Whether you are undertaking an economic assessment for a business case, regulatory impact statement, post-implementation evaluation or for general policy development, this guidance provides you with information about the preferred approach.

Key points

* Economic assessments are only one piece of information used in the decision-making process and should be supplemented with information on qualitative, equity and distributional impacts as well as strategic issues.
* Before you start the economic assessment, it is important to have a clear understanding of the problem and consider a range of strategic options available; the way the problem is specified and the options considered will determine what kind of economic assessment is undertaken.
* The key guiding principle is that the approach taken to economic assessment should be proportional to the scale and risk of the initiative being assessed.
* Cost-benefit analysis (CBA) is the preferred method of economic assessment.
* All economic assessment relies on good-quality data and it is important to invest in collecting this data early.
* Where impacts or costs are unable to be quantified or monetised, you need to describe them qualitatively (see also the Guidance on valuing non-market impacts).
* Provide a detailed list of the assumptions and limitations of your assessment, and note which variables have the greatest influence on the assessment results.

The basics – what is economic assessment?

Economic assessment is the process of identifying, calculating and comparing the costs and benefits of a proposal in order to evaluate its merit, either absolutely or in comparison with alternatives.

For the purposes of this guidance material, the term, ‘economic assessment’ is also used to describe analysis of the economic impact of an intervention or proposal. These types of analysis are referred to as ‘economic impact assessment’.

A range of different approaches and tools can be used to undertake economic assessment. The selection of approach and tool will be influenced by the nature of the investment or decision, the relevant inputs (including available data) and the outputs being sought.

Economic assessments should not be relied on exclusively as they are seldom able to tell the ‘full story’. Other qualitative factors such as social, environmental (where not quantified and monetised in the economic assessment), equity and distributional impacts are also important and must be taken into account in the decision-making process. There may also be other strategic factors to consider that are difficult to assess through an economic assessment lens.

What are some good practice principles to guide economic assessment?

Irrespective of the form of economic assessment used to inform decision making, the following good practice principles can be considered.

Before undertaking an economic assessment:

* Initiatives being assessed should be considered in the context of other investments taking place and/or relevant overarching strategies.

When planning and undertaking an economic assessment:

* Consistent data inputs, approaches and reporting templates should be used.
* The investment in undertaking an economic assessment should be proportional to the scale and risk of the particular issue, initiative or investment.
* Assessments should be transparent and outline all assumptions, data sources, and methodologies used.
* Assessments should focus on examining the welfare impacts (market and non-market) on society of the particular investment, primarily through a cost-benefit analysis.
* Assessments should be integrated in the policy or investment development process and be used to support decision making. This includes allocating appropriate time to undertake a robust assessment at a point in time when it can inform a decision being taken.
* Where appropriate, the results should be made available internally and externally, in particular to assist in the collection of data relevant to the departmental objectives, end‑of‑program outcomes and portfolio outcomes.
* Planning for ex-post (after implementation) evaluation should begin when an intervention is being designed. The identification and collection of suitable data early on will enable any impacts to be more easily attributed to the intervention to build more evidence and understanding about its activities.

What are the common methods of economic assessment?

There are a range of different methods and tools for undertaking economic assessment. Of the methods that assess the overall merits of a proposal or compare a set of options based on net benefit to society, the most commonly used are: cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), and break-even analysis (BEA). These approaches are based on a monetary valuation of options and their impacts.

Multi-criteria analysis (MCA) can be used when it is not feasible to quantify or monetise the main impacts of an option. MCA can include a wide range of criteria (for example, social and environmental considerations), all measured in the most relevant unit as opposed to monetary values. This may mean that more criteria can be incorporated than would be the case with a quantitative analysis. However, due to its lack of theoretical foundation in welfare economics, MCA is recommended as a method of last resort, or to be used to complement a CBA.

Economic modelling tools that focus on assessing the economic impact of an intervention or proposal (as opposed to its overall benefits to society) include input-output analysis, computable general equilibrium (CGE) modelling and market-specific models. These tools are often used discretely or in combination with CBA.

Which method should I use?

CBA is the preferred form of economic assessment to inform decision making for all investment decisions across the Victorian Government. However, in practice it may not be practical or possible to undertake a CBA for all proposals, for example, where:

* the cost of undertaking the CBA is disproportionate to the size of the investment or its expected impact on the economy and community
* there is limited data available to support a CBA
* quantification of the main costs and/or benefits is difficult or impractical.

In these circumstances it may be appropriate to use an alternative form of economic assessment, noting that each method will have its own limitations.

Economic assessment methods are broadly categorised into those that are used to assess the merits of a proposal or compare a set of options based on the net benefit to society, and those that are used to assess the economic impacts of an initiative - on jobs or Gross State Product, for example. The following sections provide descriptions of each. Once you are clear on which you are trying to do, Appendices A and B guide the selection of a specific method.

Methods that assess the merits of a proposal or compare a set of options based on the net benefit to society

1. Cost-benefit analysis

What is cost-benefit analysis?

Cost-benefit analysis (CBA) is the primary economic assessment tool used to inform many major public expenditure and regulatory decisions. CBA requires that you quantify in monetary terms as many of the costs and benefits of a particular policy proposal as feasible, including private and social costs and benefits, and items for which the market does not provide a measure of economic value.

CBA involves the systematic evaluation of impacts. It endeavours to account for effects on the entire community and economy, and not just account for the immediate, direct, or financial effect on any one group. This involves the consistent valuation of costs and benefits in a single monetary unit (i.e., dollars) for both market and non-market variables across time.

By doing this, CBA makes it theoretically possible to determine whether a proposal has a net benefit (whether the benefits outweigh the costs) and which of a set of alternative proposals has the greatest net benefit. By translating impacts into a monetary value, CBA provides a framework for weighing up different options and determining 'whole of government' spending priorities across diverse sectors such as transport, health, and education.

What are the key steps in a CBA?

*Preliminary step: determine whether a cost-benefit analysis (CBA) is appropriate and proportional*

The cost and time involved in undertaking a CBA should be proportional to the size of the investment and/or its expected impact on the economy and community.

The costs of data collection mean that low-risk or small-scale investments will not warrant the same level of analysis as complex, novel or high-cost investments. Proposals that relate to programs with established economic value or precedents may only merit a rapid CBA or an alternative economic assessment approach relying on existing information from similar investments.

*Step 1: Identify the base case and options*

Identify the ‘base case’ against which the incremental costs and benefits of each alternative are determined. This will often be a ‘do-‑nothing’ or ‘business-as-usual’ option. Following this, you need to develop a range of genuine, viable, alternative policy options to be analysed. In some cases, doing nothing may be the best option available. Further guidance on developing options is available on the Economic Assessment Information Portal and further information on the ‘base case’ is provided below.

*Step 2: Identify the significant impacts and select units of measurement*

A CBA should capture all costs and benefits to ‘referent group’. The referent group is the group whose benefits and costs are relevant to the decision-maker. For the Victorian Government, this will typically be the entire Victorian population. Only impacts that would not have occurred in the base case should be included in the CBA.

General principles:

* Costs and benefits should normally be extended to cover the useful lifetime of the assets encompassed by the option under consideration.
* Costs and benefits should be based on market prices as they usually reflect the best alternative uses that the goods or services could be put to (the ‘opportunity cost’).

*Step 3: Predict the impacts over the life of the proposed investment option*

The impacts should be quantified over the useful lifetime of the assets involved in each option under consideration. The total period needs to be long enough to capture all the potential costs and benefits. Because of the uncertainty involved in forecasting costs and benefits over long periods, caution must be exercised when adopting long evaluation periods.

*Step 4: Measure impacts in dollar terms (monetise impacts)*

Assign a net dollar value to the gains and losses. Costs and benefits should be based on market prices as they usually reflect the best alternative uses that the goods or services could be put to (the ‘opportunity cost’).

Monetisation can be difficult because impacts are often difficult to value in dollar terms. Most appraisals will identify some costs or benefits for which there is no readily available market data. In these cases, a range of techniques can be applied to elicit values. Monetisation can also be difficult where predicted impacts are uncertain.

More detailed guidance on non-market valuation and on addressing risk and uncertainty is provided on the Economic Assessment Information Portal.

*Step 5: Discount future costs and benefits to obtain present values*

Costs and benefits identified in a CBA are typically realised over a number of years. In order to compare them over time, the values attached to costs and benefits in future years need to be converted and expressed in today’s dollar value. This is referred to as ‘discounting’ future values.

A CBA should clearly define the discount rate used and the year at which the value of all the costs and benefits are expressed (the base year). The base year is typically the year in which the CBA is conducted. Further guidance on the discount rate is available on the Economic Assessment Information Portal.

*Step 6: Calculate the overall value*

The final overall value of each policy option is usually expressed in one of three ways once future benefits and costs have been discounted: net present value (NPV), benefit-cost ratio (BCR) or internal rate of return (IRR). These three values are known as ‘quantitative assessment tools’ and each are used to provide slightly different information. Further information is provided on the quantitative assessment tools below.

*Step 7: Outline assumptions, limitations and key variables*

At this point, it is useful to explicitly outline the limitations of the method used and the assumptions that have been made for the analysis. This will help to qualify the results and alert decision makers to where there may be some weaknesses.

You should also identify the variables that you expect to have the greatest influence on the results as this will guide the choice of which items to test in the sensitivity analysis.

*Step 8: Perform sensitivity analysis*

As a range of assumptions are used in a CBA, sensitivity analysis should be performed to test uncertainty around predicted impacts and their appropriate monetary valuation.

Sensitivity analysis involves altering some of the critical assumptions (such as estimates of savings and costs, demand and pricing) to recalculate the estimated NPVs under different assumptions. At its most simple, sensitivity analysis involves documenting the best- and worst-case scenarios.

Sensitivity analysis can help account for differences in judgment or uncertainty, providing decision makers with information on how changes in different variables will affect the overall costs and benefits of the proposed regulation. If the sign of the net benefits does not change after considering the range of scenarios, there can be confidence in the efficiency effects of the proposal. Common approaches to sensitivity analysis include worst/best case analysis, partial sensitivity analysis and Monte Carlo sensitivity analysis.

Further information is provided on sensitivity analysis below and more detailed guidance on addressing risk and uncertainty is provided on the Economic Assessment Information Portal.

*Step 9: Reach a conclusion*

The results of the CBA should be summarised and a conclusion reached. The summary should include:

* the time profiles of costs
* benefits and net benefits
* the NPV
* the discount rate used
* information on the sensitivity of estimated impacts to alternative assumptions
* a list of assumptions made
* how costs and benefits were estimated.

The option with the highest net benefit is generally the recommended option. However, sensitivity analysis might suggest that the alternative with the largest NPV is not necessarily the best alternative under all circumstances.

*Step 10: Communicate the results*

Reporting the analysis and results is the final stage of the CBA process. It is important to highlight the assumptions used in forecasting costs and benefits, key risks, and any other limitations of the analysis. You should clearly set out the reasons for recommending any particular option. The report should be structured and written in such a way as to allow for easy interpretation of results and validation of the information and data provided.

Efforts should be made to make the CBA publicly available unless there are good reasons for not doing so (e.g. security or commercial confidentiality).

What is a base case?

The base case can be understood as what would occur in a business-as-usual scenario where there is no decision to undertake government investment or policy reform. The base case is used as a reference point for comparing the costs and benefits of a policy or investment decision. Defining the base case clearly enables understanding of the incremental impacts of different options in addressing the underlying problem.

*What to incorporate in a base case*

The base case is generally defined as a continuation of the current policy setting. This might be the ‘do-nothing’ or ‘business-as-usual’ scenario, which represents the minimum cost of using the existing arrangements to deliver services at current levels and standards. The base case should specify observed long-term trends such as future population and economic growth. In some cases it will be appropriate to include planned investment or policy decisions.

However the base case is defined, it is important that it is logical and clearly articulated. If the base case is not logical or well-articulated, it will be difficult to assess the incremental impacts of investment options.

How do I identify the options that should be assessed?

The purpose of any investment is to achieve an outcome that improves the wellbeing of the community. In many instances there are multiple approaches that could achieve the outcome. These are described in CBA as policy options. The base case is considered a special policy option as it corresponds to a ‘no-change’ scenario.

More detailed guidance on the development of options is available on the Economic Assessment Information Portal.

What is a discount rate?

The costs and benefits identified in a CBA typically occur over a number of years. In order to compare costs and benefits over time, the values attached to costs and benefits need to be converted and expressed in today’s dollar value. This is referred to as ‘discounting’ future values. The discount rate is the percentage rate at which future values are reduced to bring them into line with today’s values.

Discounting is distinct from inflation adjustment. Adjusting for inflation accounts for the general increases in prices over time. Discounting accounts for how the present is valued more highly than the future. A ‘real’ discount rate is applied to future costs and benefits that have been adjusted for inflation.

Determining an appropriate discount rate requires a judgement about the value of an outcome to future users as compared to current users. The discount rate may also reflect the alternative uses of the capital proposed for use in the investment.

Substantial variation in Australian and international guidelines on approaches to discount rates reflects the ongoing debate, however, for current purposes, the following are the commonly accepted discount rates.

The Department of Treasury and Finance (DTF) [technical guidelines on economic evaluation](http://www.dtf.vic.gov.au/sites/default/files/2018-03/Economic%20Evaluation%20-%20Technical%20Guide.doc) recommends that proposed public sector investments be separated into one of three categories to reflect the risk level of the project. DTF recommends using the following **real** discount rates (i.e. rates adjusted for inflation. These should only be applied to real cost and benefit flows):

* A **four per cent discount rate** for the provision of goods and services in **traditional core public service delivery areas** where the benefits are not easily quantifiable in monetary terms (e.g. education, public health and justice)
* A **seven per cent discount rate** for when **benefits are more easily monetised** (e.g. public transport, roads and housing)
* A third category for commercial investments requires consultation with DTF to determine the appropriate rate.
* A **real discount rate of four per cent** is recommended for **regulatory and legislative** proposals (from the Victorian Guide to Regulation [Toolkit 2: cost-benefit analysis – checklist and alternatives](http://www.dtf.vic.gov.au/sites/default/files/2018-02/Toolkit%202%20cost%20benefit%20analysis%20-%20checklist%20and%20alternatives_0.docx) (2014)).

[Infrastructure Australia](http://infrastructureaustralia.gov.au/policy-publications/publications/files/IFA_Infrastructure_Australia_Assessment_Framework_Refresh_v26_lowres.pdf) requires the presentation of appraisal summary results with a **real discount rate of seven per cent** with sensitivity testing at four and ten per cent.

More detailed guidance on discount rates is available on the Economic Assessment Information Portal.

Why is it important to incorporate non-market values and impacts into economic assessments?

People are sometimes uncomfortable with the idea of estimating non-market values in dollar terms. In some cases there can be a perception that these values are ‘priceless’ or it is unethical to monetise them. There may also be a concern that giving a non-market value a price will then mean it can be bought and sold.

All of the things that people value still have value whether or not they can be quantified or measured in dollar terms. Monetising non-market values and impacts can be a challenging and expensive task. However, when considering public (government) investment in activities that will have impacts on non-market values, it is important to fully assess these costs and benefits to ensure that public resources are being allocated to generate overall benefits to society.

How should non-market impacts be dealt with?

Non-market impacts should be quantified, monetised and incorporated into a CBA where possible. More detailed guidance on non-market valuation is provided on the Economic Assessment Information Portal.

What is sensitivity analysis?

Sensitivity analysis is the process of analysing how different values or outcomes affect the value of a proposal. There are a number of ways to undertake a sensitivity analysis: worst case analysis, partial sensitivity analysis, or a full risk analysis. Sensitivity analysis allows the decision maker to examine the plausibility of assumptions made in the analysis.

For example, the decision maker can observe the effect of changing prices or other assumptions on the estimates of benefits and costs and the associated effect on the net present value of a proposal.

Why is it important to address risk and uncertainty in economic assessments?

Ignoring risk and uncertainty can have significant implications for the economic assessment of an initiative leading to ineffective decision making. Implications include: benefits and/or costs may be under/overestimated, and the options provided for economic assessment may not include any risk management activities which could have eliminated or mitigated risk.

How should risk and uncertainty be addressed?

As mentioned above, sensitivity analysis can be undertaken to analyse how different values or outcomes affect a proposal. Other methods are available to address risk and uncertainty, such as Monte Carlo and real options analysis. More detailed guidance on addressing risk and uncertainty is provided on the Economic Assessment Information Portal.

How do you assess the results of a CBA?

The objective of CBA is to determine which option best achieves a given objective. There are three main quantitative assessment tools used to help assess and rank different options in a CBA: Net Present Value (NPV), Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR).

*Net Present Value*

The Net Present Value (NPV) of an option equals the present value of benefits (the sum of discounted benefits) minus the present value of costs. If the NPV is positive, the investment improves efficiency because it involves benefits that, over time, more than outweigh the costs. If the NPV is negative, the proposal is inefficient (the costs outweigh the benefits). Policy options can then be compared by the size of their NPV.

The NPV is the most straight-forward and commonly used method to calculate the overall value of an option in CBA. It is the Department of Treasury and Finance’s preferred quantitative assessment tool when assessing options.

*Benefit-Cost Ratio*

The benefit-cost ratio (BCR) measures the ratio of the present value of benefits to the present value of costs. It is calculated by dividing the present value of the benefits of an option by the present value of its costs. The ratio must exceed one for the proposal to be assessed as generating a net benefit.

The Department of Treasury and Finance recommends that the BCR be reported with the NPV, but it does not recommend it as the only quantitative assessment tool for decision-making purposes as it tends to result in bias towards small projects and projects with early returns.

*Internal rate of return*

The Internal Rate of Return (IRR) is the rate at which the NPV of a new investment’s expected costs and benefits equals zero. In general, the IRR is compared with a benchmark figure to determine whether a project should proceed. IRRs are also compared across projects to determine their relative performance. In some cases, the higher the proposed investment's IRR, the more preferable it is to undertake.

The IRR is not preferred by the Department of Treasury and Finance as it generates irregular results (where there is no discount rate that would generate an NPV of zero or where there is more than one IRR). In addition, using the IRR tends to bias towards small projects and projects with early returns that are inconsistent with NPV rankings of projects.

How do you choose the right quantitative assessment tool for deciding between options?

Determining the most appropriate quantitative assessment tool (NPV, BCR or IRR) to assess which option is preferred can raise some issues. In general, it is preferable that projects with the highest NPV should be selected because this is consistent with the goal to maximise net benefit to society. However, budgetary constraints and the context of decision making may recommend options with a lower NPV as better under the circumstances. Sensitivity analysis can also have a significant impact on results (by showing how sensitive the overall result is to a change to a key variable and thus, how likely it is to influence the final decision made).

Assessment tools can be used in different ways according to the context of decision-making. A project can be assessed:

* on its own merits
* amongst a set of options for the purpose of addressing a specific problem
* amongst a set of unrelated projects within a fixed or constrained budget.

*On its own merits*

For a proposal being assessed on its own merits, it is sufficient to decide based on net present value. It is rare that projects are assessed on their own merits, however, as decision makers usually face constraints and good governance requires that more than one option is assessed.

*Amongst a set of options:*

When deciding between a set of options, it is insufficient to merely choose projects with a NPV greater than zero as this decision rule would not necessarily select the best option. In this case, the decision criteria would select the project with the highest NPV. Options assessed for a Regulatory Impact Statement (RIS) are an example of this type of situation. A RIS usually assesses a number of alternatives available to address the problem, and an appropriate decision criterion is to proceed with the option with the highest NPV.

*Amongst a set of unrelated projects within a fixed or constrained budget*

The aim of a CBA is to identify the projects that increase welfare by the largest amount. In the case of selecting projects within a fixed or limited budget, the NPV criterion should be the primary criterion used to select which projects to proceed with. It may also be useful to consider the BCR of projects. In a situation where capital projects need to be funded from a limited pool of funds, it can be shown that allocating funds by way of the BCR criterion results in a higher net social benefit than by using NPV. The reason is that the BCR shows the relative size of the benefits compared to the costs, whereas the NPV is concerned with the absolute size of the benefits compared to the costs.

For example, consider three hypothetical policy options below:

| Option | Costs | Benefits | Net Present Value | Benefit-Cost Ratio |
| --- | --- | --- | --- | --- |
| A | $1M | $1.7M | $0.7M | 1.7 |
| B | $5M | $7M | $2M | 1.4 |
| C | $10M | $12M | $2M | 1.2 |

Using the NPV as the decision rule would indicate either Option B or C as the best choice as they both present equal NPVs of $2 million. But where there is a budget constraint, the BCR would then be used to select Option B over Option C. If the BCR was used as the primary decision rule, this would lead to the selection of Option A.

**Further reading:** *Economic evaluation for business cases – technical guidelines* (DTF, 2013), *Victorian guide to regulation toolkit 2: cost-benefit analysis* (DTF, 2014), *Handbook of cost-benefit analysis* (Commonwealth of Australia, 2006).

What are some of the limitations of CBA and most other forms of economic assessment?

While CBA is the preferred method used in economic assessments, proper use of the tool requires a clear understanding of its limitations and weaknesses. Key limitations of CBA, and many other quantitative assessment techniques, include:

* **The expertise required** – The credibility and robustness of a quantitative assessment is dependent on the objectivity and expertise of the practitioner engaged. A quantitative assessment is only as good as the practitioner undertaking the analysis with the specific skill-set required dependent on the project under consideration. While some assessments may be very simple and require limited expertise, many can require significant technical expertise.
* **Cost and time involved in undertaking a quantitative assessment** – The cost and time involved in undertaking a rigorous quantitative assessment can be substantial. The effort expended in undertaking quantitative assessment should be proportional to the size of the investment and/or its expected impact on the economy and community. Smaller investments or government actions within more limited potential impacts may only warrant a rapid quantitative assessment.
* **Uncertainty in estimates** – Analysing future costs and benefits rests on making assumptions about future states of the world. The resulting evaluation is therefore uncertain and may not accurately reflect the realised impact of the investment. This is exacerbated when assumptions reflect a bias in the forecaster’s view of the future. Sensitivity analysis can help to account for uncertainty and ensure that post-implementation evaluations are undertaken. Sensitivity analysis also works to introduce further accountability to the accuracy and quality of analysis.
* **Equity considerations** – Quantitative assessment does not generally assess the equity impacts of a particular investment, unless an assessment is specified to do so. Costs and benefits to different groups (e.g. regional versus metropolitan Victoria) can be estimated, but a CBA does not value benefits or costs for one group more highly than another. Equity considerations for decision-makers need to overlay the CBA.
* **Optimism bias** – Studies of historic quantitative assessment demonstrate a persistent bias towards the overestimation of benefits and the underestimation of costs. This could be due to optimism bias in planning or strategic misrepresentation to increase the likelihood of a project being funded. This persistent bias underscores the importance of ensuring objectivity.

A quantitative assessment is most usefully applied when the major benefits of a program can be reasonably quantified and measured in dollar terms. **Limitations that arise from difficulties in monetising impacts include:**

* **Accounting for wider economic benefits** – Wider economic benefits (WEBs) refer to the additional benefits to the economy that stem from large transport and infrastructure projects. Traditionally WEBs have been omitted from CBA appraisals because they are usually very difficult to quantify, however this may change over time as new research and analysis becomes available. It is recommended that practitioners follow Infrastructure Australia’s advice and present CBA results without WEBs, and then with WEBs, treating WEBs effectively as a sensitivity test.
* **Valuing non-market impacts** – A quantitative assessment must account for all costs and benefits from a project in order to be valid. However, non-market impacts (such as environmental and social impacts) are often excluded from a traditional quantitative assessment due to difficulties in their measurement and valuation. Most appraisals will identify some costs or benefits for which there is no readily available market data. In these cases, a range of techniques can be applied to elicit values (guidance on methods for valuing non-market impacts is provided on the Economic Assessment Information Portal).

**Further reading:** *Victorian guide to regulation* *toolkit 2: cost-benefit analysis* (DTF, 2014), *Economic evaluation for business cases – technical guidelines* (DTF, 2013), *Guidance note: cost-benefit analysis* (Commonwealth of Australia, 2016), *Handbook of cost-benefit analysis* (Commonwealth of Australia, 2006), *CBAx Tool User Guidance* (NZ Treasury, 2015).

Alternative methods to a CBA

You may not always be able to undertake a CBA. In this situation, refer to Appendix A to help you determine which alternative economic assessment method is appropriate to use.

2. Cost-effectiveness analysis

What is cost-effectiveness analysis?

Cost-effectiveness analysis (CEA) is a partial cost-benefit approach that compares the costs of alternative ways of producing the same or similar outcomes. CEA provides an estimate of the average cost per unit of a given outcome.

CEA is useful when the main benefits cannot be easily valued in dollar terms or when it would be unduly expensive to undertake the valuation. In such cases, benefits are expressed in terms of physical units (e.g. the number of lives saved, number of accidents prevented) while costs are expressed in dollar terms. Cost effectiveness offers a priority ranking of options on the basis of comparative ‘cost per unit of outcome’.

CEA is most often used in areas such as education, health, corrections and the environment where quantification of benefits can prove more difficult.

Limitations

CEA cannot assess if the preferred option is of net benefit to society. It can only assess which of the options under consideration is capable of delivering the outcome most cost effectively. In addition, this method cannot be used to find or compare alternative projects that could achieve greater net social benefits by targeting different outcomes. Therefore, CEA should generally only be used where the decision to target a specific outcome has already been agreed upon by decision-makers.

3. Break-even analysis

What is break-even analysis?

Break-even analysis (BEA) determines the point at which the benefits of a policy option equal its costs. In conducting a BEA, policy makers estimate the degree to which a policy option could be expected to deliver benefits. The costs are divided by the monetised value of a ‘unit’ of benefit in order to identify the minimum amount (or units) of benefits required for an option to break even. By estimating the minimum benefits required, BEA informs a judgement about the likelihood of those benefits actually being achieved.

BEA can be used where a monetary estimate of units of benefits is possible but the effectiveness of a policy option or the magnitude of the likely benefits is uncertain. For example, where anti-smoking health warnings can be expected to reduce tobacco-related deaths and health costs, but it is unclear as to how effective the policy will be in directly realising those outcomes.

Limitations

BEA is a useful tool for analysing policy options but less useful for comparing the relative effectiveness of several options. For example, if two policy proposals have the same break-even point, BEA provides no guidance on which one is likely to deliver greater net benefit.

4. Multi-criteria analysis

What is multi-criteria analysis?

Multi-criteria analysis (MCA) refers to a range of techniques to assess policy options against quantitative and qualitative impacts. The approach enables the inclusion of a wider range of criteria (for example, social and environmental considerations) all measured in the most relevant unit as opposed to monetary values.

MCA provides a framework for investigating, analysing and resolving policy options characterised by multiple objectives or criteria. The evaluation framework ranks or scores the performance of options against multiple criteria measured in different units. Typically, the criteria are weighted by decision makers or members of the community to reflect their relative importance and a total score is derived for each option, allowing the overall relative value of options to be compared.

The major strengths of MCA are its ability to handle performance measures in any units (either quantitative or qualitative) and its ability to provide decision makers with a logical structure for complex problems. MCA is most effective when there is a very clear basis for scoring project options against criteria and where this evaluation framework is agreed and documented before the analysis has commenced.

MCA should generally be limited to the assessment of smaller projects and/or where the main costs and benefits cannot be valued (or it is impractical to do so).

Limitations

MCA does not have the same grounding in economic theory as CBA. Because MCA involves subjective judgments on values to assign scores, consistency of analysis and like‑for‑like comparisons can be challenging. Importantly, MCA does not tell the decision-maker whether individual proposals are of net social benefit.

Methods that assess the economic impact of an intervention or proposal

If you are seeking to assess the economic impact of an initiative, for example, on jobs and gross state product, the following methods can be used. Appendix B provides guidance for determining the appropriate method for economic impact assessment.

1. Computable general equilibrium (CGE) modelling

What is computable general equilibrium (CGE) modelling?

Computable general equilibrium (CGE) modelling is a quantitative technique used to estimate the ‘economy-wide’ impact of a proposed project or policy within a particular country or region. A CGE model accounts for the complex interactions between economic agents (producers, households, and government, among others) and is therefore useful for assessing the wider economic impact of public investments and government policies, including flow-on impacts (‘second and third round effects’). CGE models specify all of these economic relationships in mathematical terms and combine the equations in such a manner that enables the model to predict the change in variables such as prices, output and economic welfare arising from policy changes or public investments.

The use of CGE modelling in economic assessment has increased in recent years as policy makers have attempted to include the wider economic impact of proposals in the appraisal process. This approach is appropriate where a proposed project or policy is expected to have wide-ranging effects beyond a particular sector or segment of the economy.

Limitations

Where a proposed investment or policy change is expected to be relatively small and its effects limited, a CGE approach may not be an appropriate method due to the costs involved in sourcing the necessary quality data and constructing the database. Similarly, CGE is most applicable where wide-scale economic impacts are expected to flow across multiple sectors.

The scope of a CGE model is limited to market-based goods and services and therefore does not take into account non-market impacts such as environmental and social goods.

CGE modelling requires a high level of expertise. The results also require careful interpretation and explanation.

2. Market-specific (partial equilibrium) modelling

What is market-specific modelling?

Market-specific modelling is a technique that analyses effects on a small part of an economy (often on one or two markets) as compared to CGE models which estimate effects on the entire economy. Partial equilibrium analysis can be static or dynamic. This 'partial' approach either ignores effects on other industries or assumes that the sector in question is very small and therefore has little, if any, impact on other sectors of the economy.

Market-specific models are simpler than CGE models and are useful for analysing single markets or when the introduction of certain assumptions into CGE models would introduce problems.

Limitations

The scope of a market-specific model is restricted to a particular portion of the economy and as such, lacks the ability to study interrelationships throughout the economy.

The scope is also limited to market-based goods and services and therefore does not take into account non-market impacts such as environmental and social goods.

3. Input-output analysis

What is input-output analysis (IO)?

Input-output (IO) analysis is a quantitative technique which estimates the wider impacts of a proposed project or policy on the economy. IO analysis uses input-output tables which describe the flow of goods and services between sectors of an economy.

IO is designed to be a simple, low-cost, relatively easy to use tool. Because of this aspect, it needs to simplify the complex, multi-dimensional ‘real world’ economy into a straight forward model. However, its simplicity means it needs to make many assumptions about the economy which limits its accuracy.

The IO system model describes the interdependencies between individual sectors of an economy, showing how output from one sector may become an input to another. Typical outputs of IO modelling include impacts on gross domestic, state, or regional product; employment impacts; and impacts on wages and salaries.

Limitations

While IO modelling is common it often comes under scrutiny because the simplicity of the model and its assumptions restrict its capacity to provide accurate results in some situations. Typical assumptions of IO modelling include: a fixed input structure in each industry, prices not changing with the demand or supply of goods and services, and unlimited labour and capital assumed to be available at fixed prices.

These limitations mean that while IO modelling is able to describe the relationships in an economy at a point in time, it is not suitable to assess the impacts of an initiative (such as an investment) on an economy as it takes place over time.

In addition, IO modelling may overstate the benefits of proposals, especially where there is a displacement effect (for example, where investment in one region displaces investment in another region). Most importantly, while IO modelling can be used to assess the economic impact of an intervention or proposal, it cannot be used to weigh the merit of a proposal or compare policy alternatives on the basis of quantifiable (monetary) costs and benefits.

How do I assess the quality of an economic assessment?

Appendix C presents a checklist to help you assess whether the key standards of a quality CBA have been achieved.

What other guidance is available?

The following guidance on other aspects of the economic assessment process are available on the Economic Assessment Information Portal:

* Guidance on the development of options
* Guidance on quantifying and monetising non-market impacts
* Guidance on addressing risk and uncertainty
* Guidance on discount rates
* Guidance on using CBA versus CGE to estimate net social benefit.

The Department of Treasury and Finance also provide guidance on economic assessment and CBA:

* [Economic Evaluation for Business Cases Technical Guidelines](http://www.dtf.vic.gov.au/sites/default/files/2018-03/Economic%20Evaluation%20-%20Technical%20Guide.doc) (2013)
* Victorian Guide to Regulation [Toolkit 2: cost-benefit analysis – checklist and alternatives](http://www.dtf.vic.gov.au/sites/default/files/2018-02/Toolkit%202%20cost%20benefit%20analysis%20-%20checklist%20and%20alternatives_0.docx) (2014)

Appendix A: What is the appropriate economic assessment method to use when seeking to assess the merit of a proposal or decide between options based on net benefit to society?

|  |  |  |  |
| --- | --- | --- | --- |
| If... | and... | then use... | Limitations |
| Most costs, including the most important, are known and can be quantified and their value estimated | Most benefits are known and can be quantified and estimated | **Cost–Benefit Analysis (CBA)**, to compare different options, supported by qualitative explanation. | Requires all costs and benefits to be estimated, which may not be practicable in all cases. If at least the main costs and benefits can be quantified, a partial CBA can be completed. |
| Most benefits cannot be quantified, but can be estimated (for example, it may not be possible to determine number of injuries avoided through the proposal, but the dollar cost of an injury avoided is known). | **Break–Even Analysis (BEA)**, to establish how effective an option needs to be to offset its costs.  Provide supporting reasoning and evidence to explain whether the proposal will likely deliver or exceed the ‘break even’ point. | Requires units of benefit to be estimated. Does not allow the relative effectiveness of different options to be compared. |
| Most benefits can be quantified but cannot be estimated in monetary terms (for example, the likely area of habitat preserved by the proposal may be known but not the dollar value of the benefits of preserving that habitat). | **Cost–Effectiveness Analysis (CEA)**, to compare different options and identify which option delivers the outcome at lowest cost ‘per unit of outcome’. | Considers only the least cost way of achieving a given outcome, not whether the outcome itself is optimal. |
| It is not possible to quantitatively estimate the effects of many or most of the impacts of an option.  However, you are able to define the objectives and their relative importance, as a basis for comparing options. | | **Multi–Criteria Analysis (MCA),** to assign and aggregate scores to decision criteria and compare across options.  Use transparent criteria and weightings that are consistent with the policy objectives. | Requires clearly defined criteria to be weighted based on their relative importance, and a credible explanation of the allocation of scores to compare different options. |
| You are working with a complex proposal that involves a range of parts, each with different data limitations and characteristics. | | Use the most rigorous tool available to compare within choices, estimating overall costs and benefits to the extent feasible. |  |

Source: DTF (2016) [Victorian Guide to Regulation](http://www.betterregulation.vic.gov.au/Guidance-and-Resources), p.38.

Appendix B: What is the appropriate method to use when assessing the economic impact of a proposal?

| Method | When to use | How to use | Common limitations |
| --- | --- | --- | --- |
| **Computable General Equilibrium (CGE) models** | Where a proposed project or policy is expected to have significant and wide-ranging effects beyond a particular sector or segment of the economy | To estimate economy-wide impacts  As a complement to cost-benefit analysis | Typically does not take into account non-market impacts  Costly to source data and construct  Complex to understand or test results  Cannot assess overall merit of a proposal  Cannot compare policy alternatives on the basis of quantifiable impacts |
| **Market-specific (partial equilibrium) models** | Where a proposed project or policy is expected to affect a small segment of the economy | To estimate impacts to one or two interconnected sectors of the economy  As a complement to cost-benefit analysis | Does not take into account non-market impacts  Complex to understand or test robustness of results  Cannot assess overall merit of a proposal  Cannot compare policy alternatives on the basis of quantifiable impacts |
| **Input-output analysis (IO)** | Not generally recommended | Not generally recommended | Requires many assumptions  Open to misuse  May overstate benefits  Does not estimate impacts over time  Cannot assess overall merit of a proposal  Cannot compare policy alternatives on the basis of quantifiable impacts |

Appendix C: Best practice checklist for cost-benefit analysis

This checklist will help you to assess the quality of a CBA and specify the requirements for a commissioned CBA.

Before undertaking a CBA

| **Step** | **Ideal characteristics** |  |
| --- | --- | --- |
| Pre - CBA | *Timing*  The CBA is being undertaken before a public commitment has been made (if not, establish the purpose of the CBA) |  |
| *Proportionality*  The effort involved in undertaking the CBA is proportional to the size or extent of the investment |  |

The CBA

| **Step** | **Ideal characteristics** |  |
| --- | --- | --- |
| Options assessment | *Base case*  The base case is clearly defined and credible |  |
| *Options*  A reasonable set of alternative options has been incorporated |  |
| There is a comprehensive description of alternative options |  |
| The base year is common to all options being considered |  |
| *Assumptions and data*  Details of underlying assumptions have been clearly articulated |  |
| Sources of key input data and parameter values have been provided |  |
| The demand forecasting method is appropriate (seek technical advice if required) |  |
| Forecasts have been based on comparable projects or policies (where possible) or from robust publicly available research |  |
| Impact identification | All the important benefits and costs for each alternative have been identified |  |
| There is a description of all costs and benefits |  |
| All the potentially affected parties have been considered |  |
| Externalities have been considered |  |
| Non-market impacts have been considered |  |
| Significant option or existence values have been considered |  |
| Cost and benefit valuation | *Quantifying costs and benefits*  Costs and benefits are valued credibly (seek technical advice if required) |  |
| Methods for estimating costs and benefits are described |  |
| Costs and benefits have been described incrementally against the base case |  |
| Costs and benefits have been valued at their market or economic value where possible, based on reasonable and verifiable assumptions (seek technical advice if required) |  |
| The values of all costs and benefits have been adjusted for real price variations over time |  |
| Opportunity costs have been considered |  |
| There is a list detailing cost and benefit streams |  |
| *Qualitative costs and benefits*  Non-quantifiable costs and benefits have been discussed in qualitative terms |  |
| *Evaluation period*  The evaluation period is based on the economic life of the investment/decision (e.g. 10 years for a regulation) |  |
| A residual value has been incorporated if the economic life of the project exceeds the evaluation period of the project. |  |
| Discounting | Costs and benefits have been adjusted for the different times at which they occurred (i.e., discounted) |  |
| The discount rate follows the appropriate guidelines (e.g., Section 6 of DTF’s [Economic Evaluation for Business Cases Technical Guidance](http://www.dtf.vic.gov.au/sites/default/files/2018-03/Economic%20Evaluation%20-%20Technical%20Guide.doc) if seeking state funding, or Section 10.4.2 of Infrastructure Australia’s [Assessment Framework Detailed Technical Guidance](http://infrastructureaustralia.gov.au/policy-publications/publications/files/IFA_Infrastructure_Australia_Assessment_Framework_Refresh_v26_lowres.pdf) if seeking national infrastructure funding) |  |
| Addressing risk and uncertainty | All major areas of risk and uncertainty have been considered |  |
| Appropriate sensitivity testing has been conducted |  |
| There is a discussion of how alternative assumptions may affect outcomes |  |
| Identifying the preferred option | *Decision criteria*  The results of the assessment and measures of economic worth (i.e., NPV, BCR and IRR) are clearly presented |  |
| There is an explanation of why a decision criterion was chosen over others (i.e., NPV, BCR or IRR) |  |
| *Identifying the preferred option*  The results have been ranked based on initial results |  |
| The results have been ranked based on sensitivity testing |  |
| The results of different approaches were easy to compare |  |
| A preferred option has been identified that takes into account the initial assessment, sensitivity testing and all qualitative factors |  |
| There is a comparison of the preferred option with other options |  |
| Presentation of results | The structure and presentation of the CBA allows for easy interpretation and validation of the information and data provided |  |
| The results of different assessments are easy to compare |  |
| Supplementary analysis | The details of any supplementary analysis (e.g., multi-criteria analysis, assessment of distributional and/or equity impacts) have been provided |  |

After the CBA

| **Step** | **Ideal characteristics** |  |
| --- | --- | --- |
| Post-CBA | *Timing*  The CBA has been updated as the project has evolved |  |
| *Objectivity*  The CBA was undertaken by an objective third party |  |
| *Quality of analysis* (seek technical advice if required)  The depth of analysis offers assurance that results are credible |  |
| The information and data provided in the CBA are internally consistent |  |
| An appropriately detailed and tailored methodology has been applied |  |
| Double-counting of benefits has been avoided |  |
| *Transparency*  The CBA has been made available for public scrutiny (unless there are good reasons for not doing so) |  |