

Infrastructure and the Investment Evaluation Issue

Submission to the Productivity Commission

Inquiry into Public Infrastructure

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Key Points

- As the Draft Report states, Cost Benefit Analysis is a critical tool in evaluating infrastructure investment. It would be useful for the Report to be more specific about what constitutes a “CBA”. Does a CBA include an allowance for wider economic benefits, or a CGE modelling exercise?
- There are now several ways of evaluating infrastructure investments, going beyond standard CBAs. They have advantages and disadvantages as compared to the use of standard CBAs. It would be useful for the Report to recognise them, note their advantages and disadvantages, and indicate which should not be used.
- Input Output models, sometimes described as “a form of CBA” are now used as a form of investment evaluation, occasionally for infrastructure in Australia, for investments in other sectors of the Australian economy, and extensively in other countries. Given their serious deficiencies, it would be positive if the Commission could rule them out as an adequate form of infrastructure investment evaluation.
- CGE models are now being used to evaluate major investment projects in Australia, as also in the UK and Japan. CGE studies have the advantage that they allow for general equilibrium effects, potentially important in some cases, whereas a typical CBA only take into account partial equilibrium effects.
- CGE studies are rigorous and now, cost effective, though several issues concerning their use have yet to be resolved. It would be useful for the Report to recognise them explicitly, and state when they could be used in investment evaluation. As an example, the Second Sydney Airport cannot be evaluated adequately using only standard CBA.
- The Draft Report often states that transparency of the evaluations is highly desirable. However the *reasons* for transparency could be more strongly stated. There could also be much more discussion of how it might be achieved. An impression might be that there is less transparency in evaluations now than there was 20 years ago, especially now that PPPs are common. Where there are problems of confidentiality, preliminary studies or summary CBA/CGE studies may enable transparency.
- Infrastructure investment is often promoted as a “Jobs Machine”. However, its employment impacts are best assessed using CBA and CGE studies and there is no need to rely on questionable studies producing exaggerated impacts.

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1 What is Cost Benefit Analysis?

The Draft Report puts a high emphasis on the role of Cost Benefit Analysis (CBA) as the core form of project evaluation. This is appropriate. However, it is not clear exactly what the meaning of “CBA” is in the Report. It is clear that studies of the wider economic benefits of transport projects are included in the term CBA. However there are other forms of project evaluation which are sometimes called “CBAs” - these can be related to traditional CBAs, or they can be rather different. Thus computable general equilibrium (CGE) modelling studies, Multi Criteria Analyses and Input Output Models (IO) are sometimes called “CBAs”.

Given the importance given to CBAs in the Report, it is important to specify how broadly the Commission interprets the term. Thus when an Input Output model is used to assess a project, would this be regarded as a CBA? It will be argued here that it should not be. On the other hand, CGE studies of projects, which are becoming common in Australia (and also the UK and Japan) might be regarded as a form of CBA. If they are not, what role should be given to them as a form of project evaluation?

It is argued here that the term CBA should be interpreted broadly (though not so board as to include Input Output models).

2 Types of Investment Evaluation

Standard CBA

This is a well-defined technique which is based on rigorous theory (see Boardman et al, 2011; Dreze and Stern, 1987). It has had a long experience in project evaluation in Australia, though its use seems to have fallen off somewhat over recent years (e.g., the lack of use of CBA of the NBN, now being corrected). The Draft Report provides a solid discussion of it, and it recognises some of its possible limitations. For many project evaluation tasks, it is perfectly sufficient.

However, there are some other limitations which should be recognised. As practised, it is almost always a partial equilibrium tool- it does not handle general equilibrium aspects well, or at all. Externalities such greenhouse gas emissions are essentially general equilibrium (GE) in nature, and cannot be handled well, if at all, in standard CBA. Sometimes one or two indirect costs or benefits are included, but in an ad hoc way. Another example is distribution - in theory CBA can handle distributional aspects, but in reality it is very difficult for it to do so.

Wider Economic Benefits

The Draft Report recognises the role that wider Economic Benefits (WEBs) are playing in some CBAs, and notes that they should be treated with caution. One should not think that there is clear dividing line between WEBs and traditional costs and benefits. Some traditional benefits, such as those which come about through indirect effects, are not very different from some WEBs, such as those which come about from tax effects connected to increased productivity of labour may be more solidly based than others.

Multi Criteria Analysis

There are several techniques which seek to be broader than typical CBAs. One which is currently popular is that of Multi Criteria Analysis (MCA). This seeks to include other aspects relevant to the investment decision, such as environmental aspects (sometimes included in standard CBA) and social aspects (not normally included). Some users of MCA such as Quinet (2010) would argue that CBA is encompassed by the broader MCA. One could argue that standard CBA is too narrow for a complete evaluation of an investment, and that a wider MCA would be preferable.

Input Output Models

Input Output (IO) modelling studies are now being used extensively as a way of evaluating investments, including infrastructure investments. Indeed, they are sometimes called “a form of CBA”. They are commonly used in infrastructure investment evaluation in such countries as Germany (the infamous Berlin airport was subjected to an IO study, not a CBA). In Australia they have been used extensively to evaluate some forms of investment, such as those in Special Events, though this use has diminished of late. IO type models have been used to evaluate infrastructure investments, such as that of the Victorian Fast Train project.

There are many good reasons why it is not a good idea to use them. Most economists would regard them as a flawed technique. They confuse benefits with costs (additional expenditure means more benefits), they essentially assume that resources are free, and they result in grossly exaggerated estimates of the project’s impacts. Any aspects of investment evaluation can now be done much more rigorously and accurately using a (CGE) model and /or a CBA.

It may be worthwhile for the Commission to note that it does *not* consider an IO study as an adequate form of CBA.

Computable General Equilibrium Models

CGE models are now being used quite extensively in the evaluation of investments, particularly in Australia, but also in Japan (Ueda et al, 2005) and the UK (Airports Commission, 2013). They have been used investment evaluation for about twenty years, and most major investments (e.g. Second Sydney Airport (Joint Study, 2012), major road and rail links in Melbourne (e.g. Allen et al, 1995; Meyrick and Associates, 2008), High Speed Train) are evaluated using CGE studies, though there are usually also CBAs. In some cases, there is

only a CGE study (e.g., the Second Runway for Brisbane Airport) and no CBA. (On the Productivity Commission's use of CGE in transport, see Forsyth, 2011).

Thus there is an issue of what the different roles of CBA and CGE models are, and if there are conflicting answers, how they should be resolved (this issue is discussed in the attached paper, Forsyth, 2014). Sometimes there are apparent inconsistencies- for example; the CBA study of the Melbourne Grand Prix tended to say that it was not a good investment, while the CGE study appeared to say that it was a good investment (see Abelson, 2011).

One interpretation of the roles of CBA and CGE studies is that they look at different aspects of the evaluation problem. Thus some would say that a CBA measures the welfare gain (net social benefit) from the investment while the CGE study measures other aspects, such as the impact on GDP (Abelson, 2011). If this is the case, is it enough to simply require major infrastructure projects to be evaluated using CBA, given that there will be other aspects of the project will not be captured by a CBA, but which will be captured by a CGE study? Perhaps both types of study should be required. For example, it can be argued that it is not sufficient to only use CBA to evaluate the Second Sydney Airport given its reliance on inbound tourism benefits which cannot be measured accurately using the tools of CBA. The CBA of the 2012 study simply assumed that tourism benefits (equal to 40% of total benefits) were 25% of tourism expenditure (Joint Study, 2012).

Secondly, the two techniques can both be used to estimate how much better off the economy is as a result of the investment. A CGE model can measure the impact on welfare (net social benefit) of the project in exactly way as a CBA does. Typically this is not done at present, but there is no reason why it cannot be done. The two would have different limitations and hence will give different results- this means that there is an interpretation issue to be solved. Use of the two will result in more information about uncertain magnitudes being available to the decision maker.

Thirdly, in principle, a third level, of integration of the two techniques, is feasible. This may require a high level of disaggregation of the CGE model used, and the use of more sophisticated benefit measures than is common with current CGE models (feasible using the theory of CBA). The result will be a single general equilibrium evaluation of the project. There are some analysts who suggest that this complete integration of CBA and CGE is the way to go.

The issue here is not so much what level should be aimed for- rather that a CGE approach measures relevant aspects which a standard CBA is not good at measuring, or cannot measure at all. Typical CBAs do not measure general equilibrium aspects of investments well, or at all. Estimates of indirect effects are usually ad hoc, as are the estimates of impacts on employment. The same is true of estimates of the benefits from tourism of road or airport investments. In short there is a strong case for requiring major infrastructure projects to be evaluated using both a CBA and a CGE study. If CBA is sufficient to capture all the relevant aspects of an investment or a policy option, such as a change in protection, why has the Productivity Commission used CGE studies so extensively?

3 The Case for Transparency

The Draft Report argues for transparency at several stages, particularly in the case of investment evaluation. This case could be more forcefully put, and more can be said about how transparency can be achieved. This is particularly important since much of evaluation is now *not* transparent.

Why do we value transparency? There are several gains from transparency. Open and transparent evaluations can be critiqued, and errors found and addressed. The importance of key assumptions, which will affect the result of the evaluation, can be debated and the reliability of the evaluation can be assessed. At times, additional studies may be commissioned (as with the Sydney Harbour Tunnel studies), and the understanding of the problem can be enhanced. Vested interests will be more apparent.

Transparency is desirable, but it is not obvious that that it will be present. Many evaluations (if they exist) are not publicly available. This is even true for projects submitted by State Governments to Infrastructure Australia. There is a particular concern with PPPs- very often but not always, evaluations are not publicly available. There have been some cases of evaluations becoming available after the project has been commenced. Currently, projects which are possibilities for the future (Second Sydney Airport, the High Speed Train) are being more openly evaluated than those which are likely to become actual in the near future. (For more discussion, see Forsyth, 2011, Section 4).

It is suggested that there is much less available by way of evaluations of major projects than there was in Australia 10 or 20 years ago. There should not be any problem with a government releasing a CBA of a project which it is intending to construct itself. There can be problem of confidentiality for projects which are being done by PPPs or regulated public or private firms (there can be a cost in terms of loss of publicly available information if investments which had been handled directly by the public sector are transferred to regulated public firms). Private firms do not necessarily fail to provide evaluations- Brisbane Airport, which is a monopoly subject to shadow regulation, has published a CGE analysis of a second runway.

It should be possible for an evaluation of a project including those likely to be constructed by a PPP, to be published with more than just a simple cost benefit ratio (or nothing). One of the more successful PPPs, namely Melbourne CityLink, was evaluated using both a CBA and a CGE study. CBAs of projects can be done before final design and letting of contracts which would provide evidence of whether the project was warranted, even if the details of the final design and financial arrangements remain confidential. It may also be feasible for a cut down CBA, using no confidential information, to be made available publicly. The option, very often used by Australian governments, of providing little, or no, evaluation is inefficient and unnecessary.

There are other ways in which the transparency of evaluations could be fostered. One suggestion is that of Corden and Freebairn (2013) for a body similar for the Productivity Commission to evaluate infrastructure projects. A similar suggestion was made by Forsyth (2008). In a different level, it would be possible to follow the example of the Eddington Report into Transport in the UK (Eddington, 2006). An academic panel was formed, and used to gain feedback on issues and suggestions. Much the same type of idea could be used to gain feedback on major projects (there were some suggestions that this would be done for the Eddington Report on Melbourne transport).

4 Jobs and Infrastructure Evaluation

One of the more popular claims for infrastructure expenditure is that it is a “jobs machine”. Over the years and countries, many infrastructure projects have been justified on the grounds that they create jobs. Typical Input Output studies of infrastructure projects emphasise output and job impacts (this is true in Germany, not a country which has much of a jobs problem). Thus it is claimed that a project which costs \$1bn and employs 1000 people in construction will create an additional \$2bn in output and 2000 jobs. As noted before, these types of evaluations are highly flawed.

In fact, rigorous methods of investment evaluation, in particular CBA and CGE models provide a best possible means of evaluating the employment consequences of investment. The theory of shadow pricing of labour has been very well developed in the theory of CBA. However, there are problems in empirical application- it is difficult to measure the shadow price of labour. However, the general equilibrium nature of CGE models can enable us to explore how the project can impact on employment. It is quite possible that a project which employs 1000 people will lead to a net loss of jobs if it is a capital intensive one. Their main limitation is that they must embody a theory of employment- and there are many competing theories. With a CGE model one can determine the impacts with different theories (Keynesian, neoclassical), though not determine which if these is correct. In other words, one can go as far as one can in exploring the impacts of a project on employment. The best tools to explore the employment impacts of an investment are those of CBA and CGE models.

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