4 Performance of rail

The productivity of Australia's government-owned railways has improved significantly during the 1990s. The gap between Australian railways and those of best practice countries is narrowing, but productivity remains below that achieved in these countries. Some of the gap is due to factors which inherently disadvantage Australia, such as scale of operation, but a substantial proportion is also due to inefficiency.

Australian freight customers have benefited significantly from improved productivity through reductions in freight rates. On the other hand, moves to greater cost recovery mean that rail passengers have not, on average, experienced lower prices. While employment in Australian railways has declined, remaining workers have benefited through increased wages and salaries. Shareholders have experienced highly variable and often negative returns.

The inquiry's terms of reference require the Commission to undertake a stocktake of progress in rail reform and to report on international best practice in rail.[1] Chapter 3 reviews some of the key reforms implemented across jurisdictions since 1991. This chapter contains an assessment of performance of Australian railways and compares overall rail system performance with that of other countries. The Commission's approach to undertaking this performance assessment is outlined (section 4.1), followed by a summary of the rail productivity results (section 4.2) and performance outcomes for rail stakeholders (section 4.3). The performance of Australia's railways is summarised in section 4.4.

The assessment of performance presented in this chapter is supported by a detailed analysis of performance, contained in *An Assessment of the Performance of Australian Railways* (PC forthcoming).

4.1 The Commission's approach

An important objective of reform is to improve the performance of the rail industry by creating an operating environment which encourages efficiency and the adoption

1 Although referred to in the inquiry's terms of reference, intermodal comparisons were not included in the assessment of rail performance. Significant differences between the road and rail sectors make 'like with like' comparisons difficult, if not impossible, particularly in the area of road and rail infrastructure charges. Intermodal issues are dealt with in chapter 10.

of best practice. The purpose of this chapter is to assess the performance of the rail industry in Australia since the Industry Commission (IC) released its report on rail transport in 1991 (IC 1991b).

Limitations of performance assessment

There are limitations on the extent to which assessments of rail performance can be used to make judgements about the effect of rail reform and the achievement of best practice.

In particular, 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 a sample is small. In many cases, the attribution of specific reforms to changes in performance is speculative.

The degree of comparability between railways can affect how differences in performance are interpreted, particularly in international comparisons. Railways operating in different environments often face different constraints affecting the level of efficiency achievable. Broader policy parameters such as labour market regulation or competition policy, the price of inputs, population size and density, a country’s resource base and geography, and the technical characteristics of infrastructure and production, can all affect performance. International comparisons are also confounded by exchange rate changes over time.

Further, the availability and quality of data limit the number of comparators used and the depth of analysis conducted. Rail data are not uniformly collected among railways in Australia nor among railways overseas. There exists a degree of uniformity, but often only at a highly aggregated level. Data on the use of many intermediate inputs to production are not widely reported or disaggregated into urban passenger, non-urban passenger and freight services. Even where such data are available, confidentiality concerns may prevent railways making them public.

Performance comparisons need to be treated as broadly indicative rather than precise indicators of relative performance. The apparent links between performance and reform should be interpreted cautiously.

The framework adopted in this report

The approach taken to performance assessment in this report:

- focuses on rail system performance rather than the performance of individual railways; and
- defines performance to include rail system productivity and performance outcomes for rail stakeholders.

Several studies of performance advocate a broad approach to performance assessment, such as that adopted here (Freebairn (1986), Salerian (1993) and Waters (1998)).[2] McKillop expressed a concern that 'the focus of attention for performance assessment tends to be on measuring efficiency ... of individual operators' rather than measuring the performance of rail systems using a broad set of performance indicators (sub. 29, p. 1).

From a policy perspective, analysing rail system performance is more informative about the impact of reform in Australia than concentrating on individual rail organisations. A rail system combines both above and below track operations to provide rail services. It may also comprise several railways, depending on the structure and coverage of the system. The aggregation of performance across a number of railways within a system nets out the commercial successes and failures of individual operators, revealing the underlying performance of the system. It is the performance of the system which government policy seeks to influence.

Until recently, all state-based rail systems within Australia consisted of one rail entity. For this reason, state-based rail systems are referred to in this chapter as 'railways'. The term 'national rail system' is used to refer to railways aggregated at the country level.

Analysis of both productivity and performance outcomes provides a more comprehensive picture of the impacts of reform, than productivity analysis alone. Productivity indicators have been used to measure the efficiency of rail systems. Price and quality indicators have been used to reflect changes in performance outcomes for rail customers, employees and shareholders.

The performance of Australian railways is measured and compared:

- over time;
- relative to each other; and

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[2] Several other studies have been conducted on railway performance both in Australia and overseas, for example SCNPMGTE (1998), BIE (1995b), Hensher et al. (1995), Oum and Yu (1995), IC (1994b), IC (1991b) and BTCE (1991).

- with rail systems in other countries.

The assessment is conducted at the railway and national system (or country) level for the three major types of rail service: freight, urban passenger and non-urban passenger service. However, due to a lack of data, a complete analysis of productivity and performance outcomes was not possible for all services at both the railway and national system level. The productivity analysis covers the freight services of railways in Australia and North America, and freight, urban and non-urban passenger services combined at the national system level for 22 countries. The analysis of performance outcomes covers freight, urban and non-urban passenger services separately, for railways in Australia and at the national system level for 22 countries.

The period of assessment is 1989-90 to 1997-98 for Australia's government-owned railways and 1990 up to 1998 for national rail systems in other countries. This period follows on from the 1991 review of performance undertaken by the IC (IC 1991b). There are a number of weaknesses in this approach.

First, owing to data limitations the assessment of performance does not include changes to the structure and ownership of government-owned railways after 1997-98. Some participants expressed concern in regard to this limitation. FreightCorp stated:

> The Productivity Commission has developed its analysis and thinking based on the rail systems in place in 1991. At this time the country was dominated by the State-based vertically integrated railway systems ... by 1998 the nature of the railway industry had significantly altered. (sub. DR123, p. 7)

Second, the effect of any changes occurring within the period may not be fully captured, given the expected time lags between policy changes and performance. Finally, the assessment does not include private sector involvement in the rail industry for any part of the period.

In order to capture these effects, ongoing analysis would be required as appropriate data become available.

Performance data and comparators

Data were collected from various sources to form a single database. Data sources include *The Performance of Government Trading Enterprises 1991-92 to 1996-97* (SCNPMGTE 1998), various International Union of Railways (UIC) publications, the Association of American Railroads and Statistics Canada, information sought directly from government-owned Australian railways and railways overseas, and railway annual reports. Although not all data requested from railways were available in a consistent and ideally disaggregated form, a substantial amount of data were finally made available and used in the assessment.

All government-owned Australian railways provided data. For most of the period of analysis, Australian railways were made up of a single rail organisation managing both above and below track operations to provide a combination of freight, urban passenger and non-urban passenger services in their jurisdiction. However, changes in structure and ownership over the period have resulted in three main exceptions.[3]

- In 1993 the National Rail Corporation (NRC) commenced a progressive take-up of interstate freight business from Australian National (AN), State Rail Authority of New South Wales (SRA), the Public Transport Corporation (PTC), Queensland Rail (QR) and Westrail. This transfer of freight business to NRC caused a discontinuity in the data series of these railways between 1994-95 and 1995-96.[4]
- In 1996-97 SRA was separated into four rail organisations, the Rail Access Corporation, FreightCorp, Rail Services Authority and a new SRA. Data for SRA include the operations of these four organisations in 1996-97 and 1997-98.
- In 1996-97 V/Line Freight was separated from the PTC, followed by the Victorian Rail Track Access Corporation (VicTrack) in 1997-98. Data for PTC include the operations of these organisations in 1996-97 and 1997-98.

International data were available for major rail systems in the United States, Canada, Japan, South Africa, New Zealand, and 16 European countries (appendix E). Some of these rail systems are made up of more than one rail organisation. Some organisations provide a single rail service (that is, only freight services or only passenger services) and some manage a single rail function (that is, a below track or above track operation). The national rail systems in this study represent the major freight and passenger operations in each country. Data were not available for Class II freight railways in the United States and only available at the system level for Canada (aggregated for all Canadian Class II railways).

Table 4.1 provides a list of rail systems included in the assessment of performance.

[3] Chapter 3 contains a detailed description of the structure of government-owned railways in Australia.

[4] Australian National and the National Rail Corporation (AN-NRC) have been assessed jointly in this study as the main interstate provider of rail services over the period.

Table 4.1 **Rail systems included in performance assessment** [a]

Rail systems	*No. of rail organisations* [b]
Australian railways	
Australian National Railways Commission & National Rail Corporation (AN–NRC) [c]	1
Queensland Rail (QR)	1
TransAdelaide (TA)	1
Westrail (WR)	1
Victorian Public Transport Corporation (PTC) [d]	3
State Rail Authority of New South Wales (SRA) [e]	4
International rail systems comprised of one rail organisation	
Austria (Osterreichische Bundesbahnen)	1
Belgium (Societe Nationale des Chemins de fer Belges)	1
Canada (VIA Rail Canada Inc)	1
Denmark (Danske Statsbaner)	1
Finland (VR-Yhtyma Oy)	1
Germany (Deutsche Bahn AG)	1
Ireland (Iarnrod Eireann)	1
Italy (Ferrovie dello Stato)	1
Luxembourg (Societe Nationale des Chemins de fer Luxembourgeois)	1
Netherlands (NV Nederlandse Spoorwegen)	1
New Zealand (Tranz Rail)	1
Norway (Norges Statsbaner BA)	1
Spain (Red Nacional de los Ferrocarriles Espanoles)	1
United States (Amtrak)	1
International rail systems comprised of more than one rail organisation	
France (Societe Nationale des Chemins de fer Francais & Reseau Ferre de France)	2
Great Britain (British Rail & Railtrack)	2
Portugal (Rede Ferroviaria Nacional, E.P. & Caminhos de Ferro Portugueses, E.P.)	2
South Africa (Spoornet & South African Rail Commuter Corporation)	2
Sweden (Statens Jarnvagar & Banverket)	2
Switzerland (BLS Lotschbergbahn AG & Schweizerische Bundesbahnen)	2
Japan (JR Passenger Services & JR Freight)	7
United States (Class I freight)	9
Canada (Class I, II, III freight)	36

[a] The Australian railways included were all government-owned during the period of analysis; private railways were not included. International rail systems represent the major freight and passenger railways in each country. [b] The number of rail organisations (below and above track) which comprised the system at the end of the sample period: 1997-98 for Australia and 1997 for international systems (except for Britain and Denmark for which data were only available until 1994 and 1995 respectively, and New Zealand and South Africa where data were available until 1998). [c] AN provided Tasmania and South Australia with intrastate freight rail services until November 1997. The NRC was established in 1991 to take over interstate freight business from AN, SRA, PTC, QR and Westrail. By 1997-98 all remaining AN operations had been privatised. Chapter 3 contains a detailed description of the structure of government-owned rail systems in Australia. [d] In 1996-97 V/Line Freight was separated from the PTC followed by VicTrack the following year. [e] Until July 1997, all rail passenger and freight services were provided by the vertically integrated SRA, after which time SRA was separated into the Rail Access Corporation, FreightCorp, Rail Services Authority and a new SRA.

Source: PC forthcoming.

Measuring productivity

Productivity refers to the relationship between inputs and outputs. Productivity growth implies an increase in the ratio of outputs relative to inputs. This assessment adopts a total factor productivity (TFP) approach to measuring rail system productivity.[5]

There are any number of potential partial measures of productivity which compare a single input with a single output. They can be used to shed light on the possible sources of total productivity changes, revealing the extent to which the use of particular inputs might be driving productivity changes. However, partial productivity measures can be misleading about overall performance and a more comprehensive measure of productivity has been used for this analysis.

Data Envelopment Analysis (DEA) measures TFP by comparing the ratio of aggregate outputs with aggregated inputs. It enables each railway to be ranked in terms of its productivity performance relative to the best performing railway(s). The change in productivity levels over time can also be measured using this technique.

Differences in productivity are driven by many factors apart from differences in technical efficiency. Other factors generally relate to differing characteristics of individual rail systems. Of particular significance are differences in the scale of rail operations, both within Australia and overseas. Measurement inconsistencies may also influence ‘measured’ productivity, particularly if the quality or capacity of inputs used by individual rail systems varies. Box 4.1 provides a brief description of how factors affecting productivity, unrelated to technical efficiency, have been controlled for in this study.

The productivity analysis has been conducted at two levels:

- comparing government-owned railways in Australia with each other and with selected railways in the United States and Canada, in providing freight services; and
- comparing national rail systems — that is, Australia’s rail system with rail systems in the United States, Canada, Japan, New Zealand, South Africa and 16 European countries, in providing freight and passenger services combined.[6]

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5 Productivity, as measured by TFP, is a measure of gross or overall productivity, capturing all sources of productivity.

6 ‘Passenger services’ includes all major urban and non-urban passenger services provided in these countries.

Box 4.1 **Explaining differences in productivity**

DEA is used to measure the productivity of railways. Productivity captures all sources of productivity, including those arising from the scale of a rail operation, factors related to various other railway characteristics and the technical efficiency of a railway. DEA also captures any measurement inconsistencies which may occur, particularly if the quality or capacity of inputs used by railways varies.

Technical efficiency

Technical efficiency refers to the ability of railway management to produce outputs with a given set of inputs. In practical terms technical efficiency is calculated by accounting, where possible, for all factors affecting productivity. To the extent that all factors are not accounted for, technical efficiency may be biased.

The scale of rail operations

'Scale' refers to the size of a railway's output and is a factor which is largely out of the control of railway management. Rail operations of a larger scale may have high productivity because of scale economies. It may not be technically possible for smaller scale operations to attain the same levels of productivity as larger railways. DEA can be used to determine the contribution of scale and technical efficiency to productivity. Using DEA, productivity is assumed to be a product of scale efficiency and technical efficiency only.

Other railway characteristics

Traffic density, average length of haul and locomotive load are three factors which may also contribute to differences in productivity. Greater traffic density indicates that a railway can transport a greater volume of output on a given length of track. Longer haul length indicates that a railway can transport a greater volume of output per train operation. A greater locomotive load indicates that a railway can transport a greater load of output per locomotive. These factors, like scale, are also sources of economies in the production of rail services and are to a large extent out of the control of railway management. Statistical analysis is used to estimate the contribution of these factors to productivity.

Locomotive power differences

Railways which use different inputs — such as locomotives of different power levels — may be advantaged or disadvantaged in terms of their measured productivity. The power of individual locomotives varies across railways, particularly between Australian and US railways (which tend to adopt higher powered locomotives earlier than government-owned railways in Australia). An adjustment for differences in locomotive power was made to the input data for Australian, US and Canadian railways, for the purpose of freight productivity comparisons.

Source: PC forthcoming.

Several sets of productivity results were generated using a number of different models (box 4.2). Overall, the results indicate that relative productivity levels tend to vary according to the model used. Productivity growth rates are more robust, varying less between the different models.

Box 4.2 **Models used in the productivity analysis**

Five models were used to compare the productivity of Australian and North American railways in providing freight services. Two models were used to compare the productivity of Australia's and 21 other countries' national rail systems in providing freight and passenger services combined:

- model A compares the productivity of Australian, US and Canadian railways in providing freight services, using DEA;
- model B identifies the contribution of scale to the productivity levels of Australian, US and Canadian railways in providing freight services, using DEA (by accounting for differences in output size in model A);
- model C estimates the contribution of other railway characteristics to the productivity levels of Australian, US and Canadian railways in providing freight services, using statistical analysis (by accounting for differences in traffic density, haul length and locomotive load in model A);
- model D standardises model A for locomotive power differences and then compares the productivity of Australian, US and Canadian railways in providing freight services, using DEA;
- model E standardises model B for locomotive power differences and then compares the scale adjusted productivity of Australian, US and Canadian railways in providing freight services, using DEA;
- model F compares the productivity of Australia's and 21 other countries' national systems in providing freight and passenger services combined, using DEA; and
- model G identifies the contribution of scale to the productivity levels of Australia's and 21 other countries' national systems in providing freight and passenger services combined, using DEA.

Source: PC forthcoming.

4.2 Productivity performance since 1990

Railway comparisons for freight services

The productivity of government-owned Australian railways in providing freight services is compared with that of a sample of North American railways. Table 4.2 shows levels of productivity, productivity adjusted for scale, productivity adjusted for differences in operating environments and productivity adjusted for locomotive power differences. Table 4.3 shows the corresponding growth rates for each set of productivity levels, from 1989-90 to 1997-98, for Australian railways and from 1990 to 1997 for North American railways.

Productivity levels

Burlington Northern and Santa Fe Railway Company (BNSF) and Canadian National (CN) achieved best practice productivity levels. North American railways had an average productivity level of 84 per cent of best practice, ranging from best practice itself (achieved by BNSF and CN) to 48 per cent of best practice (achieved by Grand Trunk Western Inc (GTW)). Australian railways had an average productivity level of 47 per cent of best practice, ranging from 63 per cent of best practice for AN-NRC to 22 per cent of best practice for PTC.

Technical efficiency — accounting for differences in scale

After accounting for the effect of scale, the technical efficiency of railways was significantly different from productivity, with all railways in the sample moving closer to best practice.

PTC, Westrail, GTW, BNSF and CN all achieved best practice levels of technical efficiency.[7] North American railways had an average level of technical efficiency of 89 per cent of best practice (compared to 84 per cent for productivity). Australian railways had an average technical efficiency level of 70 per cent of best practice (compared to 47 per cent for productivity). Their efficiency levels ranged from best practice for PTC and Westrail to 50 per cent of best practice for QR.

[7] Railways which achieved best practice technical efficiency, but which did not achieve best practice productivity, may have done so because of a lack of similar sized railways in the sample. That is, they achieved 'best practice' using DEA because they were being compared to themselves (PC forthcoming).

Table 4.2 **Estimates of productivity levels for freight services in Australia, the United States and Canada**

	Productivity	*Adjustment for differences in railway characteristics*		*Adjustment for locomotive power differences*	
Railway	*Model A*	*Scale adjusted productivity (DEA) Model B*	*Productivity adjusted for railway characteristics (statistical) Model C*	*Productivity Model D*	*Scale adjusted productivity Model E*
Australia (1998)					
AN-NRC	0.63	0.99	0.81	0.63	0.99
Westrail	0.56	1.00	0.77	0.65	1.00
QR	0.43	0.50	0.61	0.52	0.58
SRA	0.35	0.57	0.70	0.35	0.57
PTC	0.22	1.00	0.53	0.29	1.00
Average[a]	**0.47**	**0.70**	**0.69**	**0.52**	**0.73**
North America (1997)[b]					
BNSF	1.00	1.00	1.00	1.00	1.00
CN	1.00	1.00	1.00	1.00	1.00
UP	0.88	0.99	0.90	0.88	0.99
CP	0.83	0.85	0.83	0.73	0.74
ICR	0.80	0.96	0.88	0.83	0.96
KCS	0.77	0.94	1.00	0.77	0.94
SOO	0.70	0.87	0.78	0.77	0.90
NSC	0.67	0.68	0.73	0.62	0.63
CSX	0.65	0.66	0.72	0.62	0.62
Canadian Class II & III	0.62	0.72	0.73	na	na
CR	0.54	0.55	0.69	0.54	0.56
GTW	0.48	1.00	0.69	0.60	1.00
Average[a]	**0.84**	**0.89**	**0.88**	**0.83**	**0.88**

a Weighted by ntkm. **b** The Burlington Northern and Santa Fe Railway Company (BNSF), Canadian National Railway (CN), Union Pacific Railroad Company (UP), Canadian Pacific Railway Company (CP), Illinois Central Railroad Company (ICR), Kansas City Southern Corporation (KCS), Soo Line Railroad Company (SOO), Norfolk Southern Corporation (NSC), CSX Transportation (CSX), Consolidated Rail Corporation (CR), Grand Trunk Western Inc (GTW). **na** Not available.

Data source: PC forthcoming.

Technical efficiency — accounting for other differences in railway characteristics

After accounting for other differences in railway characteristics the technical efficiency of railways was significantly different from productivity, with all railways in the sample being closer to best practice (compared to model A).

BNSF, CN and Kansas City Southern Railway Company (KCS) all achieved best practice levels of technical efficiency. North American railways had an average level of technical efficiency of 88 per cent of best practice (compared to 84 per cent for productivity). Australian railways had an average technical efficiency level of

69 per cent of best practice (compared to 47 per cent for productivity). Their efficiency levels ranged from 81 per cent of best practice for AN-NRC to 53 per cent of best practice for PTC.

Adjusting for locomotive power differences

After accounting for differences in locomotive power, on average, productivity levels and technical efficiency levels for Australian railways were higher than unadjusted levels (52 per cent compared to 47 per cent for productivity, and 73 per cent compared to 70 per cent for technical efficiency).

The ranking of Australian railways by their productivity and technical efficiency levels did not alter substantially. For productivity, Westrail went from second to first place and AN-NRC from first to second place. For technical efficiency, QR went from fifth to fourth place and SRA from fourth to fifth place.

On average, for the North American railways, adjusted productivity and technical efficiency levels were largely unchanged because of the dominance of best practice railways (which remained the same before and after the adjustment).

Productivity growth rates

Table 4.3 indicates that productivity growth rates were substantially higher for Australian railways on average, than for North American railways (8 per cent compared to 4 per cent). This was also the case for technical efficiency growth rates and locomotive power adjusted productivity growth rates (compared with US railways).

Productivity growth rates for North American railways ranged from a high of 12 per cent per year for GTW to a low of 2 per cent for Soo Line Railroad Company (SOO). Those for Australian railways ranged from a high of 12 per cent per year for AN-NRC to a low of 4 per cent for PTC and SRA.

A number of participants argued that inter-jurisdictional comparisons could be distorted by changes in the mix of freight carried by Australian railways. In particular, NRC (sub. DR117) and FreightCorp (sub. DR123) referred to the transfer of interstate freight business from State railways to AN-NRC between 1994-95 and 1995-96.

Table 4.3 **Estimates of productivity growth rates for freight services in Australia, the United States and Canada, 1990 to 1997[a]**

	Productivity	*Adjustment for differences in railway characteristics*		*Adjustment for locomotive power differences*	
Railway	*Model A*	*Scale adjusted productivity (DEA) Model B*	*Productivity adjusted for railway characteristics (statistical) Model C*	*Productivity Model D*	*Scale adjusted productivity Model E*
Australia					
AN-NRC	11.9	11.2	5.5	4.8	5.7
Westrail	11.6	8.9	5.0	9.0	6.7
QR	6.1	5.5	2.5	4.7	4.4
SRA[b]	4.3	4.8	3.0	0.1	3.4
PTC[b]	4.4	9.5	3.3	2.4	8.0
Average[c]	**8.2**	**7.6**	**3.7**	**4.8**	**5.4**
North America					
BNSF	2.5	2.5	2.5	1.8	1.8
CN	7.3	7.1	4.3	5.2	5.1
UP	6.7	8.5	3.6	6.1	7.8
CP	3.4	3.4	-0.3	na	na
ICR	4.8	4.0	0.1	4.5	4.0
KCS	4.0	0.3	3.6	3.9	0.3
SOO	1.8	2.8	0.2	1.0	1.7
NSC	3.1	3.1	1.1	1.3	1.4
CSX	3.3	3.4	1.2	1.9	1.9
Canadian Class II & III	2.6	1.9	1.3	na	na
CR	4.3	4.2	1.3	2.4	2.5
GTW	12.1	3.1	5.8	10.6	3.1
Average[c]	**4.4**	**4.8**	**2.5**	**3.4**	**3.9**

a Growth rates are calculated on an average annual basis. The period for Australian railways is 1989-90 to 1997-98 and the period for North American railways is 1990 to 1997. **b** A discontinuity in the series of productivity levels occurring between 1994-95 and 1995-96 has lowered the productivity growth rate for SRA and PTC over the period, by shifting a significant part of these railways' long haul general freight. Under Model A the average growth rate for SRA was 7.5 per cent from 1989-90 to 1994-95 and 17.7 per cent from 1995-96 to 1997-98 (an average of 11.7 per cent for the two periods). Under Model A the average growth rate for PTC was 16.8 per cent from 1989-90 to 1994-95 and 14.3 per cent from 1995-96 to 1997-98 (an average of 15.8 per cent for the two periods). The growth rates of the other models are affected in a similar way. **c** Weighted by ntkm. **na** Not available.

Data source: PC forthcoming.

Potentially, interstate freight is a more productive business than intrastate freight because of the often longer average haul lengths. It would be expected that such transfers (and subsequent discontinuity in the data series) would significantly reduce productivity growth rates for PTC and SRA.

In order to adjust for this discontinuity, growth rates for SRA and PTC were assessed separately for the periods before and after the transfer occurred. An average of the growth rates in each of these periods is a better measure of productivity growth over the entire period (around 12 per cent for SRA and 16 per cent for PTC). The discontinuity affects technical efficiency growth rates in the same way.

National rail system comparisons for freight and passenger services

The productivity of Australia's national government-owned system in providing both freight and passenger services is compared with that of a sample of national rail systems in other countries. Table 4.4 shows levels of productivity and technical efficiency for 22 national rail systems. It also shows the corresponding growth rates for productivity levels and technical efficiency levels, from 1989-90 to 1997-98, for Australia's national rail system and from 1990 up to 1998 for other countries.

Productivity levels

Australia's government-owned railways assessed at the national system level (for passenger and freight combined) achieved a productivity level 64 per cent of that achieved in the United States, Japan and Canada — the three highest productivity performers in 1997. Other countries in the sample had productivity levels ranging between 52 per cent (the Netherlands) and 18 per cent (New Zealand) of best practice levels.

Technical efficiency — accounting for differences in scale

The level of technical efficiency achieved in Australia was 69 per cent of best practice (compared to 64 per cent for productivity). The United States, Canada and Japan — all of which achieved the highest productivity levels — also achieved the highest levels of technical efficiency.

However, the levels of technical efficiency for some countries were substantially higher than their productivity levels. In particular, Ireland and Luxembourg achieved best practice levels of technical efficiency (compared to 41 per cent and 20 per cent for productivity respectively).

Productivity growth rates

Australia had the highest average rate of productivity growth over the period (8 per cent per year). This was 51 per cent higher than the next highest growth rate (achieved in Canada).[8] Growth rates achieved for other countries ranged between minus 5 per cent for Portugal to 5 per cent for Norway and South Africa.

Australia's technical efficiency growth rate was only marginally lower than its productivity growth rate over the period (both around 8 per cent per year). For some countries technical efficiency growth rates were substantially higher than productivity growth rates. For example, Norway achieved technical efficiency growth of 8 per cent, compared to under 5 per cent for productivity.

Table 4.4 **Estimates of productivity levels and growth rates for freight and passenger systems in selected countries**

System	*Productivity Model F*	*Technical efficiency Model G*	*Productivity growth rate (%)*[a] *Model F*	*Technical efficiency growth rate (%)*[a] *Model G*
United States (97)	1.00	1.00	2.0	1.8
Japan (97)	1.00	1.00	0.8	0.8
Canada (97)	0.98	1.00	5.5	5.5
Australia (98)	**0.64**	**0.69**	**8.3**	**7.9**
Netherlands (97)	0.52	0.68	1.4	3.6
Ireland (97)	0.41	1.00	1.0	0.5
South Africa (98)	0.39	0.42	4.5	4.7
Sweden (97)	0.38	0.47	1.7	2.9
France (97)	0.38	0.39	-0.4	-0.5
Spain (97)	0.38	0.43	-0.5	0.7
Finland (97)	0.35	0.45	0.2	1.1
Great Britain (94)	0.34	0.43	7.1	12.9
Portugal (97)	0.33	0.63	-4.5	1.6
Italy (97)	0.32	0.33	0.3	0.6
Switzerland (97)	0.32	0.38	3.1	3.7
Germany (97)	0.31	0.32	3.5	3.5
Norway (97)	0.31	0.74	4.5	7.6
Denmark(95)	0.28	0.60	-1.4	3.4
Austria (97)	0.25	0.27	1.2	1.3
Belgium (97)	0.20	0.24	0.6	1.3
Luxembourg (97)	0.20	1.00	1.5	0.0
New Zealand (98)	0.18	0.73	3.9	3.6

[a] Growth rates are calculated on an average annual basis. The period for the Australian national system is 1989-90 to 1997-98. The period for all other national systems is 1990 to the calendar year indicated.

Data source: PC forthcoming.

[8] The growth rate for Great Britain (7.1 per cent), relating only to the 1990 to 1994 period, was higher than for Canada (5.5 per cent).

4.3 Stakeholder outcomes since 1990

Although improvements in productivity are important, the outcomes for stakeholders are equally important in assessing overall performance. There are three main groups of stakeholders:

- consumers — users of freight, urban passenger and non-urban passenger services;
- shareholders — government and private owners of railways; and
- labour — people employed in the rail industry.

Outcomes for stakeholders are determined by the prices and quality of rail inputs and outputs. Consumers are affected by the prices and quality of rail services, shareholders are affected by the returns earned from rail services and labour is affected by the wages and salaries paid for employment in the rail industry.

Improvement or deterioration in rail productivity is likely to alter these outcomes. An increase in productivity could be appropriated by shareholders in the form of higher dividends, or it could be distributed to consumers in the form of lower prices, or to labour in the form of wage increases.

Equally, these outcomes can alter without a change in productivity, amounting to a redistribution between stakeholders — where changes in prices for one group are directly offset by changes in prices for another group. For instance, dividends to shareholders can be increased by raising the prices of rail services or reducing wages to labour.

Consumers

Consumers of rail services are directly affected by the price and quality of rail services. Consumers benefit when prices fall and/or quality improves. Consumers of other goods and services are also affected to the extent that prices and quality of rail freight services are reflected in their final prices.

Freight rates

Freight rates are influenced by many factors which may vary substantially across countries.[9] Not all of these factors are related to railway efficiency and some are

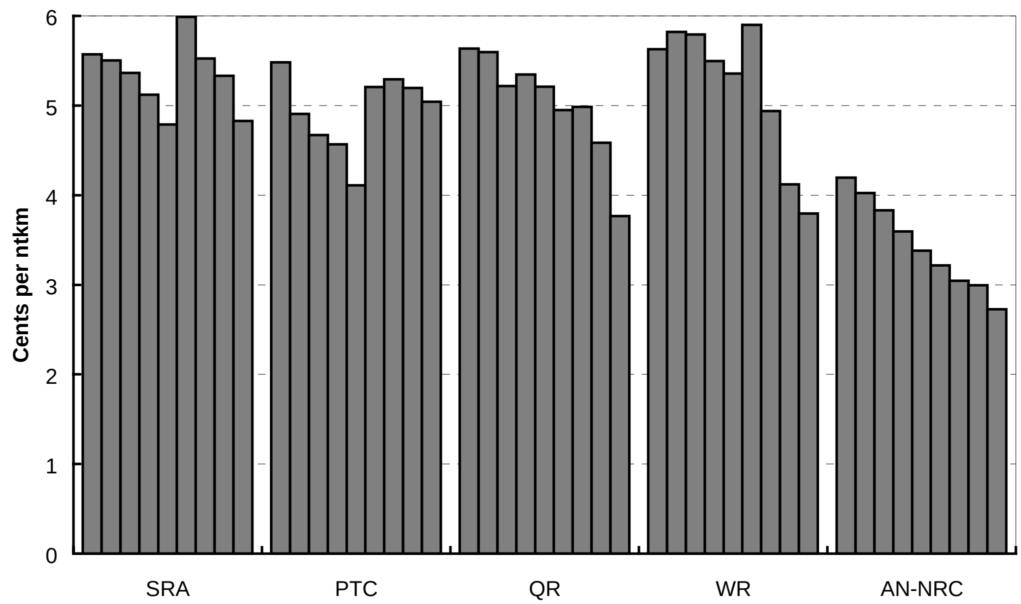
[9] Freight rates are measured as the average selling price of freight services — total freight revenue divided by ntkm. All rates have been converted into Australian dollars and deflated by the Australian Consumer Price Index (CPI).

non-controllable, at least from the perspective of railway operators. Factors of particular relevance to freight rates include the size of the freight market, average haul length, mix of freight traffic[10], axle loads and locomotive power.

Australian freight rates

Real national freight rates have declined by 18 per cent over the period (from 5.4 cents per net tonne-kilometre (ntkm) in 1990 to 4.4 cents in 1997) (table 4.5).[11] Freight rate declines occurred in all jurisdictions, although the rate of decline varied over time and across jurisdictions (figure 4.1).

Figure 4.1 **Real freight rates by jurisdiction[a,b,c], 1989-90 to 1997-98**



a Real freight rates were constructed using total revenue from freight divided by total ntkm in each year and deflated by the national Consumer Price Index (CPI). **b** AN provided intrastate rail services for Tasmania and South Australia until November 1997. **c** The steep rise in freight rates for SRA, PTC and Westrail in the middle of the period coincided with the transfer of their interstate freight to NRC. This shifted the composition of freight carried by SRA, PTC and Westrail to relatively higher priced commodities.

Data source: PC forthcoming.

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10 Movements in freight rates measured as average selling prices do not necessarily indicate an actual change in the schedule of rates charged to freight customers. A change in the composition of freight over the period may alter the average selling price.

11 The Australian real freight rate declined further to 3.8 cents in 1997-98, for a total decline of 30 per cent over the period 1989-90 to 1997-98. Due to a lack of international data, the period for international comparisons ends at 1997.

In addition to the factors listed above, the level of competition is likely to be an important factor affecting freight rates. Reform in the rail industry has increased, to varying degrees across jurisdictions, the level of competition both within rail and between rail and other modes of transport.

International freight rates

Freight rates varied considerably across countries and within countries over time. In 1997 Australia had the fifth lowest freight rate (4.4 cents per ntkm) across 22 countries. Luxembourg had the highest freight rate (20.3 cents per ntkm) and Canada had the lowest (2.1 cents per ntkm) (table 4.5).

Table 4.5 **Real international freight rates (A$ cents per net tonne-kilometre)[a], 1990 to 1997**

Country	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*Growth rate (%)*[b]
Australia	**5.4**	**5.3**	**5.1**	**5.0**	**4.9**	**4.9**	**4.7**	**4.4**	**-18.0**
United States	3.0	2.8	2.8	3.0	2.9	2.5	2.3	2.3	-25.9
Canada	3.2	3.0	2.9	2.9	2.7	2.3	2.2	2.1	-32.7
Japan	na	7.8	8.3	9.8	10.8	10.7	8.8	7.4	-4.4
New Zealand	13.2	12.2	11.2	11.5	11.5	11.8	11.5	10.2	-22.6
South Africa	2.5	2.9	3.2	2.6	2.6	2.7	2.8	2.4	-4.3
Austria	12.5	13.4	14.5	12.2	10.8	10.8	10.2	8.5	-32.0
Belgium	8.2	8.5	8.4	9.5	8.3	9.3	8.3	7.3	-10.2
Denmark	14.8	14.5	14.0	16.9	13.3	14.4	15.1	17.4	17.9
Finland	10.2	10.3	8.5	7.0	6.1	na	na	5.4	-47.0
France	9.4	9.6	9.4	10.6	9.3	9.0	8.3	7.0	-25.7
Germany	7.1	12.5	11.5	12.2	10.7	10.8	9.6	7.5	6.8
Great Britain	12.4	13.6	12.1	11.9	10.4	9.0	na	na	-27.9
Ireland	8.4	8.1	7.9	8.0	8.7	7.8	7.4	na	-12.0
Italy	10.5	9.9	8.3	8.7	7.0	6.5	5.9	5.3	-49.4
Luxembourg	na	na	na	na	23.6	25.3	22.2	20.3	-13.7
Netherlands	7.2	7.4	8.1	8.9	8.0	9.7	8.2	6.4	-9.9
Norway	11.2	10.9	11.6	8.8	9.5	10.7	na	8.4	-24.6
Portugal	4.4	5.1	5.5	5.8	4.8	4.9	4.8	4.4	0.0
Spain	7.3	7.9	8.3	8.3	6.2	5.9	5.3	4.5	-38.8
Sweden	5.3	5.3	4.9	4.7	5.1	4.6	3.8	3.3	-37.6
Switzerland	15.3	16.7	16.5	17.6	15.3	13.9	13.4	10.8	-29.5

a Freight rates are measured as the average selling price of rail services. In order to compare price levels between countries, all overseas rates have been converted into Australian dollars and then deflated by the Australian CPI. Therefore some of the change in rates may be due to exchange rate fluctuations. **b** Total percentage change in freight rates over the period. **na** Not available.

Source: PC forthcoming.

Productivity differences across countries only partially explain the differences in freight rates. Differences in freight mix and length of haul are also likely to be an important factor. Unlike most European countries, Australia's freight is dominated by bulk commodities and long haul freight which would tend to decrease the average freight rate. For this reason, Australian freight rates are more appropriately compared to countries with similar freight characteristics. Australia's freight rate was around double that of Canada, the United States and South Africa.

In growth rate terms, most countries experienced a steady decline in freight rates over the period. Growth rates ranged from minus 49 per cent for Italy to 7 per cent for Germany. The decline in Australia's freight rate was relatively small at 18 per cent.

Government policy changes and the resulting effect on the level of competition in many countries partially explains the general decline in freight rates internationally. An important objective of government policy in many countries over the last decade has been to improve the efficiency of their rail systems (appendix E). The greater the degree of competition within rail and between rail and other modes of transport, the greater the incentive for railway managers to reduce their costs and rates.

The US rail freight industry has undergone substantial deregulation since the enactment of the Staggers Rail Act 1980. Among its many provisions, the Act allowed rationalisation to occur, which intensified competition in the industry. Several mergers have occurred since 1992, reducing the number of Class I railways from 15 in 1989, to nine in 1997. In addition, competition from road transport has increased, resulting in a declining share of the freight market for rail.

The Canadian rail freight industry has undergone substantial reform since the enactment of the National Transportation Act 1987. The Act aimed to remove transport market distortions in an effort to introduce greater competition. In recent years Canadian railways have been streamlining their operations, resulting in the privatisation of CN and the rationalisation of uneconomic services (appendix E). Competition between rail and road has intensified as each competes for a greater share of the north-south market resulting from free trade agreements in the region (Statistics Canada 1994b).

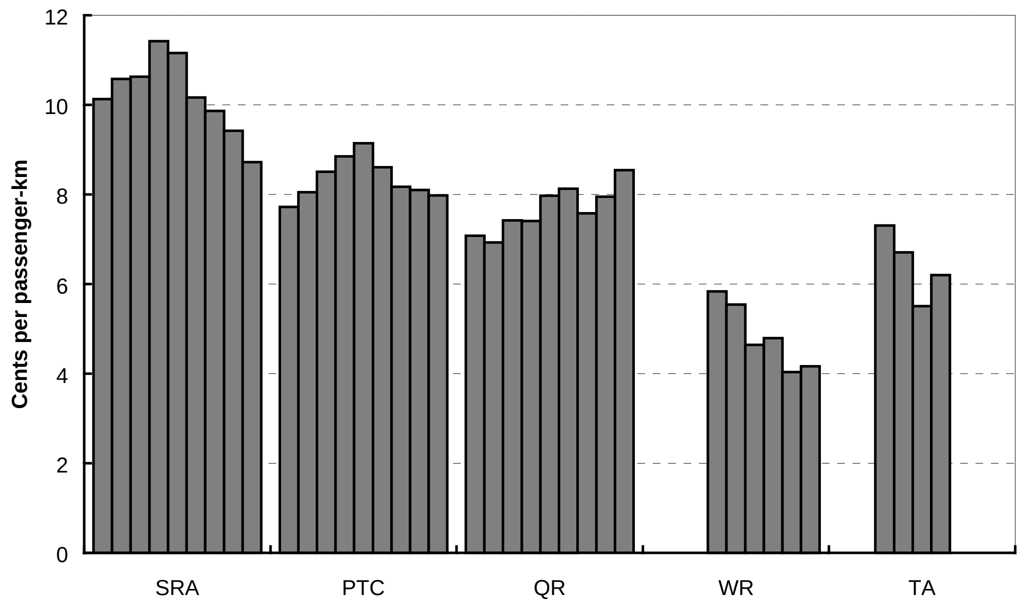
Passenger rates

Passenger rates are influenced by many factors which may vary substantially across countries. Not all of these factors are related to passenger rail system efficiency and, as with freight rates, some are non-controllable from the perspective of rail system managers. Factors of particular relevance to passenger rates include the level of government subsidy, size of the passenger market and mix of passenger services.[12]

Australian passenger rates

Real national urban passenger rates increased by 9 per cent towards the middle of the period and then fell, to settle 10 per cent lower (from 9.2 cents per passenger-kilometre in 1989-90 to 10 cents in 1992-93 and down to 8.6 cents in 1996-97).[13] Urban passenger rates increased in some jurisdictions and declined in others (figure 4.2).

Figure 4.2 **Real urban passenger rates [a,b,c], 1989-90 to 1997-98**



[a] Real urban passenger rates were constructed using farebox revenue from urban passengers divided by total urban passenger-km in each year and deflated by the national CPI. [b] Urban passenger-km data could not be provided by Westrail. Passenger-km were estimated by extrapolating numbers based on boarding statistics in Westrail's annual reports. Data were only available for Westrail from 1992-93. [c] Data for TransAdelaide were only available from 1991-92 to 1994-95.

Data source: PC forthcoming.

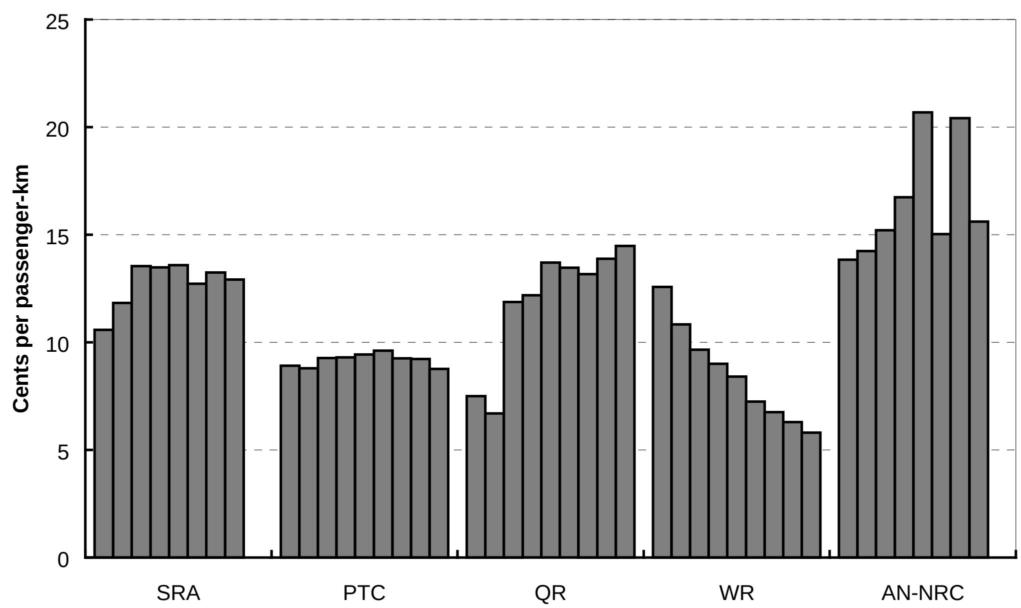
[12] Movements in passenger rates measured as average selling prices do not necessarily indicate an actual change in the schedule of rates charged to customers. A change in the composition of the type of passenger service provided over the period will alter the average selling price.

[13] The Australian urban passenger rate declined further to 8.2 cents in 1997-98, for a total decline of 10.9 per cent over the period 1989-90 to 1997-98. Due to a lack of international data, the period for international comparisons ends at 1997.

In contrast with freight rates, government policy, rather than competition, is the dominant factor affecting urban passenger rates. The general trend of increased urban passenger rates towards the middle of the period may reflect moves by State Governments to introduce more commercial pricing policies to ensure greater cost recovery. In 1993-94 the Victorian Government approved a general fare increase of 10 per cent and the Queensland Government allowed a fare increase and the removal of half price weekend fares. The 1996 Independent Pricing and Regulatory Tribunal review of the pricing of urban passenger transport services for New South Wales was also followed by an increase in some fares.

Real national non-urban passenger rates increased by 21 per cent over the period (from 10.2 cents per passenger-km in 1989-90 to 12.4 cents in 1996-97). Only non-urban passengers in Western Australia and Victoria experienced a decline in rates (figure 4.3).

Figure 4.3 **Real non-urban passenger rates by jurisdiction[a,b,c,d,e,f,g], 1989-90 to 1997-98**



a Real non-urban passenger rates were constructed using total revenue from non-urban passengers divided by total non-urban passenger-km in each year and deflated by the national CPI. **b** NRC did not provide passenger services. **c** The sharp decline in AN's rates in 1994-95 was the result of a disruption to its Indian Pacific service for six weeks due to flooding on the Nullarbor Plain, causing a downturn in passenger service revenue. **d** The sharp increase in QR's rates in 1992-93 was due to strong growth in Queensland's tourist industry and the subsequent expansion of its tourist services. **e** For Westrail non-urban rail passenger revenue could only be provided from 1993-94. From 1989-90 to 1992-93, non-urban rail passenger revenue was estimated by taking the proportion of rail passenger-km to total passenger-km (including buses) and applying the same factor to total revenue. **f** From 1994-95, non-urban passenger-km for PTC were estimated using boarding statistics. **g** Data for SRA and AN were not available for 1997-98.

Data source: PC forthcoming.

Competition from other modes has been more relevant in determining non-urban passenger rates than urban passenger rates. Deregulation of the interstate airline and road coach industries over the period led to intense price cutting and competition for regular travel patronage in these industries. In response, most non-urban passenger rail systems have invested heavily in improving the quality of existing regular services and in the creation of new services aimed at the tourist market, rather than cut prices. As a result, towards the end of the period, SRA, QR and AN managed to reverse the initial loss of revenue resulting from the loss of patronage to road and air transport.

International passenger rates

Passenger rates varied greatly across and within countries over time (table 4.6).

In 1997 urban passenger rates for Australia were 8.6 cents per passenger-kilometre, compared to a low of 2 cents for South Africa and a high of 17.2 cents for New Zealand. Urban passenger rates increased dramatically (by 43 per cent) in South Africa over the period.

In 1997 non-urban passenger rates were 12.4 cents per passenger-kilometre for Australia, compared to a low of 3.6 cents for South Africa and a high of 18.8 cents for Japan. Non-urban rates increased by 21 per cent for Australia and 11 per cent for New Zealand but declined by 25 per cent for South Africa.

A separate analysis of urban and non-urban passengers was not possible for all the countries in the sample. For the European countries, passenger rates in 1997 (urban and non-urban) ranged from a low of 4 cents per passenger-kilometre for Portugal to a high of 21.6 cents for Germany. Growth in passenger rates ranged from minus 53 per cent for Italy to 60 per cent for Germany over the period examined.

Table 4.6 **Real international passenger rates (A$ cents per passenger-kilometre)[a], 1990 to 1997**

Country	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*Growth rate(%)*[b]
Urban passenger rates									
Australia	9.2	9.7	9.8	10.0	9.9	9.2	8.9	8.6	-10.4
Japan[c]	na	na	12.3	14.7	16.1	16.5	14.0	12.0	-2.4
New Zealand[d]	na	na	na	na	15.7	17.9	17.3	17.2	9.7
South Africa	1.4	1.9	2.0	2.0	2.0	2.2	2.2	2.0	42.7
Non-urban passenger rates									
Australia	10.2	10.4	11.8	12.0	12.8	12.1	12.8	12.4	21.4
United States	15.1	14.1	14.1	15.4	15.0	14.5	15.7	15.9	5.5
Canada	13.9	13.1	13.2	14.7	14.1	12.1	11.4	11.7	-15.4
Japan[c]	na	na	19.2	22.9	25.2	25.7	21.8	18.8	-2.4
New Zealand[d]	na	na	na	na	10.3	11.2	11.3	11.4	10.6
South Africa	4.8	6.0	6.4	6.3	4.1	4.8	4.7	3.6	-24.7
All passenger services									
Japan	na	16.4	17.2	20.5	22.7	23.2	19.9	17.2	4.3
Austria	11.5	12.5	12.0	8.7	8.3	8.3	7.8	9.9	-14.5
Belgium	7.6	8.7	8.9	10.7	9.7	10.4	10.3	9.3	21.7
Denmark	10.7	11.9	12.8	14.2	na	13.5	13.1	15.5	44.9
Finland	14.8	16.4	15.7	13.9	12.3	na	na	10.3	-30.4
France	12.2	13.3	10.7	12.8	11.3	11.9	11.6	10.6	-13.1
Germany	13.5	21.3	15.7	18.9	23.8	24.9	23.7	21.6	60.1
Great Britain	15.8	18.5	17.9	18.9	17.8	18.2	na	na	14.7
Ireland	22.9	23.2	24.7	26.8	23.4	24.7	23.0	na	0.4
Italy	12.1	12.8	10.8	12.5	10.9	10.6	10.3	5.7	-52.9
Luxembourg	na	na	na	na	13.7	15.5	15.1	na	9.7
Netherlands	10.0	8.4	8.7	10.4	10.8	12.8	12.3	11.1	11.1
Norway	15.2	16.0	15.9	17.6	15.7	16.4	na	15.1	-0.3
Portugal	3.2	3.9	4.1	4.6	3.9	4.2	4.3	4.0	24.1
Spain	10.2	11.5	8.7	8.7	7.2	7.5	7.4	6.5	-35.7
Sweden	20.3	21.1	22.4	19.1	17.6	17.0	16.5	14.7	-27.6
Switzerland	12.5	13.1	13.4	15.8	15.6	14.9	14.5	12.2	-2.8

a Real passenger rates are measured as the average selling price of rail services. In order to compare price levels between countries, all overseas rates have been converted into Australian dollars and then deflated by the Australian CPI. Therefore, some of the change in prices may be due to exchange rate fluctuations. **b** Total percentage change in passenger rates over the period. **c** The urban and non-urban passenger rates for Japan are for the East Japan Railway Company. **d** The passenger-km data required to calculate rates were only available for New Zealand from 1996. Data for 1994 and 1995 were estimated using boarding statistics. **na** Not available.

Source: PC forthcoming.

Quality of freight services

The quality of rail freight services can be examined through a variety of indicators.[14] On time running is one measure of the punctuality of services. It measures the proportion of trips which arrive within a given time of the scheduled arrival time.

Participants expressed reservations about using on time running as a measure of freight service quality (box 4.3). In particular, some would prefer to use freight availability, which measures the percentage of occasions when customers receive delivery of their freight at the time they were promised by the rail operator.

Box 4.3 **Problems with on time running as a measure of service quality**

For freight services, on time running measures the proportion of trains which arrive within thirty minutes of the scheduled arrival time. Some of the perceived deficiencies of this indicator are:

- it is not equally important for all freight traffics. Westrail noted:

  We accept in intermodal (and particularly interstate) freight that it is critical that freight is delivered on time but it is not the most important and best measure especially in bulk traffics. (sub. DR107, p. 3)

  … to most of our bulk customers on-time running is somewhat of an irrelevancy and our principal measure for them is tons delivered as against programmed tons. (trans., p. 747)

- it is more important for 'internal management control' than as a measure of customer service. As NRC noted:

  The arrival time of trains can vary substantially from these [scheduled] times, eg when freight is promised to be available at 6 am, and owing to timepath allocations a train is due to arrive in the terminal at 3 am. If the train arrives late at, say, 4.30 am, this will not normally affect on-time availability of the freight on the train. (sub. DR117, p. 11)

- expected arrival times can be adjusted to allow for (deteriorating) track conditions, thus improving on time running although service may be deteriorating. According to the Australian Rail Track Corporation:

  … it is a practice in some railways to declare long standing temporary speed restrictions as permanent and incorporate resultant delays into the train timetable … result[ing] in trains meeting a timetable more regularly … A comparison of service quality considering on-time arrival (or availability) should be accompanied by … trends in transit times. (sub. DR97, p. 7)

Source: sub. DR97; sub. DR107; sub. DR117.

On time and availability statistics can provide different indications of service quality (BTCE 1997a). Unfortunately, availability statistics are not consistently reported by railways. While recognising the limitations of on time running as an indicator of

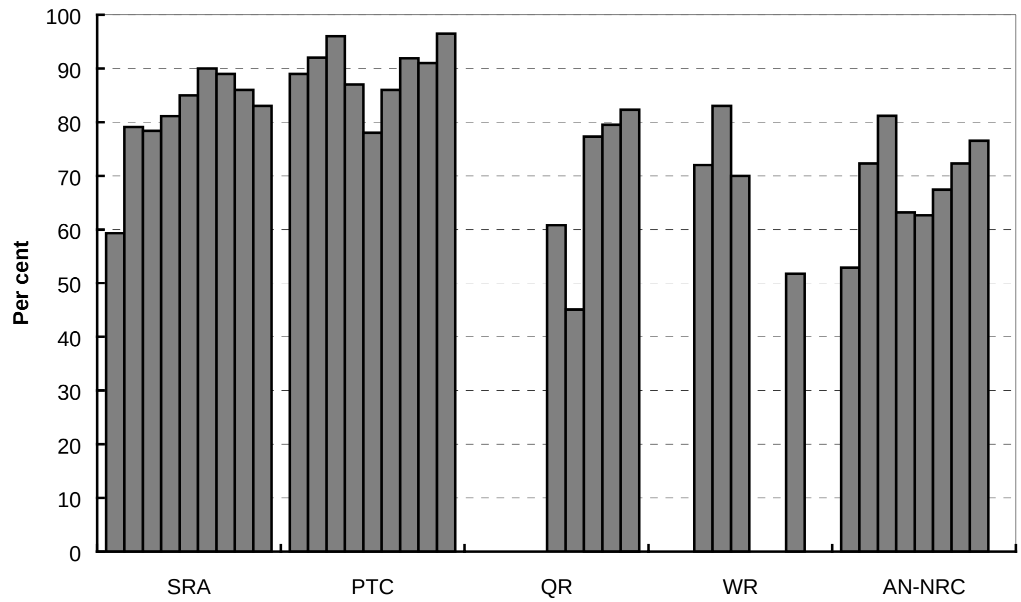
[14] BTCE (1997a) found that the service characteristics most highly valued by freight forwarders were punctuality of trains, care of cargo and containers, rail terminal efficiency, wagon capacity availability and staff quality.

quality, it is used to give some indication of the comparative reliability of freight services across jurisdictions.[15]

On time running of freight services is influenced by a number of factors, including average haul length, mix of freight traffic, track quality, track work and maintenance, traffic congestion and availability of rollingstock.

All jurisdictions, apart from Victoria, experienced on time running rates below 90 per cent in 1997-98. However, freight customers in both New South Wales and Queensland experienced significant improvements over the period, although they started from a relatively low base and remained well below Victoria. Western Australian customers have experienced a decline in on time running, while Victorian and AN-NRC customers have experienced fluctuating service over the period (figure 4.4).

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.

Data source: PC forthcoming.

[15] International comparisons of rail service quality are not included due to a lack of data.

The generally higher on time running for PTC may partly reflect the shorter freight trips in Victoria. Shorter trips may make it easier to reach a destination within a scheduled time although, as noted by the Australian Rail Track Corporation, 'a late train also has less opportunity to recover over a short journey' (sub. DR97, p. 7).

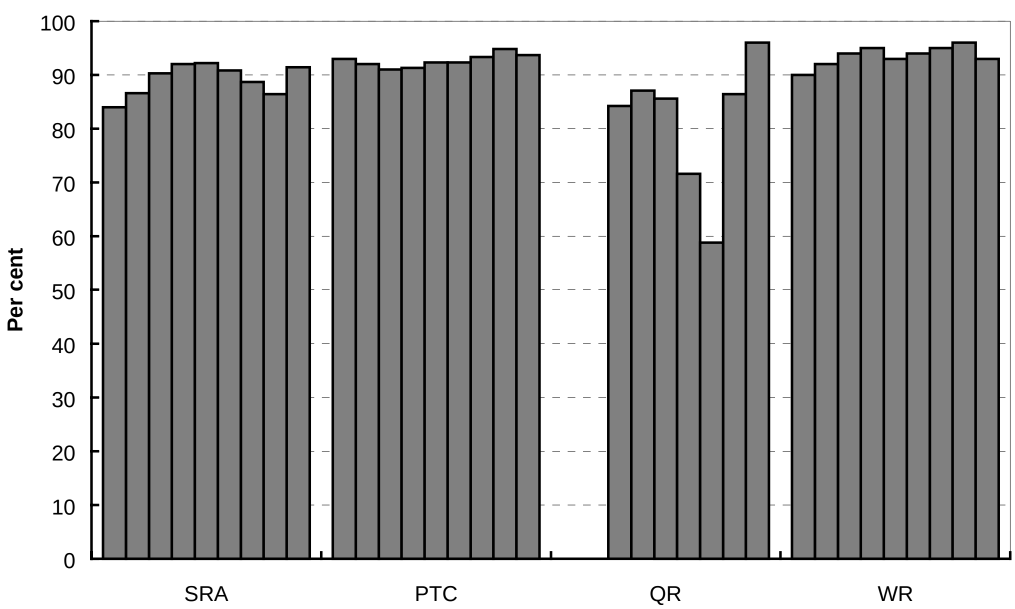
Quality of passenger services

As with freight services, there are a number of indicators of the quality of passenger services, in addition to on time running. Among these indicators are the number of services run, the proportion of services which are cancelled and the capacity of services. On time running is the indicator reported most consistently by railways.

The factors which influence passenger on time running rates are similar to some of those which affect freight on time running, including track quality and traffic congestion.

In all jurisdictions, there has been a slight improvement in the on time running performance of urban passenger trains during the period examined (figure 4.5). Urban passengers in Victoria and Western Australia have consistently experienced the most timely urban passenger services, with on time rates above 90 per cent.

Figure 4.5 **On time running for urban passenger services[a,b,c], 1989-90 to 1997-98**



[a] On time running for urban passenger services measures the proportion of trips arriving within three minutes of the scheduled arrival time. [b] Data were only available for QR from 1991-92. TransAdelaide data were not available. [c] On time running for QR in 1994-95 was affected by network track upgrading and lower rollingstock availability due to the extension of rail services to the Gold Coast.

Data source: PC forthcoming.

Non-urban passenger on time running rates are presented in PC (forthcoming).

Shareholders

Shareholders are generally interested in the financial returns generated by their investments. Where Governments are shareholders, returns of a purely financial nature may not be the only consideration, as social and environmental objectives are also likely to be important (chapter 11). Although suggested by the NSW Government (sub. DR128), the costs and benefits of these other objectives have not been included due to difficulties in measuring them.

Returns to shareholders

Return on assets (ROA) is one measure of financial returns and is affected by a number of factors which may vary substantially across countries.[16] These factors include the type of service provided (passenger services tend to provide lower financial returns than freight services), scale and density of operations, level of government funding, and other government policies (for example, those affecting competitive neutrality between road and rail (chapter 10)).

In addition, reported returns may be influenced by abnormal (accounting) items and differences (or changes) in asset valuation techniques. These factors make it difficult to compare ROA consistently over time.

Australian return on assets

Australian government-owned railways, apart from SRA, have displayed an upward trend in ROA over the period. ROA was positive for QR, Westrail and TransAdelaide, but tended to be negative for SRA and PTC (figure 4.6). The returns of AN-NRC fluctuated substantially. Fluctuations in returns for all railways tended to be due to the impact of abnormal items on profits.

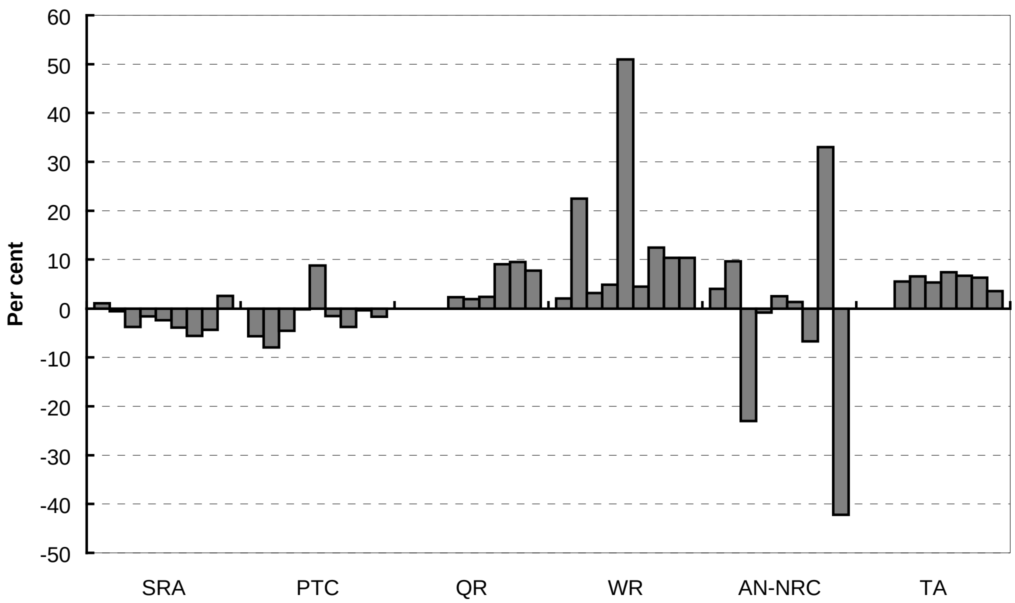
Comparisons of financial performance over time are made difficult by differing government funding policies across jurisdictions. For instance, towards the end of the period, community service obligations (CSOs) for QR and Westrail were explicitly funded. However, according to QR, ‘acceptance of lower rates of return

[16] Return on equity (ROE) is the ideal measure of shareholder returns. However, where shares are not publicly traded, equity must be treated as the residual of total assets and liabilities and may be negative. Where equity is negative, ROE cannot be used. Hence, ROA (measured as earnings before interest and tax divided by total assets) has been used instead.

[as a type of CSO] remains endemic and would directly affect return on assets' (sub. DR122, p. 2). QR argued further:

> Until … transparency is achieved it remains very difficult to evaluate the financial performance of the rail sector. (sub. DR122, p. 2)

Figure 4.6 **Return on assets by jurisdiction[a,b,c,d], 1989-90 to 1997-98**



[a] Return on assets is calculated as the ratio of earnings before interest and tax (EBIT) to total assets. Profit includes CSOs and other government payments. Return on assets cannot be calculated on a strictly comparable basis because of revaluations and abnormal items during the period. [b] SRA includes FreightCorp, RSA and RAC for 1996-97 and 1997-98. [c] PTC and TransAdelaide include all operations, including buses and trams, in addition to rail. The results presented here probably overestimate the returns to rail. [d] The large rise in ROA of AN-NRC in 1996-97 and the subsequent fall in 1997-98 are due to large abnormal revenues and expenses for AN in the respective years.

Data source: PC forthcoming.

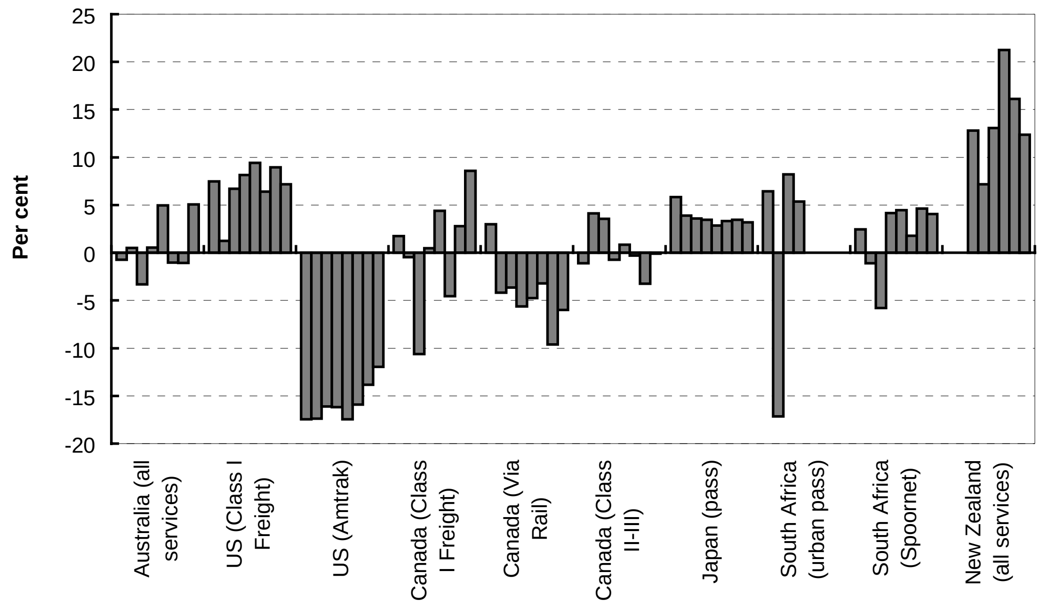
International return on assets

Return on assets was highly variable both between countries and within countries during the period examined (figure 4.7).

Australia's rail system experienced fluctuating but generally negative or low returns for most of the period monitored. This is in contrast to the positive returns earned by US Class I freight railways and in New Zealand, Japan and South Africa. The non-urban passenger services in the United States and Canada consistently provided negative returns, while the positive returns to South Africa's urban passenger system were highly dependent on government subsidies.

Abnormal items, such as restructuring costs, account for much of the variability within countries over time.

Figure 4.7 **Return on assets by country disaggregated by type of service[a,b,c,d,e f], 1990 to 1997**



[a] Return on assets is calculated as the ratio of earnings before interest and tax (EBIT) to total assets. Profit includes revenue from government subsidies. [b] Japan only includes (urban and non-urban) passenger services. [c] South Africa (urban pass) refers to the South African Rail Commuter Corporation (SARCC). South Africa (Spoornet) includes non-urban passengers and freight. [d] The lower ROA figures for Japan after 1990 were caused by an increase in the asset base of JR Central and JR West as the Japanese Government transferred ownership of Shinkansen railway assets. [e] The large fall in ROA of South Africa (urban pass) was due to a large fall in subsidies in 1990. SARCC data were only available from 1990 to 1993. [f] The large rise in ROA of New Zealand in 1995 was due to a large abnormal revenue item.

Data source: PC forthcoming.

Labour

The interests of employees in an industry can be defined at a number of levels including numbers employed, wages and other financial benefits (remuneration), and non-financial considerations such as conditions of employment, job security, training and professional development, and work safety issues. The most easily quantifiable is remuneration.

Remuneration

Employee remuneration includes wages and salaries as well as non-wage components such as superannuation. Due to difficulties in obtaining this information, a proxy for remuneration has been used. The most readily available proxy was labour costs (including on-costs).[17] In order to gain an insight into how payments to workers, on average, may have changed, labour costs per employee[18] (average labour costs) are examined.[19]

Changes in average labour costs may not be indicative of the actual changes in the direct remuneration of workers for several reasons:

- labour costs include payments such as workers compensation premiums and payroll tax which workers do not directly receive. However, wages and salaries account for a large proportion of labour costs;
- the composition of labour costs varies between railways and, in some cases, over time within the same railway. Thus, care must be taken in comparing levels across railways, as well as rates of change; and
- a number of factors, in addition to changes in wages and salaries, may influence movements in average labour costs, for example, changes in staff composition.

Remuneration of Australian employees

Real average labour costs have risen to varying degrees in all jurisdictions (figure 4.8). AN-NRC experienced the largest rise in real average labour costs of about 65 per cent over the period. Only SRA and PTC, which have experienced the most volatility in their real average labour costs, have not shown a clear upward trend. The Rail Tram and Bus Union (RTBU) noted:

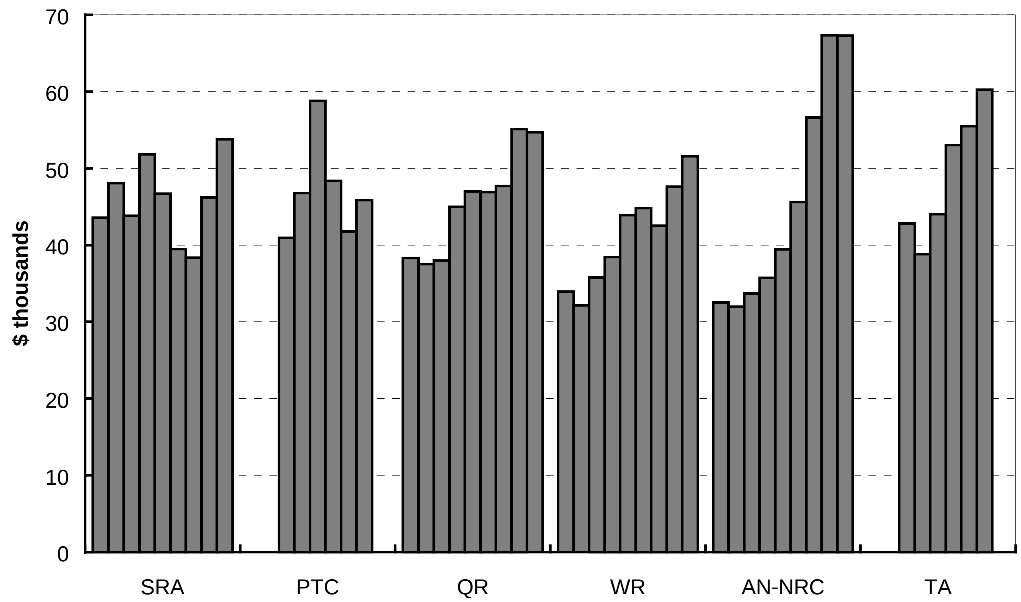
> the large rise in … average labour costs, is quite different to an analysis as to how the workforce has fared over the period of the 1990s. (trans., p. 867)

[17] On-costs generally include payments such as superannuation, payroll tax, annual leave entitlements, workers' compensation premiums and redundancy payments.

[18] The average number of employees rather than the number of employees at the end of the year has been used to calculate average labour costs. Using end of year figures would tend to overestimate average labour costs when large reductions in staff occur during the year.

[19] The purpose of this is to measure outcomes for employees. The NSW Government (sub. 128) suggested using labour costs per unit of output. However, while instructive for measuring outcomes from a railway's perspective, this does not reflect outcomes for workers.

Figure 4.8 **Real average annual labour costs by jurisdiction[a,b,c,d,e], 1989-90 to 1997-98**



[a] Real average labour costs were calculated by dividing real total labour costs (including on-costs) by average employee numbers. Real labour costs are nominal costs deflated by the national CPI. [b] QR moved from cash to accrual accounting in 1992-93. [c] NRC is only included in the AN-NRC data from 1995-96. AN is only included until 1996-97. The sharp rise in average labour costs of AN-NRC since 1995-96 can be attributed partially to the different composition of the NRC labour force compared with AN. [d] PTC data were only available from 1991-92 to 1996-97. [e] TransAdelaide data were only available from 1990-91 until 1996-97.

Data source: PC forthcoming.

Information provided by the RTBU shows that a rise in average labour costs may overstate pay outcomes for workers under Enterprise Bargaining Agreements (EBAs) in some jurisdictions (sub. DR114). EBAs for SRA resulted in a total pay increase of 20 per cent between 1992 and 1998 (compared to an increase in real average labour costs of 23 per cent). However, real average labour costs for TransAdelaide rose by 41 per cent but salaries rose only 9 per cent during this period.

The apparent divergence between outcomes represented by real average labour costs and EBAs might in part be explained by the effect of changes in the composition of workers.[20] In the case of TransAdelaide, this may not only have been the result of contracting out of jobs performed by lower paid workers but also the reallocation of

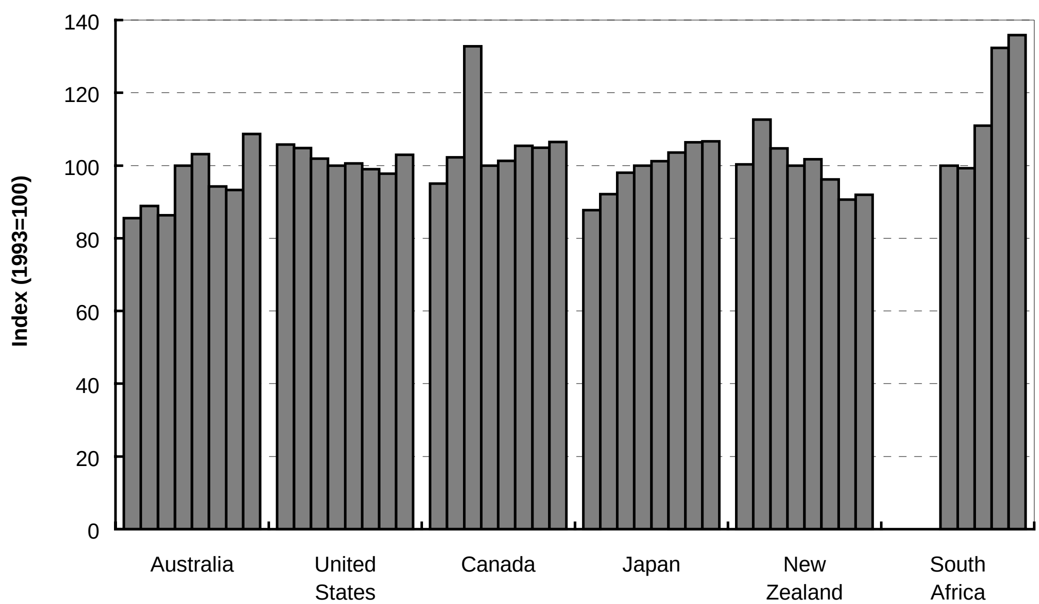
[20] For those Australian railways which provided a detailed breakdown of their labour costs, the divergence is unlikely to be attributable to changes in the components of labour costs, such as workers' compensation payments or payroll tax.

higher paid workers from the bus to the train business of TransAdelaide. Changes in reporting methods may also have been a factor.

International remuneration[21]

Real average labour costs in Australia fluctuated during the period studied, as they did to a lesser extent in both Canada and New Zealand. Fluctuations were smaller in Japan and the United States (figure 4.9). The overall increase in Australia of 27 per cent was lower than the 36 per cent increase experienced in South Africa, but greater than that experienced in the other countries examined.

Figure 4.9 **Index of real average labour costs by country[a,b,c,d,e], 1990 to 1997**



a Index constructed on the basis of real average labour costs valued in the currency of the country in question. Real average labour costs are calculated by dividing real total labour costs (including on-costs) by average employee numbers. Real labour costs are nominal costs deflated by national CPI. **b** The Australian total does not include TransAdelaide in 1989-90 or 1990-91 when data were not available. NRC is only included from 1995-96. **c** A large rise in real average labour costs in Canada in 1992 was due to a large rise in payments classified as employee benefits due to labour force restructuring. **d** Japanese real average labour costs include those of two companies for which labour cost data were available: East Japan Railway Co. and Hokkaido Railway Company, which account for 53 per cent of employees hired by the six Japanese passenger rail companies. **e** The results for New Zealand before and after 1993 are not comparable due to changes in accounting policy which occurred in 1993.

Data source: PC forthcoming.

21 An index is used to compare trends, rather than levels, across countries. The index is based on average labour costs valued in the currency of the country concerned. This avoids variations caused by exchange rate fluctuations.

Apart from the sharp rise in Canada in 1992 (caused by labour force restructuring), there was a slight rise in real average labour costs of around 10 per cent over the period. The wages component rose by about 12 per cent in real terms between 1991 and 1996.

In contrast, real average labour costs in the United States have been fairly constant. Only in New Zealand have real average labour costs fallen, but mainly towards the end of the period. This is likely to reflect partially a redefinition of labour costs.

4.4 Summary of performance

All government-owned railways in Australia experienced substantial productivity improvements in providing freight services over the period. They improved at greater rates than their counterparts in North America, but were only half as productive. After allowing for differences in scale and other railway characteristics, which generally advantage North American railways, the technical efficiency level of Australian railways was around two thirds that of the most technically efficient North American systems.

Assessed at the national level, Australia’s rail system also experienced substantial productivity improvements in providing freight and passenger services, and at greater rates than in other countries. The productivity level of Australia’s rail system was around two thirds that of the best performing countries in the study in 1997. Some of the difference is due to factors which inherently disadvantage Australia, such as scale of operation. However, in 1997 technical efficiency (productivity adjusted for the effect of scale) remained 30 per cent below the best performing countries in the study.

Consistent with the improvement in Australia’s productivity performance, freight rates in Australia have declined by 18 per cent from 1990 to 1997. This decline was less than that experienced in some other countries, but rates in 1997 were among the lowest of the countries studied. Differences in productivity, level of competition and inherent railway characteristics are among the factors likely to explain differences between countries. Measures of freight service quality indicate that in some Australian jurisdictions on time running remains poor, although it improved in New South Wales and Queensland.

Australia’s rail passengers have not benefited significantly in terms of passenger rate reductions. After initial price rises, urban passenger rates finished 10 per cent below their initial levels, while non-urban rates rose 21 per cent. In most countries studied, passengers have not experienced rate reductions to the same extent as freight customers.

Despite productivity improvements, many government-owned railways in Australia are either making a loss or are barely viable. Returns to government shareholders were often negative and highly variable over the period. However, there did appear to be some improvement in return on assets in most jurisdictions. Returns in other countries also tended to be variable, with freight systems usually earning higher returns in purely financial terms than passenger services.

It appears that labour employed by government-owned railways in Australia has gained to some extent from improvements in productivity. Real average labour costs, as proxy for remuneration, increased by 27 per cent over the period. However, only some of this would have benefited employees through wage rises granted as a result of enterprise bargaining agreements. Some of the increase in average labour costs was due to a reduction in the proportion of lower paid workers employed by railways and an increase in redundancy payments. Real average labour costs per employee remained relatively stable in the United States and Canada, increased in Japan and South Africa, and declined in New Zealand.