TASRAIL - A Cost-Benefit Assessment of Options

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Abstract:

In this paper the options available to Tasrail management and the Federal Government are identified, and the results of economic and financial analyses of these options are presented. The two basic options are closure and retention with actions taken to improve financial performance. For the retention option there are three scenarios considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour. The financial analysis indicates that, unless major efficiency improvements are achieved, the continuing need to fund Tasrail deficits may make the closure option attractive to the Federal Government. The social cost-benefit analysis, however, suggests that society would be better off if Tasrail was retained. Nevertheless, the full realisation of potential benefits available would depend on a restructuring of Tasrail.

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Introduction

In 1978 the Federal government assumed full operational and financial responsibility for the Tasmanian Government Railways following an agreement reached between the Federal and State governments in 1975. Since the takeover, the railway has been operated by the Australian National Railways Commission (AN) under the trading name 'Tasrail'. Financial losses were met by the Federal government as part of overall AN deficits up to 1985-86, when the government entered into a contractual arrangement with AN to finance the operating losses incurred by Tasrail. Over the three-year period 1985-86 to 1987-88 a total sum of $65.9 million (in 1989-90 prices) was allocated for this purpose. Based on the assessment of the BTE (1987) study, in May 1988 the Federal government decided to continue to support Tasrail for a further five years. A revenue supplement of $44.2 million (in 1989-90 prices) was provided by the government over the first three years (1988-89 to 1990-91) of this agreement.

Since assuming control of Tasrail, AN has undertaken a range of initiatives to improve railway productivity, including replacement of locomotives and rolling stock, the refurbishment of some existing rolling stock, track rehabilitation, modernisation of maintenance facilities and changes in operating practices. Staff numbers have been reduced considerably and further reductions are planned. A program of planned freight rate increases has also been implemented.

With the current financial support arrangements due to expire on 30 June 1993, the government referred the issue of the future of Tasrail to the Bureau of Transport and Communications Economics (BTCE). The aim of the study was to identify the options available to Tasrail management and the Federal government, and to undertake economic and financial assessments of these options.

The two basic options are closure and retention with actions taken to improve financial performance. For the retention option there are three scenarios considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour. A spreadsheet model was developed to perform the social cost-benefit and discounted cash flow calculations. Unpriced social effects of rail closure on the environment and redundant rail workers were considered separately. The Bureau was assisted in this study by a firm of consultants, the merchant bank Fay, Richwhite whose role it was to provide the demand projections and to analyse the business plan identified by Tasrail, likely to produce the best financial result.

This paper contains a summary of the methodology and the results of the Tasrail study (BTCE, 1991). The plan of the paper is as follows. In the next section a brief description of the characteristics of Tasrail is presented. Section 3 summarises the freight task demand projections while section 4 discusses the model and the results of both the financial and the social cost-benefit analyses. Some concluding remarks follow in section 5.

Rail in Tasmania

Since 1978 when the last passenger service, the Tasman Limited from Hobart to Wynyard, was withdrawn, the Tasmanian railways have operated solely as a freight railway. Tasrail's primary role in the Tasmanian transport system is the haulage of heavy freight for major Tasmanian industries. For 1989-90 Tasrail carried about 2 million tonnes of freight (approximately 413 million tonne-kilometres). The traffic has consisted of eight major commodities. The most important traffic on a 'revenue-earned' basis has been woodchip logs. Woodchip logs plus pulpwood and other logs comprise nearly half of Tasrail's traffic task. Other significant commodities carried by Tasrail include cement, coal, minerals, fertiliser and containers. The network as it currently exists is illustrated in Figure 1.

AN operates the Tasmanian railway system under community service obligation arrangements. These arrangements provide for revenue supplementation to meet Tasrail's operating losses. A major goal for Tasrail as set out in its corporate plan, is to achieve a 'break-even' financial position by 1995-96 that is, to cover accounting costs including interest and depreciation. Table 1 summarises Tasrail's financial performance for the period 1977-78 to 1989-90. As is shown in this table, the deficit of AN's Tasmanian operations remained at over $20 million per year in real terms up to 1985-86. However, there has been some noticeable improvement in Tasrail's operations over recent years. For the three-year period 1987-88 to 1989-90, the average operating loss was 37 per cent below that for the three years 1984-85 to 1986-87.

Over the 13 years to 1989-90, Tasrail's freight task increased by 87 per cent from 246 million net tonne-kilometres (NTKs) to a peak of 459.4 million NTKs in 1988-89. However, in 1989-90 Tasrail task declined by about 10 per cent on the previous year to almost 413 million NTKs. Tasrail's loss of $16.5 million in 1989-90, before receipt of the Federal government's revenue supplement, was 4.4 per cent more than in 1988-89 in real terms. This increase in the loss would seem to reflect both the business downturn and the growth of interest due to past borrowing for capital projects required to increase productivity and to cater for new business opportunities (AN 1990).

Tasrail's employment levels have fallen from 1686 staff in 1978 to 705 by March 1991. This represents a fall of 58 per cent. The decline in staff levels has been achieved through natural attrition and voluntary early retirement schemes. Over the same period employee productivity, measured as output in NTKs per employee, increased by 258 per cent.

Freight task projections

Figure 2 illustrates the commodity shares of the Tasrail freight task for 1989-90, while the importance of the four major commodities in terms of volume is shown in Figure 3. Together, logs (pulpwood and woodchip), coal, cement, and containers represented 86.1 per cent of Tasrail tonnage in 1989-90. The freight task is also heavily concentrated with logs, coal and containers accounting for 80.5 per cent of the task in 1989-90 as indicated in Figure 2. While cement is particularly significant in tonnage terms, the short-haul nature of the majority of movements reduces its contribution to 3.6 per cent of the total task.

The dominance of a small number of commodities in the task is also reflected in the small number of firms that are major customers of Tasrail. Six firms, namely, Australian Pulp and Paper Mills (APPM), Australian Newsprint Mills (ANM), Forest Resources, Goliath Cement, Cornwall Coal and the Electrolytic Zinc Company either received or dispatched about 90 per cent of the freight task in 1989-90.

Methodology and estimates of freight task

Tasrail's freight task projections for the 20-year period, 1991-92 to 2010-2011 were developed by the consultants (Fay, Richwhite 1991). Their analysis was performed with reference to historic trends and expected economic scenarios as well as information provided to them by Tasrail and Tasrail's customers. All forecasts and historical revenue information are in real 1989-90 dollars. From that analysis the consultants determined for each major commodity group the most likely task and real revenue rates in the short, medium and longer term.

Table 1 Tasrail Financial Performance, at Real 1989-90 Prices, for the Period 1977-78 to 1989-90[a]

($ million)

Year	*Revenue*	*Expenditure*	*Operating profit*	*Government supplement*
1977-78	23.4	65.3	-41.9	41.9
1978-79	23.6	59.7	-36.1	36.1
1979-80	27.6	56.3	-28.7	28.7
1980-81	28.7	59.8	-31.1	31.1
1981-82	25.6	57.4	-31.8	31.8
1982-83	24.6	57.7	-33.1	33.1
1983-84	24.0	54.3	-30.3	30.3
1984-85	24.9	54.0	-29.1	29.1
1985-86	25.1	51.5	-26.4	25.0
1986-87	27.4	47.1	-19.7	22.1
1987-88	29.9	44.5	-14.6	18.8
1988-89	31.3	47.1	-15.9	11.8
1989-90	28.8	45.3	-16.5	16.6

a. The price deflator used was the Australian Bureau of Statistics price deflator for expenditure on gross domestic product

Note The method of providing the government subsidy changed after 1984-85. The subsidy is now a predetermined amount rather than the realised deficit.

Source AN (pers. comm., 1991).

The demand projections were derived using univariate analysis because of data, time and resource constraints. However given the dominant role of these products in the Tasmanian economy the consultants argued that the product-by-product analysis provided opportunities to assess the cross product consistency of the forecasts and macroeconomic parameters underlying the various projections. In this regard the consultants adopted a similar approach to that used in the BTE (1987) study. The analysis focused on economic variables likely to impact on Tasrail through to 1996. Thereafter it was assumed that the 1996 freight levels and revenues (in real terms) will remain constant until the end of the forecast period.

Changes in the Tasrail task between 1977-78 and 1989-90 and forecasts to the year 2011 are illustrated in Figure 4. As illustrated by the forecasts in Figure 4, Tasrail's freight task is expected to increase up to 1995 and then experience a moderate decline. A 'high' scenario forecast was derived by adding 10 per cent onto the 'medium' (described) forecast. A 'low' scenario was attained similarly by subtracting 10 per cent from the medium forecast. These alternative scenario forecasts were used to perform sensitivity analyses to assess the effects of future demand changes.

Special circumstances

The forecasts developed by the consultants for the individual commodities have, as far as possible, included probable rail task gains and losses. Some of the possible developments that could generate variations in the future rail task from the forecast levels are outlined below:

> Potential opportunities for Tasrail's future freight task include: potential quota increases in the woodchip industry; a new stand alone pulp mill proposed by APPM; a pulp mill extension proposed by Forest Resources which would offer limited scope for rail sourcing, although opportunities could exist for finished product freight; mooted ANM plant expansion plans; the continuation of Tioxide's operation in Tasmania after 1994-95; and the approach that may be taken for the recovery of road costs attributable to heavy vehicles.
>
> Potential threats to Tasrail's future freight task include: the loss of Cornwall's smaller coal customers to Merrywood; increasing road and road operator efficiency; changes to shipping capacity that are likely to increase the number of roll on/roll off trailers that can be transported to Tasmania, and so improving road efficiency; the mooted introduction of B-doubles (a double semi-trailer with between seven and nine axles) which would further increase road efficiency allowing pay-loads of 38 tonnes to be carried; and changes to the Permit Scheme that is used in Tasmania to influence modal split between road and rail.

The future requirements of the woodchip and the paper and paper product industries are expected to have a significant bearing on the viability of Tasrail. Only a considerable expansion in these industries and/or a major restructuring of the organisation would enable Tasrail to cover the cost of its operations. Changes particularly in the supply source of pulpwood logs (i.e. a shift in pulpwood log supply

from Northern to Southern Concessions), may further undermine the viability of the Tasrail freight operations. It is, therefore, important for Tasrail in an environment of road competition to develop mechanisms that could make the freight demand for timber logs less sensitive to road competition to secure a larger share of this freight in the future.

The expected degree of road/rail competition would depend on the extent to which certain ISC recommendations are adopted and become government policy and the associated changes to the Permit Scheme. Two important ISC recommendations concern the proposed charge for vehicle mass of individual road users which is responsible for road damage; and the need to designate certain roads as being required of high construction standard for heavily loaded vehicles

Cost-benefit assessment of options

Methodology

Two types of analysis, financial and social cost-benefit, were undertaken. The aim in the financial analysis was to estimate discounted cash flows and hence the value to Tasrail's owner, the Federal government, of the various options. This differs from the value to AN which would take into account government subsidies paid to cover Tasrail's losses. It also differs from the net budgetary implications for the Federal government which would include increases in fuel excise receipts, import duties and sales taxes as a result of the shift to road transport following closure of Tasrail, and the unemployment benefits paid to Tasrail workers. The difference between the present values for any two options gives the gain (or loss) to the government as shareholder of pursuing one option over the other. Payments of principal and interest on loans were not included, so as to provide a picture of Tasrail's prospects independent of the method of financing.

Social cost-benefit analysis aims to encompass all the costs and benefits to society. In practice there will be costs and benefits to which it is difficult to attach dollar values; however, these can at least be pointed out and sometimes quantified in other ways. The net present value obtained from the social cost-benefit analysis represents the net benefit to society from closing Tasrail compared with retaining it under a given retention scenario. A negative result would indicate that, ignoring the unpriced costs and benefits, society would be worse off as a result of closure of Tasrail. In theory, it would be possible to estimate the net benefits in all affected markets under the closure option and each of the three retention scenarios and to present the results in the same manner as for the financial analysis. The value to society of pursuing one course of action over another could be seen as the difference between the net present values of the two options. In practice, however, this would require estimation of the full benefits and costs, including estimating the total areas under demand curves, for Tasrail customers and all other affected markets including that for road capacity. The only practical way to undertake the cost-benefit analysis is to focus on *changes* in benefits and costs arising from closure compared with a given retention option.

If Tasrail was to be closed down, the value of Tasrail assets released to alternative uses, and the savings in future operating costs and capital expenditures, are counted among the benefits. Offsetting these benefits are the costs of transporting by

road and sea the freight that would otherwise be carried by Tasrail, including the damage to roads caused by the additional trucks and any costs incurred by users in switching transport modes. Railway accidents will be avoided but the increase in truck numbers may result in higher road accident costs.

The treatment of consumers' surplus in the cost-benefit analysis is based on the assumption that road and rail transport are competing in the same market offering services that are perfect substitutes in all respects except for storage and handling costs. Thus once these user costs are added on to freight rates, users make their modal choices solely on the basis of cost. Under this assumption the need to evaluate areas under demand curves is avoided. Closure of rail services will generally result in higher costs for users so they, as 'consumers' of transport services, will incur a loss of consumers' surplus.

To assess changes in consumers' surplus, it is necessary to have estimates of freight rates to be paid by users for road and sea transport. *Private* costs are employed to estimate freight rates, as well as to conduct the financial analysis of rail. For social cost-benefit analysis, resources are valued at their cost to *society* or opportunity cost. Where there are 'distortions' such as taxes and unemployment in labour markets, adjustments may have to be made to market prices to derive 'shadow prices' equal to opportunity costs.

Benefits, costs and cash flows

Period of analysis: The period of the analysis was 20 years extending from 1 July 1991 to 30 June 2011. If Tasrail were to be closed, it was assumed that this would occur on 30 June 1993, the date when the current arrangements for financial support expire. Having the starting time for the analysis at 1 July 1991 means that the cash flows, benefits and costs of Tasrail's continued operation during the two years 1991-92 and 1992-93 enter into the discounted present value calculations for closure. These two years have been included due to an assumption that the government would make a decision about the future of Tasrail during 1991 and that such a decision would affect capital expenditure plans, revenues and operating costs. Both the financial and cost-benefit analyses were carried out in real terms at 1989-90 prices.

Labour and capital costs: Labour costs for Tasrail in the future will be determined as much by progress in negotiations with unions and by labour saving investment as by freight volumes. Negotiations with unions are expected to cover early retirement schemes and abolition of demarcations to improve labour flexibility and so permit operations with fewer employees. Tasrail management have identified the business plan, hereafter referred to as 'restructuring', which, if Tasrail is to be retained, they believe is likely to produce the best possible financial result. The plan involves cutting staff levels from the forecast June 1991 level of 698 to 350 employees by 1999. As implementation of this plan is contingent on the outcome of negotiations with unions and so may not be achievable in full, two other retention scenarios involving less severe labour reductions are examined in addition to restructuring. The intermediate scenario in terms of employment reductions is taken from AN's Corporate Plan Number 14 (CP14). It sees employment falling to 394 by 2000. Capital expenditures are more spread out over time in this scenario so the substitution of capital for labour occurs more gradually. In the scenario with the least impact on

labour numbers, the 'base case', employment is projected to continue to fall at the same rate as it has over the last few years, that is, 5 per cent per annum until 2003 when it reaches 394 employees. Capital expenditures are assumed to be the same as for CP14.

The capital expenditure programs under the retention scenarios are primarily aimed at reducing labour costs. In addition to an extensive track rehabilitation programme, planned capital expenditures totalling $19.8m (net of in-house labour) include: relocation of maintenance workshops; upgrading of locomotives; updating level crossing protection; upgrading the communications system; and purchase of second-hand locomotives.

Shadow price of Tasrail labour: Rail labour has to be evaluated at shadow prices in the social cost-benefit analysis because, in the event that Tasrail was shut down, it is considered that some 50 per cent of redundant railway workers would be unable to find new employment. This estimate was arrived at by two independent methods. The first was application of the results of a survey of redundant railway workers (BTCE 1990a) which found that 44.6 per cent of respondents (excluding retirees) were unemployed. Unemployment rates found by the survey for each occupational class were applied to Tasrail employees split up by occupation to arrive at a forecast unemployment rate of 48.3 per cent. This estimate may be on the conservative side because it makes no allowance for the fact that historically, unemployment has been higher in Tasmania than on the mainland, and because the unemployment percentages obtained from the survey exclude retirees some of whom might have accepted work if it had been available. In the second method, regional reabsorption coefficients estimated in BTCE (1990b) were used. A 47 per cent unemployment rate was suggested by this method.

Determining the correct shadow price for Tasrail labour involves complex issues and would require data which are unavailable. All that has been attempted here is to note the issues and put forward an estimate based on simplifying assumptions. The opportunity cost of the redundant Tasrail workers finding employment would be the value of their services in that alternative employment less relocation costs. It has been assumed that their value in alternative employment would equal their cost of employment in Tasrail. In the absence of information and because they would be relatively small, relocation costs have been ignored. The opportunity cost of workers finding new employment is also affected by the time taken to find new employment as there is no production foregone during this period. No allowance has been made for this on the grounds that, for those workers obtaining new employment, the period of unemployment is likely to be short. That rail workers finding new employment after redundancy do so quickly, is supported by BTCE (1990a). Assuming that half of Tasrail's workers are unable to find new employment and that the other half find employment quickly, the opportunity cost of Tasrail's work force must be at least 50 per cent of its financial cost. It is 'at least 50 per cent' because it is based on an assumption that the opportunity cost of the unemployed workers is zero with no allowance for the value of leisure.

Other rail operating costs: Fuel consumption was assumed to be proportional to gross tonne-kilometres. To obtain resource costs, excise tax and the State fuel franchise fee, which Tasrail's fuel supplier is required to pay after 1 January 1991, had to be deducted from the price of fuel. 'Materials and sundries' costs (sundries is work contracted out) were assumed to be 70 per cent fixed and 30 per cent variable with

gross tonne-kilometres. The remaining fixed operating costs were insurance and mainland corporate overheads.

Sales of assets: Estimates of the realisable value of Tasrail's assets were provided by Tasrail. After deducting disposal costs, the remaining value of the assets were spread over the two years following the assumed closure date. Properties leased by Tasrail to customers were excluded from the cost-benefit analysis. In most cases these are used for storage and handling of freight and would continue to be used for the same purpose if Tasrail was closed. Since they would not become available for other uses, there is no benefit to society from their sale following rail closure, only a change of ownership.

Truck operating costs: Estimates of truck operating costs were obtained by employing the Austway Data Pty Ltd Truck Cost model. A large number of assumptions had to be made concerning details such as the type of trailer, number of drivers, average speed, number of round trips per day, back-loading, tonnes carried per truck and the proportions of owner and company-employed drivers. To carry the road task forecast for 1993-94 of 359m net tonne-kilometres of freight,[1] it is estimated that an additional 181 prime movers and 289 trailers would be required providing employment for 210 drivers. It is also estimated that a further 140 people would gain employment in activities servicing the trucking industry. The total annual private cost of carrying the forecast increase in the road task following rail closure was estimated to be $33.9m (or $1.21 per kilometre travelled). To convert this to a resource cost, import duties and sales taxes were deducted from the costs of prime movers, trailers and tyres, registration charges and third party insurance costs, and fuel was priced at the same resource cost per litre as for rail.

The shadow price adjustment factor for trucking labour is likely to be significantly higher than for rail because the skills required for expansion of the road haulage industry would be less industry specific than for rail. In the absence of data indicating the proportions of the additional trucking industry workers likely to be drawn from employed and unemployed sources, a shadow price of 80 per cent of the labour costs was assumed. The result is a total resource cost for truck operations for 1993-94 of $22.4m at a 10 per cent discount rate ($0.80 per kilometre travelled). Sensitivity tests were undertaken with shadow price adjustment factors of 60 and 100 per cent.

Road pavement damage costs: The costs of road pavement damage resulting from the additional trucks on Tasmanian roads were estimated using the BTCE Pavement Life Cycle Costing (LCC) model (BTCE 1990c). The increase in costs of preserving the road pavement asset was derived by taking the difference between the estimated net present value of maintenance and reconstruction costs with Tasrail retained, from the net present value with the additional trucks resulting from rail closure. Since the LCC model incorporates equations for estimating truck and car resource operating costs as functions of road roughness, the model was also used to estimate costs imposed on existing vehicles as a result on the increase in road roughness.

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1 The road task is considerably smaller than the corresponding rail task due to the shorter road distances between some origin-destination pairs.

Accident costs: Costs of insurance, Comcare, and workers' compensation were retained in rail operating costs to serve as proxies for industrial accident costs. Over a long period, premiums would be expected to reflect the average cost of these accidents. This excludes level crossing accidents which are regarded as road accidents. From statistics on level crossing accidents for the last five years provided by Tasrail and BTCE accident costs, an average annual cost of $608 000 was derived for these accidents. To estimate the cost of additional road accidents generated by the higher truck numbers following rail closure, accident costs per vehicle kilometre travelled were applied to the forecast increases in the road haulage task. As no suitable Tasmanian data were available, fatality and injury rates for accidents involving heavy vehicles from New South Wales were combined with BTCE estimates of accident costs, to obtain an average cost per vehicle-kilometre of 7.6 cents in 1989-90 dollars. This excluded property damage costs which were accounted for through the insurance costs included in truck operating costs.

Sea freight: The only Tasrail freight assumed to shift to sea in the event of rail closure is sulphuric acid from Risdon to Heybridge. This freight is considered unsafe to carry by road. The previous BTE (1987) study of Tasrail assumed that the acid would be carried by pipeline for the last 8 kilometres from Burnie to Heybridge. However, as the demand forecasts have this traffic ceasing two years after the assumed date of rail closure construction of a pipeline would not be justified. The present analysis assumes that acid would be carried by road over this short distance.

User costs: Additional costs are likely to be imposed on some current Tasrail customers due to necessary changes in handling facilities, as all the major customers have been geared towards long-term continuing use of rail transport. Based on data supplied by Tasrail $8.44m has been assumed for additional capital costs imposed on users, split 25 per cent in 1991-92 and 75 per cent in 1992-93. The bulk of this, $6.5m, is associated with the road haulage of cement from Railton to Devonport. In order to estimate losses in consumer surplus and changes in demand when undertaking sensitivity tests with non-zero elasticities, user capital costs were annuitised at a 15 per cent real interest rate over the 18 years starting in 1993-94 and expressed as amounts per tonne.

Other labour expenses: Payments to redundant workers and workers' compensation expenses, which are major costs in the financial analysis, are excluded from the social cost-benefit analysis on the grounds that they are transfer payments.

Results

Financial analysis

The discounted present values of cash flows are presented in table 2 for the 7, 10 and 15 per cent discount rates. They indicate that the government as shareholder loses money under both the retention and closure options but it would lose less by adopting the closure option. The last line of the table, which is the difference between the discounted cash flows for retention and for closure, shows that **for the base case**

scenario the amount saved by closing Tasrail would be between $9.4m and $15.4m depending on the discount rate

Social cost-benefit analysis

The discounted present values for the social cost-benefit analysis of closure compared with the base case retention scenario are set out in table 3. The inclusion of revenues and consumer surpluses in the manner shown provides a calculation of the change in users' total willingness-to-pay (consumers' surplus plus revenue). The results in the table assume zero elasticities of demand for transport, so there is no change in total willingness-to-pay. The increase in road, shipping and input supplier revenues on the benefits side of the ledger are exactly cancelled out by the losses in consumers' surplus and rail revenue on the cost side. The interpretation of the bottom line results in table 3 is that, ignoring unpriced costs and benefits, society would be $24.5m, $18.0m or $11.0m worse off at the 7, 10 and 15 per cent discount rates respectively, if Tasrail was closed.

Sensitivity tests

Tables 4 and 5 illustrate the results of sensitivity tests for the financial and social cost-benefit analyses respectively. These tests are undertaken with respect to changes in labour force reduction projections (i.e. CP14 and restructuring scenarios), demand forecasts, demand elasticities and shadow prices of labour - the assumptions about which there is the greatest uncertainty.

The financial analyses indicate that both the CP14 and restructure scenarios produce negative discounted cash flows, but, under restructuring, losses are reduced to the point where the Government, as shareholder, would be better off retaining the railway. This can be seen more clearly from the net financial gains from closure reproduced in the lower part of the table.

The results are quite sensitive to changes in the level of demand. This would be due to the high proportion of rail costs assumed to be invariant with respect to freight carried. For the purposes of these sensitivity tests with respect to demand, rail labour costs were assumed to be fixed. A 10 per cent increase is sufficient to make retention more financially advantageous for the Government under the base case scenario. A 10 per cent decrease in demand raises the gain from closure compared to the base case retention scenario from $13m to $30m at the 10 per cent discount rate.

The results of the sensitivity tests on the cost-benefit analysis displayed in table 5 show that the net cost to society of closure of Tasrail is higher compared with the CP14 and restructure scenarios. As with the financial analysis, the result is fairly sensitive to changes in demand. A 10 per cent increase in demand roughly doubles the cost to society of rail closure compared to the base case retention scenario. A drop of 10 per cent in demand is sufficient to change the net benefit of closure from being significantly negative to around zero.

Table 2 Financial Analysis of Rail Closure Compared with Base Case Scenario: Discounted Cash Flows

(1989-90 $ million)

	Discount rate		
Discounted cash flows	*7%*	*10%*	*15%*
Retention (base case)			
Operating revenue	296.6	237.8	174.1
Other revenue	3.0	2.4	1.8
Capital expenditure	-53.3	-45.9	-36.9
Operating costs	-300.4	-245.7	-185.5
Redundancy and other severance costs	-13.1	-11.5	-9.4
Net cash flow	-64.7	-60.9	-54.5
Closure			
Operating revenue	37.0	35.6	33.4
Other revenue	0.5	0.5	0.5
Sale of assets	22.7	20.6	17.7
Capital expenditure	-3.4	-3.2	-3.0
Operating costs	-60.0	-57.7	-54.0
Redundancy and other severance costs	44.5	42.2	38.7
Workers compensation liability	1.6	1.3	1.0
Net cash flow	-49.3	-47.6	-45.1
Net financial gain from closure[a]	15.4	13.2	9.4

a. Net cash flow under closure minus net cash flow under retention

Table 3 Social Cost-Benefit Analysis of Rail Closure Compared with Base Case Scenario: Discounted Present Values[a]

(1989-90 $ million)

Benefits and costs	*Discount rate* 7%	10%	15%
Benefits			
Rail capital expenditure saved	49.9	42.6	33.9
Rail operating costs saved	154.2	120.3	83.8
Release of capital	16.8	15.5	13.5
Rail level crossing accidents	6.2	4.7	3.2
Road revenue	307.1	238.9	165.9
Shipowner revenue (acid)	2.3	2.1	1.9
Input supplier revenue	11.3	8.8	6.0
Costs			
Truck costs	198.3	158.1	114.5
Road damage costs	14.8	13.2	7.5
Increase in other vehicle costs	8.8	5.3	4.4
Road accident costs	19.4	15.1	10.5
Shipping costs (acid)	2.0	1.8	1.6
User costs	8.2	7.7	7.0
Rail revenue foregone	259.5	202.2	140.7
Net loss of consumers' surplus	61.2	47.6	33.1
Net benefit from closure of Tasrail	-24.5	-18.0	-11.0

a Assumes zero elasticities of demand, hence the sum of road and ship revenue on the benefit side equals the sum of rail revenue and consumers' surplus on the cost side.

Table 4 Financial Analysis Results of Sensitivity Tests: Discounted Cash Flows *(1989-90 $ million)*

Alternative assumption	*Discount rate* 7%	10%	15%
Net cash flows			
Closure	-49.3	-47.6	-45.1
Base case	-64.7	-60.9	-54.5
CP14[a]	-58.3	-55.6	-50.8
Restructure	-39.4	-40.7	-40.7
Base case:			
Demand forecasts plus 10%	-40.3	-41.4	-40.3
Demand forecasts minus 10%	-89.0	-80.4	-68.8
Net financial gain from closure[b]			
Base case	15.4	13.2	9.4
CP14[a]	9.1	7.9	5.7
Restructure	-9.9	-6.9	-4.4
Base case:			
Demand forecasts plus 10%	-6.0	-3.5	-2.2
Demand forecasts minus 10%	36.8	29.9	21.0

a Corporate plan number 14
b Net cash flow under closure minus net cash flow under retention

Table 5 Cost-Benefit Analysis Results of Sensitivity Tests: Discounted Present Values of Benefits of Closure *(1989-90 $ million)*

Alternative assumption	*Discount rate* 7%	10%	15%
Base case[a]	-24.5	-18.0	-11.0
CP14[b]	-32.7	-25.1	-16.7
Restructure	-43.6	-34.4	-24.0
Base case:			
Demand forecasts plus 10%	-46.0	-35.2	-23.4
Demand forecasts minus 10%	-3.0	-0.8	1.4
Elasticities of demand -1.0	-27.7	-19.7	-11.4
Labour shadow price adjustment factors:			
Rail 60%	-9.9	-6.5	-2.8
Rail 40%	-39.2	-29.5	-19.1
Road haulage 100%	-44.8	-33.8	-21.9
Road haulage 60%	-4.2	-2.2	0.0

a Base case with zero elasticities of demand for transport and shadow prices of labour at 50 per cent or financial costs for rail and 80 per cent for road
b Corporate plan number 14

Increasing the elasticity of demand raises the cost to society of rail closure but changes in elasticity are shown to be relatively unimportant over a plausible range of values. Evidently, the net loss in transport users' willingness-to-pay is almost entirely offset by the saving in costs arising from the reduction in total freight moved. It is not known just what the long-run elasticity of demand for transport would be for each Tasrail traffic, but given the small proportion that transport costs comprise of final good costs, the elasticities for transport would, in most cases, be expected to be small. Exceptions could occur for traffics where there are alternative sources of supply or where changes in transport costs affect the location of production.

Changes in the shadow price of labour strongly affect the results but the sensitivity tests indicate that over a plausible range of values, net present values remain predominantly on the side of retention of Tasrail. At the 10 per cent discount rate, an increase/decrease in the shadow price adjustment factor for rail labour by 10 percentage points, reduces/increases the cost to society of rail closure over the base case retention scenario by $11.5m. Similarly, every increase/decrease by 10 percentage points in the shadow price of road haulage labour, which is a more uncertain factor increases/reduces the cost of closure by $7.9m.

Likelihood of financial break-even

The terms of reference for the study also required the BTCE to consider whether financial break-even is an attainable objective for Tasrail. Cash flow projections suggest that, provided there are no interest expenses, Tasrail, if retained, will begin to experience positive cash flows early next decade. Cash flows however are strongly affected by the timing of capital expenditures. If, as is sometimes done for railways, 'break-even' is defined as covering operating costs (labour, fuel, materials and sundries, corporate overheads and insurance; excluding capital and redundancy and other severance costs), then Tasrail would break even for the first time in 1997-98, 1994-95 and 1993-94 under the base case, CP14 and restructure scenarios respectively. Break-even, under this definition, is an achievable financial target provided Tasrail is able to undertake the capital expenditures assumed in the study. The faster Tasrail is able to reduce its labour force the sooner break-even will be achieved, but even if reductions were to continue at the present rate of 5 per cent per annum, break-even could be attained before the year 2000. While covering operating costs would represent a significant milestone for Tasrail, it falls well short of earning an adequate return on capital invested.

Summary and conclusions

This paper contains a summary of the financial and social cost-benefit analyses of the options to close or to retain Tasrail, which were developed in a recent BTCE (1991) study. For the retention option, three scenarios ('base case', 'CP14' and 'restructure') were considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour.

The analysis suggests that Tasrail would break even, defined as covering operating costs, by 1993-94 under the restructure scenario, by 1994-95 under the CP14

scenario and by 1997-98 under the base case scenario. Besides being dependent on the rate at which Tasrail is able to restructure its operations, these results are subject to considerable variation depending on the level of the freight task achieved.

On balance, there seems to be a number of positive developments that may increase the level of Tasrail freight in the medium to longer terms. The key opportunities include the possibilities of an increased export quota for woodchips, a new pulp mill and expansion plans in woodpulp production. It is envisaged, however, that the potential threat of increased road freight competition is likely to offset some of the optimism for a positive shift in freight demand for rail. The introduction of new technology in road transport (e.g. increase in truck weight limits), changes in the Rail Protection Fees Permit Scheme and changes in road user charges for heavy vehicles have the potential to significantly affect Tasrail's competitive position.

The financial analysis, which was based on discounted present values of cash flows, indicated that the government loses under closure and all three retention scenarios. However, the government's losses are estimated to be smaller under closure than for the two higher labour cost retention scenarios, the base case and CP14. Only when the comparison is made with the restructure scenario which involves dramatic cuts in the Tasrail work force, will the Federal Government be relatively better off by retaining Tasrail.

In the social cost-benefit analysis, the benefits of rail closure include savings in future rail operating and capital costs, release of capital resources currently tied up in Tasrail and level crossing accidents avoided. The costs of closure are primarily those associated with carrying the rail task by road including truck costs, road pavement damage, and additional road accidents. The analysis estimated the net benefit to society of closure compared to the three retention scenarios. The results indicated that society would be better off if Tasrail was retained and that the benefit to society would be greater the more Tasrail is able to improve its efficiency.

Sensitivity tests were performed with respect to the three factors about which there is the greatest uncertainty, namely: (i) the freight task projections; (ii) the labour/capital adjustments required to improve the efficiency of Tasrail's operations; and (iii) the shadow prices of rail and road haulage labour. Over a plausible range of variations to these factors the estimated net gains to society from closure remain predominantly negative supporting the conclusion that Australia would be better off if Tasrail was retained.

All this ignores the broader social costs of closure which have not been evaluated in the cost-benefit analysis, for example, the costs imposed on redundant Tasrail employees unable to find work and on their families. The loss of jobs would be severest in regions already experiencing higher than average levels of unemployment such as Launceston. Then there are the deleterious environmental consequences of noise, pollution, vibration and traffic volume caused by the increase in the number of heavy vehicles using the roads. These factors appear to add weight to the conclusion that Australia would be better off by retaining Tasrail.

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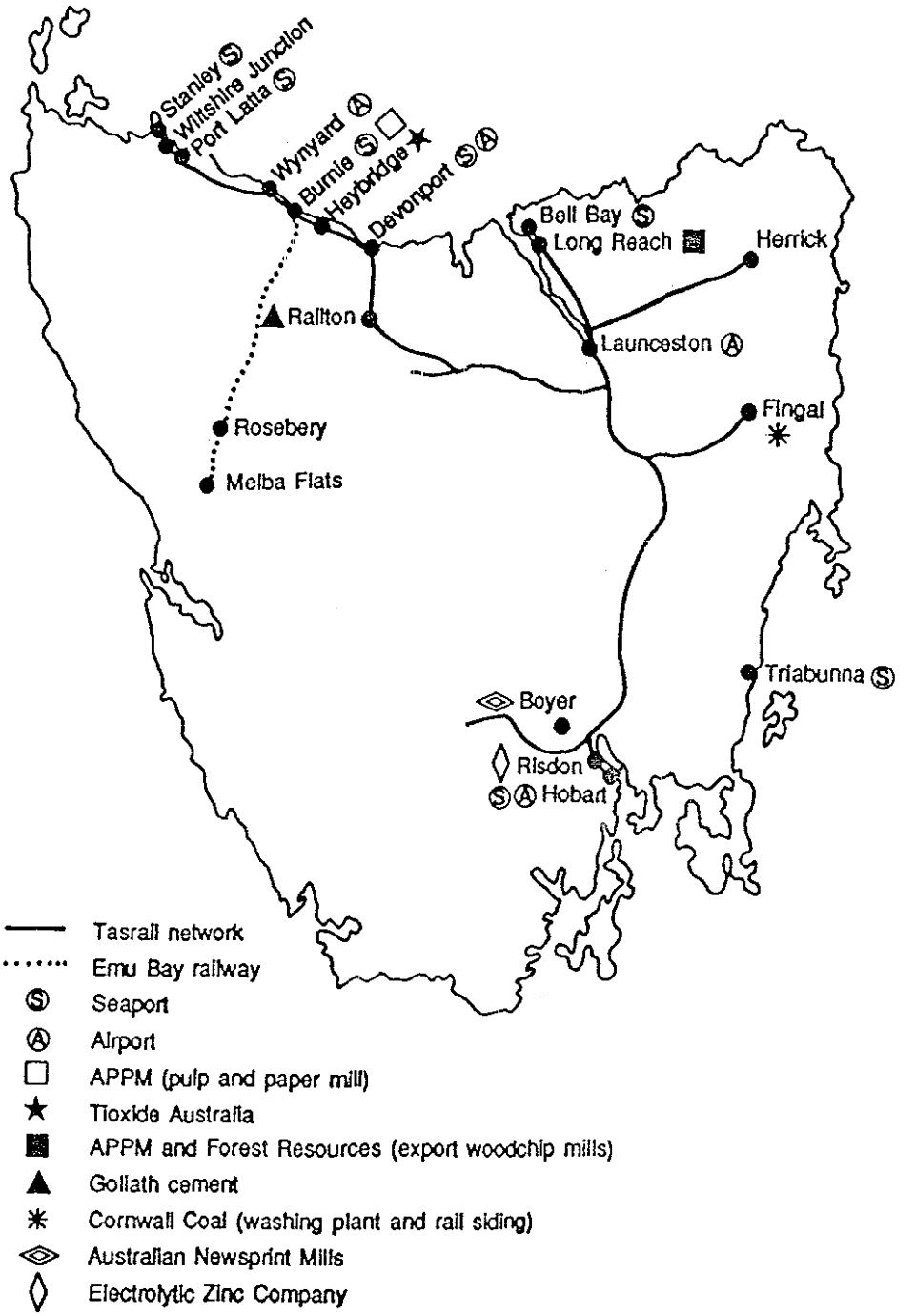
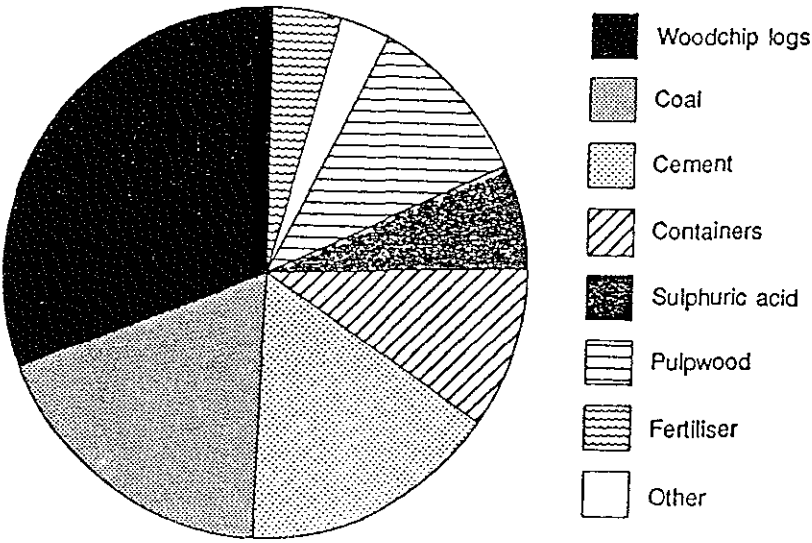


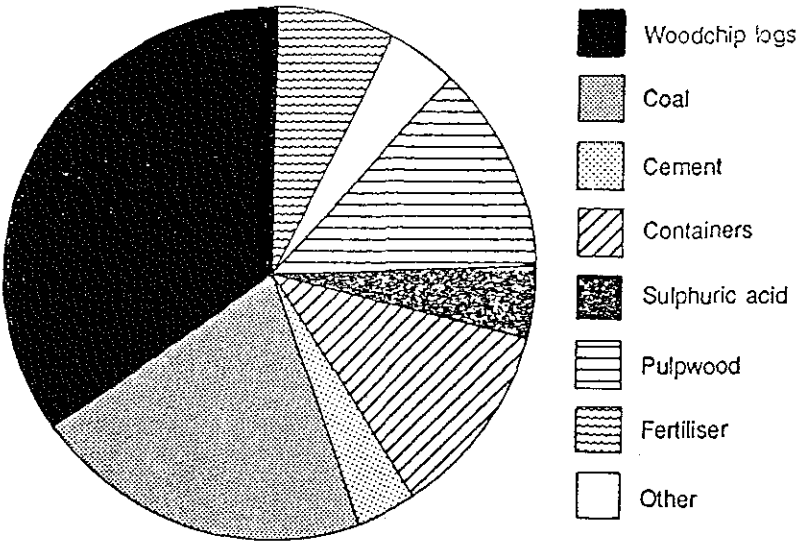
Source BTCE.

Figure 1 Tasrail network and major industry locations



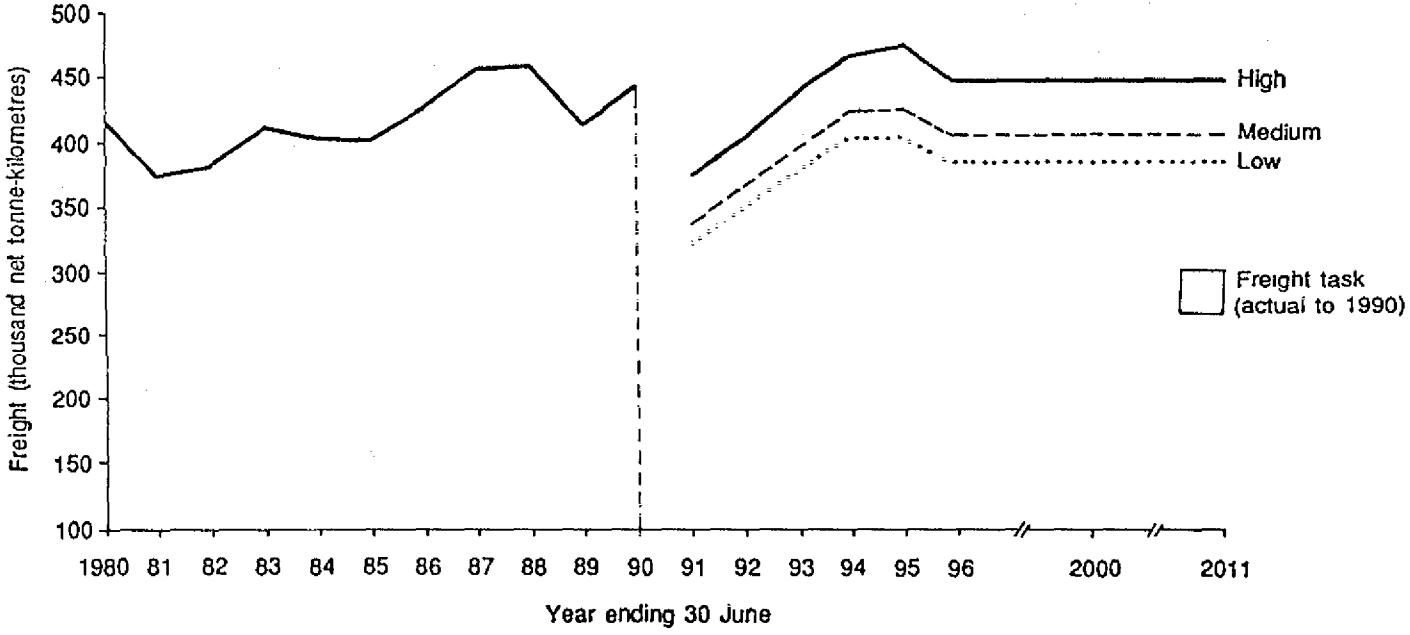
Source Tasrail, 1991.

Figure 2 Major commodities, freight tonnage, 1989-90



Source Tasrail, 1991.

Figure 3 Major commodities, net tonne-kilometres, 1989-90



Source Fay, Richwhite.

Figure 4 Tasrail freight task: historical performance and forecast