r</sub> (Car main- maintenance)		EMP <sub>h</sub> (Administration Engineering)	
	JR	Large Private	JR	Large Private	JR	Large Private	JR	Large Private	JR	Large Private
1981	12.6%	25.1%	41.9%	34.0%	14.6%	14.6%	18.4%	11.6%	12.5%	14.8%
	(0.50)	(1.00)	(1.23)	(1.00)	(1.00)	(1.00)	(1.59)	(1.00)	(0.84)	(1.00)
1982	12.4%	25.9%	41.6%	33.5%	14.8%	14.5%	18.6%	11.3%	12.6%	14.8%
	(0.48)	(1.00)	(1.24)	(1.00)	(1.02)	(1.00)	(1.65)	(1.00)	(0.85)	(1.00)
1983	12.9%	25.4%	41.1%	33.8%	15.0%	14.3%	18.1%	11.3%	12.8%	15.2%
	(0.51)	(1.00)	(1.22)	(1.00)	(1.05)	(1.00)	(1.60)	(1.00)	(0.84)	(1.00)
1984	13.9%	25.7%	40.6%	33.4%	15.3%	14.4%	17.2%	11.2%	13.0%	15.3%
	(0.54)	(1.00)	(1.22)	(1.00)	(1.06)	(1.00)	(1.54)	(1.00)	(0.85)	(1.00)
1985	16.2%	25.6%	38.3%	33.6%	15.8%	14.5%	15.1%	11.2%	14.6%	15.3%
	(0.63)	(1.00)	(1.14)	(1.00)	(1.09)	(1.00)	(1.35)	(1.00)	(0.95)	(1.00)
1986	18.2%	26.0%	36.9%	33.5%	18.2%	14.4%	11.8%	11.2%	14.9%	14.9%
	(0.70)	(1.00)	(1.10)	(1.00)	(1.26)	(1.00)	(1.05)	(1.00)	(1.00)	(1.00)
1987	20.1%	25.9%	35.5%	33.6%	20.6%	14.2%	8.6%	10.8%	15.2%	15.6%
	(0.78)	(1.00)	(1.06)	(1.00)	(1.45)	(1.00)	(0.80)	(1.00)	(0.97)	(1.00)
1988	20.3%	26.2%	34.0%	33.7%	20.0%	14.2%	8.8%	10.5%	16.8%	15.4%
	(0.77)	(1.00)	(1.01)	(1.00)	(1.41)	(1.00)	(0.84)	(1.00)	(1.09)	(1.00)
1989	20.7%	26.6%	33.3%	33.7%	19.5%	14.1%	8.8%	10.2%	17.8%	15.3%
	(0.78)	(1.00)	(0.99)	(1.00)	(1.38)	(1.00)	(0.86)	(1.00)	(1.16)	(1.00)
1990	21.0%	26.5%	32.7%	34.0%	18.9%	13.8%	9.0%	10.3%	18.3%	15.4%
	(0.79)	(1.00)	(0.96)	(1.00)	(1.37)	(1.00)	(0.87)	(1.00)	(1.19)	(1.00)
1991	21.3%	26.9%	32.8%	34.2%	17.9%	13.7%	8.8%	10.1%	19.2%	15.1%
	(0.79)	(1.00)	(0.96)	(1.00)	(1.31)	(1.00)	(0.87)	(1.00)	(1.24)	(1.00)
% change (81-85)	10.2%	2.0%	-8.6%	-1.2%	8.2%	-0.7%	-17.9%	-3.4%	16.8%	3.4%
% change (85-89)	27.8%	3.9%	-13.1%	0.3%	23.4%	-2.8%	-41.7%	-8.9%	21.9%	0.0%
% change (87-91)	6.0%	3.9%	-7.6%	1.8%	-13.1%	-3.5%	2.3%	-6.5%	8.3%	-3.2%

Figure V-1: Comparison of Change in Activity-basis Employees (Percent)



Note: JR (before): before privatization (1981)  
 JR (after): after privatization (1991)  
 EMP<sub>o</sub>: operator & conductor  
 EMP<sub>t</sub>: track maintenance employee  
 EMP<sub>h</sub>: administration & engineering employee

JR (during): during privatization process (1985)  
 Private (1991): private railways (1991)  
 EMP<sub>s</sub>: station employee  
 EMP<sub>r</sub>: car maintenance employee

5.9 Before analyzing productivity by activity, we will study changes in the proportion of employees by activity. Table V-2 shows change in the structure of each activity's employees from 1981 to 1991. Station employees accounted for about 42% of total employment in 1981, but in 1991 this ratio was reduced to 33%. Car maintenance employees, a category which accounted for 18% in 1981 also shrank to one half by 1991. These two activities in terms of employment decreased sharply in the periods before and after privatization. However, the other activities such as operator and conductor, track maintenance, administration and engineering increased their relative shares in employment during the eleven years from 1981 to 1991. When compared with large private railways in terms of proportion of operators and conductors, that for JRs were about 80% of the level of large private railways in 1991. In con-

trast, the proportion of administration and engineering is close to the level for large private railways. These results may indicate that station and car maintenance activities before privatization were inefficient and that JNR used many more employees than the private railways. JRs after privatization still have more employees in track maintenance and administration activities than do large private railways. This may suggest that since JRs' network is far longer than that of the private railways, JRs need more track maintenance. And also due to increases in the number of headquarters after regional break-up, JRs might not be able to reduce employment in administrative sections as they have done in other activities. Figure V-I shows the changes in the composition of employees in JRs before privatization, during privatization, and after privatization compared with private railways.

**Table V-3: Labor Productivity Comparison by Activity Difference**  
(Thousands of passengers km per employee)

Year	PRDo (Operator & conductor)		PRDs (Station)		PRDt (Track maintenance)		PRDr (Car maintenance)		PRDh (Administration & engineering)	
	JR	Large Private	JR	Large Private	JR	Large Private	JR	Large Private	JR	Large Private
1981	4043 (0.60)	6750 (1.00)	1214 (0.24)	4981 (1.00)	3486 (0.30)	11627 (1.00)	2761 (0.19)	14640 (1.00)	4079 (0.36)	11445 (1.00)
1982	4213 (0.64)	6603 (1.00)	1261 (0.25)	5104 (1.00)	3537 (0.30)	11813 (1.00)	2822 (0.19)	15132 (1.00)	4175 (0.36)	11548 (1.00)
1983	4434 (0.65)	6828 (1.00)	1392 (0.27)	5145 (1.00)	3819 (0.32)	12116 (1.00)	3163 (0.21)	15410 (1.00)	4461 (0.39)	11460 (1.00)
1984	4545 (0.67)	6806 (1.00)	1560 (0.30)	5243 (1.00)	4141 (0.34)	12152 (1.00)	3682 (0.23)	15679 (1.00)	4869 (0.43)	11446 (1.00)
1985	4689 (0.67)	7016 (1.00)	1979 (0.37)	5343 (1.00)	4800 (0.39)	12395 (1.00)	5016 (0.31)	16058 (1.00)	5203 (0.44)	11750 (1.00)
1986	5116 (0.72)	7063 (1.00)	2516 (0.46)	5478 (1.00)	5103 (0.40)	12738 (1.00)	7838 (0.48)	16453 (1.00)	6233 (0.50)	12356 (1.00)
1987	5302 (0.74)	7202 (1.00)	3008 (0.54)	5540 (1.00)	5182 (0.39)	13168 (1.00)	12442 (0.72)	17328 (1.00)	7014 (0.59)	11954 (1.00)
1988	5916 (0.81)	7335 (1.00)	3531 (0.62)	5703 (1.00)	6000 (0.44)	13527 (1.00)	13712 (0.75)	18389 (1.00)	7134 (0.57)	12471 (1.00)
1989	6179 (0.85)	7303 (1.00)	3837 (0.67)	5748 (1.00)	6537 (0.48)	13710 (1.00)	14522 (0.77)	18933 (1.00)	7178 (0.57)	12657 (1.00)
1990	6678 (0.89)	7481 (1.00)	4291 (0.74)	5832 (1.00)	7445 (0.52)	14415 (1.00)	15572 (0.81)	19336 (1.00)	7664 (0.59)	12918 (1.00)
1991	6864 (0.91)	7504 (1.00)	4465 (0.76)	5899 (1.00)	8153 (0.55)	14727 (1.00)	16644 (0.83)	20044 (1.00)	7622 (0.57)	13394 (1.00)
% change (81-85)	16.0%	3.9%	63.0%	7.3%	37.7%	6.6%	81.7%	9.7%	27.6%	2.7%
% change (85-89)	31.8%	4.1%	93.9%	7.6%	36.2%	10.6%	189.5%	17.9%	38.0%	7.7%
% change (87-91)	29.5%	4.2%	48.4%	6.5%	57.3%	11.8%	33.8%	15.7%	8.7%	12.0%

5.10 The analysis indicates that JR's improved productivity in station and car maintenance activities, but could not do so in track maintenance and administration activities. Table V-3 supports this surmise. The interesting point is that there was not much difference in productivity per operator and conductor between JR's and large private railways in 1991. This is true of the periods well before privatization. For example, in 1981 the difference in operator and conductor's productivity between JR's and large private railways was small compared with differences in other activities. This result is very similar to the previous comparative study of Japanese urban private and public railways by Mizutani (1987).

5.11 The productivity difference in maintenance activities, especially track maintenance, is still large between JR's and private railways. Productivity per track maintenance employee in JR's increased more than two times compared with the level before privatization in 1981. However, it is still only 55% that for large private railways. The possible reason why JR's productivity in track maintenance remains lower than for large private railways might be that JR's have larger networks (e.g. longer line haul and more lines) than large private railways. Furthermore, the contracting-out scheme in maintenance activities, which large private railways adopt, might be another reason for private railways' higher productivity.

5.12 JR's productivity per administrative and engineering employee at headquarters is also poor compared with private railways, which was less

than 60% of the level of large private railways in 1991. This shows a sharp contrast with the previous study of Mizutani, in which there was not a significant difference between private and public railways. JR's large scale network, the operation of Shinkansen, and regional division of markets might require more administrative employees. Moreover, the competition in technological development among regional JR's might need to maintain more engineers at headquarters than private railways. However, a 43% difference in productivity is still large enough to justify looking for other reasons.

#### *Productivity Differences among JR's*

5.13 Here we will analyze productivity difference among six JR's. To evaluate the privatization effect on JR's productivity, it is interesting to study the difference between the three largest JR's in Honsyu (henceforth referred to as "Honsyu JR's") and the three-islands JR's (henceforth referred to as "3-islands JR's"). Labor productivity of large private railways could be used as a benchmark to compare productivity among JR's. Table V-4 shows labor productivity among JR in terms of passenger-km per employee.

5.14 As shown in Table V-4, there is a large difference in labor productivity between Honsyu JR's and 3-islands JR's. In 1991, labor productivity of Honsyu JR's was about 2.8 times higher than that of 3-islands JR's. Honsyu JR's productivity is approaching that for large private railways. The average productivity for Honsyu JR's in 1991, for example, was about 86% that of large private

**Table V-4: Labor Productivity Comparison Among JR's After Privatization**  
(Thousands of passenger-kms per employee)

Year	Honsyu 3 JR's				3-Islands JR's			Private Railways		
	JR East	JR Central	JR West	Avg.	JR Hokkaido	JR Shikoku	JR Kyusyu	Avg.	Large Private	Small Private
1987	1293 (0.69)	2034 (1.09)	918 (0.49)	1268 (0.68)	324 (0.17)	444 (0.24)	562 (0.30)	449 (0.24)	1863 (1.00)	580 (0.31)
1988	1511 (0.79)	2245 (1.17)	1003 (0.52)	1442 (0.75)	375 (0.20)	595 (0.31)	584 (0.30)	499 (0.26)	1922 (1.00)	594 (0.31)
1989	1636 (0.84)	2329 (1.20)	1014 (0.52)	1518 (0.78)	377 (0.19)	600 (0.31)	683 (0.35)	539 (0.28)	1939 (1.00)	593 (0.31)
1990	1725 (0.87)	2608 (1.31)	1125 (0.57)	1647 (0.83)	428 (0.22)	653 (0.33)	740 (0.37)	592 (0.30)	1985 (1.00)	482 (0.24)
1991	1868 (0.93)	2545 (1.26)	1162 (0.58)	1728 (0.86)	442 (0.22)	679 (0.34)	796 (0.39)	624 (0.31)	2019 (1.00)	498 (0.25)
% change (87-91)	44.5%	25.1%	26.6%	36.3%	36.4%	52.9%	41.6%	39.0%	8.3%	14.1%

railways. On the other hand, 3-islands JR's productivity on average is close to that of less-efficient small private railways. This may reflect the difference in size between JRs and the private railways. Even JR Shikoku, the smallest of the JRs, which employed 46 thousand workers in 1991, is larger than Kintetsu, the largest private railway which employed 11 thousand employees in 1991. Thus, 3-islands JRs may still have surplus employees in relation to their size of service output.

5.15 Privatization with regional division seems to have a very positive impact on the enhancement of the productivity of 3-islands JRs. As far as productivity growth is concerned, the growth rate of 3-islands JRs has seen, on average, 3% higher

than Honshu JRs in the five years since privatization in 1987. When compared with small private railways which have very similar demand conditions, the growth rates and level of productivity of 3-island JRs are extremely high. Although there is still a large difference in labor productivity between Honshu and 3-island JRs, privatization could spur productivity growth even in 3-islands JRs, which face difficulties stemming from the small size of markets and competition from the road sector.

#### *Econometric Analysis of Labor Productivity*

5.16 To clarify what factors were responsible for the improvement in labor productivity in JRs, regression analysis is applied here. Table V-5 shows

**Table V-5: Labor Productivity Using Productivity Model (Thousand Passenger-km/Empl., '99)**

Method	Ownership	PRDo(operator &conductor)	PRDs (station)	PRDt(track maintenance)	PRDr(car maintenance)	PRDh(admin. & engineering)
Case-1:	JR	6864 (0.91)	4465 (0.76)	8153 (0.55)	16644 (0.83)	7622 (0.57)
Simple average	Private	7504 (1.00)	5899 (1.00)	14727 (1.00)	20044 (1.00)	13394 (1.00)
Case-2:	JR	7434 (1.38)	4740 (0.78)	8380 (0.84)	19513 (1.21)	7944 (0.38)
Mizutani (1993)	Private	5393 (1.00)	6105 (1.00)	9985 (1.00)	16173 (1.00)	20877 (1.00)
Case-3:	JR	6970 (1.20)	4249 (0.79)	7615 (0.65)	16138 (0.69)	8411 (0.86)
This study	Private	5793 (1.00)	5353 (1.00)	11788 (1.00)	23316 (1.00)	9762 (1.00)

[Note]

(1) (A) Case-1 is results without controlling network conditions: Results are average for JR(6 passenger JR railways) and for Private(15 large private railways) in 1991. These are the same shown in Table V-3.

(B) Case-2 is results with controlling network conditions but using a private-public productivity comparison model: Results for JR are sample average and results for private are obtained by substituting JR's network variables in Mizutani model.

(C) Case-3 is the results of a private-JR productivity comparison model when network conditions were controlled: Results of JR and Private are obtained by assigning the dummy variable (JR) a one in the case of JRs and zero if JRs were assumed to be operated by a private company.

(2) (A) Equations for productivity estimation in Case-2 are as follows:

*Mizutani's study (1993) : Private-Public Comparison Model*

$$(a) \ln(\text{PRDo}) = 5.725 + 0.478 \ln(\text{Qpkm}) - 0.378 \ln(\text{NI}) - 0.284 \ln(\text{lr}) + 0.196 \ln(\text{SI}) - 0.164 \text{PUB}$$

$$(b) \ln(\text{PRDs}) = 5.704 + 0.576 \ln(\text{Qpkm}) - 0.658 \ln(\text{Ns}) - 0.127 \ln(\text{Rus}) - 0.412 \text{PUB}$$

$$(c) \ln(\text{PRDt}) = 5.089 + 0.433 \ln(\text{Qpkm}) - 0.364 \ln(\text{Lr}) - 0.088 \ln(\text{Ru}) + 0.864 \ln(\text{CNT1}) - 0.160 \text{PUB}$$

$$(d) \ln(\text{PRDr}) = 5.629 + 0.423 \ln(\text{Qpkm}) - 0.558 \ln(\text{NI}) + 0.636 \ln(\text{CNT2}) - 0.405 \text{PUB}$$

$$(e) \ln(\text{PRDh}) = 5.686 + 0.502 \ln(\text{Qpkm}) - 0.028 \ln(\text{NI}) + 0.272 \ln(\text{lr})$$

$$- 0.307 \ln(\text{Ns}) - 0.104 \ln(\text{Ru}) - 0.118 \text{PUB}$$

(B) Equations for productivity estimation in Case-3 are as follows:

*This study: Private-JR Comparison Model*

$$(a) \ln(\text{PRDo}) = 5.194 + 0.512 \ln(\text{Qpkm}) - 0.441 \ln(\text{NI}) - 0.294 \ln(\text{lr}) + 0.205 \ln(\text{SI}) + 0.185 \text{JR}$$

$$(b) \ln(\text{PRDs}) = 7.719 + 0.443 \ln(\text{Qpkm}) - 0.463 \ln(\text{Ns}) - 0.017 \ln(\text{Rus}) - 0.231 \text{JR}$$

$$(c) \ln(\text{PRDt}) = 5.446 + 0.436 \ln(\text{Qpkm}) - 0.361 \ln(\text{Lr}) + 0.004 \ln(\text{Ru}) + 0.743 \ln(\text{CNT1}) - 0.437 \text{JR}$$

$$(d) \ln(\text{PRDr}) = 5.238 + 0.418 \ln(\text{Qpkm}) - 0.427 \ln(\text{NI}) + 0.745 \ln(\text{CNT2}) - 0.368 \text{JR}$$

$$(e) \ln(\text{PRDh}) = 5.523 + 0.555 \ln(\text{Qpkm}) - 0.486 \ln(\text{NI}) - 0.496 \ln(\text{lr})$$

$$+ 0.162 \ln(\text{Ns}) - 0.034 \ln(\text{Ru}) - 0.149 \text{JR}$$

where Qpkm = passenger-km NI = number of line lr = route-km per line SI = load factor(%)

Ns = number of station Rus = % of underground station Lr = route-km Ru = % of underground

CNT1 = contracting-out for track maintenance CNT2 = contracting-out for car maintenance

PUB = ownership dummy (public = 1) JR = JR dummy (JR=1)

the results of activity-based productivity comparison. As productivity measurements, labor productivity per operator and conductor, per station, per track maintenance, per car maintenance, per administration and engineering were used. In this analysis differences in network characteristics and ownership are considered explicitly: Passenger-km (Qpkm) as service output, load factor (SI) as service quality, number of line (NI), route-km per line (lr), number of station (Ns), percentage share of underground station (Rus) as network characteristics, contracting-out for track maintenance (CNT1), contracting-out for car maintenance (CNT2) as company policy characteristics, and ownership dummy (PUB), and JR dummy (JR) as ownership difference are taken into account here.

5.17 Table V-5 compares the results which are estimated by three different methods based on the cross-section data in 1991: The first and second rows (JR and Private) of Case 1 compare productivity by the simple average which was obtained by dividing total passenger-km by total employees on an activity-basis. The first row (JR) of Case 2 is labor productivity of JRs which was estimated using Mizutani's private-public comparison model. The coefficients in the model were obtained by the cross-section data of public and private railways. To estimate labor productivity of JRs, the average passenger-km, average number of employees, and the average of network characteristics among six JRs were used. The second row (Private) of Case 2 shows the results of simulation when it is hypothesized that JRs' productivity may be improved if JRs were operated by a private company. They are obtained when the dummy variable (PUB) is assigned zero in the simulation. In other words, the simulation indicates how ownership difference might affect JRs' productivity if JRs were to maintain the current service output and network and operate under a hypothetical private company.

5.18 The first row (JR) of Case 3 shows labor productivity of JRs which is obtained by regression analysis using data from six JRs and private railways on the number of employees, passenger km, number of lines, route km and others in 1991. The second row (Private) of Case 3 is also the estimated productivity of JRs obtained from the simulation model based on the same idea as the second row of Case 2. The results show the hypothetical productivity of JRs when it is assumed that JRs were operated by a private company while they maintained the same level of service output and network. The results indicate how productivity might be affected by the difference in ownership. Most results suggest that JRs' productivity is still 20-30% less than that of private railways, except productivity of operators and conductors. This suggests that JRs still retain more workers than private railways in most activities, even though network and other conditions are explicitly controlled in the estimation. Specifically, productivity of track maintenance and car maintenance is respectively 35% and 31% lower than those for private railways. In contrast with simple average productivity analysis, productivity for administration and engineering is only 14% less than that of private railways, when differences in network conditions are allowed for. Unfortunately the t-statics for each coefficient are about one owing to the small sample and it is difficult to specify what elements contribute to the low productivity of JRs. But it may be safe to say that because of large-scale networks JRs have to retain a larger number of employees in maintenance and stations activities, which may lower labor productivity of JRs compared with private railways.

5.19 Table V-6 is the results of simulation showing what extent Honshu JRs and 3-islands JRs may have redundant employees. Three different scenarios are introduced: (1) perfect privatization,

**Table V-6: Comparison of Employees Among JRs : After Privatization**

Case policy option	Honshu JRs			3-islands JRs		
	before	after	change	before	after	change
Scenario 1 (perfect privatization)	45,188	38,603	- 6,585(-14.6%)	7,784	6,738	-1,046(-13.4%)
Scenario 2 (decrease lines by 10%)	45,188	44,566	- 622(-1.4%)	7,784	7,677	-107(- 1.4%)
Scenario 3 (decrease line haul by 10%)	45,188	44,252	- 936(-2.1%)	7,784	7,599	-185(-2.4%)
Scenario 4 (increase contract out by 10%)	45,188	44,755	- 433(-1.0%)	7,784	7,662	-122(-1.6%)

(2) abandonment of lines, (3) reduction in line haul, and (4) extensive use of contracting out for maintenance works. The estimated productivity under perfect privatization scenario is obtained by assuming that JRs were operated as a private company when JRs maintained the current level of service output and network. In this case, the dummy variable (JR) of ownership is assigned to zero in Private-JR Comparison Model. According to Scenario 1, Honshu JRs as well as 3-islands JRs could reduce employees by about 15% of the present number on average if they were operated by the hypothetical private company. As shown in Scenario 2, even if JRs abandon some lines, it would not greatly contribute to improving productivity. The decline in employment is only 1.4% in both Honshu JRs and 3-island JRs, when we assumed that JRs would reduce 10% of the number of lines as shown in Scenario 2. Even if JRs decrease the average line haul, it may have a minor effect on employment. The elasticity of decreases in network is about 0.2 for both Honshu and 3-island JRs as indicated in Scenario 3. If JRs increase contracting out for maintenance of infrastructure about 10% of the current level, they could reduce their employees by 1% in the case of Honshu JRs and 1.6% in the 3-islands JRs. Although it is difficult to assess directly from this simulation how network retrenchment and contracting out scheme might have positive effects on productivity, the results may indicate that their contribution to the improvement of JRs' labor productivity could be smaller than we expect. This means that there is a need to examine how such factors as the automation of ticketing and ticket gate, mechanization of track maintenance and other technologies may influence productivity.

#### Benchmark Competition among JRs and between JRs and Private Railways

##### *The Conceptual Framework of Benchmark Competition*

5.20 The privatization of JNR differs in two unique respects from all other privatizations which have so far been achieved or are planned, in European nations as well as in developing countries. First, privatized passenger JRs in the main island of Japan (Honshu) are still considered to be regional natural monopolies. Thanks to high population density in the coastal regions of Honshu and excessive concentration of economic and social activities

in major cities such as Tokyo, Osaka, and Nagoya, JRs in Honshu retain natural monopolistic power in intercity passenger transportation markets as well as in commuting markets in metropolitan regions. However, JRs face fierce competition from road transport in cities and from air transport in the long distance transportation markets. Their monopolistic power has been waning rapidly in long distance markets.

5.21 Secondly, privatization has involved a regional break-up into six passenger JRs and one nationwide freight JR. The regional division of JRs has now been turned to advantage, since it has enhanced indirect competition among JRs and direct competition between JRs and private railways. Since there are a number of parallel commuting lines in major cities where both private railways and JRs provide competitive services, JRs are trying to improve the quality of their services in order to secure more patronage. It is worth examining to what extent this kind of intramodal competition (which is called benchmark competition hereafter) has been intensified since the privatization of JNR.

5.22 From the standpoint of the regulatory authority and shareholders of JRs, a comparison between the performance of JRs and the average performance of the private railways can make it easy to monitor the behavior of JRs. For example, to permit a rise in fares, the regulator can use the average performance of the railways sector as a 'yardstick' or a 'benchmark,' because it is outside the control of any single railway. Although the detailed procedures for approving fare rises is not made public in Japan, it may be safe to assume that the Ministry of Transportation would take into account the average performance of the railway sectors, since officials tend to place much importance on equality of fares among the railways. Enhancing competition based on the industry average of performance is expected to provide an incentive to efficiency and to ensure that the resulting benefits are largely passed on to customers.

5.23 The original concept of yardstick competition as a regulatory scheme was formalized first by Shleifer [1985]. The "cost-of-service" regulation on prices of monopolies cannot address the problem of lack of incentives for efficiency, since it allows that "prices track costs." There is a need to ensure that the entity is given an incentive to engage actively in cost reduction and innovation. Shleifer indicates that comparing present or past performance of similar regulated entities could serve as a simple

and useful yardstick or benchmark to evaluate what the costs ought to be and to set the right prices.<sup>9</sup>

5.24 The comparison of cost performance among similar entities is used in reimbursement system that compensates hospitals using average costs in the USA. A similar system is used by Japanese insurance companies to reimburse the costs of medical treatment to hospitals. If price is determined by the average cost of the comparable firms, the firm has strong incentive to be efficient, since it can "pocket" the difference between costs and prices. Moreover, the regulator does not need to have exact information about costs and demands in order to control prices.

5.25 Yardstick regulation was proposed in the Littlechild Report [1986] for regulation of the UK water industry. As suggested in the Report, since the yardstick or benchmark is determined not by firm's own decisions but by the other firms' decisions there is no motive to take strategic behavior of the regulated firm. In addition, the regulator may not suffer from asymmetric information about costs provided by the regulated firms, because they notify the correct costs. It seems that revealing 'true costs' does not affect the firm's profit-maximizing conduct.

#### *Overall Assessment of Benchmark Competition*

5.26 According to the original concept of benchmark competition, it might be expected that when JRs and private railways which are operating parallel lines are competing with each other for large market share and fares are determined by the industry average cost, both of them would try to reduce costs if they could take the difference between fares and costs as profit. However, both JRs and the private railways are not only under strong public pressure to reduce fares but also are not allowed to pocket the difference between fares and costs as profit. It is a general understanding that if they are also to earn extra profit, this should be injected to reduce fares. Under this kind of environment, they tend to give priority on quality-of-service competition in order to gain more patronage.

5.27 In fact, JRs as new privatized railways have been attempting to set their level of service close to that of private railways. As a result, the difference between JRs and private railways in terms of quality of service are becoming smaller in accordance with the intensity of benchmark competition. The benchmark competition has enhanced the quality of service, particularly on commuting lines where JRs

are operating parallel services with private railways. This also has positive impact on efforts to improve the overall quality of service of JRs.

5.28 Although benchmark competition which has been observed among JRs and between JRs and private railways in commuter markets is different from "yardstick competition" in a Shleiferian sense, this kind of intramodal competition has greatly contributed to upgrading the quality of service and to holding down the pressure for increasing fares in Japan. For example, since on some local lines JRs are allowed to adopt special discount fares that make it difficult for private railways to raise their fares, a rival could use improvement in service quality such as increased frequency, speed, and others as a marketing strategy.

5.29 Interestingly, regional break-up has provided an incentive for each JR to engage in quality-of-service competition, because it is easy for users to compare the difference in service. Also the JR wish to be listed on the stock market as soon as possible. Introduction of new types of cars and through-train services to meet local demand are examples. The most important effect of the regional break-up of JNR is that benchmark competition among Japanese railways has improved the quality of service in urban commuter markets as well as in intercity markets, and the benefits of improvement in quality of service have been passed to commuters.

<sup>9</sup> Shleifer's basic model is as follows: There are  $n$  identical firms operating in certain environment. Each firm faces demand curve  $Q(P)$  in its market. When a firm spends  $z$  on cost-reducing innovation, it can achieve unit cost level  $c(z)$ , with  $c(0)=c$ . The lump sum subsidy  $T$  is transferred to the firm if it engages in innovation. Profit is determined by  $\Pi=[P-c(z)]Q(P)-z+T$

If the social welfare objective is the maximization of total surpluses, then the optimum under the constraint of no loss has

$$P=c(z) \\ -c(z)Q(P)=1 \\ \text{and } z=T.$$

In sum, first, price is equal to marginal cost; second, cost-reducing innovation occurs up to the point marginal cost (=1) equals marginal benefit; and third, the cost of innovation is subsidized by the lump-sum transfer.

To eliminate the dependence of the firm's price on its own cost level, the regulator can use cost levels of identical firms to determine the price. Average cost level  $c$  and average expenditure for cost-reduction innovation  $z$  can be obtained by dividing total costs and total expenditures of  $n$  firms by  $(n-1)$ . The industry average cost and industry average expenditure can be served as benchmark in competition. What the regulator should do is to commit himself to the price and transfer rule given by price = industry average cost and  $T=Z$ . See Vickers and Yarrow [1988].

5.30 To assess the general effect of benchmark competition among JRs and between JRs and private railways, the question of how much service quality has improved since privatization is examined here. The hypothesis is that if benchmark competition in certain markets is strong, frequency at peak time will increase and the load factor will be reduced in and to win more passengers. Two types of railway lines are selected and analyzed to obtain a general picture of benchmark competition: the first type is the lines which are located close to each other. The assumption is that the shorter the geographical distance between two railways the stronger benchmark competition will be and as a result greater the improvement on the quality of service. We have examined Kansai-Line of JR Central, Tokaido-Line of JR Central between Nagoya and Osaka, Tokaido-Line of JR West, and Hanwa-Line of JR West. The second type is lines which seem to be less competitive owing to the lack of competitive railway lines nearby. Examples are Tokaido-Line of JR East, Ring-Line in Tokyo (Yamate-Line), Northeast Commuting Line (Joban Line) which connects between Tokyo and the suburban cities, and Ring-Line in Osaka (Kanjo-Line). In these cases a major competitor to railways is automobiles. Such intermodal competition between railways and automobiles and also transfer of passengers be-

tween JRs and private railways are not taken into account explicitly, for the sake of simplicity of the analysis. Although it is desirable to consider the differences in the track capacity for increasing frequency and the number of cars in a train, we did not consider them, owing to data problems.

5.31 The following Table V-7 shows the changes in frequency at peak times in competitive and less competitive markets from 1975 to 1992. Generally speaking, there has been sharp increases in frequency of JRs in competitive markets. On the other hand, in less competitive markets no remarkable changes were observed. In fact, the increasing rate of frequency of JRs from 1975 to 1992 in less competitive markets is only 19%. In contrast to this, the frequency of JRs in very competitive markets increased more than twice during the same period. The fact that the increasing rates of frequency in the private railways are almost zero may reflect the situation that private railways have utilized capacities at maximum rate so that there would be no room to further increase frequencies in those markets. In this sense, the situation with the regard to increase in frequency, for example, is advantageous to JRs, since the tracks which JRs have inherited from JNR could be used for heavy freight trains. This renders it easier for JRs to increase frequency and the number of trains than those for private railways.

**Table V-7: Changes in Service Quality (Frequency at Peak Hour)**

Degree of Competition	Line	1975	1985	1992	Ratio (1975/1992)
Weak	Tokaido: JR East	12	17	19	1.58
	Yamate: JR East	23	24	24	1.04
	Joban: JR East	18	22	22	1.22
	Kanjo: JR West	20	18	18	0.90
	Average				1.19
Strong	Tokaido: JR Central	6	7	13	2.17
	(Meitetsu)	(25)	(26)	(26)	(1.04)
	Kansai: JR Central	2	4	7	3.50
	(Kintetsu)	(18)	(18)	(18)	(1.00)
	Tokaido: JR West	19	24	28	1.47
	(Hankyu)	(25)	(26)	(26)	(1.04)
	(Hanshin)	(25)	(26)	(28)	(1.12)
	Hanwa: JR West	10	12	15	1.50
	(Nankai)	(22)	(22)	(21)	(0.95)
Average				2.16 (1.03)	

(Note): The numbers are the number of trains at peak time. Those in the parentheses are the frequency of the private railways, which are competing with JRs in the markets.

5.32 As is shown in the following Table V-8, the same approach was adopted to evaluate the effect of benchmark competition on the load factor. We could observe a similar improvement in terms of the load factor in the competitive markets, although the difference between very competitive markets and less competitive markets is small compared with those for frequency. The average load factor in Japanese railways is more than 200% in the less competitive markets and about 150% even in the competitive markets, which is extraordinary high by Western standards. Congestion in commuter trains is the most serious social problem that Japan must tackle. Since the overconcentration of population in major cities, especially in Tokyo Metropolitan areas, is the major cause for congestion, the increase in capacity of commuter trains cannot be an answer to the problem. To solve the congestion problem, there is a need to introduce drastic land-policy reforms to reduce the concentration of population in Tokyo and to change land use.

*The Effect of Benchmark Competition on JR's Market Share*

5.33 To assess how benchmark competition has influenced the market share of JRs in terms of the number of passenger, three commuter lines where JR and private railways are operating in parallel are

selected from central part of Japan. The lines are typical commuter railways which connect the central business district of a large city with neighboring cities as dormitory towns. JRs have been attempting to keep fares relatively low, to improve congestion by upgrading cars, and to increase train frequency in order to win more passengers. Since neither JRs nor private railways don't wish to lose market share by taking the initiative to raise fares, fares tend to be very comparable and stable between them. Since there has been no explicit price wars between them, benchmark competition in Japan has taken place mostly in improvement of service quality.

5.34 To study the effect of benchmark competition on a particular JR's market share, it is assumed that the number of JR's passengers may be determined jointly by the relative level of its fares, load factor, and train frequency in comparison with those for the private railways. JRs since privatization appear to have used the level of service quality by the private railways as a benchmark to establish their marketing strategies. Since passenger chooses the railway which offers relatively lower fares and higher quality of services, there would be a direct cause-effect relationship between the number of passenger and the relative levels of fares, load factor, and train frequency. It is obvious that train fre-

**Table V-8: Changes in Service Quality (Load Factor at Peak Hour) (Percent)**

Degree of Competition	Case of Lines	1975	1985	1992	Ratio (1975/1992)
Weak	Tokaido: JR East	262	256	226	0.84
	Yamate: JR East	246	263	272	1.11
	Joban: JR East	206	259	248	1.20
	Kanjo: JR West	232	244	156	0.66
	Average				0.95
Strong	Tokaido: JR Central (Meitetsu)	165 (213)	168 (184)	130 (168)	0.79 (0.79)
	Kansai: JR Central (Kintetsu)	0.83 (200)	143 (165)	143 (165)	1.63 (0.83)
	Tokaido: JR West (Hankyu) (Hanshin)	199 (209) (162)	184 (174) (162)	122 (159) (153)	0.64 (0.76) (0.74)
	Hanwa: JR West (Nankai)	212 (182)	183 (179)	169 (172)	0.80 (0.97)
	Average				0.97(0.81)

(Note): The numbers are the number of trains at peak time. Those in the parentheses are the frequency of the private railways, which are competing with JRs in the markets.

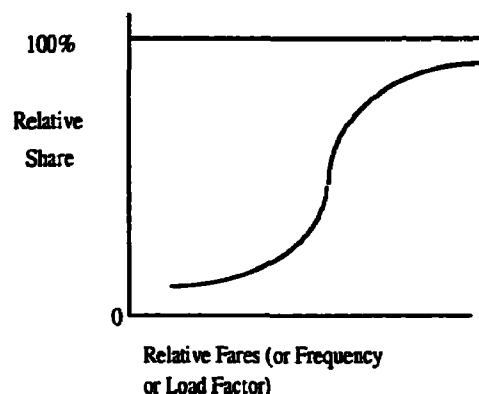
quency is a very important element for the selection of the railway in the commuter markets at peak time, because Japanese commuters as well as those in other countries are likely to place priority on reaching their workplaces on time. Although there are other important factors to influencing the choice of commuters, only three elements are considered here because other data are not available.

5.35 The conceptual framework of analysis used here is as follows: If a JR wishes to expand its market share, it would try to lower the relative fare, increase the relative frequency, and reduce the load factor in comparison with those of rival private railways. In the competitive line, the railway with the better quality of service as well as lower fares will be likely to carry a larger-than-proportionate share of the traffic. Because offering better services is believed to enable railways to capture the relative large proportion of available traffic, each railway would attempt to gain an advantage by increasing frequency and lowering load factor and being a follower not a leader in price wars. Graphically this relationship forms as S-shaped curve as in Figure V-2. The vertical axis shows the relative share of the JR

compared with that for the private railways. The ratio one indicates the 50-50 share between the JR and the private railways. The horizontal axis shows the JR's relative magnitude of the three strategic elements such as fares, frequency, and the load factor to those of the rival private railways. Again the ratio one means that these three elements are in balance among them. Increases in JR's competitiveness require movements of the share-strategic elements profile in the northeasterly direction. The following are examples which show how benchmark competition is working. Since we selected lines with the same distance, fares in the following Tables are ones which each railway company charges.

5.36 X line Case: As shown in Table V-9, the JR since privatization has been increasing frequencies at peak time. Although the private railway still keeps its dominant market share in this line, the JR has been successful for obtaining more patronage than before and expanding significantly its market share from 5.7% in 1987 to 11.31% in 1991. Since the difference in fares between the JR and private railways has been widening, this may have some influence on the expansion of passengers using the JR.

**Figure V-2: The Conceptual Chart of Relationship between the Market Share and Strategic Elements**



Note: The vertical axis = The relative share of JR to that for the rival private railways  
The horizontal axis = The strategic element such as the ratio of JR's fares, frequency, and the load factor to those of the private railways  
Increases in JR's competitiveness require movements of the share-strategic elements profile in the northeasterly direction.

**Table V-9 Benchmark Competition in X Line**

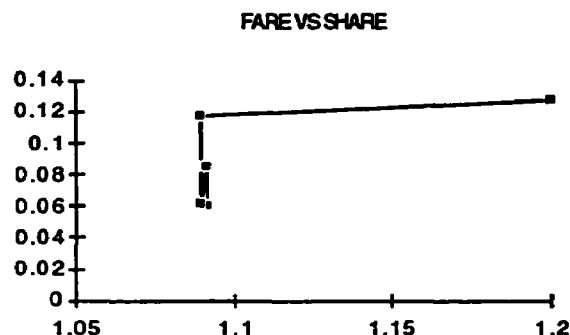
		1987	1988	1989	1990	1991
Number of passenger at peak hour	JR	1,214	1,653	1,230	2,391	2,680
	Private	20,050	19,510	19,890	20,430	20,450
Fare (yen)	JR	440	440	450	450	450
	Private	480	480	490	490	540
Load factor at peak(%)	JR	139	140	118	131	143
	Private	162	158	161	165	165
Frequency at peak hour (no. of trains)	JR	4	5	7	7	7
	Private	18	18	18	18	18

5.37 The Figures V-3,4,5 show the relationship between the JR's market share and the relative fares, load factor, and train frequency of JR to those for the rival railway. Obviously the movements in the northeasterly direction show improvement of JR's competitiveness. Although no one single factor is decisive in improvements in JR's competitive edge, it seems that relatively lower fares and higher train frequency of JR have been contributing to an

increase in its relative share of passengers on this line from 1987 to 1991.

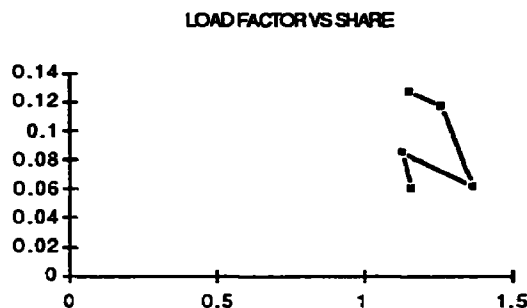
5.38 Y Line Case: In the case of Y line, the JR had relatively a large share of the market before privatization. The JR after privatization made efforts to increase the frequency of trains at peak time by 60% from 1987 to 1991. In contrast to this, the private railway did not have room to increase frequency, because of the limited capacity of infra-

**Figure V-3: The relationship between the relative level of JR's fares and JR's market share**



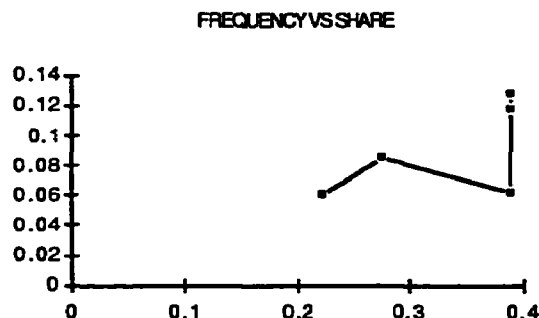
Note: The vertical axis = the market share of JR in the X line from 1987 to 1991.  
The horizontal axis = the relative advantage of JR's fares against the rival in the X line from 1987 to 1991.

**Figure V-4 The relationship between the relative level of JR's load factor and JR's market share**



Note: The vertical axis = the market share of JR against the rival in the X line from 1987 to 1991.  
The horizontal axis shows the relative advantage of JR's load factor against the rival in the X line from 1987 to 1991.

**Figure V-5: The relationship between the relative level of JR's train frequency and JR's market share**



Note: The vertical axis = the market share of JR in the X line from 1987 to 1991.  
The horizontal axis = the relative advantage of JR's train frequency against the rival in the X line from 1987 to 1991.

structure. As a result, JR has succeeded in expanding its market share from 19% to 28%. Because fares were in balance between the JR and the private railways, the competition took the form of increasing frequency and reducing the load factor. Table V-10 indicates the strategic policies of both JR and the private railway in competing lines.

5.39 The following figures indicate how improvements in JR's service levels may be responsible for the increase in passengers for the JR in Y line from 1987 to 1991. Both the JR and the private railway did not raise fares for six years, owing to benchmark competition. However, the JR's market share has increased drastically. The Figure V-6, 7 and 8 may indicate that when fares are not different between rivals, the relative level of service quality becomes important to determine relative market shares. In this line the relative increase in train frequency seems to be a key for the increase in JR's market share.

5.40 Z Line Case: As Table V-11 shows, JR had a relative high share in this market and expanded its market share after privatization from 1987 to 1988. However, the private railway counterattacked JR's expansion policy by increasing its frequency from 1989 to 1991. As a result, JR was forced to reduce its market share compared to the private railway from 1988 to 1989. JR has gradually regained its competitiveness from 1990 onwards when the rival's concern raised its fares. JR's lower load factors may

have provided favorable conditions for the JR to regain its market share. Note that due to changes in the location of traffic research from 1989, train frequencies and load factors in 1987 and 1988 are adjusted to maintain consistency of data.

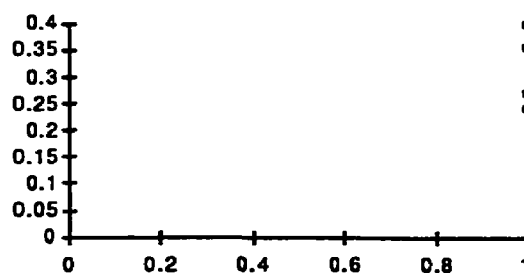
5.41 In Z line the relative low fares of JR and increase in train frequency may be responsible for the increases in JR's market share from 1987 to 1991. The following Figures V-9,10, and 11 show the relationship between JR's market share and three variables. In this line there is a clear-cut relationship between the market share and relative fares as well as relative frequency, but not between the market share and relative load factor.

5.42 There is no single decisive factor for increases in the relative share of JR's passenger in these three lines, because various elements jointly have contributed to improvements in JR's relative competitiveness. However, the load factor is obviously not an important factor for measuring the relative increase in JR's market share, partly because the load factor might be used as a means for increasing transportation capacity for the short terms in order to cope with the shortage of the capacity, and partly because the load factor itself is estimated by dividing the number of the passenger by train frequency at peak time. These case studies indicate that benchmark competition has enhanced the level of service quality in these competitive lines

**Table V-10 Benchmark Competition in Y Line**

		1987	1988	1989	1990	1991
Peak no. passengers	JR	8,876	9,899	12,871	13,013	14,706
	Private	36,829	37,127	36,815	36,970	37,170
Fare (¥)	JR	430	430	440	440	440
	Private	430	430	440	440	440
Peak load factor (%)	JR	174	167	134	124	130
	Private	181	178	171	169	168
Peak frequency (no. of trains)	JR	8	10	10	11	13
	Private	26	26	26	26	26

**Figure V-6: The relationship between the relative level of JR's fares and JR's market share**  
FARE VS SHARE



Note: The vertical axis = the market share of JR. The horizontal axis = the relative advantage of JR's fares against the rival in the Y line from 1987 to 1991.

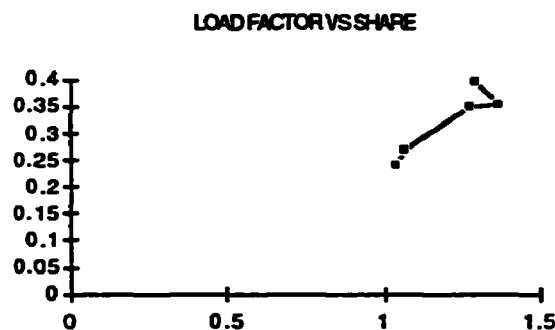
and the benefits of improvements have been passed on to commuters.

#### Appendix: A Simple Integrated Analysis of Benchmark Competition

5.43 It is difficult to analyze directly the overall effect of benchmark competition on the modal choice because data are limited to only five years after privatization. We could not apply any econometric methods to study the effects of benchmark competition on market shares. The following analysis is an attempt to assess how JR's efforts may affect its market share through benchmark competition. The basic assumption is that the number of passen-

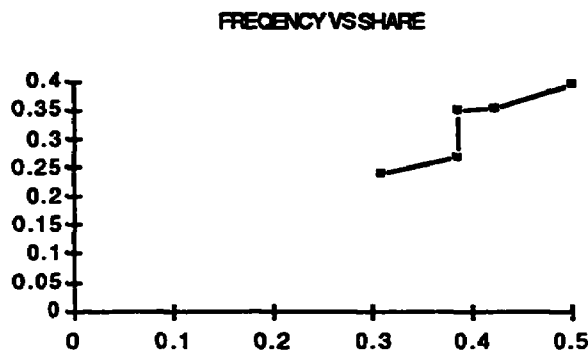
gers may be determined jointly by the relative level of fares, relative level of load factor, and relative level of frequency. Note that, econometrically speaking, because the load factor is determined by dividing the number of passengers by train frequency, there might be a strong tendency to correlate traffic with these two factors. Although there is no way to avoid these statistical problems, since there has been no attempt so far to investigate the effect of benchmark competition on market share, we have tried to adopt the following simple analysis. It is assumed that there is a linear relationship between JR's relative level of fares, load factor, and frequency and JR's relative market share as follows:

**Figure V-7: The relationship between the relative level of JR's load factor and JR's market share**



Note: The vertical axis = the market share of JR. The horizontal axis = the relative advantage of JR's load factor against the rival in the Y line from 1987 to 1991.

**Figure V-8 The relationship between the relative level of JR's train frequency and JR's market share**



Note: The vertical axis = the market share of JR. The horizontal axis = the relative advantage of JR's train frequency against the rival in the Y line from 1987 to 1991.

**Table V-11 Benchmark Competition in Z Line**

		1987	1988	1989	1990	1991
Peak no. of passengers	JR	9,515	10,515	10,117	10,933	12,404
	Private	29,574	29,768	30,290	31,075	32,259
Fare (¥)	JR	380	380	390	390	390
	Private	390	390	400	460	460
Load factor at peak(%)	JR	176	169	126	122	130
	Private	173	171	166	162	159
Peak frequency (no. of trains)	JR	7	9	9	10	11
	Private	27	27	28	30	32

$$P_{jr}/P_{pv} = C \{ (F_{pv}/F_{jr})^a + (L_{pv}/L_{jr})^b + (Q_{pv}/Q_{jr})^c \}$$

where

$P_{jr}/P_{pv}$  = the ratio of JR's passenger to the private railway's passenger,

$F_{pv}/F_{jr}$  = the ratio of fares of the private railways to JR's fares,

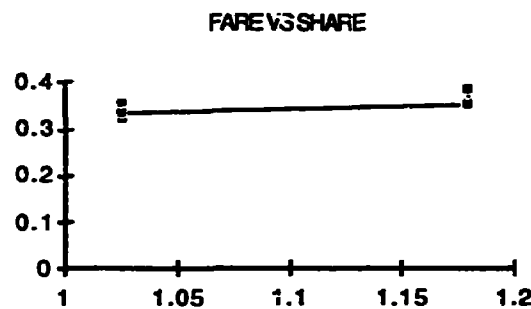
$L_{pv}/L_{jr}$  = the ratio of load factor of the private railways to JR's load factor,

$Q_{pv}/Q_{jr}$  = the ratio of train frequency of the private railways to JR's train frequency.

5.44 The equation indicates that if the situation is favorable to JR in terms of the relative ratio of fares, load factor, and frequency, JR's relative market share will increase over time. C is a kind of coefficient to determine the slope of the equation.

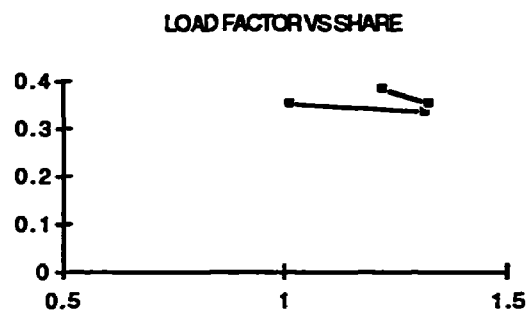
The larger the value of C is, the steeper the slope becomes. C may suggest how changes in JR's fares, load factor, and frequency could affect on the modal choice of commuters who might select the railway which offers better quality of service, other things being equal. In that sense C could be a proxy to show the sensitivity of commuter choice. C is called choice index hereafter, and shows indirectly the intensity of benchmark competition over time. In reality, JR has been trying to keep fares unchanged, reduce the load factor, and increase frequency to win more passengers. Although the analysis cannot take into consideration how many passengers have shifted from a private railway to JR and vice versa or from passenger cars to JR, it may

**Figure V-9: The relationship between the relative level of JR's fares and JR's market share**



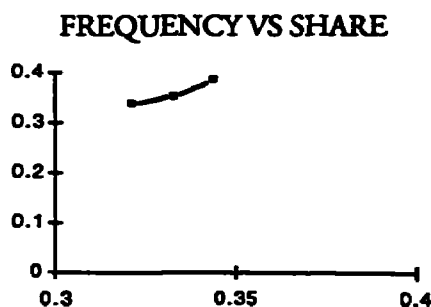
Note: The vertical axis = the market share of JR in the Z line from 1987 to 1991. The horizontal axis = the relative advantage of JR's fares against the rival in the Z line from 1987 to 1991.

**Figure V-10 The relationship between the relative level of JR's load factor and JR's market share**



Note: The vertical axis = the market share of JR in the Z line from 1987 to 1991. The horizontal axis = the relative advantage of JR's load factor against the rival in the Z line from 1987 to 1991.

**Figure V-11 The relationship between the relative level of JR's train frequency and JR's market share**



Note: The vertical axis = the market share of JR in the Z line from 1987 to 1991. The horizontal axis = the relative advantage of JR's train frequency against the rival in the Z line from 1987 to 1991.

show the interaction between JR and a private railway.

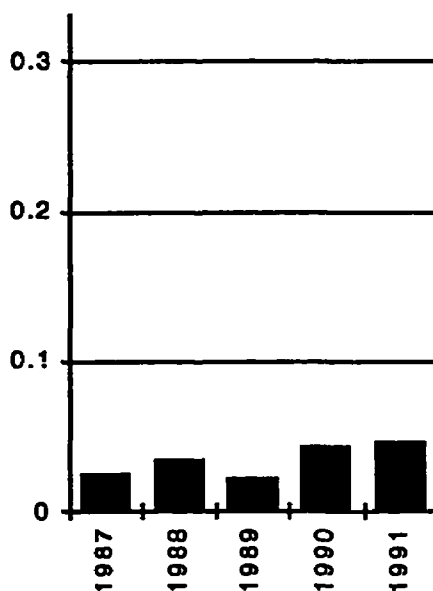
5.45 Although the coefficients,  $a$ ,  $b$ , and  $c$  are unknown, it is obvious that  $a$  and  $b$  are non negative values ( $a, b > 0$ ) and  $c$  is a negative value ( $c < 0$ ). Since  $a$  and  $b$  are the coefficients to show the relative level of fares and load factor of JR to the private railways, their positive values mean that if JRs offer relatively lower fares and lower load factors than their counterparts, JRs could increase their market share. The coefficient  $c$  must be nega-

tive because if JR's relative frequency is larger than that for the private railways JRs could increase their market share, which is shown as the inverse of the relative frequency of JRs to the private railways. Although there is a need to estimate these coefficients (elasticities), because of data availability we did not estimate them. For the sake of simplicity, we define here  $a$  and  $b$  as being plus one ( $a, b = 1$ ) and  $c$  is minus one ( $c = -1$ ). If JR and the private railway share the market equally, and if JR is equivalent to the private railways in terms of fares,

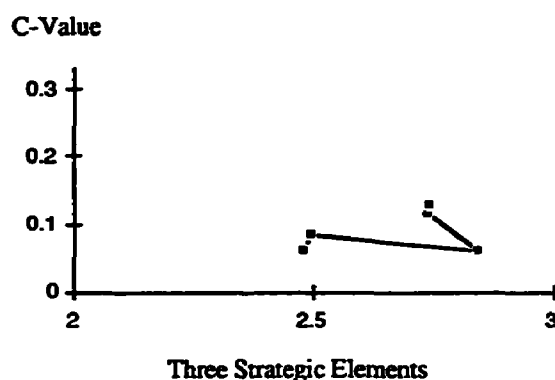
**Table V-12 Changes in Choice Index in the case of X-Line**

	1987	1988	1989	1990	1991
C Values	0.024	0.034	0.022	0.043	0.046

**Figure V-12 Changes in JR's Choice Index in the case of X-Line**



**Figure V-13 Changes in JR's relative competitiveness**



Note: The vertical axis = C-values. The horizontal axis = Relative Fare + Relative Load Factor + Relative Frequency. Movements to the northeast direction mean that JR's relative advantage is increasing over time.

load factor, and frequency, C will be 1/3 or 0.33, because the numerator  $F_{pv}/F_{jr}$  is equal to 1 and the denominator is the sum of  $F_{pv}/F_{jr}=1$ ,  $L_{pv}/L_{jr}=1$ , and  $Q_{pv}/Q_{jr}=1$  so that the sum of these ratio becomes three. In other words, when the competitiveness of JR and the private railway is in equilibrium, C would be 0.33. The relative increase in JR's competitiveness owing to benchmark competition can be measured by the deviation of C from an equilibrium value of 0.33 over time.

5.46 Tables V-12 to 14 and Figures V-12 to 17 show the changes in C values of three lines, which may indicate the degree of the modal choice of benchmark competition from 1987 to 1991. Prefer-

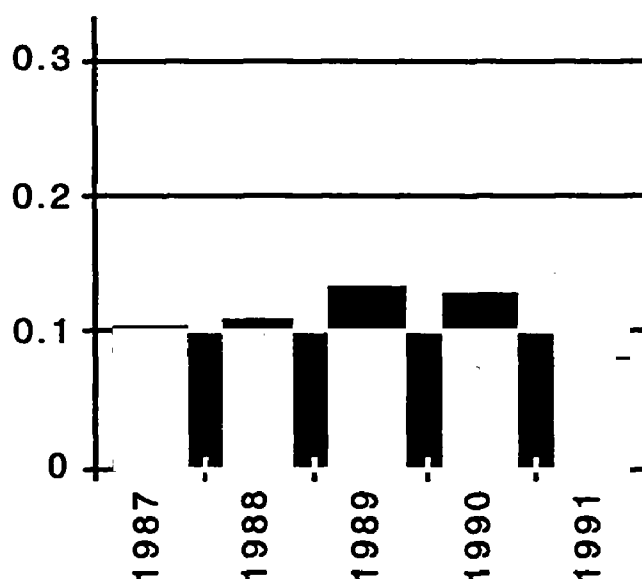
ence to JR due to benchmark competition in X-Line increases about twice from 1987 to 1991. Figure V-13 shows the changes in the relationship between JR's competitiveness and three variables over time.

5.47 In Y line, since the JR increased its frequency, it became more attractive than before. As shown in Table V-13 and Figure V-14, the calculated C values in Y line are not only higher than those in X-Line but also increased by about 40% from 1987 to 1991. The JR has succeeded in expanding the market share by improving the quality of service. Figure V-15 shows changes in the relationship between JR's competitiveness and three variables over time.

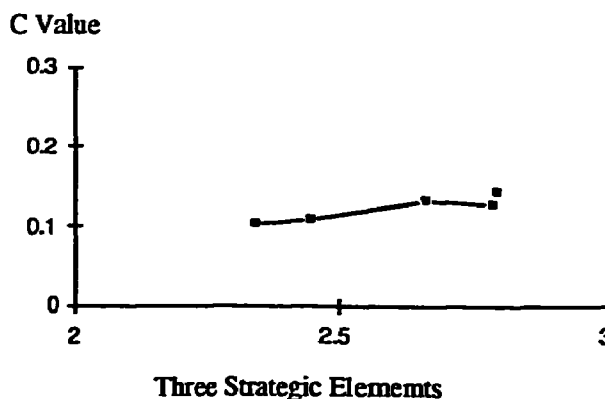
**Table V-13 Changes in Choice Index in Y-Line**

	1987	1988	1989	1990	1991
C Values	0.103	0.109	0.132	0.126	0.142

**Figure V-14 Changes in Choice Index in Y-Line**



**Figure V-15 Changes in JR's Relative Competitiveness**



5.48 The following Table V-14 and Figure V-16 show the changes in Choice Index in Z-Line from 1987 to 1991. Since the private railway continued to increase its frequency from 1988 to 1989, JR's competitive edge was reduced, but after owing to increase in the relative frequency of JR, the situation for JR gradually has been improving. Figure V-17 shows the changes in the relationship between JR's competitiveness and three variables over time.

**Economic Analysis of JR Freight**

*Changes in Cost and Service Output of JR Freight*

5.49 The main purposes of the creation of a nation-wide Japan Freight Railway Company (JR Freight) were to reduce the snowballing deficits of the freight section of JNR and provide an opportunity for restructuring freight operations and redressing inefficiency. It was expected that JR Freight could stand alone financially and survive in the very

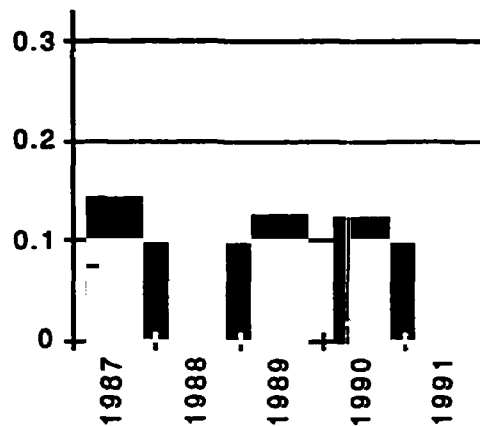
competitive market, if it was freed from the heavy burden of maintaining infrastructure. For the first two or three years after separation from JRs passenger, thanks to the economic boom in the late 1980's and the severe shortage of workers in the trucking industry, JR Freight made fairly good progress in expanding its market share. However, after the burst of the bubble economy in spring 1991 demands for railway freight have been fallen rapidly, since shipping general goods by railway is considered the last choice for customers who place priority on delivery time. As a result, JR freight finds it difficult to maintain even the current market share, which is less than 5% of the total freight market on a ton-km basis.

5.50 One of the problems JR faces is heavy dependence of JR Freight on forwarders to collect freight. Traditionally JR Freight has not been equipped with the necessary marketing functions and does not have trained people to engage in sales

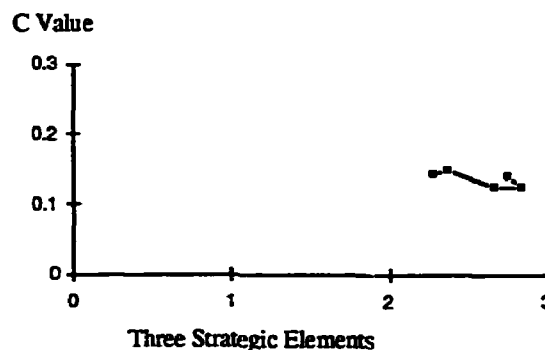
**Table V-14 Changes in Choice Index in Z-Line**

	1987	1988	1989	1990	1991
C Values	0.142	0.149	0.125	0.124	0.140

**Figure V-16 Changes in Choice Index in Z-Line**



**Figure V-17 Changes in JR's competitiveness**



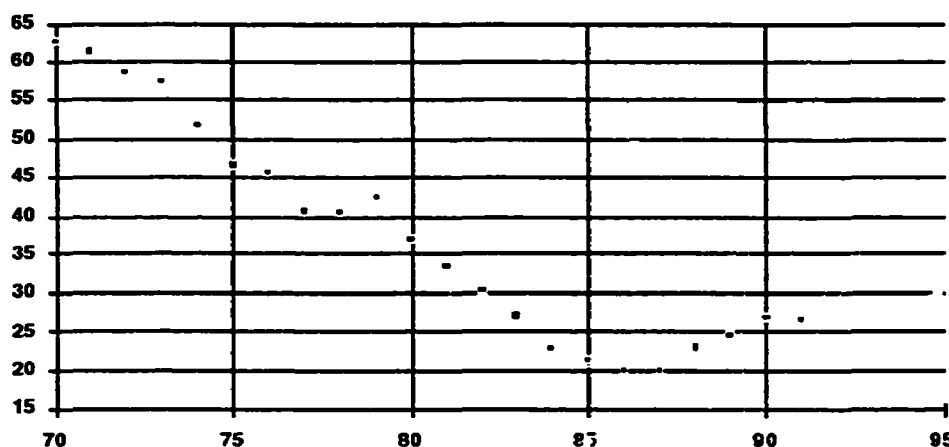
Note: The vertical axis = C-values. The horizontal axis = Relative Fare + Relative Load Factor + Relative Frequency Movements to the northeast direction mean that JR's relative advantage is increasing over time.

activities. JR Freight is in a very weak position to access directly its clients in the general goods market when compared with forwarders. The trucking companies are closer to final consumers than JR Freight and have better knowledge of what the customers want. Trucking companies were able to make use of the transportation capacity of JR Freight as a buffer to adjust supply and demand for their own interest. When they cannot handle demand, for example, because of a shortage of drivers or trucks, they may use JR Freight to transport goods. Since there is asymmetric information between JR Freight as principal and trucking companies as agents, JR Freight can monitor imperfectly the opportunistic behavior of trucking companies who may act cooperatively or non cooperatively to maximize their own profits. The Ministry of Transport attempts to promote use of railways in the freight market from the viewpoint of coordination among transportation modes. But JR Freight is losing its competitive edge mainly because of time-cost inefficiency.

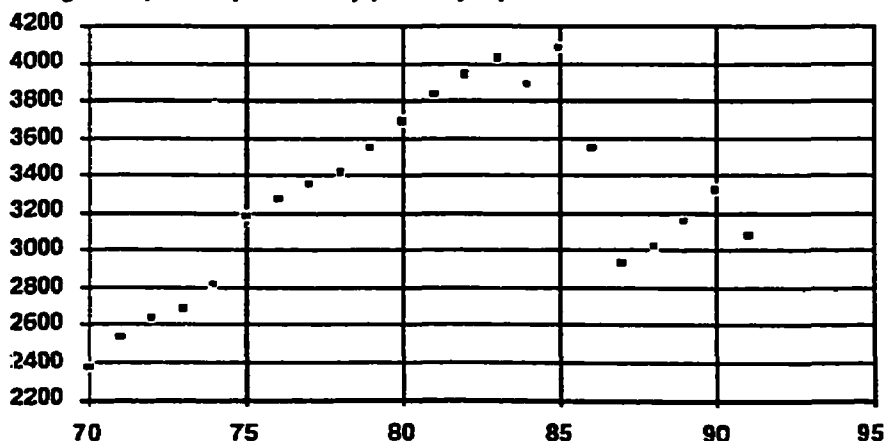
5.51 JR Freight in effect borrows tracks by paying user fees to JR's passenger companies. Under this situation, the important question is whether or not the user fees JR Freight pays cover the relevant cost of track use. According to the contract between JR's passenger and JR Freight, user fees are supposed to be based on avoidable cost. To assess whether JR Freight financially stands alone or not, it is important to study whether user fees are close to the marginal or average cost of railway operations. If the user fee is smaller than the marginal cost, there will be a possibility of cross-subsidization between passenger JR's and JR Freight. If so, the user fee JR Freight currently pays may not be justified from the standpoint of efficiency.

5.52 Figure V-18 shows changes in ton-km of railway freight from 1970 to 1991. Railway freight showed a sharp decline in the 1970s and 1980s, but since privatization in 1987 demand for railway freight has shown an overall increasing trend. As shown in Figure V-19, however, demand began to decrease again from 1992, owing mainly to the sluggish

**Figure V-18: Trend of Freight Transport (Ton-km)**  
*X=year Y=ton-km (billion)*



**Figure V-19: Trend of Operating Cost (less Depreciation)**  
*X=year Y=operating cost (less depreciation) (billion yen)*



economy. In spite of decreasing demands, the operating cost of JR Freight surprisingly increased sharply. The operating costs reached peak at 1985, and since then there have been parallel changes between demands and cost. This means that during the relevant period the JNR freight section may have been a major cause for the JNR's huge deficit. To restructure the deficit-ridden freight section, JR Freight needed to be cut off from passenger transportation activities.

#### *Estimation of Cost Function*

5.53 JRs as a whole jointly supply two different services - passenger and freight - using the same infrastructure. Since JR passenger companies own the track, JR Freight is supposed to pay user fees for the use of track based on the avoidable costs, as discussed earlier. The problem is how to allocate common costs which include not only the cost of providing track but also the costs for signaling, terminals, electricity generation stations, and so forth, since common costs form a very substantial part of total cost for railway operations. Moreover, there is a large portion of common cost which is not clearly traceable. JR passenger companies use an accounting method that allocates common costs to one activity or another. From an economic point of view, however, accounting costs are of limited guidance in setting user fees for the use of track. Generally speaking, the accounting method does not conform to economic costing methods. The problem is that there are significant differences associated with the costs of track used exclusively for passenger services and that used only for freight. This means that the calculation of avoidable cost is changed by its definitions. The concept of avoidable cost becomes rather dubious as a mean to allocate common costs. It is important to study whether JR Freight is covering its specific costs plus contribution to overheads from the standpoint of economic analysis, because if user fees for the track use are less than the avoidable costs, then JR Freight is making a loss for JR passenger companies.

5.54 To determine whether JR Freight may cover the relevant track costs from the viewpoint of efficiency, the following procedure is used here: first, operating costs of passenger and freight services are estimated by time-series and cross-section regression analyses using data of output of passenger and freight and network conditions. Secondly, the average cost and marginal cost, economies of network density, economies of scale, and economies of scope are calculated to clarify the cost

structure. Thirdly, avoidable costs are calculated under various scenarios. Finally, the estimated avoidable costs are compared with the average cost and marginal cost in order to determine whether the user fee for the track use is appropriate or not. This may give an indication as to what extent JR Freight is cross-subsidized by JR's passenger.

5.55 The avoidable costs are defined as follows: Suppose that  $C(Q_p, 0)$  is Stand-Alone cost to operate only passenger railways (the cost of supplying passenger service in isolation), and  $C(0, Q_f)$  is Stand-Alone cost to operate only freight railways (the cost of supplying passenger service in isolation).  $C_t$  is the sum of two Stand-Alone cost, that is  $C_t = C(Q_p, 0) + C(0, Q_f)$ . Assume that  $C_j = C(Q_p, Q_f)$  is the joint cost when a railway company supplies both passenger and freight services at the same time. Since the avoidable costs are defined as costs saved if either passenger service or freight service is withdrawn, they are obtained by dividing incremental costs by output as follows:

$$AVC_p = \{C(Q_p, Q_f) - C(0, Q_f)\} / Q_p, \text{ for fixed } Q_f$$

and

$$AVC_f = \{C(Q_p, Q_f) - C(Q_p, 0)\} / Q_f, \text{ for fixed } Q_p$$

where  $Q_f$  stands for output of freight service and  $Q_p$  shows output of passenger service. There are two kinds of the avoidable costs. The problem is in defining the base from which to begin to the series of allocations, passenger service or freight service. Which definition is used depends on whether the infrastructure of railway is mainly designed for passenger service with freight service imposing additional costs or not. If priority is given to passenger service,  $AVC_f$  should be used. If priority is given to freight service,  $AVC_p$  should be used. However, it is a general understanding in Japan that passenger JRs provide important intercity services and also play a key role of providing commuter services in major urban areas. It may be reasonable to suppose that JR passenger companies have priority over JR Freight. In this case, the avoidable costs are calculated on the basis of how much JR passenger companies could save cost of operations if freight services were abolished. The avoidable costs can be determined by the joint cost  $C(Q_p, Q_f)$  minus cost of passenger service  $C(Q_p, 0)$ , that is  $AVC_f$ .

5.56 To judge whether user fees are relevant or not, there is a need to know whether economies of scope and scale exist in JRs operations as a whole. If

the joint cost ( $C_j$ ) is smaller than the sum of Stand-Alone costs ( $C_t$ ), this may indicate the existence of economies of scope in railway operations. In other words, if the total costs of supplying jointly passenger and freight services by monopoly are smaller than those for supplying them separately by two independent railway companies, this may indicate that the joint production of passenger and freight services can save costs compared with separable provisions of these services. If the result is the opposite and so diseconomies of scope exist, the break-up of passenger service from freight service or vice versa may be desirable. Our measurement of economies of scope (ESP) is the ratio of the sum of Stand-Alone costs to total costs as follows:

$$\text{Economies of Scope (ESC)} = [C(Q_p, 0) + C(0, Q_f)] / C(Q_p, Q_f)$$

If ESC is greater than one, this means that economies of scope exist and if it is less than one, it shows diseconomies of scope.

5.57 Diseconomies of scope in railway operations might arise if the joint use of track for passenger and freight services have affected adversely each other, for example, owing to conflict of scheduling and the need for managerial adjustment between them. There might be large transaction costs for adjusting the two different operations. The joint cost  $C_j$  could become larger than the sum of two Stand Alone costs if economies of scope are smaller than diseconomies of scope. Whether or not the joint cost becomes larger than the sum of Stand Alone costs may depend on whether or not diseconomies of scope (cost-augmenting activities) are larger than economies of scope (cost-saving activities). In this case, the calculation of avoidable cost is far more complex than we expect. It is extremely difficult to separate economies of scope from diseconomies of scope in railway operations. Instead we will use regression analysis to give overall assessment on the relevancy of user fee.

#### *Estimation of Cost Function of JRs*

5.58 It is assumed that costs are explained by two kinds of service outputs, network factors, and some dummy variables as follows:

$$C = C_p + C_f = f(Q_p, Q_f, N_i, D)$$

where

$C_p$  = operating cost of passenger

$C_f$  = operating cost of freight

$Q_p$  = output in passenger transport (i.e. passenger-km)

$Q_f$  = output in freight transport ( ton-km)

$N_i$  = network variables (i.e. route-km, trip length etc.), and  $D$  = dummy variables (i.e. privatization dummy).

5.59 Since samples are small, simple log-linear cost function is used here. The advantage of log-linear cost function is that the coefficients of each variable represent the elasticities of cost. To avoid bias of estimation, different sample sets and different kinds of models are introduced. Basically two kinds of cost specification are used as follows:

( for time-series sample)

$$\ln(C) = a + b_1 \ln(Q_p) + b_2 \ln(Q_f) + c \ln(N) + d \text{ PRV}$$

(for cross-sectional sample)

$$\ln(C) = a + b_1 \ln(Q_p) + b_2 \ln(Q_f) + \sum c_i \ln(N_i) + d \text{ JR}$$

where PRV and JR are dummy variables. In the first estimation equation the dummy PRV is assigned a one for after privatization and a zero for before privatization. In the second equation the dummy JR is a one for JR and a zero for private railways.

5.60 Table V-15 shows the results of estimation in cases of time-series ordinary least square method (Model-1), first-order autoregressive method (Model-2), cross-sectional method (private railways only, Model-3), and cross-sectional method (JRs plus private railways, Model-4). The  $R^2$ 's are very high, although the  $t$ -statistics are relatively small. Generally speaking, route-km has high elasticity in most models, which show that length-of-route variable may have a strong impact on changes in cost. In cross-sectional analysis, elasticity of passenger-km is also large both in the case of private railways only and in the case of JRs plus private railways, which may indicate that output of service is an important factor to set the cost. However, differences in the size of output between JRs and the private railways are extremely large, which may give bias to the estimation results.

5.61 Table V-16 shows the estimated average cost and marginal cost of JRs using the above-mentioned models. Average cost of passenger JRs in time-series analysis is about 11 yen per passenger-km and that for cross-section analysis is in between 7 and 8 yen per passenger-km. In case of JR Freight, average cost ranges from 43 to 88 yen per ton-km in the time-series analysis, but in cross section analysis it has hovered around 35 yen per ton-km.

5.62 Economies of network density, economies of scale, and economies of scope using the same

model specification are shown in Table V-17. Economies of network density are defined as the proportional increase in costs due to the proportional increase in output, fixing input prices, network factors, and service output characteristics. Economies of scale are calculated as the proportional increase in cost resulting from the proportional increase in output and route length, fixing input prices and service output characteristics. Economies of scope mean that the cost of joint

production is smaller than individual costs of production. There are very large economies of network density in time series analysis, although in the cases of cross section analysis economies of network density decline almost one-half compared with time-series cases. As far as economies of scale are concerned, they range from 1.00 to 1.58, which are a little higher than North American railways study by Cave, Christensen, and Swanson [1981], but close to the result of American urban railways study by

**Table V-15: Estimation Results : Coefficients and Standard Errors**

Model type of sample	Model-1 time-series (1981-91)	Model-2 time-series (1981-91)	Model-3 cross-sectional (private only)	Model-4 cross-sectional (JR+private)
Method	OLS	AR1	OLS	OLS
ln(Qp) (passenger-km)	0.172 (0.348)	0.151 (0.391)	0.422 (0.062)	0.348 (0.127)
ln(Qf) (ton-km)	0.044 (0.125)	0.127 (0.161)	0.084 (0.076)	0.076 (0.157)
ln(Lr) (route-km)	0.505 (0.601)	0.353 (0.696)	0.493 (0.120)	0.533 (0.223)
ln(lp) (passenger trip length)	-	-	-0.545 (0.084)	-0.462 (0.176)
ln(lf) (freight trip length)	-	-	-0.108 (0.090)	-0.102 (0.186)
PRV (privatization dummy)	-0.209 (0.083)	-0.224 (0.095)	-	-
JR (JR dummy)	-	-	-	0.330 (0.847)
constant	28.982 (0.041)	28.995 (0.048)	24.495 (0.232)	25.769 (0.866)
R**2	0.9091	0.9203	0.9600	0.8522

Note: The numbers in the parenthesis are the standard errors.

**Table V-16: Estimated Average Cost and Marginal Cost**

type of cost	model-1 (time-series: OLS)		model-2 (time-series: AR1)		model-3 (cross-sectional: private only)		model-4 (cross-sectional: JR+private)	
	AC	MC	AC	MC	AC	MC	AC	MC
passenger JRs	11.5	2.0	11.1	1.7	6.9	2.9	7.9	2.8
freight JR	43.7	1.9	87.8	11.1	34.2	2.9	35.5	2.7

Note: 1) AC is average incremental cost  $\{(C_j - C_p)/Q_j\}$  and MC is marginal cost, which is obtained by AC times elasticity.

2) These numbers are estimated results using 1991 statistics of JR.

**Table V-17: Economies of Network Density, Scale and Scope**

	model-1 (time-series: OLS)	model-2 (time-series: AR1)	model-3 (cross-sectional: private only)	model-4 (cross-sectional: JR+private)
Economies of network density	4.63	3.60	1.98	2.36
Economies of scale	1.39	1.58	1.00	1.04
Economies of scope	0.76	0.43	0.26	0.30

Viton [1980]. This cost study suggests that there would be diseconomies of scope in JRs, since every values show far less than 1.

5.63 The estimation of avoidable costs is shown in Table V-18 under various scenarios. Scenario 1 indicates that all joint costs, in other words, all incremental costs resulting from joint production of passenger and freight service, are allocated to JR Freight. Scenario 2 is that all joint costs are attributable to JR passenger companies. In Scenario 3, all joint costs are allocated by share of outputs assuming the average weight of a person to be 70kg. Scenario 4 shows the estimation of avoidable cost using JR Freight's marginal costs. The avoidable cost per ton-km in this case is estimated as being between 14 yen and 43.7 yen per ton-km.

5.64 Table V-19 shows that the comparison of user fee and average and marginal cost based on time-series model-1. Since elasticity of ton-km ( $\ln Q_f$ ) is 0.044 and average cost is calculated by  $(C_t - C_p)/Q_f$ , we can obtain the marginal cost of 1.9 yen per ton-km by multiplying AC by the

elasticity. Although samples are small, it may be safe to conclude that JR Freight does not cover avoidable costs in any case. JR Freight pays only 0.65 yen as the user fee which is far lower than the marginal cost estimated here. From this econometric analysis there is little doubt that JR Freight is subsidized by JR passenger companies. The relationship between JR passenger companies and JR Freight must be changed from the viewpoint of efficient resources allocation. However, in the definition of avoidable costs, relevant costs are tied to the particular railway policy. There are social costs associated with road transportation which may justify the cross-subsidization of JR Freight by JR passenger companies if social costs of railway freight is less than that for trucking. As the second-best theory suggests, if prices in road sectors deviate from costs, there are sound economic reasons for railways to deviate from the marginal cost pricing. There is a strong need to study the costs of railway freight transportation from the viewpoint of externalities.

**Table V-18: Estimation of Avoidable Costs**

	description	cost for freight only	freight's share of joint cost	avoidable cost of freight	avoidable cost per ton-km (¥/ton-km)
Scenario 1	all joint cost is allocated to freight	381,314	784,991	1,166,305	43.7
Scenario 2	all joint cost is allocated to passenger	381,314	0	381,314	14.3
Scenario 3	all joint cost is allocated by share of outputs	381,314	476,411	857,725	32.1
Scenario 4	of all joint costs, marginal cost of freight	381,314	50,725	432,039	16.2

Note: (1) Costs to calculate avoidable cost are as follows:

$C(Q_p, 0)$  (only passenger) = 2,060,970 billion yen

$C(0, Q_f)$  (only freight) = 381,314 billion yen

$C_t$  (passenger & freight) = 3,227,275 billion yen

$C_j = C(Q_p, Q_f)$  (joint cost) = 784,991 billion yen

**Table V-19: Comparison between Fare Level and Costs**

	JR freight average rate	JR passenger revenue from track use	AC (average cost)	MC (marginal cost)
Ton-kmbasis	7.29	0.65	43.7	1.9

Note: AC (average cost) and MC (marginal cost) are estimated by the time-series results (method-1).

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