

A FRAMEWORK FOR

NATIONAL PERFORMANCE MONITORING

OF

GOVERNMENT TRADING ENTERPRISES

Report to Special Premiers' Conference, July 1991, prepared by a Task Force on Monitoring Performance of GTEs.

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INTRODUCTION

The November 1990 Special Premiers' Conference established a Task Force of Commonwealth, State and Territory officers to report on the feasibility of establishing a national system for monitoring the performance of all major Government Trading Enterprises throughout Australia.

As the sponsor of this proposal, New South Wales naturally was an active participant in the work of the Task Force.

Its final report and recommendations were endorsed by the Special Premiers' Conference at its meeting in Sydney on July 30, 1991.

The report should be read by all NSW GTEs engaged in energy, rail, water, major ports and urban public transport so as to acquaint themselves with the requirements of national performance monitoring in future.

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NSW Government Representative
on the Special Premiers'
Conference Task Force on
Monitoring Performance of GTEs.
August 1991

EXCERPT FROM SPECIAL PREMIERS' CONFERENCE COMMUNIQUE, SYDNEY, JULY 30, 1991.

National Performance Monitoring

Government Trading Enterprises (GTEs) use a significant quantity of the nation's resources. The efficiency with which these resources are deployed is fundamental to the nation's economic performance and to assisting in many areas our international competitiveness.

Recognising these factors, leaders and representatives have agreed that a framework for national performance monitoring be established for GTEs. The system will initially concentrate on a core of larger and more significant enterprises in each jurisdiction.

At the State/Territory level the enterprises will include those involved in energy, rail, water, major ports and urban public transport. Commonwealth enterprises to be covered include Telecom/OTC, Australia Post, Australian National Line, the Federal Airports Corporation and the Pipeline Authority. This core group will be expanded progressively once the system is operational and may, in due course, extend to Local Government enterprises.

A range of performance indicators are to be used including accounting, economic and non-financial indicators. The focus initially will be on providing accounting and non-financial measures of performance.

The Industry Commission, under the auspices of a Commonwealth-State Steering Committee, is to prepare a preliminary version of national performance indicators for 1990-91 concentrating on accounting and non-financial measures of performance. The Steering Committee will consider:

- preparation and publication of performance indicators for 1991-92 by the end of 1992;
and
- the appropriate agency to undertake the task on an on-going basis.

In the meantime, the Public sector Accounting Standards Board and other bodies are to be requested to give priority to refining national accounting standards for GTEs, including standards for asset valuation.

**A FRAMEWORK FOR
NATIONAL PERFORMANCE
MONITORING OF GOVERNMENT
TRADING ENTERPRISES**

Report to Special Premiers' Conference. July 1991, prepared by a Task Force on Monitoring Performance of Government Trading Enterprises

Background

- 1 The discussion papers presented to the Special Premiers' Conference of October, 1990, included a paper which proposed that performance monitoring of Government Trading Enterprises (GTEs) would be best achieved by State and Territory Governments agreeing to regularly supply GTE performance data to a national monitoring body for GTEs. The communiqué of the Special Premiers' Conference of October 1990 accepted in principle the value of national performance monitoring for GTEs. It established the Task Force to report on how national monitoring might be best advanced. The Task Force has developed proposals for the establishment of a national monitoring system which are outlined in this report.

Rationale for National Performance Monitoring

- 2 The objective of a national monitoring system is to provide a national information base on the comparative performance of GTEs. By their nature, GTEs are subject to less market-based surveillance than private firms. For example, judgements about the relative performance of private firms and their management are reflected in the share market as shareholders and potential owners signal their views of corporate and management performance by placing values on company shares. Sharemarket monitoring may not always work perfectly but the exposure of the firm to the market for share trading does generate some degree of control over managerial incentives for better performance.
- 3 This process is not generally available to owners of GTEs. Its absence creates the danger that improvements in efficiency by GTEs arising from reforms of their operations may not be sustained unless their performance is subject to monitoring and assessment, with managers being rewarded and retained or dismissed on the basis of their performance. Performance monitoring offers a partial alternative control and evaluation mechanism for GTEs in the absence of an operational market for corporate evaluation and control.
- 4 The prime objective of performance monitoring is to assist governments in their efforts to achieve and sustain improvements in the productive and allocative efficiency and client responsiveness of GTEs. Performance monitoring can help to ensure that production costs are minimised, the right mix of goods and services is produced, consumers' preferences are responded to and that an appropriate rate of return is achieved on public assets.
- 5 An appropriate rate of return on public assets is necessary for several reasons. First, to assist governments in determining priorities for the use of community resources by comparing rates of return. Second, because governments are finding it increasingly difficult to finance the operating deficits of commercial ventures which have a lower priority than government social or regulatory obligations such as health, education and law and order. Third, the squeeze on government revenues from traditional sources (that is, taxes, regulatory fees, fines and grants from other tiers of government) means that earnings from investments (for example, government enterprise dividends) are increasingly expected to be at commercial rates to help fund essential social/regulatory services.

- 6 Owing governments at present utilise a variety of mechanisms to monitor the performance of GTEs and their managers. Annual reports of enterprises and the public reports of the Auditors-General and of parliamentary committees provide some discipline on the operation of GTEs. Additional performance monitoring systems have been, or are being, put into place by all governments - State, Territory and Commonwealth - as part of reform programs announced for GTEs. A number of industry associations have implemented, or plan to develop, national performance measures for their respective GTEs.
- 7 National performance monitoring could complement the existing and planned processes of governments. Public monitoring at the national level offers further incentives for improved performance by GTEs. Accounting, economic and non-financial measures of performance could be compared for GTEs operating in similar activities in different States and Territories. This would have the effect of setting national benchmarks or goals for the performance of GTEs and introducing an element of competition in striving for improved performance.

Calculation of total factor productivity and economic rates of return on a consistent basis for the various authorities could assist governments to satisfy themselves that resources are being used efficiently by their authorities and that a reasonable return is being earned by community resources. Performance monitoring could also allow the operations of GTEs to be compared with similar operations in the private sector and in other countries. Information which highlights varying performance of GTEs and the factors contributing to relative weaknesses and strengths can help to focus management efforts on areas where efficiency gains might most profitably be sought.

Scope of Enterprises to be Covered

- 8 The Task Force recommends that a national monitoring system be established progressively, beginning with a core of larger and more significant enterprises of each State, Territory and the Commonwealth. Further enterprises could be included as the system is developed. The Task Force suggests the core group could cover State and Territory enterprises involved in energy, railways (freight and passenger), water, major ports and urban public transport. The Commonwealth enterprises in the initial group could include Telecom/OTC, Australia Post, Australian National Railways Commission, ANL, the Federal Airports Corporation and the Pipeline Authority. It recognises that progress in corporatisation is very uneven across this range of Commonwealth, State and Territory GTEs and that some of these enterprises are at an early stage in the corporatisation process. This unevenness has some implications in terms of available data bases and their comparability at a national level.
- 9 This core group could be expanded progressively once the system of national monitoring is operational. Enterprises providing services to government such as property and accommodation services could be included at an early stage. Ultimately coverage could extend to all significant government trading enterprises. How and when national performance monitoring is extended is likely to depend to some extent on data availability and the progress of GTE reform. The Task Force suggests that the extension of the program at a later date could be considered by a Steering Committee to oversee the advancement of national performance monitoring.

Range of Performance Indicators

- 10 Performance indicators can be usefully classified as accounting, economic and non-financial. Attachment A describes the range of indicators included in this classification and a more detailed guide to performance indicators is provided in the discussion papers prepared by the Task Force. To evaluate the performance of GTEs it seems desirable to have regard to a range of measures.
- 11 Financial accounting measures of performance are widely used in the private sector and can be constructed from the accounting framework of most GTEs, although there are inconsistencies in the range, definition and content of measures presently used.
- 12 Economic measures of performance include economic rate of return, partial factor productivity and total factor productivity.
- 13 Accounting and economic measures of performance need to be supplemented by non-financial indicators. In the absence of market disciplines, some aspects of commercial performance such as quality of service are not amenable to measurement by financial indicators and there is the possibility that cost reductions and increased returns may be achieved through reduced quality of service. Non-financial indicators could cover quality of service, efficiency and effectiveness (including price index) indicators. Examples of non-financial indicators could include on-time running for train services, number of customers served per employee, system reliability etc.
- 14 It is recommended that national monitoring cover accounting, economic and non-financial indicators. Monitoring could focus initially on normal accounting indicators and non-financial indicators but be extended as quickly as possible to economic rates of return and total factor productivity.

Accounting Indicators

- 15 It should be possible to institute quickly a system of national monitoring based on the accounts published by each GTE. Most enterprises included in the core group account on a financial year basis (July/June) and many are required to report publicly within three months. It would be desirable that the data used to construct accounting indicators of performance be drawn from the audited statement of accounts of GTEs.
- 16 In a number of cases relevant industry organisations (including those for electricity, water, rail, urban public transport, harbours) have recognised the value of comparable financial and other performance indicators and are working to produce industry standards or models. Governments have also moved to update and standardise the financial reporting required of the enterprises they own. Additionally academic and other studies have highlighted accounting differences and gone some way towards identifying adjustments needed to improve comparability.
- 17 However, there remain several problems of data comparability. GTEs have differing corporate objectives, structure, range of activities, operating environment and legislative or policy constraints. Some enterprises in some jurisdictions have adopted accrual accounting but several still report on a cash basis. There are many other differences in accounting practices such as definitions of debt and equity and approaches to valuation of assets; accounting for community service obligations varies; and tax/dividend relations with owning governments vary. As a result, there are many

methodological issues that need to be resolved to ensure that data is consistently defined and measures are truly comparable. Perhaps the most important of these is revaluing assets from an historic cost to a current value basis. However, standards on the most appropriate way to revalue assets at current value have still to be refined by the Public Sector Accounting Standards Board and agreed to by different governments.

- 18 Consultations with enterprises by the Task Force has revealed the need to develop consistent definitions and to identify and quantify adjustments which need to be made to improve the comparability of published commercial accounts. The co-operation and input of the relevant industry associations is an important part of this process.
- 19 In order to assist further in developing consistency in definitions and data, the Task Force suggests that governments request their respective Departments of Treasury or Finance to establish a process to highlight differences between the various jurisdictions in accounting standards and definitions for GTEs (including asset valuation), harmonise differences in standards and definitions, and identify gaps in national standards. The Task Force recommends that priority be given to developing an interim framework for asset valuation based on existing guidelines of various governments and that a working party of accounting officers be established for this purpose. The working party should consult with the Public Sector Accounting Standards Board to determine whether that body can develop detailed national guidelines for asset valuation within twelve months. If this timetable cannot be met the Task Force suggests that the working party proceed to develop interim standards for asset valuation. The Task Force recommends also that governments jointly request the Public Sector Accounting Standards Board to give top priority to addressing the issue of refining national accounting standards for GTEs and give priority to setting clear standards for asset valuation.
- 20 One general problem concerning the appropriate methodology for monitoring GTE performance is the treatment of community service obligations (CSOs). One option is to exclude CSOs from the data used to construct performance indicators by excluding their costs and the capital stock associated with delivery of the service. Alternatively, an adjustment could be made to performance indicators such as the rate of return to allow for the non-commercial activities of GTEs. The difficulty with these options is that it becomes very arbitrary as to what part of the capital stock is excluded from assessment or to what extent the rate of return of a GTE should be adjusted for a CSO. Almost any unwise or inappropriate investment decision could be blamed on a CSO. For this reason, the Task Force suggests that a more appropriate approach would be to include CSOs in the construction of performance indicators and invite owning agencies to attach notes to the published measures describing relevant CSOs and detailing the costs incurred in providing them. Nevertheless, problems of comparability will remain. The proposed Steering Committee will need to give priority to developing an appropriate approach to identifying and costing CSOs on a consistent basis.
- 21 Because of all these complexities, it will require considerable work and time to produce a set of national performance measures which reaches a standard fit to publish. The Task Force suggests, however, that the co-operation of enterprises be sought to enable the Steering Committee (proposed in paragraph 27) to do a 'mock-up' version of national performance indicators in 1991. This could serve as a preliminary to publishing accounting indicators for the core group of enterprises for the financial year 1991-92 by the end of calendar 1992, subject to the Steering Committee agreeing that the estimates are of a standard suitable for publication. The purpose of the preliminary version of national indicators would be to highlight problems and to allow some time to

improve comparability. Even the initial published measures will not be perfect and the various problems in establishing strict comparability will require that the results be interpreted with caution. Once the national performance monitoring framework is established, however, it can evolve as accounting practices are improved and the measures refined.

Economic Indicators

- 22 The Task Force considers that, while improving the comparability of indicators based on commercial accounting data and concepts would be a useful first step in national performance monitoring, the exercise should be extended as quickly as possible to include economic indicators. Calculations of economic rates of return and total factor productivity are important tools towards achieving the objectives of maximising returns to owners and improving the efficiency of resource allocation. While the data for these measures are more difficult to compile than for accounting indicators, they are necessary to provide a true indication of the comparative performance of GTEs. Economic rates of return provide a means of assessing whether the community is deriving a reasonable return on the assets it has in GTEs and the extent of cost recovery. Productivity measurement provides an indication of how efficiently GTEs are transforming inputs into final services. The discussion papers prepared by the Task Force provide a detailed survey of the methodology and data requirements of these indicators.
- 23 Some governments recommend use of different measures of economic rates of return and there is a need to consult with governments to develop a consistent approach where possible as to which measure is adopted. Data requirements for consistent estimation of economic rates of return and total factor productivity are extensive. The information requirements to calculate economic rates of return include revenues, operating and maintenance costs, economic depreciation and current value of capital costs. Calculation of total factor productivity indices is more data intensive, requiring price and quantity series for each output and input which are not easily obtainable for many GTEs. Some enterprises are reasonably placed to provide data for calculating economic rates of return. For others, however, a substantial commitment of resources would be required to itemise and revalue assets. Consistent approaches would need to be developed to the current valuation of assets where no market value is apparent and to coping with the unpredictability of technical obsolescence.
- 24 Criticisms have been made of existing estimates of economic rates of return and factor productivity because of the assumptions that have had to be made to overcome data limitations. Notwithstanding these criticisms, the estimates have been seen by some enterprises to present a useful general picture of relative performance which has assisted management efforts to highlight problem areas and overcome them. The publication of estimates has also provoked some agencies to work to improve relevant data bases so that better estimates can be prepared in future.
- 25 The Task Force therefore recommends that the Steering Committee should continue the work of developing and publishing estimates of economic indicators for the core group of enterprises. That process will depend on owning governments regularly requiring their enterprises to undertake the task of revaluing their assets on a current value basis. Because perfect numbers will never be obtained the Steering Committee should publish "the best available" data for as many core group enterprises as soon as possible. The status of the various estimates should be explained in the report.

- 26 In recognition of the difficulties and resources involved in the calculation of total factor productivity estimates, it seems desirable to retain partial factor productivity measurement (for example, labour productivity) as part of the framework for performance monitoring.

Non-Financial Indicators of Efficiency and Effectiveness

- 27 While some non-financial indicators (e.g. time lost through industrial disputes and through accidents) might be applicable to most or all enterprises, most non-financial indicators (particularly those measuring effectiveness in meeting customer demands) will be relevant only to enterprises operating in particular industries. Accordingly the Task Force has been guided by the enterprises and their industry associations in the development and definition of relevant indicators. Attachment A provides some examples of non-financial indicators which could be monitored. The discussion papers prepared by the Task Force set out a more detailed selection of possible non-financial indicators for each of the core industries which could be monitored. Advice from enterprises suggests it should be possible to present comparable data for such indicators in the Steering Committee's 1992 report.

Publication of Performance Indicators

- 28 The task of collating performance indicators could be undertaken by a body such as the Industry Commission or the ABS and be published under the auspices of a Steering Committee consisting of Commonwealth, State and Territory representatives. The role of the Steering Committee would be to oversight the preparation and publication of national performance indicators. Also, in consultation with relevant enterprises, it could advise on the progressive extension of performance monitoring beyond the core group of enterprises. It would also have a continuing role, again in consultation with enterprises and relevant industry associations, in the development and refinement of indicators to be monitored. Attachment B sets out a suggested terms of reference for the proposed Steering Committee.
- 29 For the purpose of the 1991 'mock-up' version, it is proposed that the Industry Commission perform the collating role. Ongoing administrative arrangements for following years would then be reviewed by the Steering Committee.
- 30 The collation and publication task might require the input of one accountant (corporate financial analyst) and one economist on a more or less full-time basis. Publication would occur within six months of the end of each financial year showing GTE performance indicators for the past five years. The Steering Committee would confine its textual material in this report to technical descriptions of the performance indicators and data sources, although there may be a need for some explanatory material to educate users about the problems of comparability. Owing portfolios would be given the opportunity to insert notes concerning special one-off environmental or other factors affecting the performance of particular enterprises or qualifying the comparability or usefulness of any performance indicator.

- 31 The Task Force recommends that data be provided to the Steering Committee by central agencies nominated by each government. These agencies would be responsible for ensuring that data is consistent with agreed concepts and definitions and is provided in a timely manner. The establishment of GTE monitoring bodies in each State and Territory would facilitate the process as well as contributing to improve monitoring of GTEs by the respective governments.

Summary of Recommendations

- 32 The recommendations of the Task Force are as follows:

- i) A national performance monitoring framework be established for GTEs;
- ii) The system initially concentrate on a core of larger and more significant enterprises of each State, Territory and the Commonwealth. The enterprises included be those involved in energy, railways, water, major ports and urban public transport. The Commonwealth enterprises covered be Telecom/OTC, Australia Post, Australian National Railways Commission, ANL, the Federal Airports Corporation and the Pipeline Authority. This core group be expanded progressively once the system is operational;
- iii) A range of performance indicators be adopted including accounting, economic and non-financial indicators. Initially, the focus be on providing accounting and non-financial measures with extension to economic measures as soon as possible. It would be desirable for accounting indicators to be based on data drawn from the audited statement of accounts of GTEs;
- iv) A Steering Committee of State, Territory and Commonwealth representatives be established as soon as possible to oversee the preparation and publication of national performance indicators, the development and refinement of indicators and the possible extension of performance monitoring to other GTEs;
- v) Each Government assign an appropriate central agency to provide a GTE monitoring capacity to act as the interface between the Steering Committee and each Government's GTEs;
- vi) The Industry Commission, under the auspices of the Steering Committee, prepare a 'mock-up' version of national performance indicators for 1990-91 which would not be published;
- vii) Based on the outcome of the 1991 'mock-up' version, the Steering Committee consider:
 - (a) preparation and publication of performance indicators for 1991-92 by the end of 1992;
 - (b) the appropriate agency to undertake the task on an ongoing basis;
- viii) Governments request respective Treasury or Finance Departments to consult to highlight differences between Governments in accounting standards and definitions for GTEs, to harmonise differences, to identify gaps in national standards and report on these matters to the Steering Committee;

- ix) Governments request the Public Sector Accounting Standards Board give top priority to refining national accounting standards for GTEs including standards for asset valuation; and,
- x) Governments establish a working party of accounting officers from the Commonwealth, State and Territories to develop an agreed interim framework for asset valuation based on existing guidelines of various governments, if this task cannot be completed by the Public Sector Accounting Standards Board within twelve months, and report to the Steering Committee. Such a framework could be used by all GTEs to revalue their assets on a current value basis as soon as possible so as to enable calculation of rates of return on assets.

Performance Indicators For GTEs

Various indicators can be used to monitor the performance of GTEs in terms of financial results, efficiency and effectiveness. These performance indicators for GTEs can be classified according to accounting, economic and non-financial indicators.

Accounting Indicators

A variety of accounting indicators are available to evaluate the financial performance of GTEs. The Task Force has focussed on those accounting indicators which can best assist in meeting government objectives to improve the performance of GTEs. Operating ratios concerned with performance in terms of assets employed, sales and expenses seem best suited to this role. Examples of the most relevant operating ratios are return on assets, return on sales and asset utilisation rates.

An indicator of the rate of earnings generated on the total assets employed by an enterprise is provided by relating operating profit to total assets. It is referred to as the return on assets (ROA) or return on investment. It is calculated by expressing earnings before interest and tax as a percentage of total assets expressed at historic or, preferably, at current values.

Return on sales expresses the profit earned before interest and tax as a percentage of sales revenue. It indicates how much accounting profit (that is, not necessarily cash flow) is available to meet interest, tax and dividends payments to the owning agency.

The asset utilisation rate expresses sales revenue as a percentage of total assets. It indicates the sales revenue generated by the investment in assets.

Other useful operating ratios include stocks/sales, working capital/sales, trade creditors/sales and trade debtors/sales.

Shareholder governments and creditors have an interest also in dividend, leverage and liquidity indicators which reflect the risks inherent in the particular financing policies of GTEs. These include indicators such as dividends payable/net profit, total liabilities/total liabilities + shareholders funds, interest bearing debt/shareholders funds, current assets/current liabilities, and cash/current liabilities.

Economic Indicators

Accounting measures of the performance of GTEs primarily serve the needs of management and owners. They do not necessarily reflect the impact of the operations of an enterprise on the economy such as the contribution of an enterprise to the stock of resources or wealth available to the community. Other indicators such as economic rates of return and productivity measures are more suited to this purpose.

The economic rate of return is the ratio of the present value of the net economic income before interest and tax to the current value of assets. Net economic income consists of the net cash flow of the GTE less depreciation based on the real working life of the asset. The economic rate of return facilitates a direct comparison with the cost of capital of a GTE and thus enables an assessment of performance inclusive of the risks borne by the enterprise. It provides a means of assessing whether the community is getting a reasonable return on the assets it has tied up in GTEs and the extent of cost recovery.

Productivity measures provide an indication of how well an enterprise is using the inputs it has at its disposal to deliver services. Partial productivity measures such as output per employee have been used for some time by many enterprises. The disadvantage of partial productivity measures is that the changes in productivity they indicate may be due to changes in the composition of inputs rather than changes in overall economic performance. For example, if capital is being substituted for labour then labour productivity may be increasing while capital productivity, and possibly total productivity, is declining. A more comprehensive measure of the productive efficiency of an enterprise is total factor productivity.

Total factor productivity (TFP) is an index of the ratio of total output quantity to total input quantity. Comparing TFP indices for different GTEs provides information on their technical efficiency (the extent to which maximum output possible, given existing technology, is realised from the inputs used).

The data requirements for the calculation of TFP are quite extensive and include current value of capital costs, economic depreciation, and time series for the price and quantity of each output and input of the enterprise.

Non-Financial Indicators

Non-financial indicators can be used to complement accounting and economic indicators of performance. They can be used to provide measures of quality of service, efficiency and effectiveness. Often these indicators will be specific to particular industries.

Assessment of the performance of a GTE should have regard to its quality of service. Quality of service indicators cover performance in such matters as reliability, response time, accessibility and security. Examples of such indicators include response times to enquiries or provision of service, frequency of service, rate of service difficulties or equipment failures and surveys of customer satisfaction.

Apart from the more detailed quantitative estimates of productivity described above, indicators of efficiency can be provided by a variety of more general measures. For example, many GTEs can provide general indicators of labour productivity. Other such indicators of efficiency may include time required for the provision of service, time required for maintenance and extent of excess capacity.

Effectiveness indicators provide a measure of the degree to which a GTE is achieving its objectives. They include measures of output, market share and constant prices. They may include indicators of staff/management relations such as staff turnover, levels of industrial disputation and occupational safety and health.

Proposed Terms of Reference for Steering Committee on National Performance Indicators

The Task Force recommends that a Steering Committee of Commonwealth, State and Territory Government representatives be established to:

- 1 publish national indicators of the performance of government trading enterprises;
- 2 determine administrative arrangements for the publication of national performance indicators including arrangements for the collection and compilation of performance indicators beyond 1991;
- 3 develop and refine national indicators of performance of government trading enterprises in consultation with governments, enterprises, industry associations and other relevant bodies;
- 4 contribute to the development of consistent accounting standards and definitions for GTEs in consultation with the Public Sector Accounting Standards Board and to make recommendations to governments; and
- 5 advise governments on the progressive extension of performance monitoring beyond the core group of government enterprises.

Discussion Papers on
Performance Indicators for
Government Trading Enterprises

Prepared by a Task Force on Monitoring Performance of
Government Trading Enterprises, April 1991

Discussion Paper No. 1

The Use of Financial Accounting Indicators in National Performance Monitoring

1 introduction

Financial accounting information contained in the annual reports of State and Commonwealth GTE provides a good source of data with which the proposed National Performance Monitoring body could assess performance.

Accounting information is prepared according to Generally Accepted Accounting Principles which are a reconciliation of the information needs of a diverse group of users and the specific problems encountered by practising accountants. Among the users of GTE accounts are the shareholder governments and parliaments, managers, employees, debt holders and other creditors, customers, special interest lobby groups and government regulatory agencies. Mutually shared interests notwithstanding, users are likely to be primarily concerned with their own particular interests. For example, with a progressive separation of the dual role of shareholder and the industry regulator, it is conceivable that the information demands of the two branches of government could become more specific to their respective roles.

A wide range of financial performance indicators representing each user's perspective could be constructed from GTE annual reports. Nevertheless, should the Steering Committee on National Performance Monitoring of GTEs seek to publish all possible indicators the truly important indicators could be lost in a sea of detail.

Accordingly, there is a need to consider which of a range of accounting indicators can best meet the expressed objective of State and Commonwealth Governments to improve GTE performance. Accounting ratios are usually classified as: operating ratios, leverage and liquidity ratios and market ratios. Market ratios are not relevant for GTEs where stock is not traded. Leverage and liquidity ratios pertain to the exclusive interests of shareholders and creditors reflecting the risks inherent in the particular financing policies of the GTE. A list of dividend, leverage and liquidity indicators is provided at the end of this attachment.

Operating ratios are, however, concerned with performance in terms of assets employed, sales and expenses. These ratios would appear to come closest to meeting the expressed objective set down by governments in relation to performance monitoring.

For the purpose of illustration, some of these ratios are outlined in the next section. The third section address some general issues associated with financial ratio analyses.

2 Operating Ratios

This section defines major financial ratios. A guide to the use of financial ratios is provided in the Company Director's Manual.

Return on Assets:

$$\frac{\text{EBIT}}{\text{Total assets}}$$

The return on assets seeks to relate earnings before interest and tax (EBIT) to the assets which have produced the earnings regardless of the financing source (ie debt or equity). Either the value of assets at the start of the year or the average value of assets is used in the denominator.

Since historic costs typically bear little relationship to current values, the standard accounting ROA indicator may shed little light on whether a GTE's assets are being used efficiently. For example, a high accounting ROA does not mean that further investment by the GTE in similar assets will yield similarly high returns and a low return does not imply that the assets could be better employed elsewhere. Judgements of the efficiency of asset use are somewhat difficult in these circumstances. To some extent this problem may be ameliorated by calculation of a ROA with reference to the current value of assets.

Profit Margin:

$$\frac{\text{EBIT}}{\text{Sales Revenue}}$$

Measures the profit earned on each dollar of sales revenue and indicates how much accounting profit (ie not necessarily cash flow) is available to meet interest, tax and dividend payments to shareholders.

Sales to Total Assets:

$$\frac{\text{Sales Revenue}}{\text{Total Assets}}$$

Expressed as a multiple, this ratio represents the sales dollars generated by each dollar invested in assets. A rising ratio generally signifies an improvement in performance but a too rapid increase may well indicate an attempt to do too much business with too little capital. A high ratio could indicate the GTE is working close to capacity which in turn implies that it may be difficult to do more business without further investment.

The operating margin and sales to asset ratios could be used together to emphasise four ways in which management might seek to increase trading or operating profit in relation to assets employed. Subject to overall market conditions and any price capping mechanism, management could increase operating margin by reducing costs or raising prices or both. Furthermore, it might seek to boost sales volume or scale down the amount of assets employed, particularly low yielding or unproductive assets.

GTEs sometimes could be beset by a combination of underpriced output, high cost structure or excessive assets in relation to sales (output) and therefore the foregoing three indicators might be useful.

Nevertheless, since the financial data is highly aggregated some care is needed in interpretation. For example, it could be difficult to detect mispriced services, especially for GTEs which produce multiple outputs. Additionally, the extent to which a GTE's performance actually falls short of some 'desired' level has a bearing on how these (and other financial) ratios are interpreted.

Without seeking to be exhaustive, other useful operating ratios could include:

- Stocks/Sales
- Working Capital/Sales
- Trade Creditors/Sales
- Trade Debtors/Sales

Obviously, the usefulness of each of these ratios depends on what aspect of GTE performance is being assessed. Stock comprise raw materials, consumables, purchased components, work in progress and finished goods. A rise in the Stocks/Sales ratio, without good reason, may indicate a slowing in demand for the GTEs output or a poor stock control system. In addition, the optimal level of stocks carried should be sensitive to associated costs (interest, storage etc).

As sales grow the Working Capital to sales ratio may indicate how much capital is required to finance operations in addition to fixed assets.

The trade credit and debt ratios provide an additional perspective on a GTE's trading environment.

3 The Limits of Ratio Analysis

Although ratio analysis is widely used, some care needs to be taken to ensure the results are interpreted properly. Incomplete interpretation might lead to unwanted judgements and unwise policy decisions. The purpose of this section is not to argue against ratio analysis but to argue for thoughtful ratio analysis.

Financial accounting based performance measures usually take the form of ratios of relevant aggregates to facilitate comparison by adjusting for size.

The ratios are typically compared with a 'standard' to ascertain how well an enterprise is doing relative to others in its industry group or relative to all other firms.

The respective size of financial variables is properly controlled only when there is a strict proportional relationship between the variables entering the ratio calculation. In this regard the evidence from accounting research is mixed; the proportionality assumption is not supported in some studies. Hence, a periodic check for proportionality in the main ratios may be advisable.

In most ratio analyses, a firm's financial ratios will be compared to corresponding industry means or median ratios and the firm's performance is judged on the basis of the difference between the firm's ratios and the industry average. This type of comparison involves several considerations.

First, comparisons are sound only if the whole industry follows similar accounting policies. Therefore, some care needs to be taken to ensure that the accounting policies (including valuation rules) are harmonised between the relevant GTEs.

Second, in the case of GTE performance monitoring, GTEs could tend to adjust a particular ratio toward the industry average of the previous year. The industry average could become or be seen as a target. Should this happen some GTEs will find that their ratio will move in the opposite direction of the industry average simply because as a matter of arithmetic not all

GTEs can be better than the average. This problem may be particularly acute when the whole industry effectively comprises a handful of GTEs.

As a related point, the pressure to be better than the average might create a further incentive to window dress the accounts and particular attention may need to be given to such problems.

Third, and as a consequence of problems with using the GTE industry average as a benchmark, before any significance can be attached to a movement in a particular ratio in any direction it may be necessary to ascertain what is the 'ideal' value of that ratio. The ideal ratio for the particular GTE may be influenced by its business strategy, for example, is it expanding, contracting or diversifying? Without an understanding of how the ideal ratio behaves over time it may be hard to know the significance of particular movements.

Fourth, it does not follow that if in a given set of circumstances an increase in a particular ratio indicates an improvement in the position of the firm the higher the ratio the better. Return on Assets may rise because the firm fails to replace its assets. In these circumstances the higher ratio does not bode well for the long term health (or wealth) of the GTE.

Fifth, some GTEs have a diverse product range. For example, the Federal Airports Corporation is a major property developer/manager and a provider of aviation infrastructure. Similarly, energy authorities are involved in generation, distribution and perhaps some retailing. An overall ratio for the GTE may be less relevant than ratios calculated for its major lines of business. Moreover, as parts of a GTE are opened up to private sector competition it is more realistic to compare like activities or ones which have a similar market risk with respect to investments. Therefore, some further consideration of the meaning and appropriateness of overall entity level performance indicators would need to be undertaken.

Lastly, the published financial accounts do not show developments which have yet to be realised. A major contract or an important work practices agreement may involve significant cash flows in later years but would not be recognised until it is brought to book. Similarly, bad investment or similar decisions may not be reflected for some years. Performance measurement, if it is to be instructive, may need to have regard to such factors. This kind of qualitative assessment is arguably best undertaken by the owning governments in footnotes to the published National Performance Monitoring data.

4 Summary

The limits of ratio analysis notwithstanding, financial accounting ratio indicators are the most readily available measures for governments seeking to monitor the progress of their GTEs.

Other Ratios of Primary Interest to Shareholder Governments and Creditor

Financial Leverage ratio

$$\text{Total liabilities}/(\text{Total liabilities} + \text{Shareholders funds})$$

This ratio measures the extent to which the GTE is financed by external sources of funds. The higher the ratio the higher the financial risk borne by the creditors. Total liabilities includes finance leases. Shareholders funds for unincorporated government enterprises is equivalent to Total Assets less Total Liabilities.

Debt - equity ratio

Interest bearing debt: Shareholders funds

This ratio measures the extent to which the GTE is financed by interest - bearing debt

Times interest earned

Net profit before interest and taxes (EBIT)/Gross interest charges

This measures gearing in the income stream, ie the ability of the GTE to meet its interest charges from income. It measures the income cover afforded to creditors.

In addition to the adjustments for the interest and taxes (ie adding them back in), net profit here is measured after depreciation and before abnormal or extraordinary items.

Current ratio

Current assets/current liabilities

This ratio shows the amount of short term assets available to meet short term liabilities and provides an indication of the safety margin afforded to current creditors.

Cash ratio

Cash/current liabilities

Measures the cash available to meet short term liabilities. Cash defined as cash on hand, at the bank and on deposit plus negotiable securities.

Dividend Payout Ratio

Dividend payable/Net profit (after interest, tax and extraordinary items)

Measures the proportion of profit paid out as dividends.

Discussion Paper No. 2

Economic Performance Monitoring of GTEs: A Survey

1 Measuring Economic Performance

Before the success or otherwise of GTE reforms can be gauged, it is necessary to have in place a system for measuring GTE performance. Two indicators which should form the core of any GTE performance measurement system are the real rate of return and total factor productivity. An example of one approach to the calculation of real rates of return and total factor productivity is provided in the Attachment to this discussion paper.

The economic rate of return is the ratio of the present value of the net economic income before interest and tax to the current value of assets. Net economic income consists of the net cash flow of the GTE less depreciation based on the real working life of assets. The economic rate of return provides an indication of the impact of the operations of an enterprise on the economy. It facilitates a direct comparison with the cost of capital of a GTE and thus enables an assessment of performance inclusive of the risks borne by the enterprise. Real rates of return provide a means of assessing whether the community is getting a reasonable return on the assets it has tied up in GTEs and the extent of cost recovery. They also provide the most accurate way of comparing GTE performance with that of the private sector. Profit series, prices received and prices paid indices also provide useful information on how a GTE is performing over time.

Total factor productivity (TFP) is an index of the ratio of total output quantity to total input quantity and is an important indicator of economic efficiency. Comparing TFP indices for different GTEs provides information on their technical efficiency (the extent to which the maximum output possible, given existing technology, is realised from the inputs used). Technical efficiency and allocative efficiency (the extent to which inputs are combined in cost minimising proportions) are the determinants of economic efficiency. This, along with the extent to which costs are being fully recovered, is the major determinant of economic performance. TFP indices also reflect scale effects and gains resulting from improved management practices.

Productivity change is also an important indicator of how well the economy as a whole is performing. It gives an indication of how efficiently we are transforming inputs into end-products and of the size of the economic cake available to increase community living standards.

Ideally all inputs used in production should be accounted for to form a measure of total productivity. However, output is often measured relative to one input such as labour or capital. The disadvantage of these single or partial productivity measures is that the composition of inputs may be changing thus giving a misleading impression of overall economic performance (eg if capital is being substituted for labour then labour productivity may be increasing while capital productivity, and possibly total productivity, is declining). More generally, productivity will be increased by advances in technology, a better trained workforce, removing restrictive work practices and eliminating other sources of waste and inefficiency.

Looking at productivity growth performance for Australia in isolation means little, however, unless it is compared with our trading partners' productivity. Comparisons need to be made not only of growth rates of productivity but also of absolute levels - a country can take little comfort from a similar productivity growth rate to those of its partners if it still has a lot of catching up to do. Similarly, for comparisons of GTE productivity performance between states. TFP levels need to be considered as well as growth rates.

One of the main problems in undertaking productivity and rate of return studies is obtaining accurate estimates of capital inputs. Being durable, capital inputs are consumed in production over many years rather than just the year in which they are purchased. Most information available on investment and capital stocks is, however, in historical cost terms which needs to be corrected for the effects of inflation, the difference between economic and accounting depreciation, the effects of technological obsolescence, etc. Ideally, a thorough valuation of all the GTE's assets at current prices is required for an accurate estimate of the GTE's total economic costs. The first step in obtaining such a valuation is to compile a register of all assets held by the GTE. Following this, reputable valuers should be employed to assess the current value of the assets. For those assets which cannot be valued directly (eg. due to thinness or non-existence of the market), approximations could be made based on the discounted cash flow of expected future production from the asset. Armed with this information, it is possible to form estimates of the quantity of capital employed by the GTE and its annual user cost.

At the economy-wide level, the Australian Bureau of Statistics has measures of national capital stock available. These are used by Aspden (1990) to form estimates of 'multifactor' productivity. At the individual GTE level, Swan (1990) has formulated a means of calculating capital user charges from past investment data based on the absolute price level accounting approach. This approach takes into account investment streams, asset lives, interest during construction and capacity commissioned each year. Investment expenditure made in past years is converted to current dollars using a general price index to reflect changes in purchasing power. An annual user charge is calculated as the constant real annuity consisting of interest and depreciation charges associated with a given real rate of return which the investment must earn over its expected economic lifetime to equal its direct capital outlay and interest cost during construction.

2 The Approach of Previous Studies

The first comprehensive attempts to measure GTE performance in Australia were made in the Industries Assistance Commission's report on Government (Non-Tax) Charges where TFP indices were calculated for each of the State electricity systems and the major rail networks (IAC 1989). From these indices growth rates of TFP for the respective electricity and rail systems were compared. The results of this work, and most subsequent work, were that GTE productivity has generally increased over time but that significant differences in the rate of increase exist between GTEs.

The IAC studies of electricity and rail TFP adopted different approaches to measuring capital stocks. In both cases only published data at an aggregate level was used. In the absence of any estimates of the current value of the capital stock, the electricity study used the Swan approach outlined above of taking net investment data for long periods of time and deriving an annual user charge based on the return necessary to generate the specified rate of return on direct capital outlays and interest during construction. Swan's (1990) estimates were used for New South Wales, Victoria and Tasmania. For the other States a much simplified version of Swan's approach was used which produced approximations for those States.

For the rail productivity study, current value estimates of rail capital stocks prepared by the Australian Railways Research and Development Organisation were available for the year 1978-79. The Commission was unable to verify the accuracy of these estimates but assumed an overall rate of depreciation for rail assets and combined this with investment data obtained from the ABS to update the 1978-79 point estimates. The accuracy of this approach not only depends on the accuracy of the initial point estimate of current value but also on the appropriateness of the overall depreciation rate assumed and the compatibility of the investment data obtained from a different source.

In a recent study of comparative electricity industry productivity Lawrence, Swan and Zeitsch (1990) have applied an improved indexing procedure compared to that of the IAC (1989). This study utilises the methodology of Caves Christensen and Diewert (1982). It represents a major advance over earlier comparative productivity work with productivity levels as well as growth rates being compared for the period 1975-76 to 1988-89. The data set used was largely the same as that used by the IAC with the exception that the complete Swan method of calculating capital annual user charges was extended to the remaining mainland States and the real rate of return was increased to 8 per cent from the very conservative 4 per cent used by the IAC.

Zeitsch, et al (1990) examined rates of return and productivity in a number of Commonwealth GTEs (Australia Post, Qantas, Telecom and the Australian National Line) and the Australian water industry. They found that rates of return in these GTEs were low compared to a relatively conservative benchmark rate of 8 per cent for the period 1985-86 to 1987-88. The GTEs examined were found to have productivity growth rates above that of the economy as a whole (1.3 per cent) for the period 1975-76 to 1987-88. In this study capital stock estimates for the GTEs were again derived from aggregate published data and point current value estimates derived from a number of sources. For Qantas and ANL point estimates derived by the Rae Committee (1983) were used as the starting point. For Australia Post, estimates derived by the Bradley Committee (1982) were used and, for Telecom, 1975 valuations of certain asset categories calculated by Telecom were used. This procedure is subject to the limitations outlined above for the rail estimates with a high dependence on the accuracy of the initial point estimate and the appropriateness of the depreciation rate chosen. For Qantas additional problems were encountered with the increasing move towards hiring aeroplanes instead of purchasing them.

In a recent study of the two major telecommunications GTEs, Swan (1990b) found a wide disparity in rate of return performance. Over the past 14 years Telecom's average rate of return has been a very low 2 per cent. This contrasts to an outstanding OTC average rate of return of 21 per cent. When compared to overseas telecommunications carriers using an internal rate of return methodology, OTC again has the best performance of the 6 carriers examined while Telecom has the worst.

This poor showing by Telecom contrasted with Zeitsch, et al's finding that Telecom performed relatively well with the highest rate of return of the GTEs examined in their study. Upon investigation one of the weaknesses of the point estimate method of calculating capital stocks was revealed. Zeitsch, et al used a 1975 point estimate of Telecom's capital stock which subsequent analysis indicated considerably undervalued Telecom's assets and omitted large parts of the capital stock. As a result Zeitsch, et al found that Telecom performed well, earning a 7.7 rate of return in 1987-88. Swan (1990b) reworked these estimates using a more recent valuation of Telecom's assets prepared by the Rae Committee (1983) and verified by Price Waterhouse and found that the rate of return in 1987-88 was reduced to around 4.2 per cent.

It can be seen that in most cases the more recent studies have sought to overcome deficiencies in both the data and methodology of the earlier studies. This process is typical of quantitative economic research where progress is made in small, iterative steps. However, not all recent studies represent an advance over earlier ones. For instance, EPAC (1990) has recently published estimates of rates of return on book values for a range of GTEs. While the EPAC measures covered a large range of individual GTEs, they need to be treated with extreme caution due to their reliance on book value capital estimates. The effects of inflation, the divergence between accounting and economic depreciation rates and different conventions followed all mean that book value capital estimates will bear little, if any, resemblance to the current economic value of the capital stock. The same applies to the 'conventional accounting basis' financial performance estimates recently released by the BTCE (1990).

3 The Next Stage

While much progress has already been made on measuring GTE performance, the studies quoted above also serve to illustrate the magnitude of the task remaining. Many major areas of GTE activity have yet to be covered and extensive refinement is required in those areas already examined.

The major deficiencies of existing studies relate to data availability, particularly for estimates of the capital stock. As indicated previously, the best approach to measuring a GTE's capital stock is to compile a register of assets and then to undertake a valuation of those assets at current prices. For those assets for which no market currently exists, proxies such as the discounted cash flow from expected future production may have to be used. To obtain this degree of detail and accuracy in the estimation of the capital stock obviously requires the active participation of the GTE concerned. Western Australia and NSW are currently undertaking revaluations of their GTEs' assets. Victoria completed this process some years ago as part of its general adoption of current cost accounting practices.

Estimates of the capital stock can still be made without the involvement of the GTE, as illustrated by the studies quoted above. However, fall-back approaches to measuring the capital stock then have to be used which are likely to be less accurate. By making assumptions about the average depreciation rate for the GTE's total assets, significant errors are likely to be introduced. For instance, inadequate allowance can be made for the technological obsolescence of specific assets. If the point estimate approach is adopted, valuations which are a decade or more old are typically used. This magnifies the problems associated with choosing an appropriate depreciation rate and the degree of accuracy of the original valuation is typically not known. Of the fall-back options, more accurate estimates of the capital stock will generally be obtained by constructing a series from past investment data. However, this is information-intensive and requires detailed investment information for a long period of time for long-lived assets. In the case of hydro-electric assets, Swan (1990a) assumed an asset life of 70 years. For railway assets an even longer life is probably appropriate requiring information back to the turn of the century.

It should also be noted that while a complete revaluation of GTE assets is preferable, this approach is also not without some problems. For instance, uniform approaches to conducting the revaluations need to be agreed upon to ensure consistency. Of equal importance, however, is the question of how to move forward once an accurate revaluation has been obtained. GTE performance monitoring involves tracking performance through time, not just examining the situation at one point in time. The studies quoted above illustrate some of the problems in trying to update point estimates. It would be too costly and not timely enough to undertake complete revaluations each year so presumably some compromise has to be arrived at where periodic revaluations are undertaken. The participation of the GTE would be critical in determining the most appropriate means of updating the estimates between revaluations.

Without co-operation and assistance from the GTE, estimates of capital stock and, hence, economic performance can still be made but they are likely to be less satisfactory and may not treat the GTE fairly by not being able to utilise the GTE's detailed knowledge of its own operations. Policy decisions made on the basis of such second best estimates may be unnecessarily harsh on the GTE.

Greater participation by the GTEs is also important in establishing other aspects of the methodology and database. For instance, the State electricity study of Lawrence, Swan and Zeitsch relies heavily on annual data published by the Electricity Supply Association of Australia (ESAA). While this is currently the best source of electricity industry data, there are some inconsistencies between States in the way data is supplied to the ESAA and there are a number of errors in the data for individual States, perhaps reflecting the fact that supplying this data in the past has not been considered an important task. Further work is required in co-operation with the respective States to eliminate the remaining errors and inconsistencies in the published ESAA data.

Some more general areas of dispute also remain over the appropriate methodology for assessing GTE performance. An example is the treatment of community service obligations (CSOs). An argument sometimes advanced is that GTEs have been required to fulfil CSOs over the years and have consequently made some investments which would never have been made on a purely commercial basis. It is then argued that these investments should be excluded from capital stock estimates to which the commercial rate of return is applied (eg BTCE 1990) or, alternatively, that a less than commercial rate of return should be applied to the whole capital stock to allow for these non-commercial and implicitly non-voluntary investment decisions.

One response to this is that the decision as to what part of the capital stock should be excluded from assessment is highly arbitrary. Any unwise or inappropriate investment decision could be blamed on a CSO. If the GTE is to improve its performance and operate in a commercial manner, its operations in their entirety need to be assessed on a commercial basis. If governments believe there is a genuine CSO component they want carried out then this should be funded by an explicit revenue transfer to the industry or appropriate adjustments to the required rates of return and dividends. Otherwise, governments cannot properly determine the value of the CSO either in absolute terms or relative to other government activities which have been crowded out. Methodological issues such as this need to be debated and an approach agreed upon before comprehensive and consistent GTE monitoring can proceed.

Areas of GTE operation not yet covered range from the small (such as Comcar) to very significant parts of the economy (such as railways) where only superficial analysis has been undertaken. The Industry Commission is currently undertaking further work on measuring the performance of the five major railway systems. Preliminary results indicate that rates of return over the last decade are in the order of -40 to -20 per cent. However, again these estimates rely heavily on dated point estimates of the capital stock, made in this case by the Australian Railways Research and Development Organisation. Extensive work is required to ensure that all railway assets are included and valued appropriately. Anecdotal evidence indicates that in many cases large GTEs do not even have complete registers of their assets, let alone a good feel for their current value.

4 Conclusion

GTE performance monitoring in Australia is still in its infancy. Much remains to be done in terms of refining existing studies, data sets and methodologies and extending the range of GTEs covered. An important component of this process is greater co-operation and participation by the GTE themselves. Only by helping to design the performance monitoring program and supplying detailed and accurate data can the GTEs be assured of accurate and fair assessment. An important first step in this process is obtaining comprehensive revaluations of GTE assets at current values.

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A PRACTICAL GUIDE TO CALCULATING RATES OF RETURN AND TOTAL FACTOR PRODUCTIVITY

1. INTRODUCTION

The aim of this paper is to provide a simple illustration of the steps involved in calculating Real Rates of Return (RRR) and Total Factor Productivity (TFP) for a representative government business enterprise (GBE). The approach uses readily available information from the GBEs annual reports, supplemented by additional information on the valuation of capital stocks.

The rationale and interpretation of RRR and TFP are not discussed in this paper. Rather, the paper focuses on the procedures involved in calculating these measures from the data compilation through to the final calculation of RRR and TFP. The first section will cover the equations used in estimating RRR and TFP. This is followed by identifying and compiling the variables required to calculate these performance indicators. The example chosen is an imaginary railway authority and the data used is fictitious. However, the methods described are based on the actual experience of the Industry Commission in collecting the data for and calculating railway performance measures (Lawrence and Avanzado 1991).

2. THE PERFORMANCE MEASURES

Before discussing data collection, it is necessary to step back and consider the variables required in the calculation of RRR and TFP. This involves reviewing the equations used to calculate each of these indicators.

2.1 The Real Rate of Return

The RRR is the rate of return on the current market value of assets employed. It can be defined as:

$$\text{RRR} = \frac{\text{Revenue} - (\text{Operating cost} + \text{Economic depreciation})}{\text{Current market value of assets}}$$

or

$$r_t = R_t^n / (P_t K_t) * 100 \quad (\text{A1})$$

where

r_t is the real rate of return on invested capital in year t;

R_t^n is the nominal earnings on invested capital in year t;

P_t is a price index of a unit of capital at time t;

K_t is the value, at constant prices, of capital at time t.

The term $(P_t K_t)$, therefore, measures the nominal value of capital.

The nominal earnings on invested capital in one period is defined as:

$$R_t^n = Y_t^n - E_t^n - D_t^n \quad (\text{A2})$$

where

Y_t^n is the nominal economic income in year t, defined as total income less interest income and revenue from sales of assets;

E_t^n is the nominal economic expenses in year t, defined as total expenses, less interest expenses and the book depreciation charge; and

D_t^n is the nominal declining balance economic depreciation expense on the estimated capital stock in year t.

2.2 Total Factor Productivity

TFP is an index of the ratio of total output quantity (Q) to total input quantity (I). Thus,

$$\text{TFP} = Q/I \quad (\text{A3})$$

To combine many diverse outputs and inputs into measures of total output quantity and total input quantity, respectively, an indexing procedure must be used. The TFP index used here is the Tornqvist procedure defined as:

$$\log\left(\frac{\text{TFP}_m}{\text{TFP}_n}\right) = \sum_i \frac{1}{2}(R_{im} + R_{in}) \log\left(\frac{Y_{im}}{Y_{in}}\right) - \sum_j \frac{1}{2}(S_{jm} + S_{jn}) \log\left(\frac{Y_{jm}}{Y_{jn}}\right) \quad (\text{A4})$$

where m and n are adjacent observations, there are i outputs, (Y), j inputs, (X), the Rs are output revenue shares and the Ss are input cost shares.

A more detailed explanation and discussion of these measures can be found in Zeitsch, et al (1990) and Lawrence, Swan and Zeitsch (1990, 1991)

3. COMPILING THE REQUIRED DATA

Most of the variables in equations A1 to A4 can be sourced from GBE annual reports except for the valuation of assets and the quantity of capital stocks employed. Ideally, a thorough valuation of the GBE's assets at current market prices is required for an accurate estimate of the GBE's economic costs. This information is typically not available from GBE annual reports which normally report only historic cost accounting values of assets. Historic cost information on capital costs is not suitable for the purposes for calculating RRR and TFP measures because it fails to take into account the effects of inflation, the difference between economic and accounting depreciation and the effects of technological obsolescence. The approach used in the rail productivity study was to apply the methodology of Zeitsch et al. (1990) to derive estimates of the current value of assets based on previous current cost valuations and subsequent investment data and estimates of economic depreciation. This section will describe how these variables are extracted from the available information in annual reports and supplemented by information from other sources.

For RRR, the following data are required:

- Economic income
- Economic expenses
- Market value of assets

3.1 Economic Income and Expenses

Economic income or Y_t^n (equation A2) can usually be derived from the profit statement of annual reports. Economic income includes all revenue directly obtained from the GBE'S business operations. It, therefore, excludes interest receipts and some other sources of income not directly associated with provision of the GBE'S services.

Economic expenses or E_t^n (equation A2) are similarly taken from the expenditure statement of annual reports. Accounting depreciation and interest payments are excluded because an economic cost of depreciation is calculated instead and the rate of return being calculated is before interest and tax liabilities.

In the rail productivity study on Choochoo railways, for example, economic income and expenses were taken from Choochoo's annual reports to come up with a series for the years 1978-79 to 1988-89. To illustrate how these variables were extracted from Choochoo's annual reports, the income and expenditure statement for 1988-89 is reproduced in Table 1.

	\$000
INCOME	
Freight services	309366
Passenger services	206432
Retail and catering	20565
Interest	21005
Rent	12955
Asset sales	4358
Other	7732
Redundancy grant	4940
TOTAL	587353
EXPENDITURE	
Operations	349946
Salaries and wages	452629
General Charges	24265
Redundancy payments	4940
Audit fee	199
Board member's emoluments	46
Depreciation	83733
Assets written off or sold	30814
Amortisation of loan discounts	2161
Interest and other loan charges	1504
Leasing charges	2906
TOTAL	953143

Calculation of the economic income and expenses from Table 1 is quite straight forward. The interest received, asset sales and grants were deducted from local revenue reported in Table 1 to obtain economic income Y_t^n . Likewise, depreciation, interest expenses and other capital charges were deducted from total operating expenditure to obtain economic expenses E_t^n . The resulting economic income and expenses statement is shown in Table 2.

Table 2: Economic income and expenses for the year ended 30 June 1989:	
<i>Income</i>	\$557050
<i>Expenses</i>	\$832025

Similarly, economic income and expenses were compiled for the proceeding ten years and used in estimating the RRR from 1978/79 to 1988/89 (see Table 4).

3.2 Value of the Capital Stock

The next step is to obtain an estimate of the current market value of assets (or capital stocks) in each year. As mentioned above, the methodology of Zeitsch et al (1990) was used to update estimates of railways capital stocks made by the Australian Railway Research and Development Organisation (1981) for the year 1978-79. Choochoo's current asset valuation for 1978-79 was updated by combining annual investment data and estimates of economic depreciation to form a capital stock series.

The point estimate of the value of capital assets for Choochoo Railways in 1978-79 was \$699.54 million. This nominal value was converted to 1984-85 constant prices by dividing by the ABS price index for public enterprises fixed capital expenditure to produce a value in 1984-85 prices of \$1242.52 million. The real value of capital assets for subsequent periods was then estimated using the following relationship:

$$K_t = K_{t-1} + I_t - D_t \quad (\text{A5})$$

where

- K_t is the capital stock in constant prices in period t
- I_t is investment (by the rail system) in constant prices in period t
- D_t is economic depreciation of capital stock in constant prices in period t

Assuming that additional capital has a life span of 20 years and economic depreciation can be approximated by the declining balance method, then:

$$D_t = 0.06 K_{t-1} \quad (\text{A6})$$

Substituting this expression into equation (A5) produces:

$$K_t = 0.94 K_{t-1} + I_t \quad (A7)$$

Table 3: Estimating the value of capital stocks for Choochoo Railways.

Year	Nominal Investment (\$m)	Price index	Real Investment (It)	Real Depreciation K(t-1) *0.06	Real Capital stock ^b	National Capital stock ^c (\$m)
1978/79	0.5	0.563	0.89	79.25	1242.52 ^d	699.54
1979/80	-0.5	0.632	-0.79	74.55	1167.17	737.65
1980/81	123.0	0.700	175.71	70.03	1272.86	891.00
1981/82	163.0	0.782	208.44	76.37	1404.92	1098.65
1982/83	135.0	0.891	151.52	84.30	1472.14	1311.68
1983/84	219.5	0.940	233.51	88.33	1617.33	1520.29
1984/85	214.5	1.000	214.50	97.04	1734.79	1734.79
1985/86	264.0	1.084	243.54	104.09	1874.24	2031.68
1986/87	209.5	1.181	179.06	112.45	1940.85	2270.79
1987/88	206.0	1.265	162.59	116.45	1986.99	2517.51
1988/89	174.5	1.335	127.75	119.22	1995.51	2725.87

a Implicit price deflators for public enterprises' fixed capital expenditure. ABS Cat. No.5204.
b Real Capital Stock = $(K_{t-1}) * (0.94) + I_t$
c Nominal Capital Stock = Real Capital Stock * price index
d Source: ARRDO's estimated value of capital stocks for 1978/79 (\$699.54 million) converted to 1984/85 constant prices

Once the capital stock series has been obtained in 1984-85 constant prices using this method, it is converted back to current prices by multiplying by the ABS price index to form a time-series of nominal asset values. The complete procedure is set out in Table 3. It should be noted that in many cases current valuations of a GBE's assets will not be available. In these cases other approaches to estimating the value of capital stocks will have to be used such as Swan's (1990) approach to valuing electricity industry assets.

3.3 Calculating the RRR

Having derived estimates of economic income, expenses, depreciation and the current value of assets, the calculation of Choochoo's estimated real rates of return is set out in Table 4. The true income or nominal earnings (R_t^n) is estimated by deducting economic expenses and depreciation from economic income (Equation A2). It should be noted that D_t^n or depreciation used here refers to economic depreciation derived in Table 3 (converted to current prices using the price index in Table 3). Real rates of return are calculated as true income divided by the nominal value of capital stocks (Equation A1).

Table 4: Estimating real rates of return for Choochoo Railways.

Year	<i>Economic Revenue</i> (\$m)	Economic Expenses (\$m)	Nominal Depreciations (\$m)	True Income* (\$m)	Nominal Capital Stock (\$m)	Real rates of return** (%)
1978/79	218.6	397.6	44.6	-223.7	699.54	-32.0
1979/80	283.1	441.3	47.1	-205.2	737.65	-27.8
1980/81	279.8	429.4	49.0	-198.6	891.00	-22.3
1981/82	331.6	525.3	59.7	-253.4	1098.65	-23.1
1982/83	347.4	571.5	75.1	-299.2	1311.68	-22.8
1983/84	411.5	609.0	83.0	-280.5	1520.29	-18.5
1984/85	469.3	651.8	97.0	-279.5	1734.79	-16.1
1985/86	541.2	706.3	112.8	-278.0	2031.68	-13.7
1986/87	570.6	723.1	131.6	-284.0	2270.79	-12.5
1987/88	567.1	782.0	147.5	-362.4	2517.51	-14.4
1988/89	557.1	832.0	162.9	-437.8	2725.87	-16.1

* True income = Operating revenue - Operating expenses - Depreciation.

** Real rates of return = True income/ Nominal value of capital stocks.

3.4 Calculating TFP

In forming an index of TFP it is necessary to aggregate many diverse output and input quantities into single measures of total output quantity and total input quantity, respectively. Following the Choochoo railways example, value and quantity data are required for each of its outputs and inputs. In this example, Choochoo Railways is assumed to produce two outputs (freight and passenger travel) using three broad input types (labour, capital and other inputs). In some cases, direct measures of the value and quantity of these variables may be available. In other cases, only value information may be available. In these cases resort to the use of a price index may have to be made to approximate the price faced by Choochoo. Using the identity value = price x quantity, an implicit quantity can then be derived by deflating the value by this price index. The required output and input variables are then as follows:

Output variables

- Passenger revenue
- Passenger kilometers
- Freight revenue
- Net tonne kilometers

Input variables

- Labour cost
- Number of operating and maintenance employees
- Annual user cost of capital (VAUC)
- Quantity of capital stocks
- Other costs
- Price index for other costs

Most of these variables can be found in annual reports. The variables passenger and freight revenue and labour cost for example can be taken straight from Table 1. Net tonne kilometres and the number of staff data were also taken from annual reports. Other costs is derived as a residual after subtracting labour costs from the economic expenses variable described above.

Some of the desired quantity variables may have to be approximated using information from a number of sources. The passenger kilometres variable, for example, had to be derived for Choochoo Railways since the only information available from their annual reports was the number of passenger journeys. Additional information on the average distance travelled by Choochoo's passengers had to be obtained from secondary sources and combined with the number of passenger journeys to obtain the variable passenger kilometers.

Capital inputs are different from other inputs in that only a fraction of the input is used each year to produce outputs. In the case of capital it is, therefore, necessary to estimate the service flow derived each year from the capital stock. For simplicity, the quantity of this service flow is usually assumed to be directly proportional to the quantity of the capital stock. Therefore, the quantity of capital inputs included in the TFP calculations is the same as the quantity of the capital stocks reported in Table 3 (in 1984-85 constant prices). The value attached to this capital input is known as the annual user charge for capital and is derived using the formula:

$$VAUC = (g + D - dP_k/P_k) P_k Q_k$$

Where

- g is the opportunity cost of holding capital
- D is the declining balance rate of economic depreciation
- dP_k/P_k is the rate of capital gains on the GBE's assets.
- $P_k Q_k$ is the nominal value of capital stock

Choochoo's annual user charge for capital is derived in Table 5. Since Choochoo Railways is a government business enterprise, the ten year government bond rate was used to approximate the net cost financing a dollar's worth of capital.

Table 5: Estimating the annual user charge for capital (VAUC).

	\$	$D+g$	P_k	dP_k/P_k	Nominal value of capital	VAUC
			0.63			
1980-81	0.132	0.192	0.700	0.100	891.00	81.53
1981-82	0.164	0.224	0.780	0.103	1098.65	133.07
1982-83	0.149	0.209	0.890	0.124	1311.68	111.24
1983-84	0.138	0.198	0.940	0.053	1520.29	219.39
1984-85	0.135	0.195	1.000	0.060	1734.79	234.20
1985-86	0.130	0.190	1.080	0.074	2031.68	233.64
1986-87	0.128	0.188	1.181	0.086	2270.79	234.90
1987-88	0.120	0.180	1.265	0.066	2517.51	284.27
1988-89	0.135	0.195	1.335	0.052	2725.87	379.80

g = government bond rate

D = declining balance rate of asset depreciation (6 per cent).

$VAUC = [(g+D) (dP_k/P_k)] * \text{Nominal value of Capital Stock}$

The complete data set used to calculate TFP for the period 1980-81 to 1988-89 is presented in Table 6

Table 6: Data used for calculating total factor productivity.						
A. Output variables:						
Year	FREIGHT		PASSENGER			
	(\$m)	(ntk)	(\$m)	(Passenger-km)		
1980-81	190.81	5300	69.30	2252		
1981-82	225.69	5350	84.07	2273		
1982-83	226.31	4550	96.84	2064		
1983-84	279.94	5550	106.84	1897		
1984-85	320.55	6150	121.23	1875		
1985-86	368.40	6850	140.93	2063		
1986-87	369.63	6700	156.51	2091		
1987-88	329.37	7100	182.13	2286		
1988-89	309.37	6800	206.43	2122		
B. Input variables:						
Year	LABOUR		OTHER INPUTS		CAPITAL INPUTS	
	(\$m)	(No. of staff)	(\$m)	(Quantity*)	(\$m)	(Quantity)
1980-81	299.41	21044	130.02	107.20	81.53	1272.86
1981-82	355.40	20651	169.92	124.62	133.07	1404.92
1982-83	371.82	20184	199.72	131.88	111.24	1472.14
1983-84	407.80	20376	201.20	123.30	219.39	1617.33
1984-85	444.42	20714	207.34	118.07	234.20	1734.79
1985-86	466.95	20536	239.27	126.64	233.64	1874.24
1986-87	461.65	19293	261.41	128.86	234.90	1940.85
1987-88	459.32	18359	322.67	149.86	284.27	1986.99
1988-89	452.63	16557	412.45	179.71	379.80	1995.51
* Implicit quantity derived by deflating the value by a price index						

The TFP index can be calculated from the data listed in Table 7 using equation A4. The indexing formula can be implemented easily using an econometrics package such as SHAZAM or can be programmed using a standard spreadsheet package. In the case of Choochoo Railways, the estimated TFP index is shown in Table 7.

Table 7. TFP index for Choochoo railways.

YEAR	Index
1981	1.00
1982	0.96
1983	0.83
1984	0.92
1985	0.97
1986	1.05
1987	1.05
1988	1.10
1989	1.02

4. SUMMARY

The various steps involved in calculating RRR and TFP for a representative GBE have been illustrated in this paper. While this approach will be generally applicable to most GBEs, the availability of data and the characteristics of the service provided by particular GBEs will necessitate case by case modifications to the procedure. The issues of most concern will typically be the availability and reliability of estimates of the current market value of capital assets and the choice of an appropriate rate of economic depreciation of these assets. In other cases, choosing appropriate variables to capture all aspects of the quantity and quality of a GBE's outputs may pose special problems. This is particularly the case for those involved in the provision of financial market services.

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Discussion Paper No. 3

Non-Financial Indicators of GTE Performance

The evaluation of GTE performance is far from straight forward. There are pitfalls in relying on particular financial measures without reference to other indicators which may help provide a broader perspective on the performance of GTEs. Non-financial Indicators (NFIs) of performance can complement accounting and economic measures. They can be used to measure quality of service, efficiency and effectiveness. As such they are usually industry-specific measures.

In order to settle on specific national indicators for each industry it may be advisable to undertake further consultations with the relevant industry associations, many of which are in the process of establishing specific indicators of quality of service, efficiency and effectiveness to be monitored on a national basis. Governments may also need to continue to liaise with their respective GTEs on specific indicators to be monitored.

Quality of Service

Quality of service is an essential component of the competitiveness of both private and public firms. Assessment of the performance of a GTE should have regard to its quality of service. There is a need to ensure accountability to consumers of the services GTEs supply in a monopoly situation. There is a need also to ensure that improved financial or productivity performance is evaluated with reference to the quality of service.

The linkage between quality and competitiveness is related to variables such as reliability, response time, accessibility and security. In other words, predictability is an important parameter for consumer satisfaction. The ability to rely on a particular level of quality of service, even if not the highest possible, is an important requirement for industries using the services of GTEs. Quality of service information is therefore necessary to ensure the accountability of monopoly GTE suppliers to consumers. Formal monitoring of quality of service over a number of years can serve to highlight any decline which may develop in a particular service affecting the competitiveness of the products of industries using the services of GTEs.

GTEs which operate under conditions of monopoly, relatively free from the pressures of competition, can improve performance as measured by financial and economic indicators by lowering costs at the expense of reducing service levels. For example, a public telecommunications provider could reduce the number of staff correcting faults or breakdowns in the delivery of telecommunications services. This may lead to a higher economic rate of return or better cost recovery performance. Yet, the subsequent delays in service provision could affect significantly the ability of user industries to compete on the world market. Improved performance would have been achieved at the expense of service quality and the competitiveness of user industries.

Improving the performance of GTEs may involve trade-offs between financial performance and quality performance. NFIs can provide essential information in assessing the extent to which such trade-offs are warranted. They help bring consumer requirements into the equation of what is improved performance of a GTE.

Efficiency

The efficiency of a GTE is concerned with the relationship between outputs and inputs, whether a GTE has been using its resources to best advantage to achieving its outputs. Quantitative economic measures of efficiency have been surveyed in Discussion Paper No. 2. They can provide comprehensive estimates of GTE performance but have extensive data requirements and involve a complex estimation methodology.

More readily available data from GTEs can provide an indication of changes in efficiency of a GTE, but without the comprehensiveness of those measures surveyed in Discussion Paper No. 2. Most GTEs can provide indicators of labour productivity.

Effectiveness

'Effectiveness' is the degree to which a GTE is achieving its objectives. Many GTEs have equity and other non-commercial objectives as well as output and efficiency goals. The multi-faceted nature of GTEs means that additional monitoring devices are required to provide an adequate guide to their overall performance. This applies in particular to major GTEs operating in regulated markets and providing community services obligations specified by governments.

Effectiveness indicators include measures of output, market share and price movements in real terms. NFIs also provide a benchmark of best practise in provision of some services. Certain elements of performance defy evaluation according to financial or economic ratios. Some examples of such non-financial factors are staff turnover, on the job skill acquisition, levels of industrial disputation, and occupational health and safety.

In addition, NFIs can provide a measure of the extent to which a GTE is meeting its CSOs. As CSOs are intended to advance certain social policy objectives progress towards these objectives cannot be fully evaluated by financial or economic indicators.

There are, however, many difficulties applying NFIs to assess performance of many existing CSO arrangements. The actual social objective of these CSOs is rarely defined and the GTE operates without clear separation of commercial and non-commercial objectives. NFIs will only become a useful measure of performance when CSOs are well defined, and explicitly funded as part of a contract between Government and GTE. The contract should contain agreed targets for performance as measured by NFIs.

Examples of Non-Financial Indicator

Certain NFIs are applicable to all GTEs across sectors. Examples of such NFIs are listed below.

- | | |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Efficiency | <ul style="list-style-type: none">. measures of working time lost due to sickness, or industrial accidents or industrial disputes (working days lost per '000 employees);. labour employed per unit of output;. training as a proportion of the total salary budget; and,. labour turnover. |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- Effectiveness . environmental considerations like measurement of emissions of greenhouse gases and energy consumption;
 - . the existence of performance agreements relating to CSOs; and
 - . indices of changes in real prices.
- Service quality . surveys of customer satisfaction (that could be used to construct an index).

Some NFIs are specific to certain sectors. Examples of such NFIs are listed below.

Communications

- Efficiency . average time required for connection of service;
 - . delay in clearance of faults;
 - . call failure rates;
 - . number of faults recorded per connection;
 - . probability of mistaken delivery (postal);
 - . probability of damage to article (postal); and
 - . time taken for delivery of information (postal).
- Effectiveness . density and distribution of postal agencies;
 - . density and distribution of public pay-phones;
 - . proportion of public pay phones in working order;
 - . connections per capita; and
 - . articles posted per capita.
- Service quality . proportion of exchanges giving access to international circuits;
 - . percentage of main lines on automatic exchanges;
 - . response times (dial tone delay, delay in setting up a call, response time for enquiries);
 - . accuracy of directory enquiries; and
 - . time taken for message delivery (postal).

Energy

- Efficiency . reserve plant margin (peak demand/nominal capacity);
 - . average repair time for public lighting;
 - . average time required for connection of service;
 - . number of emergency call outs per connection; and
 - . proportion of generated output actually distributed (sold).
- Effectiveness . measures of electrical fatalities;
 - . connection per capita;
 - . proportion of lots serviced (electricity and/or gas);
 - . plant capacity available for generation;
 - . plant output generated; and
 - . density and distribution of public lighting.
- Service quality . indices of reliability based on the proportion of outage time over the period of total usage.

Public Transport

- Efficiency . excess capacity (seats/vehicles) per service.
- Effectiveness . percentage of occasions that trains run on time;
 - . station/population density;
 - . serious passenger injuries per passenger km; and
 - . number of journeys per capita.
- Service quality . seat availability;
 - . average service frequency; and
 - . average age of vehicles.

Water

- Efficiency . breakages or blockages per 100km of piping; and
 - . average time required for connection of service.
- Effectiveness . unsewered lots as proportion of total lots;
 - . proportion of solid waste removed from water supply; and
 - . proportion of solid waste recycled.
- Service quality . tests of water quality.

Waterfront

- Efficiency . property leased over the area available for lease;
 - . time equipment is available as a proportion of time required;
 - . berth occupancy; and
 - . vessel turnaround time.
- Effectiveness . number of vessels.
- Service quality . berth queueing.