

10 Valuing spillovers and other non-market transactions



There are four major reasons why a particular intervention benefit will not be recorded through the market. The first is because it affects a party other than the intervention provider and recipient (that is, someone not directly involved in the transaction for which a price is struck). The second, third and fourth reasons arise because the consumer of the service does not voluntarily purchase the service through the market. In this case, while the transaction may occur because of compulsion or funding from a third party, such as the government, there is no consumer price and hence no way to evaluate how much the consumer values the service.

These three reasons for non-market consumption of the service are: first, because either the purchaser or supplier of the service is myopic and does not appreciate the benefits to be had from engaging in the transaction; second, because the benefits, while statistically significant on average, are too uncertain at the individual level for the individual to have the confidence to invest¹³; and third, because although both parties know of the benefits, the potential purchaser, cannot afford to buy (or borrow money for) the service even though he or she realises that over the longer term there will be a net return.

While there are undoubted potential spillovers or benefits to third parties from investing in early childhood interventions (for example, from reduced crime rates and fewer welfare dependants), there is an implied view in the literature that the reason the target groups, predominantly low income families, are not already investing more intensively in their children's education and social development is because of the other three factors discussed above. In short, either low income families are not appraised of the benefits of positive early childhood experiences, are not convinced that they will apply to their individual circumstance, or do not have the funds to pay for the extra professional assistance and materials.

The following section discusses the nature of spillovers and why they are not captured by the market. This is followed by consideration of ways that have been devised to monetise major non-pecuniary spillovers and other benefits to consumers that are not transacted through the market because the consumer does not voluntarily purchase them from the market.

The nature of spillovers (externalities)

A complete cost-benefit analysis should count the expected costs and benefits of a program to all parties in society, regardless of whether these are transacted through the market, or whether they are directly transacted through contact with another person or another activity.

The first and second party to a transaction are the producer (supplier) and the consumer of the good or service. In the case of a market transaction, the price paid for the good or service is taken to reflect both the producer's (maximum) cost of production (or benefits foregone) and the consumer's (minimum) valuation of consuming the product. Because both the producer and consumer are willing parties to a market transaction, it is assumed that the agreed price is above the maximum cost and below the minimum benefit.

13 While mathematical probabilities can be calculated for a large group of individuals, the importance of other factors dominate outcomes for single individuals.

Spillovers, or externalities, are unintended effects of such a transaction on a third party. Generally, the third party has no power over the absorption of these effects.¹⁴ Examples of spillovers include changes to the environment resulting from a higher level of production and consumption and thus a change in the ability of third parties to derive satisfaction from the environment, or a change in the welfare of a whole community resulting from more education or health programs for a specific sub-group.

Spillovers are always outside the market and are thus not measured through the price mechanism. Taken to the extreme, the number and quantity of spillovers is unlimited, as the actions of one party can have infinite possible effects on the welfare of proximate parties. However, the cost-benefit analyst must, for practical reasons, limit the scope of measured costs and benefits to those that are significant in size and that should reasonably, and ethically, enter a societal welfare function.

Valuation of non-market costs and benefits

How far the analyst should go to impute the value of non-marketed costs and benefits depends on the estimated size of these effects, relative to market transactions, and how much information needs to be collected. As a minimum, the analyst should mention and describe the principal spillovers.

Where commercial operations co-exist with public provision, the former may be used to impute values, after adjusting for differences in quality. In Australia, this will include health, educational, aged-care and recreational services. In some cases, there may be no market for the good or service in Australia, for cultural or institutional reasons, but commercial operations may exist overseas (for example, commercial city parks, commercial beaches) from which to draw prices. The difficulty here is finding examples that are close enough with respect to its characteristics that a parallel can be drawn.

Clearly, there are private markets in Australia and other countries for intensive childhood services of the type considered in this report. Parents can buy extra kindergarten services, and extended professional assistance for social and educational needs. The prices of these services can be used as a shadow price for the value to families that are receiving these services free through a government or welfare agency program.

However, there remains the critical issue of how much foresight parents who currently use the private market have, and thus how well the price they are prepared to pay encapsulates the present value of long-term benefits to the child, and second, whether the impact on children who use the private market will be of the same proportion to the impact on children who do not. Children who use the private market are more likely to belong to high income and well educated families than children who do not use the private market. In essence, the impact of the program may depend on selection effects. It is not clear whether these qualifications imply a systematic over- or under-estimate of the “true” value of the benefits of the intervention services to the target group.

If the impact on the target group is higher than for the population currently purchasing the services privately, then the present value of benefits will be higher than the present value of the costs of running the intervention. In addition, if it can be convincingly argued that there are spillover benefits from the intervention, such as reduced crime rate and better social cohesion, then the present value of benefits will be accordingly higher still. The aim of the evaluations is to argue that either or both of these additional sources of benefits are present, and to define, and possibly monetise the size of these benefits.

Two generic rules – the principles of exact compensation and of opportunity costs – are used to quantify non-market transactions.

Principle of exact compensation

In theory, the pecuniary measure of the effect of an externality is the amount of income that a person would have to receive, or forego, in order to maintain his or her level of satisfaction (utility) at

14 Usually this is because they are intrinsically non-excludable (for example, air pollution) or not excluded in practice (for example, gardens).

the same pre-effects level. In order to assess this, economists use the principle of revealed preferences. They look at how much people are prepared to pay in order to avoid a negative spillover, or to come in contact with a positive spillover.

Principle of opportunity cost

In many cases, explicit or implicit program costs represent transfer payments and are not true societal costs since there is no opportunity cost (foregone benefit) from using the designated resource or labour. The classic example is when a program uses unemployed labour. Even though there is a program cost to employing people who would otherwise not be employed (wages + on-costs + capital costs), the true cost is their loss from their alternative use, which is the loss of leisure. The same reasoning applies to otherwise unused facilities and resources. However, the cost of scarce (or already employed) labour should be counted as a program cost, because outputs from alternative employments are being foregone.

In the remaining sections, divergent approaches to valuing changes to one person's wellbeing through change to their health or socio-physical environment are considered. Estimates of the number of people affected by type of cost and benefit also have to enter the cost-benefit formula. In addition, if the analyst wants to conduct a sensitivity analysis of the distributional consequences, enumeration of the *types* of people affected needs also be made.

Life and health

One of the common benefits to monetise is a reduction in death and ill health. To the extent that early childhood interventions reduce anti-social behaviour and improved health and thus ill effects on the participants and people they interact with over the course of their life, these factors may be included in an evaluation.

There are four common ways that the literature uses to monetise the value of life and health. Evaluators who require these values for an evaluation will not make these estimates themselves but will draw upon an existing study.

The first method, a simple but rather narrow way to calculate the societal loss from one person's life, is to equate it to the present value of future earnings (or PVE) Y .

$$PVE = \sum_{t=c}^{t=d} \frac{Y_t}{(1+r)^{t-c}}$$

where t is time, c is the current year, and d is the expected year of retirement.

In some cases, account is also taken of the bereavement of the family and loss of enjoyment by the individual (Mishan 1975: 299). Changes to transfer payments are not measured as these represent a transfer between members of society and not a net loss to society. Transfer payments, such as an orphan's payment, would only be included (as a gain to the family and a loss to the rest of the community) if the present value calculation included weights for income distribution factors.

This method is not widely accepted, since by extension, it implies that the goal of an economy is to maximise GDP (which by extension is achieved through unlimited immigration) (see Mishan 1975: 301).

The second method, a more advanced version of the PV earnings, is the PV of losses affecting other parties only. This deducts personal expenses, C , from gross income, Y . This essentially excludes the loss of utility to the dead person.

$$PVnetE = \sum_{t=c}^{t=d} \frac{Y_t - C_t}{(1+r)^{t-c}}$$

This method is also not well accepted as it implies that there is no loss associated with a person, such as a low-income recipient who consume their whole income.

The third method is to look at revealed preferences of individuals or the government. Expenditures, such as installing seat belts, improving occupational health and safety or improving medical equipment, that lower the probability of death, can be used to calculate a dollar figure for a reduction of x per cent in the death rate of y people over a given year. For example, a new diagnostic machine in a hospital is reasonably expected, through earlier detection, to reduce the death rate from that disease by 1 per cent. If 1,000 people are treated each year, the machine costs \$10 million, and has a life-time of ten years, then the value of saving a life is \$100,000.

Similarly, the wages associated with more risky jobs compared with less risky jobs may be used to calculate a person's pecuniary assessment of the risk differential. If one job earns \$100 per week more than other comparable jobs but has a 1 percentage point greater chance of serious injury in any given year, then the value of losses due to injury is equal to $\$100 \times 52 \times 100 = \$520,000$.

This method does rely upon the assumption, in the case of government expenditures, that decisions on these matters reflect societal preferences. In addition, it is assumed that individuals make reasonable, informed choices and are not unduly myopic. One disadvantage of this revealed preference method is that as many different estimates as there are examples will be produced. There is likely to be a different trade-off in jobs between the risk of injury and wages for many jobs. An average, or weighted average for certain demographic groups, offers the best solution.

With *the fourth method*, the amount for which a person is prepared to insure their life may indicate how much he or she believes their life is worth to their beneficiaries. Similar to the second method above, this method assumes that the life has no intrinsic value to the potential loser of life.

In a similar way to the calculation for loss of life, calculation can be made for the loss of limb or health.

Location effects

Local amenity – arising from pollution, traffic congestion, crime rates, access to good schools and facilities – can be measured through the analysis of property prices. To estimate the effects of one type of amenity, such as crime rate, the analysis would need to be multi-variate and involve large amounts of data to enable one effect to be separated from the other. This requires obtaining data from locations with a large variation in the effect under consideration and to be able to control for all the other major characteristics that affect housing prices. The argument is that the difference in average rental (or rental imputed from price) between similar houses, but one group located in a high crime area and the other in a low crime area, represents how much people are willing-to-pay to avoid the negative externality of a greater risk of being the victim of crime; or in other words, how much the difference in crime rate is worth to the people.¹⁵

Life satisfaction

Job, social and family satisfaction are commonly cited benefits from many programs and there is a tradition of measuring changes in satisfaction in questionnaires using ordinal scales such as the Likert scale. While these scales are regarded as acceptable ways to rank, and sometimes compare,¹⁶ levels of satisfaction, they do not easily translate into a pecuniary value.

15 Due to the psychological and pecuniary cost of relocation, only the rents or housing prices of people recently moving in to a neighbourhood should be included. Someone who values a reduction in the crime rate more than the rent differential between neighbourhoods, will not move if the cost of moving exceeds the present value of the net gain.

16 This implies that the scales are cardinal, not just ordinal.