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Valuing Environmental Goods and Services: The Past and the Present

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Abstract

Environmental goods and services are non rival and non excludable. People generally free ride and conceal their preferences for such goods and services. Thus there is market failure in case of such commodities. This makes valuation of environmental goods and services difficult. This paper offers a brief description of two main approaches of non-market valuation, revealed and stated preference methodologies to value environmental goods and services. The historiography in development of these two methodologies is discussed. Further, the life satisfaction approach of environment valuation, a relatively newer method of environment valuation, is introduced as an alternative to revealed and stated preference methodologies. The paper concludes that whereas the stated preference methodologies can estimate non-use values, are prone to hypothetical scenario bias. The life satisfaction approach does not use a hypothetical scenario but should be used with caution as it uses subjective measures of happiness/life satisfaction/wellbeing.

Keywords: *Environment, Revealed Preference, Stated Preference, Life Satisfaction, Valuation*

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Introduction

Economic valuation has been traditionally perceived in terms of market prices. Valuation of a good historically meant multiplying price with quantity. Consumers reveal their preferences for market goods directly. When an individual buys bread and pays Rs. 10, the price paid expresses her maximum willingness to pay (WTP). But non-market goods and services are not freely available in the market. Such goods are often non-rival and non-excludable. As a result, consumers do not have the incentive to reveal their WTP for a non-market good. People generally tend to act as a free rider by concealing their preferences for public good in order to enjoy the benefits without paying for them. People behave in a similar manner while treating public 'bad' like environment pollution. This character, thus, leads to market failure. Price and quantity data becomes non-available due to absence of market.

Valuing items that has no market price was thought impossible earlier. The scenario changed when economists tried to use a latent demand curve of such goods and services through other means. The two main approaches to value non-market goods i.e. the revealed preference (RP) and stated preference (SP) method make alternative attempts to obtain a solution. The RP way is to passively observe people taking decisions in real world settings. The WTP for a non-market good can be inferred from information on market transactions for a related private good. The demand for water quality, for example, can be observed from purchase of aqua guards.

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The SP way is to create a hypothetical market and ask people what value they wish to place on a proposed change in an amenity or the maximum amount they would be willing to pay for the same change. In SP, an individual only states how she would behave in a hypothetical situation.

Incidentally, both approaches were first proposed in 1947. In 40's, US Government was thinking of reducing assistance to several sectors due to financial crisis. The Government asked the Director, National Park Service (NPS), to justify financial support that they receive. NPS requested several renowned economists to propose measures to value national parks. Harold Hotelling replied. Hotelling advised NPS on how to measure the economic benefits from the national parks. Hotelling suggested that the number of visits to a park or any other recreational area would vary according to the costs of travel of visitors coming from different places. Thus quantity of visits to the park at a range of prices coming from different distances can be used to estimate a demand curve. The technique proposed by Hotelling attempts to infer from actual actions and came to be known as travel cost method. Another indirect market method, the averting behaviour approach, relies on the fact that some purchased input can be used to avert the effects of pollution. As market goods can be used to compensate the effects of pollution, the value of a marginal change in pollution can be measured by the value of the market goods used to control pollution. Averting behaviour approach can be used to value non-market commodities when market goods can be substituted for pollution. The weak complementarity approach, on the other hand, values changes in environmental quality by making use of the complementarity of environmental quality. A specified improvement in water quality at a lake can be valued by an increase in a household's demand for visits to the lake. The hedonic pricing method, another indirect market method, relies on the notion that price of a good (seen as a bundle of attributes) can be decomposed into the prices of different attributes that make up the good. Difference in the air quality in the neighbourhood region is manifested by a difference in the prices of houses.

Wantrup, also in 1947, published a paper on the economics of soil conservation. Wantrup, never attempted to implement his idea empirically, but suggested that information on demand for non-market goods can be obtained by asking individuals directly about their WTP for successive increments in them. The first application of contingent valuation (CV) was by Davis in 1963. Davis designed and implemented the first CV survey to determine the value to hunters and wilderness lovers of a particular recreational area. Davis compared his CV findings with WTP based on travel cost approach and found that they yield more or less similar result.

CV as a method gained more acceptance and studies were conducted to value non-market goods. In 1986, the Department of Interior (DOI) sanctioned the use of CV technique to measure damages. In March 1989, the supertanker Exxon Valdez spilled 11 million gallons of crude oil onto the Bligh Reef in Prince William Sound, Alaska. The accident raised the demand that Exxon be forced to pay for the lost non-use or existence values in addition to out of pocket losses suffered by fisherman, resort owners, tour operators and others directly and indirectly harmed by the accident according DOI regulations. The oil

spill prompted the Federal Government to promulgate the Oil Pollution Act of 1990. The new law directed the Department of Commerce acting through National Oceanic and Atmospheric Administration (NOAA) to formulate its own regulations governing damage assessment. The General Counsel of NOAA, Thomas Campbell requested Kenneth Arrow and Robert Sollow to chair a panel of experts. The panel was asked to confine its attention solely to the potential reliability of the CV method. The NOAA panel met 8 times between June and November of 1992. The panel submitted its report to NOAA on January 11, 1993. The report was published in the Federal Register on June 15, 1993. The panel concluded, "CV studies can produce estimates reliable enough to be the starting point of a judicial process of damage assessment, including lost passive use values."

Does people respond honestly to a CV query? Seip and Strand (1992) asked respondents about their WTP for membership of a nature protection agency and later asked the same respondents to pay the stated amount. They found significant differences in stated WTP and the actual payment. Griffin et. al.(1995) compared actual behavior of households to obtain a piped water supply connection with WTP of the same respondents recorded earlier. The finding suggests a different view regarding accuracy of CV estimates. They found that the actual behaviour to connect or not to connect was consistent with stated WTP. The general believe is that a suitably developed CV study can estimate WTP for a non-market good correctly.

CV is an improvement over RP techniques as it can estimate non-use values. CV uses a hypothetical scenario and thus responses are prone to strategic bias. A recent approach of environmental valuation rests on observing the impact of a change in the provision of a non-market good or service on happiness/life satisfaction/wellbeing. Apart from socio, economic and demographic factors, environmental conditions affect wellbeing/ happiness. It is expected that respondents staying in areas having high air pollution or poor water quality are expected to express lower happiness/wellbeing. In happiness surveys, people are asked to state their level of happiness/life satisfaction/wellbeing along with their perception about the non-marketed commodities such as water quality, air quality etc. It is also seen that respondents knowingly or unknowingly offer happiness/wellbeing responses that move systematically with the change in the level of provision of the non-market commodity. Using these responses, the trade off between income and the level of the non-market commodity can be estimated. This approach of valuation of a non-market commodity is known as 'The Life Satisfaction Approach of Valuation' and uses two correlations. First the correlation between self-reported happiness and the level of the non-marketed commodity which gives marginal utility of the non-marketed commodity. The second correlation is between self-reported happiness and income from which marginal utility of income can be estimated. These two marginal utilities can be used to obtain the marginal rate of substitution between the non-marketed commodity and income. This yields an approximate marginal monetary valuation of the non-marketed commodity. This approach of valuation to estimate WTP has been widely used in recent years in case of airport noise, green house gas emissions, air pollution, terrorism, weather and climate and by many researchers.

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