

‘A travel cost analysis of the value of Carnarvon Gorge National Park for recreational use’: comment

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Beal (1995) has estimated the consumer surplus for use value of visits to the Carnarvon Gorge National Park at A\$2.4 million per year, or at a capital value of A\$40 million assuming a real rate of discount of 6 per cent per year. The purpose of this article is to point out that there are two sources of error which make this estimate at least four times too large.

The first and most significant error in Beal (1995) is made in the last stage of the calculations. On p. 302 the inverse demand equations for camper and non-camper visitors are given as:

$$P = 62.53 - 0.004 Q \quad (\text{camping}) \quad (1)$$

$$P = 95.28 - 0.04 Q \quad (\text{non-camping}) \quad (2)$$

where P is entry price per person, and Q is number of visits demanded. Beal continues (p. 302):

These equations have been estimated in terms of visitors undertaking four-day trips.

If the unit in which output is measured is changed to day equivalents so that demand may be understood in terms of the more familiar camper-nights or day entries, the demand curves shift iso-elastically and the equations become:

$$P = 62.53 - 0.001 Q \quad (3)$$

$$P = 95.28 - 0.01 Q \quad (4)$$

Equations 3 and 4 have been derived from equations 1 and 2 by dividing the slope coefficient by 4. They yield an in-perpetuity consumer surplus of visitors to the park of A\$40 million for $P = 0$. However, the daily willingness to pay for entry over a four-day period is presumably one quarter the

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willingness to pay for the full four-day period. This is not a study in which the time spent at the recreation site varies by visitor. In deriving equations 1 and 2 all visits (camping and non-camping) are taken to be for four days. Each visit therefore yields the individual visitor the same facilities and services. After changing the units of the total duration of the number of visits to the park from four-day periods (total duration = Q) to days (total duration = q), not only is the quantity intercept numerically four times larger (as in equations 3 and 4), but the vertical intercept is four times smaller. The area of consumer surplus is unchanged, but the slope coefficient is one sixteenth of its former value. Equations 1 and 2 after correct transformation for the change in total duration units¹ become:

$$P = 15.63 - 0.00025 q \quad (\text{camping}) \quad (5)$$

$$P = 23.82 - 0.0025 q \quad (\text{non-camping}) \quad (6)$$

There is no difference between the consumer surplus calculated from correctly computed demand equations for four-day visits and for daily visits. Both sets of equations give the in-perpetuity consumer surplus of visitors to the park as A\$10 million, not the A\$40 million claimed by Beal. The following advice in the Conclusion should be disregarded:

The estimation of consumer surplus will be affected by the units in which output is measured and the demand curves expressed. It is incumbent upon the researcher to determine the unit of output most appropriate to the purpose of the study.

Another source of overestimation arises from the way multiple destination visits were dealt with, though the overestimation is of a much lower order of magnitude. In response to a question on the mail questionnaire about the reason for making the trip to Carnarvon Gorge National Park, most respondents either answered that the visit to the park was the chief reason for the trip, or answered that the visit to the park ranked equally with other destinations visited on the trip. For visitors from the more distant zones 5 to 12, more than 50 per cent ranked the park as equally important as other destinations. Beal (1995, p. 297) states that: 'A respondent's nomination of Carnarvon Gorge as equally important implies no lesser value being placed on the site by these visitors over the value placed on it by visitors for whom visiting it was the prime reason for their trips.' She goes on to suggest that any adjustments to the travel cost of those giving the equally important answer may be wrong in principle, and anyway would be arbitrary.

¹ I am grateful to the editors for a technical correction to an earlier draft and for suggesting the presentation of these equations.

However, to make no adjustment is also arbitrary, and risks overestimating consumer surplus for the park. As an analogy, if a diner in a restaurant selects a \$20 meal consisting of a main course and a dessert, and rates both courses as equally appetising, it does not follow that the diner's willingness to pay for either the main course or the dessert on their own must be greater than \$20. By way of sensitivity analysis, it would have been worth presenting consumer surplus for demand schedules calculated (admittedly somewhat arbitrarily) with travel costs to the park equal to an n -th of the trip cost for those respondents with n destinations which they rated as equally important.

Reference

- Beal, D. J. 1995, 'A travel cost analysis of the value of Carnarvon Gorge National Park for recreational use', *Review of Marketing and Agricultural Economics*, vol. 63, no. 2, pp. 292–303.