

## Analysing costs & benefits

### Introduction

Cost Benefit Analysis (CBA) is a technique used to estimate the monetary value of the benefits and the costs to the community to assess whether a proposed initiative is worthwhile.

The concept was originally developed by Jules Dupuit, a French engineer, and was further elaborated by a British economist, Alfred Marshall. Much of the practical development, however, came about because of the US Federal Navigation Act of 1936 which required that the US Corps of Engineers carry out projects to improve the waterway system when the total benefits of a project, irrespective of where they accrued, exceeded the costs.

### Principles of cost benefit analysis

A cost benefit analysis can be undertaken using only direct financial costs and direct financial benefits. However, to be worthwhile, it is necessary to include more intangible items, such as benefits to society. It is also necessary to think about who benefits and who bears the costs. It is helpful to bear in mind the following principles:

- Costs and benefits, whether economic, social or environmental, must be measured in a common unit – and the easiest is money, so all the benefits, if not already expressed in monetary value, need to be converted to a monetary value, and that needs to be at 'present values' to eliminate the impact of inflation;
- Estimating the monetary values can be challenging, particularly where people's time is involved, so estimates need to be rooted in evidence and market choices and it may be better to give ranges rather than implying total accuracy;
- Spell out assumptions and provide references to data sources;
- Benefits which involve reducing risk to life and limb are difficult to quantify because of the difficulty of putting a value on a human life – but people already make choices, for example, taking higher pay to work in a more risky environment, so the difference can be used as an indicator;
- The analysis needs to compare the positions with and without the change, and only consider the additional benefits and additional costs, remembering that not changing in the way proposed may force other changes with associated costs;
- Avoid double counting of benefits and costs;
- The cost benefit analysis for a proposed change in regulation should be proportionate to the likely impact, but should be rigorous enough to inform decision making.

If the present value of the benefits exceeds the present value of the costs then the project is worthwhile.

### The risks

The risks represent the current problem(s) that necessitate the policy choices that are being considered. In other words, what is the problem being addressed by the policy and why.

Ideally, the risk should be quantified over a specified period of time – probably a year, but it can be longer depending on the nature of the risk.

Specify the business sectors affected, the number of firms involved and the sizes of the firms (in terms of their employment and turnover).

Some firms may be more affected than others, for example, small firms. Identify where the burden is likely to fall most heavily. What are businesses being asked to do and when, for example, buying new equipment in the near future might be harder for small businesses.

Consider the extent to which other stakeholders (for example, NGOs, consumers and the public sector) might be affected by the proposal. Benefits may accrue to a specific group such as workers, consumers, or low-income groups or to society in general. Common benefits may be a cleaner environment, better health, a safer workplace or improved food hygiene.

## **Costs**

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Costs may be one off or impose a continuing burden on businesses; they may be related to the policy or they may be related to implementation. The separation of policy and implementation costs is important. Policy costs are those that are directly attributable to the policy goal (for example, an import duty, or the cost of a licence, or the costs necessary to meet the policy objective) while implementation costs are those associated with understanding the requirements, keeping records or demonstrating compliance.

High costs of implementation relative to costs of policy might suggest the desirability of using an alternative to regulation. The relative magnitudes will also reflect how efficiently the policy might be implemented and therefore how well it is designed. Keeping the costs separate will also assist in ensuring that all the costs are considered.

Identify the costs by thinking about the aim of the proposal and what businesses, consumers or other stakeholders will be required to do. Think about the impact that the proposals might have on the environment. What will businesses have to do to familiarise themselves with the new requirements in terms of training, employing more people, investing in new equipment, changing their working practices, changing their product, moving to new premises etc? What costs will the public sector bear in complying with the proposal and in enforcing and monitoring it? What costs will central government incur in developing and disseminating the policy? Think, too, about any indirect costs – changes in behaviour such as fewer firms setting up in business, reduced consumer choice, less competition between firms, less innovation etc.

You will need to quantify the costs. Where there is uncertainty, make it clear and spell out the assumptions used to determine the estimates.

Some costs will be easy to estimate while others will be more difficult. Costs might include:

- labour costs (familiarisation with new legislation, training, new working practices, time spent taking inspectors around the firm etc);
- cost of new equipment or new production processes;
- collecting information and providing proof of compliance – use labour costs, plus the cost of new equipment (eg computers or software) required to do this;
- cost of getting licences – these will involve estimating the fees plus administrative costs;
- cost of extra legal, accountancy or other consultancy advice.

When identifying costs (or benefits) it is important to count them only once. Some regulations are only concerned with transfers from one section of society to

another, for example social security payments. The transfers may change the distribution of income or wealth but they do not give rise to direct economic costs (or benefits), except for any associated costs of administration or compliance. Care also needs to be taken to avoid any double counting of costs and benefits (eg one firm incurs a cost which it then passes on to a customer through higher prices) and which should only be counted once in the cost benefit analysis.

## **Benefits**

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Benefits do not all accrue at one but are received over time. Identify the benefits by thinking about the aim of the proposal and the risks being addressed. If the proposal is to improve consumer health then the benefit should be a reduction in illness or death; if it is to reduce air pollution then the benefit should be x% fewer tonnes of the pollutant being emitted to the atmosphere. The risks associated with this pollution might be illness or damage to property and crops. The benefits would therefore be a reduction in these.

Once you have identified the benefits then you should quantify them in monetary terms. The starting point may be to consider how many lives are saved, or how many illnesses will be avoided, or how many animals will face better conditions, or how many workers will have improved rights, or how much money will be saved through reduced fraud. But in all cases, there is a need to translate these into money.

Some of the benefits may accrue to the sector, perhaps through cost savings from a regulation that is designed to reduce or simplify existing requirements or through higher receipts as a result of an existing regulation being properly enforced.

Where there is uncertainty, make it clear and spell out the assumptions used to determine the estimates.

Some benefits will be easy to estimate – for example, higher wages or increased incomes – but others will be more difficult. In turning benefits into money, you could use the following:

- time – use wages multiplied by the hours saved;
- the environment – you could use surveys which show people's willingness to pay (how much people would pay for a clean river, fresh air or a national park) or their willingness to accept (how much people would be prepared to accept in compensation for suffering from pollution);
- life/health – use estimates of the value of a statistical life, or the cost of treating the illness;
- social benefits – you could use surveys, eg showing people's willingness to pay to have a more equal distribution of income; also again people's purchases might give some idea of people's values; and
- training – you could use surveys of firms' increased revenue and productivity gains following training; or use analysis of the higher wages that trained staff can command.

There is likely to be uncertainty over the valuations, in which case, spell out the assumptions and use ranges.

## **Present values**

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Both costs and benefits will accrue over time; to ensure that they are properly compared over the chosen period, it is necessary to use 'present values'. There is a technique, known as discount cash flow, which enables the calculation of present values and which takes account of the time value of money. This allows for the fact that spending \$10,000 in, say, five years time, costs less than spending \$10,000 now since the money could be invested in the meantime. The rate of return that might be available is known as the discount rate and is used to determine the

amount of money that would have to be 'spent' now if it was to be worth \$10,000 in five years time. Similarly, it is reasonable to spread one off costs over the chosen period.

What discount period should be used? It depends on the policy proposal, but a ten-year period is typical. If the main cost is the purchase of a piece of equipment then the expected lifetime of the equipment could be used. If the costs or benefits are likely to appear well into the future you might want to consider a longer timescale. However, you should not deliberately pick a very long period in an attempt to get the answer that you want.

### **Sensitivity analysis**

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Sometimes the probabilities of different outcomes can be estimated using statistical techniques (for example, the risk of accident or fire). Often probabilities cannot be calculated because the necessary data either does not exist. Sensitivity analysis is simply the calculation of how changes in particular assumptions affect the anticipated impacts of the various options being considered. Alternative outcomes need to be chosen carefully to focus on those uncertainties that are most important.

It may be that a single factor is crucial to the decision of whether an option is worth implementing. In such cases, it can be helpful to see how much the value of this factor would have to fall (if it is a benefit) or rise (if it is a cost) to make it not worth implementing the option. Once this point has been determined it may be relatively easy to assess the likelihood of the outturn being worse than this.

### **Conclusion**

In principle, cost benefit analysis is straightforward. In practice, it can be quite complicated as there will be a need to think about the costs and benefits in considerable detail and, in many cases, to gather appropriate data to inform the calculations. It is for that very reason that it is important to consult – the businesses that are going to be affected are those that will be most likely to pinpoint the likely costs (and unintended consequences) – and to use the results of the consultation to keep updating the calculations, ideally until everyone is satisfied that the analysis gives a fair representation of both the costs and the benefits.

#### **Further information**

- Worked examples of a cost benefit analysis are available at <http://www.sjsu.edu/faculty/watkins/cba.htm>
- See <http://www.cabinetoffice.gov.uk/regulation/ria/> for guidance on how impact assessment is undertaken in the UK
- There is a factsheet in this series which describes discount cash flow