REPORTS

Railway reform in China
Promoting Competition
2003

Introduction

This report on railway reform in China consists of the Summary and Recommendations of an OECD/DRC Seminar on Rail Reform in Beijing held in January 2002.

Overview

Railroads are important in China both because of their enormous geographic coverage and because of their role as a key vehicle for transporting goods. Reform within this sector could have an enormous positive effect on the economy of China.

One way to minimise the risks of failure from poorly designed policies is to understand the successes and failures of reforms implemented elsewhere in the world. Working with the Development Research Centre of China's State Council, the OECD shared its expertise on rail reform by providing Chinese policymakers and experts an opportunity to work with their counter-parts in OECD countries.

The content of these discussions as well as suggestions for Chinese rail reform have been captured in this publication.

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Centre for Co-operation with Non-Members

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RAILWAY REFORM IN CHINA

PROMOTING COMPETITION

Summary and Recommendations of an OECD/DRC Seminar on Rail Reform in Beijing 28-29 January 2002

Organisation for Economic Co-operation and Development

The Chinese translation was revised and formatted by Chuen-Mui WU, Administrator, China Programme, Asia and China Programmes Unit, Centre for Co-operation with Non-Members (CCNM), Organisation for Economic Co-operation and Development (OECD).

FOREWORD

Infrastructure sectors, such as railroads, play a fundamental role in China's economy. The China railroad is important both because of is sheer size and because of its role as a provider of key transport inputs. The reform of this sector could have an enormous positive effect on the economy of China. However, the impact of bad or poorly designed reforms could take years to reverse.

One way to minimise the risks of failure is to understand the successes and failures of reforms implemented elsewhere in the world. Working with the Development Research Centre of China's State Council, the OECD shared its expertise on rail reform providing Chinese policymakers and experts with the opportunity to work with their counter-parts in OECD countries as they embark on this ambitious reform. The content of these discussions as well as suggestions for Chinese rail reform have been captured in this publication.

Since 1995, China and the OECD have engaged in a fruitful dialogue on many policy issues of common interest while making available the experience of OECD countries to China as it seeks to modernise its economy and enhance its international competitiveness. This dialogue, carried out through the OECD's Centre for Co-operation with Non-Members covers a range of policy areas, including, tax policy, statistics, environment policies and indicators, agriculture, competition, enterprise reform, corporate governance, financial sector reform, insurance, education, and science and technology. China has endorsed OECD's principles of corporate governance and recommended their application to its enterprises, including state-owned ones.

In the field of competition law and policy, the OECD has, most importantly, been involved in the process of drafting China's new Anti-Monopoly Law. As a result, members of the drafting group have met with experts of the OECD's Competition Committee. China is also a regular participant in the OECD's Global Forum on Competition.

The OECD is pleased to continue collaborating with the Chinese government, to facilitate the process of transition and the integration of the Chinese economy into the wider world. This publication is part of the OECD's ongoing co-operation with non-member economies around the world.

These proceedings are published on the responsibility of the Secretary-General of the OECD.

Eric Burgeat
Director
Centre for Co-operation with Non-Members
OECD

PREFACE

The Development Research Center of the State Council is a policy research and consulting institution directly under the State Council, the Central Government of the People's Republic of China. The DRC undertakes a variety of economic and social studies on the Chinese economy, publishes a variety of reports and makes policy recommendations to the Chinese government.

China's accession to the WTO has made more pressing the need for further reforms in China's economy. The needed reforms include, for example, rules for the protection of competition, improvements in the legal and legislative system, enhancements in the efficiency of administrative processes and institutions and improvements in the efficiency of state-owned enterprises. Last, but not least, there is a need to speed up the reform, reorganization and transformation of those industries which have characteristics of a natural monopoly or public utility.

DRC researchers have recently written that:

"The priorities for reform in these industries are: on the one hand, to introduce competition and new market players if that is possible, to corporatise state-owned enterprises, to lower the level of state ownership and to separate enterprise management from government administration; on the other hand [the priorities are] to establish, in accordance with the natural monopoly features of these industries, efficient mechanisms complying to the requirements of the market economy. *If the reforms of these industries made significant progress it would be of great significance to the overall drive of the reform of the national economy and the transformation of government functions*".[1]

Against this background, the DRC was pleased to co-host an OECD event on competition and reform in the rail sector. It is hard to over-emphasize the importance of the rail sector to the Chinese economy. Without, say, the dense network of road infrastructure of, say, Western Europe, and lower levels of car ownership, the rail sector is a core and virtually essential transportation mode for both passengers and freight. Although no foreign rail system is exactly the same as that of China's we consider it essential to learn from the experiences of other countries in rail reform.

This publication, which is the result of collaboration of the OECD and the DRC, has the potential to stimulate further public policy debate on the future of the Chinese rail system. We are happy for the OECD to publish this document to make it available to a wider audience.

Qingtai Chen
Vice Director-General
Development Research Center of the State Council of
the People's Republic of China

[1] Liu Shijin, Lu Zhongyuan, Long Guoqiang, Wang Xu, Liu Shouying, "Pending WTO Entry: Orientation of Government Role and Immediate Priorities of Reform", China Development Review, published by the Development Research Centre of the State Council, Vol 3., No. 3, July 2001. Emphasis added.

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In many respects the Chinese railway is the envy of transport policy-makers in the West. Demand for rail transport services is growing steadily; thousands of kilometres of new line is added to the network every year; rail still holds 31% of the freight transport market and 37% of the passenger transport market;[2] traffic density is high and many lines are operating at or near capacity; despite losses in the early 1990s, the Chinese railway is currently profitable.

However, this very success is placing the current system under strain. Investment in the rail sector has had trouble keeping up with the growth in demand. Already some rail customers are kept waiting or are turned away. There is a real danger that rail transport bottlenecks will emerge and will act as a constraint on future economic growth. Can the current centrally planned and state-owned rail system efficiently allocate its limited capacity to the highest-valued uses, while expanding its capacity in such a way that contributes to rather than constraining China's economic growth?

Economic growth in China has been uneven, concentrating on the coastal regions. This is in part due to weaknesses in China's transport infrastructure which allow businesses on the coast to be more closely integrated to the world economy than to inland regions of China. The development of an efficient, innovative and market-oriented rail network would facilitate investment and modernisation of China's rail infrastructure, alleviate the growing income gap and spread the benefits of economic reform more widely.

This paper, prepared by the OECD and the Development Research Center under the State Council of the People's Republic of China (DRC), discusses principles for reforming the Chinese railway, based on experience of rail reform in OECD countries. This paper draws on materials presented at a seminar held in Beijing on 28-29 January 2002.

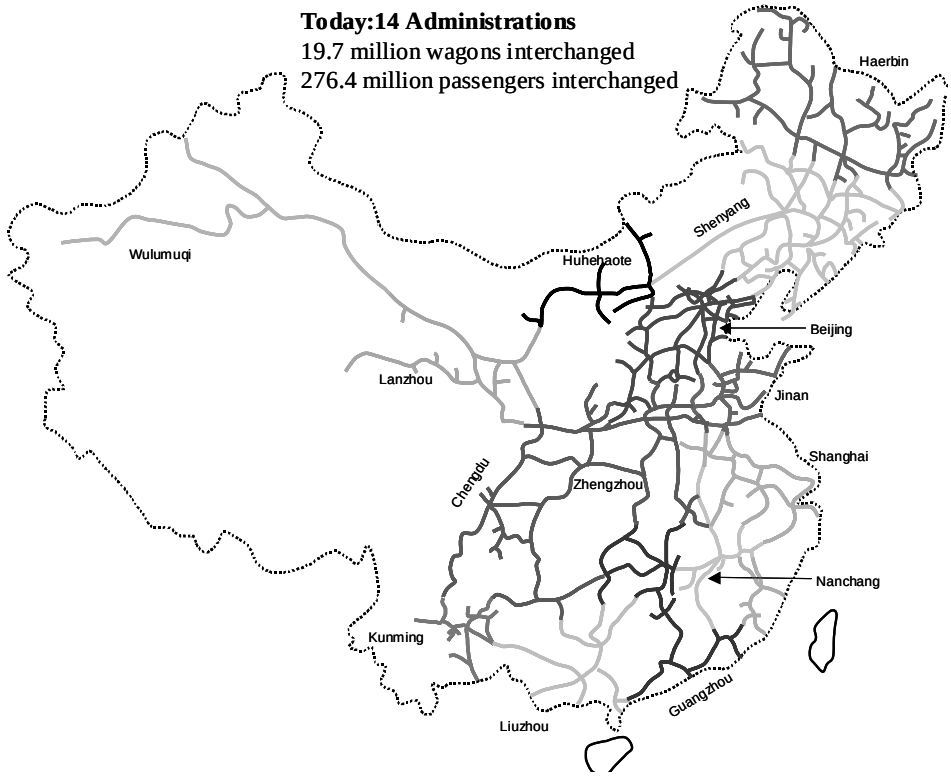
[2] Compared to around 14% of the freight market and 6.5% of the passenger market in Western Europe (Source: ECMT, *Trends in the Transport Sector 1970-1998*)

Part I: Background

1.1 The Chinese Railway System

In China, the rail industry is government owned and operated. Chinese rail services are organised and provided by a government Ministry - the Ministry of Railways. Within the Ministry of Railways, the rail network is organised into 14 regional rail administrations or bureaux. The total length of the Chinese railway is 68,700 km, the fourth longest railway in the world. This length has expanded rapidly over the last half century – from 21,810 in 1949 to 54,616 in 1995[3] and 68,700 in 2001. The geography of the Chinese railway is illustrated in.

Figure 1: Map of the Chinese Rail Network

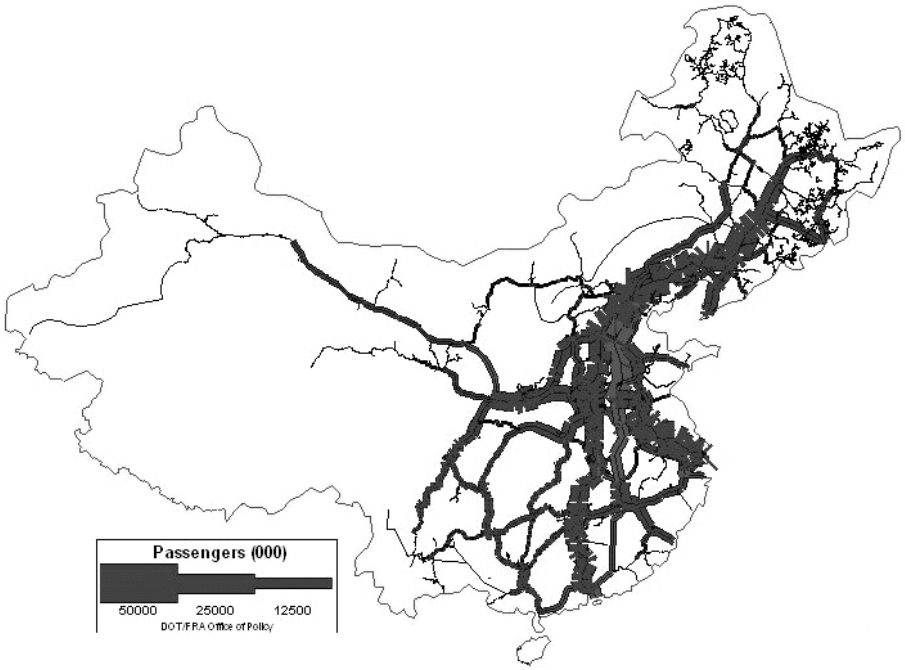


Source: Thompson (2002)

The following diagrams provide some indication of the major traffic flows on the Chinese rail network. As is clear, the bulk of the passenger and freight traffic is north-south along the coastal regions of China, with a smaller amount of traffic out to the west.

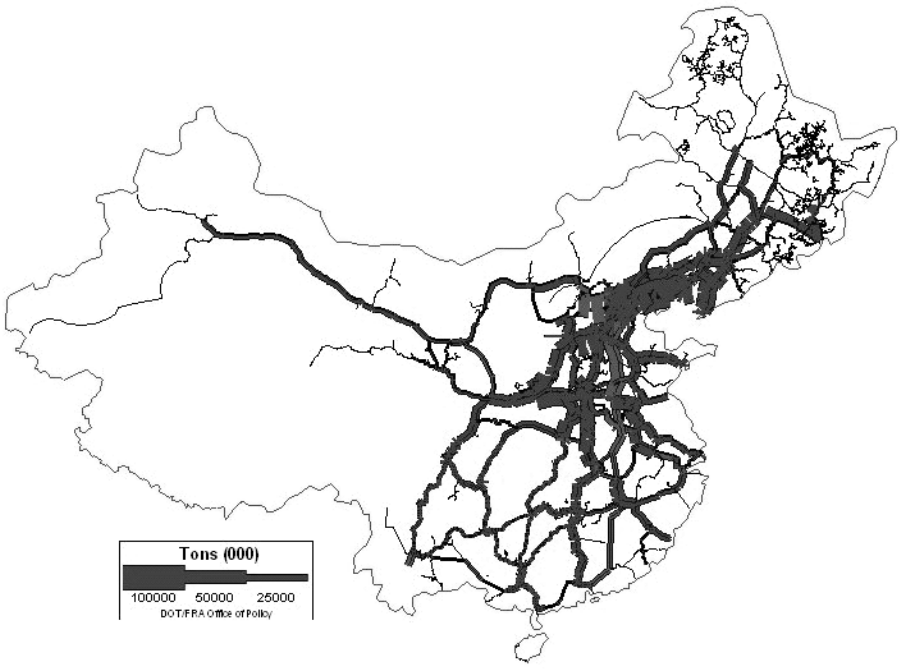
[3] Source: Nash and Wu (2000), page 27.

Figure 2: Passenger Traffic Flow Density (excludes intra-zonal traffic)



Source: Thompson (2002)

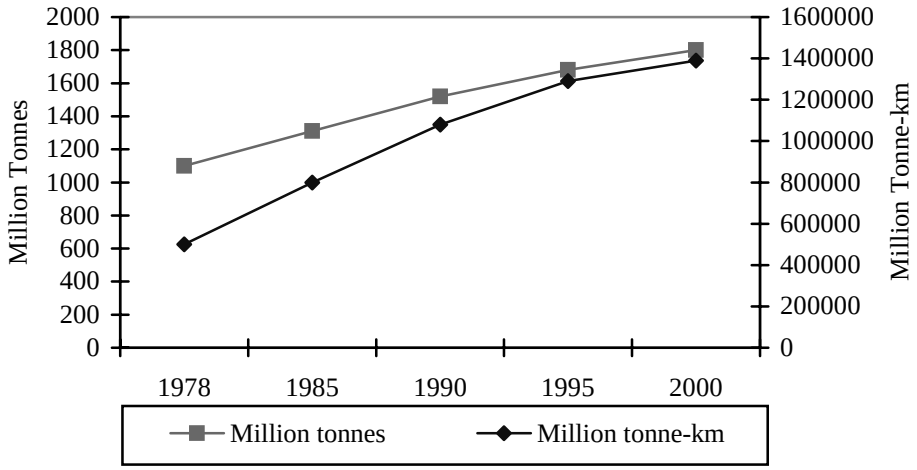
Figure 3: Freight Traffic Flow Density (Tons, Excludes Intra-zonal Traffic)



Source: Thompson (2002)

Freight volumes have increased rapidly over the last two decades, reaching 1.4 trillion tonne-kms in 2000.

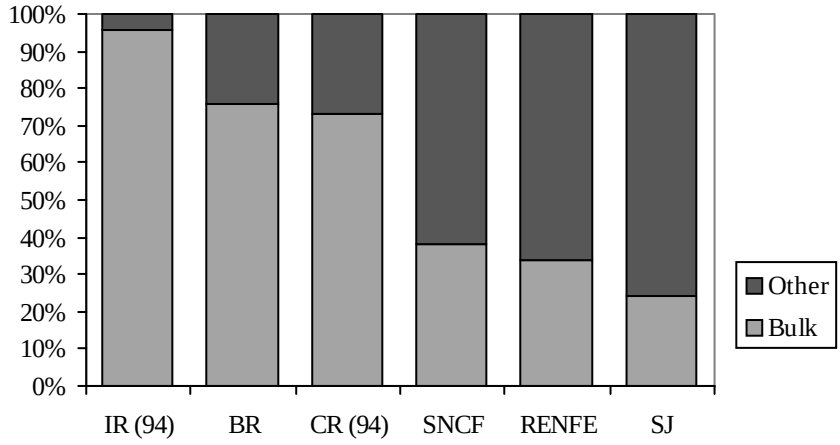
Figure 4: Freight Transportation: Growth 1978-2000



Source: DRC

A relatively high proportion (around three-quarters) of this freight traffic is bulk goods, of which coal alone constitutes more than half. Coal alone accounts for 42% of all Chinese rail freight traffic.

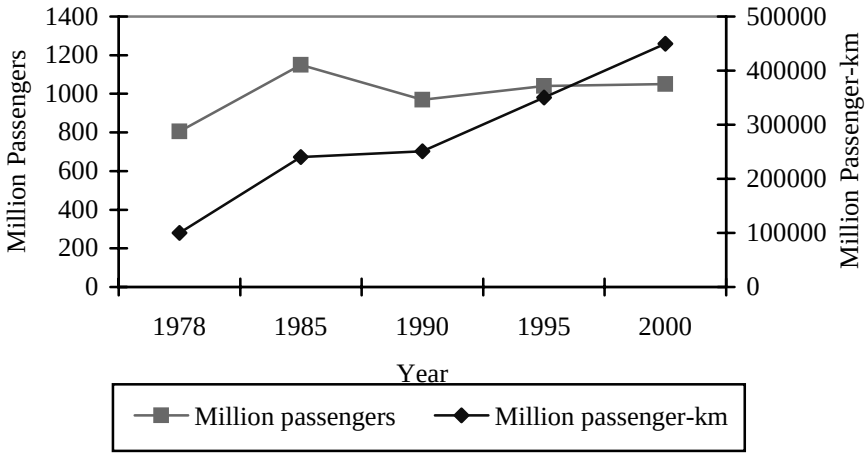
Figure 5: Freight Transportation: Split Between Bulk and Other (1994)



Source: Nash and Wu, Table 2; IR = Indian railways; BR= British railways; CR= Chinese railways; SNCF = Société National de Chemin de Fer (French railways); RENFE = Spanish railways; SJ = Swedish railways

Although total passenger numbers have remained relatively steady over the last two decades, there has been a strong increase in the average length of a rail journey (increasing from 134 km in 1978 to 431 km in 2000) leading to a significant increase in passenger-kilometres. (See Figure 6).

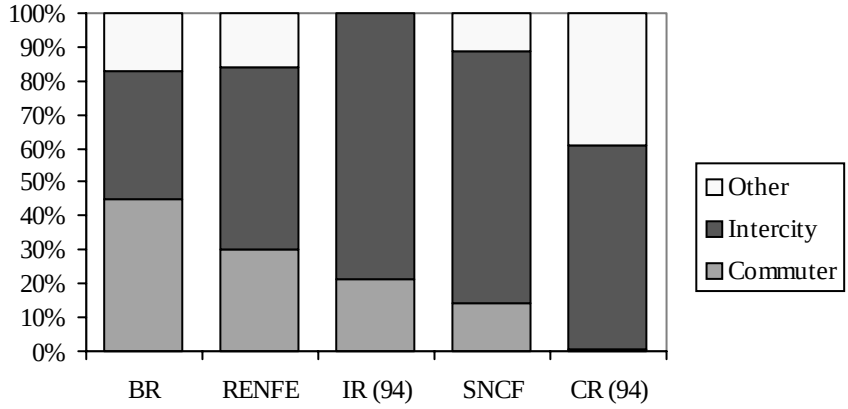
Figure 6: Passenger Transportation: Growth 1978-2000



Source: DRC

Compared to other railway systems, the Chinese rail industry carries very little commuter (short distance passenger) traffic.

Figure 7: Passenger Transportation: Split between Inter-city, Commuter and Other (1994)



Source: Nash and Wu, Table 2

Despite the strong growth in services provided, the market share of rail in the overall transport market has been declining. The share of rail in the total transport passenger-kms has declined from 60.6% in 1980 to 37% in 2000[4]. The share of rail in freight tonne-km has declined from 48% in 1980 to 31.3% in 1980. This decline is expected to continue. The DRC forecasts that rail will experience annual passenger growth of 4.6% from 2001-2005, compared with growth of 7.9% for road and 8-10%

[4] Source: DRC (2001).

for aviation. The DRC forecasts rail freight growth of 2%, compared with 5.7% for road, 3% for shipping and 13% for aviation. The DRC notes:

> [At the present time] "other modes of transportation, such as expressways and civil aviation, are developing at speeds that have outstripped that of railway transport. In long-distance transportation, in particular, expressways and airlines are threatening to replace traditional railway transport."[5]

The density of traffic on the Chinese rail system is the highest in the world. The traffic density is twice as high as the next-most dense rail network (Russia) and about ten times higher than rail systems in Western Europe. As Table 1 shows, this is not due to more frequent trains but to much higher train loading – the average number of passengers per train in China is more than ten times higher than that in the UK.

Table 1: Density of Traffic on Selected Railway Systems

	Passenger mean journey length (km)	Mean train load (pass)	Freight mean shipment length (km)	Mean train load (tonnes)	Traffic units per route-km (million)	Train-km per route-km
CR (5)	347	998	806	1634	30.00	20,456
IR (94)	79.9	809	703.6	1158	8.93	12,306
BR	41.0	89.0	128.3	343.2	3.01	26,055
DB	41.8	107.8	221.8	305.9	3.12	22,405
SJ	78.5	103.4	349.5	471.0	2.53	9225
SNCF	76.4	200.2	358.7	303.7	3.30	14,313

Source: Nash and Wu (2000), Table 3.

The government tightly controls prices and investment levels. The DRC observes: "the prices for railway passenger tickets and cargo services are decided by the State Planning Commission, and the Ministry of Railways and the enterprises below it do not have any say in this field". The State Development Planning Commission uses a very elementary system for regulating prices. All passenger prices are set on the basis of a simple basic rate per passenger kilometre. This basic rate varies according to the hardness of the seat or bed and the speed of the train. No differentiation is made according to the time of day or week, peak/off-peak periods, the length of journey, one-way vs two-way, business vs leisure travel and so on. On any given train, all the passengers in a given class of service will pay the same ticket price.[6]

The system for regulating freight prices is only slightly more sophisticated. The State Planning Commission sets the basic rate per tonne-kilometre on 9 basic categories of freight. No differentiation is made for speed, reliability of service, ultimate destination, and so on.

[5] DRC (2001).

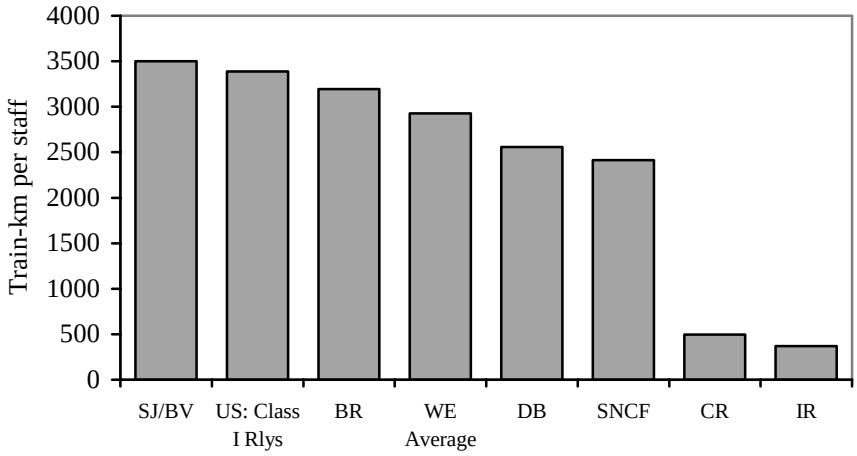
[6] In the next section of this paper we explain why it is important for a railway to be able to differentiate its prices across different types of passengers and services.

Similarly, as in many OECD countries, all investment decisions of the state-owned rail enterprises above a certain size are approved by the central government. The DRC writes:

> "China institutes an administrative system to examine and approve investment in railway construction projects according to their sizes, with the various railway bureaux entrusted with the power to make decisions on projects calling for an investment of less than 30 million yuan. State investment remains the major source of state assets in railways. Although the railway industry has carried out a certain degree of reform to increase fund-raising channels and a number of railways jointly invested by local governments have been opened to traffic, the decision making power over railway investment projects remain in the hands of the government, and the establishment of the Railway Construction Fund, which accounts for 50 percent of the national's total investment in railway construction, was a result of government administrative control."[7]

Labour productivity of the Chinese Rail system is relatively low. As Figure 8 shows, in 1990 the average train-km per staff of the Chinese rail network was 496, compared with the average of 2926 for Western European railways. Of course, since labour costs are lower in China than in Western Europe, it could be expected that there would be some shifting of the capital-labour ratio in favour of labour in China.

Figure 8: Labour Productivity: Train-km per staff for selected railways (1990)



Source: Nash and Wu, Table 2

As the economy grows and increasing demands are placed on the rail sector, certain specific problems are emerging. Nash and Wu (2000) write:

> "Because of the fast-growing demand and capacity constraints, China Rail's management attention has focused on maximising operational efficiencies as opposed to improving customer service. China Rail's services are poor in quality compared with Western Europe:
>
> - *Suppressed demand*. There were 20 bottlenecks on main trunk lines in 1995, with around 10-20% suppressed demand during the economic boom period (more than 40% of monthly wagon requests were denied in 1990);

[7] DRC (2001).

- *Longer waiting time and stringent requirements on shippers*. For freight, the shipper usually must give between 18 and 48 days advance notice to order a wagon, and is permitted only some 4 hours to load or unload a wagon when it arrives, while for passengers, long waits (e.g., 24 hours) for rail hard bed tickets on congested railway lines are common.

- *Slow travelling speed*. Comparing 1995 with 1980, the travelling speed of passenger trains increased from 43.9 to 49 km/h; the travelling speed for freight trains increased from 28.7 to 30.2 km/h. In Western Europe, the average speed for passenger trains on developed networks was 117.7 km/h in 1993.

- *Low frequency*. The average passenger train frequency per day of China Rail was 17.8 in 1995 and there were only one or two direct trains per day from Beijing to the provincial capitals. Unsatisfied demand and overcrowding are common. While in the UK, the average passenger train frequency per day was 60.7 in 1993 (on Japan Rail 90.4 in 1994) and there are 17 trains from London to Edinburgh, 36 trains from London to Manchester and 15 trains from London to Paris every day.[8]

Experience with reform to date

In the mid-1990s, faced with a financial deficit in the rail sector, China experimented with certain reforms. In 1998, the Ministry of Railways piloted a "responsibility system" for the management of state assets in the Liuzhou, Nanchang, Hohhot and Kunming railway bureaux.[9] A year later this system was extended to the entire railway transport industry. The responsibility system involved the delegation of the management of certain powers to the railway bureaux, while focussing monitoring on the value of state assets, profit levels, and economic returns. The Ministry also instituted a veto and an investigation system whereby enterprise leaders who had failed to fulfil the anti-deficit quotas would be warned in the first year, and dismissed from their posts if they failed again in the second year.[10]

The responsibility system achieved tangible results:

> "First, production quotas have been implemented on a per-worker basis, accounting has been carried out down to the work group level, and worker and staff performance has been subject to check-ups at every work post. These policies have contributed tremendously to the effort of eliminating the deficit a year ahead of schedule. Secondly, reform of the labour, personnel and distribution systems has achieved unprecedented progress thanks to such efforts as linking the amount of work done with work efficiency, letting workers compete for work posts, and cutting down on surplus labour force and reallocating the layoffs. Thirdly, the Ministry of Railways has speeded up its pace of shifting its administrative functions, streamlining its staff and organisation, and increasing its work efficiency."[11]

[8] Nash and Wu (2000), page 32.

[9] This material is taken from DRC (2001).

[10] This material is taken from DRC (2001).

[11] DRC (2001).

At the same time, several other reforms have been carried out:

- Four railway bureaux have set up a separate legal entity to provide passenger transport services;

- Enterprises and activities that are not directly related to transportation services have begun to be stripped from the industry. In particular, five major companies in railway engineering, railway construction, rolling stock manufacturing, telecommunications signalling, and civil engineering have been detached from the Ministry;[12]

- Ten colleges, and a number of secondary, technical and adult education schools have been handed over to the Ministry of Education or localities;

- A variety of measures have been adopted to transform management of branch railway lines, one of which is to cut down on the staff and work force and increase efficiency while taking care to arrange new jobs for the layoffs. During the last three years of the Ninth Five-Year Plan period, 800,000 people were given new jobs as a result of restructuring branch line management, and a surplus labour force of 320,000 were cut from the transportation services.

- The Ministry of Railways has organised three large-scale campaigns to increase train speeds on trunk railway lines on April 1, 1997, October 1, 1998, and October 21, 2000 respectively. Much has been done to improve service, streamline business operation and optimise train dispatch timetables.

The DRC summarises the lessons learned from these reforms as follows:

> "The reform carried out over the last few years has enabled those working under the Chinese railway transport industry to reach the consensus that the only way out for the industry is to break through monopoly, allow competition, transform the administrative system and management mechanisms, and cultivate market-oriented entities."[13]

The Objectives for Future Reform

In brief, the situation of the Chinese railway in 2001 is both similar and different from the situation of the railway in OECD countries prior to reform. As with other state-owned (pre-reform) railways in OECD countries, the railways in China have relatively low labour productivity, are relatively slow and are not perfectly matched to consumer demand. On the other hand, unlike western countries, the Chinese economy is in a phase of rapid transformation and growth. Demand for rail transport, even if not growing at the rate of the economy overall, is still growing strongly.

[12] In OECD countries railway companies are often able to lower their costs by purchasing services such as construction, manufacturing, signaling equipment, etc. on a competitive market, rather than providing these services internally.

[13] DRC (2001).

The DRC identifies the following four goals for rail reform in China:

- Separation between government functions and enterprise management and between government functions and state asset management;
- Promotion of competition inside the rail sector itself
- Creation of incentives for market-oriented investment
- The establishment of a sound, unified, impartial and highly efficient regulatory framework.

1.2 Rail Markets, Rail Market Power and Rail Market Competition

Before looking at specific reform proposals in the rail sector, it is important to understand some preliminary theory. In particular, we recall here (a) the reasons for regulating the rail sector, (b) how competition experts define markets; and (c) the different forms of competition in the rail sector.

In any regulatory reform process, the first, essential, step is to clearly identify the "problem" which makes some form of regulatory intervention in the market desirable.[14] In economics jargon the problem is usually a "market failure" of some kind. In natural monopoly industries such as railways, the primary market failure is that conventional competition in the market is not possible - the natural monopoly cost structure of the rail industry is such that (in many rail markets) only one firm is likely to survive. If there is a genuine natural monopoly in a market, the entire market demand is more efficiently served by a single firm than by two or more firms. In such a market only one firm can survive in the long-run. Nearly all such markets require special regulatory intervention.

However, a typical rail company will compete in not one market but in hundreds of distinct markets. The competition conditions in each of those markets may be quite different and therefore, both the need for and the nature of regulatory intervention in each market can be quite different. Ideally, the regulatory response would be tailored to the conditions in each market.

Definition of Rail Markets

What are the services provided by a typical rail company? Or, put another way, what are the markets in which a typical rail company competes?

Competition policy experts conventionally distinguish markets according to three dimensions: the "geographic", "product" and "time" dimensions. Each of these three dimensions can be used to differentiate rail transport markets.

- Geographic dimension – suppose a shipper wishes to transport goods from Beijing to a customer in Shanghai. Is this shipper likely to consider a service from Beijing to Guangzhou a close substitute? If the answer is no (as seems likely) then each origin-destination pair is a specific rail market.

[14] See, for example, the "OECD Reference Checklist for Regulatory Decision-Making". The first question on that list is "Is the problem correctly identified?"

- Product dimension – are shippers of goods willing to pay more for greater speed or reliability of service? If so, then each separate quality of service is a different market. Are shippers willing to pay more for timeliness for the transport of, say, fresh flowers than for, say, the transport of coal? If so, these different services are in a specific market.

- Time dimension – If a shipper must get his goods to the market by 5 am the next day, will he consider a train leaving one hour, one day, one week or one month later a close substitute? If the answer is no, these trains are in a separate market.

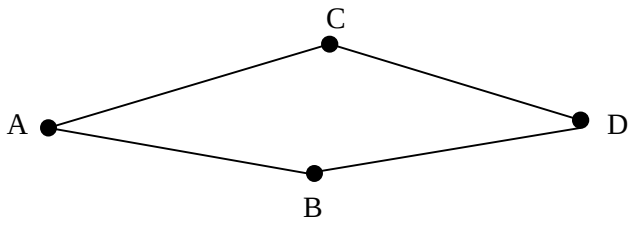
Of course, the same principles apply to passenger transport. It is clear from this that a typical railway company operates in many hundreds or thousands of markets. The competition conditions can differ widely between these markets. In each market the competition conditions depend on the quality and number of the substitutes available to a customer in that market. We will look at the different potential substitutes in different circumstances below.

Types of Competition

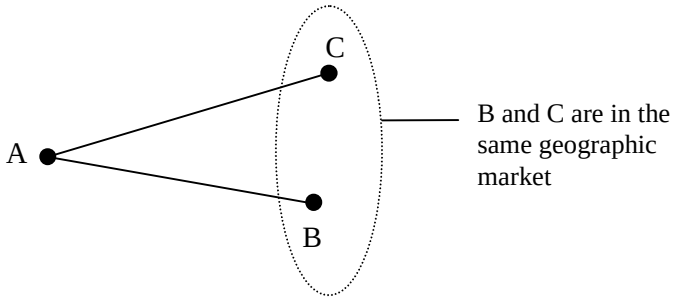
Suppose that a passenger wishes to travel between two cities at a certain time. This passenger may be able to take alternative transport modes. Depending on various factors, such as the speed, comfort and reliability of the alternative modes, these other modes may be close substitutes (or even preferable) to the rail mode. If there is sufficient competition from other transport modes the rail transport provider will not have market power in this market. This is known as *inter-modal competition*.

Of course, there can also be significant inter-modal competition in a market for the transport of goods between two cities at a certain time. Depending on the particular goods, the origin and destination cities and the speed and timeliness of services, goods may be effectively carried by air, trucks, barges, coastal shipping, or container shipping. Road freight, in particular, is for many goods, preferred to rail in most OECD countries. Unlike rail, road freight offers point-to-point service, enhancing the speed of end-to-end service, reducing the need for trans-shipment, with consequence risk of breakage or loss and allowing for the surveillance of the cargo as a unit from its origin to its destination.

In some cases, even if the passenger has no choice but to take a train, the passenger may have a choice of routes between his origin and final destination. For example, in the diagram below, a passenger travelling from A to D has a choice of a route via B or a route via C. If these two routes are operated by different rail companies, and if the two routes are similar in other respects (such as speed, comfort, safety and reliability), there will be a degree of competition between these two rail operators. This is known as *route-based competition* or *competition over parallel tracks*. Of course, this form of competition is equally important in the freight market.



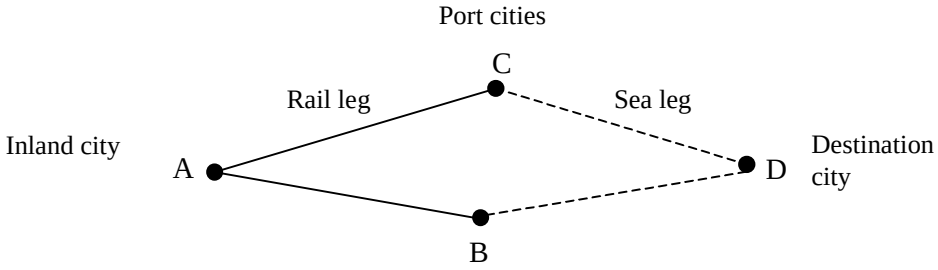
Another form of competition can limit the market power of a rail operator in rail freight markets. Suppose that a manufacturer of goods located at A has a choice of two (or more) rail operators, one of which provides transport to B and the other provides transport to C. Suppose that B and C are in the same geographic market for the manufacturer's products. If two goods are in the same geographic market they must sell at the same price, so the manufacturer is indifferent between selling his product at B or C. If the routes AB and AC are sufficiently similar (in cost or journey time) the market power of each is limited[15].



We can summarise this as follows: If two rail lines serve the same origin and different destinations and if the destinations are in the same geographic market, then the two rail lines compete in the same geographic market. We might call this *end-market competition*.

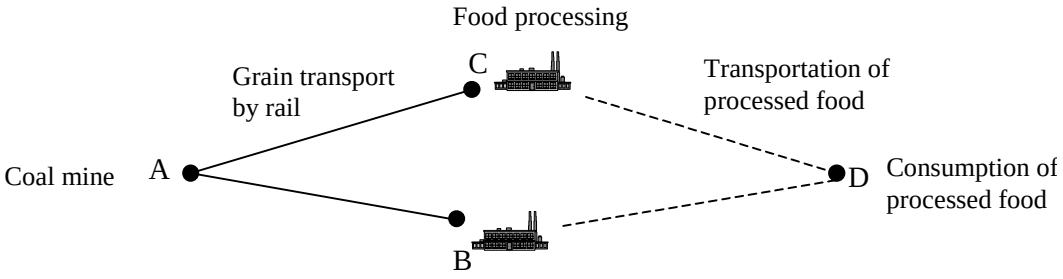
Even when the destination cities B and C are not in the same geographic market there can be some constraint on the market power of the individual rail lines serving these cities. Suppose, for example, that either (a) B and C are coastal cities from where the freight is shipped to its final destination or (b) the goods from A are used as an input into a production process at both B and C and the final goods compete against each other. In each of these cases, the extent to which one rail line AC or AB can raise its prices is limited.

For example, suppose that B and C are port cities from where the goods are shipped to their final destination, as in the following diagram. In this case, if the rail line AC raises its price so that the cost of rail transport AC plus the sea leg CD is greater than the price of AB plus BD, it will lose business to the other rail line. It is clear that the market power of AC is limited to the difference in the cost of the sea legs BD and CD. If these two sea routes are close substitutes, the market power of AC is limited.



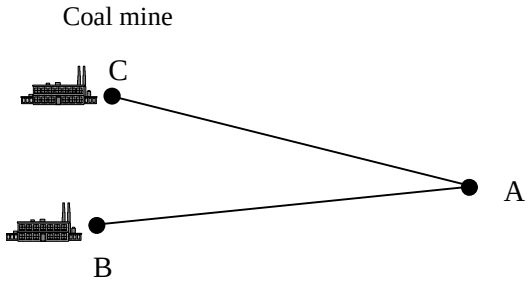
[15] More generally, the market power of any one rail operator will be limited to the difference in the prices of the goods in the end-markets B and C.

The same argument applies when the goods from A are used as an input into a production process at B and C and the final product competes in a single market. For example, suppose that a grain producer at A can ship grain to food-processing factories at either B or C. Suppose that the cost of transportation of the processed food is negligible, so that the processed food from B and C compete in the same final market at D. In this case the market power of the rail line AC will be limited to the difference in the efficiency of the food processing factories at B and C. If both factories are equally efficient the market power of each railroad is limited.



More generally, the market power of the rail link AC is limited to the difference in the price that the two factories at B and C are willing to pay.[16] If the two factories are willing to pay the same amount for grain, the market power of each of the rail lines is limited.

Similar arguments apply to rail lines that serve different origins but the same destination. For example, suppose that two coal mines, located at B and C are both connected by rail links to a city A, where their customers are located. In this case the market power of the rail link AB, even though it may have a monopoly on coal transportation from B to A, is limited by the difference in the mining costs of the two mines. If the two mines have similar extraction costs, the market power of each of these rail links is limited.

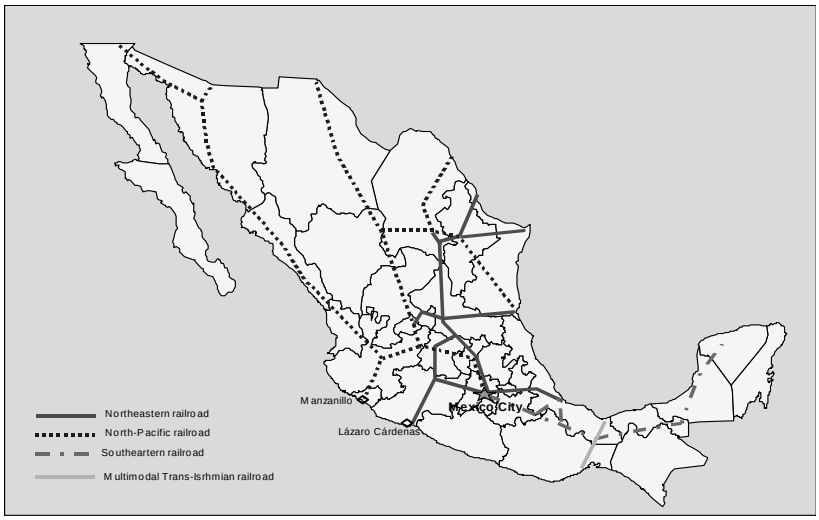


The restructuring of the Mexican rail industry provides one concrete example of the use of these forms of competition. The reform of the Mexican rail industry involved separation into four major railroad companies and a number of short-line railroads. Three of the four major railroad companies were chosen in such a way that they serve broadly parallel routes (See Figure 9). All three of these railroads serve Mexico City. In addition, the two northern railroads serve both the city of Monterrey and the Gulf coast port of Tampico. Both northern railroads also serve border crossings with the US

[16] This is sometimes also referred to as source competition.

and serve Pacific coast ports. The north-eastern and south-eastern railroads both serve the port city of Veracruz. These reforms have clearly enhanced the scope for both competition on parallel tracks and both source and end-market competition.

Figure 9: Structure of the Mexican Rail Industry



Source: Garcia Alba (2002)

It is important to mention one more form of competition. Suppose we have two railways which serve different origins (B and C) but the same destination A (as in the diagram above). Consider the position of a firm or an entrepreneur choosing whether to locate a factory at B or C. This factory will consume a large amount of rail services. Once the factory has made a decision to locate at B or C it will be subject to the market power of the railroad. But before the location decision has been taken the two railways CA and BA can compete for the business of the factory by offering a long-term contract for rail services at attractive terms. In other words, provided railways can enter into long-term agreements, even though two railways do not compete ex post, they nevertheless can compete ex ante, before a location decision is sunk.

Part II: Reform Proposals

2.1 Introduction

Let's turn now to look at the various approaches for reform of the rail industry. Policies for reform of the rail industry can be divided into two broad categories:

(a) Those that relate to the structure and incentives of the key enterprises and institutions in the rail sector;

(b) Those that relate to enhancing competition in the rail sector.

These two categories are not mutually exclusive, but mutually reinforcing. On one hand competition is one of the most important ways to promote efficiency and innovation in rail enterprises. On the other hand, it is difficult (if not impossible) for competition to develop when the policy role is mixed with the enterprise role and/or one or more rail enterprises has a soft budget constraint.

We will look at each of these broad categories in turn below.

2.2 Reform of Institutional Arrangements (Governance)

For many OECD countries, reform of the rail sector has primarily focused on reform of the institutions involved in the rail industry. These reforms have affected not just the enterprises directly involved in the provision of rail services, but also the government agencies involved in oversight, monitoring and regulating the industry. In fact, for many countries, the reform of the institutional arrangements in the rail sector is equally as much, if not more, a reform of the government sector as it is a reform of the rail enterprises themselves.

Principles for the Design of Institutions

Broadly speaking, the following principles guide the reform of institutions in the public sector:

- First, different objectives are identified. These may include, for example, "ensuring the highest possible return on state-owned assets", "preventing the exploitation of market power", "ensuring high standards of safety", "ensuring the provision of rail services which best meet consumer demand", "ensuring that non-commercial services of an adequate standard are provided at least cost to the government" and so on.

- Second, objectives that are in conflict with one another are put into different agencies or institutions. Clearly "control of market power" is in conflict with "ensuring the highest possible return on assets". These objectives should be addressed by separate agencies to ensure that any trade-off of conflicting objectives is carried out by decision makers at a high level in a public, transparent manner.

- Third, where there is a need for private investors to make a long-term investment (as may be the case in the rail industry), and where the decisions of a governmental agency or institution can affect the value of that investment (by, for example, limiting competition or regulating prices to a low level), the governmental agency or institution should be distanced from the day-to-day intervention or control of the government on the one hand and the existing firms in the sector, on the other.

- Fourth, each agency or institution should be granted the powers and discretion necessary to carry out its tasks and fulfil its objectives.

- Fifth, mechanisms should be put in place to ensure that each agency or institution has the correct incentives to fulfil its objectives. For each institution we should ask – what are the incentives for performance? Can we tell if the agency is failing to fulfil its objective? If so, what penalties will be imposed? What incentives does the agency have to fulfil its objective?

Application to the Railway Sector

We may apply these principles to the rail sector. Given the large number of different objectives to be fulfilled, we can identify a number of different institutions with different roles:

(a) The role of *owner of assets* in the rail sector. As long as the government continues to own major assets in the rail sector it is important that those assets earn the maximum possible return for the government. The government, as owner, could establish a special institution for ensuring that all its assets (not just those in the rail sector) are being managed in a way which generates the maximum income for the government while ensuring that other government policy objectives are met.

(b) The role of *regulator* of the rail industry. This regulation can take many forms, including control of market power (i.e., control of prices), control of safety and control of environmental harm, licensing of new entry and control of anti-competitive behaviour. In the UK, for example, these regulatory roles are spread across four different agencies – the Strategic Rail Authority, the Office of the Rail Regulator, the Health and Safety Executive and the Office of Fair Trading (the UK's competition authority).

(c) The role of *purchaser of non-commercial services*. Many governments choose to subsidise specific rail services for the benefit of rail users. As discussed later, the efficient selection of a provider of non-commercial services requires some form of competition – which may require that this role be separate from the government's role as provider of rail services. In the UK, for example, this role was performed by an agency known as OPRAF – the Office of Passenger Rail Franchises[17]. The objective of this agency is to provide specific services at least cost to government funds.

(d) The role of *long-term and strategic planning and integration with other transport modes*. In OECD countries, a Ministry of Transport typically carries out this role (there are no Ministries of Railways in OECD countries) although in the UK the Strategic Rail Authority has some of this role.

(e) The role of *providers of rail services.* That is, the enterprise or enterprises that provide the services that make up the rail industry, including track and infrastructure services, freight services and passenger services. In the UK, the enterprises in this category include Railtrack, the rolling-stock leasing companies, the franchised passenger companies and the freight companies. We will discuss later how these providers should be separated horizontally and vertically.

At a minimum, we can identify three roles which must be separated – the government's role as owner of assets, as regulator of the sector and possibly as provider of rail services. It would be preferable, however, to also separate the role as owner from the government's role as planner of the transport sector and the role of purchaser of non-commercial services from the government's role as owner or provider of services. In the case of a privatised railway system, the government no longer needs to play the role of owner of assets or provider of services – in this case the government's role is limited to the regulatory role, the strategic policy role and the purchaser of non-commercial services.

[17] Subsequently merged into the Strategic Rail Authority.

Whichever final form is chosen, it is widely agreed that some separation of the different roles is required. "Ministries of Railways ran many of Europe's post war railways. Today, the only ECMT member countries to retain ministries of railways are to be found in the Commonwealth of Independent States, and Russia plans in the near future to separate the railway from Government."[18] Louis Thompson of the World Bank writes:

> "Monoliths are expensive anachronisms. Their social burdens hinder them in competition with leaner private competitors. They cannot compete in non-rail activities (locomotive or coach manufacture) with more specialised, private firms which operate on a world scale using world-class technology. Their mélange of incompatible rail markets restricts their ability to compete effectively with enterprises having a tighter, "core" focus. Their confusion of costs among many different activities makes it impossible to calculate costs of individual activities accurately, inviting politically inspired cross-subsidies, and making it difficult to resist pressures from powerful special interests. Their independent governmental status makes it much harder to integrate railway policies and activities into an effective national transport policy."[19]

Reform of Rail Enterprises

We will focus now on the last of the roles identified above – the enterprises that directly provide rail services to customers and end-users. What can be said about the structure and governance of these enterprises?

Ideally, these enterprises would have both the incentive and the ability to provide rail (freight and passenger) services that consumers and users desire in as efficient and innovative a manner as possible.

An important first step in this direction is the corporatisation of the rail enterprises – that is giving them the same legal status as any other corporate entity. This process also involves delegating authority to the enterprise the right and responsibility to organise its affairs and establish its own practices, including possibly raise its own capital, subject to monitoring and oversight focused primarily on maximising the return on the state assets used. Stephen Perkins of the European Conference of Ministers of Transport notes:

> "Conferring freedom to management to run railways as commercial businesses has been the cornerstone of the rail reforms in all European countries over the last few decades. This was initiated in western Europe largely in response to liberalisation of road transport markets, and enabled the railways to survive the severe industrial restructuring that followed the oil shocks of the 1970s. Commercial freedom was conferred in the simplest of terms, railways were constituted as (state-owned) joint stock companies and required simply to make a long term financial return by managing the business in the way they saw fit subject to a limited set of conditions such as tariff regulations, control of borrowing and review of line closure programs."[20]

[18] Perkins (2002).

[19] Thompson (2002).

[20] Perkins (2002).

Is corporatisation sufficient to give rail enterprises incentives for efficient and innovative operation? This clearly depends on, amongst other things, the quality of the corporate governance on these enterprises. A key question here is whether public owners have the same incentive and ability to extract performance as private owners. This is discussed further below. Here, we note, first, certain factors that will hinder the incentives for efficiency and innovation of rail enterprises, whether publicly or privately owned.

Hard Budget Constraint

It has long been recognised that one of the pre-conditions for efficient operation of any enterprise is a hard budget constraint.[21] In a market economy, one of the strongest disciplines on a firm is the threat that inefficient operation will lead to insolvency, dismantlement or take over by another enterprise. A firm which has access to external funds of an unlimited amount has both reduced incentives and ability for efficient operation: First, for such a firm, the threat of bankruptcy is distant or remote, limiting the power of this threat as a discipline on the firm. Second, suppliers of the firm, recognising that the firm cannot be made insolvent have an incentive to hold out for better terms and conditions. This raises the cost to the firm for key inputs. In Italy, for example, the government found that chronic deficits had substantially raised both labour costs and the cost of new locomotives.[22]

A soft budget constraint might arise in the rail sector, for example, when the government feels that it cannot afford to shutdown certain services or engage in major reforms (with the ensuing loss of jobs). In this case, the government can do little about losses incurred by the rail enterprises. The rail enterprises, knowing they can rely on government funding (through losses) have little incentive to restructure themselves. In Argentina, for example, the rail operator had been losing more than $US 2 million per day for years on end before restructuring was finally imposed.[23]

This problem is particularly complicated when rail enterprises are required to provide non-commercial services (such as the provision of unprofitable services to under-developed regions or the transportation of military supplies at non-commercial terms) without some mechanism for explicit and independent costing of those services. If the government is committed to the non-commercial services but is unable to determine exactly how much it costs to provide the services, the rail enterprise can claim that its losses are due to the need to provide non-commercial services. Again, this reduces the incentive on the enterprise to engage in restructuring. If the government wishes to ensure the supply of non-commercial services, it should do so in a way that allows it to limit the funds to be provided, as discussed below.

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[21] See, for example, Majumdar (1998).

[22] [The poor performance of the Italian rail operator] "seems to result from the lack of any effective budget constraint on the company's behaviour, since the company's inefficient choices and poor performance is not actually penalised and its losses are usually balanced through additional government funds. In such a situation there are no significant incentives for the company to efficiently allocate internal resources in order to reduce the costs of providing services at the required quality standards. These features also favour a particularly slack relationship between FS [the Italian rail operator] and its suppliers. … In the Italian rail industry a significant share of the monopolistic rent appears to be split among a large number of different players, including managers, employees, suppliers as well as final consumers, whose vested interests are at present the strongest obstacle to any structural reform aimed at introduction competition and promoting economic efficiency". OECD (1998), page 94.

[23] Kogan (2002).

The hardening of the budget constraint requires a number of related policies that have implications well beyond the rail sector, including:[24]

- A sound legal framework, including the implementation of modern bankruptcy laws, up-to-date accounting disclosure requirements and courts that are prepared to enforce contracts and declare insolvency if necessary;
- A commitment by the state not to provide hand-outs and not to tolerate chronic loss-making;
- A commitment by the state to not change the tax rules on loss-making companies;
- Policies which place prudent controls on bank lending, such as improvements to corporate governance on the banking sector;[25]
- A commitment by the state to prevent companies accumulating debt with suppliers or employees through trade or wage arrears.

It is possible (but by no means certain) that the government will find it easier to commit to not fund the deficits of a private enterprise. This, alone, is a primary reason for placing the enterprise in private hands. This is discussed further below.

Non-Commercial Service Obligations

As just mentioned, one of the primary reasons why governments continue to fund loss-making rail enterprises is as a result of the desire to preserve certain rail services that are deemed to be socially valuable even if not commercial viable. Railways in many countries are called upon to provide non-commercial services. China is no exception:

> "The contradiction between public welfare and the enterprises' commercial operations is an outstanding problem. Railway transport enterprises undertake a colossal amount of railway construction for the benefit of land reclamation, local economic development, and ethnic unity, and in the service of political and military goals (the basic starting point of the non-profit making railroad investment is to satisfy the public welfare needs and demand). In addition, rail enterprises render large amounts of non-profit-making transport services for the sake of economic and social development in underdeveloped regions, the shipping of military supplies, the effort to aid the poor and relieve victims of natural adversities, the shipping of servicemen, the handicapped, and students. The costs of these non-profit-making operations are not compensated by the market or other commercial means."[26]

[24] These are drawn from Kornai (2001).

[25] Kornai (2001) cites a study by Gao and Schaffer (1998) who show that loss making enterprises in China gain access to bank credit on a mass scale, while in Hungary such selectiveness in reverse is much rarer. In most market economies, bank credit goes predominantly to successful companies that are borrowing in order to expand.

[26] DRC (2001).

How can such non-commercial obligations be funded in a way that does not involve the government committing to providing the services whatever the cost?

It is important to emphasise at the outset that withdrawal from the provision of non-commercial services should always be considered. Withdrawal from the provision of services does not mean that these services will not be provided at all. Certain services may be more efficiently provided through other transport modes (such as the replacement of rail transport by buses). In some cases, the withdrawal of a subsidised rail service may allow the development of competition for the service from other transport modes. In some cases, in fact, a service which is dropped by an incumbent rail operator can be profitably provided by another rail operator. In the US and Mexico there are many examples of services abandoned by the major rail carriers being taken up by so-called "short-line" railroads. Many hundreds of such railroads exist in the US today.

A second relevant point is that OECD governments have found that it is often worthwhile to hand the funding of services of a regional or local interest to regional or local government. As long as services of a local interest are funded by the central government, local authorities have an incentive to lobby for the expansion and continued or enhanced funding of the services, without regard for the cost or the trade-offs involved. By transferring responsibility for the funding of those services to local government, the local authority has a greater incentive to make trade-offs with other policy objectives and to balance the need for rail services against the need for other public goods. The local authority may withdraw from the provision of services for which the benefits do not justify the costs or provide the services in some other way (e.g., by replacing rail services with road services). Perkins writes:

> "Germany and more recently France have successfully re-channelled state funding to support [regional] services to local governments. This gives local governments both power and responsibility to purchase services and make their own judgement as to what services are viable, and offer value for money. In Italy, local governments were given the power to transfer funds provided by central government for the support of rail transport services, not only to other transport modes but also to entirely different services, such as health or education, if this is where the local government sees the priority for public services. In a number of countries, notably Germany, local governments are able to put regional rail services out to competitive tender, and in several cases new operators have won the business away from the incumbent national rail company. Germany has also transferred feeder lines that the national railway found uneconomic to private companies, able to run freight services at lower cost, subject to more flexible safety and employment regimes."[27]

Whether non-commercial services are funded by local, regional or central government, the government cannot be sure it is obtaining the services at least cost without some form of competition for the provision of the services. Ideally, therefore, the provider of non-commercial services should be chosen through a competitive tendering process.

As an aside, note that the degree of competition in such a competitive tendering process will depend on other structural policy decisions. If there is a single integrated rail company there is unlikely to be much competition for the provision of individual non-commercial services. Breaking the rail network up into many companies (as discussed below) increases the number of potential bidders for any given service. In addition, reducing the level of specific investment required by the potential bidders will also enhance the competition in the tendering process. In the UK the need to invest in rolling stock was reduced by placing the ownership of the rolling stock in separate companies, which

[27] Perkins (2002).

lease the rolling stock to the successful bidders of the passenger franchises. In this situation, the company which wins the franchise does not need to make a substantial investment in rolling stock.

Reform of the handling of non-commercial services lies at the heart of rail reform in Europe:

> "[A] fundamental part of regulatory reform for railways in Europe has been creation of transparency in the funding of public service obligations. These are increasingly made on a contractual basis – the state, or local authority purchases transport services from the rail company rather than allocating subsidies. The governments of central and Eastern Europe still fail to consistently make full payment for the services provided but even here there is now transparency in the obligations the state puts on rail carriers and the compensation expected. There is also increasing flexibility in the kinds of services governments will pay for to meet social mobility needs, in the interest of finding more efficient solutions. Bus and even taxi services can substitute for what were traditionally rail services and some administrations use competitive tendering for the award of public service contracts. … The European Union has legislated to require all its Member States to create transparency in the compensation and allowances provided in respect of public service obligations and is expected to issue more explicit regulations, together with rules on state aids to railways during 2002."[28]

Flexibility to Set Prices and Services

A second pre-condition for efficient operation is that rail enterprises must have the ability to choose their own prices and services (possibly subject to some overall constraint on market power).

The rail industry is an industry with substantial economies of scale – there are very high fixed costs invested in the track infrastructure, while the marginal costs of train operation are relatively low. Many OECD countries require the rail sector to recover not just the marginal cost of the track infrastructure but the full costs (this was discussed earlier). In a situation of high fixed costs and low marginal costs, if the rail industry is to recover its total costs it is desirable for rail enterprises to engage in some form of price discrimination.

This price discrimination can take many forms. Perhaps the simplest form is charging different prices to different end-users, according to the demand of that end-user. This means, for example, charging lower prices for routes which face more inter-modal competition, or higher prices at peak times when demand is more inelastic. It may also mean charging different prices for "business" or "leisure" travellers, or different prices according to the length of stay at the destination and so on.

Airlines in OECD countries are experts at this kind of discrimination. On any given flight there may be dozens of different fares, which vary according to the class of service, the length of stay of the traveller, whether the trip involves a Saturday-night stay, whether the trip is one-way or two-way and so on. On any given flight it is possible that no two passengers pay exactly the same fare.

Rules prohibiting discrimination of this kind can have disastrous consequences. If a railway (or an airline) was prevented from price discriminating across customers in this way, the results could be the bankruptcy of the railway. Suppose, for example that the costs of providing a rail service was $100 and that there were 10 passengers each willing to pay $5 and 25 passengers willing to pay no more than $2. In this simple example, if the railway was required to charge the same price to all its passengers there is simply no price at which the railway can cover its costs – the railway is forced to

[28] Perkins (2002).

go out of business. If the railway is allowed to price discriminate, it could charge $5 to the first set of passengers and $2 to the rest, earning enough revenue to stay in business and providing valuable services.

This kind of price-discrimination is known as second-degree price discrimination (charging different prices to different classes of customers). But railways can also use third-degree price discrimination (charging different prices according to the quantity consumed). For example, a railway might use a two-part tariff with a high fixed price and a low marginal price. The simplest example of this is a "rail pass" which, for a fixed price, allows unlimited travel on, say, a metropolitan rail network, for a period of time. As a general rule, provided that the following two conditions are met: (a) that the price exceeds marginal cost (and marginal cost could be very low) and (b) that selling at that price does not affect the ability of the rail company to sell services to the same or other customers, selling an additional service to a customer will always be worthwhile.

The same principles apply to freight traffic. The prices for freight traffic should be differentiated, according to (a) the identity of the goods carried; (b) the origin and destination of the freight[29]; (c) the speed or reliability of the service, and so on. Freight prices could also involve two-part or multi-part pricing[30] and so on.

Of course, when a rail enterprise has market power in some markets, it may be necessary to control the prices charged by that enterprise in those markets (the prices of the same enterprise in other markets can be left unregulated). But, even when prices are regulated the rail enterprise should remain free to discriminate in the way just described. Price regulation is compatible with price discrimination when the price regulation is carried out by means of a cap, not on individual prices, but on the prices of a bundle of services. A cap on the averaged prices in the bundle allows the rail enterprise flexibility to raise certain prices and simultaneously lower other prices, in a way that enhances overall efficiency.

As mentioned earlier, at present, the State Development Planning Commission uses a very unified system for regulating prices. All passenger prices are set on the basis of a simple basic rate per passenger kilometre. No differentiation is made according to the time of day or week, peak/off-peak periods, the length of journey, one-way vs two-way, business vs leisure travel and so on. This system should be replaced with a system that allows rail enterprises more flexibility to adjust their tariffs.

Perkins notes:

> [In China] "Central control of the prices charged for rail transport mean that there is little or no discrimination between the value that different users, and different categories of transport, attribute to rail services, except on the relatively small proportion of new lines and new services where some freedom to price according to the market has been granted. Relatively low value movements may be crowding out higher value traffic. Central planning can never match the effectiveness of market based pricing to establish relative values.
>
> "Freedom to set prices for transport services is an important part of the management freedom required. In Europe passenger tariffs have been progressively liberalised. Governments still supervise prices for many categories of service, often regulating standard fares but allowing freedom for companies to offer premium services (1st class, high speed supplements etc.) at

[29] ... including whether or not goods are for export... and so on.

[30] For example a long-term contract to carry coal might include a fixed annual fee, independent of the amount of coal carried and a charge per tonne of coal carried.

> higher prices or to offer cheaper tickets to specific groups of customers or with restrictions such as no refund when the ticket is not used. … There is almost no regulation of freight tariffs now in Europe. Price competition from road transport is severe and sufficient to regulate rail tariffs in almost all markets. …
>
> The importance of long distance coal and other bulk transport in China, and the monopoly power enjoyed by rail in these markets, means tariffs for these categories of freight will require regulation. … Regulatory oversight of general rail freight tariffs in China may also be required while the road network is inadequate to deliver effective competition from road haulage, but this need will diminish as the road and motorway network grows. Moreover, inland and short sea shipping already competes strongly with rail on the eastern seaboard and along the principal rivers."[31]

For similar reasons, the rail enterprises must be free to add new services or withdraw from existing ones. If a particular service is not covering its incremental cost (despite careful price discrimination of the kind just described), the rail enterprise must be free to withdraw from the service. If the service is important to the government, the service should be separately purchased by the government as a non-commercial service in the ways described above. Similarly, if a railway cannot add new services it cannot respond to market demand in an efficient and innovative manner.

In addition, the rail enterprises must be able to structure their businesses as they choose, including the ability to focus on "core" businesses, while divesting other non-core businesses. This may include divesting so-called "social infrastructure" such as hospitals, educational institutions and so on. The arguments for divesting transport-related businesses are weaker. Related activities, such as hotels, travel agencies, freight forwarders, commercial property leasing could enhance demand for rail services and could help rail operators to maximise the value of their assets. On the other hand, participation in these other activities may allow cross-subsidies and may make it more difficult to assess the performance of the rail enterprises.

Incentives for Efficient Operation

So far we have noted that the rail enterprises should have a hard budget constraint and the ability to set their own prices (possibly subject to a constraint), choose their own services and choose how they are organised. Although these are important policies in their own right they do not guarantee the efficient, innovative and responsive operation of the rail enterprises. In other words these are necessary but not sufficient for effective reform.

Whether or not rail enterprises have incentives to be efficient, innovative and responsive to market demand depends in a large part on the governance of these entities – that is, the system of rewards and incentives put in place from the top of the management hierarchy down.

The quality of this governance will depend (amongst other things) on the ownership of the rail enterprise. The owners of a private rail enterprise, since they benefit from the profits earned by the firm and suffer from its losses (in technical terms the owners are the "residual claimants" of the firm), have a strong incentive to ensure that the firm is operated in an efficient, innovative and responsive manner. In contrast, since, with a state-owned firm, the benefits from increasing profits or reducing losses are shared over a large group, the incentives on any one manager or government officer tend to

[31] Perkins (2002).

be weaker. As a result, it is harder, with a state-owned firm to ensure that strong incentives for efficiency are maintained. This is not to say that state-owned railways will always be hopelessly inefficient. However, there is little doubt that these railways could be operated more efficiently in private hands.

There are a variety of ways in which a railway can be placed in private hands. These include outright sale (privatisation), concessioning or franchising. Very long concessions are virtually indistinguishable from outright privatisation – the only difference being that the underlying assets will revert to government hands at some date in the future. Various other schemes (such as the "BOT" or Build-Operate-Transfer schemes) also keep railways in private hands for a period of time.

The discussion of the last few sections makes clear why the rail reform of, say, Argentina or Mexico was so successful. The process of tendering franchises that was used in Argentina and Mexico had many beneficial effects. Competitive tendering simultaneously:

(a) Placed the railways in private hands, strongly enhancing the incentives for good corporate governance;

(b) Cut off government funding, thereby hardening the budget constraint;

(c) Freed the railways to set their own prices;

(d) Re-established the value of the fixed assets employed in the rail sector at a level commensurate with their ability to earn income; and

(e) Liberated the railways from loss-making services and ensured that any remaining non-commercial services were provided at a minimum cost to the government budget.

The fundamental need for further institutional reform is well recognised in China. The DRC writes:

> "There is a confusion about the property rights of railway transport enterprises as major entities on the market. The railway bureaux and sub-bureaux in China cannot be counted as being corporate entities in the legal sense of the term, and a corporate governance structure that is up to the standard of a market economy is yet to come to stay. Confusion about property rights, and about the boundaries of rights, responsibilities and interests has been the major hurdle in the Chinese system for the nation's railway transport enterprise to establish themselves in the market. The fact that the government serves as both an owner and an entrepreneur, and, in the case of the Ministry of Railways, which functions simultaneously as a national transport enterprise and the representative as well as director and operator of state assets in the railways, has robbed the Chinese railway transport industry of both its incentive and constraining mechanisms, a drawback that must be uprooted if the system is allowed to continue. With their property rights as corporate entities not well defined, the various railway bureaux and sub-bureaux cannot possess, use and dispose of their assets and gain a profit from them as complete legal entities, and the owner and its representative (such as the Ministry of Railways) can intervene in a transport enterprise's business activities and what it has achieved using his property rights status. The asset management responsibility system that has been introduced to the entire industry has, fundamentally speaking, failed to remedy the confusion of property rights among transport enterprises."[32]

[32] DRC (2001).

Application to China

DRC has raised and emphasized the principles of the reforms of the railways in China. The DRC's proposals can be summarised as follows:

- *Separation of government functions from enterprise management.* The Ministry of Railways should detach itself from its subordinate railway bureaux and sub-bureaux and concentrate on industrial policy, supervision, state asset management, and financial taxation.

- *Corporatisation.* Rail enterprises should be granted the status of independent corporate entities. The ministry should refrain from directly intervening in their behaviour in day-to-day business operations and allow them to make their own decisions in arranging their business according to supply-and-demand on the transportation market.

- *Separation of social infrastructure and non-core businesses.* The government should provide the necessary conditions for rail enterprises to divest their social and institutional functions (such as public security, hospitals, courts, and schools). Moreover, railway enterprises should divest their non-transport businesses, enabling greater transparency as to the accounts of the rail business itself.

- *Establishment of an independent rail regulation/supervision body*. This body should have a formal legal basis for operation, should be independent, and should operate in a fair, efficient and transparent manner. The tasks of the body would include accreditation of market operators, supervision over competitive behaviour and prices, regulation of track access fees, enforcement of safety standards and imposition of fines and penalties.

- *Revamping the state asset management system.* Separation of role of government as investor, policy-maker and supervisor into different government agencies. Establishment of a state railway asset operational and managerial system with responsibility for maximising return and preparing assets for privatisation in a manner which maximises the revenue for the government without limiting competition.

- *Formulation of a competition law and competition enforcement policy.*

- *Reformulation of the policy role of the Government.* The current Ministry of Railways should be integrated with other transport policy roles to form a Ministry of Transportation. This ministry should concentrate on the long-term development of the nation's railways. The ministry should: plan for changes in the national railway network in the light of changing demand for passenger and cargo transport; monitor developments in railway enterprise organisation structure, passenger and cargo service prices, the competitive environment and competitive strategies; and put in place policies to encourage investment in new technology and in the regions (such as the policy to encourage investment in railway infrastructure in the western region).

- *Separation of non-commercial from commercial operations and placing financial subsidy and compensation mechanisms on a sound basis.* This includes establishing policies regarding the choosing of subsidy recipients (such as the introduction of a bidding system for government subsidy).

In addition to these important reforms, this discussion has highlighted two important further step that are not mentioned by the DRC – (a) the importance of placing the railway enterprises in private

hands, through partial or full privatisation or through concessions or franchises (as in Argentina or Mexico) and (b) the importance of reform of the way that the prices of rail services are regulated, allowing flexibility to the rail enterprises to set their prices to each customer or in each market in line with the elasticity of demand.

2.3 Pro-Competition Reforms

The previous section has discussed reform of the institutions and enterprises governing the rail sector. However, reform of the enterprises and institutions in the rail sector is not a guarantee of efficient, innovative and responsive rail services. Although a privately owned and properly regulated rail system is probably more efficient and responsive than a state-owned monolithic railway, even a private monopoly is not likely to be as efficient as a competitive rail industry.

On the other hand, it is worth emphasising that simply introducing competition, without institutional reform may not have much effect. There are many ways in which a state-owned monolithic railway operator may be able to restrict competition. For example, a monolithic ministry-run railway may be able to use its control over licensing or taxation to restrict entry. Even if a monolithic railway does not abuse its regulation powers, the provision of a competing service may require access to certain facilities of the incumbent, such as stations or loading facilities, which, in the absence of an independent regulator, the incumbent railway may be able to refuse. Finally, even if there is an effective independent regulator, competition will not develop if the incumbent railway has a soft budget constraint – a privately funded rival operator cannot hope to earn an adequate rate of return when competing against a subsidised incumbent. For the remainder of this section on promoting competition, we will assume that the institutional reforms discussed above have already been carried out.

The remainder of this section is organised as follows. We focus first on intermodal competition (which is the most important form of competition in most rail markets in OECD countries) and then we turn to the issue of intra-modal competition: how can we promote competition within the rail sector. In particular, how should the industry be structured so as to maximise competition?

Intermodal Competition

In the rail sector intermodal competition is of primary importance. In many or even most rail freight and passenger markets, other transport modes are effective substitutes for rail services.

In many OECD countries, intermodal competition is significant in all except a few rail markets. In particular, in the freight transport market, road transport is a good substitute for all but the heaviest bulk commodities. Even in the case of bulk commodities, water transport is often a satisfactory alternative. In fact, in many OECD countries the degree of inter-modal competition is such that little or no regulation of the rail sector is required at all. There is no regulation of rail freight tariffs in any Western European country. In some cases the concern has not been that rail faces too little competition from other transport modes, but that rail faces “too much” competition – that somehow rail is disadvantaged in its competition with other transport modes. In some rail reforms in OECD countries very little attention was given to the creation of competition within the rail sector, on the basis that inter-modal competition was more than sufficient. In New Zealand, for example, the rail sector was privatised as an integrated monopolist without any regulation to control market power.

There are a number of policy steps that can be taken to promote inter-modal freight competition, as Pittman notes:

> "Both road freight transport and river freight transport tend to be industries that can be structured as reasonably competitive,[33] so that where they are economically feasible they can by themselves provide competitive transport alternatives to shippers and obviate the need for regulation. The Chinese government should do everything possible to encourage the development of intermodal competition, for example by:
>
> - liberalising private entry into motor and water carriage;
> - providing the necessary road and water infrastructure for the use of private operators;
> - promoting competition in the procurement policies of governments at all levels, to ensure that infrastructure investments get the best results possible; and
> - ensuring that tax policies -- for example on fuel use -- do not discriminate against particular transport modes."[34]

Promoting Competition within the Rail Sector

Although intermodal competition is predominant in many rail markets in OECD countries, it is clear that there remain some markets in some countries where rail has substantial market power. In the case of China, the road infrastructure is not yet as developed as in western countries and the air transport industry is still largely in its infancy. In China, therefore, the scope for intermodal competition is more limited. It is important, therefore, to look at other approaches to enhancing competition within the rail mode.

Promoting competition within the rail sector inevitably involves a choice as to how the industry will be structured. In particular, competition policy in the rail sector involves a choice between a primarily vertical separation of the industry and a primarily horizontal separation of the industry.

The rail industry can be divided into several sub-sectors or activities. Two activities are particularly relevant – the provision of the track infrastructure and the operation of trains. The provision of rail track has natural monopoly elements – it involves a large fixed cost and a low marginal cost of operation. Furthermore, the addition of a second track between two points more than doubles the capacity of railway between those points. These natural monopoly elements suggest that the provision of track infrastructure is a non-competitive activity. (However, as we note below, some competition between track infrastructure is possible). On the other hand, the economies of scale and scope in the operation of trains are more limited, suggesting this is a competitive activity.[35] The provision of rail services requires the use of both of these complementary services – trains and track infrastructure.

[33] This is more true for truckload road haulage than it is for less-than-truckload road haulage, where the creation of a hub-and-spoke network may yield significant economies.
[34] Pittman (2002).

[35] There can be some economies of timetable density, mentioned below.

There are at least four different structural policies which are designed to promote competition in a sector such as rail. These four policies are discussed in more detail in the OECD publication "Restructuring Public Utilities for Competition".[36] These four policies are as follows:

(1) *Vertical separation*

Under this approach, the ownership of the track infrastructure is separated from the ownership of the operation of trains. The primary form of competition with this approach is competition between train operating companies operating over an independently-owned track infrastructure. The train operations may themselves be also separated horizontally and competition may or may not be permitted on different segments of the track. The clearest examples of this kind of separation occur in the UK and Sweden.

(2) *Vertical Integration with Access Regulation*

Under this approach, the incumbent rail operator is allowed to remain vertically integrated (although there may also be some horizontal separation) but competing train services are allowed access to the track of the incumbent at regulated terms and conditions. The primary form of competition with this approach is competition between the rival (non-track owning) train companies and between the rival train operating companies and the integrated incumbent.

(3) *Vertical Integration (with Horizontal Separation)*

Under this approach, the incumbent integrated rail operator is separated into several route-based companies. The primary forms of competition with this mode are competition over parallel tracks and end-market and source competition, as explained below. In addition, each integrated operator may enter into reciprocal arrangements with other operators that allow a rival's trains to operate over the first network's tracks.

(4) *Joint or common ownership*

Under this approach the natural monopoly infrastructure (or parts of it) is jointly owned by the train operating companies. In practice, this last approach has only so far been used for access to certain key shared facilities (such as a central railway station – as in Mexico City, or certain key pieces of track).

Note that these approaches are not necessarily incompatible. It may be possible to have separation of infrastructure from operations for, say, freight services, while maintaining integration for passenger services (as occurs in Japan).

[36] OECD (2001).

Each of these approaches has both advantages and disadvantages. We will discuss the pros and cons of each of these approaches in turn:

Vertical Integration with Access Regulation

The first broad policy we will consider is to allow the incumbent railway to remain vertically integrated (i.e., providing both track and train operations) while requiring this railway to provide access to the track to third-party train operating companies.

The primary theoretical advantage of this approach is that it allows competition in the competitive segment of the rail industry (i.e., in train operations) in all segments of the rail market (including freight and passenger services) and in all parts of the rail network. In addition, it does so without foregoing any of the benefits of economies of scope that arise from the joint provision of track and trains (as discussed in the next section).

Where the non-integrated operators provide a service which does not compete with the incumbent the incumbent has little incentive to deny access and, provided there is no congestion (or other disruption to the existing services of the incumbent operator), the incumbent has an incentive to welcome the additional traffic on its tracks. This approach can therefore be appropriate, for example, for the operation of passenger trains over an integrated freight network or vice versa.

On the other hand, where the non-integrated operators provide a service which directly competes with the incumbent operator, the incumbent (assuming it operates under normal commercial profit motives) has a strong incentive to discourage or deny access. This denial of access can take many subtle forms, such as granting of less desirable train paths, or scheduling maintenance to disrupt the rival's trains, or reducing maintenance on routes most used by the rival's trains. In this case, preventing discrimination may be a difficult task for a regulator. Experience shows that even experienced well-resourced regulators in OECD countries have difficulty preventing discrimination in this context. This task is likely to be especially difficult for a new regulator in the context of China.

Pittman summarises the problem as follows:

> [When an integrated railway network is forced to provide access to a competing train operator] "there may be a serious problem of favoritism and discriminatory access (as well as cost shifting to evade any remaining rate regulation). How is a regulator to make sure that the track owner does not give more favorable access terms -- regarding either price or quality -- to its own, integrated train operation than to competing train operators? Will this require more knowledge than the regulator is likely to have, and more extensive intervention in the day-to-day operations of the railroad than the policy maker is likely to desire? And if favoritism cannot be effectively prevented, can there be effective competition in the "competitive" sector?"[37]

In practice, is there any experience with competition using this approach? The answer seems to be "relatively little". In the US a non-integrated passenger operator (Amtrak) operates over the tracks belonging to integrated freight companies and in Japan a non-integrated freight operator provides services over tracks belonging to the passenger companies, but these services do not compete with the integrated firms' own services.

[37] Pittman (2002).

There are also examples of regulators imposing mandatory access rights to specific facilities – such as limited segments of track (as in Canada) or certain other facilities. These regulatory actions seem successful at promoting competition as long as the access rights are limited to certain segments of track.[38]

In the US, although regulators have on occasion imposed mandatory access rights over longer distances (several hundred kilometres or more), in these cases effective competition has not emerged. Pittman writes:

> "One US example that suggests caution is the trackage rights arrangement imposed by the Surface Transportation Board on the merger of the Union Pacific and Southern Pacific Railroads, whereby the Burlington Northern/Santa Fe line was given access over the merged railroad's lengthy "central corridor" route from the Midwest to California. As of this writing, the "tenant" railroad, the BNSF, carries only about five percent of the traffic on this route."[39]

The advantages and disadvantages of vertical integration with access regulation are summarised in the table below.

Vertical Separation

As just noted, a primary problem with allowing the incumbent operator to remain integrated is the strong incentive that this firm retains for discriminating against competitors. Regulation is unlikely to be able to control this incentive to discriminate and so competition is likely to suffer. A solution to this problem is to vertically separate the incumbent operator – separating the provision of the track infrastructure from the provision of train services (in the same way that, say, airports are usually provided by enterprises separate from the companies which operate planes).

As with the last approach, vertical separation has the advantage that it offers the potential for competition to develop in all segments of the rail industry and all parts of the existing network (although, in practice, on some markets demand may not be large enough to overcome the economies of scale and density in train operations).

In addition, vertical separation may also be useful as a tool for enhancing the transparency of financial flows. In particular, accounting separation or functional separation can be useful to prevent infrastructure subsidies being used to subsidise train operations. This was one of the primary objectives of the separation requirements imposed in the EU by the EC Directives. Thompson notes:

> "A primary objective of the European Commission was to break the financial[40] link between national infrastructure companies and their associated operating companies so that intra-rail competition could be fostered. Separation enhances clarity of government policies by permitting costs to be clearly separated and subsidies focussed on particular services and agreed purposes. Separation facilitates introduction of the private sector by breaking the

[38] In Canada, policy-makers recently decided against extending the mandatory access rights from a 50 km radius to 100 km.

[39] Pittman (2002).

[40] The Commission Order 91-440 only required an accounting separation between infrastructure and operations. Some railways have chosen to go farther to institutional separation. The Commission has leaned strongly in favor of an eventual requirement of institutional separation, but has not done so to date.

system into manageable components some of which (freight in particular) can be privatised without necessarily having to privatise others."

There are two primary theoretical drawbacks of this approach. The first is that the separation of track and train operations may significantly increase transactions costs. The second is that the separation of track and train operations may prevent efficient pricing of use of the track.

Consider first the effect on transactions costs. The efficient operation of a railway network involves many decisions on the use of the track which directly affect train operations and vice versa. Maintenance of the track, for example, may require delaying or cancelling certain train services – it will be much more difficult for the track owner to know which services to cancel when it does not know the true profitability of each of the services. Each train operator has an incentive to argue that train operations should occur at a time which disadvantages its rivals. At the same time, the train operators may be in a better position than the track operator to determine when a particular section of the track needs maintenance. Separating these roles increases the costs of having the information about what track needs maintaining communicated back to the relevant part of the track organisation.

The same difficulties apply to track investment or upgrade. An upgrade may affect some operators more than others – if all train operators have a say about how the upgrade will be carried out those operators who value the upgrade least have the greatest incentive to delay the upgrade, perhaps in the hope of sharing in the benefits of those who value the upgrade most. There is some evidence from the UK that after separation of the infrastructure, the costs of maintenance have increased 50% and the costs of upgrades have increased 150%.

Similar difficulties arise in scheduling. For any section of track the optimal train schedule will depend on factors such as the speed of the trains and how much the train operators value leaving or arriving at a specific time. This problem is difficult even within an integrated railway. The problem is more difficult when each of the train operating companies have private information about the value of their services.

In addition to the increased transactions costs, it is also possible that separation of track and train operations might forego some other benefits of integration, such as efficient pricing of use of the track. Efficient pricing, as we saw earlier, requires fine discrimination in access prices according to the elasticity of demand of the services being provided over the track. This would require, for example, that a freight operator carrying, e.g., computer screens should pay a different access charge than a freight operator carrying, e.g. coal. If the track operator cannot determine what is being carried by the freight operator it will not be able to price access to the track efficiently.

Pittman summarises the problems of vertical separation as follows:

> "First, there is the loss of economies of scope. These may have partly to do with train scheduling and co-ordination, but much more important in the Chinese context may be the question of investment incentives. Serious questions are being raised, not only in the railroad sector but also in other sectors where unbundling is a possible reform option, as to whether the owner/operator of the remaining monopoly asset -- in this case the rail infrastructure -- will receive the proper signals and incentives for investments if it does not also participate in the competitive sector. If not, the network may be slow to respond to opportunities for growth, and maintenance may not be directed to the most appropriate locations or equipment (leading in the rail sector to the possibility of increased accidents).

> Second, there is the problem of sequential monopoly. With the economies of scale that characterise train operation, it seems unlikely that there will be many train operators operating over a single geographic corridor. This means that, in addition to the monopoly power which we assume accrues to the owner/operator of the track, there may be monopoly (or oligopoly) power enjoyed by the train operator as well. Economic theory suggests that the result of a monopoly downstream firm paying a monopoly price for the upstream product and setting its own monopoly price on the final product will be a higher price than that which would be set by an integrated monopolist. Even without this conclusion, if structural separation does not create competition among train operators, one may ask what is the point of the whole complex exercise.
>
> Finally, either of these models will require a complex operating agreement between the track owner/operator and whichever train operators it does not control. The terms of service required by a train operator desiring track usage -- like those of an electricity generator requiring long distance transmission access -- are multifaceted and complex. The contractual relations between the two enterprises are likely to be correspondingly multifaceted and complex. An entire set of transactions that takes place *within the enterprise* in the US, Canadian, and Mexican systems must take place *between two independent enterprises* under this type of system. It is not completely clear how workable such a system will be, especially in a country like China where the legal institutions for the support of private contractual relationships are still being developed."[41]

These difficulties may not be insurmountable obstacles. This approach has been adopted in both the UK and Sweden. In the UK, the scope for competition on the routes of the passenger franchises has been strictly limited by the terms of the franchise agreements. There is, however, some in-the-market competition in the rail freight business in the UK. It is possible that the degree of in-the-market competition at any one time may underestimate the true competition impact of this approach because, at least in the rail freight business, contracts for the carriage of freight are quite long. The market is therefore likely to be relatively contestable, even if the number of firms actually operating in the market at any one time is limited.[42]

The advantages and disadvantages of this approach are summarised in the table below.

[41] Pittman (2002).

[42] In other words, even if one firm has a near-monopoly in the market at any one time, other firms could bid for freight transport contracts when the time comes to renew the contract. It may not be entirely fair to assess the success of the UK reforms on the basis of the level of competition which emerged. Competition was explicitly restricted in the case of the passenger franchises. On many other indicators the UK reform was a success – passenger and freight traffic had increased (against declines prior to reform) and safety and on-time performance had both improved. The insolvency of Railtrack is not, in itself, evidence of the failure of this approach.

Vertical Integration (with Horizontal Separation)

The final structural approach for promoting competition that we will consider involves allowing vertical integration, but, at the same time, promoting competition through careful separation of the integrated operator into route-based companies.

In the earlier discussion of forms of competition we discussed how different railways can compete over the same origin-destination pair, even though they served different intermediate points. This was referred to as competition over parallel tracks, even though the different tracks are not literally running along-side each other over their entire route. In addition, we saw how two railways which serve the same origin can compete when the different destination points fall in the same economic market – this was called end-market competition.

With careful attention to traffic flows, it may be possible to separate the existing integrated network in such a way that many users of rail services face a genuine choice of rail network (maximising the scope for end-market competition and competition over parallel tracks), even if those rail networks are not perfect substitutes for all conceivable origin-destination pairs.

Several points are worth noting:

- First, it is important to recognise that separation into regional railway networks will not achieve the objective of promoting competition *throughout* the rail network. Separation into regional networks only enhances competition for those cities which happen to lie at a border of two regions. Regional railway networks are likely to have a near monopoly for in-region traffic flows. In addition, the provision of services that crosses a regional boundary requires the agreement of the regions involved, effectively eliminating the possibility of competition between the two regions. The existing regional boundaries should not be the basis for a structural separation of this kind.

- Second, promoting effective competition under this approach may require additional policies to ensure that rival networks have access to customers located near points where two railroads intersect. This might include local joint ventures for facilities such as a shared railway station on limited rights of access to the track of a rival operator. In Canada, for instance, captive shippers located on one of the railroads but within 30 km of the other may insist upon receiving either service by the second railroad over the tracks of the first or service by the first that interlines with the second, both at regulated rates.

- Third, no matter how the integrated railway is divided, it is inevitable that the provision of services between some origin-destination pairs will require the co-operation of two or more railroads. Vertically integrated railroads may, under some circumstances, voluntarily agree to allow reciprocal access for trains from one operator to operate over the others' tracks. Such agreements should be encouraged, as should joint ventures between railroads to provide end-to-end services which could not be provided by any one railroad alone.

- Fourth, horizontal separation into separate vertical integrated entities is not incompatible with other approaches. In particular, as noted earlier, an integrated rail company has little or no incentive to refuse access to a company serving a different market (and may even welcome the additional traffic). So, even if the integrated company is separated into vertically-integrated parts, the non-integrated train operating company serving a different market could also co-exist in the market without substantial additional regulation. As noted earlier, in the US a non-integrated passenger operator (Amtrak) operates over the tracks

belonging to integrated freight companies and in Japan a non-integrated freight operator provides services over tracks belonging to the integrated passenger companies. Some track access of this kind will be necessary for a trans-Asian rail operator.[43]

This approach of vertical integration coupled with horizontal separation is used (in one form or another) in many OECD railroads. In Canada, for example, two major railroads operate over largely parallel east-west routes across Canada. In the US, there are four major integrated railroad companies. As explained earlier, in Mexico the reform of the railway resulted in three major railway companies. The two northern companies in Mexico both have access to the US border, the Pacific coast and the Gulf of Mexico.

If this approach were adopted in China, the following steps would need to be carried out:

(1) Identify the major rail markets and the scope for intermodal and intramodal competition in each market. This will involve, amongst other things, identifying the major transport routes (the major origin and destination pairs for passenger and freight traffic), identifying rail routes which predominantly or exclusively provide coal freight service, identifying which ports compete for the trans-shipment of goods (or passengers), identifying which shippers would be prepared to use other routes, and so on.

(2) Conduct a thorough system analysis to see if one could divide the existing integrated network into horizontally separated, vertically integrated network in such as way as to maximise the scope for route-based competition or source competition of the kind described earlier in those markets which do not face adequate inter-modal competition.

(3) Provide for the imposition of compulsory track access rights where necessary in those locations where limited access rights would significantly improve competition – particularly near the intersections of major railway networks.

(4) Identify which remaining markets still do not face adequate competition, either inter-modal competition, or route-based competition – this might include, for example, the market for commuter services in the immediate vicinity of a large city. For such services, there are essentially four choices:

   (a) First, there could be separation of track infrastructure and train operations for these services. This is especially likely to be effective if the non-competitive services represent only a small part of the overall traffic on the relevant parts of the track (which is unlikely to be the case for commuter services). In this case, the transactions costs problems highlighted above linked to the separation of infrastructure and operations are unlikely to be serious.[44]

   (b) Second, there could be joint ownership of the infrastructure by rival, competing operators competing in this market.

   (c) Third, for some markets periodic competitive tendering will be appropriate (perhaps, for example, to select the provider of certain passenger services). The

[43] Pittman (2002) discusses the various trans-Asia rail link proposals.

[44] In addition, separation of this kind would facilitate entry by, for example, large shippers who may wish to operate their own trains. The threat of this entry could act as an important constraint on market power.

winning bidder in these tenders would be the rail operator which offers to provide the service at the required quality at lowest price (in the case of profitable services) or at the lowest subsidy (in the case of unprofitable services).

(d) Fourth, the remaining markets could be subject to conventional price regulation.

What might the resulting railway system look like for China? Of course, it is impossible to say without detailed investigation of the freight and passenger transport markets and traffic flows in China. As just one indication of where the principles discussed here might lead, one approach would be to replace the existing 14 railway bureaux with 8 route-based railways.[45] The route-based railways might, for example, be based around the following "core" routes.

(1) Beijing-Shenyang-Haerbin
(2) Beijing-Shanghai
(3) Beijing-Zhengzhou-Changsha-Guangzhou
(4) Beijing-Kunming
(5) Beijing-Wulumuqi
(6) Shanghai-Lanzhou
(7) Shanghai-Changsha-Kunming
(8) Shanghai-Nanchang-Kunming

The precise number of such route-based railways could be more or less than eight, by further dividing up these routes (e.g., by separating Shanghai-Nanchang and Nanchang-Kunming, or by joining Beijing-Haerbin and Beijing-Kunming). At this stage we cannot say whether railway companies based on these routes would be viable. The ultimate structure will require balancing factors such as the desire for competition against the need for viability and the increased transactions costs that arise when a freight or passenger train must cross from one railway network to another. In addition, of course, there could be a number (perhaps hundreds) of short-line railroads[46] and, perhaps, separate networks in the vicinity of large cities where there is a large amount of very local traffic (such as commuter traffic).

These route-based railroads might each provide both passenger and freight services. Both freight and passenger services would then benefit from the kind of route-based competition that has been discussed in this paper. It is not essential to combine freight and passenger operations in these rail enterprises, however. For example, it might be desirable to allow the passenger-side of these enterprises to form joint ventures to provided integrated passenger services over longer routes than just the routes above. It would also be conceivable to completely separate off the passenger services, and allow these to be provided through competing companies which pay for access to the track of the vertically-integrated freight based companies (along the lines of the US model). As mentioned earlier, an integrated freight company has little reason to discriminate in the provision of track access to a company with which it does not compete.

A restructuring along these lines offers the potential for significantly more competition than a railway system organised into separate regions. For example, shippers in Guangzhou have at least two

[45] This option is based on a proposal by Russell Pittman.

[46] Empirical studies of railways in OECD countries have found that the most efficient size for a railway company is around 3-4 thousand km. Since the Chinese rail network currently has around 66,000 km, it could support around 16-22 separate vertically-integrated railway enterprises without loss of efficiency. In other words, it is not necessary to sacrifice efficiency in the pursuit of competition.

alternatives for transporting goods to Beijing (Guangzhou-Shanghai-Beijing, Guangzhou-Changsha-Zhengzhou-Beijing and even Guangzhou-Kunming-Beijing). In fact, under a restructuring of this kind, there are at least two routes, served by separate railway companies, for any pair of the following 6 cities: Beijing, Zhengzhou, Changhai, Changsha, Guangzhou and Kunming.

This proposal does not ensure competition over parallel tracks for passengers or shippers in the western regions (as this area is served by a single track) or in the northern regions. Passengers and shippers in the west may need to be protected through conventional price regulation. Alternatively, compulsory trackage rights could be imposed as far as, say, Lanzhou, allowing trains operating through Lanzhou to compete for business from Wulumuqi. In the north, the railway network is dense enough to justify further separation, but the details of that separation will depend on precise traffic flows. One possibility would be to separate a rail link to a port in the northern region, so that exporters face choices as to which port they send their products. Note, however, that even with just the 8 route-based railways discussed above the Beijing-Shenyang-Haerbin railway would not be entirely without constraints on its market power, due to the presence of source competition. For example, shippers at Haerbin selling their products in Beijing would compete with products shipped on other railways to Beijing – if the Beijing-Shenyang-Haerbin railway raised its prices too much these products will no longer be able to compete.

This proposal is only intended as an indication of what a restructured rail system in China might look like. This proposal does not address the market power of each railroad company for local (intra-regional traffic), such as commuter services into a large city. These market power problems will need to be addressed in some other way, using some of the other policies discussed above. We do consider, however, that this approach is a significant improvement over the existing structure of regional railway companies.

Policy	***Description***	***Advantages and Disadvantages***
Vertical integration with Access Regulation	Incumbent (possibly regional) operators are allowed to remain integrated (providing both track and train services) but regulator enforces access to track by third-party train operating companies.	In theory it allows for competition in all parts of the network and for all different types of services without loss of benefits of jointly providing track and train services (economies of scope). However, incumbent integrated operator has strong incentives to deny or deter access and can discriminate against non-integrated rivals in a variety of ways (including access to scheduled train paths, timing of maintenance, access to railway stations) which may be very difficult to prevent. Access contracts may need to be very sophisticated and may be difficult to enforce.
Vertical Separation	The provision of the track infrastructure is separated (in ownership) from the provision of train services. There could also be many new train companies formed to promote competition.	In theory this approach allows for competition in all parts of the network. Importantly, the track operator has little or no incentive to discriminate against train operating companies, creating the maximum scope for competition. However, there is some loss of the benefits of jointly providing track and train services (economies of scope) – this could result in higher transactions costs, less efficient pricing arrangements and very complex contractual arrangements between train operating companies and the track infrastructure which may be difficult to enforce.

Separation into regional route-based integrated rail companies	The incumbent rail network is divided into many different companies each serving different routes with the routes chosen in a way to maximise the scope for competition	This approach ensures that any economies of scope can be exploited – in particular companies can make best use of track and other infrastructure facilities and can set their prices efficiently. In addition, this approach does not require sophisticated regulatory intervention or enforcement of complex contracts. However, the scope for competition is somewhat more limited – competition is especially restricted origin-destination pairs which lie entirely within the routes of one operator. Scope for competition depends on the choice of the routes.

Markets Without Effective Competition

Up to this point we have discussed policies for promoting both intermodal and intramodal competition. For various reasons, in a rail system as large and as complex as China's, it will generally not be possible to achieve effective intermodal or intramodal competition in all rail markets. How should any remaining market power in the rail sector be handled?

As an aside, it is worth noting that in passenger markets, even when competition is feasible (e.g., when competing train operators have non-discriminatory access to any tracks and other infrastructure facilities necessary), effective competition on any given route may not emerge, for two related reasons. The first reason is that a certain proportion of travellers seem to have a preference for frequency of service on a route. That is, if an incumbent operator offers 10 round-trips per day between two cities A and B, a new entrant will gain far less than 20% of the market if it offers 2 round-trips per day. If travellers have a preference for frequency, new entry has to be on a large scale if it is to capture a sizeable share of the market. The second reason is that larger operators can often organise their network around a hub-and-spoke structure. This allows a substantial increase in frequency of service between any two points on the network, without a corresponding drop in loading ratios on any one train. These patterns have quite clearly emerged in the airline industry. It seems likely that they will be equally important in the rail industry. It is interesting to note that there are relatively few examples of competition between passenger rail operators over the same track anywhere in the OECD.[47]

What can be done about residual market power where it occurs? If intermodal or intramodal competition is not sufficient to control market power, it will be necessary to look to other policies, such as price regulation. As we have already noted, this price regulation should be targeted (i.e., should only apply to those freight shippers or those passengers who do not have effective competitive alternatives – so-called "captive" shippers in the US and Canada) and should allow a degree of flexibility to the regulated railway company – allowing the regulated firm to adjust its prices according to the elasticity of demand.

It is also worth emphasising that competition for-the-market can also play a role in price regulation. Competition for the market in the form of competitive tendering forces rail operators to reveal their costs and therefore allows the regulator to set prices more efficiently. We have already

[47] A few minor examples of such competition do exist in the UK e.g. between Great Eastern and Anglia on the Liverpool Street to Ipswich route, although they tend to be historical accidents resulting from a previous split between commuter services (Great Eastern) and inter city services (Anglia). There may, of course, also be competition between passenger trains operating between two cities A and B serving different routes, however.

discussed how competitive tendering can be used to ensure a minimum subsidy for non-commercial services. Competitive tendering can also be used to ensure the lowest possible prices for users, given a certain minimum required service level. Perkins notes that competitive tendering for passenger concessions is becoming increasingly common.

> "Competitive tendering of exclusive passenger concessions in Italy, the Netherlands, Germany and the United Kingdom has been described. The practice is likely to be adopted for regional passenger services across much of Europe as there have been few problems with the experience so far. The most critical issue is the length of concession required to provide for investment in rolling stock and management of the re-franchising process at the end of the concession to avoid interruptions to investment. The few examples of competition on the tracks between neighbouring franchises in the United Kingdom have been one of the more successful parts of the British reforms, bringing more frequent services and reducing prices below regulated levels."

Application to China

Which form of restructuring is most appropriate for China? As we have seen there are pros and cons of each of the approaches above and the selection of any one approach will depend on details which are highly specific to the situation in China. We consider that there are two viable options for China – horizontal separation into route-based integrated rail companies and (b) vertical separation into train operating companies, on the one hand and track infrastructure on the other.

2.4 Principles for Managing the Reform Process

The experience of rail reform in OECD countries provides some important additional guidance, not just on the content of the reforms themselves, but on how the reforms should be carried out. In particular, the experience of OECD countries highlights the importance of the following:

(a) *The likely need for a mix of approaches, tailored to the market conditions.*

> As emphasised throughout this paper, railways are complex enterprises competing in many thousands of different markets. There is unlikely to be one right approach for the entire railway sector. Rather a mix of approaches is likely to be appropriate, tailored to the specific needs of each part of the network. "Different parts of the Chinese rail system may require different forms of organisation and regulation. Competition in dedicated coal freight services can and should take very different forms to that in mixed use lines."[48] Thompson writes: "Mixed solutions of structure, ownership and competition are often the best approach. In fact, insisting on an "all or nothing" approach to structure or ownership is a well-proven strategy for resisting change."[49]

[48] Perkins (2002).

[49] Thompson (2002).

(b) *Attention to the timing and sequencing of reforms;*

Careful thought should be paid to the sequence and timing of reforms. Some reforms (such as institutional reforms, establishment of an independent regulator) clearly need to be carried out before others (such as the introduction of competition). It may be possible to evaluate and assess the success of early reforms before carrying out further reforms. In some case it may be possible to carry out "pilot projects", implementing reforms on a small scale before extending the reform nationwide.

Finally, rail reform is inevitably complex. Maintaining the flexibility to make mid-course corrections is important. Thompson notes:

"We have yet to see a concession or franchise agreement that did not need to be changed or renegotiated as a result of unforeseeable developments. Most rail concessions have been created in countries undergoing wrenching change in all sectors of the economy. It is extraordinarily difficult to predict the course of development under these circumstances and there are always events which no one could foresee. As a result, there needs to be a mechanism to facilitate necessary changes in agreements, or concession management and oversight will become unmanageable."

(c) *Attention to objectives and expectations;*

No reform process can be successful when it is asked to achieve conflicting objectives. Successful reform therefore demands careful attention to the necessary trade-offs at the outset. Where objectives are conflicting, it may not be possible to assess whether a reform has or has not achieved its objectives. In addition the reform process may itself be subject to being taken over by one of the interest groups. At the same time, it is desirable to manage the expectations of the public by making clear at the outset what the reforms are expected to achieve and how the success of the reforms will be measured. If the public holds unrealistic or misguided expectations, otherwise successful reforms could be perceived as having failed. Thompson again:

"It is vital to have in advance a realistic metric to measure the outcome -- "compared to what?" The U.K. situation is an excellent example of the problem. … [T]he privatized rail system was performing better in *every* category than British Rail performed in the years preceding privatization; but, in reading the press one could have concluded that privatization has failed. This is because privatization was being unfairly compared with (often conflicting ideas of) perfection, not with what went before, and because the real problem were probably too complex to permit easy press coverage. All rail restructuring is political, and success in the political arena is based on perceptions of results. Perceptions, if not corrected, sometimes create political realities."[50]

(d) *The importance of information systems;*

Measuring the success of reforms and assessing whether or not to make a mid-course correction requires clear and accurate information about the state of the rail sector. Therefore it is important to put in place, from the outset, a system for collecting relevant statistical information on performance, outcomes and the financial position of railway enterprises. In

[50] Thompson (2002).

particular, the implementation of the combined waybill data (TMIS), network model and costing models is essential.

(e) *Attention to reforms in related sectors;*

There may be little benefit (and indeed, it may be harmful) to introduce market-oriented reforms in the rail sector when closely-related sectors remain under the planning system. For example, there may be little benefit for introducing market-responsiveness in the rail sector if its major customer is the coal industry which is not responsive to price signals. Otherwise viable rail services will not be able to turn a profit if competing with subsidised road transport. The rail reforms should be considered as part of and carried out in tandem with reforms of the transport sector as a whole.

Conclusions

The Chinese rail industry is one of the biggest in the world and has the potential to make a major contribution to the Chinese economy. However, it is unlikely that the rail sector will be able to respond to growing market demands in an efficient, innovative and responsive manner as long as it is managed by a monolithic government Ministry. Without reform, there is a real risk that transport bottlenecks will develop, constraining the growth of the Chinese economy and limiting the extent to which the rapid growth in China's coastal regions will spread to the interior.

Any thorough reform of the Chinese rail sector will involve the restructuring of the current rail enterprises. We have set out a number of possible approaches to restructuring. Once the conditions for commercial operations have been established, attention should focus on the promotion of competition within the rail sector.

Experience in OECD countries shows that even relatively modest rail reforms offer the promise of substantial improvements in efficiency. But successful rail reform takes time – if the Chinese economy is to have an effective rail sector by the year 2010, it is appropriate to start now to determine the reform path for Chinese railway in the future.

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