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ECONOMIC INFRASTRUCTURE IN AUSTRALIA:
A REVIEW OF THE ISSUES*

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ABSTRACT

This paper examines the questions of whether the economic infrastructure in Australia is adequate or excessive and whether it is efficiently used. Problems with the present framework of control for investment decisions are identified, and the options for improving the framework are discussed.

The paper considers the criteria for determining whether or not the infrastructure is adequate and discusses the costs of inadequate or excess provision. There is little evidence of a general inadequacy of infrastructure investment although one can point to many instances of inadequate or excessive investment. Thus, the allocation of investment funds in the public sector is not always efficient. Unless these problems of efficiency can be addressed, increased funding of public enterprises will not ensure that funds are directed to projects with high economic or social returns.

A range of possible options for improving investment decisions is considered, including financial targets, incentive and sanction structures, improved monitoring, and increased private sector involvement. None of these is without its problems, but a commitment to greater reliance on them could lead to improved infrastructure investment decisions.
1. INTRODUCTION

In Australia, as elsewhere, there is a growing interest in infrastructure questions. In some countries, such as the U.S., there are claims that investment in infrastructure is declining and that the infrastructure is deteriorating, and some have suggested that these trends may lead to an infrastructure crisis (Economist, 1987). There is less concern about an infrastructure crisis in Australia, but there have been suggestions that problems are developing. There have been two National Infrastructure Forums, and two reports on infrastructure have recently been published. One, the report of the House of Representatives Standing Committee (Langmore, 1987), looked at social and economic infrastructure. The more recent EPAC report (1988) looked at economic infrastructure. The authors of this paper contributed to the EPAC report, and the approach and conclusions here are consistent with it. The EPAC report includes a review of the evidence on infrastructure adequacy and efficiency.

Infrastructure issues are present in other policy discussions. Public enterprises supply much of the economic infrastructure, and the recent privatisation debate has focussed attention on whether, in the presence of financial constraints, those enterprises are able to maintain an adequate investment program. The requirements of public enterprises for additional capital funding have been examined in a recent report from the HV Evatt Foundation (Botzman et al., 1988) while several aspects of the privatisation debate are reviewed in Abelson (1987). The new set of controls for Commonwealth public enterprises is designed to improve their investment decisions and increase the efficiency with which these enterprises use their capacity, and several states have been conducting similar exercises. Arrangements for public enterprises formed an important component of the micro-economic reform package of the Federal Government's May Statement. The
need for structural adjustment has implications for infrastructure investment and operation.

In this paper, we review the issues concerning economic infrastructure. We restrict attention to this, and exclude social infrastructure, partly on grounds of manageability, but mainly because an essentially different set of questions arises. Economic infrastructure refers to assets that produce services which in turn form important inputs into the production of final goods and services. It includes water, gas and electricity, transport and communications. Social infrastructure includes housing, education and health, amongst others. It is usually supplied direct to consumers, and its provision has a strong social or redistributive element. Since the objectives of economic infrastructure provision are more narrow - in the main provision of services valued by users and paid for by them - questions of adequacy and efficiency are more easily addressed. But it has to be recognized that there can be redistributive or equity issues which arise with economic infrastructure provision.

There are a number of questions that we shall investigate in this paper:

(a) Is the current provision of infrastructure adequate, and is investment sufficient to ensure adequacy in the future?

(b) Are sufficient funds being allocated to replacement investment, as compared to investment in new projects?

(c) How will the demands that are placed on infrastructure be affected by structural change?

(d) Are existing infrastructure services being produced and priced efficiently?

Not all of these questions can be answered definitively. On some - such as (b) - there is little reliable information. Based on available evidence, our conclusion is that problems are present - examples of inadequate and excess capacity exist, as do inefficiencies in the use of infrastructure. This leads on to questions about the institutional framework within which infrastructure investments are made and capacity is used.

(e) How do macroeconomic and fiscal constraints affect investment decisions?

(f) How have institutional factors, such as public enterprise controls, affected investment and operations in the past?

(g) Are social objectives and the other non-commercial objectives of enterprises presently being met in the most efficient way?

(h) What options are there to improve the allocation of funds and the use of capacity?

We examine those questions by first looking at the criteria for adequacy, the meaning of efficiency, and the costs of inadequacy and excess. Next, we examine the available evidence, and draw some (admittedly tentative) conclusions from it. In Section 4 we discuss macroeconomic and fiscal constraints and their impact on infrastructure investment, and the consequences of structural change. The problems with the current framework are considered in Section 5, and the options for improvements are canvassed in Section 6. Our conclusions are summarised in Section 7.
In theory, complete cost-benefit studies of all investments would require large amounts of data. In practice, many investments are not feasible due to such constraints. The real problem is that the information required is usually only available within the enterprises providing the infrastructure. For some types of enterprises, this is an issue, as it is usually more readily available outside of the enterprise. For others, such as dams or power stations, it is not.

2.1 CROSSING THE CRITERIA

If the conditions of the adequacy and efficiency of the infrastructure provision are to be examined, it is necessary to start by setting the criteria by which those projects are to be judged. If, for a branch of the infrastructure, there were many projects from which benefits were derived, then either present or proposed, and if those benefits could be quantified, it would be possible to compare the benefits with the costs of the project. However, it is not possible to evaluate the benefits of a well-developed organization such as a telecommunication enterprise or one in the service industry. It should be possible, using published information or data, to assess whether or not the generating capacity will be at all adequate.

Cost-benefit analysis is usually considered as proceeding on a project-by-project basis. Frequently, however, while the government controls the amount of investment that is to be allocated, it is not possible to decide the amount of funds that are to be allocated to the public enterprise or to a branch of the enterprise. In deciding the extent of funds to be allocated to such enterprises, governments should be guided by the rate of return, not the proceeds of the enterprise. The existence of high return projects within an enterprise of low overall profitability may be of little relevance if, for institutional or political reasons, they are not to be proceeded with. Moreover, the efficiency of investment funds is allocated.
It is important to look not only at the overall level of capacity and investment, but also at how efficiently they are being used. Problems may arise if, for example, prices are set inefficiently low. There may be adequate capacity, but it may be allocated inefficiently. Apart from this, services may not be produced at minimum cost. As with adequacy, efficiency can be difficult to assess from outside. While it can be possible to compare the overall efficiency of an organisation (e.g. a state electricity authority) with that of comparable organisations elsewhere (e.g. other electricity authorities), it is very difficult to determine how efficiently particular services in diversified enterprises are being provided.

2.2 CHOOSING THE INDICATORS

Complete cost-benefit analyses are frequently not available although some information on infrastructure capacity and investment often is available. There are several issues which need to be addressed in examining the adequacy and efficiency questions.

(a) The time frame. High overall returns to investment in the past do not imply that they will hold in the future. Investment in the past may have been worthwhile, but capacity may be adequate now and further investment unnecessary.

(b) Margins and averages. It is likely that in several areas of investment average returns will be high, but marginal returns will be low. Since the discussion is about whether additional investment is required, the marginal return is relevant, not the average return. Unfortunately, published figures are normally of average, not marginal, returns.

(c) Profit rates of returns. Rates of return of profit on capital invested are often no indication of the returns to investment in infrastructure providing enterprises. Profit rates, at the margin, are only an indication of the worth of an investment in competitive industries - and such infrastructure is provided under conditions of monopoly, or near monopoly. A high rate of return may be achieved simply because the enterprise is using its monopoly power to charge high prices. Furthermore, in areas of natural monopoly, efficient pricing may result in low rates of return, or losses. Apart from this, some infrastructure providers may be selling below cost as a matter of government policy. Whether or not this is justifiable, it means that nothing can be read from achieved rates of return in terms of the adequacy of capacity, or the efficiency with which it is being used.

(d) Allocative efficiency. This deals with the choice of output level, quality and price. It is possible for adequate capacity to be available, yet for it to be allocated inefficiently. For example, airport runway capacity may be adequate, but if it is underpriced, it will be over used and delays will occur. Maintaining excessively high service standards will add to costs more than benefits, and make it seem as if capacity is inadequate. In short, in some cases infrastructure provision may appear inadequate, but the real problem is that it is not being efficiently utilised.

(e) Productive Efficiency. This refers the efficiency with which services are being produced - are they being produced at minimum cost? If inefficiency of this type is present, the cost to users and the economy is similar to the costs imposed by inadequate infrastructure.
2.3 THE COSTS OF SHORTAGE AND SURPLUS

It is obviously desirable that the "right" level of infrastructure capacity should be provided. However, if this level is not achieved, there will be costs. In the case of a shortage, these costs can take several forms.

(a) Higher costs of production. Infrastructure industries may still be able to produce the required outputs, but they may not be able to take advantage of more efficient methods of production that investment could bring. Because they are excessively prolonging asset lives they may be spending more on maintenance than is desirable. The end result will be higher prices to users than is desirable, or reduced service availability.

(b) The quality of output can decline. With some systems, excess demand may mean congestion and delays (eg with telecommunications facilities or city roads). While these may not show up as costs to the infrastructure enterprise, they will add to the costs of users.

(c) Services may not be available to potential users. Thus, limited airport capacity may mean that tourists are dissuaded from flying to a city, or Australia altogether. A lack of availability of electricity may mean that an aluminium smelter is not built. Sometimes potential users will circumvent the non-availability by producing the service themselves, possibly at higher costs.

Where the costs of excess investment are passed on through higher prices, these have the same adverse effects on infrastructure users as do higher costs (in cash or lower quality) due to inadequacy - projects are cancelled, exports are lost and user industries experience high cost structures. The same is true if taxes are imposed to cover losses of infrastructure enterprises which have over invested.

In contrast, the costs of surplus capacity are straightforward. Excess investment must be paid for - either this will be through higher prices for the output, or through higher taxes if the government funds the cost of excess investment. One of the reasons for the sharp price rises for electricity lies in excessive investment by electricity authorities in the early 1980s.

How do the costs of inadequate and excess investment compare? The Langmore Committee (1987, pp47-48, 120-126) considered that the costs of inadequate investment were greater than those of excess, but it produced no evidence to support its contention. Nor is it obvious why this should be so. If it were the case that inadequate infrastructure meant that particular services were totally unavailable, the costs could be high. However this will rarely be the case. Under investment in rail, road, electricity or telecommunications will normally mean that costs are higher or quality is lower than is desirable, but the services will still be available. Underinvestment in airport capacity may impose costs, but these can be minimised by efficiently rationing available capacity - the shortfall leads to a rise in price to users. To make any proposition about the relative costs of, say, a 10% shortfall and a 10% surplus, it is necessary to have detailed information about the costs of the process. A priori, it might be expected that sometimes a shortfall is more costly, and sometimes a surplus is more costly. In the absence of detailed information, it would be appropriate to give equal weight to each possibility, and not to err, as the Langmore committee suggests, in the direction of excess investment.

It should not be doubted that infrastructure investment is important in the process of economic growth, and in
facilitating structural change. However, infrastructure investments which advance these objectives will be those which perform well in cost benefit terms, and which produce services which other industries need. There is little or no scope for using infrastructure as a 'leading sector', to force the pace of development in other industries. This has been tried at different times in Australia, and it usually ends as a costly failure (such as the Ord River Scheme). Examples of poorly sited, excessive investments are easy to find in Australia. Rather than stimulating growth, they have hindered it, by absorbing resources and producing little return. The demand for infrastructure services is a derived demand, depending on the demands for final goods and services, and the infrastructure sector serves others best when investment is neither inadequate nor excessive.

3 ASSESSING THE EVIDENCE

3.1 RECOGNISING THE LIMITATIONS

In discussing the evidence on adequacy and efficiency, we must first acknowledge that our knowledge is limited. If a rigorous assessment is to be made, considerable information about a large number of investments is required. While broad judgements may be made about large investments, much investment in infrastructure takes the form of small investments (new exchanges, new pipes, rail track improvements). It is difficult to assess these with information typically available outside the infrastructure enterprises themselves. Even if this information were available, there would be a major task of evaluating and aggregating the results of thousands of projects.

We shall thus be much more modest and circumspect in our conclusions than the Langmore Committee which considered that significant increases in infrastructure investment were warranted. They may be, but we would like to see the detailed analyses before reaching such a conclusion. The claims of infrastructure enterprises should be given some weight, but they must be recognised as ambit claims.

As noted earlier the existence of some projects with high returns in the public sector does not imply that investment funds in aggregate should be increased since the funds may not be used for the good projects. While it would be convenient to have a clear measure of likely investment programs that would satisfy economic and broader social criteria over the years to come, this is not the priority. Rather, it is important that the authorities charged with the responsibility to invest have the incentives to invest appropriate amounts, and use capacity efficiently. This means having the right framework for public enterprises to operate within.
3.2 TRENDS

One indication of the adequacy of investment might be in trends. If the trend of infrastructure investment were sharply downward, there would be prima facie evidence of either a problem or a structural shift. Thus, in the US, there is a clear break of trend in infrastructure investment, which lends credence to claims of a problem (The Economist, 1987). The same sort of pattern is not evident in Australia. Some time series are shown in charts 1-4. They do not tell any particular story about infrastructure adequacy.

Chart 1 indicates a slight fall in public relative to private investment and GDP over the period since 1950. Chart 2 suggests that public enterprises, the main providers of economic infrastructure, have maintained, perhaps increased, their investment as a share of GDP. Relating investment to GDP may be a poor way of indicating need. A better denominator might be public enterprise output – as Chart 3 shows, there is no trend in this ratio since 1975. Chart 4 suggests there may be something of a fall since 1975 in government social infrastructure investment, but not, until the most recent years, for economic infrastructure.

In examining such trends, a number of qualifications need to be made.

(a) Is constancy relative to some indicator (e.g. GDP) a good measure of adequacy? Possibly requirements
have changed, and the earlier provision is now too low or too high.

(b) Was investment in earlier periods exactly adequate? Perhaps it was excessive or inadequate.

(c) What base period is being used? The early 1950s may be a poor period to use as a base because there was much catch-up investment in infrastructure after the neglect of the war years.

(d) The importance of different sectors changes, and there are changes in demand for public infrastructure. In the early 1950s, much of the freight task was performed by rail, whereas now it is performed by road. A rail wagon is included in 'public infrastructure' whereas a private truck is not. Some other changes may be taking place in the opposite direction. It is not possible to know, without a disaggregated analysis, what proportion of GDP public infrastructure should be if it is to be adequate.

Overall, trends show little clear movement and, allowing for the problems of interpretation, they tell us little about the adequacy of infrastructure investment.

3.3 THE EPAC BUSINESS SURVEY

In 1987 EPAC surveyed 27 major business users of infrastructure services. The objective was not so much to undertake a scientific survey, but to gain some idea of how businesses perceived problems with the infrastructure they are using. Such an approach has advantages and disadvantages. If there are major problems of availability of certain services, users could be expected to be aware of them. They may also have views concerning the efficiency with which the services are being provided, their
appropriateness, and the responsiveness to changes in demand. The users, however, do not have an in depth knowledge of infrastructure provision, so they may not be aware of problems. They may not realise if replacement investment is being neglected, or if investment in new technology could lower the cost of output.

Respondents to the survey identified a number of areas of inadequacy - e.g. Sydney Airport international terminal capacity and roads in cities and to ports. In most areas, however, they regarded provision as adequate for their needs. There were also satisfied, in the main, with the standard of such services as telecommunications, energy and water. Ports and railways attracted adverse comments; many viewed these services as being inefficiently operated, and failing to live up to their potential. There were several more specific points of both criticism and praise. Most firms would prefer to see greater private sector involvement in infrastructure provision (from first telephone handsets to private power stations) - several of these firms could have a direct interest in such involvement.

In short, the business survey did not provide any evidence of general inadequacy of infrastructure, though particular problem areas were identified. There was considerable concern about efficiency and service standards in some areas, especially transport.

3.4 SURVEY OF INFRASTRUCTURE PROVIDERS

In 1987, a number of infrastructure providers were contacted by EPAC to find out their views on problems of replacement and of investing to meet future demand. As with the business survey, this was not intended as a scientific survey, but as an exercise to identify any major problems.

Most respondents were not concerned about having insufficient funds to undertake worthwhile replacement projects, though some, such as Telecom, felt that problems could develop under current funding arrangements (Telecom, 1987). Maintenance and restoration of roads were also noted as problems which may be growing. In other areas, such as electricity, it was considered that assets were being replaced when it was economic to do so.

Several providers doubted whether funds would be available to meet future demand. This tended to be true more for providers directly reliant on governments for funding rather than for those which generate their own cash flow. There was also concern about the variability and uncertainty of funding.

In short, the infrastructure providers considered that enough was being spent on replacement of assets in most areas, and that the capacity available was adequate. They were sometimes critical of funding arrangements and some considered that there could be problems of inadequacy in the future.

3.5 SUBMISSIONS TO THE LANGMORE COMMITTEE

The Langmore Committee sought submissions from the public on infrastructure questions. It received many submissions from government departments, from several (but by no means all) infrastructure providers, from some unions, and Local government, and from bodies with an interest in infrastructure questions, such as the National Infrastructure Committee, the CSIRO and the Australian Federation of Construction Contractors. Some were extensive and detailed - for example the Treasury, Department of Finance and Telecom submissions. As with the EPAC surveys, the submissions to the Langmore Committee do not constitute a scientific or comprehensive survey.
In a few cases, the infrastructure providers gave a careful statement of their position, and of the problems they saw themselves as facing. Some government agencies gave useful overviews of the problem. However many submissions, as might be expected, amounted to little more than putting forward cases on behalf of interested parties. It would be difficult to interpret the information as reliable evidence that a general problem of inadequacy either exists, or is likely to develop in the near future.

3.6 SPECIFIC STUDIES

Of all the sources of evidence on infrastructure adequacy and efficiency, perhaps the most reliable are the studies made of specific problems. These include cost benefit studies of projects, reports of inquiries, and analyses of issues such as replacement of assets. A list of studies that have drawn attention to areas of excessive, inadequate on inefficient infrastructure is at Appendix A.

These specific studies are the most reliable for several reasons. Many are detailed and comprehensive - they meet most nearly the ideal requirements identified in Section 2 for a sufficient assessment of the adequacy question. They are the most explicit in terms of criteria and assumptions. Finally, they are the most independent - in the main, they have been undertaken by individuals, groups, or agencies which do not have a direct interest in putting forward particular views of the problems.

The main limitation is that they are not comprehensive in their coverage of projects and areas of infrastructure. The roads area is well covered, airports and electricity projects have been given considerable attention, but telecommunications and ports have been subjected to rather less independent scrutiny. Thus, it is not possible to use such studies to determine whether there is an overall adequacy problem, or whether the right amount of funds is currently being invested (though they will help one form a judgement). However, they are invaluable in determining where the infrastructure problems lie, how significant they may be, and in pointing to the types of changes in the institutional framework that may be needed to minimise these problems. Studies of particular projects suggest a mixed picture. There are examples of investment projects, such as urban roads, which have consistently shown high benefits relative to costs, yet which have not been undertaken. This may be for funding reasons, but in many cases this is not so. Investments in infrastructure have been held up for environmental reasons (city roads), disputes between governments, companies and unions (coal loaders and airport facilities) and Federal-State rivalries (interstate rail projects).

This may be contrasted with several investments which perform poorly on economic and social criteria which have nevertheless been funded. Regional factors have resulted in excess investment in airports in north Queensland, yet there is no really adequate international gateway. Projects which are easy to 'sell' to the public, such as XPT trains and sewerage outfalls have been preferred to less impressive, but more worthwhile projects such as track upgrading and replacement of water mains. It has been argued that new construction has, for political reasons, been favoured over spending on maintenance. There is evidence of over investment in rural roads (Docwra and Kolson, 1971). Finally, there was major over investment in electricity generation in the early 1980s. In many cases, examples of both under and over investment occur within the same organisation - a better allocation of funds, not necessarily a larger amount, would have led to better service provision and lower costs.

Most studies are of large projects or systems (e.g. the grain handling systems). There has been less attention given to problems of maintenance and replacement investment in existing infrastructure assets. (An exception is Burns,
1987, and the South Australian Public Accounts Committee 1987). There could be a need for significantly increased replacement in the years to come. Whether or not adequate funding is available overall, there is the possibility that good investments in replacement will be sacrificed for poorer, but more visible investments in new projects.

There have also been studies which have produced evidence on the efficiency with which infrastructure is produced and used. Undercharging of road for freight vehicles, and the consequent imbalance between road and rail shares of the freight task, have long been discussed (May, 1984, ISC 1987a, Luck and Martin, 1987). Capacity at busy airports is underpriced and not rationed efficiently (Mills, 1982). Work practices in ports and railways are often outdated and result in costs being higher than they need be.

While the conclusions of any one study may be, and often are, disputed, the overall picture which emerges is likely to be an accurate one. While there are gaps in the coverage, such studies will give the best insight into where the problems are, and what the nature of these problems is.

3.7 CONCLUSIONS

Any conclusions must be tempered by the limits to the available evidence - and sometimes, these limits are tight. However, a review of the evidence suggest the following:

(a) There is no evidence of obvious, general underprovision or over provision of infrastructure services. Over time, increases in public infrastructure investment (as well as private infrastructure and non-infrastructure investment) will be worthwhile. Unless the Australian economy grows much more rapidly than it has in the past, a sharp increase in public infrastructure investment is unlikely to be necessary. There could be a need for a significant increase in replacement investment in some areas - however the evidence for this is sketchy.

(b) There are many examples of under and over investment. Sometimes these occur within the same organisation. It is evident that good projects are delayed, or not constructed for a variety of reasons - lack of funding is only one of many and often it is not the most important. It is also clear that many projects which are expected to perform poorly are nonetheless given funding. In short, whether or not there is too little or too much funding overall, there is a problem of allocation of funds, both with and between organisations.

(c) While some infrastructure providers are relatively efficient, others are less so. Examples of under or over pricing exist, leading to ineffective use of available capacity. In other cases costs are higher than they need be. These are not problems which have recently emerged - rather they have been present, and recognised, for a long time.
4. MACRO-ECONOMIC CONSIDERATIONS AND STRUCTURAL CHANGE

4.1 MACRO ECONOMIC CONTROL

Governments have used the level of public investment as an instrument of fiscal policy - this is likely to continue. Thus, the level of investment in infrastructure has been, and is likely to continue to be, influenced by factors other than the need for such investment.

The government has many fiscal policy controls at its disposal, but the use of all of them involves costs. If the government increases taxation for fiscal policy reasons, there will be adverse effects on incentives. It can try to affect the level of private investment through specific incentives, interest rate policies and the like. These are not particularly effective or reliable policies - the response to a change in investment incentives, for example, can rarely be predicted accurately. By contrast, the Commonwealth Government can control its own investment directly, and thus have a fairly predictable effect on overall investment and demand. It can control investment by its public enterprises less directly, and investments by States to an extent. If the Commonwealth Government wishes to produce a change in aggregate demand, it will find altering public, including infrastructure, investment one of the most effective devices open to it. If infrastructure investment were excluded from use as a fiscal device, other instruments would need to be relied on more heavily, at an additional considerable cost in terms of efficiency.

The result need not be that infrastructure investment becomes inadequate over time, although there will be cycles. There will be a cost in terms of efficiency - at times, projects will be delayed, and at other times, more than usual will be invested. There is also the potential for poor handling of the allocation problem. Some projects may be easy to postpone but the costs of postponing them may be high, whereas other projects may be difficult to slow down even though they are less urgent. It is probably inevitable that public infrastructure investment will be used to some extent as a macroeconomic control. The main issue is then to ensure that the framework within which control takes place minimises the losses to efficiency by ensuring that the funds that are made available for infrastructure investment are used efficiently.

4.2 CROWDING OUT

An issue which sometimes gains attention is that of the possible crowding out of private sector investment by public sector investment. It may be debated whether or not such crowding out occurs in Australia. If Australia is a price taker in international capital markets, and funds are elastically supplied at a rate which reflects world interest rates and the risk associated with the borrower, crowding out would not occur. Any tendency for increased public investment (financed through borrowing) to increase interest rates would then be counteracted by increased capital inflow. There would be no reduction in private investment.

Alternatively, suppose that Australia faces an upward sloping supply of funds schedule. Additional public investment increases the rate at which private investors can borrow overseas, and thus they reduce the level of their investment. Full crowding out is very unlikely to occur.

Crowding out will only be a problem if the return on public investment is less than that which could be obtained from any investment that it displaces. If all public investment is evaluated at the market interest rate, plus an allowance for the taxation of private investment, this should not happen. Thus the possibility of crowding out is no
argument for restricting investment in public infrastructure. It does, though, highlight the need (present whether or not crowding out takes place) to accept only those projects which have benefits greater than costs, discounted at the appropriate rate of interest.

4.3 FISCAL CONSTRAINTS

It is possible that the Federal government may wish to reduce either or both of the Budget deficit and the Public Sector Borrowing Requirement (PSBR). At the same time, it may wish to limit tax increases (for example, because of their inefficiency/disincentive effects). If so, public investment in infrastructure may be affected.

The effect on total infrastructure spending depends on the motive for imposing the target. If the limits on spending were being imposed to control demand or influence the external balance, it would be counter-productive to use "backdoor" methods to increase infrastructure spending. For example, if investment that would have been undertaken by the public sector were undertaken by the private sector, aggregate demand would increase, and this would defeat the purpose of the original constraint. If there is a constraint on overall demand, public and private investment are substitutes and there is no point in facilitating changes in one to negate the effect of changes in the other.

An alternative possibility is that the deficit and PSBR are to be limited for essentially "window dressing" reasons. These measures may be interpreted by financial markets as indicators of the government's fiscal position. These markets may have an effect on the working of government policy, but are thought to be not perceptive enough to realize the major deficiencies in these measures. If so, the government may keep to targets in order to produce a desired effect in financial markets, yet it may wish to avoid the real costs of meeting the self imposed constraints. If there are good investments open to the government, it would be appropriate to use methods of financing them which do not affect the deficit or PSBR.

An option which has received a good deal of attention recently is that of privatisation, partial or full (see Advisory Group on Australian Airlines, 1988). Since, as is discussed later in this paper, full privatisation may influence the efficiency of enterprises, more important considerations arise than the effects on the PSBR. But if the objective is to undertake window dressing changes in indicators such as the deficit or PSBR, it may be desirable to minimise the cost of these constraints on infrastructure spending (and any other form of spending) by partial privatisation or such devices as "equity trusts" and leasing.

The debt/equity issue, has received attention recently in the context of public enterprises (see Advisory Group, 1988). It is natural that the managers of public enterprises should be in favour of low debt/equity ratios, since their performance looks better if the ratio is low. However, there is no such thing as an appropriate debt/equity ratio for a fully public enterprise. It is a 100 per cent owned subsidiary of the government, and thus one owner bears all the risks no matter what the financial structure. Debt/equity ratios are chosen by companies to balance risk and taxation factors, with consideration given to the impact on capital markets. A public firm need not consider these effects - it cannot alter the incidence of risk, any taxation payments ultimately accrue to its owner, and when appealing to capital markets for loan funds, its riskiness is assessed by its ownership rather than by its debt/equity ratio. Thus the debt/equity ratio is only of secondary importance for a fully public corporation. Even if the government were to declare that the enterprise would not be supported were it to run into difficulties (Advisory Group, 1988) future governments would not be so committed.
But if a firm is privatised, even if only partly, the debt/equity ratio takes on the same importance as with a normal private firm.

Given that the Federal Government is constraining the deficit and PSBR to influence financial markets, it is somewhat surprising that the Langmore Committee is so against partial privatisation. If the need for more investment is as pressing as the Langmore Committee suggests, then partial privatisation would appear to be attractive. It would enable the investment to go ahead, while at the same time preserving public control of the enterprises.

4.4 INFRASTRUCTURE AND STRUCTURAL ADJUSTMENT

Australia is currently undergoing structural adjustment, and this process is likely to continue for some time.

Structural adjustment is not a new experience - major adjustments were required at the time of the mining boom in the 1960s and 1970s. Such adjustment involves reorienting the capacity of the economy to produce goods and services. As a result, the demands on the infrastructure will change. Thus, as an example, an increase in tourism will lead to increased demand for airport capacity and roads in areas which tourists visit. At the same time, the demand for other infrastructure services (electricity for minerals processing) may be less than originally expected.

Some new facilities will be needed, and it is possible that overall investment will need to increase, though not necessarily by much. Infrastructure will need to support the expanding sectors - it will need to respond to change rather than to be a leading sector. It is possible that the need for investment in infrastructure will be less than in the mining boom, when new facilities (railways, ports) had to be constructed in remote places. The main impact of structural change on infrastructure providers will be to increase the need for responsiveness to demand. Demand projections will need to be revised more frequently, and investment programs adjusted accordingly.

Where (as with airports) investment lags behind changes in demand, it will be important to ration capacity and operate the facilities efficiently. Such imbalances occur frequently during periods of structural change. Pricing policies, and other allocative devices, become more important during such periods. If pricing policies are unchanged and inappropriate, the costs of inadequate capacity can be high in the short term - properly adjusted, pricing policies can be used to minimise the costs of short term shortfalls in capacity.
5. PROBLEMS WITH THE CURRENT FRAMEWORK

5.1 INTRODUCTION

At present, most economic infrastructure services are provided by public enterprises, although roads and (until recently) airports are important exceptions. These enterprises operate, to a degree, at arm's length from government but their independence has been constrained by the expectation that they achieve social objectives in addition to their commercial objectives, and by a range of controls that operate both at the strategic level (e.g. over aggregate borrowings) and at a more detailed level (e.g. over individual investment decisions). While most public enterprises pay dividends to their shareholder, some (e.g. the railways in the larger states) are chronic recipients of government subsidies to meet their operating deficits.

As noted, this framework of control of infrastructure providers does not seem to have done too bad a job in terms of providing a broadly appropriate level of investment in infrastructure. But investment has often been inefficient - the best projects have not always been proceeded with - and infrastructure has often been managed inefficiently once in place. There are two fundamental reasons why these problems occur.

First, governments assign to the providers of infrastructure multiple objectives the relative importance of which may be neither clear nor consistent through time. In some cases there may be better ways of meeting some of the objectives. Moreover, the investment plans and other aspects of the operations of the providers of infrastructure may be required to meet the demands of political expediency. The second problem is that, although governments have to allow their public enterprise managers a degree of autonomy if efficiency is to be achieved, there is no guarantee that managers will use this autonomy to advance fully the government's objectives and to achieve efficiency. Instead they may sacrifice the government's objectives to an extent to advance objectives of their own - a quiet life, or a degree of technical excellence that consumers would not be willing to pay for had they the choice, or overinvestment. By contrast with private shareholders, governments have felt less able to offer their managers rewards or penalties depending on the extent to which the government's objectives are met. Moreover, governments may be less interested in monitoring the performance of managers than private shareholders who face the possibility of takeover. The multiplicity of the objectives of public enterprises adds to the difficulty of monitoring the success of management in achieving them.

The existence of important elements of natural monopoly in the core functions of many infrastructure providers (e.g. the electricity and telecommunications networks) makes both problems more difficult. A fully competitive public enterprise could be instructed to behave in a way similar to its private sector counterparts and earn maximum profits. But a public enterprise monopoly that was given similar instructions would set prices too high and produce too little. To avoid these problems it is necessary to instruct public monopolists to have regard for consumer benefits as well as for profits. (For similar reasons the infrastructure industries with monopoly power would almost certainly be subject to some form of regulation were they to be placed in the private sector.) Thus public monopolists are almost bound to have multiple and competing objectives. Moreover, it is much easier to assess the success of the management of a public enterprise in advancing the government's objectives if there are private sector competitors with whom comparisons of performance can readily be made.
These problems are discussed in greater detail in the rest of this section and implications are drawn for public investment. An interesting discussion of some of these issues, with particular reference to underdeveloped countries, can be found in Hemming and Mansoor (1988).

5.2 ACHIEVING SOCIAL OBJECTIVES

At present governments advance a variety of objectives through the operations of public enterprises and other providers of infrastructure. In addition to its economic objectives Telecom for example, "accepts the social responsibility to price services at an affordable level so that telecommunications services are available nationwide" (Telecom, 1988). The pursuit of objectives other than economic efficiency is not questioned here. Indeed, considerations of economic efficiency are in principle inseparable from those of income distribution. This is because disparate goods and services can be added together to arrive at a figure for total value of output only on the basis of their market values. Values can be calculated using the existing set of prices, but these in turn depend on the income distribution, and there is no presumption that a dollar is worth the same no matter to whom it accrues.

Some ways of achieving a particular social objective may be less costly than others in terms of the extent to which achievement of society’s other objectives is sacrificed in doing so. One way of achieving social objectives is through general subsidy or regulation arrangements that apply to all relevant firms. Thus an enterprise may be offered a subsidy to provide socially desirable but unprofitable services or may be subject to regulation to prevent environmental damage or to promote occupational health and safety. Alternatively, a public enterprise (and particularly a monopoly) may be instructed, for example, to purchase from Australian suppliers or to charge all customers a uniform price, regardless of differences in the costs of providing them with the service. The government may be prepared to accept a lower dividend than would otherwise be the case in return for the enterprise achieving various non-commercial objectives; alternatively the costs of meeting social objectives may be met through increases in prices for customers in general.

There are a number of reasons for suggesting that, in general, it is better to achieve social objectives directly (e.g. through subsidies) rather than by interfering with the pricing structure or other aspects of the operations of public enterprises. First, direct subsidies generally permit a more precise targeting of their objectives than alternative methods. Moreover, cross-subsidisation between groups of consumers is equivalent to raising taxation through narrowly based indirect taxes on the use of the good or service in question: such taxes are unlikely to be particularly equitable or economically efficient. Cross-subsidies do not discriminate between users on an ability-to-pay basis, whereas direct subsidies are financed from general taxation which has a major progressive element through personal income tax.

There can, secondly, be significant departures from allocative efficiency if enterprises are required to establish pricing structures that do not reflect marginal costs or if they are required to meet sub-commercial rates of return because they are simultaneously meeting social objectives. If an enterprise prices some services below marginal cost, it follows that the costs of investments required to support these services will exceed the returns. (It may be argued that such investments would rank more highly if social factors were also taken into account but this will not be so if the setting of prices below marginal cost amounts in effect to a poorly targeted subsidy.) Moreover, if the enterprise is required to meet an average rate of return target and its access to external funds is limited (e.g. through an external borrowing limit), it
follows that some investments that are justified on economic grounds will not proceed unless the enterprise can earn profits on some services that are produced under conditions of diseconomies of scale and which are priced above marginal cost. Cross-subsidisation, therefore, if understood as involving the setting of some prices below, and others above, marginal costs is likely to lead to inefficiencies in the allocation of investment. If, on the other hand, an enterprise is required to earn a less than commercial rate of return, there is a danger that this required rate will become the rate at which the enterprise evaluates all of its investments. A misallocation of resources will occur if projects are proceeded with that are not justified by their economic and social returns.

Thirdly, for good management, it is desirable to have a few, well-specified objectives. Managers who are given a list of vague and conflicting objectives to achieve may not satisfy any of them very well, or may emphasise some objectives at the expense of others in a way that was not intended by governments. If social objectives are met through explicit subsidy, then meeting those objectives becomes, from the enterprise’s point of view, part of its commercial task. The technical efficiency of public enterprises may therefore be enhanced if social objectives are met through direct subsidies.

Finally, competition is an important spur to efficiency but cross-subsidies and competition do not mix. The least desirable situation is where competition develops for some of the services of an enterprise (perhaps because of changes in technology) but is prevented elsewhere. The cross-subsidy will then be financed from a declining base and at an increased cost in terms of efficiency. (It could be argued that this situation is now occurring in telecommunications where private networks are being set up, in part, to circumvent the Telecom cross-subsidy.) By contrast, direct subsidies are consistent with competition.

For all these reasons there is much to be said for meeting society’s non-economic directly rather than through intervention in the policies and operations of public enterprises. There may, however, be instances, where the direct approach is either not feasible, or is judged to be impractical (e.g. because of community or political attitudes).

Thus far we have considered in this section only the general problems that arise because of the multiplicity of objectives that governments wish to pursue through the public sector. There are a number of more specific problems that should also be noted. First, some infrastructure projects have been proceeded with for essentially short term political reasons. It may be that this is particularly the case for those projects that are undertaken by government departments, or in those public enterprises that receive large government subsidies for their operating expenses. Secondly, political priorities can change suddenly, for example in responses to changes in the macroeconomic environment. Thus the investment plans of public enterprises may be affected by requirements to restrain overall price increases or borrowings. Thirdly, in the Australian institutional environment many infrastructure investment decisions may reflect the priorities of both the Commonwealth and State governments and the result may be an unsatisfactory compromise. There would appear to be considerable scope for reducing the duplication of effort between Commonwealth and State governments in road funding, for example. Moreover, the Commonwealth Grants Commission’s procedures may have weakened the incentives for States to improve the efficiency of their public enterprises since the total deficit of these enterprises is treated as a necessary obligation of government for fiscal equalisation purposes. Finally, the Australian Loan Council has been more concerned with the macroeconomic effects of public sector borrowing programs than with ensuring that investment funds are directed towards the projects with the highest rates of
return. The recent NSW Commission of Audit report (1988, p33) points to a number of instances where Government interference in the decision making of public enterprises has had adverse effects on their efficiency.

5.3 GOVERNMENTS AND PUBLIC ENTERPRISES

As noted earlier, governments have to allow considerable autonomy to the managers of public enterprises in order to take advantage of the technical knowledge that they possess. But, because of this autonomy, the managers of a monopoly public enterprise may have considerable freedom to pursue objectives other than the government’s. It is not entirely clear what objectives the managers would choose to advance. One suggestion is that, prompted by the limited nature of rewards and sanctions in the public sector, they may choose the quiet life (see e.g. Alchian, 1965). Such a firm would tend to produce inefficiently but is unlikely to overinvest. Alternatively, the managers of a public enterprise may choose rapid expansion of the enterprise (see e.g. Niskanen, 1971). Such an enterprise may price too low and invest too much.

There is evidence that, at least for some enterprises, overinvestment may have occurred. The McDonnell report into electricity generation in New South Wales concluded that the reliability standards used by the Electricity Commission were "likely to lead to an expansion in electricity generation capacity beyond the level supported by the economic value placed by consumers on the additional reliability obtained". Moreover, there were no rigorous financial constraints or performance indicators to discourage overinvestment in electricity supply (McDonnell 1986). The NSW Commission of Audit (1988, pp39-40) points to a number of examples of overcapacity.

Investment in electricity capacity in the early 1980s is now widely recognised to have been excessive in several States. The same might be said of private sector investments in coal mines and aluminium smelters - in all cases there were overoptimistic expectations concerning the demand for resources. Investment in either the public or private sectors can be inadequate or excessive if actual demand exceeds or falls short of expected demand. There has, however, been systematic overcapacity in electricity for a long time due to the maintenance of excessively large margins of reserve capacity above expected demand.

The incentives for public enterprises to invest efficiently may not be strong because of the general weakness of rewards and sanctions in the public sector. The problem of incentives, and of the ability of governments to commit themselves to courses of action which induce efficient performance from their enterprises, are issues which have attracted considerable attention elsewhere. At the practical level, there has been much attention in the U.K. to the problems of making the nationalised industries perform (see Rees, 1984). Recently, the theory of incentives as they apply to public enterprises has been considerably developed (see Gravelle, 1982, and Caillaud et al, 1988). While complete resolution of these problems is not always possible, the solutions in place often fall well short of the best feasible ones.

The recent upsurge of concern as to whether the public sector is making sufficient provision for the maintenance or replacement of its assets suggests that the public sector is not always efficient in its investment behaviour.

These problems of possible over-investment and inefficiency of investment lead the owners of public enterprises into a dilemma. To prevent a misallocation of resources, they have no alternative but to control the total amount that public enterprises invest. It is unlikely that the
controllers of public enterprises have sufficient information to determine what an efficient allocation of public investment would be. In determining the quantity of funds to be allocated to their public enterprises, governments should be guided by the marginal rates of return on the projects that would proceed for each increase in the investment funds of the enterprise.

It has often been argued (e.g. in Langmore, 1987) that, because there are investment opportunities available in the public sector with high rates of return, the investment funds available to public enterprises should be increased. The analysis set out in this Chapter suggests that this is not necessarily the case. There are structural reasons concerned with the way that objectives are set in the public sector, and the incentive structures and monitoring arrangements available in that sector, that result in an inefficient allocation of investment. If the investment funds available to the public sector were increased, there is no guarantee that projects with high returns would be proceeded with. In these circumstances the priority for policy should be to increase the efficiency with which the public sector allocates available investment funds and operates infrastructure once in place. The ways in which this can be done are discussed in the next chapter. The need for additional public investment in total (if any) should be clearer once such action has been taken.

In contrast to the Langmore Report, Perkins (1987, p173) argues that controls on borrowing in the 1970s and early 1980s appear to have forced many public enterprises to improve the efficiency of their pricing policies. Moreover, she argued that "in the absence of strict financial accountability, rate of return targets and some private competition, relaxation of borrowing controls on the statutory authorities may merely cause a very wasteful blow-out in their investment expenditures".

6. IMPROVING THE EFFICIENCY OF INFRASTRUCTURE INVESTMENT AND OPERATIONS

It has been argued in Chapter 5 that public investment funds may be allocated inefficiently, and infrastructure services may be operated inefficiently, because:

(a) The objectives that public enterprises are expected to meet may not be clearly stated by governments or may conflict;

(b) The financial and institutional framework in which public investment decisions are taken may not be conducive to maximum efficiency;

(c) Public sector incentive structures may not be particularly effective in encouraging public enterprise managers to advance the government's objectives;

(d) Governments may be relatively ineffective in monitoring the performance of their enterprises;

(e) Competition in product and capital markets may be not feasible or is restricted when it is feasible.

This chapter first considers (in 6.1) the policy options that are available to governments to address these problems. Three broad strategies, consisting of alternative packages of these options, are then outlined in Section 6.2.

6.1 POSSIBLE OPTIONS FOR IMPROVING EFFICIENCY

The options allow for the following:

(a) Efficiency will be enhanced if governments can clarify the objectives that they require public enterprises to
meet and ensure that their objectives are being met in the most efficient way. There is much to be said for providing public enterprises with a single objective or a few, clearly specified, objectives. If the government grants enterprises explicit subsidies for meeting social objectives, then the fulfillment, of those objectives becomes part of the enterprises commercial task. However social objectives are met, more information on the costs and distributional consequences of doing so would be desirable.

(b) The institutional framework in which public investment decisions are taken could be revised to make it more conducive to efficiency. For those items of infrastructure that are provided by governments, reduction in Commonwealth-State duplication and increased use of cost-benefit analysis in decision making would be desirable. For public enterprises, the problem is to provide them with a framework of control in which they are motivated to base individual investment decisions according to cost - benefit criteria. This is discussed further in (c) below. But it would be desirable if those (including the Australian Loan Council) who control the allocation of investment funds to enterprises would, to a greater extent than at present, base their decisions on the relative returns available in these enterprises.

(c) As noted above, an improved framework of control for public enterprises could be developed. Such a framework might be made up of the following elements:

The flexibility of public enterprises to respond to changing market demands could be enhanced by removing the detailed controls that governments have in the past exercised over many aspects of these businesses.

To prevent overinvestment, the retention of strategic controls over borrowings and investment is desirable, except where public enterprises are subject to competitive and capital market disciplines similar to those faced by private firms.

The assignment to enterprises of appropriate financial and other performance targets. This is a complex matter. For monopolies, profit is not a good indicator of social efficiency - enterprises may be able to meet their profits targets by increasing prices. There are therefore suggestions that profits targets should be supplemented by price regulation. But enterprises may be able to meet both profit and price targets by, say, reducing the standard of service. Essentially, managers know much more about these enterprises than do the controllers, and there is no guarantee that they will be strongly motivated to meet whatever targets they are set in a way that is consistent with government objectives. There may therefore be a tendency for governments to become involved in more and more aspects of their enterprises' operations - contrary to the desire to give managers greater autonomy.

The development of credible performance-related incentive and sanction structures in the public sector is of considerable importance. Ideally, managers would be rewarded according to the extent to which they advanced all the government's objectives - not just profit.

Greater attention should be paid to monitoring the performance of public enterprises. This could involve the use of up-to-date accounting practices (such as Current Cost Accounting) and
greater emphasis on the review of efficiency by outside experts.

(d) Finally the private sector may be able to remedy the deficiencies of public sector provision - provided that it is allowed to. The options here include the introduction or strengthening of competition (although it needs to be recognised that the core activities of many infrastructure providers are natural monopolies), contracting out and joint ventures, and partial or complete privatisation.

6.2 THREE STRATEGIES FOR IMPROVING PUBLIC ENTERPRISE PERFORMANCE

Three broad approaches are considered in this section:

- The first approach, increased flexibility, would free enterprises from detailed controls, in return for the development of improved methods of measuring performance. Enterprises would still be subject to some strategic controls (e.g. over borrowings).

- The second approach, commercialisation, would go further by placing enterprises on a fully commercial basis and allowing them to operate at arm's length from government.

- The third approach is greater private sector involvement.

(i) Increased flexibility for public enterprises

The main features of this approach include the following:

- the development of broad medium term goals, including financial targets and (if necessary) price adjustment rules to prevent abuse of monopoly power;

- development within the organisation of corporate plans to achieve these broad objectives;

- depending on the efficiency of the organisation and the environment in which it operates, relaxation on a case by case basis of operational controls over such matters as personnel, purchasing arrangements and specific investments;

- retention of some key controls (e.g. over borrowings);

- independent review of efficiency and performance.

This approach may be appropriate for those infrastructure providers which have a substantial degree of monopoly power in their core services but is not inconsistent with allowing greater competition at the fringes. Where public enterprises are considered to be an efficient instrument of social policy, their social objectives would need to be clearly defined and, to the extent possible, the costs and distributional implications made transparent.

The essence of this approach is the removal of impediments to good performance by public enterprises. Its success depends on how clearly government objectives are defined and how effectively the enterprise is motivated to advance them. The overall level of investment is controlled centrally but its allocation is mainly at the discretion of management, though subject to some independent monitoring. The efficiency of the organisation would determine how well investment is allocated (and how efficiently infrastructure services are provided).

The Commonwealth Government is moving along lines similar to the 'increased flexibility' approach for those of its enterprises that have substantial elements of monopoly power. Some State governments are moving in a similar
direction. While this approach is not without problems, it offers the prospect of gains in efficiency.

(ii) Commercialisation of public enterprises

The essence of this approach is that an enterprise, while remaining in public ownership, would be expected to behave in a way similar to a competitive private enterprise. Public enterprises can never be subject to exactly the same disciplines as private companies - for example, the threat of takeover is absent. The desirability of a policy of commercialisation depends, ultimately, on the extent to which public enterprises can be made subject to essentially similar disciplines to those operating in the private sector. For example, the management of public enterprises could (at least in principle) be left in no doubt that they will be replaced if they are consistently unable to meet government objectives; a careful system of charges for government guarantees on borrowings could (at least in principle) remove any cost advantages that public enterprises might gain through access to rates of interest lower than their private competitors; and social objectives could (at least in principle) be advanced through explicit subsidies or general regulations that apply both to the public enterprise and its competitors.

Commercialisation is appropriate only for those public enterprises that operate in competitive markets. A commercialised monopoly would have no problem in meeting profit targets but would have plenty of scope to operate inefficiently or pursue objectives distant from those of the government. The enterprise would have considerable power but would, only to a limited extent, be accountable.

The success of commercialisation depends on the extent to which enterprises can be made to conform with the objectives of government while maintaining their managerial autonomy. How well investment funds are allocated depends on how efficient the enterprise is overall.

It could be argued that since a public firm may be less strongly oriented towards profit than its private counterparts, commercialisation is likely to be a less satisfactory alternative to privatisation. (Tregove in Freebairn, Porter and Walsh, 1988, refers to commercialisation as "Clayton's privatisation".) Even so, a commercial public enterprise may be quite strongly oriented towards profit and this option is one that can be proposed where public ownership is valued for the its own sake or where the sale of enterprises would give rise to serious transitional problems (Campbell Committee, 1981).

The Commonwealth Government is moving towards the commercialisation of those of its enterprises that operate in a competitive environment.

(iii) Increased Private Sector Involvement

The term privatisation is used in this paper to refer to the transfer of ownership, in whole or in part, from public to private hands. As noted earlier, there are methods other than privatisation through which the involvement of the private sector in the provision of infrastructure services could be increased: these include joint ventures, contracting out and the introduction of competition.

It has been argued that privatisation would tend to improve the efficiency of enterprises because the scope for political involvement would be reduced, and because the monitoring and incentive structures in the private sector may be more effective than those in the public sector. Difficulties arise, however, in the case of natural monopolies. Private monopolies have an incentive to minimise the costs of producing a given level of output but may raise prices above, and reduce output below, the allocatively efficient level. They may invest too little, although funds will be allocated relatively efficiently between projects. To prevent these problems prices (and
perhaps other aspects of the operations of private monopolies) are likely to be regulated. However, regulation has its problems and it is interesting to note that many of the problems of regulation of public enterprises that were noted earlier in this chapter seem to have re-emerged in the United Kingdom, following privatisation (Helm and Yarrow, 1988). Moreover, privatisation could make the subsequent introduction of competition more difficult if the expectation of future monopoly profits is capitalised into the sale price.

Finally there may be concerns that social objectives relating to access and affordability may be more difficult to meet following commercialisation or privatisation. Privatisation is a more attractive option where competition already exists or can simultaneously be introduced and where social objectives can efficiently be met through methods that apply equally to all competitors.

As noted earlier, there are ways other than privatisation through which the private sector might be allowed more scope in the provision of infrastructure. Particular services might be contracted out to private enterprises (or, for that matter, other public enterprises) with specialised expertise. This occurs as a matter of course in the private sector. Indeed, private enterprises sometimes contract out to public enterprises - as with the use of railways by the freight forwarders. But, since contracting out can give rise to problems of quality control and industrial relations, each possibility needs to be evaluated on its own merits. A public or private enterprise that faces incentives to produce efficiently will, of its own volition, contract services out where this is appropriate.

At another level, the private sector can be permitted, either on a joint venture or sole provider basis to make major investments in systems operated by the public sector. Thus, a private enterprise could construct and operate a power station or a road. The conditions under which the outputs of these projects are made available (e.g. conditions of access to the grid or road pricing) would be determined by the government or public enterprise. Private investment of this type could ensure that worthwhile projects that might otherwise be delayed go ahead where government expenditure is being restrained for other than macroeconomic reasons. All of the objectives of public enterprise can be achieved under such arrangements, and the public enterprises involved would have a standard with which to compare their own operations.

Such arrangements in which a particular enterprise has full responsibility for a particular task or the operation of a specific plant are likely to be more effective than the sale of part of the ownership of a diversified enterprise. In the latter case, there may be no change of objectives or management. Alternatively the result may be some confusion as the enterprise attempts to serve two masters, public and private owners, with divergent objectives. But, if enterprises choose, as appropriate, whether to perform tasks and build and operate plants in house, or to contract out to public or private enterprises, the distinction between "public" and "private" enterprise will over time become a blurred and less important one.

There is evidence to suggest that opening a market up to competition is important in leading to improvements in efficiency (see, in the context of public enterprises, the article by Borchering et al, 1982, and the review by Domberger and Piggott, 1986). But, as noted earlier, the core functions of many infrastructure providers are natural monopolies. Arrangements such as contracting out, joint ventures and the sale of part of an enterprise may be important in extending the scope of competition in infrastructure services.
(iv) Evaluation of the Options

As noted earlier, commercialisation is not an attractive option for monopolies. Such enterprises could have considerable power and be accountable only to a limited degree. For enterprises that are, or which could become, subject to competition, the choice between commercialisation and privatisation should be based on the strengths of the relative incentives for efficiency. We have discussed a number of reasons why public sector production may be less efficient than private sector production and the evidence is not inconsistent with this view. But some public enterprises that operate in competitive environments have achieved high levels of efficiency and it may sometimes be the case that the additional efficiency gains from privatisation are exceeded by the transitional costs.

For the natural monopolies the choice lies between retaining them in public ownership but improving the framework of control (option i) and privatisation (option iii). Privatisation is less attractive when monopoly is present, as is often the case for infrastructure services, than in competitive environments. If the enterprise is privatised as a whole, it can be expected to use its monopoly power. The question then arises of whether, and how, regulation can limit the losses from this - it is difficult to design efficient regulatory structures. Option (i) avoids this problem but replaces it with others. The results depend very much on what controls and objectives are imposed on the enterprise, and how effectively they are enforced. Not only does the government have to design a framework of controls and incentives which induce efficient performance, but it must credibly commit itself to making them work.

In practice, governments often find it difficult to maintain for long and enforce a particular framework of control for their public enterprises. Governments may wish to change the rules of the game at short notice, for example in response to a macroeconomic emergency. This may, in turn, have adverse effects or the efficiency of enterprises. Moreover, governments also find it hard to enforce sanctions when the management of enterprises is not achieving the government's objectives. By contrast, the scope for government intervention in the operation of private companies is probably less than for public enterprises; privatisation thus amounts to an act of commitment by the government to a particular framework of control for the enterprises concerned. The management of a private enterprise is likely to be quite successful at earning maximum profits; the appropriateness of this depends on the extent to which society's other objectives can be achieved through subsidy or regulation.
7. CONCLUSIONS

A good deal of information would be required to determine whether Australia's infrastructure capacity and spending are adequate, inadequate or excessive. To make a reliable judgement, it is necessary to assess the position on an investment-by-investment basis across a wide spectrum of divergent projects. Such information is not currently available, nor is it likely to become available in the foreseeable future. It simply does not follow that, because there is inadequate investment in one aspect of, say, a water authority's operations, there is inadequate investment overall in the authority, or in water supply generally. Likewise, examples of excessive investment in some services do not mean that, overall, there is excess capacity and investment in Australian infrastructure.

The broad brush indicators, such as trends in investment or capacity relative to other magnitudes, or rates of return, are too aggregative, and subject to qualification, to have much meaning. Specific studies of past or proposed investment can give an indication of adequacy or otherwise in a particular area. However, these are not available except for a relatively small proportion of investments. Such studies may have been undertaken within public enterprises, but are not released for commercial confidentiality reasons. Thus, it is very difficult for an outsider to assess the adequacy or otherwise of the investment program of an enterprise such as Telecom or a State Railway.

Any conclusion about infrastructure adequacy must therefore be an agnostic one - no one has sufficient information to conclude that it is adequate, inadequate or excess. Our tentative view, based on the evidence that is available, is that there is neither obviously excessive nor obviously inadequate infrastructure provision. However, more information could lead one to alter this conclusion.

To concentrate on questions of "adequacy" as does the Langmore Committee (1987) is to miss the main aspect of the infrastructure problem. Whether infrastructure is broadly adequate or not, there exist problems of allocation and efficiency. There are many examples of inadequacy and many of excess - and often these appear side by side in the same authority. There are, in addition, many cases of the existing infrastructure being operated inefficiently and ineffectively.

The problem, then, is not so much one of determining how much should be invested in infrastructure, as one of improving the conditions under which that investment is made. This in turn, leads one to investigate the operations of public enterprises and other providers of infrastructure services, and to examine whether they operate under constraints, and with incentives and guidelines, that induce them to choose a level and allocation of investment which is efficient. The evidence suggests that improvements in this framework can be made.

Problems of allocation of funds and efficiency of operation have been observed before. For example, Mathews, writing in 1967, notes that

"The Australian transport system has for decades been plagued by neglect and misdirected effort, arising particularly from: (a) inadequate facilities resulting from a shortage of financial resources; (b) political pressures leading to the establishment and continuance of uneconomic services, wasteful capital expenditure programmes, inappropriate pricing policies or irrational competition between different forms of transport".

Several of the factors identified by Mathews as leading to poor infrastructure decisions, such as the different priorities and divided responsibilities of State and
Federal Governments, remain and are likely to continue to do so.

But, over the period since Mathews wrote, there has been a more extensive use of techniques such as cost benefit analysis and governments have perhaps paid more attention to the results. When crises have developed, governments have responded. Thus, after major problems in electricity development, the Victorian government revised its controls for public enterprise. The framework under which public enterprises operate have improved in some States and Commonwealth since 1967. What remains to be seen is whether the governments are committed to make the new frameworks work, and do not intervene to circumvent them when short term possibilities present themselves.

Indeed, there is something of a problem in determining what is the most 'efficient' outcome. A project may, on cost benefit criteria, be a poor one, but if it is popular, and the electorate votes for it, arguably it should go ahead. Projects where the benefits are highly concentrated (e.g. in a particular electorate) but where the incidence of costs is disposed (e.g. financed through general taxation) are particularly likely to go ahead even if they are not fully justified on broader economic and social grounds. Politicians however often overestimate the short term attractions of a project, and underestimate the long term costs. Voters may turn against governments when they realize that they are being required to finance projects from which they see little benefit.

Experience has shown that all too often the targets or controls are abandoned when the going gets difficult. Governments have a problem in committing themselves for extended periods to a course of action, and making it clear to others that they are indeed committed. This problem of commitment is likely to prove the most difficult in designing a better framework for infrastructure provision.
APPENDIX

Examples of Excessive, Inadequate and Inefficient Infrastructure

The following examples have been drawn from detailed official or academic studies of particular areas of infrastructure. Further details can be found in Appendix 6 of Economic Infrastructure in Australia (EPAC 33, 1988) from where these examples have been taken.

Excessive

- Brisbane airport (BTE, 1975; Bosch, 1984).

- International gateways in Adelaide, Townsville, Cairns etc (Bosch, 1984).

- Irrigation works (McColl, 1976; Paterson, 1987)


- Grain Storage Capacity (Royal Commission, 1987).

- NSW XPT services (BTE, 1987).

- Electricity generation (McDonnell, 1986).

Inadequate

- Sydney airport runways and terminal facilities (Department of Sport, Recreation and Tourism, 1986; NSW Ministry of Transport, 1986).

- Urban arterial roads (BTE, 1984; Abelson, 1986; BTCE 1987).

- Spending on rail mainline freight upgrading (AARDO, 1981).

Inefficient

- Railways (ISC, 1987 (a); Holthuyzen, 1987; Royal Commission, 1987, 1988).

- Ports and terminals (Trace, 1984; Webber, 1986; ISC, 1987b; Royal Commission, 1987).

- Low availability of power station base load (McDonnell, 1986).

- Cost recovery from heavy road vehicles (ISC, 1987; Luck and Martin, 1987).

- Pricing of railways (Forsyth, 1984).

- Pricing of electricity (Porter, 1983).

- Pricing of water (Paterson, 1987).

- Pricing of services to the mining industry (Emerson, 1987)
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