Appraising Rail Transport Systems Using Discounted Economic Value Added: The Australian Case

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Abstract:

The evaluation tools such as risk-adjusted discounted cash flows DCF to evaluate the performance of the railway industry in Australia have been subjected to criticism Much of the criticism stems from the recognition that it is perhaps the accounting data on which traditional performance measures are based do not reflect the relevant information required to value the entities One proposal for reform includes replacing the venerable DCF method with a broader, value-added measure, called economic value added or MVA The latter is already widely used to measure the intrinsic worth of a publicly listed corporation It is the purpose of this paper to look at the feasibility of applying this model to appraise the performance of Australian railways.

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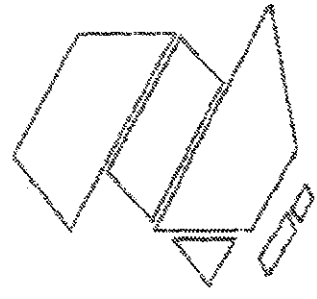

APPRAISING RAIL TRANSPORT SYSTEMS USING DISCOUNTED ECONOMIC VALUE ADDED: THE AUSTRALIAN CASE

Introduction

Australian government railways are characterised by large financial losses. In 1989-90 the direct loss in aggregate was $2,100 million. The Industry Commission estimated that over the last decade these losses amounted to at least $20,000 million, and the true economic cost is larger still.[1] Even taken on their face value, the amounts involved are not trivial. Railways losses account for about one third of State sector debt. Moreover, these losses impact on financial markets by absorbing available funds that could have been more productively employed elsewhere.[2] The focus of debate on railways in Australia have addressed the problem of reducing the size of this loss.[3] One way is to improve financial and operating efficiency; the other is to corporatise railways.[4]

The purpose of this paper is not to enter into these debates, but rather to raise the hitherto neglected issue of asking what are the appropriate evaluation techniques? The question is: "what experience with railway reforms overseas and attempts at past reforms can shed some light on the proper valuation tools to be used to guide the new reform agenda?"

The evaluation tools used to date (such as risk-adjusted discounted cash flows DCF) have been subject to criticism.[5] Much of the criticism stems from the recognition that it is perhaps the accounting data on which traditional performance measures are based do not reflect the relevant information required to value the entities. One proposal for reform includes replacing the venerable DCF method with a broader, value-added measure, called economic value added EVA. The resultant sum of the present value of the discounted economic value added has a stock market equivalent, market value added, or MVA. The latter is already widely used to measure the intrinsic worth of a publicly listed corporation. *It is the purpose of this paper to look at the feasibility of applying this model to appraise the performance of Australian railways.*

Evaluating Future Cash Flows Using Benchmarks

Despite widespread dissatisfaction, the capital asset pricing model CAPM is still used to discount estimated free cash flows as a performance evaluation tool, possibly because it is thought that no viable alternative exists. Indeed, the argument now is that there is still merit in setting a target rate of return for government business enterprise and monitoring performances against such a benchmarks *provided they are the right benchmarks*. As the Commonwealth Treasury explained:

> *Target rates of return for public business enterprises should reflect the return achievable from alternative private sector investments of similar risk that are*

> *just viable (marginal). If targets set on this basis were met over time the resources of he enterprises would tend to be channelled to their highest value use from a national point of view and the owner governments could be confident that the community was getting value for money from the public business investments*

In calculating rates of return, eg return on assets ROA, the Treasury argues this requires an estimate of the value of the assets as well as an estimate of the earnings derived from those assets. It is in the current definition of 'earnings' as the difference between cash flows classified as either revenue or expenses which creates the problem for railways.

The taxpayer as a shareholder expects to make a return on the substantial assets acquired in the name of a railway system. Using a relatively low estimate of the current aggregated market value of rail capital stock of $10 billion suggests that a cash flow of up to $1 billion per annum *should* be generated in order to give a return on assets ROA of 10%, when in fact the returns were *negative* 11.5%.[6]

While expecting a positive return on funds employed, the reality is that the total stock of railway assets yields large negative rates of return reflecting the magnitude of the deficits incurred. The Industry Commission has extended to railways the analysis done previously on rates of return for a range of other government business enterprises. That analysis indicated, for example, average real rates of return ROA in the three years to 1987-88 of a positive 5.5% for Telecom and positive 1.0% for Australia Post.[7] While many of the external benefits and costs of railway operation are excluded from these rate of return measures, that is no different from the situation for Telecom and Australia Post both of which are required to provide some non-commercial services to the community. The rates of return suggest that the community has not been getting a reasonable rate of return on the assets that it has tied up in railways.[8] EPAC estimated that in 1991-92 total rail (QR, SRA, PTC and Westrail) averaged a rate of return on assets of *negative* 9.15%, with QR earning positive 13.18% and Victoria's PTC earning a negative 31.65%.[9]

In an assessment of the performance of government business enterprises the Industry Commission argued that SRA calculations of required returns are in any case overstated because indexation of prices is allowed for in both the valuation of assets and the calculation of the required rate of return. The Industry Commission adopted as the appropriate benchmark a real rate of return of 8%, equivalent to the real return on long-term government bonds (1985-86 to 1987-88), adjusted for a small margin of risk and a community service obligation. For the specialised sub-category of railway coal freight it adopted a risk-return benchmark real return of 10% (or about 15% nominal assuming an inflation rate of 5%).

Given that the estimated capital stock is around $15 billion for all Australian government-owned railways, the Industry Commission estimates the current financial performance of rail services is currently costing $4 billion per annum; so when added

to the approximately $1 billion it *should* be earning according to the benchmark, *the true value loss may be more than $5 billion per annum* worse than if they were provided by a viable commercial alternative.[10] Expressed differently, this is the intrinsic or real opportunity cost, it is the `value added' loss each year of a nominal corporation which, in order to remain viable, should *add* to shareholder value. In this case, the opening capital stock is being reduced in the order of $5 billion. By propping up though equity grants and non-repayable debt issues the government is disguising the true extent of the loss.

The provision of equity capital is usually provided free of any implicit charges. In those cases when a capital charge *is explicitly* extracted, this often bears no relation to market realities. Higher returns expected from equity holders commensurate with the higher level of *financial* risks resulting from the value of the debt in the overall capital structure is invariably omitted for the simple reason that no estimates of the value of `equity' (or its government enterprise equivalent) is even attempted. That is, the cost of equity capital has been implicitly assumed to be zero. This presumption has rarely been articulated in discussions on railway performance.

Despite their defects, free cash flow estimates provide clear evidence of the scope for a more disciplined use of railway assets. The aim of these earlier methods using DCF was to encourage more efficient use of resources, in particular to assist with rational pricing and investment decisions.

These target or benchmark rates of return using risk-adjustment factors (eg beta) are not appropriate for railway systems. A number of observers have already noted that the approach is flawed. The Australian Chamber of Manufacturers for example argued that benchmarks offer no guarantee of greater operational efficiently "because it is too easy for authorities to achieve such returns via price increases rather than improvements in operational efficiency."[11] Similarly, the Commonwealth Treasury argued that "Pricing to equate demand with available capacity as much as possible -rather than pricing to maximise returns or pricing to meet prior targets - is a fundamental requirement of government business enterprises .... especially in the cases of enterprises with monopoly power."[12] The Industry Commission also agreed that subsequently setting prices to reach some targeted rate of return on capital "may be inappropriate" because such an approach would likely result in under utilisation of fixed capital.[13]

Difficulties of Using DCF Analysis

While both the SRA and the Industry Commission have moved down the path of using a risk-adjusted benchmark rate, it is doubtful if this model is appropriate.[14] Even abstracting from the fact that the crucial difference between debt and equity is usually ignored in their analysis, it is doubtful if DCF using a risk-adjusted discount rate is the right approach to use in a railway context.[15]

True, the capital asset pricing model CAPM and its variants (eg the continuous time asset pricing model) can provide a commonly understood benchmark for setting target rates of return. Yet in so doing there are two difficulties in obtaining values for the

parameters used. Firstly, railways currently have fettered responsibilities and potential conflicts in loyalties which constrain their corporate freedom of action; and secondly they have unique problems of valuation of assets and liabilities which impinges on performance appraisal.[16] For example, a significant asset of a railway system resides in real estate which is difficult to value. This value capture problem arises primarily because the increase in value consequent upon the existence of the railway is often captured by outside parties.[17] Let us examine these two criticisms in more detail.

1 Fettered Responsibilities

The first criticism of using DCF analysis to evaluate railway performance is that is it is unreasonable for railways to seek the same returns as that of an efficient (ie. least-cost) organisation. Australian rail systems have complained of political interference in investment decisions. AN for example claimed federalism and state ownership of rail services impedes the introduction of the newer technologies; Vicrail claims that short term investments are given priority; QR suffers expansion and upgrading of its coal lines based on political decisions to subsidise the coal exports in periods of international competitive pressures; and Westrail claims that profit-earning projects are delayed and that there is discrimination against projects with long term benefits

Political decisions currently still play a dominant role in determining the nature and magnitude of railway capital expenditure. AN argued it was the only rail system that borrowed on its own name prior the establishment of the National Freight Corporation NFC. Even so, AN was still reliant on an explicit Commonwealth guarantee for its borrowings for which it paid a fee of 0.125% per annum.[18] From it submission to the Industry Commission, AN advised it preferred *not* to borrow from the Commonwealth as the terms were inflexible and the cost was higher than competitive sources of funds.

Rather than demanding a 'least cost' pricing structure, another more feasible alternative which has been proposed would involve a phased reduction in freight rates as rail moved towards international best practice. Management has already partially moved to accrual accounting practices. This at least will make allowance for a depreciation charge, and hence require an estimates of the value of capital assets. If, as is currently being advocated by the Australian Accounting Research Foundation AARF that an objective of general purpose financial reporting is to "provide information useful to users for making and evaluating decisions about the allocation of scarce resources," then it is an inescapable feature of modern accounting to properly value non-current assets.[19] Moreover, should a future maintainable earnings (FME) approach be recommended to value non-current assets, then the issue of the appropriate capitalisation rates comes to the fore.[20] Even so, by generating debates as to the best means of identifying non-current assets and the best methods of valuing these assets, the whole question of government control of assets represents a step in the right direction. The adoption of accrual methods of accounting will at least favour proper management of fixed assets (and future capital projects), rather than allowing the political considerations to intervene in the process, but it does not go far enough to redress the more fundamental problems of valuation.

If railways are required to achieve a commercially acceptable rate of return then they first have to operate as an efficient *commercial* organisation. Bulk freight rail systems may be *operationally* efficient in the transport of some particular goods in some regions but this still does not mean that these railways on these routes are operating as an efficient transportation system.[21] Commercial effectiveness is determined on the basis of properly aligned property rights. If for example financial instruments cannot be classified as debt or equity then return on equity becomes meaningless. To the extent that least-cost practices are not in place, estimates of least cost practices should be calculated *and then discounted appropriately* to in order to set appropriate prices and rates of return, not the other way around as is currently the practice.[22]

According to consultants Travers Morgan, operating costs for SRA and QR together would decrease by approximately 22% with the introduction of `best-practice' costs in the haulage of coal and other minerals.[23] By their own admission these calculations do not take into account any capital costs nor capital charges associated with non-renewable capital such as land.[24] This is a notable omission: because some assets are difficult to measure they are simply excluded from the calculation! They explain that a "major reason" for the lack of emphasis on improving capital utilisation "has been inadequate recording of the cost of capital assets."[25] Increased investment in mechanised maintenance equipment and replacement of existing assets should achieve lower operating (including infrastructure and maintenance) costs, which now absorb about 70% of all railway costs, as measured according to existing railway accounting conventions, but which would be lower if a more realistic valuation of assets were to be used

Management control techniques have changed in some rail systems in attempt to improve accountability by allocating ownership of existing assets to strategic business units SBUs, and indeed asset identification and elimination of surplus assets is expected to be a major outcome from current restructuring of management practices.[26] Without an estimate of the true amount of capital invested in rail it would be difficult (to say the least) to devise a full cost recovery scheme. It should be stressed however that even if the optimal cost recovery procedure *were* devised and implemented this does not *per se* guarantee economic efficiency.[27]

Assuming accountability restructuring is successful, the fundamental issue remains: accountable to whom? As is the case in the private sector, the interest of managers do not always coincide with those of the shareholders.[28] Managers invest their human capital; shareholders funds. The former will thus be expected to be pre-occupied with signalling to the market place for managerial talent their ability to control a large labour force and to borrow funds. The capital-labour ratio and debt-equity ratios may therefore not be optimal when considered from the viewpoint of the owners. Remuneration packages should be recast so that the interests of the two groups are more closely re-aligned: the granting of options over shares is one technique already widely used; but a better system would be to base managerial remuneration *on value created* during their incumbency.

Thus the significance of the discrepancy between actual and least cost practice as outlined in the Travers Morgan study. The discrepancy depends on the contribution or value created above and beyond the cost of the additional inputs acquired during the period: it is the addition to equity apart from contributions. It is value added in the production process, and not cash inflows less the cash outflows, nor accrued revenues minus accrued expenses, as presumed in the accounting process that railways are now implementing.

An example may clarify the point. Increased value is derived from one of three sources: improved net operating profit; new product development or value derived from the taxation benefits of financial reorganisation. If the net operating profit after tax NOPAT contributes 40%, and the discrepancy between least cost and actual pricing is five percent, then this `value driver' would contribute 40% of five percent of the value of the final output. If we assume a $1 million operating profit, then five percent of $1,000,000 would be $50,000, and of that amount the value of the value driver would be $20,000 (ie. 40% of the $50,000). If we further assume the number of years of operation to be 10 years, and assume a discount rate of 12%, then the increase in economic value added would be:

After year 1, $20,000 discounted at 12%, gives a present value of $17,857
After year 2, $20,000 discounted at 12%, gives a present value of $15,944
.....
After year 10, $20,000 discounted at 12%, gives a present value of $6,439

The sum of the present values so computed for the 10 years would be $113,004, which represents the increased value of the railway system consequent on adopting the `best methods' practices. It is the economic value added by making those improvements. Current accrual accounting cannot incorporate the value of these improvements in such an integrated fashion, and free cash flow analysis misses the fact that it is the net stock increase in the value of the entity which is the relevant issue, not just the cash flows.

Adopting EVA as the valuation technique for railways removes any lurking potential for dividing managerial responsibilities. It enables a more consistent remuneration program to be devised and thus dispenses with potential conflicts of interests. For example, in the case above, if 10% of the EVA were allocated to management as a performance bonus, it would receive $11,300 (ie 10% of $113,004) over the period. There should thus be congruence of interests between the owners who devised the remuneration scheme and gain the EVA personally and the managers tasked with the responsibility of having generated this increase in value.

In addition to tidying the loyalty issue, EVA unleashes other benefits as well. To start with, EVA properly values the assets of railways, and in so doing also measures any improvement in the value of these assets. Prior public sector accounting systems did not recognise a significant valuable asset in the railway capital stock inventory. `Value capture' elements do not traditionally be incorporated in public rail investment estimates.[29] The adoption of a private sector accrual accounting system will not easily admit of this valuable asset either: the value of an option to claim development of land

space which has become (or might become) valuable. This generic value driver is a strategic option value and is usually referred to as `value capture' in traditional literature but in the context of an EVA analysis it assumes greater significance.

To recapitulate: target rates of return have been justified a means to remove some of the political constraints which presently prevail, but they represent at best misguided attempts to improve performance. Target rates of return cannot play a useful role unless the railways are permitted to make commercial decisions, not only in the daily operations but also in the longer term investment strategies. Accordingly railways must have the unfettered ability to set commercial charges. To be meaningful, such charges must include the savings from the present capital structure presently used for rail funding (eg tax deductibility of interest on debt, the true risk-adjusted cost of equity capital consequent on the leverage employed, the element of risk associated with loans to semi-government authorities) and any community services obligations which governments or any other public agency wishes to impose. Unfortunately these true or economic costs are rarely fully and explicitly enumerated in calculating target rates of return using DCF analysis.

2 Financial Risk

The second criticism relates to the other side of the balance sheet: to the division between liabilities and shareholders' funds or its equivalent (eg government equity). Obviously the sum total of both sides should balance. But double-entry accrual accounting has rarely ever been fully implemented as an integrated procedure in State railways.[30]

The difficulty is that the total liabilities for rail systems is difficult to determine. Most discussions concerning the size of the railway deficit implicitly presumes that the deficit will be financed through debt issues. As debt rises, this increases the financial risk of the `owners.'[31] Yet it is scarcely acknowledged by those advocating the use of a risk-adjusted discount rate that the cost of equity capital rises as deficits increase. Presumably, the difficulty of distinguishing between debt and equity in government statutory authorities precludes such an acknowledgment. If it is difficult to separate the two sources of funding in the capital structure of railways, then techniques which do not require such a separation should be used. The capital asset pricing model is incomplete and does not give a true picture of the true cost of deficit financing if the effects of the debt issue are ignored in calculating the appropriate benchmark for evaluating investments. The EVA approach by contrast does not depend so critically on the debt-equity mix in the capital structure, since it asks only what are the value drivers which generate the increased value. It does not require a separation of the costs of the two sources of finance.

Just how difficult is it to distinguish between debt and equity? Difficult it seems, because it has been argued that **all** government debt can be `reclassified' as equity.[32] ***Firstly***, the bulk of advances were made at the inception of most government business enterprises (eg State Railways; Telecom) and so reflect a claim by the government upon the assets which were given at the time. *Second,* the interest paid on these initial

advances has been varied at the government's discretion, rather than being contractually determined as would be more likely in the case of debt. The result of this is that the government can vary these rates in order to withdraw capital in a manner which resembles dividend payments. *Third*, the fact that the owner (ie the government) is the provider of the advances rather than a third party, strains the concept of debt, since ownership and control are rights that usually rest with the holders of that right rather than bondholders. And *finally*, all advances which have been made subsequent to the initial offering have been made at times when no alternative of issuing public debt was available. This factor suggests that the government has on these occasions preferred to engage in equity-type finance rather than see it resort to incurring an additional liability. For these reasons it can be argued that virtually all assets should be appropriated by the new shareholders, or that all claims on assets should be reclaimed by debt-holders. In either case, the distinction may appear irrelevant because it is the taxpayers who ends up with the assets.

Adjusting for financial risk in EVA analysis

Whatever performance appraisal technique is used, free cash flows DCF or economic value added EVA, the resultant benchmarks should allow for the risk of the business and other criteria considered relevant to the nature of that business. It is here that economic value added offers a richer integrative framework than risk-adjusted return on equity targets when analysing capital-intensive industries such as railways. It enable other factors besides cash flows to be brought into the equation, and railways have lousy cash flows.

The almost universally used measure of performance in the private sector among professional analysts is rate of return on assets ROA or equity ROE. Yet for railway systems the expected cash flows are poor; their real worth lies in the value of their assets, notably real estate. Should this real estate be valued at current market prices, which is often advocated, the subsequent return on assets calculation will be unacceptably poor. This arises because the denominator in the return on assets ROA equation is increased, reducing the yield. For example, if earnings remained static at say $100m and assets were valued at $500m, then ROA would be

$$\$100m / \$500m = 20\%.$$

Should the value of assets be increased to $800m. ROA would fall to

$$\$100m / \$800m = 12.5\%.$$

Privatising railways does seem an attractive proposition precisely because of these asset values. As the Japanese experience indicates, some privatised railway systems can prove to be enormously profitable.[33]

The appropriate benchmark should not be return on assets as usually interpreted but should reflect the **potential** to create value for the prospective owners. Economic value added or its popular share markets equivalent shareholder or market value added MVA

allows this potential source of income to be incorporated into the valuation equation. Indeed, in the controversy surrounding the feasibility of allowing a new privatised railway system to be established between the Sydney-Melbourne route, the word `value capture' was mentioned in the sense that the railway would increase value along the route but that this increased value would not necessarily be captured by the owners of that service.[34] Where the railways did capture the benefits, as was the case with the privatisation of Japanese railways, this generated rates of return well above the average for similar risk investments.

The term `value capture' currently interpreted refers to the process whereby, in the establishment of a new railway line or in the upgrading of an existing line, the railway itself is able to benefit from the enhanced value of property affected by the new railway services. Value may be captured by the railway participating in commercial development of, for example, its railway stations. Or it may be captured by the railway receiving some share of increased land and property values attributable to the railway line and stations. Many railways in the US were financed initially from sale of part of land around the right of way, land which was granted by the government as an inducement to build the railway, and the concept has had some airing in Australia as the Very Fast Train (VFT) proponents initially considered that the project could be partly funded thought a tax on the enhanced value of land.

The Economic Value Added Approach[35]

For large capital-intensive investment proposals such as railways it may be more appropriate to approach investments from this value added perspective.[36] Industries which have their primary value locked up in non-current assets, such as smokestack industries and railways, instead of using risk-adjusted discount rates to value investments and the worth of the business, it may make more sense to approach prospective investments directly and bypass the tortuous route of summing the (risk-adjusted) present value of cash flows. This more direct approach simply quantifies the value of the proposed investment to the owner in much the same way that net present value does.

Economic value added refers to the value created by a corporation during the passage of time, usually one financial year. It represents the difference between beginning and ending capital, and is a stock concept:

$$EVA = V_2 - V_1 = dV/dt$$

EVA is not an accounting concept (hence the term `economic' value added), nor is it a flow or rate of return but is a dollar amount. For example, if opening capital is $1000 and ending capital is $1100, then EVA is $100. This amount needs to be discounted back to the present for it to have proper economic meaning; the resultant present value may in this case be worth say $91. When the present values of all the discounted EVA estimated to occur in the future are added together, this gives us the market value added, or MVA.

Return on capital employed r *less* the cost of capital k gives the spread or net return on capital:

$$\text{Spread} = r - k$$

EVA is the spread *times* the amount of capital at the beginning time period:[37]

$$EVA = (r - k)\, K_t$$

Alternately expressed, EVA is the amount generated by that capital *less* a cost for that capital employed:

$$EVA = rK - kK$$

The stock market will reflect EVA in a market valuation, and this market valuation is the MVA

$$\text{MVA} = \text{sum of present values of EVAs}$$

$$\text{MVA} = \text{sum}\ (r - k) / (1 + k)$$

Exhibit 1 illustrate the meaning of EVA and its stock market counterpart, MVA. The opening capital value in 1993 is $1000 and the value created during the year is $40. Discounted back to the present at a discount rate of 10%, given by the weighted average cost of capital WACOC, this gives a PV of $36.36. In the next year EVA is $41.45, which when discounted again at 10% (ie using a present value interest factor PVIF of 0.8264) produces a PV of $34.26. Similarly for all the other years to 1999: each EVA is discounted to the present and then added in much the same that net present value is calculated, only that the resultant summation of future EVAs is called market value added. But unlike NPV, the initial investment is **added** to the MVA, to give the forecasted market value of the project. In this case, $1,000 is added to the $211.65 to give a market value of $1211.65. (This amount should be roughly analogous to the market capitalisation of companies on the stock markets.) If the amount of debt is subtracted from this figure, the result will be the market value of the equity, and from here it is but a simple step to divide this forecasted equity valuation by the number of issued shares to give the intrinsic current share value. In case 1, the shares should be valued at $7.12.

EXHIBITS

The concept EVA and MVA is intuitively obvious. The difficulty is to obtain the raw data initially. Practically, raw accounting data is reworked to package the data required, but is easier to initially understand the concept using familiar financial terminology. If we multiply the spread between the return on assets ROA or r and the weighted average

cost of capital WACOC k by the opening value of the capital stock this will give us EVA. For example, with an r of 14% and k of 10%, the spread is 4%. Multiplied by K_t of \$1000, EVA is \$40. That is, EVA is the return from capital employed less the weighted average cost of capital multiplied by the amount of capital used in generating this return.

The EVA approach outlined above is not only intuitively obvious. It also conforms with an approach to investment evaluation and an accounting measuring approach long advocated by economists, not to mention its taxation advantages! As of early 1992, `value adding' has also been given legal endorsement through the promulgation of Australian Accounting Standard Board AASB, tasked with the responsibility of standardising the accounting conventions of the new 1992 Corporations Law. Exposure draft ED 51B defines revenues as any

> *inflows or other enhancements or savings in outflows of economic benefits or service potential in the form of increases in assets or reductions in liabilities, other than those relating to contributions by owners, that result in an increase in equity during the reporting period.*

Similarly, exposure draft ED 46B defines expenses as

> *consumption or losses of economic benefits or service potential in the form of reductions in assets or increases in liabilities of the reporting entity, other than those relating to distributions to equity participants, which result in a decrease in equity during the accounting period.*

That is, in adopting this definition the AASB has lent its support to the modern economic value added approach to revenues as being any factor which increases the resource base of the entity, that is, to increase assets over liabilities excluding contributions of equity. The AASB has dispensed with the old accounting presumption that revenues are net accrued inflows, and that expenses are net accrued outflows. This subtle distinction hides a very dramatic shift in the axiomatic foundations of accounting, the implications of which impinge on the issue of accounting for government business enterprises as well as for private sector entities.[38]

Entities may be valued a number of ways. Historical cost, current cost, replacement value, realisable value the sum of the discounted value of future maintainable earnings (FME) are the most popular. Of these, the most accurate and reliable is the sum of discounted FME. Yet until this redefinition of earnings as being the net increase in the value of equity (ie EVA) for each year, discounted back to the present at a risk-adjusted discount rate, this route yielded a disappointing value for all rail systems. This disappointment arose because of the archaic definition of earnings as being the difference between cash inflows and outflows or, worse still as viewed from a proper valuation perspective, as being the difference between accrued inflows and outflows.

Yet privatisation programs overseas, notably in Japan and the US, revealed that the acquisition value of a rail system was surprisingly high. Turnaround strategies implemented in the acquired railways yielded returns well in excess of required rates of return for similar risk investments. The missing link in the equation was that the value of rail systems derived not so much from the cash flows but from the hitherto unmeasured increases in asset values resulting from "difficult to measure" improvements such as the value of the land corridors occupied by the railways.[39] Given that rail systems currently have poor cash flows relative to the assets employed, and the prospects of a high cash flow appear dim, estimating future expected earnings as the difference between revenues and expenses as merely net inflows *seriously underestimated the aggregated value of the entities*. Using EVA, the measurement difficulties are not solved but at least the inbuilt implicit bias dragging the value downwards is removed. By redefining earnings as the net increase or decrease in equity boosts value by allowing formerly ignored factors (such as value capture) to be explicitly incorporated into the discounted future maintainable earnings valuation formula.

Previous methods of valuation prior to the AASB promulgation were unsatisfactory. This was widely recognised, but it was addressed in a number of *ad hoc* ways most of which were not entirely satisfactory either. It was rarely admitted that at fault lay the defective historical cost accounting convention that net inflows must be measurable according to traditional accrual concepts, and that they must be a flow over time and not a fixed stock.

The SRA for example dealt with the problem of employing different methods of calculating capital costs for different types of assets. For non-renewable assets (for example, infrastructure), an annual rate charge was calculated on an historical cost basis, while for renewable assets (for example, locomotives and wagons), a replacement cost depreciation policy was followed (using 7% real interest rate over the assessed economic life of the asset, based on the current replacement cost which is updated each year).[40] The SRA is considering the use of depreciated replacement cost valuation for track as well as rolling stock, but inflated historical costs for non-replacement capital (for example, tunnels, bridges and buildings). This was not a consistent approach to the problem, even though it at least acknowledged its existence.

Information on the valuation of assets of government business enterprises is currently designed to serve two purposes. The first is to provide the readers of annual reports with information about the performance and financial standing of the enterprise. Using historical costs for this exercise may provides incorrect or misleading information about the market value of the firm. The second purpose is to provide to the investor in the corporation information about the return received on investment and whether the investment has maintained its value in real terms. For this purpose the use of replacement cost (which includes an inflation factor) is sometimes used, but this is also hardly satisfactory, presuming as it does that the choice of original equipment was appropriate. It frequently gives a too high asset valuation and generates a low rate of return on assets. It has been suggested that it is this phenomenon which compels

railways to charge high freight rates, justified in the name of a full cost recovery pricing policy. It is well known that Queensland coal companies prefer a purely historical cost approach to asset valuation because it produces a smaller asset base and hence requires smaller profits to achieve respectable returns, which in turn means lower freight rates.

Summary and Conclusion

The size of the deficit of Australian railways is of concern to the governments which currently act as their owners, and are therefore legally bound to fund those deficits. These deficits are currently not trivial, and demands are being made to reduce this drain on state government resources and to improve performance.'

Care should be exercised in requiring railways to do this. Caution is required because target risk-adjusted rates of return as determined by the CAPM may not be appropriate for railway systems. Such benchmarks are not appropriate because railways do not operate in an unfettered environment and because the required rate of return for financial risk is difficult to determine. The division between liabilities and equity is murky at best; the capital structure ill-defined, and a major component of its assets consists of land which is awkward to value using traditional valuation techniques. In the light of these difficulties it may be more appropriate to use an alternative to the CAPM to benchmark the performance of Australia's railway systems. Discounted economic value added EVA analysis may prove to be a more accurate and convenient alternative.

University College UNSW, June 1993

References:

Abelson, Peter (ed.) Privatisation: **An Australian Perspective** Australian Professional Publications, Sydney: 1987

Affleck, F.N. "The Future for Rail: Developing a National Strategy to Meet Competition," unpublished paper presented at the Profiting from Transport Reform Conference, Sydney 31 May- 1 June 1990

Ahn, Chang and Thompson, Howard E. "An Analysis of Some Aspects of Regulatory Risk and the Required Rate of Return for Public Utilities," **Journal of Regulatory Economics** Vol.1 (1989), pp.241-57

Beesley, Michael E. and Kettle, Peter B. "Devising Business Strategy for Railways," **Transportation** Vol. 13 (1984), pp.53-83

Bendall, Helen and Manger, Gary J. "Corporate Investment Decisions: What are the Relevant Criteria?" **Corporate Management Journal**, May-June 1991

Borins, Sandford F. "The Effect of Pricing Policy on the Optimal Timing of Investments in Transport Facilities," Journal of Transport Economics and Policy May 1981, pp.121-33

Bureau of Industry Economics (BIE) **Research Report No.41** [the `Travis-Morgan' report] Canberra AGPS 1992

Bureau of Transport and Communications Economics (BTCE) **Financial Performance of Government Business Enterprises in the Transport and Communications Portfolio 1977-78 to 1988-89** (Information Paper 35) Canberra AGPS 1990

Cook, James "How not to run the Railroads," **Forbes** Vol. 141, No.3 (February 8, 1988), pp. 122-26

Cox, J.C., Ingersoll Jr J.E. and Ross, S.A. "An Intertemporal General Equilibrium Model of Asset Prices," **Econometrica** Vol.53 (1985), pp.363-84

Dodgson, J.S. The Economics of Australian Railway Deficits Australian National University Centre for Research on Federal Financial Relations **Occasional Paper No.11**, Canberra 1979

Economic Planning Advisory Council EPAC [Ross Clare and Kaye Johnston] **Profitability and Productivity of Government Business Enterprises** Research Paper No.2 Canberra AGPS August 1992

Economic Planning Advisory Council EPAC [Ross Clare and Kaye Johnston] **Financial Performance of Government Business Enterprises: An Update** Background Paper No.25 Canberra AGPS April 1993

The Economist "Japanese Railways: Where Rail Makes the Money," Vol.307 No.755 (June 11, 1988, pp.72-73

Forsyth, Peter J. "Transport Deregulation in Australia: An Interpretation in Terms of Public Interest and Private Interest Theories," Department of Economics, Australian National University Canberra, unpublished manuscript, May 1992

Galligan, Brian **Utah and Queensland Coal: A Study in the Micro Political Economy of Modern Capitalism and the State** Brisbane: University of Queensland Press, 1988

G. Green, "Management Reforms in British Rail," unpublished paper presented as a Keynote Address to the Conference of Railway Engineers, Adelaide September 1991

Grimm, Curtis M., Kling, James A. and Smith, Ken G. "The Impact of US Rail Regulatory Reform on Railroad Management and Organizational Structure," **Transportation Research** Vol. 21A, No 2 (1987), pp.87-94

Grimm, Curtis, Winston, Clifford and Evans, Carol A. "Foreclosure of Railway Markets: A Test of Chicago Leverage Theory," unpublished paper presented to the Department of Economics, Faculty of Economics and Commerce, Australian National University 10 October 1991

Hensher, David "Productive Efficiency, Ownership and Contracting Out of Transport Services," in Abelson (1987, pp.154-67)

Holthuyzen, Fay "The Finances and Performance of Australia's Rail Systems," a paper presented at the Thirteenth Australasian Transport Research Forum Transcripts in Christchurch New Zealand, 1988, transcript of proceedings Volume 1, pp.17-42

Industry Commission **Rail Transport Report**, Volume 1: Report (Report No. 13), 21 August 1991

Kolsen, H M. and Docwra, George "Cost Recovery Policy in Theory and Practice," paper presented at the Thirteenth Australasian Transport Research Forum Transcripts in Christchurch New Zealand, 1988, transcript of proceedings Volume 1, pp.35-55

Kunz, Martin and Shiel, Michael "Comparative Analysis of the Effect of Rail Ownership on Performance," a paper presented at the Thirteenth Australasian Transport Research Forum Transcripts in Christchurch New Zealand, 1988, transcript of proceedings Volume 1, pp.35-55

Manger, Gary J. and Robertson, Paul "Corporate Acquisitions: New Light on an Old Strategy," **Corporate Management Journal** Oct.-Nov. 1991

Organisation for Economic Planning and Development OECD **Telecommunications and the Australian Economy: Report to the Department of Communications** [the 'Ergas Report'] Canberra AGPS 1986

Officer, R. R. 'Accountability and Monitoring the Performance of the State Enterprise,' in Monash University Centre of Policy Studies **State Enterprise and Deregulation** Melbourne 1983

Sutcliffe, P., Micallef, F. and Parker, L. D. **Financial Reporting by Government Departments** Australian Accounting Research Foundation Discussion Paper No. 16 Caulfield Vic. 1991

Rimmer, Maureen and Michael, Ewen "What If Railway Deficits Were Eliminated?" La Trobe University School of Economics **Economics Discussion Paper No.31/88** December 1988

Stewart, G. Bennett III **The Quest for Value: A Guide for Senior Managers** New York: Harper-Collins, 1991

Tamaschke, Rick and Lougheed, Alan "The Crowding Out Effects of Government Investment in Railways and Other Public Enterprises in Australia," University of Queensland Department of Economics **Working Paper in Economics No. 70** (September 1988)

Turk, Ivan **Accounting Analysis of the Efficiency of Public Enterprises** International Center for Public Enterprises in Developing Countries (ICPE) Monograph Series No. 19, Ljubljana Yugoslavia, 1984

United States Interstate Commission, Report to the United States Congress on Northeastern Rail: Evaluation of the US Railway Association's Final System Plan, August 25, 1975

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[1] Industry Commission (henceforth IC), 1991. p.120. See also Holthhuyzen (1986).

[2] For the aggregate effect of the crowding out other investment in capital markets see Tamaschke and Lougheed (1988).

[3] See for example Dodgson (1979); Rimmer and Michael (1988).

[4] For a discussion of possible options to improve freight operating performance see Affleck (1990); for a discussion of the effect of ownership on the likely performance of railways see Kunz and Shiel (1988); and for a discussion of regulation alternatives see Forsyth (1992).

[5] Officer (1983).

6 Economic Planning and Advisory Council EPAC (1992, p.19).

7 In responding to the draft IC report on this issue, AN argued that 'if the rates of return of the road transport sector were calculated on assets which included the road network and related land servicing and 'control infrastructure, in the same way that AN s rate of return includes track and related land and other assets, then the road transport sector would also demonstrate very low (generally negative) rates of return.' AN calculated that the real rate of return on their freight services was 5.8 per cent if the cost of track infrastructure and the value of government contributions were excluded

8 It may be argued that these estimates should be placed in a time context. These performance figures relate to the 'mid-1980s, and improvement have occurred in railway rates of return in recent years, especially for Westrail, QR and AN. Moreover, recent data for 1989-90 shows some recovery for the SRA after two depressed years, which is consistent with the NSW Treasury view that there are likely to be lags before the reforms and investments of recent years become operational.

9 EPAC (1993, p.9).

10 Cf. EPAC's (1993) net capital stock estimates for 1991-92 of $10,645 for total rail (QR, SRA, PTC and Westrail)

11 Industry Commission IC (1991, p.132). For a discussion of the optimal pricing policy and investment strategies in transport industries see Borins (1981).

12 IC (1991, p.132).

13 IC (1991, p.133).

14 Variants of the capital asset pricing model applicable to transport systems are discussed in Cox, Ingersoll and Ross (1985), while their practical feasibility is questioned by Ahn and Thompson (1989).

15 Australian Treasury (1990).

16 Other problems such as transfer pricing which inhibits flexibility in adjusting prices, and that demand for rail transport is both highly inelastic and seasonal are not addressed here.

17 Other factors besides property rights compound this problem of valuing rail real estate, eg asset 'specificity' which limits the use to which specialised railway items can be put. For a discussion of other relevant investment criteria in capital intensive industries see Bendall and Manger (1991).

18 IC Report, 1991., p.111.

19 Australian Accounting Research Foundation AARF 1990 Statement of Accounting Concepts SAC 2 "Objective of General Purpose Financial Reporting," updates and replaces the former 1985 Australian Society of Accountants ASA and Institute of Chartered Accountants in Australia ACAA's SAC 1 'Objectives of Financial Reporting by Public Sector Entitites."

20 This issue is discussed in more detail below.

21 For a discussion of alternative commercial alternatives and their effect on productive efficiency see Henscher (1987)

[22] Bureau of Industry Economics BIE (1992. Table 3 and Figure. 4.8. p 51).

[23] BIE (1992. p.56).

[24] BIE. (1992. Table 5.2. p. 59).

[25] BIE (1992. p.50). British Rail acknowledged the significance of the capital component of railways as early as the mid 1970s and had even implemented programs to improve capital asset management. Green (1991).

[26] For a discussion of the effect of reorganising railways into strategic business units (SBUs) using Vicrail as a case study.. see Beesley and Kettle (1984). On the relevance of contracting out as part of a SBU strategy see Manger and Robertson (1991).

[27] This cost recovery issue is dealt with more fully in Kolsen and Docwra (1988).

[28] For a discussion of the effects of regulatory restrictions have on managerial behaviour and performance of US rail managers see Grimm *et al* (1987) and Cook (1988).

[29] One of the first attempts to explicitly incorporate value capture in the valuation of a railroad can be found in the US Interstate Commission Report on Northeastern Rail (1975 pp. 40-45).

[30] For a support of this critical view see Turk (1984).

[31] This foreclosure risk can be very real in a regulated monopoly carrier such as is the case in the United States. For a discussion as to how this risk affects managerial behaviour and the investment decision see Grimm *et al* 1991.

[32] For a support of this argument see for example Organisation of Economic Planning and Development OECD (1986); Bureau of Transport and Communications Economics BTCE (1990).

[33] While in principle the Japanese government allows railways to earn up to 7% of the value of their railway assets, some discretion is allowed in the use of discovering new uses for their greatest asset land. JNR was split into seven baby JNRs in 1987. All made money in their first year in sum 156 billion yen - about four times about that originally expected (*The Economist* 1988, p.72).

[34] It was even suggested that a portion of the increased value should be taxed to defray the infrastructure costs in developing the corridor. A "value added tax' if ever there was one!

[35] This approach follows Stewart (1992).

[36] For another approach to the value added dimension as a method of estimating the extent of foreign control, see Galligan (1988, esp. pp. 212 -216).

[37] EVA can be converted to a standardised value by adjusting the capital value K to a common base amount and multiplying by 100.

[38] This procedure of incorporating the best features of the AASB redefinition of accounting concepts and applying them to public sector entities is advocated by Sutcliffe (1991).

[39] Other awkward attributes difficult to measure but which nevertheless contribute to economic value added include asset specificity, intermodal benefits, and the abolition of the requirement for railways to act as a community service.

[40] NSW Coal Association. Submission 31 p 11 reported in IC (1992, p 260-62.