Valuing the Recreation Outings of Children[1]

by

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Occasionally, an analyst in a benefit-cost analysis or a natural resource damage assessment will have historical data on the number of people using a recreation area. In order to develop an aggregate welfare estimate for an increase or reduction in the use of the area resulting from some proposed or actual change in the site, the analyst needs a welfare measure per person.[4] At many sites a substantial proportion of the recreators will be children (e.g., people less than 13 years of age).[5] This leads to the need for an appropriate welfare measure per recreation outing for children. We explore the value of recreation outings for children in this paper.

The remainder of this paper is divided into four sections. The first section examines the prospects for directly valuing the recreation outings of children. The second section focuses on alternatives for indirectly valuing the recreation outings of children. The third section presents the appropriate aggregate welfare measures including the recreation outings of children. Finally, the last section discusses the implications of our findings for future research. The paper ends with references and a short appendix.

Directly Valuing the Recreation Outings of Children

In general, consumer surplus is the appropriate welfare measure for recreation outings at public sites. Consumer surplus represents the difference between the

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[4] At sites having a wide diversity of recreation activities, per-person welfare measures may be needed for each of the main recreation activities (e.g., surfing, picnicking, fishing, jogging, etc.).

[5] We discuss the definition of "children" later in the paper.

maximum amount that recreators are willing to pay to use a particular site and the amount that they actually pay to use that site. Conceptually, consumer surplus for recreation activities at a particular site depends on factors such as:

- Site attributes (e.g., fishing pier, sandy beach, parking availability, water quality, availability of restrooms, boat ramp, ball fields, etc.),
- Tastes and preferences of the recreators for various recreation activities and site attributes,
- Income of recreators,
- Number and attributes of substitute sites, and
- Cost of using the site and its substitutes, usually including both out-of-pocket costs as well as the opportunity cost of recreators' travel time.

It is unlikely that the concept of consumer surplus applies to the recreation outings of children, even though children generally enjoy recreation outings, thereby obtaining "value" from those outings. Young children do not have the cognitive abilities demanded by welfare theory, such as transitivity of preferences and consumer sovereignty (Dockins et al., 2002; Petrou, 2003). Children typically do not have an ability to pay or discretion over how household resources (time and money) are allocated among daily activities. Furthermore, they are unlikely to fully grasp the concept of substitution, either geographically or temporally. Tradeoffs between recreation activities, site attributes, and money may not be understood or play a role in children's recreation behavior.

Even if the concept of consumer surplus applies to the recreation outings of children, the two primary non-market valuation approaches for measuring consumer surplus (i.e., revealed-preference and stated-preference approaches) are not useful for directly measuring the value of children's recreation outings. Both measurement approaches use information obtained from surveys of recreators. Children are not surveyed for these measurement approaches for a variety of reasons. For example, children are not surveyed for revealed-preference approaches because:

- Children cannot select and travel to recreation sites on their own; they must be taken to the sites by an adult.
- Children don't face a work/leisure trade-off; outside of school commitments, they face a leisure/leisure tradeoff.
- Children don't incur out-of-pocket expenses for recreation activities.

- Travel time may be pleasurable for children (e.g., playing computer games or watching a DVD while a passenger in a car).

Children are not surveyed for stated preference approaches because the valuation or referendum scenario in a contingent valuation (CV) survey will not be understood and/or reliably answered by children. Many of the characteristics of respondents that typically explain variations in willingness to pay in a CV survey (e.g., income, membership in environmental organizations, and education) will not apply to children. Similarly, children will not be able to reliably tradeoff site attributes and money in conjoint scenarios or other choice-based valuation approaches.

In summary, the discussion above leads to the following proposition:

Proposition 1: Traditional non-market valuation approaches are not appropriate for directly estimating the value of recreation outings by children.

Thus, an indirect approach is need to estimate the value of recreation outings by children (hereafter, $Children).

Indirectly Valuing the Recreation Outings of Children

It is likely that most parents consider the tastes and preferences of their children when choosing a recreation site for an outing involving the children. In fact, many parents may choose a recreation site primarily because their children enjoy outings to the site (i.e., recreation decisions involving children are endogenous to family structure). Such parental altruism is especially likely for sites having amenities that are oriented toward children (such as playground equipment) or other attributes that are enjoyed by children (such as a sandy beach).[6] In these instances the value per outing for parents includes an implicit value for the recreation activities of their children. This brings us to our second proposition:

[6] See Dickie and Gerking (2007), Quiggin (1998), Strand (2007), and Teal and Loomis (2000) for more discussion of parental altruism.

Proposition 2: If the value per outing for parents ($Parents) <u>includes</u> an implicit value for the recreation activities of their children, then an indirect measure of $Children would be $Parents minus $Non-parents.[7]

We only found three studies in the economics literature that have empirically tested for differences between $Parents and $Non-parents. Teal and Loomis (2000) conducted a CV survey by telephone of San Joaquin Valley (California) residents, eliciting their value for programs to:

- Increase wetlands,
- Reduce wildlife contamination, and
- Increase salmon populations.

Parental status (i.e., parents versus non-parents) was not a significant determinant of willingness to pay (WTP) for any of the three programs, other things being equal.

DuPont (2004) implemented a CV survey by mail of residents of the Hamilton Harbor watershed in Ontario, Canada. The respondents were asked to value Harbor programs intended to produce specific improvements to swimming, recreational fishing, and recreational boating. DuPont found that parents had a statistically significant higher WTP for improvements in swimming than non-parents, but there was no difference in WTP for improvements in fishing or boating. DuPont hypothesized that the greater water contact associated with swimming, compared to fishing and boating, led parents to value improvements in swimming more than non-parents.

Hilger and Hanemann (2008) had an extensive panel data set of recreational beach trips by 595 respondents to 51 beaches in southern California. They investigated the WTP of the respondents for improvements in water quality using the data set. The coefficient on the parameter for the presence of children on a trip was either negative or insignificant for three basic models. An interaction term for the presence of children and getting in the water produced a significant negative coefficient for all three models. These results indicate that recreators who were accompanied by children were willing to pay <u>less</u> for water quality improvements than recreators who had no children in their

[7] Another indirect measure of $Children would be ($Households With Children — $Households Without Children). For simplicity, we focus on ($Parents — $Non-parents) in this paper. However, similar conclusions would apply to $Household measures.

party. Hilger and Hanemann concluded that further research was needed on this unexpected result.

In summary, the literature comparing $Parents and $Non-parents is very thin. Furthermore, the results from the three studies comparing $Parents and $Non-parents were inconclusive. Therefore, another indirect approach may be needed to value the recreation outings of children.

Most previous studies of recreation sites and activities develop a value per recreation outing for the surveyed recreators, who are all adults, without obtaining information on their parental status. However, the surveyed recreators at most sites and for most activities will include both parents and non-parents. Therefore, the value per recreation outing for adults ($Adults) will be a function of $Parents and $Non-parents. This leads to our third proposition

Proposition 3: If $Parents <u>includes</u> an implicit value for the recreation activities of their children <u>and</u> $Adults is a proportion of both $Parents & $Non-parents, then $Adults will be greater than $Children at most recreation sites.

From Proposition 2 we have

(1) $Parents **–** $Non-parents **=** $Children

In order for $Children to be positive,

(2) $Parents **>** $Non-parents

Assuming that both parents and non-parents recreate at a particular site, then we can define $Adults with the following equation:

(3) $Adults **=** (θ • $Parents) **+** [(1 – θ) • $Non-parents]

where θ is the number of parents who use the recreation site relative to the total number of adults (parents and non-parents) who use the site. So, θ will be a fraction between 0 and 1. Given the relationship in Equation 2, we can re-write Equation 3 as

(4) $Adults **>** (θ • $Non-parents) **+** [(1 – θ) • $Non-parents] **=** $Non-parents

This leads to:

(5) $Parents **>** $Adults **>** $Non-parents

Equation 5 is consistent with $Adults being a weighted average of $Parents and $Non-parents, as previously defined.

It is clear from Equation 5 that if $Non-parents is greater than $Children, then $Adults must be greater than $Children. At recreation sites that are primarily children oriented (e.g., sites with playground equipment and other facilities mainly used by children), it is possible that $Children will be greater than $Non-parents. Even at those sites, $Adults will be greater than $Children when the following condition holds:[8]

(6) $\theta > (\$Children - \$Non\text{-}parents) / \$Children$

At children-oriented sites, θ is likely to be close to 1 (i.e., almost all of the adults going to the site will be parents bringing their children), which means that Equation 6 is likely to be true, leading to $Adults being greater than $Children.

In summary, if $Parents includes an implicit value for the recreation outings of their children, then $Adults will exceed $Children at most recreation sites. As we discuss in the next section of this paper, this offers the prospect of using a fraction of $Adults as a proxy for $Children.

If $Parents excludes an implicit value for the recreation outings of their children, then we offer the following proposition:

Proposition 4: If $Parents excludes an implicit value for the recreation activities of their children, then an indirect valuation for $Children does not exist.

As discussed in the next section of this paper, Proposition 4 leads to a dilemma when estimating aggregate welfare changes at recreation sites where some of the recreators are children. Also, a "philosophical" question may arise in this situation. Namely, if parents do not implicitly value the recreation outings of their children, then should an analyst assign a value to the recreation outings of those children in a benefit-cost analysis or a natural resource damage (NRD) assessment? We do not attempt to answer this question in this paper.

[8] We provide the derivation of Equation 6 in the Appendix to this paper.

Aggregate Welfare Measures Including the Recreation Outings of Children

In a benefit-cost context analysts will want to estimate the aggregate welfare change for either an improvement in the recreation site (e.g., a water quality improvement) or a decrement in the recreation site (e.g., the closure of a recreation area on a reservoir). In an NRD assessment the analyst will want an estimate of the aggregate welfare loss from a site closure or a deterioration in a site attribute (e.g., the imposition of a fish-consumption advisory resulting from the release of a hazardous substance). Consistent with the propositions in the previous section of this paper, the appropriate aggregate welfare measure depends on whether $Parents includes or excludes an implicit value for the recreation activities of their children. The former alternative leads to the following proposition:

Proposition 5: If $Parents <u>includes</u> an implicit value for the recreation activities of the children, then the appropriate aggregate welfare measure is #Adults times $Adults.

Most recreation sites are used by both parents and non-parents, which means that

$$(7) \quad \#Adults = \#Parents + \#Non\text{-}parents$$

As noted in the previous section of this paper,

$$(8) \quad \begin{cases} \theta = \#Parents \,/\, \#Adults \\ (1-\theta) = \#Non\text{-}parents \,/\, \#Adults \end{cases}$$

Using Equation 8 we can substitute for θ and (1- θ) in Equation 3, which leads to:

$$(9) \quad \$Adults = [(\#Parents \,/\, \#Adults) \bullet (\$Parents)] + [(\#Non\text{-}parents \,/\, \#Adults) \bullet (\$Non\text{-}parents)]$$

Multiplying both sides of Equation 9 by #Adults leads to

$$(10) \quad \$Adults \bullet \#Adults = [(\$Parents \bullet \#Parents)] + [(\$Non\text{-}parents \bullet \#Non\text{-}parents)]$$

The left side of Equation 10 is the appropriate welfare measure because it includes the welfare of parents, their children, and non-parents. Essentially, the utility obtained by children from their recreation activity is captured in the $Parents component of $Adults.

We must note that in a benefits-transfer application, adjustments may have to be made for differences in the mix of #Parents and #Non-parents at the study site versus the target site, since $Adults is a weighted average of $Parents and $Non-parents.[9]

In the event that $Parents excludes an implicit value for the recreation outings of their children, then the following proposition applies:

Proposition 6: If $Parents excludes an implicit value for the recreation activities of the children, then the appropriate aggregate welfare measure is [(#Adults • $Adults) + (#Children • $Children)]

As indicated in Proposition 4, if $Parents excludes an implicit value for the recreation activities of their children, then an indirect value for $Children does not exist. Consequently, a proxy may be needed for $Children in this situation. Proposition 3 indicates that $Children will be a fraction of $Adults in most situations. However, that result was derived when $Parents includes an implicit value for the recreation outings of their children, which is contrary to the situation associated with Proposition 6. Nevertheless, a fraction of $Adults might be more appropriate than excluding a value for the recreation outings of children, if $Parents excludes an implicit value for their children's outings.

Implications of Findings for Future Research

The findings above have several implications for future research. Analysts need to determine if parents' values for recreation outings at a site include an implicit value for the recreation outings of their children. If they do, then a separate per-outing value for children is not needed – an average value for the adults using the site applied to the number of adults using the site will yield the appropriate aggregate welfare measure. The implication is that recreation surveys supporting both stated preference and revealed preference valuation approaches need to get information on parental status, the composition of recreation parties (especially whether the children of parents are in the party), and household income. In a benefit transfer context, this further requires that

[9] Given that the relative proportions of parents and non-parents in the adult population surveyed at a recreation site is either unknown or not reported in primary valuation studies, an assessment of the relative proportions may need to be conducted at the site under consideration for a benefit transfer. However, this would still beg the question about the relative mix of parents and non-parents in the primary study being transferred.

the relative mix of parents and non-parents would be another factor in choosing primary studies that correspond to the transfer or policy site. Additionally, the wording of the valuation scenario in stated-preference surveys would need to make it very clear to respondents that they are being asked to provide a value for the entire household (including their children), not just themselves.[10]

Of course, applying an average value for adult recreators to the number of adults using a site requires a definition of "adult." For sites where most recreators arrive and depart by car or truck, then the driving age in the state (usually 16 years of age) could be an appropriate cutoff for "adults," which means that children would be recreators who are less than 16 years of age. Since some teenagers below 16 years of age may have their own discretionary income from an allowance or part-time job (e.g., mowing lawns or babysitting) and possibly the ability to use a bicycle or public transportation to go to recreation sites, analysts may choose to define "adults" as people at least 13 years of age. We have difficulty thinking of anyone under the age of 13 as an "adult." These recreators are unlikely to have discretionary income for recreation activities. Perhaps more importantly, they are unlikely to have the ability to independently choose and then travel to recreation sites. It is quite possible that their parents would not allow them to do so for safety reasons even if a child was able to go to a recreation site on their own.

If an analyst determines that parents' values for recreation outings exclude an implicit value for the recreation outings of their children, then the analyst may need to develop an approach for estimating a separate value for children's outings in order to have a complete aggregate welfare measure.[11] Based on our analysis, some fraction of the average adult value may be an appropriate proxy for the average value of children's

[10] Recently some analysts have expressed concern about how individuals are responding to stated preference valuation questions, namely whether individuals are expressing their own values or values for their household (Bateman and Munro, 2009; Lindhjem and Navrud, 2009). Lindhjem and Navrud (2009) find that expressions of individual and household willingness to pay are not statistically different across samples when queued for the unit of valuation, but that expressions of household value are higher than expressions of individual values within a sample, especially when household expressions of value are asked after individual expressions of value.

[11] Some models show promise for estimating consumer surplus values for children. For example, Dickie and Gerking (2007) develop a consensus model of family behavior and apply this model to conducting benefit transfers of adult values to children values for health risk reductions (Dickie and Gerking, 2009). Other candidate models may include Strand's (2007) model of intrahousehold bargaining and Dockins et al.'s (2002) intrahousehold allocation model. However, each of these models is a departure from the traditional non-market valuation techniques applied in valuing recreation outings and they may not be consistent with traditional economic theory in that the child is not treated as a decision maker.

outings in these situations, but the basis for determining the fraction is not clear. Additional research would be needed on a conceptual and empirical approach to estimating the fraction to apply to the average adult value, when parents' values exclude an implicit value for their children's outings.

If an analyst needs a value for children's outings, then an issue may arise with respect to the appropriate treatment of the outings of very young children (e.g., infants). If children are so young that they do not actually participate in recreation activities (e.g., they always are held by an adult or pushed in a stroller) and/or they are not old enough to be aware that they are at a recreation site, then they probably should not be included in aggregate welfare measures. These children are not experiencing any utility from their visit to the recreation site relative to being elsewhere. As a practical guide, very young children who are only carried or pushed in a stroller for the entirety of their visit to a recreation area might be excluded from aggregate welfare measures.

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Appendix: Derivation of Equation 6

In Equation 3 in the body of this paper we define $Adults as:

$$\$Adults = (\theta \bullet \$Parents) + [(1 - \theta) \bullet \$Non\text{-}parents]$$

If $Adults > $Children, then

$$(\theta \bullet \$Parents) + [(1 - \theta) \bullet \$Non\text{-}parents] > \$Children$$

By subtracting $Non-parents from both sides of the inequality, we obtain:

$$\theta \bullet (\$Parents - \$Non\text{-}parents) > (\$Children - \$Non\text{-}parents)$$

Since ($Parents – $Non-parents) equals $Children, the inequality simplifies to:

$$\theta \bullet \$Children > (\$Children - \$Non\text{-}parents)$$

Dividing both sides of this inequality by $Children yields Equation 6 in the body of this paper, namely:

$$\theta > (\$Children - \$Non\text{-}parents) / \$Children$$