

MEASURING USERS' RESPONSE TO HIGHER RECREATION FEES

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may force low-income users to decrease their recreation participation proportionally more than high-income users. Some low-income users may stop using the facilities altogether, thereby eliminating them from the user population (Dustin 1986). On the other hand, higher fees may not have a differential impact on current users with different income levels (Cordell 1985). That is, low income users may decrease their use of the facilities in the same proportion as by high-income users, thereby suggesting that the higher fees do not have a differential impact on campers with different income levels. Clearly, the potential for differential impacts of higher fees across user groups with different income levels is of concern to recreation managers and to economists as fee increases are considered. Decisions regarding future fee levels for recreation facilities should be made with the knowledge of how the higher fees will affect different segments of the user public.

Although the literature suggests that the potential differential impact associated with fee increases is an important factor that should be considered when contemplating higher fees, we are not aware of any studies designed specifically to empirically determine whether such a differential impact exists. In fact, no conceptual framework for measuring the differential impact has been presented in the literature.

The purpose of this paper is to present a conceptual framework that can be used to test for the existence of a differential impact across income groups as fees are increased. Although no empirical results are presented, we are currently in the process of testing the framework using data obtained from campers who camped in Maine state park campgrounds during 1984.

In the next section, we present the theoretical model developed to determine whether higher fees have a differential impact on users with different income levels. We also present a discussion of a procedure that can be used to empirically estimate the theoretical model.

Theoretical Framework

The theoretical framework is based on neoclassical demand theory. For the purpose of illustration assume that the recreational activity under study is camping at state parks. Then, the consumer's utility function can be represented by:

$$U = f(C, Y)$$

where C represents the number of nights camped at state parks during the year and Y is a composite commodity representing all other goods the consumer could purchase. The objective of the consumer is to maximize utility subject to her budget constraint which is depicted as:

$$I = P_C C + P_Y Y$$

where I represents the consumer's income, P_C is the "price" of camping or the per night campsite fee and P_Y is the price of the composite good.

The constrained optimization problem of the consumer can be stated mathematically using the Lagrangian function:

$$\text{Maximize: } L = f(C, Y) + \lambda(I - P_C C - P_Y Y)$$

where λ is the lagrangian multiplier. Solving the first-order conditions for utility maximization simultaneously, one can derive the consumer's demand equation (C^*) for camping at the state park campgrounds. In implicit form, the demand for camping will depend on the income of the consumer, the campsite fee and the price of the composite good Y :

$$(C^* = f(P_C, P_Y, I).$$

One of the arguments against higher fees at publicly-provided recreational facilities is that higher fees may force low-income users to reduce their use of facilities more than high-income users, or force them to stop using the facilities altogether if they cannot afford the higher fee. Measuring the impact of higher fees on current users with different income levels is an important factor to consider when contemplating fee increases. In this paper we develop a conceptual framework that can be used to determine whether higher fees have a differential impact on current users with different income levels.

Introduction

Few topics have received more attention during the last 25 years in the field of recreation economics than recreation user fees. In 1966, Clawson and Knetsch advocated greater use of fees for resource-based recreation facilities provided by the public sector. Since 1966, numerous articles have been written on the subject, describing both the advantages and disadvantages of fees for publicly-provided recreation (for example, see Harris and Driver 1987, Manning and Baker 1981, Manning et al. 1988, and Cockrell and Wellman 1985). The Reagan administration's effort to expand the use of fees at federal recreation areas during the 1980s motivated a renewed interest in the question of fees for recreation. In general, the new "federalism" of the 1980s and the large federal budget deficits both focused attention on fee levels at federal recreational facilities.

Currently, many state governments have fallen on hard fiscal times. The growth of state government that occurred in the 1980s outstripped state governments' ability to collect sufficient revenues to finance its activities now that the economy has entered a recession. In response to the fiscal problems, some states have implemented or are considering the implementation of higher fees at state parks during these tight fiscal times. Consequently, state legislators and recreation professionals are again asking themselves what is a reasonable fee to charge for state-provided recreation facilities.

One of the important issues surrounding the implementation of higher user fees at publicly-provided recreation facilities is that higher fees may affect current users with different income levels in different ways. For example, the higher fees for recreation

Once the demand curve for state park camping is obtained, it can be used to investigate the potential effects associated with changes in the fee level. The approach developed below focuses on two aspects of the demand curve. First, we are interested in how camping participation is affected by the income level of campers while holding all other factors constant. That is, we want to determine whether the number of nights of camping increases or decreases as income increases. This "income effect" is determined by taking the partial derivative of the demand equation with respect to income ($\partial C^* / \partial I$). If the partial derivative is positive, then we can conclude that camping at state park campgrounds is a normal good, and that the Engel curve for camping has a positive slope. That is, an increase in the income of the consumer will result in an increase in the number of nights camped at a constant fee level. Similarly, a positive income effect suggests that the demand curve of a high-income camper will lie above and to the right of the demand curve of a camper with a lower income, other things being equal. This situation is illustrated in Figure 1, where D_L and D_H represent the demand curves of a low-income and high-income camper, respectively.

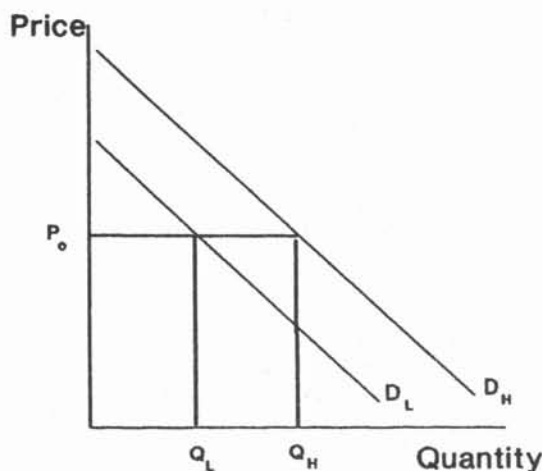


Figure 1. The relationship between the demand curves of high and low-income campers when the income effect is positive.

On the other hand, if $\partial C^* / \partial I$ is negative, then camping at state parks is an inferior good and the Engel curve for camping has a negative slope. In other words, at a given fee level, campers will camp fewer nights as their income increases. The negative income effect also signifies that the demand curve of the low-income camper will lie above and to the right of the demand curve of a high-income camper, other things being equal. This situation is illustrated in Figure 2.

Measuring the income effect associated with camping is important when considering differential impacts because differences in the number of nights camped by different campers can be caused in part by differences in the income of the campers. In other words, the income effect determines the relative position of the demand curves of campers with different income levels. If the income effect is positive, the demand curve for people with high incomes will lie above and to the right of the demand curve for low-income campers, other things being equal. Conversely, if the income effect is negative, the

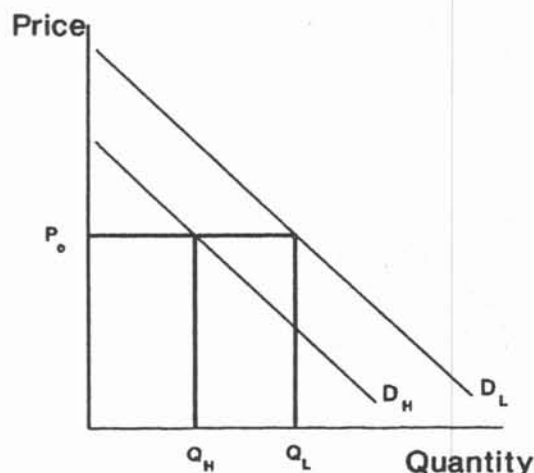


Figure 2. The relationship between the demand curves of high and low-income campers when the income effect is negative.

demand curve of low-income campers will lie above and to the right of the demand curve of campers with higher incomes, other things being equal.

The second aspect of the demand curve that is important when measuring the effects of higher fees is the "own-price effect". The own-price effect is measured by taking the partial derivative of the demand function with respect to the camping fee: ($\partial C^* / \partial P_C$). The own-price effect is the inverse of the slope of the demand curve. We know that $\partial C^* / \partial P_C$ is negative since demand curves are almost always downward sloping. However, the magnitude of the own-price effect may differ for people with different levels of income, which means that their demand curves will have different slopes. In fact, if higher fees have a differential impact across income groups the demand curves of campers with different incomes must have different slopes. Specifically, the demand curve for high income campers should be more inelastic (have a steeper slope) than the demand curve for low-income campers. This situation is shown in Figure 3. The steeper demand curve for high-income campers indicates that changes in their camping activities are less responsive to a change in camping fees than are the camping activities of low-income campers who have a flatter demand curve. For example, if the camping fee increases from P_0 to P_1 as illustrated in the Figure, the camping activity of the high-income camper will decrease from Q_0 to Q_H , while the camping activity of the low-income camper will decrease from Q_0 to Q_L . Clearly, the fee increase causes a greater reduction in the camping activity of the low-income camper than the high-income camper. This type of differential effect would represent an adverse differential impact across income groups in that low-income campers would reduce their camping activity more than high-income camper and may stop camping at the facility altogether.

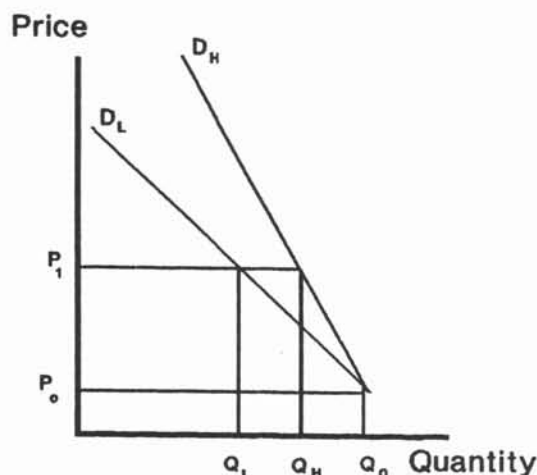


Figure 3. Demand curves illustrating differential impact on campers with different levels of income as fees are increased.

Empirical Considerations

An empirical test of the existence of differential impacts can be performed by estimating a demand curve for the recreation facility that includes an interaction term between the fee level and income. Assume that the following demand curve is estimated:

$$C^* = b_0 + b_1 P_C + b_2 I + b_3 (I * P_C)$$

$$\text{Where } b_0 - 0$$

$$b_1 < 0$$

$$b_2 - 0$$

$$b_3 - 0$$

Given this specification, the income effect defined above is:

$$\delta C^* / \delta I = b_2 + b_3 P_C$$

Clearly, if b_2 and b_3 are both statistically significant and positive, then the income effect is positive and the demand curve of high-income campers will lie above and to the right of the demand curve of low-income campers, *ceteris paribus*. Similarly, if b_2 and b_3 are both statistically significant and negative, then the income effect is negative and the demand curve of low-income campers will lie above and to the right of the demand curve of high-income campers. If b_2 and b_3 are both significant but have different signs, the income effect will be positive for some fee levels and negative for other fee levels. Finally, if both b_2 and b_3 are both statistically insignificant, the income effect is zero and the demand curves of the low and high-income campers would be the same, other things being equal.

The own-price effect for the demand function with an interaction term between price and income is:

$$\delta C^* / \delta P_C = b_1 + b_3 I$$

As noted above, b_1 is negative; however, the magnitude of the own-price effect also depends on the sign and magnitude of b_3 . If b_3 is positive, then the own-price effect will become smaller as income increases. That is, the reduction in camping activity associated with an increase in camping fees will be smaller for high-income campers than for low-income campers. Since this corresponds to the adverse differential impact described above, the adverse differential impact exists if the estimated coefficient b_3 is positive in the estimated demand equation.

If b_3 is negative and statistically significant, the own-price effect will be larger for high-income campers than for low-income campers. That is, high-income campers decrease their camping activity more than low-income campers in response to a fee increase, other things being equal. Although this would also represent a differential impact, it is not considered to be an adverse impact since high-income campers' greater response to higher fees does not reflect an inability to pay the higher fee. Finally, if b_3 is not statistically different from zero, the own-price effect is the same over all campers, regardless of their income level, and no differential impact exists across income groups.

The theoretical and empirical framework outlined above can be tested by estimating the demand curve for a recreational activity that includes an interaction term between income and the campsite fee. The interaction term is required to allow the income effect to vary with the fee level. It is also required to allow the own-price effect to vary with the income level of campers. Since the differential impact across income groups implies that the own-price effect associated with higher fees must differ for campers with different levels of income, the interaction term must be included in the demand equation.

Preliminary empirical work has been completed using the procedures outlined above. Data from people who camped in Maine state parks campgrounds during 1984 are being used to estimate both resident and nonresident demand curves for Maine state park camping. The preliminary work suggests that a differential impact may, in fact, exist as camping fees are increased. However, additional work must be performed before these results are presented.

Summary and Conclusions

The purpose of this paper was to develop a theoretical framework and empirical procedure that could be used to determine whether higher fees at recreational facilities create differential impacts across income groups of current users. The procedure developed focuses on measuring the income effect and own-price effect derived from the estimated demand curve for the facility. Since a differential impact across income groups implies that the slopes of the demand curves of high and low-income users must be unequal, an interaction term between income and the campsite fee must be included in the estimated demand equation. Adverse differential impacts exist if the coefficient on the interaction term is positive and statistically significant.

Preliminary estimates using data obtained from Maine state park campers suggest that adverse differential impacts may, in fact, exist at higher camping fees. However additional empirical work is required before the results are presented.

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