

Introducing Competition into Natural Monopoly Industries:

An Evaluation of Mandated Access to Australian Freight Railroads

By

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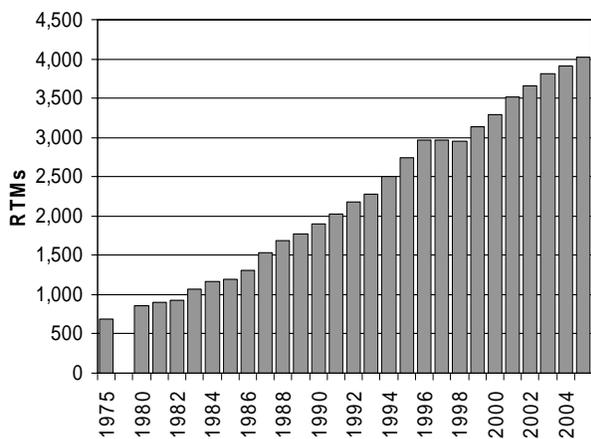
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I. Study Context

Policy makers have long grappled with introducing competition into natural monopoly industries such as transportation, telecommunications and electricity in order to eliminate excess profits and assure efficient provision of service. Freight railroads presented a particular challenge because rather than earn monopoly rents, the industry in North America, Europe and Australia struggled to remain financially viable in the face of competition from other modes, especially trucks. For example, US rail share of freight transportation declined 33% between 1950 and 1975. During the 1970s, the rail industry's return on equity was in the 3% range and return on sales was only 4%. Several major US railroads declared bankruptcy in the 1970s including the Penn Central, the Rock Island, and the Erie Lackawanna. The freight rail experience in Europe and Australia was similar although government subsidies and road freight regulation kept the railroads in business.

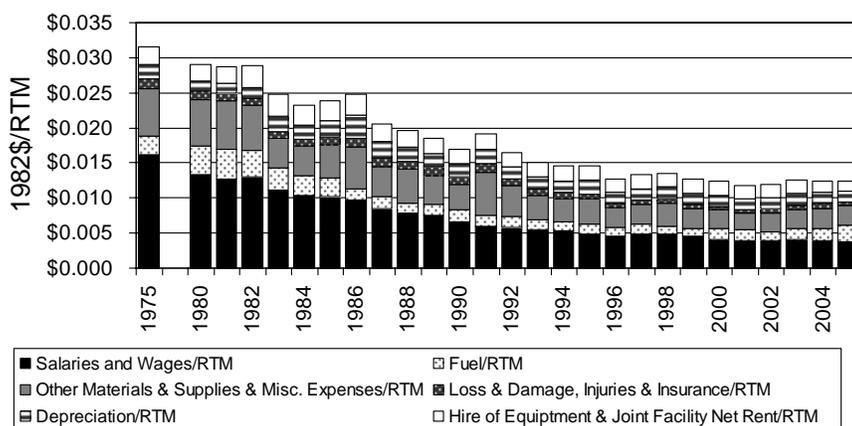
Policy makers in the US were the first to tackle the problem of freight railroad viability. The solution adopted was total economic deregulation. The rationale for the change was that regulation was inhibiting the rail industry from responding to competitive pressures from the trucking industry. With the Staggers Act of 1980, US railroads were free to enter and exit markets, introduce new service offerings, enter into private contracts with shippers, set rates and abandon track. Over the next two decades, the railroads reduced costs, rationalized capacity and increased productivity. Exhibit 1 shows that revenue ton-miles increased more than 465% from 1980 to 2005. The productivity gains and corresponding cost reductions (Exhibit 2) enabled the railroads to invest in track and rolling stock upgrades. (In the US, rail assets are owned by vertically integrated private corporations). The industry also shared its gains with its customers, enabling it to compete more effectively with other modes. US coal rates provide a case in point where rates declined steadily in real terms from 3 cents per ton-mile in 1985 to 1.5 cents in 2005. The end result of greater productivity, lower costs, rate reductions and a stronger commercial focus was a rebound in rail share. US freight rail share stood at 40% in 2007 (Exhibit 3).

Exhibit 1
US Freight Rail Productivity
 (revenue ton-miles per employee hour)



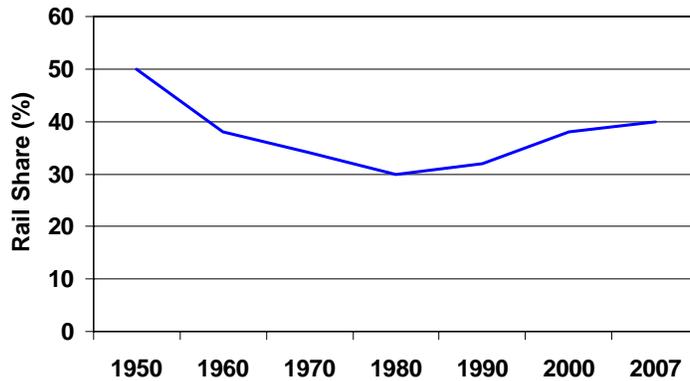
Source: AAR, "Ten Year Trends"

Exhibit 2
US Freight Rail Cost
 (constant dollars per ton-mile)



Source: AAR, "Ten Year Trends"

Exhibit 3
US Rail Share of Total Freight
(Percent of Ton-Miles)

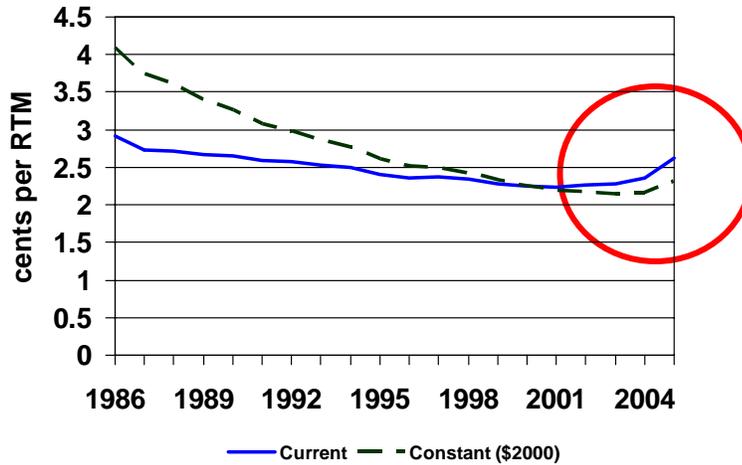


Source: Eno Transportation Foundation

Governments in Europe and in Australia have taken a different approach to freight railroad regulation and revitalization. Their solution centered on increasing competition among railroads by requiring open access to rail lines (known as mandated access in Australia). This would allow multiple operators to offer rail services to shippers over the same infrastructure, which in turn would spur innovation, increase productivity, and lower costs. These outcomes would lead to market share gains for the rail industry. Europe and Australia encouraged railroads to vertically unbundle their operations into above and below rail businesses. In some jurisdictions, the below rail assets have been transferred to a separate infrastructure company; in others, the railroad has remained a single corporate entity, but “ring fenced” the management of the infrastructure functions to provide arms-length and unbiased service to its own above rail operating unit and any other operator that wants to use the line.

Shippers in the US have begun to ask if open access is necessary in the North American rail market. The primary reason for the question is increasing rail rates. Exhibit 4 shows that rail rates in current and even constant terms declined following the Staggers Act for 15 years. Rates in current dollars were lower in 2003 than in 1986. However, beginning in 2004, railroads began increasing rail rates at a rapid pace. In 2005, rates increased by 7%, the greatest increase in 20 years.¹ Some shippers claimed their rates for individual movements rose more than 100%.² The rate increases enabled the major railroads to earn their cost of capital in 2006, the first time in decades. The ability of the railroads to increase rates so rapidly and not lose freight to other modes stems from a combination of decreased rail capacity following years of asset rationalization and a renaissance in the demand for rail service spurred by a growth in containerized imports as well as less favorable truck economics.

Exhibit 4
 US Rail Freight Rates
 (Current and Constant 2000 dollar revenue per ton-mile)



Source: AAR, "Ten Year Trends"

Although US railroads have responded to this heightened demand by selectively and strategically adding capacity, the prospect of higher rates in the future is strong. A hedge fund that took a sizable financial stake in one of the largest US railroads has publicly stated their opinion that “over the next ten years, the company should raise the rates it charges shippers by at least 7 percent a year.”³ Shippers who have incurred rate increases and hear calls for more have begun pressuring the US Congress to enact measures that would increase rail competition. One of the calls is for open access so that shippers could choose among multiple rail service providers much like the European and Australian models. The US railroads do have a limited form of open access referred to as trackage or haulage rights and reciprocal switching; however, the actual volume of freight moving under such agreements is small. Moreover, they are largely vestiges of prior rail mergers either mandated by the regulator or negotiated among the carriers in order to secure merger approval. While the current shipper proposals have stopped short of suggesting vertical unbundling, shippers remain focused on dramatically increasing open access beyond the current arrangements.

Open access following the European and Australian model would represent a radical departure from the historic US approach of creating competitive markets in the transportation industry. Consequently, a careful examination of the successes and/or limitations of the European and Australian experiences is critical. The purpose of this research is to examine the Australian experience with open access and determine its applicability to the US. Australia’s rail system is a close analog to that of the US. The freight moving on both railways is dominated by bulk and intermodal traffic, the length of haul is similar especially for intermodal business, and neither system has extensive intercity passenger service.⁴

II. Research Objectives and Methodology

The objectives of this research are twofold: to understand the success and limitations of open access in Australia and identify lessons learned from the Australian experience that are relevant for US policy makers. The assessment centers on comparing the benefits of competition resulting from open access with the costs of coordinating the open access regime. Exhibit 5 enumerates the potential benefits of open access. One group of benefits would be increased competition through new entrants joining the market or existing providers expanding their service offerings. Greater competition would be expected to result in lower rates and greater rail share. Competition resulting from access could also yield improved efficiency and service quality. Finally, mandated access could increase investment in infrastructure and rolling stock.⁵

Exhibit 5
Benefits and Costs of Mandated Access

Benefits of Competition	Costs of Coordination
<ul style="list-style-type: none">• New entrants• New services• Lower rates• Increased rail share• Improved efficiency and service quality• Increased investment	<ul style="list-style-type: none">• Suboptimal tradeoffs• Larger organizations• Delayed decision making• Compliance expense• Litigation expense

Source: Author analysis of Kain, Peter. "Rail Infrastructure Pricing: Seminar October 22, 2003." 2003.

The exhibit also shows the possible costs of coordinating a vertically unbundled, mandated access regime. First, the division of responsibility between infrastructure provider and above rail operators could lead to suboptimal tradeoffs such as when track maintenance is performed. There is also the potential for a "maintenance externality" since the lack of track maintenance could impose a cost on above rail operators. The reverse could be true for operators that fail to maintain their rolling stock. Second, the vertical unbundling requirement of access increases the number and size of rail organizations. Third, there is also the potential for regulatory compliance costs and even expenses for litigation. Finally, the regime could introduce time delays in offering new services since there is an elaborate process for regulatory review.

Statistical tests of changes in freight rates, service reliability, investment levels and coordination costs pre- and post- access would provide the strongest evidence of the mandated access policy's success or limitations; however, lack of detailed data make such quantitative analyses impossible. For example, time series rail rate data exists in aggregate, but not by commodity and/or shipping lane. As Fred Affleck, a university

professor and former general manager of Australia's National Rail described the data challenge: "a critical assessment of either business strategies or policies is handicapped by lack of access to much confidential data."⁶ Quantitative information associated with the costs of coordination is equally elusive. Consequently, the present analysis relies on piecing together evidence to determine the net impact of mandated access.

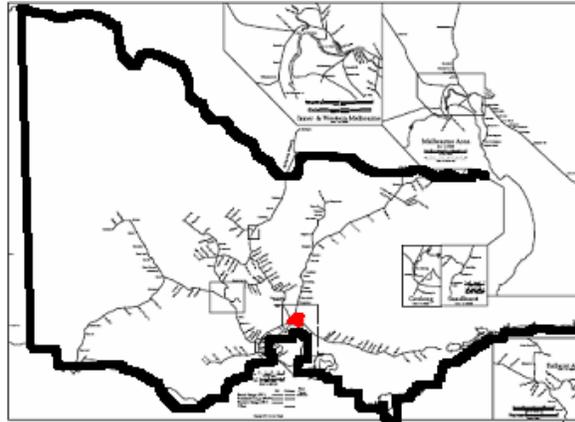
The information is drawn from industry and government reports, and supplemented by interviews with key players in the Australian rail industry. Although the documents used come from a broad array of sources, key documents are from the Department of Transport and Regional Services (DOTARS) and the Productivity Commission along with annual reports and financial statements from major above- and below-rail operators and the Australasian Railway Association (ARA). The interviewees represent a cross-section of rail operators, infrastructure providers, state and national regulators, and academic institutions including Pilbara Rail, Rio Tinto, BHP Billiton, Pacific National (PN), Genesee & Wyoming Australia (GWI), WestNet Rail, Australian Rail Track Corporation (ARTC), QR Network Access, the Ministry for Public Transport in Queensland, the Queensland Competition Authority, the Economic Regulation Authority of Western Australia, the Victoria Treasury, the Essential Services Commission of Victoria, Sydney Ports, the Independent Pricing and Regulatory Tribunal of NSW, the Productivity Commission, BTRE, the Federal Treasury, the Australian Competition and Consumer Commission (ACCC), the National Competition Commission (NCC) and Planning and Transport Research Centre.

Section III below provides a history of the freight rail industry in Australia. The process leading to the mandated access regime and its mechanics as applied to freight railroads are described in Section IV. The assessment of the Australian access regime is presented in Section V. Conclusions and lessons for US policy makers are provided in the final section.

III. Evolution of Freight Railroads in Australia

The Australian colonies began to develop railway systems in the second half of the 1800s. This construction began almost 50 years before the colonies' federation in 1901, and thus the railroads were planned as separate systems with the specific needs of each colony in mind, rather than being created as a unified system. The first three colonies to build railways were Victoria, South Australia (SA), and New South Wales (NSW); Western Australia (WA) and Tasmania were too sparsely populated, and Queensland was included in the territory of NSW.⁷ Although the original railways were built by private companies, colonial governments quickly took over once it became clear that, due to the low traffic density, private rail was not economically feasible. (The majority of the railways remained government owned and operated until the end of the 20th century). The routes extended out from the colonies' major ports – in most cases the major port was the capital – and provided transport of goods from rural areas and mining regions⁸ (Exhibit 6).

Exhibit 6
Late 1800s Victoria State Railway System

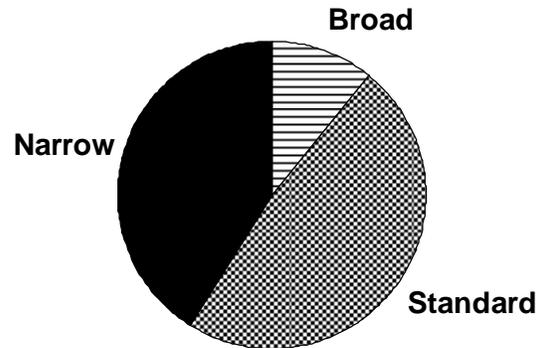


The early Victorian rail system extended outwards from the capital in Melbourne

Source: Victorian Railway Maps, 1860-2000 <<http://www.vrhistory.com/VRMaps>>

Because rail systems were not expected to provide interstate transport, little effort was expended to ensure interoperability among the states: no centralized regulatory agencies were created to promote standardization. As a result, state engineers controlled the track laid in each colony. The Sydney Railway Company (SRC) of NSW was the first to begin planning a railway, and their Irish chief engineer recommended the use of Irish broad gauge (1600 mm). SA and Victoria both agreed to match the gauge being used by the SRC. When the SRC replaced the Irishman with a Scottish chief engineer only a few years later, the company changed to a standard gauge (1435 mm) system, the gauge predominantly used in Northern England. Victoria and SA had already ordered locomotives, and were left with engines that were incompatible with NSW infrastructure.⁹ Furthermore, when Queensland became independent of NSW and began to build its own railway a decade later, it opted to use narrow gauge (1067 mm) due to the economic benefits of narrower gauges on routes with light traffic;¹⁰ WA adopted narrow gauge for similar reasons, and SA built both narrow and broad gauge. Multiple gauges made interstate commerce difficult: a cross country journey from Perth to Brisbane required one to change trains six times in 1917.¹¹ The vestiges of multiple gauges exist today. Just under half of railroad mileage in Australia is standard gauge. The remainder is primarily narrow gauge, although there is also some broad gauge (Exhibit 7).

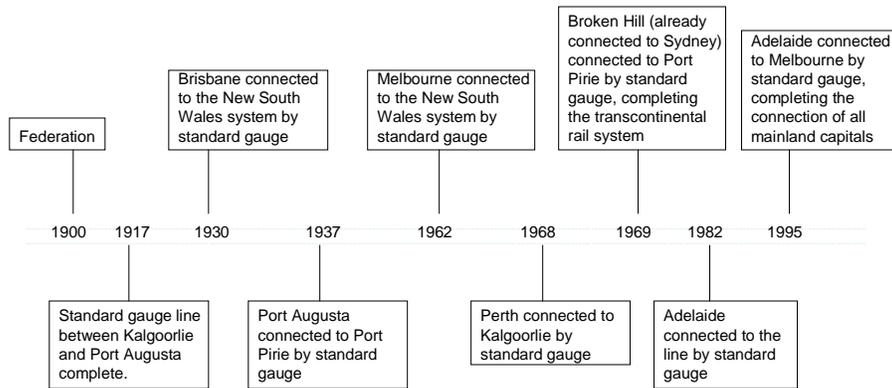
Exhibit 7
Australian Composition of Railroad by Gauge



Source: Australian Bureau of Statistics. 2002 (Wikipedia). Excludes narrow gauge, sugarcane railways.

The end of World War II was a pivotal point in Australia's surface transportation industry. The war highlighted the impacts of the lack of rail interoperability. For example, breaks in gauge severely limited transport from factories in NSW and Victoria to shipping in Queensland. In addition, threats of Japanese invasions highlighted the need to transport troops quickly across different gauge systems. Several proposals were offered to standardize the nation's rail gauge, and a 1956 proposal to create a single cross-country standard gauge line was universally accepted. Implementation began in the early 1960s; however, it was not until 1995 that the Melbourne-Adelaide line was converted from broad to standard gauge, finally completing the inter-capital system (Exhibit 8). The implementation process may have been delayed due to conflicts over who would finance the standardization.

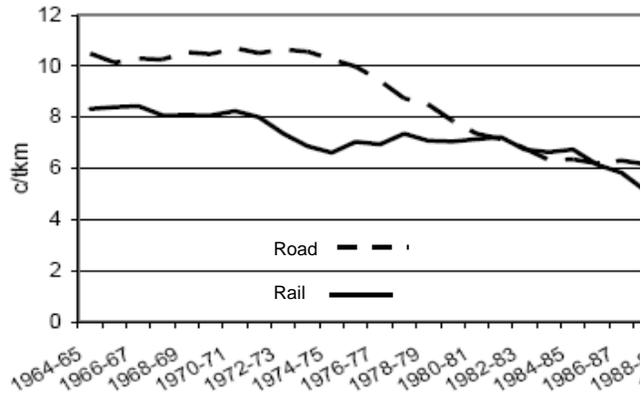
Exhibit 8 Milestones in Australia's Standard Gauge Interstate Railroad



Source: Author analysis

The end of the war also saw the introduction of improved truck technology in Australia, as improvements developed for military purposes came into commercial use. These changes boosted motor carriers' productivity and reliability. The new trucks were able to leverage Australia's highway system that was built during the 1950s and 1960s. The impact of truck competition on the rail sector was muted by significant regulation of the motor carriers. By the 1970s, these restrictions became politically and economically indefensible and the motor carrier industry was deregulated, making possible faster and more reliable service at only slightly higher rates and drawing shippers from the railroads. Exhibit 9 shows that after the trucking restrictions ended, truck rates dropped precipitously. Rail rates saw an initial decline, but eventually became constant as part of Australian macro-fiscal policy,¹² while truck rates continued to fall. As a consequence, rail share declined further. For example, rail share of total freight from NSW to Victoria declined from 32% in 1972 to 10% by the end of the 1980s (Exhibit 10). The loss of share and embedded rail bureaucracy resulted in the railroads requiring large public subsidies. Moreover, the governments used the railways and their associated workshops and maintenance facilities to create employment opportunities, often using them as an employer of last resort when the economy was in decline. By the end of the 1980s, the need for widespread rail reform was evident.

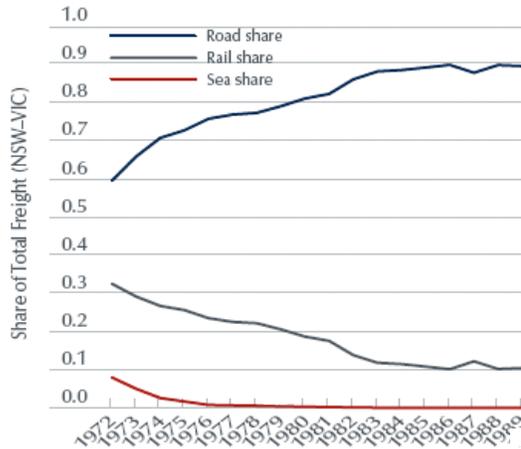
Exhibit 9
Trends in Australian Truck and Rail Rates



Source: Australian Government Productivity Commission, "Road and Rail Freight Infrastructure Pricing, No 41", 22 Dec. 2006

Exhibit 10
Freight Volume by Mode

Interstate Freight, NSW to Victoria, shares of rail, road and sea, 1972-1989



Source: Australasian Railway Association, "Australian rail freight performance indicators, 2005-2006"

Australian policy makers' first attempt to revitalize the railroads came in 1970s when the Whitlam government proposed a national rail system. The Commonwealth Railways - operator of the Pt Pirie - Kalgoorlie Trans Australia Railway - was combined with the SA and Tasmanian systems to create the Australian National Railways (ANR). While the name implied the railroad was of national scope, Queensland, NSW, WA, and Victoria retained their rail lines. The creation of ANR did not stop the deterioration of the freight rail industry in Australia.

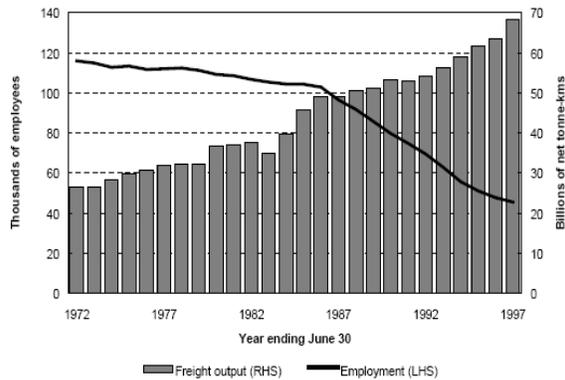
Based on the success of railroad privatization and corporatization in Europe and South America, by the late 1980s policy analysts looked to these strategies as the way to improve the competitive and financial position of the Australian railroads. The first serious look at the issue took place with the 1991 Inquiry Report on Rail Transport. It found that the governments controlling the railroads lacked commercial focus and clearly defined objectives, leading to inappropriate government intervention. The report also warned of the developing problem of monopolistic pricing in coal freight. In its recommendations to policy makers, the report emphasized that governments should not have so much control over the industry, suggesting corporatization of government-owned rail. Such a measure would ensure that railways had command over the services they provided and the prices they charged, and that they would be able to reduce expenditure on labor without political interference. In order to remedy the problem of monopolistic pricing, the report recommended vertical unbundling of rail operators coupled with required open access of rail track and infrastructure for an appropriate fee.

At that time, only the corporatization recommendation was adopted. In 1991, National Rail Corporation (NRC) was established to operate “above rail” interstate freight service. NRC was owned by the Commonwealth, Victoria, and NSW and controlled all interstate rail in those states. An agreement with ANR and the state governments enabled NRC to offer rail service connecting the state capitals across the country. Policy makers anticipated that NRC would be profitable by 1998. The states also sought to reduce the need for subsidies and spur innovative management with the privatization of their intrastate rail lines. For example, GWI purchased some of the intrastate freight lines in SA in 1997 and entered into a joint venture to buy the non-urban assets of WA in 2000.

The anticipated productivity and service gains were largely achieved as NRC and the new acquirers invested capital in rail and rolling stock. For example, NRC was provided more than \$100 million in government funds to upgrade its locomotive fleet and RailAmerica committed \$36 million to improve infrastructure, locomotives and convert a grain line to standard gauge.¹³ The combination of capital infusion and competitive management practices led to a steady increase in ton-kilometers handled by the railroads, while the number of employees consistently declined (Exhibit 11). Track quality and locomotive productivity also improved.

Exhibit 11
 Australian Railroad Productivity Trends
 Post-Corporatization / Privatization

Figure 2.10 Employment and freight output in government-owned railways, 1971-72 to 1996-97



Source: Productivity Commission, "Policy in Rail Reform", Aug. 1999

At the outset of the 21st Century, Australia has more than a dozen rail operators providing above or below rail service on an inter or intrastate basis. Exhibit 12 lists the major freight rail providers and shows that Pacific National (PN), SCT Logistics and, from November 2007, QR National are the above rail operators servicing the transcontinental market. The states have one or more infrastructure providers and one or two primarily above rail carriers. While the interstate rail traffic is generally provided by vertically unbundled providers, intrastate operations are performed by a mix of bundled and unbundled providers.

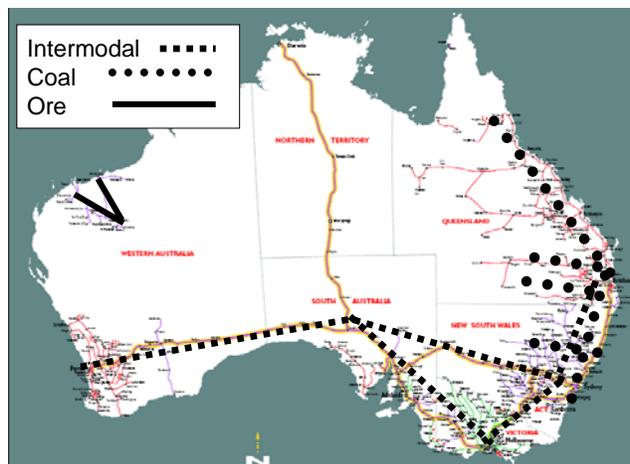
Exhibit 12
Representative Australian Freight Railroads 2007

	Vertically Integrated	Infrastructure	Rail Operators
National		ARTC	Pacific National SCT Logistics Freightlink QR National
States	Silverton Rail (freight) OneSteel FreightLink Australian Railroad Group ASG Flinders Power QR (Ring fenced) Comalco (aluminum freight only) Pilbara Rail Company (iron ore freight only) Rio Tinto (iron ore freight only)	RailCorp New South Wales ARTC VicTrack (passenger and freight) QR Network Access WestNetRail	CountryLink Southern Shorthaul Railroad V/Line Freight Southern Shorthaul Railroad Australian Southern Railroad QR National South Spur Rail Services Australian Railroad Group

Source: Author analysis

Australia's current rail freight flows fall into five primary segments (Exhibit 13). The first is intermodal traffic, moving either East-West or North-South. Rail dominates the East-West lane owing to the long length of haul. Trucks have the vast majority share in the North-South lane owing to the shorter length of haul and challenges of moving freight through urban centers such as Sydney. The second segment is coal moving from mines in the Hunter Valley of NSW and Bowen Basin in central Queensland. The shipments move from mines to ports in unit trains traversing 100 to 300 kilometers. The railroads handled 254 million tons of largely export coal in 2006. The third segment is iron ore mined in the Australia's Northwest, the Pilbara region. This traffic, 258 million tons in 2006, is shipped in dedicated unit trains over private railroads built, owned and operated by the mine corporations to export facilities at Port Hedland, Port of Dampier and Port Walcott.¹⁴ Grain represents the fourth segment. These shipments are mostly intrastate focused and are highly seasonal. The last segment is a range of products such as steel and other ores that move in relatively small volumes.

Exhibit 13
2007 Australian Rail Network and Major Freight Flows



Source: Author analysis

IV. Australia's Mandated Access Regime for Railroads

While rail reforms were progressing during the early 1990s, Australian policy makers considered broad scale economic changes to increase the competitiveness of the country's natural monopolies. The Report by the Independent Committee of Inquiry into a National Competition Policy for Australia (more commonly known as the Hilmer report after its chair, Professor Frederick Hilmer), was published in late 1993. The Hilmer Report recommended reform of government-owned natural monopolies, including railways. The report argued that, to achieve the most efficient provision of public goods and services, there was a need for increased competition among government or even corporatized monopoly businesses. To accomplish this, the report called for vertical unbundling of natural monopolies with operators of the monopoly infrastructure offering access at approved prices and numerous operators competing to provide service to customers. For example, in the case of railroads, track infrastructure is the natural monopoly. Multiple, competing rail operators can vie for customer freight if they have equal access to the rail infrastructure.

The National Competition Policy (NCP), a group of reforms prompted by the Hilmer report and based on its recommendations, was adopted in 1995. In addition to mandating third party access and suggesting vertical unbundling and privatization, the NCP outlines the obligations the Commonwealth, state, and local governments have to create competitive neutrality and promote structural reform of public monopolies. It lists "public interest" factors governments should take into account when considering new policies. The NCP also created the National Competition Council (NCC), which provides advice on third party access to monopoly infrastructure and revises the roles of the Trade Practices Commission via the Australia Competition and Consumer Commission (ACCC). The ACCC "promotes competition and fair trade in the market place to

benefits consumers, business and the community.”¹⁵ As prescribed in the Hilmer Report, the NCC provides independent policy advice to governments and undertakes public education on competition issues, but is not able – except in very few cases – to enact any policies itself. The ACCC is the main administrative body that deals with competition policy and is the final authority on national regulation.

Most significantly, the reforms established Part IIIA of the Trade Practices Act of 1974 (also known as the National Access Regime), which identifies three ways (voluntary undertaking, certification, and declaration) for third party operators to gain infrastructure access. Under the voluntary undertaking method, the owner of rail infrastructure proposes access rates, terms, and conditions for ACCC approval. The rate range typically provides a lower bound that covers marginal costs and an upper bound that provides for recovery of long-term variable costs and rate of return on investment. Once approved, the access provider is free to negotiate actual rates with rail operators requesting use of the line. If the parties are unable to reach terms, the access rates can be set by arbitration through the ACCC. Thus, the Australian access approach is referred to as a “negotiate – arbitrate” model.

The second method – certification – allows states to propose an access regime. A state government is empowered to apply to the NCC to certify that a policy covering third party access in its state is effective. A key aspect of the certification option is that infrastructure covered by a certified program can not be declared, the process described below.

The third approach to access rail infrastructure that is not subject to a voluntary undertaking or certification is a declaration for service made to the NCC. The NCC recommends access if it would promote a material increase in competition, be uneconomical to create a second facility to provide the service, considers the facility to be of national significance based on its size, importance to trade, or importance to the national economy, and the access would not be contrary to public interest.¹⁶ If a service is declared, the applicant gains access by coming to an agreement with the service provider or, if no agreement is reached, through arbitration by the ACCC. The NCC’s recommendations are not binding; a Commonwealth Minister (usually the Commonwealth Treasurer or Commonwealth Minister of Finance and Administration) must approve the application before it is final. Decisions by the Minister can be appealed to the Australian Competition Tribunal (ACT), an independent statutory tribunal.

The policy of mandated access drove the Commonwealth and states to unbundle and/or continue corporatization/privatization of their railroads. In 1998, the Commonwealth created the Australian Rail Track Corporation (ARTC) to run the below rail standard gauge, interstate rail system. The tracks owned by ANR were transferred to ARTC. The interstate lines in Victoria were leased to ARTC; subsequently, the lines in NSW were also leased to ARTC. The ARTC currently owns or leases more than 10,000 km of standard gauge track in four states: NSW, SA, WA, and Victoria. ARTC is also leases the Hunter Valley coal network and manages other intrastate rail lines in NSW.

At the state level, SA sold its freight operations, SARail, to the American short line railroad, GWI. Victoria separated its Public Transport Corporation (PTC) into four different entities, of which V/Line Freight controlled PTC's former freight road, including control of the non-urban intrastate infrastructure. V/Line Freight was then privatized in 1999 to another American short line operator, RailAmerica. RailAmerica then sold to PN, and eventually PN sold it back to the Victorian government. WA horizontally separated its freight from its passenger services, and sold the integrated freight company, Westrail, to Australian Railroad Group (ARG), a joint venture of GWI and Wesfarmers, in 2000. More recently, the railway was sold to QR and BBI, with QR acquiring the above-rail business and BBI taking the infrastructure. NSW separated its State Rail Company into Rail Access Corporation (subsequently, RailCorp), which oversees the track network (which is now leased and/or managed by ARTC), and FreightCorp, which controls above-rail freight operations and passenger service. FreightCorp was sold jointly with the NRC (the remaining above-rail corporation) in 2002 which now operates as PN. PN's below rail operations have spun off into a company called Asciano as part of the deal whereby one of PN's owners (Toll) took over the other (Patrick's). Queensland did not separate or privatize its railway, and the government-owned Queensland Rail (QR), which was corporatized in 1995, continues to control almost all track, passenger, and freight services in the state.

In general terms, the majority of the below rail infrastructure is now in the hands of corporatized government owned or funded entities. The above rail operations are dominantly provided by the private sector and by Queensland's corporatized railroad, QR.

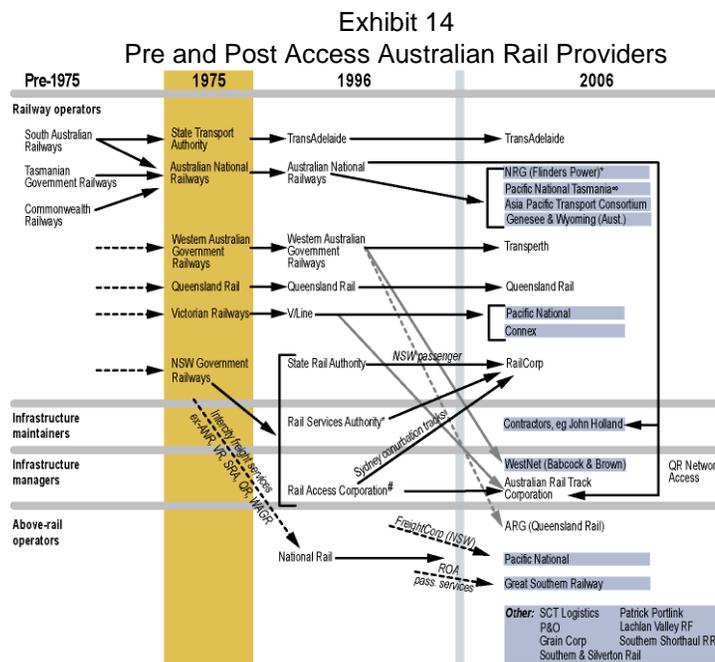
V. Assessment of Mandated Access to Railroads

The assessment of mandated access to rail infrastructure weighs the benefits of increased competition against the costs of coordination. The potential benefits of the regulatory framework include new rail service providers entering the market, the introduction of new rail services by new or existing providers, improved service reliability, increased productivity and cost reductions through more effective management or innovation, rate reductions for shippers, modal share gain for the railroads, solid financial performance and increased investment.

In sum, the benefits of mandated access appear limited. Only two significant new entrants have come into the market and there are only a handful of expanded service offerings from existing rail operators. Despite a growing freight task in Australia, rail share system-wide has remained unchanged.¹⁷ Service quality and efficiency have improved, but this is a continuation of the pre-access trend. There has been extensive investment in rail infrastructure and rolling stock over the last ten years, however, much of this funding has been through government subsidy. One area where mandated access has generated benefits is in lowering rail rates, especially for coal. There is an open question as to whether the rate reductions are a wealth transfer from the railroads to the mines or a social welfare gain. The evidence of benefits achieved in these areas in the ten years since mandated access is presented below.

New Entry and Expanded Service Offerings

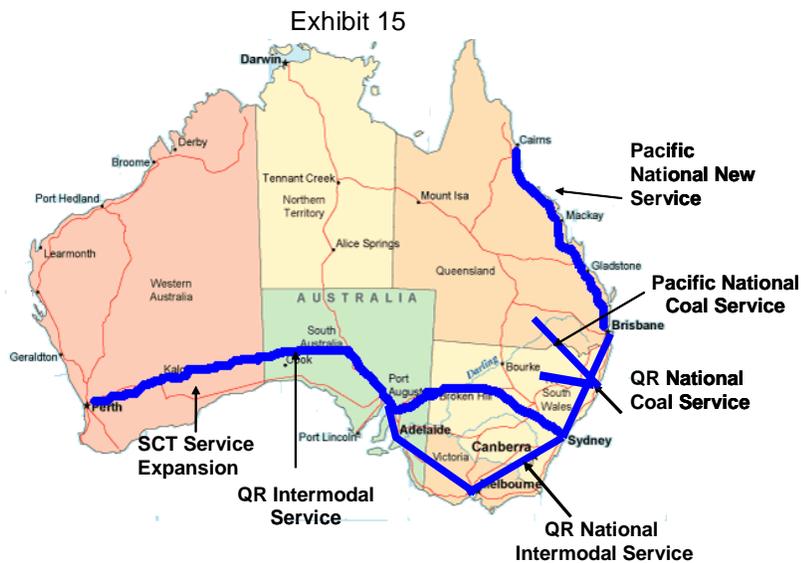
A comparison of the rail entities in 2007 versus 1995 shows dramatic change (Exhibit 14) but much of the change is in name only, resulting from changes in ownership and vertical unbundling. After 1995, two structural changes took place in the industry. The first was privatization of National Rail and several of the state railway systems as described above. This change led to new names and operators, but not fundamentally new participants and only modestly increased the geographic scope of rail offerings. For example, PN, which acquired National Rail’s above rail operations, simply took over its predecessors business. The second structural change was the vertical unbundling associated with mandated access. Separating above and below track operations increased the number of rail participants. Vertical unbundling enabled two companies to directly control their transcontinental freight.



Source: Bureau of Transport and Regional Economics, "Optimizing harmonization in the Australian railway industry. Report 114." 2006.

PN is the largest private sector operator in Australia. Its entry into the Australian rail market resulted from the privatization of National Rail. Mandated access has enabled PN, more recently, to enter into two new markets. The first offers intermodal service over track owned by QR Network Access from Cairns to Brisbane (Exhibit 15). PN runs 18 services a week on this route, representing about 15% of total intermodal trains.¹⁸ It is noteworthy that the service took more than 18 months to negotiate and a PN representative indicated the only reason the customer waited for the service was that the shipper was an affiliate of PN. A second potential new service is providing coal service in Queensland. In October 2007, two coal shippers in Queensland were reported to have agreed to have PN move some of their coal in order to improve service and reliability. While PN’s coal volume is small, it could grow significantly in the future. The importance of the service issue is highlighted in a recent report, which found that “export bottlenecks in Queensland found that Queensland Rail’s monopoly position had cost the

state economy \$1 billion last year.”¹⁹ The solution to the bottleneck issue requires the collaboration of the entire supply chain including mines, ports, and railroads.



Note: Red lines indicated **roads**
 Source: Author analysis

QR, a major railroad that predates the new competitive regime, has also taken advantage of mandated access to enter two markets. The first is providing coal transport from the Hunter Valley. QRNational bid for and won contracts to move coal on the tracks managed by RailCorp (subsequently ARTC) in this fast growing export coal region. As of mid-2007, QRNational had 18 million tons under contract, 15% of all Hunter Valley coal.²⁰ Some industry observers suggest that this initial market entry will lead to either large volumes for QRNational or at least lower rates for the mine operators who continue to use PN.

QRNational announced its intent to enter the transcontinental intermodal market in October 2007. On November 13, 2007, the rail operator began operating a three-day-a-week service between Melbourne and Perth, with trains of up to 1,200 meters in length (as opposed to the 1,500-1,800 meter length of the other operators). QR’s expanded service is intended “to source a competitive share of current and future rail freight business on the East-West corridor while adding to our already established services on the corridors on the East Coast of Australia.”²¹ QRNational suggests that their entry will be well received: “the market has been seeking an alternative on this corridor for a long time.”²² The new service was enabled by securing prime paths on the route and by purchasing some of the flat wagons that Toll was required to dispose of when it received approval for its acquisition of Patrick. The service was also facilitated by the construction of a new terminal in Perth. Some in the industry are concerned that there is not sufficient volume for three railroads and that eventually industry rationalization will occur.

The first new entrant after mandated access was SCT Logistics. SCT is a logistics service provider that ships intermodal freight across the country. In 1995, after mandated access, SCT “took the visionary step of becoming the first private company in Australia to operate a non-Government rail freight service on the Australian Interstate Network.”²³ SCT now operates four trains per week on the Melbourne to Perth and weekly service from Parkes (Sydney) to/from Perth. The real value of mandated access to SCT was its ability to directly control its entire supply chain, including rail transport. As a logistics provider, door-to-door reliability is critical. Successful logistics companies package the least cost modes that meet the shippers’ service requirements. Rail is often the lowest cost option for long haul moves, but the service performance is more variable than truck. Mandated access allowed SCT to buy rail service from any carrier it wanted, thus increasing the likelihood that the rail portion of the supply chain would meet reliability standards. In the absence of mandated access, the integrated rail operator, which could compete for the same freight as the logistics provider, could discriminate against the logistics company by providing its own direct customers higher quality service. The second entrant was Toll, an international integrated logistic service provider, in 1996. Similar to SCT, Toll used the intercity standard gauge system to move containers across the country. Toll’s rail operations ultimately became part of PN. It should be noted that the entry of SCT and Toll did not immediately represent any additional freight.

Beyond these national players, there has been some new entry of niche players post-access such as Independent Railways of Australia (formerly Lachlan Valley Rail Freight), Southern Shorthaul Railroad and South Spur. A final set of entrants are companies that commission their own trains such as the Australian Wheat Board, GrainCorp and Manildra. While there are a number of these entries, their overall freight volume is small.

While the activity described above shows some competitive actions resulting from mandated access, the overall volume of freight impacted is quite small. Estimates of 15% of the relevant markets are typical. Given the growth in the freight task in Australia, why is the entry on such a small scale? The lack of new entrants and limited new service offerings may result in part from the design of the mandated access regime. First, although access to rail lines is guaranteed in theory, in practice it has limitations. For example, there are a limited number of premium rail paths (the use of a specific rail line at a defined time). Shippers not only want low cost and reliable service, they also want to specify the time to tender and receive the freight. Intermodal shipments, because they often provide consumer merchandise, need to arrive at destinations just before peak buying periods. In the retail sector, there are seasonal and even weekly peaks. In Australia, retail weekly sales peak on Friday, and therefore retail freight customers want goods to arrive on or shortly before Thursday so that the merchandise can be moved to store shelves just-in-time for customer sales.²⁴ The problem of train paths is that there are a limited number of trains that can optimally meet the shippers’ needs. Thus, offering access is only one element to support increased competition; the other is available capacity. New entrants have the uphill battle of not only finding new customers but also securing desirable train paths. Limited anecdotal evidence of path access constraints was found, perhaps because the rail share in the long haul market is already so high as detailed below, but the issue could become more important as the freight task in Australia

grows. In an effort to ease this concern, regulators required to PN to give up some premium train paths in exchange for the parent company's approval of an acquisition.

A second concern is that mandated access applies only to the rail track infrastructure; it does not cover the terminal and other rail service facilities.²⁵ Efficient loading and unloading of intermodal trains requires dedicated terminals with sufficient space to handle 1800 meter long trains (west of Adelaide). These facilities also require expensive handling equipment to place and remove the road trailers/containers to and from the rail cars. Even the processes to enter and exit the terminal require costly computer systems. A cost for a new intermodal terminal typically runs into the millions of dollars. Thus, in the absence of shared terminal facilities, a new entrant must make a very sizable and stationary capital investment. As a result, small entrants may be reluctant to enter the market unless they can negotiate with an existing provider for terminal access. Only when a rail operator has a long-term commitment for sizable volume can new entry take place, as was the case in the Cairns to Brisbane lane where PN opened new terminal.²⁶ Servicing rolling stock can be equally problematic. Because SCT does not have access to locomotive fueling facilities along the transcontinental route, it recently customized its road locomotives to draw fuel from a fuel wagon attached behind the locomotive, in addition to from the locomotive fuel tanks.

A third impediment to truly open access is the multiple rail gauges that reduce the utility of rolling stock assets. Wheel sets can be manufactured to operate on both standard and narrow gauges, but it is expensive. Thus, for a new entrant to participate in Queensland (where narrow gauge is used), the operator must be confident that he will be in the market for the long-term, as rolling stock typically has a 30 year life. QRNational would need to overcome the same hurdle in entering the standard gauge market. PN's entry into the narrow gauge market between Cairns and Brisbane and in Queensland coal service as well as QRNational's entry into the standard gauge Hunter Valley show that the gauge barrier can be overcome, but the market must offer long-term potential for highly profitable traffic in which transportation contracts can be won multiple times.

The designers of mandated access regime envisioned that above rail operators would gain use of rail infrastructure largely through the voluntary undertakings of the below rail providers. ARTC filed a voluntary undertaking of its intercity standard gauge rail line in 2002, and after refinement with the ACCC it was accepted. This undertaking expired in May 2007, and as of January 2008 it was seeking ACCC approval for a new undertaking. There have been examples of states applying for and receiving certification; however, those regimes have lapsed or changed so the original certification no longer applies. Although no states are currently certified,²⁷ formal regimes exist in Queensland, WA, Victoria, and Tasmania. In addition, the Competition and Infrastructure Reform Agreement requires all states and territories to submit their state-based access regimes for certification before the end of 2010.

The "insurance" of access if infrastructure providers failed to complete voluntary undertakings was the opportunity for an above rail provider to declare service on desired rail infrastructure. Gaining access through the declaration process has been attempted

several times since mandated access. To date, none have lead to access (Exhibit 16). The declarations in the iron ore rich Pilbara region provide insight into the issues associated with access through declaration.

Exhibit 16
Representative Declarations / Certifications for Rail Access

Year	Details	Resolution
1996	Carpentaria Transport declares Queensland rail services	Denied
1997	NSW Minerals Council declares Hunter Railway Line Service	Denied
1997	SCT declares RAC rail services	Denied
1997	SCT declares WestNetRail services	Denied
1998	Robe River Iron declares Hamersley Iron rail services	Outside TPA 1974 jurisdiction; application not considered by NCC
2001	Aulron Energy Limited declares facilities owned by Asia Pacific Transport.	Originally accepted, but overturned by the ACT
2007	FMG declares BHP Billiton Iron rail services in the Pilbara	Originally denied, decision overturned by the ACT. The ACT's decision was <u>appealed to the Federal Court</u> which has heard the case, but has reserved its decision.

Source: Author analysis

The Pilbara region, located in the north of WA, contains nearly all of Australia's iron ore. In recent years, almost all mined Australian iron ore has been exported and, in 2005, iron ore from Australia comprised 37% of world iron ore exports, making Australia the largest exporter of iron ore in the world.²⁸ Thus, the Pilbara is both a nationally and internationally important market. The region's mining is dominated by two companies – BHP Billiton Iron Ore (BHP) and Rio Tinto Iron Ore (RTIO). Both companies are fully vertically integrated and own the railroad infrastructure that runs between the mines and the ports, the locomotives and ore cars that run on them, and the ports where the ore is shipped. Because the rail is used for such a specialized purpose, it has become quite technologically advanced, and the two Pilbara iron ore producers have created some of the most efficient heavy haul rail in the world.²⁹ For example, the average train that RTIO runs in the Pilbara is 230 cars long with each carrying about 105 metric tons of iron ore. The trains that BHP runs can be up to 336 cars long. Important technologies developed by the companies deal mainly with ability to monitor and control trains and ability to detect trains requiring maintenance.

Although BHP and RTIO control many of the larger deposits, numerous other iron deposits exist in the Pilbara that are owned by a variety of smaller companies. In general, such deposits remain undeveloped because they are too small to support the infrastructure required to transport the ore from the source to a location where it could be processed and shipped. Therefore, to profit from these deposits, the companies must obtain access to the railways and ports controlled by BHP or RTIO, either by selling part of the project to BHP or to RTIO in exchange for use of their rail or by seeking to have the rail they need declared as a service under Part IIIA of the Trade Practices Act 1974.

The first attempt to have a Pilbara railway declared came in late 1998, when Robe River Iron Associates applied to obtain access to the Hamersley Iron Pty Limited (which was 100% owned by RTIO) railway. Hamersley Iron applied to the Federal Court to obtain an order stating that their railway was not a service under Part IIIA because it was part of a production process. The Court heard the matter in early 1999, decided in favor of Hamersley Iron, and threw out the declaration application from Robe River Iron. The Judge stated that,

By use of its railway line (and associated infrastructure) it does not merely convey ore by rail from mine to port, it makes up the recipe that it has formulated for the creation of a particular batch of its product. The making-up of a recipe for batch of product depends on the line being made available (by Hamersley) for Hamersley's use...It follows from this that Hamersley's use of its railway line is an integral (indeed, essential) operation in Hamersley's production process.³⁰

Although Hamersley Iron appealed the decision, RTIO acquired a 53% share of Robe River Iron Associates in 2000, and Hamersley Iron and Robe River Iron have merged their rail operations into the Pilbara Railroad.

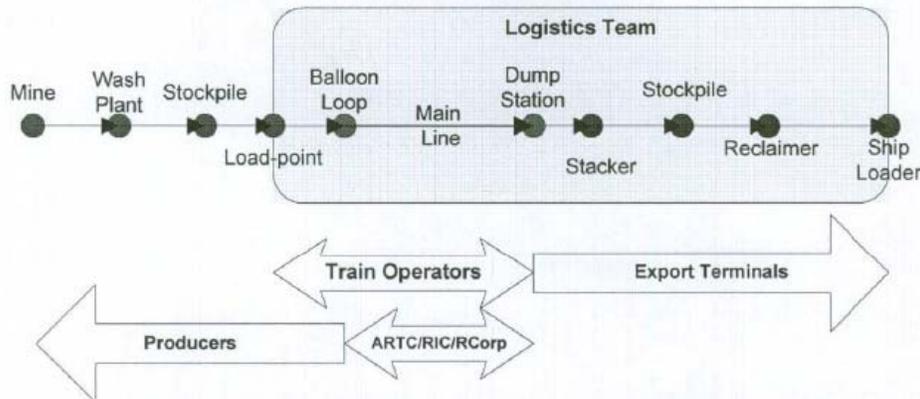
In June 2004, Fortescue Metals Group Ltd (FMG) filed to have two segments of the BHPBIO railway – the Mount Newman railway line and the Goldsworthy railway line – declared as services under Part IIIA. The NCC's recommendation on whether the lines were part of a production process followed the precedent established by the Hamersley rail decision: a line is part of a production process *if it does not carry* a finished commodity. Because the ore carried by the Goldsworthy line is not blended until it reaches the port, the ore is considered unmarketable on the rail and the line is considered part of the production process. The Goldsworthy line was therefore quickly exempt. The Mount Newman line, on the other hand, carries a mixture of marketable and unmarketable ore, and thus is not clearly a production process. The Mount Newman line underwent the full declaration process, and in March 2006 the NCC recommended that the line be declared. The recommendation was sent to the relevant Minister who did not make a decision within the following 60 day period; thus he was deemed to have denied. Both BHPBIO and FMG appealed the Council's decisions to the Federal Court.

The court actions associated with this matter thus far involved BHPBIO taking the NCC and FMG to the Federal Court alleging that the Mount Newman railway line was a production process and therefore not capable of being declared under Part IIIA of the Trade Practices Act 1974. Secondly and relatedly, FMG took the NCC and BHPBIO to the Federal Court alleging that the Goldsworthy railway line was not a production process and therefore was capable of being declared under Part IIIA of the Trade Practices Act 1974. At first instance, the trial judge found in favor of FMG (and the NCC) in concluding that both railway lines were not a production process. BHPBIO appealed this decision to the Full Court of the Federal Court of Australia with the appeal being dismissed. BHPBIO has now applied for special leave to appeal the matter to the High Court. The special leave application is expected to be heard sometime in early 2008.

Between mid 2004 and early 2006, both FMG and BHPBIO, along with other interested parties, made numerous submissions detailing their respective positions on the ability of the Mount Newman line to support third party operators. The arguments put forth by FMG center on the current lack of mining competition in the region. FMG references the number of smaller deposits in the Pilbara and claims that such deposits are effectively stranded because the mines are too small to be profitable unless the miner can use existing infrastructure, and are therefore inaccessible except by BHPBIO or RTIO. FMG cites that no third party operators have been able to develop deposits because rail transport is a bottleneck in the mining process. According to FMG, access would reduce costs (as building a new railway would be significantly more expensive), promote competition in the iron ore market as well as in other mineral markets, allow for more iron mines to open, and encourage research into exploration for other ore mines in the Pilbara.

BHPBIO submissions stated that their railway was a significant part of their production process, and claimed that a vertically integrated supply chain for ore was the most efficient method of production. According to BHPBIO, the development of vertically integrated iron ore production proves that such a method is the most efficient. Benefits include flexibility in mining and rail operations, coordination between various elements, and quick response to increased demand. The submissions note that coal railed on the east coast with shared access have been unable to quickly response to increased demand, resulting in enormous amounts of lost revenue and permanent market share loss. The multiple players required in the Hunter Valley are shown in Exhibit 17. Beyond these efficiency reductions, BHPBIO hypothesized that allowing access would further damage iron ore production by resulting in costly negotiations with third party operators, subsidization of third-parties due to unrealistic access prices, and opportunity costs stemming from third party operators preventing expansion because they are unwilling to make required investments. BHPBIO notes that such damage should not be allowed, given the impact it would have on the railway and the internationally-important market. BHPBIO also makes a separate argument that access will not result in new entrants at all because even if the entrants use preexisting infrastructure, the smaller mines are not viable.

Exhibit 17
Hunter Valley Coal Chain



Source: Pacific National, "Model Undertaking – Coal: Explanatory Document", Mar. 2007

Several other interested parties also made submissions. RTIO made several submissions arguing that FMG's application failed a number of necessary declaration criteria. Among their claims were that access to the line could not be provided safely, that there were existing or proposed rail lines that already provide competition for BHPBIO's Mount Newman line, and that there was already an existing effective access regime (although it is not certified), and therefore the Mount Newman line is not eligible for declaration. Like BHPBIO's submissions, RTIO emphasized the national and international importance of the Pilbara iron market, and discouraged any actions which might have a negative effect on it. On the other hand, the Western Australian Government made a submission giving its support for the application sent in by FMG and for access in the Pilbara in general. The government stated its desire for railway infrastructure owners to share their facilities and thus allow more mines to be opened, but did not make any arguments based on the Trade Practices Act.

The status of the Pilbara declarations remains unresolved as of October 2007. The Federal Court dismissed BHPBIO's appeal that the lines are part of the production process clearing the way for the lines to be declared and opened to FMG. However, it is likely that the High Court is likely to be called upon to hear the case in the future.

Service Quality, Efficiency and Safety

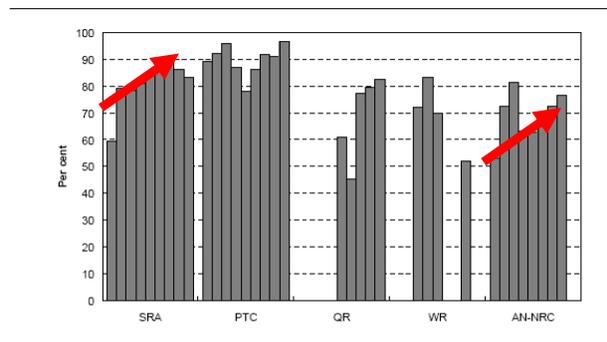
Assessing the impact of mandated access on rail service, cost and safety is clouded by the multiple actions that took place in the rail sector before and after the open access regime was instituted. As described above, much of the rail industry was corporatized and/or privatized at the same time. Moreover, the federal and state governments invested in track and rolling stock upgrades. Thus, the performance changes that are observed may result from any of these major policy changes. Sufficient data is not available to conduct

a statistical assessment of the causal factors; therefore, the reasons for the observed trends are qualitatively ascribed.

Service reliability on the railroads has generally improved over the past ten years. While comprehensive and consistent figures for on-time performance do not exist pre- and post-access, snapshots of reliability show a pattern of improvement that predates the regulatory change. Exhibit 18 shows the on-time running for freight service between 1990 and 1998 for selected carriers. With the exception of WR, data shows a general trend of improvement. For example, SRA began the period running about 60% on-time. By 1998, on-time performance exceeded 80%. The gains during the 1990s were largely attributable to improvements to the track structure, locomotives, rolling stock, and single management (under NRC). The primary infrastructure improvement was the completion of the interstate standard gauge system. During this time, ARTC used government funds to add and lengthen passing tracks. Another portion of the service improvement resulted from NRC's introduction of new rolling stock, especially locomotives. The investment in power units appears stem from privatization, rather than access, since the locomotives were used to replace old and unreliable equipment, not to enter new markets or expand existing service.

Exhibit 18 Australian Rail On Time Performance

Figure 4.4 On time running for freight services by jurisdiction^{a,b,c,d,e}, 1989-90 to 1997-98

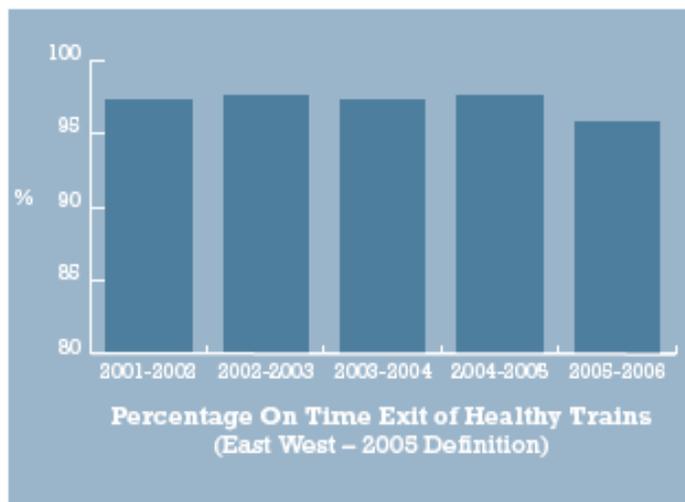


^a On time running for freight services measures the proportion of trips arriving within thirty minutes of the scheduled arrival time. ^b Data were only available for QR from 1993-94. QR's service in 1994-95 was affected by the Mainline Upgrade Project which began in 1993. This involved major track and bridge upgrading works which created short term service disruptions. ^c Data were only available for Westrail from 1991-92 to 1993-94 and 1996-97. ^d On time running for AN-NRC relates only to AN between 1989-90 and 1992-93. From 1993-94, AN-NRC on time running is a weighted average of AN and NRC measures (weighted by the share of ntkm). ^e Data for AN-NRC were not available for 1997-98.

Source: Productivity Commission, "Policy in Rail Reform". Aug. 1999.

More recent data shows a leveling in overall service performance. ARTC reports the number of healthy trains on-time remained largely constant at approximately 95% from 2001 to 2005 on the East-West corridor (Exhibit 19), with a slight decline to 92% in 2006. Performance on the North-South corridor was comparable in 2006.³¹ This statistic, however, does not measure service reliability from the customer's perspective since a train that is late coming onto the ARTC network but exits in the scheduled elapsed time is considered to exit on-time but from the shippers point of view the arrival is late. In the East-West corridor only 52% of trains were healthy in 2006.³²

Exhibit 19
On Time Railroad Performance on ARTC Tracks

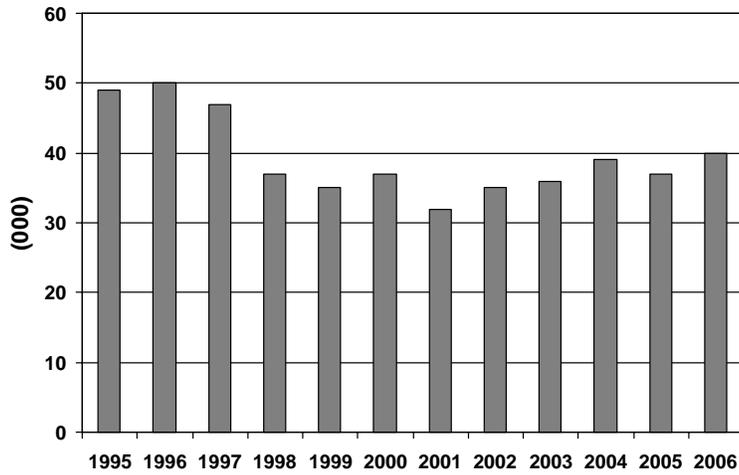


Source: Australian Rail Track Corporation, 2006 Annual Report. ARTC notes that service levels continued to improve in 2007.

While the improvements in service are generally attributed to non-access related capital improvements, there is limited anecdotal evidence that intra-rail modal competition accounted for a portion of the service improvement. A railroad observer recalled that intermodal reliability on the East-West corridor actually declined after privatization because the vertically integrated operator would “hold for load” rather than adhere to schedules. The decision was logical from the railroad’s perspective since the cost of waiting for additional loads to fill the train was small compared to the extra revenue that could be generated. However, for a logistics provider using the train that is held, schedule adherence was more important. The threat of competition from an alternative hook and haul carrier after vertically unbundling could induce the above rail carrier to improve its service performance although no data are available to support this hypothesis.

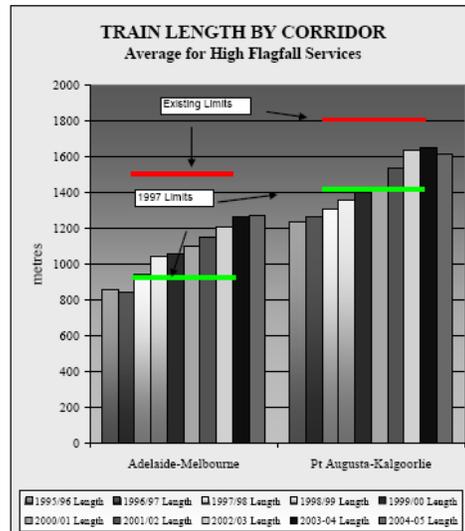
As with service, rail productivity increases and unit cost declines achieved over the past decade were a continuation of pre-access trends. The privatization of the railroads led to a steady reduction in workforce. After substantial rail employee reductions in the 1980s, the number of rail employees dropped from 50,000 in 1995 to 40,000 in 2006 (Exhibit 20). The introduction of new locomotives also spurred productivity gains and lowered costs. Australian rail observers generally attribute this improvement to modal competition from trucks and ships, not mandated access. Efficiency gains from longer train lengths provide a case in point. Between 1997 and 2006, average train lengths on the East-West mainline increased from substantially. The longer trains permitted on the Pt. Augusta to Kalgoorlie segment, 1,400 meters to 1,800 meters (approximately 30%), was typical of the improvements (Exhibit 21). Allowing longer trains was a direct result of lengthening passing tracks through government investment. There is no direct tie to mandated access.

Exhibit 20
Employment in the Rail Industry



Source: BTRE Australian Transport Statistics booklets, 2002-2007

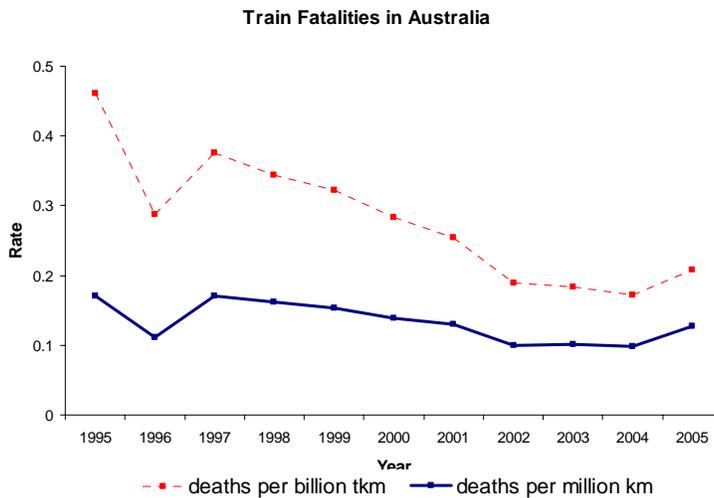
Exhibit 21
East-West Intermodal Train Length by Corridor



Source: Australian Rail Track Corporation, "Productivity Commission Inquiry Road and Rail Freight Infrastructure Pricing: Australian Rail Track Corporation Submission." May 2006

Safety has improved across the board since the mid-1990s (Exhibit 22). Both fatalities per ton-kilometer and fatalities per train kilometer have steadily decreased since 1995, although in the past couple of years they have increased slightly (but are still not close to their previous rates). Derailments per train kilometer have also decreased, if not as steadily as fatalities, and are far lower now than they were even five years ago.

Exhibit 22
Australian Railroad Safety Performance



Source: Australian Transport Safety Bureau, "Australian Rail Occurrence Data 2007." 2007

It is unclear whether safety, efficiency, and service improvements are a result of corporatization and privatization or are a result of the more competitive atmosphere introduced by mandatory access. As the Productivity Commission summarizes,

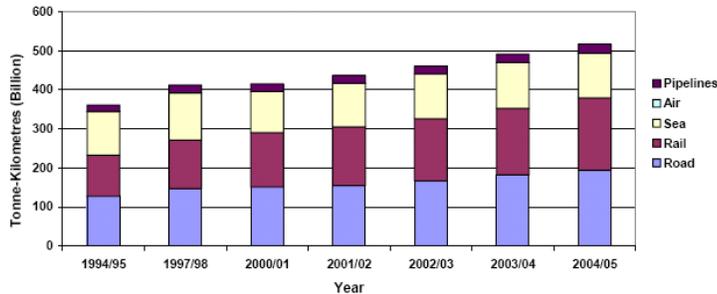
The attribution of changes in performance to specific rail reforms is difficult. There are many factors in addition to rail reform, affecting the performance of railways simultaneously. These include the demand for rail services, mix of freight traffic and passenger services, technology, managerial decision making, input markets and competition from other transport modes. This issue is particularly important when the number of railways in the sample is small. In many cases, the attribution of specific reforms to changes in performance is speculative.³³

Market Share and Rates

The most direct measures of the success of introducing competition into the rail sector might be increased rail market share and/or lower rates. The freight task in Australia grew by approximately 45% in the decade after mandated access. Overall, rail share has grown slightly (Exhibit 23)³⁴. The aggregate figures mask several important market specific changes. The share increase results from rapid growth in short-haul coal and ore shipments owing to foreign demand. Ore exports grew from 130 million tons to 240 million tons between 1995 and 2005.³⁵ The growth in these rail-centric shipments, however, is driven by Australia's global competitive position for these commodities, rather than competition in the rail sector.

Exhibit 23 Freight Volume by Mode

FIGURE H6: THE DOMESTIC FREIGHT TASK



Notes:
 (1) Includes pipelines.
 (2) The freight task undertaken by air transport equated to 0.21, 0.26, 0.25, 0.24, 0.21, 0.20 and 0.29 billion tonne-kilometres in 1994/95, 1997/98, 2000/01, 2001/02, 2002/03, 2003/04 and 2004/05, respectively.

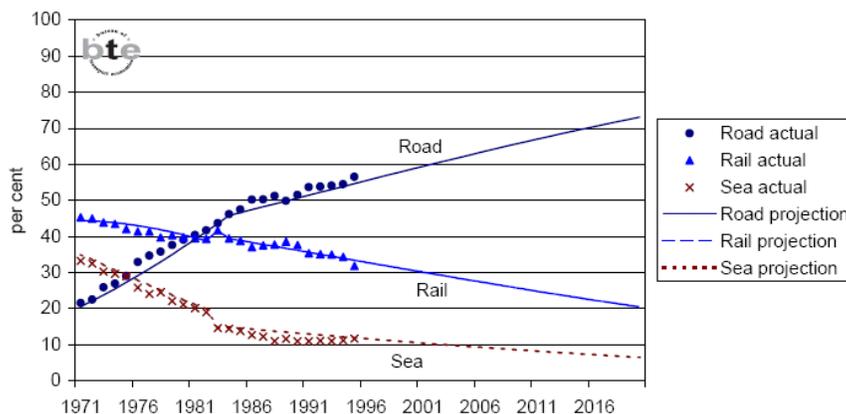
Source:
 Apelbaum Consulting Group.

Source: Australasian Railway Association, "Australian Rail Transport Facts, 2007." 2007

In the interstate freight market, rail share has declined since mandated access (Exhibit 24). For example, the intermodal rail share has declined slightly since access was mandated in 1995 (Exhibit 25). The decline was steepest just after access was instituted and has since leveled off. While there is no evidence that the decline was attributable to mandated access, the regulatory change did not result in a stronger rail position and the BTE forecasts that the market share decline with continue.

Exhibit 24 Freight Volume by Mode

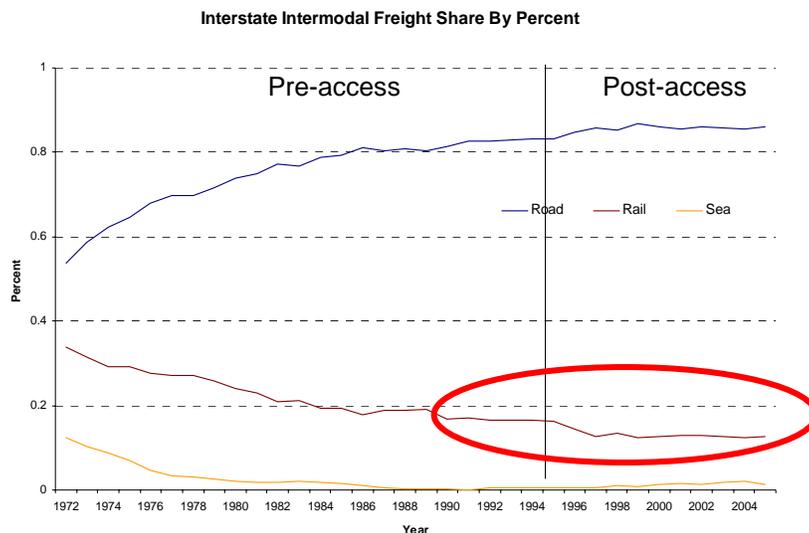
Figure 1.5 Trends in Interstate Non-bulk Freight Mode Share



Source: BTE estimates.

Source: BTE Working Paper 40 "Competitive Neutrality between road and rail" 1999

Exhibit 25
Australian Intermodal Rail Freight Share

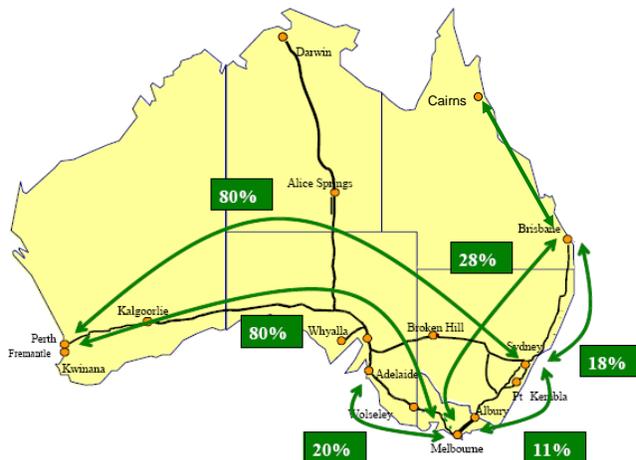


Source: Bureau of Transport and Regional Economics, "Australian Rail Freight Performance Indicators 2005-06." 2006

The intermodal segment can be further decomposed into North-South and East-West segments. Rail is the secondary mode on the North-South corridor, where rail share is only 11% in the Melbourne-Sydney lane and 28% in the Melbourne-Brisbane lane (Exhibit 26).

Exhibit 26
Australian Intermodal Rail Freight Share by Market

Figure 5 Rail share of interstate intermodal markets



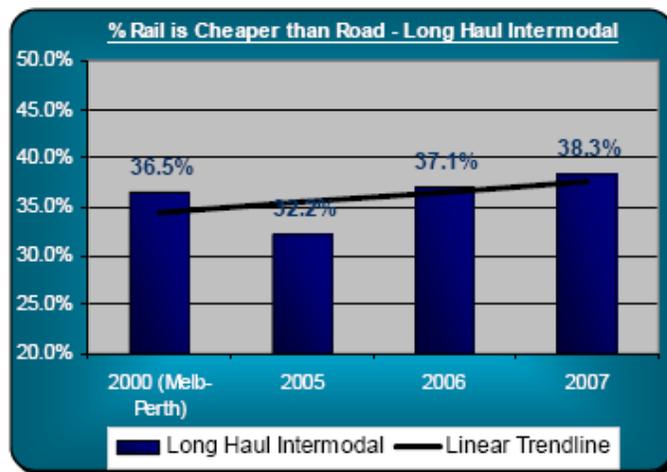
Source: Australian Rail Track Corporation, "Productivity Commission Inquiry Road and Rail Freight Infrastructure Pricing: Australian Rail Track Corporation Submission." May 2006; Author analysis

Over the next couple of years, however, this story could change. ARA suggests,

On the North South corridor, rail will become significantly lower cost than road when NSW track operating and maintenance costs are reduced to the Australian Rail Track Corporation's (ARTC) targeted levels. This, combined with small but important improvements to the way above and below rail operators work together, will result in 'efficient rail' costs being thirty to fifty percent lower than road on the North South and East West corridors respectively.³⁶

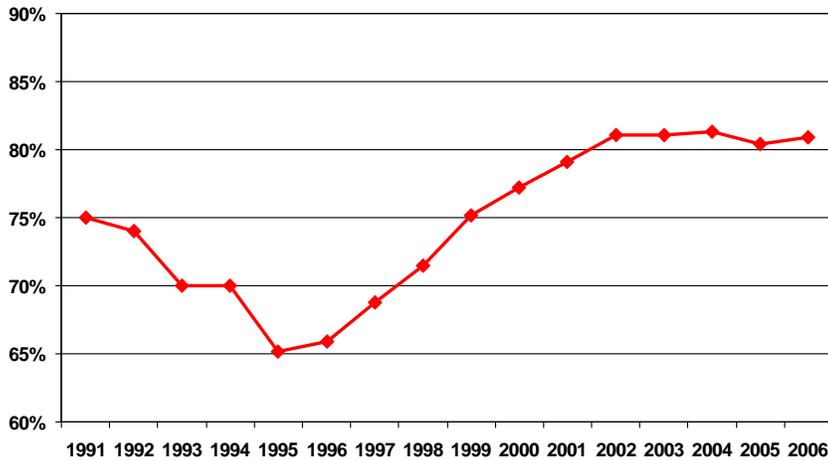
Rail is the primary mode for East-West intermodal traffic, where share is approximately 80%. The dominance is due in part to the fact that rail maintains a significant cost advantage over truck on this lane (Exhibit 27). There was a share gain in the East-West lane that is contemporaneous with access (Exhibit 28) and likely related to SCT's entry into transcontinental rail service; however, rail experts generally attribute the majority of improvements to the completion of the inter-state standard gauge line and the additional passing loops.

Exhibit 27
% Rail is Cheaper than Road



Source: Australian Rail Track Corporation, "Australian Rail Summit 2007." 2007

Exhibit 28
Road vs. Rail Land Freight Market Share



Source: BTRE, "Rail infrastructure pricing". 2003; ARTC

Why has access not led to increased share? There is strong evidence that the answer is intense modal competition, rather than a lack of rail offerings. As explained in a Productivity Commission Report, “except for some specific bulk freight commodities—coal in particular – rail freight charges appear likely to be constrained by inter-modal competition, rather more than by price ceilings set by economic regulators.”³⁷ The ARTC voluntary undertaking sets floor and ceiling access charges. The floor roughly correlates with the marginal cost to ARTC, while the ceiling would provide ARTC with enough money for sustainable long-term investment, and the range purposely allows for price discrimination. The limits are meant to be indicative only, as they are based on ARTC forecasted expenditures. The 2002 ARTC undertaking explains that

ARTC has a legitimate business interest in recovering all of its reasonable costs associated with granting Access to the Network and obtaining a fair and reasonable return on ARTC’s investment in the Network (including maintenance costs) commensurate with its risk...[but]... operates in a competitive environment where competitive pressure from other modes of transport (particularly road) place constraints on rail transport and access pricing. Accordingly, in ARTC’s view, it is unlikely to be able to price in any of its markets at levels which will fully recover the full economic costs of its assets.³⁸

Truck competition is only part of rail’s challenge. Transcontinental containerized traffic can also move by ship. Foreign flag vessels are permitted to move containers from the east coast to the west coast using coastal or continuous voyage permits. In testimony before the House of Representatives Standing Committee on Transport and Regional Services, the CEO of Shipping Australia Ltd. stated that ships can move containers from Melbourne to Perth “at rates that are generally about 65% cheaper than road and about 30% cheaper than rail.”³⁹ The cost advantage results from ships continuing onto other

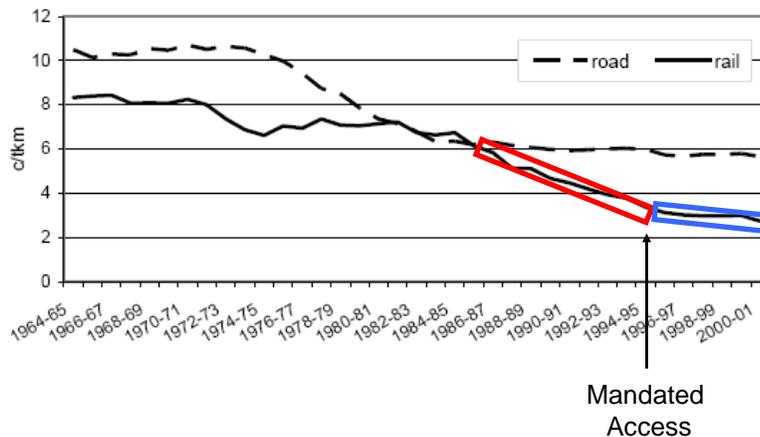
countries, not returning empty to the east coast as do trains and trucks. Between the trucks and ships, there is little need for rail-to-rail competition.

A similar competitive story emerges for the intrastate rail operations, even for the privatized carriers. The need for continued subsidies and a prolonged drought that reduced grain volumes have led some states to re-examine the role of corporate railroads. In 2007, both Victoria and Tasmania took back their below-rail business.⁴⁰ Increases in truck capacity with tractors pulling two and three trailers (double and triple B units) have weakened rail's comparative position. Although the levels of truck competition and degrees of vertical and horizontal separation vary by state (Queensland's ring-fence is quite different from NSW's vertical unbundling), trucks have played a critical role in changing the competitive landscape.

Turning to rail rates, shippers have enjoyed lower costs for rail service after mandated access, but this is a continuation of a trend that dates back to the 1980s. In fact, the pace of decline slowed after access was introduced (Exhibit 29). Lack of detailed rate data limits the analysis of more micro-level rate changes.

Exhibit 29
Australian Non-Bulk Rail Freight Rates

Figure 6 **Rail's interstate non-bulk rates have fallen more than road's**
\$2006



Source: Australian Government Productivity Commission, "Road and Rail Freight Infrastructure Pricing, No 41, December 22, 2006

There is evidence, however, that access or threat of access has led to lower rates in the eastern coal markets.⁴¹ News sources and industry experts report that rates for eastern coal moves have been lowered, some as much as 42%.⁴² The dominant portion of the coal produced in the Hunter Valley is railed to the Port of Newcastle for export. The Hunter Valley has seen substantial expansion in the years since mandated access. The rail service has historically been provided by FreightCorp, National Rail and subsequently PN operating on tracks now controlled by ARTC. In the 1990s, access pricing in the Hunter Valley fell substantially due to access regulation removing monopoly rents. Between 2003 and 2005, QRNational sought and successfully secured contracts to haul coal out of

the Hunter Valley using RailCorp's (now ARTC's) rail infrastructure. This new entry resulted from rate reductions and the desire of mine operators to have multiple options and thus reduce single provider risk. The traffic volume captured by the new entrant is approximately 15%, and rate reductions are thought to be in the 10 to 20% range. As explained by the ARTC, an example of vertical separation delivering appropriate outcomes is "the efficiency of the Hunter Valley network, where, in a vertically separated structure, above rail competition has been delivered."⁴³

PN is pursuing entry into the Queensland coal region, seeking to challenge QRNational's exclusive carrier position. PN would operate over QR Network Access' rail line. Sources report at that time QRNational reduced its rates on threatened traffic by 10 to 20% in order to keep the freight. In late 2007, newspapers reported that PN succeeded in winning coal traffic in Queensland from two customers. As the article described, "while the size of the contracts is believed to be relatively small, it symbolizes the start of something big."⁴⁴ The successful entry has been attributed less to lower rates and more to frustration with the incumbent's service reliability.

A key question for policy assessment is whether the gains described above are a social welfare gain or simply a wealth transfer from the railroads to the mining companies.

Investment and Financial Health

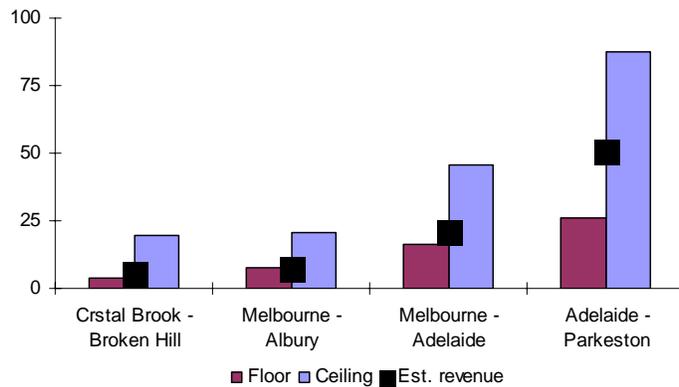
The Australian national and state governments have invested heavily in the rail industry over the past decade. Funding for the interstate standard gauge network alone amounted to hundreds of millions of dollars since 1995. ARTC has begun a significant investment program, and plans to invest over \$2B in its network between 2007 and 2010.⁴⁵ State governments have also invested capital into their railroads. QR Network Access investment \$1B in below rail infrastructure over the last two years, and plans to spend more than \$2.5B between 2007 and 2010.

The private sector has also invested in improving rail infrastructure and rolling stock. When GWI acquired the intrastate rail network in SA, it committed to spending \$62 million in capital to maintain and renew locomotives, rolling stock and track over a five year period.⁴⁶ This type of investment was typical for those privatizing the state railroads. The private railroads in the Pilbara have also received substantial upgrading during the past decade. Since 2003, Rio Tinto has invested close to \$5 billion on infrastructure and facilities development, including a recent \$130 million investment in Cape Lambert to increase capacity.⁴⁷ BHP Billiton has also invested in its rail assets; however, vertical unbundling has a downside. As PN has noted, "often it is only possible to get five years certainty in relation to access pricing, which is insufficient given the much longer investment horizons typically associated with expanding above rail capacity."⁴⁸

The investments described above should enhance the competitive position of railroads vis-à-vis truck and ship; however, it is difficult to see that these investments are either the result of mandated access or particularly support the policy. The lion's share of the spending was in the form of government subsidy, not the result of attracting private capital into the rail sector.

Although there are no overall profitability measures of the rail freight industry in Australia, there is strong evidence that the infrastructure portion of the industry is not earning a market rate of return. First, the largest infrastructure provider, ARTC, charges access fees that fail to cover long run variable costs. The actual rates ARTC charges are often closer to marginal costs (Exhibit 30). Second, RailAmerica, which acquired the Victoria intrastate system, sold its interest to PN after only five years. While RailAmerica was able to recoup its investment plus return by “bleeding the assets” according to a government official, PN was unable to operate the system without substantial government subsidy. Consequently, Victoria bought PN’s interest and plans to invest substantial capital to revive operations.

Exhibit 30
Representative ARTC Access Rates



Source: Australian Rail Track Corporation, *ARTC Annual Report 2003*. 2003

The major above rail operators appear to be profitable. SCT is purported to be generating a strong return although financial data is not available from this privately held company. Measuring success based on the services offered, SCT has shown great progress from its one 600 meter train per week in 1995 to its daily service with 1,600 meter trains today. GWI received \$207.1M, its largest gain on sale in the company’s history, when it sold its 50-percent interest in certain Australian Railroad Group (ARG) assets.⁴⁹ QR operates at a profit; however, its 06/07 revenues included \$928.6M in Transportation Service Contract and an additional \$35.1M in Shareholder Agreement revenue.⁵⁰ The profitability of PN is not publically available. While the financial picture for operators appears more positive than that of infrastructure companies, it is unlikely that they are earning a sizable profit; if they were, it is likely that the infrastructure companies could capture a portion of this return.

Cost of Coordination

Mandated access brings with it several coordination and compliance challenges, predominately between the above rail operators and the infrastructure providers. As outlined by the Productivity Commission,

Separation removes the benefits attributed to a vertically-integrated structure... Thus, in particular, while separation may improve the ability to coordinate activities along the rails (that is, between railway networks), coordination between rail and train becomes more difficult. Separation brings with it greater ongoing transaction and coordination costs that under integration.⁵¹

PN has reiterated these challenges,

Vertical separation has the potential to introduce substantial interface costs, financial, qualitative and in management resources... Even under pre-third party access structures, vertically integrated railways often found significant difficulties managing intra-organizational interfaces, so it should not be assumed that reintegration would necessarily [remove] all such difficulties. Further, the horizontal separations between track owners add significantly to the coordination efforts required to operate trains across different networks.⁵²

As outlined in the quotes above, these challenges can be quite complex. First, there is the potential for conflicting priorities between infrastructure companies and service providers. The example of conducting track maintenance illustrates this point. In a vertically integrated railroad, maintenance plans aim to minimize both cost and impact on freight service. When the railroad is unbundled, the infrastructure provider wants to perform the maintenance to minimize its costs. The freight operators want the track servicing to take place in way that minimizes its impact on its train schedules. This challenge is exacerbated by the fact that

Australian access price systems do not include 'real-time' pricing mechanisms that either penalize train operators for train delays they generate or penalize infrastructure managers for delays they cause by infrastructure faults.⁵³

Track operators report that the coordination impact is small, while some operators have different view. As PN explained in 2006,

In the last three years, PN's Intermodal Division invested \$220 million in rolling stock and terminals to cope with growth in demand, compared with the \$42 million invested by the ARTC, the track owner. This lack of alignment is creating an environment in which delays in new track investment are common.⁵⁴

The ARA recognizes this challenge, explaining that "the rail industry needs to remove inefficiencies which contribute to increasing operating costs at the interface between train operations and track managers including aligning investment priorities."⁵⁵

Another example of the potential costs of differing incentives is the “wheel-rail” interface.⁵⁶ Rail operations are safest and costs are minimized when wheels are trued and rail is appropriately profiled. If wheels are not trued, they will damage the rail. If rail is not properly profiled, wheels will be damaged. In a vertically integrated company, these issues are addressed by a single management team with one goal – maximize safety and minimize costs. In a vertically unbundled environment, the wheel-rail interface becomes an externality. The track operator does not face the costs of poorly profiled rail that causes excess wear on the wheel. The reverse is true for rail service providers who do not properly maintain the wheels of their rolling stock. Although there is no quantitative evidence of this external cost, interviews revealed a concern that this mismatch of priorities could occur. Fear of a wheel-rail issue has been clearly stated as a reason for not allowing third party operators on the Pilbara railroads.

A second challenge is coordinating operators with multiple infrastructure providers. Operating a train from Brisbane to Perth requires traversing the tracks of QR Network Access, ARTC, RailCorp and WestNetRail.⁵⁷ Thus, the train operator must ensure that the paths secured from one infrastructure provider link up seamlessly with the other track providers. The track maintenance example drives home the point. One operator relayed a case where one rail provider had its track out of service for a week, thus slowing transit times. No sooner had that operator returned to normal operations, another infrastructure provider launched its maintenance program leading to another week of delays. Thus, according to some rail officials, coordination even among the track access providers is an essential, yet a non-natural, act. However, recent history demonstrates that progress can be made in this area. PN has been participating in a cooperative process with ARTC, mining companies and port operators to increase the efficiency of the coal supply chain. Between 2003 and 2005, productivity improved over 15% through “improved coordination, without the need for additional investment.”⁵⁸

A third cost of coordination is the need for larger rail organizations. Vertically unbundling the industry requires multiple entities where only one was needed previously. Above and below rail operators each need a CEO, a finance department, a human resources department, etc.. There is some irony in that railroads around the world have been consolidating to exploit cost saving synergies over the past two decades, yet mandated access requires reversing these gains. Another need for “extra” staff is to comply with the requirements of mandated access. ARTC must file an undertaking every five years. Each of the rail operators has a regulatory group to address the issues associated with mandated access and another to deal with safety (previously managed in-house). The parties include above and below rail operators, government regulators and policy makers and a long list of consultants. While there were some regulatory requirements prior to access, industry observers generally believe the level of effort is substantially greater with mandated access.

A large government regulatory infrastructure is necessary to support mandated access. Exhibit 31 shows the various agencies at the national level including the NCC, ACCC, and ARTC. The Productivity Commission has also spent considerable resources in support of access regulation and broader competition issues. The competition

commissions in each state also devote energy to supporting mandated access. The combined annual budgets for these groups exceed \$125 million (Exhibit 32). The government agencies involved in access must address not only rail issues but also those in electricity, gas, telecommunications and water and the ACCC deals with other consumer matters. Thus only a small portion of these funds are devoted to rail access; nevertheless, the commitment is likely to be millions of dollars annually.

Exhibit 31
Regulatory Infrastructure

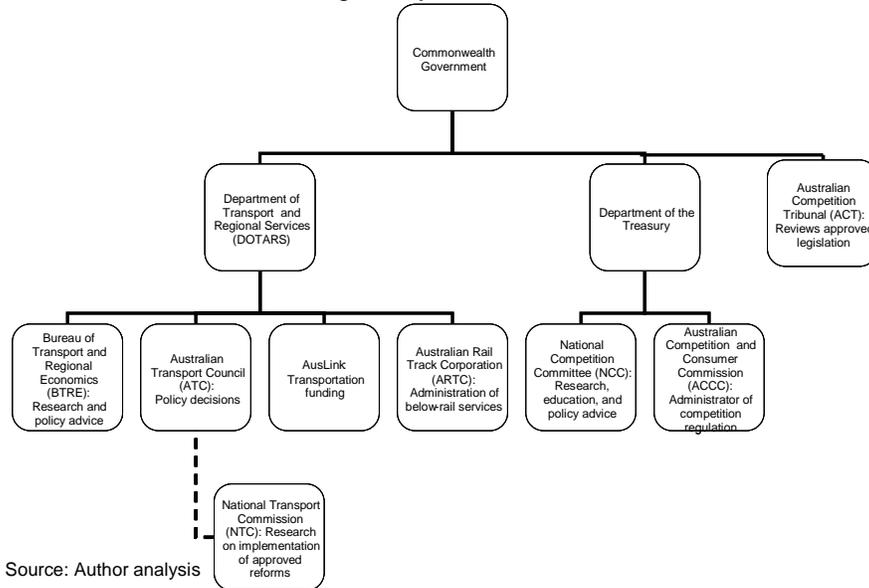


Exhibit 32
Annual Expenditures for Regulatory Bodies
Associated with Mandated Access

		2006 (M)
Federal	NCC	\$4.0
	ACCC	\$89.8
	Federal Total	\$93.7
State	Independent Pricing and Regulatory Tribunal (NSW)	\$15.3
	Victoria Essential Services Commission (ESC)	\$2.7
	Queensland Competition Authority (QLD)	\$6.1
	Economic Regulatory Authority (WA)	\$6.7
	SA Essential Services Commission (ESCOSA)	--
	State Total	\$30.8
Federal & State	Grand Total	\$124.6

Source: Author analysis. Expenditures reflect all activities of regulatory bodies. Only a small portion is spent on rail access.

The magnitude of these expenditures can be understood by examining the costs associated with FMG's declaration in the Pilbara. Summing the amounts reported by representatives of the key parties reveals that the declaration is costing more than \$10 million per year.

Beyond these direct monetary costs, the access regime has also introduced significant regulatory lag and uncertainty. The negotiate-arbitrate nature of mandated access contributes to the long time frames. For example, PN negotiated with QR Network Access for more than 18 months in order to secure the Cairns-Brisbane route. In that case, an agreement was reached. Had the parties not been able to come to terms, the two and half month arbitration process would have commenced.⁵⁹ Thus, it is hard to envision how a new competitor could enter a market with the nimbleness that customers expect and truckers provide. There is no direct evidence that investment in the rail system has been impeded by the long and uncertain times to access tracks; however, it is easy to assume there is some negative impact. Several consulting studies have been completed estimates of the impact of delayed investment in the Pilbara. One study found that a one year delay in spending \$2 billion in infrastructure upgrades (that is compensated for in the following year) would lead to a permanent output loss of \$400 million.⁶⁰

The challenge of coordinating multiple rail participants is seen most starkly in the Hunter Valley export coal supply chain. Exhibit 17 above shows the multiple players required for efficient operation, which include the port, infrastructure providers, rail operators and mines. Because of the uncertainties associated with open access, not only on the railroad but also and potentially more importantly at the port, maximum throughput has not been achieved. Efforts at coordination and capacity allocation are having some benefit, but as one participant in the supply chain stated, the company and the country are losing out on millions of dollars because of the uncertainties associated with open access.

VI. Conclusions for US Policy Makers

Ten years have passed since Australia implemented mandated access for rail infrastructure. Over that time, many of the anticipated benefits have not materialized. Two key measures of increased competition – new entrants and new service offerings – have taken place in only modest terms. This experience is consistent with that of other countries. In 2005, the OECD noted that while some countries have seen entry of new rail providers following vertical separation, the number of entrants is small and their share of the total freight task is low.⁶¹ One explanation for the lack of entry in Australia could be the ineffective declaration process – access has yet to be granted to any party seeking rail use through the declaration process. Another is that premium train paths are limited and open access does not apply to terminal and other service facilities which are often integral to above rail operations. A third explanation is the multiple rail gauges may limit the desirability of the market. A fourth reason could be the inability of new entrants to secure trainload quantities, given customers' reluctance to incur the risks associated with new and potentially untried entrants.

The goals of improved productivity, safety and cost reduction have been met, but the achievement appears to be a continuation of long-term trends that predate mandated access and is generally attributed to privatization and commercialization of the railroads. Rail's overall modal competitive position, except for the rail-centric coal and ore, has not been enhanced since the access regime was instituted. There has been investment in rail infrastructure and rolling stock in the post-access period; however, the majority of these funds have been from the government rather than the private sector. Finally, the financial health of the industry players is mixed. ARTC is not covering its costs. On the other side of the ledger, industry watchers believe SCT and GWI are both profitable.

The one bright spot in the mandated access story is rate reductions. There is strong evidence that coal rates in the East have been reduced either because of actual or perceived competition. These reductions are reportedly in the 10% range but may be as much as 20%. While as of 2007 the contracts that have seen the reductions account for a small portion of coal shipments, the likelihood is that the reductions will spread to more of the coal traffic over time. In these cases, there is a broad policy question: Are the reductions a true social welfare gain or merely a wealth transfer between railroads and shippers? To date, the answer appears to be a wealth transfer as no underlying efficiencies have been achieved.

These savings have been offset at least in part and potentially in full by the costs of coordination. The operational impacts associated with vertical unbundling are hard to quantify, but industry representatives are concerned about the conflicting interests between above and below rail operators, especially at the wheel-rail interface. There are also concerns about coordinating train path assignments across multiple infrastructure providers. Vertical unbundling has also added to the industry's staff levels especially for executive management and support functions such as finance, HR and IT. There are also tangible costs for compliance with the regulations. More than ten Australian government agencies are associated with mandated access and each rail operator has a staff function that deals with access and associated policy issues. In the case of declaring access, the costs can be substantial as demonstrated by the millions of dollars spent in the FMG – BHP Billiton case. Finally, the process for access is time consuming and adds a degree of uncertainty to the industry. Ironically, the Australian system actually increased the role of regulators to include rules for access and vertical unbundling as well as determining access charges.

It is important to note that access regulation has only been in place for ten years. More time might be needed to see the full benefits of the access regime. For example, in the US it took 20 years for deregulation to really take hold. As the OECD explains, "it is not yet possible to draw a clear picture as to the role of vertical separation in the overall reform of the rail industry."⁶² Nevertheless, in weighing the benefits of competition versus the costs of coordination, the net impact of mandated access appears to be negative.

The Australia experience offers several lessons for policy makers. The first is that a "blanket" solution to improving rail competitiveness is not appropriate. As ARTC states, "no single structure or access regime is appropriate for all networks."⁶³ Different

segments of the business have varying degrees of monopoly power that must be mitigated. In Australia, the intermodal segment faces intense competition from truck. Mandated access simply adds costs in a market that relies on its rate advantage to retain its market share. There are no monopoly profits to be “competed away.” In contrast, rail service in the coal segment does exhibit some characteristics of a natural monopoly. In this case, competition is appropriate to ensure efficient and effective operations. The question for policy makers is how to generate the competition, through vertically unbundled above rail operators or by allowing shippers to select carriers that can use the rail infrastructure through trackage rights with the owner. While the blanket approach is not appropriate, it should be noted that customized policies often bring higher transaction costs.

A second lesson is that rate reductions stemming from entry or the threat of entry are only sustainable if they are accompanied by efficiency gains or volume increases. The rate reductions in the Australian coal sector can be viewed as a “win” for mandated access (at least from the shippers’ perspective) because the remaining traffic, largely unprofitable, is subsidized by government. The federal and state governments in Australia pour millions of dollars into rail infrastructure. State governments have also heavily subsidized their intrastate rail service. In the US, the railroads are both vertically integrated and have no public subsidy. Without profits from the areas where railroads have comparative advantage, the rail industry would not have the funds needed to maintain its infrastructure and haul less profitable commodities.

Lesson three is that policy must be carefully crafted, given the many barriers to effective access. For example, requiring access without assuring the necessary ancillary services are available is counterproductive. Moreover, the policy must recognize what is really of value. In the case of the intermodal network, it is train paths not access to rail lines. The efficiency of the design is also important. The negotiate – arbitrate model with numerous regulatory appeal alternatives is a time consuming process. The uncertainty associated with the indefinite timeframe can lead to delayed investment at a time when the freight task is growing and railroads should be focused gaining share from truck and ship, not taking it from each other.

A fourth lesson is that administering an open access regime can be both time consuming and expensive. The delays associated with the Australia’s negotiate-arbitrate model have been significant as seen in PN’s entry in the Cairns – Brisbane market and the yet to be resolved declaration in the Pilbara. The mandated access regime also imposes significant costs on industry participants and government regulators. The annual cost in Australia’s rail sector totals into the millions and when litigation ensues, such as in the Pilbara declaration, the cost may rise into the tens of millions. Policy makers therefore must adopt a total cost view when assessing the social welfare gains of an open access regime.

A final lesson is to avoid making policy where lack of data limits ability to assess performance. Mandated access has caused substantial change in the rail industry. It is unfortunate that the data to conduct an accurate, quantitative assessment of this policy is not available. In designing such a policy in the future, there is great value in not only identifying the desired outcomes but also defining how they will be measured.

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⁵ It is also possible that regulatory risk and commercial uncertainty could reduce or delay investment.

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- ²⁹ Rio Tinto Iron Ore, "Building Prosperity: The Australian iron ore industry in the 21st century." 2006: p 6
- ³⁰ Kenny, Justice Susan. "Hamersley Iron Pty Ltd v National Competition" [1999] FCA 867; 28 Jun. 1999
- ³¹ Australian Rail Track Corporation, 2006 Annual Report
- ³² Australian Rail Track Corporation, 2006 Annual Report
- ³³ Productivity Commission, "Progress in Rail Reform", Aug. 1999: p. 60
- ³⁴ Australasian Railway Association, Inc., "Australian Rail Transport Facts 2007." 2007
- ³⁵ Australian Government Department of Foreign Affairs and Trade, STARS Database
- ³⁶ Australian Railway Association, "The Future for Freight", 2005: p. 3
- ³⁷ Productivity Commission, "Road and Rail Infrastructure Pricing." Dec. 2006: p. 326
- ³⁸ Australian Rail Track Corporation, "Access Undertaking." 2002
- ³⁹ Transport Networks Inquiry, House of Representatives Standing Committee on Transport and Regional Services, 21 Nov. 2005: p. 60-1
- ⁴⁰ In Tasmania and Victoria, PN still operates above rail service.
- ⁴¹ Interviews also indicated that grain and intermodal rail rates were reduced following mandated access, however, those reductions were not sustained.
- ⁴² Productivity Commission, "Review of National Competition Policy Reforms", Feb. 2005
- ⁴³ Australian Rail Track Corporation, "Australian Rail Track Corporation Submission in Response to Productivity Commission Inquiry into Road and Rail Freight Infrastructure Pricing Discussion Draft." Nov. 2006: p. 16
- ⁴⁴ Ferguson, Adele. "Asciano chief rakes over new coals." The Australian Business, 10 Sep. 2007
- ⁴⁵ Australian Rail Track Corporation, "2007 ARTC Interstate Access Undertaking: Explanatory Guide." Jun. 2007: p. 4
- ⁴⁶ Minister for Finance and Administration, "Australian National Sale Success." 28 Aug. 1997 <http://www.financeminister.gov.au/media/1997/mr_47b97_joint.html>
- ⁴⁷ Rio Tinto, "Expanded ports will keep pace with output." <<http://www.riotinto.com>>
- ⁴⁸ Productivity Commission, "Review of National Competition Policy Reforms." Feb. 2005: p. 219
- ⁴⁹ Genesee & Wyoming, 2006 Annual Report
- ⁵⁰ QR 06/07 Annual Report.
- ⁵¹ Productivity Commission, "Road and Rail Freight Infrastructure Pricing." p. 309
- ⁵² Productivity Commission, "Road and Rail Freight Infrastructure Pricing." p. 310

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- ⁵³ Bureau of Transport and Regional Economics, "Rail Infrastructure Pricing: Principles and Practice, Report 109." 2003. p. xxv
- ⁵⁴ Productivity Commission, "Road and Rail Freight Infrastructure Pricing." p. 310. This quote refers to the period from 2003-2006. During that time, there was little benefit from investing heavily in ARTC's EW network as the necessary investment had already been carried out in earlier years and market share was high. ARTC plans to spend 2.5B on the infrastructure that PN uses between 2006 and 2010.
- ⁵⁵ Australasian Railway Association, "Investing for the Future." Jul. 2004
- ⁵⁶ Bureau of Transport and Regional Economics, "Optimising harmonisation in the Australian railway industry. Report 114." 2006: p. 79
- ⁵⁷ If the train goes via Melbourne, the list is extended to include the Connex (the urban passenger operator) and the tracks of TransAdelaide.
- ⁵⁸ Pacific National, "Submission to the House of Representatives Standing Committee on Transport & Regional Services Concerning the Inquiry into the Integration of Regional Rail and Road Freight Transport and their Interface with Ports." May 2005. p. 3
- ⁵⁹ Economic Regulatory Authority, "Arbitration: Rail" <<http://www.era.wa.gov.au/1/61/45/rail.pm>>
- ⁶⁰ Moran, Alan and Warren Pengilley. "Regulation of Infrastructure." 2007: p. 29
- ⁶¹ Productivity Commission, "Road and Rail Freight Infrastructure Pricing"
- ⁶² Productivity Commission, "Road and Rail Freight Infrastructure Pricing." p. 314-5
- ⁶³ Productivity Commission, "Progress in Rail Reform." p. xxix