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Evolution and Revolution:
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Railways

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Evolution and Revolution: the Changing Focus of Regulation of the World's Railways

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ABSTRACT

This paper provides an overview and perspective on the regulatory changes sweeping through the world's railways. The review concentrates on railways in the relatively wealthy countries, primarily because they are the vanguard, where a century or more of management practice and government controls are undergoing change. The paper begins with comments on the nature of rail technology and markets, the implications for government and public policy direction, and forces of change which have pushed railways internally and externally into new organizational and regulatory structures, most of which are still evolving. The latter part of the paper comments more specifically on changes taking place in several countries.

I. Rail Technology, Operations and the Evolution of Public Policy

The long-standing intimate link between railways and public policy are explained primarily by two things: (1) the economics of railways; and (2) politics.

1.1 The Economics of Railways

Railways embody a number of technical and operating characteristics which have important economic implications. Railways supply an extraordinary array of services, supplied typically over a large number of origins and destinations. Rail production is relatively capital intensive, especially provision of way and structures, but much of the rolling stock is long lived as well. The great variety of outputs produced by shared resources and facilities means that determining the costs of specific services has been elusive. Even today, with detailed data bases and activity-

based costing, many cost allocations remain ambiguous. The difficulty of price-cost comparisons was a compounding factor in controversies regarding monopoly power of railways.

There is a second practical distinction about rail markets which are important for understanding the origins and persistence of public policy in rail decisions. This is whether or not passenger services are supplied. Their importance is primarily because they bring greater political awareness than does the carriage of freight, not that the latter are unimportant. Stated bluntly, passenger services bring greater political interference with rail decisions, and money-losing operations.

1.2 Politics and railways

Throughout the world, the rail industry has been accorded special strategic significance by nations, i.e., there is a greater propensity for government intervention in rail matters compared to most other industries. In part this reflected economic efficiency concerns, viz., the regulation of monopoly power, but also reflects a strategic policy role for railways as a tool for economic and political integration of regions. This was especially relevant in the late 19th and first half of the 20th century when railways were the dominant carrier of freight and passengers. Given the public interest in railways, this meant that there were established channels of influence by governments. But this meant that railways tended to become a tool for all manner of political intervention, from favouring certain groups or commodities to use as anti-inflation measures. The efficacy of some of these policies was dubious, but politicians use whatever tools are available.

Political interference is particularly important for railways with extensive passenger service. Passengers vote (so do shippers but somehow their votes carry less influence), and perhaps for this reason, rail passenger services rarely are financially viable. The lack of commercial incentives to serve passengers requires that a railway be administered by rules and regulations because normal commercial incentives do not exist. This furthered the need for government intervention, either by regulation or, more typically, by government ownership and operation of railways. Profitability could not be the focus for many of the world's railways, so "running the trains" was the measure of business success rather than profitability. This is the key difference between North American railways and practically any others in the world. The North American carriers became almost exclusively commercial freight railways, leaving a shrinking passenger market to be operated (by government entities) separate from freight operations.

From the mid to late 20th century, a number of forces acted on railways and governments, and set into motion a number of organizational experiments, most of which are still underway.

II. Forces of Change Affecting the World's Rail Industries

2.1 Technological change and the rise of transport competition

One of the dominant characteristics of the 20th century is the sustained technological advance, and transportation innovations were a central part of this. The "friction of distance" has declined markedly. This brought about unprecedented travel and transport, and the enabled specialization and trade which are a major factor in our economic advance. (The declining friction of distance and increased mobility have their adverse consequences in facilitating wider human conflict and now global environmental deterioration, but these are set aside for this paper).

Railways have made major technological advances, but basically they were a victim in the rise of competition. New modes of transport have displaced the dominance of railways. First in North America, but then spreading elsewhere, the motor car and air travel dominate passenger travel, and the motor carrier (truck or lorry) dominates freight except for a few commodities, primarily bulk traffic. Rail passenger travel remains important in large urban areas (where motorized transport is not feasible for the volumes involved), in short haul high density markets (e.g., Europe and Japan), and in countries where incomes are low and government subsidies sustain the rail operations. Rail subsidies are prominent in virtually all passenger operations; Japan is the most notable exception; Japan has some very large volume routes with high prices, but they also have low density services as well.

Although there is intramodal rail competition in a few places, notably in North America, the primary competitive forces are intermodal competition (competition between modes) and "market competition." The latter refers to competition in the market place for the goods being carried. For example, coal shipments tend to be 'rail captive,' but markets for coal are competitive and this limits the prices which railways can charge. Still another example is competition between logistics chains. Containers from Japan to eastern U.S. can move to different ports (west and east coast) and by different rail systems. Car buyers in Chicago can be supplied by Japanese or European manufacturers and the corresponding supply chains. Competitive rail freight markets have enabled deregulation in these markets. Because rail passenger markets are less competitive (usually not commercially viable), this has limited the workings of market forces, but significant innovations and modifications to market structure are emerging here, more below.

2.2 Disenchantment with government performance and the deregulation movement

Following the Great Depression and World War II, there was a significant expansion in the size and roles of government in the economies of all the democracies. This enjoyed widespread support and is characterized by the rise of social programs and greater regulation of economic activity. But certainly by the 1970s, there was a growing disenchantment with the performance of government intervention in economic affairs generally, but especially via restrictive regulations. Not only railways, but most transport modes in most countries evolved under fairly rigid regulatory environments. Arguments for deregulation arose in academic circles at first, generally opposed by industry and government, but the idea caught on, particularly as evidence on performance differences in regulated and unregulated markets came to light.

The first significant rail deregulation was in Canada, who granted the railways pricing freedom

in their 1967 National Transportation Act. The subsequent strong productivity performance of Canadian railways relative to their U.S. counterparts was an influence on the subsequent (and more sweeping) rail deregulation in the U.S. (via the Staggers Act of 1980) (Caves, Christensen and Swanson 1981). Regulatory reform and/or reduced government ownership and control are now taking place in other countries, and tends to be taking a different form than in North America.

Railways, similar to telecommunications firms, make use of sunk capital assets which are used to connect the spatially- separate markets. Because of the capital intensity, this can provide substantial market power to an incumbent firm. Competitors must face risky substantial investments of their own, or purchase access rights from the incumbent, who in turn, is a competitor. Regulation of access, or divestiture of ownership/control over such sunk assets is a major focal point of regulation in both telecommunications and railways.

III. Recent Developments in Rail Organization and Regulatory Reform

3.1 Overview

The traditional regulatory model (or government ownership and control) involved direct regulation of prices. Rate structures evolved with a mix of cost recovery, cross-subsidy and a hodgepodge of equity and efficiency goals, often in conflict. Conflicts between shippers and carriers were resolved through a legal regulatory process or direct lobbying of government-owned railways. While not efficient, just about any rate structure could prevail during a monopoly era. But the rise of competition gradually undermined at least part of such rate structures, viz the parts which were profitable. As is well known, railways tended to lose high valued traffic while retaining much high-cost low-value traffic. Most countries responded to the rise of competition by suppressing or regulating it.

The last two or three decades have seen waves of change sweep through rail industries throughout the world. In North America this has been deregulation of rail companies and relying primarily on competitive forces. Some residual regulatory controls remain in Canada and the U.S., but they are small in comparison to traditional regulatory structures. Other countries, most of whom have had government-owned railways, are also trying to reduce or greatly modify government control over the industry. Recently, several countries have embraced an old but radical idea to alter the structure of the rail industry: separating ownership of track from rail operations. This is an alien idea to traditional rail management.

Traditionally, rail decision making is very operations-oriented. There is the necessity of controlling train movements upon the track, the scheduling and blocking of car/wagon movements, and the tradeoffs between track investments, maintenance policies and train running costs. Railroaders have long believed that vertically-integrated management is necessary to maintain system integrity and efficient decisions. But a consequence is that rail companies have substantial fixed and sunk costs in infrastructure, and this constitutes a significant barrier to entry

thus discourages competition. The contrast with motor carriers has been recognized a long time: trucks make use of publicly-provided roads, they are a variable cost to the trucking companies (there is a further issue that truck user charges often do not result in full cost recovery). By separating track ownership from operations, this offers the potential of relying on competition among train operators, even on relatively 'thin' routes. For the latter, competitive bidding for specific services might bring about reliance on competition even for monopoly routes.

A number of countries are pursuing new track ownership and organization in the rail industry. If an incumbent railway retains ownership, there is growing emphasis on allowing access to these facilities by would-be competitors. (This is also an issue in telecommunications, an industry which shares the importance of fixed infrastructure in offering services to customers). The concepts of granting access to fixed facilities and fostering competition are consistent with the broad trend of reducing the role of direct government control over transportation (and other industries). Aside from organizational issues, a major controversy is over appropriate pricing of access. In effect, traditional vertical integration means that track charges are recouped on a differential basis from various traffic carried, implicit in the pricing policies of rail management. Relying instead on granting access to different carriers to the same track requires some *ex ante* price of access. This requires allocation of traditionally unallocable costs, and agreement on cost recovery targets and the extent to which access prices can vary among operators.

The fundamental issue is access rights to rail track infrastructure. Open access to rail track requires a right to move trains over a track segment in some well defined way. The allocation process is essentially an allocation of the *capacity* of track to carry train movements. Such movements can range from a complete train movement through to space allocated on a specific wagon over a specified time period. Capacity is subdividable, even when indivisibilities in track exist. This suggests that the indivisibility problem disappears once rail access rights are defined as a right to some movements per some agreed unit of time.

This open access interpretation of the rail infrastructure company obligates the rail access company to supplying movement 'slots' over its right of way and rail track (DeVany and Walla 1997). It may retain some of its capacity to move its own trains, contract out some amount of movements, and possibly place the remainder in a spot (or auction) market. When the access company is itself a user of the track as well as a competitor with open access entrants, there is the potential for anti-competitive practices against third-party access; an established pricing regime (and/or an effective regulator) are required to ensure that there is no discrimination in favour of the access company. The concept of slots is relatively straight-forward, although there are many practical issues such as resolving traffic control priorities in rail operations ("meets and passes").

The jury is out on whether or not this reorganization can lead to workable competition and efficiency gains, but even the most sceptical are anxious to see how these experiments work out. It has the potential of reforming and rejuvenating one of our oldest industries.

Another regulatory framework has had limited application to railways, although it has been embraced in telecommunications and other monopoly services: this is price cap regulation. Instead of extending regulatory control over individual prices, this approach merely "caps"

overall revenues, allowing management discretion over individual prices. The idea is that managers are aware of market conditions and better appreciate which markets can bear what level of charges. Varying markups over variable costs, or differential pricing, is an economically optimal strategy up to the point where monopoly profits are earned (this is known as "Ramsey pricing" in the economics literature (see Hensher and Brewer, Chapter 6, in press).

The second feature of the price cap approach is that it focuses regulation primarily on the rate of price increase over time rather than the structure of prices at a point in time. Firms must increase prices to deal with input price inflation. Even if a firm were not earning monopoly profits at a point in time, productivity gains would enable a firm's profits to grow even if they were only raising prices equal to inflation. Hence the price cap regime limits the average price increase to the rate of price increase (RPI) minus "X", where X is a prescribed productivity gain. This ensures that productivity gains are shared with customers, and there is an incentive for efficient behaviour because the rewards of still higher productivity growth are retained by the firm. The concept of a productivity adjustment to regulated rate increases has been adopted in North America, but there the price cap is applied to specific rates rather than apply only on an aggregate basis (Waters and Tretheway, 1991).

IV. Summary Status of Regulatory Reform and Restructuring in Selected Countries

We first summarize the shift in regulatory direction in Canada and the U.S. Railroads in most other countries of the world are also going through radical change, but most are quite different from the North American experience. This is for a number of reasons. Most other countries have a history of government ownership of their railways. Most have substantial passenger operations and attendant financial losses. Most countries in Europe, and many others, still see a strategic role for railways as a preferred alternative to reduce reliance on motor transport with its energy requirements and pollution costs.

A desire for efficiency and a belief in the benefits of competition are motivating policy outside North America too. But it is taking quite a different form than the North American experience of a number of competing rail systems. Outright privatization is not feasible for systems with substantial money-losing operations. Nonetheless, there are innovative ways of involving private management and capital by various types of contracting arrangements.

4.1 North America

The Canadian and U.S. railways are very similar in operations and commercial orientation, although there are some important structural differences to note. Historically, a preference for competition and distrust of monopoly in the U.S. made it difficult for railroads to extend their territory. The U.S. Class I rail industry was a patchwork of rail lines across the country. In contrast, the Canadian Pacific and Canadian National Railways were nation-wide systems, including extensions into the U.S. The government-owned CN (privatized in 1996) operated with substantial independence. Both countries had regulatory bodies which regulated rates.

Noting the rising competition facing railways, Canada granted substantial pricing freedom to railways in 1967, which led to an even stronger commercial orientation than before.

The U.S. rail industry was stagnating by the 1970s. Although still efficient by world standards, productivity growth was low, and the financial picture was gloomy. Starting in the mid 1970s, a series of regulatory reforms culminated in the Staggers Rail Act of 1980. Although some residual regulatory provision persists, for the most part the American railroads have been free to restructure and compete. The restructuring has been substantial, and paradoxical. The Class I rail industry has simultaneously both downsized and merged. Large railroads became larger as they extended their reach to serve wider networks. At the same time, a substantial amount of "feeder lines" were closed or sold off to "short line" operators. These were partly "union busting" to gain greater flexibility by rail workers, but also reflect modern management strategies to concentrate on core business (large volume, long haul) and rely on more nimble smaller carriers to provide feeder services. For the most part, the U.S. rail industry has done well since 1980. Productivity growth is substantial, and finances have improved.

The U.S. has taken few steps regarding facilitating access to track. The merger movement has given rise to concerns about the foreclosure of running rights formerly granted to other railways following the merger of "end to end" railroads. The U.S. also retains residual regulation concerning captive shippers. The maximum rate is limited to the "standalone costs," in principle, this is the amount it would cost a shipper to move the goods himself/herself, allowing them to combine their movements with other traffic available in calculating the full costs of carrying their traffic. This is regulation and not a means of fostering competition in these captive markets. In contrast, Canada no longer has regulatory protection for "captive" shippers, but does provide for the right of such shippers to invite other railways to bid for their traffic and carry it over the serving railway's track at prescribed (regulated) rates ("CLRs" or "competitive line rates"). The Canadian legislation effectively undermines some property rights of the incumbent or serving carrier in an attempt to promote competition. However, thus far there have been very few CLRs as railways seem reluctant to encroach on other's territory.

4.2 The United Kingdom Approach

The privatisation of British Rail, under the 1993 Railways Act, involved a mixture of franchising and deregulated sale of assets and operations. The previously unified national railway was restructured into over 100 separate companies, including 25 passenger Train Operating Companies (TOCs), the infrastructure company Railtrack, six rail freight companies, three rolling stock leasing companies plus other companies covering maintenance, engineering and other support services. During 1995-97 all passenger services were franchised to private sector operators, while all other companies were sold outright to the private sector. Railtrack is required to cover all costs, primarily through charging train operators for the use of the network (Nash and Dodgson 1996). Operators are expected to procure new rolling stock as a result of the incentive of lower operating costs or higher revenue, with the investment being funded by rolling stock leasing companies. Infrastructure enhancements are as a result of negotiated deals between Railtrack and operators.

A Rail Regulator licenses rail operators, regulates charging and access to the network and sets the basis of competition. Passenger rail services are under the control of the Office of Passenger Rail Franchising (OPRAF) who issues contracts via competitive tendering to the private sector to provide passenger rail services. These franchises run for between 7 and 15 years. Overall the level of regulation is fairly minimal for the rolling stock and engineering companies and for freight, but is extensive for passenger services (Dodgson 1996).

The regulation was designed essentially to safeguard existing rail services and customers. Since 1997, there are some additional directives to actively encourage use of rail passenger transport. These new guidelines for OPRAF obscure the boundaries between the Office of Rail Regulation (ORR) and OPRAF, limiting the powers of the regulator as the independent champion with powers to protect the public interest.

Track charges are designed to cover Railtrack's total costs and give correct signals for utilisation of the existing network and for investment (or re-investment) in the system. There are 'negotiated' charges for commercial traffic, and 'administered' charges for subsidised passenger services. Although economic principles have been followed in ensuring that, for example, charges at least cover avoidable costs, the initial charges appear to vary too little with use to ensure efficient use of existing capacity (Nash 1997).

The U.K. model involves a high degree of vertical and horizontal segregation to provide competition both in functions (rolling stock leasing, maintenance, etc) and services. It is a bold experiment and it is too early to pass judgement on its performance, but just getting the structure established and operating surprised some sceptics.

One concern for the future is the risk of under-investment. Since the current franchise periods are 7-15 years, investors will want investments to be profitable over that timescale, even if the life of assets is actually longer. In addition, Railtrack uses a relatively high discount rate of 8 percent. Another problem arises if enhanced services on additional capacity will not be profitable, but will yield social benefits. OPRAF has to estimate the benefits and pay the operator accordingly. It may also have to give commitments to employ the new rolling stock or infrastructure beyond the end of the life of the existing franchise. Moreover, the benefits of any particular infrastructure may be split between a number of operators, which may reduce the incentive to anyone to take the lead in pursuing proposals.

Ultimately the question of interest is the potential savings in subsidy made possible by the privatisation via long-term franchised contracts. Initial estimates (Beesley, 1997 and Nash, 1997) indicate that substantial savings are being calculated, although this is relative to recently escalated subsidy levels. Adding the administrative costs of servicing OPRAF and ORR (net of other earlier regulatory obligations) and the savings will be smaller but still positive and could accumulate to sizeable amounts over time (Beesley and Nash, *Ibid.*).

4.3 European Approaches

In contrast to the British approach of privatizing and franchising various components in a competitive framework, what might be termed the European model concentrates on the

separation of infrastructure from operations, with emphasis on the development of free and non-discriminatory access for competition in service supply. While this model is widely accepted at the conceptual level it is not yet fully operational. One obstacle still remaining is fostering infrastructure access across national boundaries.

Restrictions on the free movement across boundaries by road have been almost totally eliminated, but there is far to go for rail operations. This will be indispensable for promoting intermodality and rail-truck competition.

In Sweden the rail infrastructure authority, Banverket, was established in 1988. A major rationale was to place road and rail transport on a comparable basis. Both types of operators now pay charges based on marginal costs. There is an annual charge per vehicle and a charge per vehicle kilometre varying with the type of vehicle. These do not cover total costs. Banverket also uses social cost-benefit analysis investment criteria like that used in the roads sector. There has been a substantial increase in rail infrastructure investment. For the time being, the state owned company (ST) remains the monopoly train operator on the main lines, although secondary routes are put out to competitive tender. A greater degree of open access is under discussion, but there is no intention at present to privatise Banverket or SJ (Bruzelius et al., 1996).

The German experiment is complicated by the merger of two systems. In January 1994 the two state-owned German railways, DB (former West German) and DR (former East German), were merged into the German Rail Corporation, Deutsche Bahn AG. (Traffic loss has been particularly rapid on the former Eastern system since reunification, and the Federal Government has taken over responsibility for much previous debt and for excessive staff costs on both former systems).

Track and signalling have been separated from operations. DB AG has been divided into three parts: Track Network PLC, passenger traffic, and freight traffic. There is to be open access to the infrastructure for third parties, and there are published access prices. These prices distinguish between ten categories of line, and seven types of passenger trains and five types of freight trains. There are price variations for track wear-and-tear related to the weight of trains, and for the operator's requirements in terms of punctuality. There are also discounts related to volume and advance purchase which have led to criticisms that the established operator will be at an advantage in relation to entrants. Another controversial feature has been the high level of charges because of a desire to recover total costs. High charges for track discourages frequent services, particularly regional and local services. This caused charges to be revised for such services. (It appears that even before this revision charges were not in fact recovering total costs). (Hensher and Brewer, in press, Ch. 3).

4.4 Developments in Australia and New Zealand

In contrast to the British and European systems described, New Zealand has gone for fully-fledged privatization of a vertically-integrated rail system, without open access. New Zealand Railways are predominantly freight, although there are some long-distance and commuter passenger services. The latter are provided under contract in Auckland and Wellington, but the

long-distance passenger services are not supported by government. After initially being restructured as an "arms-length" company, New Zealand Rail was offered for sale in 1992 and sold to a consortium which included the (U.S.) Wisconsin Central, the U.S. Berkshire Partners, and Fay, Richwhite of New Zealand (King 1996).

The most innovative recent developments in Australasia are those in New South Wales. The Transport Administration Act 1996 restructured the New South Wales (Australia) State Rail Authority (SRA) into four corporatised entities, each with two shareholders neither of whom is the portfolio minister. The four agencies are: Freight Rail Corporation of NSW operating as FreightCorp which is a rail based freight transportation business; State Rail which provides commuter transport under CityRail (Sydney metropolitan) and CountryLink(non-metropolitan); the Rail Access Corporation with responsibility to own, operate, maintain and enhance rail infrastructure and to actively market access to those facilities by existing and potential rail operators; and the Railway Services Authority which is the railway engineering and maintenance group with a mandate after two years to be totally commercial.

Rail services are affected directly by a new competition policy in Australia. In 1995 each Australian State Government agreed with the Federal Government to implement a national competition policy under the Council of Australian Governments (COAG) National Competition Policy Agreement. One aspect requires access to essential infrastructure facilities which are important to competition in other markets (i.e., are intermediate inputs), which would be difficult to replicate, and which are of national significance. New South Wales is developing its own rail access regime to comply with this.

Users of the infrastructure should not be at a disadvantage in relation to the infrastructure provider, in other words there should be competitive neutrality. This is seen to require a clear accounting separation for rail infrastructure, but not structural separation on the British and Swedish lines.

The RAC is responsible for negotiating access to the infrastructure. This has required the SRA to improve its cost and revenue data allocation, and its negotiation and contract documentation. The National Rail Corporation, which has taken over loss-making inter-state freight traffics, requires access to SRA tracks and hence an access pricing regime, while SRA's own Rail Freight requires access to track and yards in the Sydney area. Other, private, companies have entered the interstate freight market.

A fixed-formula approach to access charges has been rejected in favour of a cost-based system with negotiation of access prices with users or potential users. This raises similar issues of cost allocation and asset valuation as in Britain. The individual states in Australia have different views on track access pricing. Views range from equal pricing to Ramsey-pricing and price equal to the opportunity cost of the marginal revenue foregone.

An interesting issue is the charges for transporting Hunter Valley export coal. This has been a very profitable traffic for the SRA, and the profits have in the past been regarded as a kind of mineral exploitation royalty. Now with open access, the mining companies wish to handle the traffics themselves, or contract with third parties. However the potential loss of cross-subsidy is a serious political consideration.

Pricing rail access is also complicated by very different market segments. In the East-West corridor rail has a market share approaching 80%, and this is the only corridor that recovers fully distributed costs. The Eastern rail corridors attract only 20-30% of the general freight market. In long-distance passenger transport the rail share is less than 6%. In urban public transport the share of the railway is around 30%.

There are worries that, in a country of long low density transport corridors such as Australia, a combination of open access and privatisation could lead to monopoly services combined with inadequate investment and a heavy burden of subsidies on the state for loss-making activities. That is, many question how effectively competition can work in such a system.

V. Conclusion

The world's rail industries today are a paradox. The importance of railways in the total transportation market is a fraction of their importance decades ago. Many identify them as bastions of outmoded, government-controlled, unionized industries. But the reality is different and changing rapidly. Railways have undergone substantial productivity improvements and radical technological change in some markets such as high-speed rail (although the latter remains dependent on substantial government support). Railways are undergoing nothing less than revolutionary change in management orientation, industrial organization and government policy. Many of these changes are just underway. As with any risky venture, there will be failures but also successes which will guide rail reorganization and performance improvement for the coming decades.

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