Guidance on using CBA versus CGE models to estimate net social benefit

The following general guidance discusses an alternative approach to measuring the net social benefit of a proposal.

This note explores the integration of two forms of analysis: cost-benefits analysis (CBA) and computable general equilibrium (CGE) modelling. The two methods are often used in a complementary manner, where CBA is used to estimate the net social benefit of a proposal and CGE modelling is used to estimate the economic impact of a proposal. However, occasionally CGE modelling is also used to estimate the net social benefit of a proposal. The merits of this approach are considered.

Which approach should I use?

Both CBA and CGE approaches have their respective strengths and weakness. The decision to use either approach in conducting economic assessments would be guided by the main objective of the assessment project. Generally, in cases where the main objective is to estimate economic impacts on the economy as a whole, a CGE approach would be ideal. If, however, the main objective is to estimate the economic and non-economic impacts, a CBA would be the appropriate method.

It is useful to note that CBA and CGE modelling are complementary approaches. Often CBA models rely on the outputs of CGE models. Furthermore, suitably specified CGE models may offer welfare analysis alongside the estimation of economic impacts. The welfare analysis results from a CGE model could be used to check the plausibility of a CBA model's welfare analysis.

What is the difference between cost-benefit analysis and CGE modelling?

Current economic assessment guidelines require project analysts to undertake a CBA to support investment or policy proposals. A CBA measures the net social benefit/cost of a proposal. That is, the extent to which the community is better (or worse) off with a proposal. The net social benefit calculation includes the marginal (or additional) private benefits and costs resulting from the proposal but also includes the marginal (or additional) social benefits and costs (also known as externalities).

CBA is usually supported by additional analysis and modelling. Examples include, modelling the distribution of costs and benefits for the community, equity analysis, or modelling the impact of a project on gross domestic (or state) product. CGE models are typically used for the latter: to estimate the economic impact (e.g. on gross state product or employment) of a policy or investment. In contrast to a CBA, CGE modelling does not directly estimate the costs or benefits of a proposal.

CGE modelling is sometimes used instead of traditional CBA to investigate the merits of a project. The use of the different methods to inform decision making usually raises concern

since the two approaches provide different results and the outputs of such studies cannot be directly compared. The reason is that there is a difference between the way each approach measures impact:

- The CBA measure of welfare (or the net social benefit) associated with a proposal is the extent to which a community is better off with an investment or a policy.
- The CGE measure of the economic impact of a proposal is the change in the macroeconomic (economy-wide) variables of interest.

Specifically, the differences between the two models include:

- A CBA will include all private and social costs and benefits of a proposal, including non-market effects such as environmental effects. A CGE model will not typically calculate any externalities.
- A CGE model is a general equilibrium approach to modelling, which means that the model examines economy-wide impacts. In contrast, a CBA is usually undertaken using a partial equilibrium approach. In partial equilibrium analysis, analysis is undertaken on a single market (and closely related markets where relevant) and secondary (or indirect) effects are ignored.
- Changes in GDP/GSP, as measured by a CGE, do not necessarily reflect changes in welfare. One reason is that GDP includes income accruing to foreign investors (which would not be considered in a CBA).

Can a CGE model be used to calculate the welfare impacts of a proposal?

While a CGE model is typically undertaken to measure the economic impact of a proposal (effect on GDP, employment or some other variable of interest), the model can also be used to measure the welfare impacts (or the net social benefit) of a proposal. To enable this, a CGE model will usually have to be programmed (if not already) to calculate and output the welfare effects of a proposal. Additional calculations are required to include externalities in the final analysis (such as environmental effects or congestion externalities) since a CGE model does not calculate these effects.

Is it worth using a CGE model to calculate the welfare impacts of a proposal?

One of the benefits of using a CGE model is that such modelling provides a better picture of the distributional and equity impacts of an investment or policy proposal.

However, CGE modelling has limitations in respect of calculating the welfare impacts of a proposal.

Depending on the CGE model being used, the model may be unable to identify or estimate effects for a specific sector in an economy relevant to the analysis. For example, a CGE model could model the transport sector but without adjustment or additional data may not be able to model the heavy rail freight component of that sector. While these could be incorporated, it is likely that there would be additional resource costs to making these calculations.

CGE modelling may not be an appropriate method to calculate net social benefit if the investment or policy proposal is not significant enough to bring about general price changes in the economy or a specific sector of the economy.

In deciding to take a CGE approach to welfare analysis, analysts should also consider the project costs of CGE modelling in comparison to undertaking a traditional CBA approach.