The Japanese Experience with Railway Restructuring

Fumitoshi MIZUTANI
Graduate School of Business Administration, Kobe University
2-1 Rokkodai, Nada-ku, Kobe 657-8501, JAPAN
toshi@rokkodai.kobe-u.ac.jp
and
Kiyoshi NAKAMURA
School of Commerce, Waseda University
1-6-1 Nishi-Waseda, Shinjuku-ku, Tokyo 160, JAPAN

1 INTRODUCTION

While many countries have privatized their railways since 1987, the privatization of the Japan National Railway in that year marked the first sweeping reform of a national railway in the world. Privatization has been accomplished in various ways in different countries. Indeed, railway restructuring in Japan has been markedly different from that in European nations. In this paper, we will explain the Japanese approach to railway reform and discuss the experience gained and lessons learned from the privatization process.

The paper consists of five chapters. The first summarizes the privatization of the JNR, explaining the impetus for privatization, the steps by which it is being achieved, the restructuring options which were available at the time of privatization, and the general characteristics of this privatization. Second, we will describe how the management of the privatized JRs differs from that of the former JNR. While most privatization studies focus on regulatory changes, we want to concentrate also on managerial issues such as corporate goals, relationships with interest groups, organizational structure, incentive systems, and task-improving activities. In the third chapter, we will show performance results of the JR companies since privatization, discussing not only overall performance but also rail fare, competition, and the operation of local rail service. Fourth, we will consider several policy issues related to rail restructuring, using as a basis for discussion these topics: regional subdivision, vertical integration, and yardstick competition. Finally, with the situation of developing countries in mind, we will outline important points related to rail privatization policy.

2 A SUMMARY OF THE PRIVATIZATION OF THE JNR

2.1 The Road to Privatization

Reasons for Privatization

Along with two other huge public entities, Nippon Telephone and Telegraph and the Japan Monopoly Public Corporation (Tobacco and Salt), which were privatized in the late 1980s, the Japan

National Railway (JNR) began the process of privatization in 1987, when it was partitioned into six regional passenger companies, abbreviated as JRs, and one nationwide freight company.

As a public corporation, the JNR encountered numerous organizational problems, such as complacency due to a lack of a sense of crisis, an antagonistic labor-management relationship, and political interference. Reforms were hindered by opposition from politicized labor unions, which were divided into several organizations. The repeated failure of rationalization produced an ineffectual alternation between easy dependence on government subsidies and halfway reforms. In 1964, for the first time in its history, JNR showed an operating loss, its competitiveness having been eroded by motorization and the failure to reduce its heavy burden of redundant employees. The hostile relationship between management and labor unions profoundly damaged morale in the workplace and lowered productivity and the quality of service.

It gradually became evident to those both inside and outside JNR that divestiture would be necessary to reduce the huge government subsidies supporting JNR and to enhance its efficiency. The idea that social infrastructure could be paid for not by the government out of strained budgets but out of private funding was not new in Japan, since much railway service had been and still is provided by private railway companies. Moreover, since inter-modal competition had drastically eroded the domain of JNR as a natural monopoly and the potential for competition in the market was extended, it became obvious that JNR, even though it was such a traditional and politically powerful entity, should be required to work within the framework of a market economy. A divestiture plan was devised by members of a special committee organized by several political entrepreneurs and by pro-privatization management inside JNR.

The Process of Privatization

An important fact about the JNR privatization was that it was not accomplished all at once, but was intended to be achieved in a step-by-step manner. When railway reform began in 1987, most stock of the newly established JRs continued to be held by the public sector at Japan National Railway Settlement Corporation (JNRSC), a temporary holding company established for this purpose. Stock was not immediately offered to the public because the government was concerned that the dismal reputation of the deficit-laden and inefficient JNR would affect stock prices negatively and there would be embarrassingly few investors interested in acquiring stock in the new railway companies. It was necessary to sell the stock at as high a rate as possible, to help alleviate some of the immense debt bequeathed by the JNR. The newly created JNRSC company would hold railway stocks until the newly privatized companies could establish a reputation worthy of a respectable stock offering, by increasing efficiency and showing profits. Thus, although the date of JNR's privatization is given as 1987, strictly speaking the JNR was not privatized that year but launched onto a course toward privatization.

Among the seven JR companies, the most rapidly privatized proved to be JR East, 62.5% of

whose stock went on the market in 1993. The subsequent recession delayed the issue of further stock until 1996, when a portion of JR West shares went on the market, followed by JR Central shares in 1997. To date, 62.5% of JR East's, 68.3% of JR West's, and 67.0% of JR Central's shares are held by the private sector. All shares of the other four JR companies, however, are still held by the government, and a specific plan for their issue has not been determined (e.g. Mizutani and Nakamura, 2000).

As of summer 2001, the privatization of the JNR is incomplete. Although the government still holds a large portion of the JR companies' stock, the railway companies are certainly on the way to full privatization.

2.2 Restructuring Options

General Important Features of Restructuring

As Moyer and Thompson (1992) point out, the restructuring of the railway business is composed of key elements which promote the ability of the railway to meet the needs of its potential users: assets, liabilities, work forces, management, business strategy. As case studies in Europe, America, and Japan indicate, different prototypes of restructuring have been adopted to enhance the competitiveness of railways. The following are major options for asset restructuring of the railway: geographical division, vertical separation, and functional distinction.

As for geographical division, due to a generic trait of transport markets, the railway market and physical assets such as the track and terminals can be divided geographically. Geographical market segmentations involve separating freight and passenger markets into several sub-networks. In general, traffic demands in railway are mainly local or concentrate on specific segments of the networks so that geographical segmentation may be better suited to offering services to meet local needs.

As for vertical separation, like telecommunications and other public utilities, the railway business constitutes (1) naturally monopolistic elements such as track maintenance and (2) potentially competitive elements such as train operations and commercial functions. Unbundling truck maintenance (the lower part of railway) from train operations (the upper part of railways), at least in theory, is considered one way of sharpening the competitive edge of railway in the transport market. However, as the case of British Rail indicates, the division of track from trains becomes problematic, because an adversarial relationship has developed between the central track authorities and the train operating companies. The difficulties of vertical separation come from high transaction costs, monitoring of the other's performance, creating complex performance schedules, and creating incentive in the track authority to invest in new facilities to increase efficiency and improve safety.

In terms of functional distinctions, railways serve basically two important markets, passenger and freight, each with its own operational and geographical uniqueness. A distinction between passenger and freight markets is logical since it would make the railway companies more responsive to specific needs of particular users. However, if economies of scope between the related

activities are known to be significant, a horizontal distinction policy is not the best choice.

As far as asset reorganization for debt reduction is concerned, there are various mechanisms such as the sale of non-essential assets by auction, public offering of stocks and land including terminals, franchising or leasing, or the sale of operating rights.

The Japanese Approach to Restructuring

It is difficult to choose the best general practices because specific options are most suitable for achieving specific purposes of restructuring. In the case of Japan, due to the highly dense population along the major railway lines and extremely large commuter demand in the metropolitan areas, vertical integration and geographical separation could be the best choice since large economies of scope seem to exist not only between related activities but also between railway and non-railway activities like residential development along the lines, tourism, retailing, and so forth. The question of which policies should be applied is perhaps the most important for enhancing the efficiency and competitiveness of railways, but there seems likely to be no general answer to this question. The most critical point is how structural reforms could include incentive mechanisms. The structural policy of a railway should go hand in hand with competitive measures for efficiency.

As we discussed in previous work, the Japanese approach to railway privatization has six distinguishing features: (1) horizontal separation (or regional subdivision); (2) functional distinction (or passenger-freight distinction); (3) vertical integration (or operation and infrastructure integration); (4) lump-sum subsidies for low density JRs; (5) the establishment of an intermediary institution; (6) allowance of non-rail service (Mizutani and Nakamura, 1997). With this study, we add to the list a new distinguishing feature: (7) the yardstick competition scheme. We will briefly explain these characteristics.

The main problem with the JNR was that it was too large an organization to be managed properly. Thus it was decided that the company would be separated into six regional passenger railway companies. After consideration of several options for separation, regional subdivision by geographical demand was decided upon. The smaller, subdivided companies would be expected to meet their users' local needs, and to compete with each other to improve their performance. In this subdivision, 95% of all trips would be completed within the borders of these regions. In addition to two distinct regional JRs, JR East and JR West in the Tokyo and Osaka metropolitan areas respectively, JR Central, based in Nagoya, was appointed to be the operator for the most profitable trunk-line Shinkansen between Tokyo and Osaka.

Second, the decision to separate former JNR's freight section from the six new passenger companies resulted from the loss of competitiveness as the trucking industry became more successful. It was feared that managerial responsibility, too, would be vague, were the freight division to be consolidated with the passenger companies. To avoid excessive financial burden on JR Freight, it would

borrow tracks from infrastructure-holding passenger JRs, instead of holding the tracks itself. Regional separation was not chosen, in order to retain scale merit.

Third, unlike in the European rail industry and in marked contrast to British Rail privatization, vertical integration was maintained after privatization. In theory, it was possible to introduce vertical separation of track ownership and rail operation, but this was not seriously discussed before privatization (e.g. Suga, 1997). Most railways in Japan are privately owned integrated systems, and their successful examples most likely made vertical separation seem an unattractive and excessively complicated option. Furthermore, since major urban private railways have been increasing profits by diversifying into various businesses such as running department stores and hotels at stations, developing residential land along the tracks, and promoting tourism, privatized JRs were expected to behave likewise, making the integration of track ownership and train operation desirable in light of the possibility for diversification.

Fourth, in order to stabilize the management situation for smaller JRs, a lump-sum subsidy scheme has been implemented through the Management Stabilization Fund (MSF), with interest revenues from the Fund to cover these subsidies. Since the Three-Island JRs were handicapped by geographical locations with relatively small populations and the rapid development in their regions of highway networks, lump-sum funds (1,278 billion yen) were channeled to these JRs. The fund, which originally took the form of a ten-year debt owned by the JNR Settlement Corporation, was supposed to yield interest and subsidize the operation losses of these JRs. While the Corporation for Advanced Transport and Technology (CATT) has borrowed funds from the MSF for the three small-island JRs at a fixed interest rate of 4.99% since 1997, the subsidy scheme is scheduled to be eliminated by the end of fiscal year 2001. Without MSF these JRs will go in the red, making them unattractive candidates for listing on the stock market, so that they have postponed plans for issuing their stock.

Fifth, JNRSC was set up as an intermediate institution to repay the debts of the JNR and to find new jobs for its redundant employees. The Japanese government and JNR management placed top priority on facilitating the transfer of dismissed employees to other sectors by enacting a special law for reemployment of former JNR workers in the process of privatization. As a result, in contrast to privatization practices elsewhere in the world, little labor rationalization was undertaken. To avoid sweeping layoffs, every imaginable means of reducing unemployment and social conflict were introduced such as transfers to local governments, to public organizations such as the National Tax Administration Agency, the Police Agency and the Meteorological Agency and the flourishing NTT as well. Moreover, the JNRSC was established to transfer these redundant workers smoothly to other sectors. With generous inducements for voluntary retirement, reduction in the work force had begun well before the implementation of privatization, so that only 1,047 remained to be dismissed in the process of privatization.

Sixth, JRs have been allowed to engage in non-rail business, as private rail companies have been doing in Japan for decades To increase demand for rail transportation, private rail companies

conduct such businesses as housing development, tourism, and the operation of other modes of transport such as buses. The JR companies have begun to follow the example of these private railways and tried their luck in various non-rail related enterprises.

Last, a yardstick competition scheme was introduced. Under this scheme, rail operators compete with each other to improve performance, and the regulator assesses the operators' performance by using common measures, results of which assessment are to be used when fare revision is being considered.

Regulatory Changes and Ongoing Plans

Table 1 shows regulatory changes and ongoing plans since privatization. First, the organization form was converted from a public corporation, which was one government body, to a special corporation in a stock-company style commercial body but still regulated by special laws (Mizutani, 1999a). These are expected to become fully private corporations, and special laws related to them are to be abolished.

Table 1 Major Regulatory Change by Privatization and Future Result

Item	Before Privatization	After Privatization	Ongoing Plans
(1) Organization	Public corporation	Special corporations	Genuine private companies
(2) Operations	Nationwide service	Six regional passenger companies and one freight company for all Japan	No change
(3) Rail services	Integrated services of passenger and freight	Separation between passenger and freight services	No change, but possibly reorganization of the freight company
(4) Scope of business	Rail-related services only	Non-rail-businesses (e.g., residential development, tourism) allowed	More diversification of businesses
(5) Approval of fare	Approval by the Diet	Approval by Transport Minister	Notification to Ministry of Land, Infrastructure, and Transport
(6) Fare regulation	Strict control by the government	Strict control by the government Installation of yardstick competition scheme in January 1997	Incentive regulations such as price caps
(7) Investment and financing	Capital supplied by the government and investment plan required Diet approval	JRs allowed to invest without Diet approval but Ministry approval required	No ministerial approval needed on important business matters, including the appointment of top executives, bond issuance, and borrowing

Second, operation and rail services were divided into six regional passenger companies and one nationwide freight rail company. So far, there are no specific further plans, but freight rail services might be reorganized because of recent concerns about environmental issues and competition with trucks.

Third, as for scope of business, as we mentioned above, JRs have been allowed to be involved in non-rail business since privatization, and these activities continue to expand, with the aim of securing rail ridership and fully utilizing internal resources.

As for fare approval and fare regulation, governmental intervention has been lighter after privatization. Before privatization, rail fare was approved by the Diet but is now regulated by the Transport Ministry, which is still ultimately a division of the national government. However, yardstick regulation has been introduced as an incentive scheme, and quite recently a price cap scheme has began to be considered in determining rail fare.

Finally, as for investment and financing, governmental intervention has lessened since privatization. In the future, with full privatization, JRs will enjoy more freedom.

JNR Debts and the JNR Settlement Corporation

The transfer of 37.1 trillion yen of liabilities was supervised by the JNRSC, which itself took on about 60% of the total debt and was expected to liquidate this liability by selling JNR-owned real estate (7.7 trillion yen) and selling stocks (1.2 trillion yen). The remaining 40% of the long-term debt was allocated to the three main-island passenger JRs. The three small-island JRs were exempted from liability because their profitability was very uncertain due to the small size of their markets and lower population density. The taxpayer originally was expected to bear the huge burden of over 13.8 trillion yen. The JNRSC has sold 6.22 million shares of the three main-island JRs' stock, out of a total of 9.19 million stocks. The Corporation has paid back 2.7 trillion yen. However, due to the delay in sales of stock and land after the collapse of the asset-inflated "bubble" economy in the early 1990s, the JNR Settlement Corporation's liabilities have been increasing due to interest payments which amount to about 1 trillion yen annually.

Although the JNRSC was reorganized as a division of the Japan Railway Construction Public Corporation (JRCC), and named the Japan Settlement Headquarters in 1998, there has been no change in the long-term debt issue. In spite of the current plan of JRCC to pay back 3.9 trillion yen by selling JR stocks and land, taxpayers will have to shoulder the 24.1 trillion yen loan, which is to be repaid from the general account budget over the next 60 years.

The Shinkansen Holding Company

The Shinkansen Holding Company was organized to own and lease infrastructure properties of the Shinkansen and to allocate the resulting profits to the three main-island JRs. It was disbanded because the leasing system would cause a problem when Shinkansen assets would be disposed of at the

end of the leasing period. The Shinkansen assets were sold to the three main-island JRs through an installment selling plan. Because of this purchase of Shinkansen assets, the long-term debt payment of the three main-island JRs increased, and in the case of JR Central, although it owns the most profitable Shinkansen line between Tokyo and Osaka, the interest burden reaches one quarter of yearly earnings.

3 MANAGERIAL REFORMS AT JR

3.1 Management Goals

Sumita (2000) argued from his experience that in state-owned corporations, management responsibility is not clarified, so that even if performance targets are not met, there is no need to assume responsibility as long as the best possible efforts have been exerted. One important problem of the JNR was the intervention of many stake holders: politicians, government officials, unions and rail users. Intervention from these groups could not be avoided, resulting in a complete loss of independence for JNR. For example, government officials and managers of the JNR wishing to manage it more efficiently might deem it necessary to reduce wages and increase fares while unions and rail users find these actions unacceptable and put pressure on the government not to change. Conflicting interests led to vague "solutions," and the goals of the JNR became unclear; in fact, its performance goals were drawn up solely for the sake of convenience, in order to have pertinent laws or the budget passed by the Diet. After privatization, the goals of the JRs became clearer.

3.2 Relationships With Interest Groups

Massive strikes by labor unions often occurred at the end of the JNR era, and the relationship between management and labor unions was at its worst (Mizutani, 1999). Since then, the situation has improved, mainly because management and labor unions seem to be working toward the same goals, with management now giving rewards in the form of salary increases when performance has improved. This, in turn, seems to lead to further improvement and an increased sense of trust.

It is not clear how relationships with the local community have changed since privatization, but it is certain that before privatization they were not good. Sumita (2000) suggests that the local community was a rather spoiled interest group using private automobiles to distribute petitions demanding extra services from the JNR and protesting loudly when loss-making lines were slated for elimination. A cooperative relationship between communities and the JNR was made difficult mostly because local autonomous municipalities were forbidden by law to furnish subsidies to JNR. In the process of privatization, many local lines were converted to bus services or other rail companies which were owned by both the private and public sectors. As we will explain later, there is still the possibility of future conflict between the two groups with regard to maintaining local service in small communities.

3.3 Organizational Structure

Newly established JRs have assumed a structural form designed to facilitate decision-making. JNR had been an unwieldy and bureaucratic organization, unresponsive to external change. It was clearly too large to be a single organization and too centralized for efficient decision-making. As a result, there were several problems, such as the excessive length of time it took to make a decision and the inability of the organization to meet local needs quickly. To approve a single initiative, it was necessary to circulate documents among 20 to 30 people who would stamp them with their personal seals (Ishi et al., 1994). JNR's reform therefore stipulated not only privatization but also regional subdivision into organizations smaller than the JNR. Moreover, the JRs themselves became less centralized organizations in general. For example, branch offices have more freedom to use their own judgment when making a decision.

Public enterprises lack the will to economize on construction costs or general expenses because generating earnings is not necessarily the first priority of the operation, at least not in Japan. Once agreed upon, budgets, whether at a state or local government level, must be spent in their entirety, and those making efforts to economize and save portions of the budget are regarded as naive. Therefore, almost no efforts are made in these entities to reduce expenditures, and corporate performance is generally poor. On the other hand, private enterprises must generate earnings, or failures would make it impossible to survive in a market where competition from the auto and airplane industries is a constant threat.

As for organization structure, two kinds of reforms are important: a change to a flat organization and the introduction of an M-form type structure. First, like most government entities, the JNR was a typical hierarchy with a vertical organization. Government ministries in the past have often been seen as examples of dysfunctional vertical organizations where individual Bureaus operated separately but the ministries as a whole failed to function as coordinated entities (Sumita, 2000). In order to improve upon this kind of organization, first, hierarchy became more flat, evolving from four stages (1, division manager; 2 section manager; 3 section vice-manager; 4, subsection) to three stages (1, division manager; 2, section manager; 3, subsection). This change shortened decision-making time (Kitani, 1997). However, in Mizutani's study (1999b) based on available structural maps of each JR, the number of divisions increased by about 40% from 1987 to 1995. Furthermore, as for characteristics of structural changes, the Honshu JRs show an increase in management divisions and branch offices while the Three-Islands JRs show an increase in non-management divisions.

Second, traditional JNR organization was based on a group of job skills and the decision-making of each division was sometimes superior to the decision-making of the organization. In other words, this kind of organization encouraged sectionalism and frequently resulted in internal divisions thwarting each other, a serious obstacle to getting the entire organization to achieve its full potential. For example, according to Sumita (2000), at the JNR, the civil engineering group was

powerful and there were members of the Diet from this group, so that they had a firm hold on a major portion of the budget for many years. This might have encouraged a surfeit of new line construction in the JNR era. To avoid such a situation, the M-form type of organization was introduced. For example, JR East set out to streamline its organization and unify the different departments performing the same type of work. Sumita (2000) reported that integration and unification resulted in awareness no longer being restricted to one's group exclusive of all others, and in a growing sense of a single team unit representing the company.

3.4 Incentive Systems

A more private company-style performance rating system was introduced. The wage system at JNR was based mostly on age and seniority, a system providing no incentive to improve performance. Sumita (2000) noted that when JR East listed its shares on the stock market in 1993, the majority of its employees became shareholders, a state of affairs that has proved to be a major morale-booster for both management and employees.

3.5 Task Improving Activities

As for task improvement, activities such as the Quality Control Circle, the suggestion system, and other forms of action have been taken at the initiative of employees. The QC Circle and the suggestion system are very popular among manufacturing and construction companies in Japan and are used to make clear the task responsibility of each employee. In our experience, we cannot completely believe that these schemes can help to improve productivity, but Sumita (2000) reported that more than 5 billion yen per year is being saved through the QC Circle, the suggestion system and other forms of action taken at the initiative of employees.

4 THE PERFORMANCE OF THE JRs AFTER PRIVATIZATION

4.1 Overall Performance Changes

The overall performance of the six JR companies since privatization is summarized in Table 2, where we selected nine performance measures from various aspects and compared three time periods: 1) the beginning of privatization (1987); 2) the fifth year (1992); and 3) the most recent year (1998).

This table shows that overall performance for most JRs has been improved since privatization. However, compared with the numbers in 1992, the most recent results are not always sufficient, perhaps due to the recent recession in the Japanese economy. JR Freight's financial performance (operating revenues-cost ratio) was especially dismal, sinking to a level lower than at the beginning of privatization.

Table 2 Overall Performance Changes Since Privatization

Item	Year	JR East	JR Central	JR West	JR Hokkaido	JR Shikoku	JR Kyushu	JR Freight
Operating	1987	1.222	1.086	1.091	0.561	0.681	0.810	1.065
revenue	1992	1.284	1.567	1.156	0.632	0.855	0.864	1.024
cost ratio	1998	1.178	1.429	1.108	0.701	0.812	0.897	0.974
Average	1987	14.68	21.95	16.24	17.34	17.30	15.26	8.57
fare	1992	13.48	20.46	15.00	15.59	17.12	13.99	7.27
	1998	13.44	21.52	14.95	16.84	18.35	14.86	6.51
Average	1987	56.89	51.55	43.56	33.76	31.70	36.61	15.06
load	1992	58.74	50.75	44.67	34.82	35.02	31.36	17.04
	1998	57.60	50.98	42.05	28.90	27.13	31.41	17.40
Train	1987	30,038	39,406	28,910	10,584	18,217	19,619	7,434
density	1992	36,011	49,598	36,512	12,838	23,081	29,245	9,075
	1998	34,305	47,621	38,893	15,231	24,779	29,771	8,544
Demand	1987	104,491	41,148	45,782	3,920	1,673	7,664	20,026
	1992	128,486	51,201	54,423	4,869	2,068	8,560	26,241
	1998	126,110	48,538	53,526	4,540	1,815	8,280	22,643
Labor	1987	22,734	39,457	21,070	9,587	14,009	15,354	117,010
productivity	1992	32,717	48,228	26,482	12,945	19,110	26,524	152,970
	1998	34,725	44,463	30,569	16,132	23,138	29,867	166,114
M onthly	1987	256,889	264,549	256,617	265,085	234,185	247,844	252,190
wage	1992	306,487	269,220	302,548	299,103	220,548	260,326	295,486
	1998	360,814	310,362	333,240	318,293	305,127	322,240	275,608
Average	1987	743	1,096	713	1,221	926	817	133
operating	1992	670	697	641	1,021	824	608	136
cost	1998	717	812	634	817	722	607	138
Accident	1987	1.653	0.883	1.421	1.273	3.489	2.190	0.980
rate	1992	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	1998	0.536	0.212	0.810	0.499	1.368	1.182	0.720

(Note):

(1) Definition of measures:

(i) operating revenue recovery ratio = operating revenues / operating costs

(ii) average fare = fare revenues / passenger kilometer : (yen per passenger-km or per ton-km)

(iii) average load = passenger kilometer (or ton kilometer) / car kilometer : (person or ton)

(iv) train density = train kilometer / route kilometer : (number of trains per route)

(v) demand = transported passenger kilometer : (million passenger-km or million ton-km)

(vi) labor productivity = car kilometer / number of employees in rail division : (car-km per person)

(vii) monthly wage = monthly salary per employee in rail division : (yen per person)

(viii) av. operating cost = operating cost / car kilometer : (yen per car-km)

(iv) accident rate = number of all kinds of accident / million train kilometer

where fare revenues = total revenues from fare

operating revenues = fare revenues + sales revenues such as parcel transport and charges to kiosks

operating costs = labor costs + energy costs + material costs + maintenance costs (tracks and rolling stock) + depreciation + tax

Operating revenues do not include subsidies. Operating costs are considered as total costs of rail operation financially defined, which include both variable and fixed components of rail costs.
(2) All monetary terms are in 1995 value.
(3) These figures are all for 1987, 1992 and 1998 fiscal years.

Among these measures, efficiency has been much improved since privatization. Certainly, labor productivity has been improving. In our previous study (Mizutani and Nakamura, 1996), the JRs' labor productivity after privatization was still inferior to that of large private railways but the difference might have disappeared by now. In fact, when we compared the total productivity growth of JRs with that of private railways, the average annual growth rate of JRs shows much higher values: JR (11.40%); private (-0.70%) for 1987-92; JR (-0.48%); private (-0.03%) for 1993-98. As for the average costs, the level was certainly lower than in 1987.

4.2 Rail Fare

Rail Revision

The rail fare of the JNR was expected to cover all rail costs, but was based on the outcome of political deals, not on sound economic judgment. Political interference in rail operation and investment in fact increased rail costs and led to inefficiency, resulting in a fare increase almost every year from 1981 until 1987, when privatization began. Table 3 shows the record of fare revision of the JRs, which except for the Three-Islands JRs, did not increase fare level during the ten years after privatization. The only exception is the fare increase in the two years immediately following the introduction of the consumption tax. Maintaining fare at the same level as at the start of privatization indicates that the real value is decreasing, and an increase in ridership can be expected. In fact, Sumita (2000) reports that JR East has made every effort not to increase rail fare.

Table 3 The Increasing Percentage of Passenger and Freight Rate Since 1980

Period	Date of revision	Passenger	Freight	Note
Before Privatization	1981.4.20	9.7%	9.7%	
	1982.4.20	6.1%	6.3%	
	1984.4.20	8.2%	4.2%	
	1985.4.20	4.4%	3.1%	
	1986.9.1	4.8%	-	
After Privatization	1989.4.1	2.9%	3.0%	Enacted consumption tax (3%)
	1996.1.10	7.0%(a), 6.7%(b), 7.8%%(c)	-	
	1997.4.1	1.9%	1.9%	Increase consumption tax rate to 5%

(Note) :The numbers for passenger rate change for January 10, 1996, are (a) JR Hokkaido, (b) JR Shikoku, and (c) JR Kyushu.
(Source):Ministry of Transport (ed.)(2000), p.115.

Parallel Rail Lines

Rail fare at the JR companies after privatization became more competitive than that of other

private rail companies, the most notable case being on JR lines parallel with private rail company lines in large metropolitan areas. Table 4 shows the rail fare comparison between JR and large private rail companies along some selected parallel lines. The table shows that in almost all cases the difference in fare level between JRs and large private rail companies became smaller and in some cases the JRs' fare level even became lower.

The JRs' decreasing relative fare level is certainly due to the increase in productive efficiency caused by the privatization of the JNR. Certainly, the unit cost of JR companies has decreased compared with that of JNR, making it no wonder that JRs' price level has become lower.

Notably, the decrease in JR fare to the level of that of private railways was not the same for all lines. In general, cases in the Nagoya and Osaka areas, where there are more parallel lines, showed larger decreases than cases in the Tokyo area. During the JNR era, JNR lines were not considered serious competition for the private railway lines parallel to them, but after privatization, each regional JR company has aimed to make all regional lines more competitive, with a resulting close in the price gap.

Table 4 Fare Comparison Between JR and Major Private Railways in Selected Competitive Lines

Metropolitan Area	Section of a Line	Operator	Regular Fare (yen)		Commuter Rail Pass (yen per month)	
			1986.4.1.	2000.10.1	1986.4.1	2000.10.1
Tokyo	Ueno - Narita	JR East	730	890	21,500	26,280
		Keisei	680	810	17,400	21,920
		JR/Private	1.07	1.10	1.24	1.20
	Shinjuku - Hachioji	JR East	440	460	13,200	13,860
		Keio	290	350	9,300	13,190
		JR/Private	1.52	1.31	1.42	1.05
	Shinagawa - Yokohama	JR East	260	280	7,800	8,190
		Keikyu	230	290	7,580	11,260
		JR/Private	1.13	0.97	1.03	0.73
Nagoya	Nagoya - Gifu	JR Central	480	450	12,460	13,080
		Meitetsu	480	540	12,460	16,340
		JR/Private	1.00	0.83	1.00	0.80
	Nagoya - Yokkaichi	JR Central	440	460	13,200	13,860
		Kintetsu	430	610	11,500	19,780
		JR/Private	1.02	0.75	1.15	0.70
Osaka	Tennoji (Nanba) - Wakayama	JR West	730	830	21,500	24,750
		Nankai	700	890	15,500	25,050
		JR/Private	1.04	0.93	1.39	0.99
	Osaka (Umeda) - Sannomiya	JR West	380	390	11,400	11,960
		Hankyu	230	310	8,780	12,480
		JR/Private	1.65	1.26	1.30	0.96
Fukuoka	Hakata (Fukuoka) - Kurume	JR Kyushu	590	720	16,600	20,750
		Nishitetsu	500	600	14,850	22,280
		JR/Private	1.18	1.20	1.12	0.93
	Hakata (Fukuoka) - Omuta	JR Kyushu	1,000	1,250	28,760	33,980
		Nishitetsu	850	1,000	22,500	29,480
		JR/Private	1.18	1.25	1.28	1.15

(Source):
(1) Ministry of Transport (ed.) (2000), pp.110-111
(2) Ministry of Transport (ed.) (1986), pp.88-89

4.3 Competition

One important and distinguishing effect of the privatization of the JNR is that competition has worked actively in many ways. First, the Shinkansen became a viable alternative to the airplane along the major long-distance trunk corridor, with popular routes being Tokyo-Osaka, Osaka-Fukuoka, Tokyo-Fukuoka, Tokyo-Yamagata and Tokyo-Akita. The companies focused mainly on shortening transport time, but attention was paid also to service quality and price. For example, JR West has actively introduced new types of cars between Osaka and Fukuoka in order to win business trips from air transportation. The new types of cars provide new amenities such as compartment rooms for meetings, electrical outlets for personal computers, and silent cars for passengers who want to rest. Furthermore, travel time was reduced by more than twenty percent.

The privatization of the JNR affected other transport organizations, attracting business away from them and reducing their ridership. In the Greater Osaka Metropolitan area, JR lines run parallel with lines of other private rail companies, giving rail users a choice (Nakamura and Mizutani, 1995). Table 5 shows trends in the number of passengers and share in rails in the Greater Osaka Metropolitan Areas. From this table we can clearly see that the ridership of the JRs after privatization has increased while private rail companies have been gradually losing some of their competitiveness, so that in 1997 their share became less than 50%. However, the subway system operated by the local government has not been affected by the privatization of JNR, as its network does not significantly overlap with JR lines.

On March 20, 1996, a new movement was begun in Osaka: a consortium of transport organizations, called "Surutto Kansai," (Go Through Kansai"), and whose purpose is to increase users' convenience. Under this consortium, rail users can avoid buying separate tickets from separate railway or bus companies along their desired route by purchasing prepaid cards which can be used on all facilities of the consortium's members. Originally there were five member organizations such as Hankyu and the Osaka city transport bureau. Four years later, in May 2000, 26 transport organizations have joined the consortium, and its network accounts for 792.1 km in rail lines and 2,375.2km in bus routes. JR West is not specifically excluded from this consortium, but as installation was required of ticket gate machines compatible with those of all other members, JR West opted not to join. As a result, an atmosphere of JR-versus-the-Others prevails in the Osaka metropolitan area.

The advantages of joining the consortium are as follows. First, an increase in ridership is expected due to expansion of network. Second, investment costs for system development such as for ticket gate machines can be avoided because the system is developed jointly. Third, advertising of the joint network can be expected without loss of management freedom in each organization. An advantage for users is the convenience not to buy tickets when changing modes of transportation. The consortium can also be judged to be good for society in that it protects the environment by encouraging the use of public transportation over the private car. According to the administrative office of the consortium, the number of prepaid users has been steadily increasing but a clear effect is not yet evident..

Table 5 Trends in Number of Passengers and Share in Rails in the Greater Osaka Metropolitan Area

Year	Numbers of Passenger (thousand)			Share of Passenger			Note
	JR West	Private Rails	Subways	JR West	Private Rails	Subways	
1980	1,086,022	2,508,336	813,318	0.246	0.569	0.185	
1981	1,079,424	2,515,534	986,452	0.236	0.549	0.215	
1982	1,059,261	2,495,711	1,009,021	0.232	0.547	0.221	
1983	1,065,140	2,515,052	1,036,329	0.231	0.545	0.224	
1984	1,068,560	2,501,624	1,046,038	0.231	0.542	0.227	
1985	1,074,479	2,574,773	960,198	0.233	0.559	0.208	
1986	1,088,105	2,613,680	975,768	0.233	0.559	0.209	
1987	1,145,095	2,623,316	921,938	0.244	0.559	0.197	Privatization
1988	1,203,132	2,652,969	1,076,853	0.244	0.538	0.218	
1989	1,197,248	2,672,564	1,096,877	0.241	0.538	0.221	
1990	1,228,650	2,715,036	1,156,811	0.241	0.532	0.227	
1991	1,264,666	2,777,166	1,167,219	0.243	0.533	0.224	
1992	1,304,737	2,747,929	1,168,136	0.250	0.526	0.224	
1993	1,367,843	2,726,708	1,161,090	0.260	0.519	0.221	
1994	1,308,396	2,885,756	1,135,110	0.246	0.541	0.213	
1995	1,380,645	2,590,129	1,157,746	0.269	0.505	0.226	
1996	1,384,975	2,601,995	1,145,749	0.270	0.507	0.223	Consortium
1997	1,379,976	2,502,765	1,151,611	0.274	0.497	0.229	
1998	1,366,037	2,439,685	1,140,150	0.276	0.493	0.231	

4.4 Local Services

Previously, we showed performance results in a profitable market. In this section, we will explain results occurring in an unprofitable market. Before the privatization of JNR, there was considerable debate about whether local rail services in small communities would remain intact. The concern was that newly privatized rail companies would ruthlessly eliminate any unprofitable lines, leaving the transportation poor, such as children, the elderly and the handicapped, to fend for themselves. Quite recently, an empirical investigation of this issue was done by Mizutani (1999b).

The methodology is as follows. First, he selected local rail lines of six passenger JRs. Second, by using timetables, he obtained several service quality measures in both the first year of privatization (1987) and the tenth-year after privatization (1997). He then compared these service quality measures for two time periods. As observations, he chose a total of 35 lines from six passenger JRs by considering regional differences and service quality measures such as 1) departure time of the first train, 2) departure time of the last train, 3) operating time given section of rail line, 4) number of trains per day, 5) number of trains per off-peak-hour, 6) travel time in a given 30 km.

Mizutani's conclusion is that overall local rail service in small communities has been maintained since privatization, negating the fear of those who predicted that privatization would damage or even eliminate local rail service. To a certain extent, it is not surprising that local lines have fared so well, considering the financial health of the JRs since privatization. Even the Three-Islands JRs, which

have been less fortunate financially, have managed to maintain their local lines.

However, if the financial situation takes a turn for the worse, the concern remains that the rail companies may at some point choose to abandon service. A sign for optimism is that even though there is no legal obligation to maintain less profitable local lines in small communities, privatized railways have so far chosen to do so. Quite recently, though JR West has sent out signals that it is becoming more difficult to maintain several local lines in small communities, and recent drastic reductions in off-peak services found on timetables from April, 2001, augur that some sacrifices can be expected in the near future. The deficits of some local lines are being covered by cross-subsidies derived from the JRs' profitable transport operations in major urban areas. Local rail services will be abolished or converted to bus services if the JRs cannot make enough profits from major urban lines or efficiently use internal resources such as employees. According to Sumita (2000), in the future the number of surplus personnel may fall to zero, making it difficult to secure sufficient personnel to operate the local lines.

5 SELECTED IMPORTANT LESSONS

5. 1 Regional Subdivision: Horizontal Separation

We think that the policy for subdivision of a nationwide railway system was correct. The issues are how the system should be divided and how big each organization should be. As for the first question, while other alternatives for dividing the JNR were discussed both officially and unofficially, regional subdivision was selected In Japan. At least three other possible options were discussed: four regional subdivisions based on the four main islands (Honshu, Hokkaido, Shikoku and Kyushu); about twenty regional subdivisions based upon the branch offices of the JNR; and division into trunk lines and branch lines. The last two were rejected firstly because there was great financial variation among the twenty subdivisions due to differing rail demand conditions, and secondly because branch lines could not be financially independent. As for the proposed four subdivisions, the Honshu region was considered to be too large compared with the other three, thus needing further subdivision. In addition to these three alternatives, a division into urban rail operation and intercity rail operation was suggested, but was rejected as not feasible technically because both operations use the same tracks.

Regional subdivision of the passenger rail service seems to be functioning well so far. First, yardstick competition has improved the overall performance of the JRs. Second, more regional needs have been met, particularly with improvements in frequency. Third, as for the integration of railway services into different regional organizations, not many problems have been reported, although the number of inter-regional rail services has decreased.

As for the second issue, six regional passenger companies were created. One problem in Japan is the wide variation in the size of the six regional passenger rail organizations, reflecting demand and transportation density. The Honshu JRs (JR East, JR Central and JR West) are in a highly advantageous position compared with the Three-Islands JRs (JR Hokkaido, JR Shikoku and JR Kyushu).

As for the size of organization in terms of cost, there is a problem. According to Preston (1996), the optimal railway size for minimizing operating costs might have a network of around 4,000 km and run 120 million train-km per annum. His pioneering results provide useful information for the restructuring of the rail industry, but for us have the limitation of having been obtained from European state railways. It is necessary to get more precise information about privately owned railways.

Research on the optimal size of rail organization has recently been done by Mizutani (2001), who estimated the total cost function for privately owned urban railways in Japan. He calculated the railway size to attain the minimum average cost in terms of service output and network size. According to the data in 1995, he found the optimal size to be about 804 million vehicle-km per year with a network of 89.8km per line, and with 4 lines. In this case, the average costs are 506.3 yen per vehicle-km. The optimal size in terms of output is found to be similar to Preston's result, which shows that the optimal size in terms of train-km is 120 million train-km. When we translate Mizutani's result of output to train-km, the result would be about 161 million train-km (= 804 million vehicle-km / 5 cars per train). However, in terms of network size, Mizutani's result is much smaller than Preston's because the total length is about 360km (= 89.8km per line x 4 lines). Presumably, Mizutani's data set is based on urban rail organizations so that the network size would be smaller. In other words, Japanese railway systems are more densely operated than those in other countries.

Based on Mizutani's result, we evaluate the size of the railway organization. Table 6 shows the major railway companies in Japan and shows their output and network size in 1998. In terms of output measures, the slightly smaller size of JR Central or all combined Osaka-based private railways are closer to an efficient size.

Table 6 Major Japanese Rail Companies and Their Output and Network Size in 1998

JR Companies			Tokyo based Major Private			Osaka based Major Private		
Name	Vehicle-km (million)	Route-km	Name	Vehicle-km (million)	Route-km	Name	Vehicle-km (million)	Route-km
JR Hokkaido	157.1	2,499.8	Tobu	254.1	463.3	Kintetsu	335.6	594.1
JR East	2,189.5	7,538.2	Seibu	168.0	176.6	Nankai	100.2	171.7
JR Central	952.0	1,983.5	Keisei	80.2	102.4	Keihan	92.0	88.1
JR West	1,272.9	5,079.3	Keio	102.9	84.7	Hankyu	166.7	146.6
JR Shikoku	66.9	855.8	Tokyu	107.7	100.3	Hanshin	40.1	45.1
JR Kyushu	263.7	2,102.1	Odakyu	136.9	121.6			
			Keikyu	94.7	87.0			
			Soutetsu	44.6	35.9			
Sub Total	4,902.1	20,058.7	Sub Total	989.1	1,171.8	Sub Total	734.6	1,045.6

(Source): Ministry of Transport (2000), p.76

5.2 Functional Division: Passenger and Freight Services

We think that functional division was correct for Japan, where railways are mostly for passenger transport. Freight transport is done by either truck or ship, with rail holding only a 4.2% share on a ton kilometer basis. Clearly, before privatization, the freight section of JNR was unprofitable, unable to compete with trucking companies, and deficient in marketing skill. In fact, JNR's freight division was one of the main sources of JNR's operating deficits. If such an unprofitable establishment had been attached to any of the JR passenger companies, their prospects for success would have been reduced, and their listing on the stock market would have been less favorable.

We might also cite the argument of scope economies in order to rationalize the separation of passenger and freight service. Several researchers have noted that there are diseconomies of scope with passenger and freight operations in the railway industry (Kim, 1987; Preston, 1996). From this point of view, it is not necessary to provide both passenger and freight services under the same train company. Instead, the consolidation of freight rail companies with trucking companies may be preferable.

5.3 Operation and Infrastructure Integration: Vertical Integration

This issue of vertical integration still stimulates much debate in the rail industry. The relationship between operation and railway infrastructure can take many forms (Brooks and Button, 1995). In the European style, for example in the case of the British Railways privatization, rail operation was separated from infrastructure. In Japan, JR passenger companies hold rail tracks, as most other Japanese private railways do, and cases involving only operation or only ownership of infrastructure are very limited, with Kobe Kosoku and JR Freight being examples of the few.

Empirical results are insufficient to allow a policy judgment on this issue, as a concrete theory has not yet been developed in the rail industry. However, transport economists have discussed advantages and disadvantages, such as the British economist Nash (1997), who wrote of the British Rail experience. Vertical separation makes it easier to 1) promote a variety of operators, 2) clarify intra-industry relationships, and 3) specialize activities. On the other hand, vertical separation makes it difficult to 1) set up fair prices and monitor performance, 2) organize timetabling and slot allocation of trains, 3) negotiate arrangements for investment projects, 4) maintain safety of train operation, and 5) provide integrated information and ticketing.

There are two important factors which make a vertically separated system undesirable in Japan. The first factor concerns transaction costs, and the second is the existence of economies of scope between operation and infrastructure providing services. Although we do not have clear evidence, vertical integration or a separation policy is related to these two factors, which may depend on traffic density. For example, under the condition of low traffic density, the integrated system is not efficient because the fixed cost of track maintenance is too high and the rail company could save money by outsourcing with a

construction company. Transaction costs related to separation are not significantly large because the traffic is not so large that transactions between two companies could not be conducted on an ordinary basis. On the other hand, as traffic density increases, scope economies between the two activities come into play so that the company has an incentive to carry out the two activities. At least, it may be said that there are diseconomies of scale when the two activities are separated. Furthermore, transaction costs related to separation become larger. As many transport economists point out, in the scheduling of track maintenance under heavy operation, and with regard to investment plan in signals and tracks which affect train operation, cost allocation between the two activities will be a considerable issue between the two companies. As a result, the transaction costs related to these will increase, such as the opportunity cost of meeting time, the legal costs of reaching agreements, and the costs of reducing asymmetric information. All these costs make a vertically integrated system seem desirable.

Cost efficiency does not exist in vertical separation in the rail industry. Mizutani and Shoji (2001) attempt to evaluate this subject with a limited data set. Their methodology is straightforward. First, they construct the cost function for track maintenance activities by using a vertically integrated system. Second, they substitute the data of a vertically separated organization, in this case the Kobe Kosoku railway, into the estimated cost function and obtain the infrastructure cost. Finally, they compare these estimated infrastructure costs which are considered as a case of a vertically integrated system with the actual costs of a vertically separated system. They find that the vertically separated system costs about 5.6% more than the vertically integrated system, and thus conclude that there are no significant cost differences between two systems. This is a just case based on reported accounting costs of railway firms; opportunity costs of transactions, especially time costs of meeting, negotiation and search, are not included. If we consider these costs, the separated system might be more expensive than the integrated system.

In summary, in the case of low traffic density, a vertically separated system is cheaper than a vertically integrated system but in the case of higher traffic density, the integrated system may be better. The policy option for vertical separation was not considered at all when JNR was privatized (Suga, 1997), because when compared with European railways, the much higher traffic volume of the JRs makes it less likely to succeed with a separated system.

5.4 Yardstick Competition

A yardstick competition scheme is used for avoiding inefficiency due to the licensing system. Compared with open access system, in which operators are selected by tendering, a yardstick competition scheme is less rigorous but still encourages competition. In the case of the JRs, the yardstick competition scheme still has a short history, having been introduced in 1997. However, in the case of large private railways, competition certainly works to some degree (Mizutani, 1997). In practice, we are concerned with whether or not the selection of a rail operator every few years is feasible. In the long run,

a licensing system incorporating yardstick competition may attain more efficiency. Long-term commitment to a line is also important. For example, private rail companies in Japan have long shown this commitment by developing real estate and shopping establishments along rail lines. A company involved only in rail operations might not share this long-term commitment, in the uncertainty that it may lose its operating license at some point. It is conceivable that an operations-only company, with its attention focused only on fulfilling the minimal promises of a written contract, might lose the entrepreneurial behavior characteristic of a major private rail company. Service quality might therefore suffer. In the long-run, the location of households would change.

In conclusion, the yardstick competition scheme might be useful under the licensing system in the long-run. So far, larger private rail companies in Japan have shown good performance, demonstrating commitment to the development of areas along their lines, and are considered attractive in terms of both housing environment and rail service quality.

6 CONCLUDING REMARKS

Japanese privatization has succeeded in many ways so far but there remain a number of problems to be solved in the near future. Privatization is not a cure-all panacea. Care must be taken that privatization should not result in a simple transfer of monopolistic power from a public corporation to the private sector. It should be noted that when monopolistic privileges are transferred into private hands, competition is an indispensable ingredient in controlling market power. The main objective of privatization policy is to introduce many kinds of competition. The role of government is to create a competitive environment and to promote actual and potential competition in the market and even within the organization itself by using incentive regulations. Furthermore, in Japan the older and very successful large private railways have served as good role models for the newly privatized JRs. The railway industry is conservative and has tended to be stagnant. The privatization process has indeed proved to be a constructive force in mobilizing what was once rather indolent national railway.

REFERENCES

Brooks, M. and K. Button (1995) "Separating Transport Track From Operations: A Typology of International Experiences," *International Journal of Transport Economics*, Vol.22, No.3, pp.235-260

Ishii, Y., K. Okada and T. Yada (1994) "Railway Management in the Age of Chages: Kyushu Railway Company (Henkakuki no Teitsudo Keiei: Kyushu Ryokyaku Tetsudo Kabushiki Kaisya)," *Transportation and Economy (Unyu to Keizai)*, Vol.54, No.4, pp.5-40 (in Japanese)

Kim, H. Y. (1987) "Economies of Scale and Scope in Multiproduct Firms: Evidence From US Railroads," *Applied Economics*, Vol. 19, No.6, pp.733-741

Kintani, S. (1997) "Privatization Progress and Its Effects at JR West: JR Nishinihon ni Okeru Mineika no Shinten to Sono Kouka," In T. Imamura (ed.) *Effects and Reality of Privatization: NTT and JR*

(Mineika no Kouka to Genjitsu), Chuo Hoki, Tokyo (in Japanese)

Ministry of Transport, Regional Transport Bureau, ed.(1986) *Rail Fact Book 1986 (Suji de Miru Tetsudo 1986),* Transportation Policy Research Center, Tokyo, Japan (in Japanese)

Ministry of Transport, Railway Bureau, ed.(2000) *Rail Fact Book 2000 (Suji de Miru Tetsudo 2000),* Transportation Policy Research Center, Tokyo, Japan (in Japanese)

Mizutani, F. (1994) *Japanese Urban Railways: A Private-Public Comparison,* Avebury, Aldershot, U.K.

Mizutani, F. (1997) "Empirical Analysis of Yardstick Competition in Japanese Rail Industry," *International Journal of Transport Economics,* Vol.24, No.3, pp.367-392

Mizutani, F. (1999a) "Changing Trains: Japan," in van de Velde, D. M. (ed.) *Changing Trains,* Ashgate Publishing, Aldershot, U.K., pp.255-306

Mizutani, F. (1999b) "An Assessment of the Japan National Railway Companies Since Privatization: Performance, Local Rail Service and Debts," *Transport Reviews,* Vol.19, No.2, pp.117-139

Mizutani, F. (2001) "Privately Owned Railways' Total Cost Function, Organization Size and Ownership," Kobe University, Mimeo

Mizutani, F. and K. Nakamura (1996) "Effects of Japan National Railways' Privatization on Labor Productivity," *Papers in Regional Science,* Vol.75, No.2, pp.177-199

Mizutani, F. and K. Nakamura (1997) "Privatization of the Japan National Railway: Overview of Performance Changes," *International Journal of Transport Economics,* Vol.24, No.1, pp.75-99

Mizutani, F. and K. Nakamura (2000) "Japan Railways Since Privatisation," in Bradshaw, B. and H. Lawton Smith (eds.) *Privatization and Deregulation of Transport,* Macmillan, Basingstoke, U.K., pp.205-235

Mizutani, F. and K. Shoji (2001) "Operation-Infrastructure Separation in Japanese Rail Industry: The Case of Kobe Kosoku Tetsudo," *Paper Prepared for the World Conference on Transport Research 2001,* July 22 – 27, Seoul, Korea

Moyer, N. E. and L. S. Thompson (1992) "Options for Reshaping the Railway," *Policy Research Working Paper,* The World Bank, June 1992.

Nakamura, K. and F. Mizutani (1995) "The Effects of Railway Privatization on Competitive Performance: A Case Study of Japanese Railways," *Journal of the Eastern Asia Society for Transportation Studies,* Vol.1, No.1, pp.85-102

Nash, M. C. A. (1997) "The Separation of Operations from Infrastructure in the Provision of Railway Services: The British Experience," in The European Conference of Ministers of Transport (ECMT), *The Separation of Operations from Infrastructure in the Provision of Railway Services,* OECD, Paris, France, pp.53 - 89

Preston, J. (1996) "The Economics of British Rail Privatization: An Assessment," *Transport Reviews,* Vol.16, No.1, pp.1-21

Suga, T. (1997) "The Separation of Operations from Infrastructure in the Provision of Railway Services:

Examples in Japan," in The European Conference of Ministers of Transport (ECMT), *The Separation of Operations from Infrastructure in the Provision of Railway Services*, OECD, Paris, France, pp.153-176

Sumita, S. (2000) *Success Story: The Privatisation of Japanese National Railways*, Profile Books, London, UK