

Demystifying Economic Valuation: Key Paper

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Notes for consultation:

This paper is intended as an introduction for a general audience; a “go to paper”. Consultation comments are requested on whether (i) the key issues are covered and (ii) the level of coverage is appropriate for its purpose.

Electronic copy of the paper can be found here: <http://valuing-nature.net/economics>

Comments should be sent to ece@eftec.co.uk by 4 April 2016.

Why economic valuation?

We live in a world in which resources are limited and choices are inevitable. So it helps to understand the relative values of different choices.

Our existence, health and happiness depend on the natural environment. But when we make choices about how we use it, often we do not consider all of its value. Instead, we tend to focus on the financial gains in the relatively short term.

Economic valuation is one way to, at least partially, redress this imbalance. Economic analysis is not a replacement for social discourse or political process. On the contrary, the best practice should be to use all types of evidence to support better decisions - including different interpretations of ‘value’. This paper is about the economic interpretation of value.

Economics contributes to understanding how we make choices and how they affect human health and happiness – different words like ‘wellbeing’, ‘welfare’ and ‘utility’ are used, but mean broadly the same thing. How we take the natural environment’s contribution to our health and happiness for granted has been a topic in economics for centuries. Petty, Malthus and Marx, to name a few, wrote about the value of nature, between the 17th and 19th centuries.

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² The Valuing Nature Programme is a 5 year £6.5M research programme which aims to improve understanding of the value of nature both in economic and non-economic terms, and improve the use of these valuations in decision making. It funds interdisciplinary research and builds links between researchers and people who make decisions that affect nature in business, policy-making and in practice. See www.valuing-nature.net. Like the VNP this paper focuses mostly on the UK applications / examples, though concepts are universal.

For the natural environment, similarly, there are many terms like ‘environmental resources’, ‘natural resources’, ‘natural capital’ and ‘ecosystem services’³. There will be another VNP paper on these terms. Here we use the term to mean all living and non-living things that make up the environment, above and below ground, and in water and air. These provide numerous benefits to humans and other living beings, both directly and indirectly.

The benefits we receive from the environment come in many forms. Some environmental goods are traded in the market economy. For example, we pay for the food we eat and the materials that give us shelter. But these traded goods exist because of other environmental services, for example pollination by insects, and nutrient cycling by soil organisms. And there is also the clean air we breathe, the clean water in the rivers, lakes and the oceans and the beauty that makes us happy, that fills us with wonder and inspires art, and supports the bonds that keep us together as societies. We do not buy or sell these goods and services, at least not directly, but they are just as important as those that we do and we value them for a variety of reasons.

The natural environment is also valuable beyond our individual relationship with it: ‘intrinsic value’, for example, is the value of things in and of themselves, without human interaction. ‘Value’ has different meanings in different contexts as defined by different discipline

What is economic valuation?

Economic valuation is simply a way to understand how much something is worth to particular people or to society as a whole. The terms ‘economic value’, ‘social value’ and ‘societal value’ are sometimes used interchangeably.

Total Economic Value is a typology developed to characterise why we may value the benefits we receive from the environment. The most obvious reason is that we personally benefit from the multiple uses of the natural environment, directly and indirectly, now and in the future. This is **use value**. We also benefit from knowing that environmental resources we don't think we'll use will still be there if we do in fact need them in future, a bit like an insurance policy. This is **option value**. And we may also value the environment for unselfish reasons, wanting it to be there for the benefit of other people during our lives (**altruistic value**), for future generations (**bequest value**), and for the sake of nature itself independent of human uses of it (**existence value**). The last three ‘components’ are collectively referred to as **non-use value**. The word ‘total’ refers to the sum of changes in use, option and non-use value due to a change in the environment. Changes can be positive or negative.

We express some of these values through our behaviour as consumers when we purchase goods and services of (or including) the natural environment. But the price we pay does not capture all of the value we may hold, and also includes other elements. For example, most prices represent the costs of raw materials, and also labour and capital for producing something. In addition the cost of the environmental damage such as pollution or depletion of natural resources caused during the production is not captured in price.

³ There will be another Valuing Nature Programme paper to clarify these terms.

There are no markets to buy and sell most of the goods and services of the natural environment. In economic terms, the benefits of these non-traded (non-market) goods and services and the costs that are not included in the prices are termed '**externalities**'. They are 'external' in that they do not directly affect profits or welfare of those involved in the market transactions, but they do affect other people. The result? We produce and consume more than we should, had we taken into account the full costs of production, and we leave the natural environment in a more degraded state than it would be had we accounted for its full set of values.

One contribution to solving this problem requires measuring the externalities, and implementing policies to ensure measured externalities are taken into account in decisions. Many such policies already exist and we have done much to reduce environmental damage. There is still a long way to go, however, and measuring externalities and understanding economic values is a vital component of achieving sustainable economies.

How do we estimate economic value?

This paper is about how we estimate economic value in monetary terms. Money is used because it is a familiar, comparable and continuous unit of measurement. Financial gain is also measured in monetary terms. Thus using money makes financial and non-financial benefits of the natural environment directly comparable.

Let's think of a familiar example before continuing with the more technical explanation:

Imagine you regularly go for a walk in your local park to keep mentally and physically healthy. The entrance to the park is free, you don't spend any money to make the trip and you don't make any purchases while out for a walk. So if we look at that type of expenditure data, it looks like the park has no economic value. In fact, local authority accounts enter the value of the parks (as assets) at their nominal value of £1 for this reason. They do show the cost of upkeep based on actual spending. In reality, the value of the park is, of course, much greater than that because many people derive great benefit from using or seeing the park. So if we decide to use economic value evidence to estimate these benefits, how can we go about doing this?

Without the opportunity to exercise in the park, you could become more prone to getting ill, maybe being off work, reducing your economic output. You may have to get medical treatment which would cost you or society. Besides, maybe, you just enjoy walking in the park, seeing the seasons change and watching geese come and go.

The properties near the park fetch just that little bit more in the market when compared to the same properties a few hundred yards away, and that is one way to measure part of the value of the park to people. If we had sufficient health data, we could estimate how many sick days are avoided by all park users because of exercising in the park, and we can estimate the economic value of those days. Alternatively, and assuming that the park will be developed, say for housing, we could ask you how much you would be willing to pay to ensure the park is protected from development.

So there are different ways to estimate the economic value depending on which benefit we want to estimate. Estimates of different benefits can, in general, be added together, but different estimates of the same benefit cannot - that would be doublecounting.

The economic value of a positive change in the natural environment is measured by what individuals are willing to pay to secure it, or what they are willing to accept as compensation to forgo it. The economic value of a negative change, on the other hand, is measured by what individuals are willing to pay to avoid it, or what they are willing to accept as compensation to tolerate it. *The two measures are known as Willingness to Pay (WTP) and Willingness to Accept (WTA) and the payment need not change hands for the purposes of economic analysis.*

The change could be in the quality and/or quantity of the environment or the individuals' access to it. What's important is that the change is measurably linked to the benefit received by individuals (e.g. improved health linked to reduced air pollution) or directly discernible by the individual (e.g. change in the landscape). **This is why economic valuation is, in fact, a three step process.** First, the way a decision will influence the environment needs to be understood (qualitative assessment). Second, the change in the environment and the related benefits need to be expressed using biophysical units (quantitative assessment). Only then can valuation in monetary terms take place. All three steps bring uncertainties and assumptions that need to be acknowledged.

Three types of data are used to quantify monetary value (in terms of WTP and WTA) when undertaking original research: market prices, observing consumer behaviour and individuals' statements of value. *Using estimates from the literature and making the necessary adjustments is called value (or benefit) transfer.*

While some economic valuation methods for original research use market price data, **economic value is not the same as price.** This is because markets (market prices) fail to reflect the value of the natural environment due to externalities, as mentioned above. When there are no markets, the price is zero when the value is not. When there are markets, the price does not capture all components of value. However, it is still useful to use what market data we have.

Observing consumer behaviour in markets in which environmental goods and services are bought and sold.

For example, we can look at how much food, water, timber, fuel, minerals and so on people buy (and at what price) either for direct consumption or to use as input to production. We could observe how this purchase changes in response to changes in the quality and quantity of the resource / service.

Observing consumer behaviour in markets that are related to the environmental resources and services. *These methods are collectively known as revealed preference methods.*

For example, we can observe how much people spend on travelling (in terms of fuel, accommodation, food, entry fees, time and so on) to a remote beautiful landscape for recreation. What they pay in travel cost is at least how much they value the recreational benefit, otherwise they would not make the trip. The data collected on the number of visits and travel costs are analysed to estimate the demand for the recreational benefits of a site. *This method is known as the travel cost method.*

The property market is another example. We can look at how property prices vary with environmental and other factors. If we have data on a sufficiently large number of transactions for properties with a wide range of characteristics, we can calculate the price premium buyers are willing to pay for living in a cleaner area, near a park, with good views, or with a garden, just as we can calculate the premium for an additional bedroom or period features. *This method is known as hedonic property pricing.*

We can also observe what people purchase and how much they spend when they feel the need to compensate for declining benefits from the natural environment. There are many examples of such purchases: for example, if people think the tap water is not clean enough, they may buy filters to install in their home, or they may buy bottled water. Purchases may also be made for multiple reasons, not necessarily associated with the environment - for example, some people simply prefer the taste of bottled water. Such different reasons need to be taken into account when analysing this data, but ultimately, what people spend on such marketed products is an indication of how much they value the natural benefit they no longer have. *This method is known as avertive expenditure or avertive behaviour method.*

Such compensatory behaviour can be seen at organisational scales: for example a local authority may need to build a flood wall because the coastal marshes have been drained for agriculture and can no longer protect the town from coastal flooding. The cost of the wall is a minimum expression of the value of the flood risk reduction service provided by the coastal marshes. *This method is known as replacement cost.* It is only useful if there is widespread agreement that replacement is worthwhile.

Asking people to state their willingness to pay or willingness to accept. These methods are collectively known as stated preference methods.

Through carefully designed questionnaires we can present the choice and the environmental changes to people directly, in the form of a choice about whether or not to pay for some option. Questionnaires explain the option, what impacts it will have on the environment, who is responsible for its implementation and how the flow of money they are being asked to give would be organised. The questionnaires also remind respondents that their budgets are limited and that there are many other things that require their attention and money. A sufficiently large and varied sample of people is surveyed and the data are analysed not only to estimate the economic value but also to explain how it changes due to different environmental, social and individual factors. *These methods are known as stated preference surveys. They could be designed as 'contingent valuation', which asks direct questions, or 'choice modelling', which presents respondents with choices that involve different costs and asks them to choose their favourite. Some surveys have both designs. They can be used for any environmental goods or services and are the only economic valuation method that can estimate non-use values.*

Whose values count?

Everyone, whose welfare is expected to be affected by the change in the environmental resource, should count. This is regardless of whether they are using the resource or paying for it. It also includes both those who gain from the change and those who lose. In most public sector work at the national scale, it's the entire population whose values should count. At the other end of the scale, going back to the example above, it's the people who use the local park (and those who may use it in future, or those who simply like to protect the heritage). The scarcer the resource, and the bigger the change, the more people are likely to be affected and, hence, the more people should count.

How do we use economic values in decision making?

As with any other type of evidence, more and better information about economic values does not necessarily mean more and better decisions. And economic value evidence is only one input to decision making. All other scientific, social, moral and ethical considerations (not in any particular order) must also be considered.

Decision making always involves a trade-off, and hence the relative valuation of the outcome of choices. If the main purpose of valuation is to increase the standing of the benefits of the natural environment against (usually shorter term) financial gain, then the best place to use economic value evidence is in decisions that involve a choice between financial gain (or loss) and environmental damage (or protection). The value evidence is also useful in allocating budgets between different priorities such as prioritisation of conservation expenditures.

Economic value evidence can be used to improve our **understanding of how the natural environment benefits us**, for example, to help set policy and investment priorities. Better understanding of the economic value of the natural environment can also highlight synergies and opportunities where investments in the natural environment can also benefit businesses. This is particularly relevant for natural capital accounting which is becoming more popular, or the large scale exercises like the UK National Ecosystem Assessment (UK NEA) and The Economics of Ecosystems and Biodiversity (TEEB) initiative.

Economic value evidence can be used for **economic appraisal**. It is often used in both the cost and the benefit side of cost benefit analysis. Economic impact (jobs and expenditure) data are also used for appraisal. The value evidence could also be used to make a business case for investments that will generate sufficient economic value, but not necessarily financial return.

Economic value evidence can be used for **capturing some of the value currently ignored by the markets**. For example, the cost of environmental pollution can be used to set the level of pollution taxes.

But economic values vary! And so they should!

The price of manufactured goods and services, labour or commercial land value vary and so do the value of environmental resources. In fact, how economic values vary is just as informative for decision making as the values themselves as they help us understand how we can maintain or increase this value. Economic values vary with the following interrelated reasons (not an exhaustive list):

- **The characteristics of the resource.** What the resource is and where it is affect its value: location is particularly important for use values. Easy access may mean higher values for some resources (like an inner city park) but this does not necessarily mean that inaccessible resources are less valuable – it depends on the resources, its uses and type of value. Different resources are expected to have different values. But it is also the case that the same resource is valued less when it is in a poor condition – as it cannot provide all the services it is capable of providing.
- **Scarcity & substitutability of resource.** Resources have different values depending on whether there are any substitutes (the more scarce a resource (with less substitutes) the higher its value).
- **Direction of change.** Individuals tend to value negative changes more highly than the equivalent amount of positive changes. This is observed in many other fields, and explained by psychology as ‘loss aversion’.
- **The scale of change.** The greater the change, the greater its value.
- **The timing of change.** Changes today are valued more highly than changes next year.
- **Individuals.** People have different values for the same thing – just as they react differently to different prices. Because they have different rights, needs, wants, cultural and individual tastes and

habits, knowledge and experiences that make them value their relationship with the natural environment differently. They also have different incomes that limit their willingness to pay more than their willingness to accept compensation. This is a fact of observing consumer behaviour and expressing value in monetary units. It need not lead to unjust distribution of access to the environment – presenting the value estimates separately for different income groups as well as averages, and weighting the estimates by income, will help decide what other, including distributional, factors should be taken into account.

Tips for presenting / selecting economic value evidence for decision making

This section shares our experience of what works when communicating economic value evidence. It is both for economists presenting the evidence and others trying to select which evidence is appropriate for their analysis.

Be clear about what's included in the economic value estimate and what's not. Reporting the following, as a minimum, will help convey this and explain the variation between different estimates: resource, service, benefit, and change valued; location; the definition and characteristics of the affected population; and valuation method used. It is also important to acknowledge which components of the total economic value are captured in an estimate. It is not necessary to be able to disaggregate the monetary estimate amongst the components but useful to know what's likely to be captured and what's not. Finally, it is important to use other (non-monetary) data to describe / measure what's not included in the monetary estimate so as not to bias the decisions in favour of what's expressed in monetary terms.

Engage with decision makers and stakeholders. Presenting to decision makers and their stakeholders is not about simplifying the complexities; it's about making the evidence relevant to the choices and constraints they are facing. In addition, economic valuation work is not only about the monetary results. Using the qualitative – quantitative – monetary assessment framework for stakeholder engagement has been shown to be useful on its own in moving decisions forward.

Be specific about what types of decisions the economic value evidence can be used for. The context in which valuation took place and the context of the decision need to match. Context is determined by the resource, its quality and the services it provides, whose values are included in the estimate and the change valued. These are also the factors that need to be matched between the studies in the literature and the decision analysed when undertaking value transfer.

Be careful about the language you use both when you undertake the study and when you present the results. Jargon does not add credibility. It alienates. Short cuts could be problematic (e.g. use 'economic value' not 'financial value' unless of course you are talking about financial value). Equally too much information confuses and could bias the findings: relevance to the evidence and audience is key.

Do not aim for a single number that claims to answer all questions. That's a recipe for failure. Be open about uncertainties and assumptions. Use sensitivity analysis to show how sensitive the results are to key factors and assumptions.

Choose the economic valuation method appropriate for the planned use of the value evidence. There are practical factors here like availability and ease of getting the relevant data, budget and timing. In terms of the purpose of valuation, the following considerations could help:

- If you are interested in use values only for a resource that's traded in markets, use the market price. Beware that market prices are distorted by subsidies and taxes which can be adjusted for.
- If you are interested in use values only for a resource that's not traded in markets but likely to influence one that is, use revealed preference methods (travel cost, hedonic pricing and averted behaviour).
- If you are interested in both all components of total economic value and/or measuring the economic value of a change that has not happened before (so no opportunity to observe consumer behaviour), use stated preference methods.

Agree the appropriate level of effort. The cost of economic valuation should be proportional to the magnitude of the environmental change. For large changes that will have long term effects, decisions are likely to need higher certainty, and hence location and resource specific analysis. If the decision can accommodate high degrees of uncertainty and/or if the decision maker is interested in orders of magnitude of economic value, select and adapt estimates from the literature, i.e. use value transfer.

Research all options before concluding economic valuation is not necessary or too expensive. Increasing experience with undertaking valuation exercises and using technology (e.g. online surveys instead of in-person surveys, GIS for local data, valuation tools like InVEST and TIMM) make data collection and analysis easier and cheaper, approaches to valuation once deemed too expensive may no longer be so.

Present economic value evidence as part of the three-stage process that it is, together with qualitative and quantitative assessments of change. Also remember economic value evidence is only one input to decision making.

References

HM Treasury Green Book – for the economic appraisal principles (and using economic value evidence within this context) officially adopted in the UK (2013).

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