74-23,711

ANDERSON, Robert A., 1941-
THE VALUE OF TIME AND THE DEMAND FOR OUTDOOR RECREATION.

The City University of New York, Ph.D., 1974
Economics, general

University Microfilms, A XEROX Company, Ann Arbor, Michigan

THE VALUE OF TIME AND THE DEMAND FOR OUTDOOR RECREATION

by

Robert A. Anderson

A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1974

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

June 17, 1974
date

Victor R. Fuchs
Chairman of Examining Committee

June 17/74
date

Donald F. Gordon
Executive Officer

Victor R. Fuchs

James Smith

Robert Willis
Supervisory Committee

The City University of New York

ABSTRACT

THE VALUE OF TIME AND THE
DEMAND FOR OUTDOOR RECREATION

by

Robert A. Anderson

Adviser: Victor R. Fuchs

This study applies the new theory of consumer economics formulated by Gary S. Becker and Jacob Mincer to the market for outdoor recreation services. According to this theory, time and goods are combined in consumer production functions to produce "commodities" which yield utility directly. Because time is limited, relative to its possible uses, the time taken to produce commodities is an element in the total prices of those commodities. The value placed on time, and thus the prices paid for commodities, varies across individuals and across time periods.

Large amounts of time are used by households to provide themselves with outdoor recreation services. Time is involved in preparation for, travel to and from, and actual participation in outdoor recreation. Low entrance fees and other "goods" costs for many forms of outdoor recreation, especially at public

facilities, should increase the relative importance of time costs in outdoor recreation consumption decisions. Yet recreation demand studies consistently ignore these consumer borne costs. For example, benefit-cost studies for outdoor recreation facilities do not place a value on travel time saved and thus tend to overvalue more remote facilities relative to market oriented facilities.

According to the new theory time value will not vary randomly across individuals but will be positively related to the wage rate, and thus to income. As a result, ignoring time price effects will lead not only to distortions in measured price effects, but also to distortions in measured income effects since higher income people will face higher total prices for the time using commodities that they consume. More time intensive commodities like outdoor recreation will be relatively more expensive than other commodities to high income people. As a result there will be an inducement for these people to choose less time intensive commodities or processes of providing themselves with these commodities.

The empirical analysis, based principally on two New York home interview surveys, yields abundant evidence that time costs are an important element in many aspects of outdoor recreation consumption decisions. But the wage effect is found to be the opposite of that expected based purely on the time value theory. A third consumer cost element not introduced in the initial analysis, the disutility of effort, is felt to be the cause of this finding. Outdoor recreation is felt to make relatively larger effort demands on consumers than many of its substitute commodoties (especially other leisure time

activities), reducing its time intensity relative to them and reversing time price effects. Tests run on the available data tend to support this contention.

The combined influence of the presence of time and disutility components in the total prices of outdoor recreation commodities is to reduce the effect of money price changes and to undervalue the net benefits and costs of outdoor recreation. Consumer costs are most seriously undervalued, and net benefits overvalued, for more remote recreational facilities, according to the analysis in this study.

ACKNOWLEDGMENTS

I have been helped by many people in the course of this study. To them I hold a gratitude far greater than I can express here.

I am especially grateful to Professor Victor R. Fuchs for establishing the point of departure for this study. Beyond this he provided much useful advice and needed encouragement. I am also grateful to the other members of my committee for their careful review and numerous suggestions, many of which helped me to get out of one blind alley or another. Professor James Smith gave me special help with the mathematical and theoretical formulation and Professor Robert Willis gave special help with empirical problems.

I am especially grateful to Ivan Vamos of the New York State Office of Parks and Recreation Planning Division for providing technical support and for emphasizing the many policy related aspects of the study. His kind help and encouragement will always be remembered.

In many cases where I needed things done or help with ideas I called on others of whom the following are but a few: Cathy Bersaw, Mary Callahan, Frank Kuwick, Dr. Kie Bok Lee, Suck Young Lee, Eileen Weirsbowski, Mary Wiejola and Dr. James Youtsler. Mrs. Josephine Lucas gets a special thanks for typing the final version in the heat of the summer, in the middle of moving her office (without a phone) and still helping me to meet my deadline.

Finally, I would like to thank my wife, Joan, for putting up with the many frustrations along the way and to her and the children, Cay and Jenny, for helping to make it all worthwhile.

Since perfection is not yet a way of life, this report undoubtedly still contains errors. My hope is that the good ideas in it will outweigh the importance of these errors and that the report will have a productive impact on economic thinking and policy related to outdoor recreation and the full range of leisure commodities.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Time is a valuable resource. Both economic theory and empirical observation give ample support to this contention. People conserve it in a variety of ways. When offered comparable services, one of which is available at a lower time cost, people will tend to choose the one with the smaller time cost. Producers, recognizing this, pay a premium to locate their businesses closer to the markets that they intend to serve. Because of competitive pressures, service industries, especially, tend to be market oriented.

This is frequently not true of outdoor recreation services, however. Large land and other natural resource demands, combined with public open space, conservation and preservation policies, has given much of the outdoor recreation industry a greater resource orientation than most other service industries. This often imposes substantial travel time costs on facility users. In addition, outdoor recreation occasions are generally characterized by substantial blocks of activity time. Although for some activities, more than for others, time is the predominating cost consideration, outdoor recreation in general is typified by important time elements in total price. For this reason, differences in the value of time should be especially important to outdoor recreation choice decisions.

A number of recent studies[1] lend support to the close association

[1] Jacob Mincer, "Labor Force Participation of Married Women: A study of Labor Supply," in Aspects of Labor Economics, Special Conference Series 14 (New York: Princeton University Press for the National Bureau of Economic Research, 1962); Jacob Mincer, "Market Prices, Opportunity Costs, and Income Effects," in Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld, ed.: C. F. Christ (Stanford: Stanford University Press, 1963); Gary S. Becker, "A Theory of the Allocation of Time", Economic Journal 75 (September 1965): 493-517; Reuben Gronau, The Value of Time in Passenger Transportation: The Demand for Air Travel, Occasional Paper 109 (New York: Columbia University Press for the National Bureau of Economic Research, 1970).

predicted by economic theory between the earning power of the individual and his value of time. Other evidence indicates that, for the individual, time value is not a constant but varies across different time periods,[2] ostensibly because institutional factors reduce alternative earning power during certain times. This variation in time's value, among individuals and across different time periods will be reflected directly in the prices of commodities. It should be reflected most strongly in those commodities with high time intensities subject to low elasticities of substitution of goods for time.

This study examines the effects of time value variation on outdoor recreation choice decisions. The empirical examination centers on two New York State home interview surveys directed at outdoor recreation; one was conducted on Long Island and the other in the Syracuse area. The Long Island survey draws a distinction between past weekday and past weekend outdoor recreation while the Syracuse survey concentrates on all past year outdoor recreation occasions. Together they allow testing of the hypothetical relationships suggested by the time value hypothesis.

A wage, based on age, education and sex is used to reflect alternative earning power of people, but leeway from that value is considered for different time periods used for recreation purposes. The results of the study indicate that time-goods substitution in outdoor recreation takes place in a variety of ways as time value changes. Evidence is found of substitution among commodities and activities of different time intensities, of concentration of recreation occasions in different time periods, and of alteration in processes of self production of outdoor recreation services.

For the most part, the results support the hypothetical relationships

[2] Becker; Gronau.

suggested by Becker's theoretical construct. With increasing time value people exhibit greater awareness of time costs relative to other restrictions on participation. They substitute money for time in their consumer production functions as income increases. And they concentrate more of their production of outdoor recreation and take longer recreation trips in low than in high time value periods.

When overall recreation consumption levels are considered, however, the survey results do not support the time value hypothesis as formulated. Because of the large time demands of outdoor recreation, time value differences among people were expected to be reflected in lower recreation consumption levels, when income differences are accounted for. In fact, a small but significant shift into outdoor recreation is observed with increasing time value.

In an attempt to explain this finding a new element is introduced into the analysis. Unlike most other commodities, the production of outdoor recreation is felt to make large effort demands on the household. The result is thought to be a sufficient reduction in pure time intensity of outdoor recreation relative to substitute commodities to reverse the expected effect of time value increases. Other leisure time activities (Watching TV, reading, relaxing, visiting with friends, etc.) require similar large time and low money inputs but much smaller effort inputs. Because these are perhaps the closest substitute commodities to outdoor recreation their time intensities relative to outdoor recreation can be expected, to a large extent, to determine the direction of effect of time value increases on outdoor recreation consumption.

In addition to reducing the pure time intensity of outdoor recreation commodities, the disutility associated with effort may influence the

relationship between time value and outdoor recreation consumption in a second, more indirect fashion. Some of the same individual characteristics which lead to high wages, and thus high time values, may lead to greater efficiencies of and/or lower resistances to effort. If this is true, effort disutility may well decline with increasing time value, at least partially offsetting the tendency for increases in time price. Other leisure time activities, benefiting much less from such a positive effort "price" effect, would tend to rise even more in price relative to outdoor recreation.

One individual characteristic likely to have an important influence on the effort disutility of outdoor recreation is general health and physical condition. Although direct health questions were not asked in the surveys, using age and education as proxies for this variable, evidence is found that physical condition plays a role in outdoor recreation consumption decisions through its effect on effort "price". Moreover, the empirical evidence supports the hypothesis that the negative time price effect is reduced with increases in effort disutility.

Dividing activities into classes according to subjective relative money-effort components of total price allows checking for differential time value effects. The results generally support the revised version of the time value hypotheses. Two top money-effort classes yield the greatest positive time value effects; the lowest money-effort class yields the only significant negative time value effect.

Chapter II reviews existing outdoor recreation demand methodology and the theory of the value of time. In Chapter III these are combined to develop the revised theory of outdoor recreation demand presented there. Chapter IV provides the empirical tests of the hypothetical relationships

implied by the new theoretical construct.

The empirical results give clear evidence that time costs play a prominent role in outdoor recreation choice decision, but they also give evidence, though of a more tentative nature, that the effects of time value differences are tempered by differences in effort disutility among commodities and across individuals. Although this would serve to reduce somewhat the distortion of measured income effects predicted by Jacob Mincer's empirical work and Gary S. Becker's theoretical framework, distortion of measured money price effects should be made even greater by this additional price element. Because of data limitations this potential distortion is only given cursory treatment here as is the whole question of evaluating the benefit of saving consumer time and effort through facility location and other conservation measures. Nevertheless, the analysis indicates that these are directions which future examination of outdoor recreation demand could profitably take.

CHAPTER II

Review of Past Studies

Traditional economic theory treats leisure time as a normal good. It is consumed in lieu of and in conjunction with other goods and services. When a choice is made in favor of a greater amount of leisure time over additional work and income, the choice is essentially one among different types of goods. Being a normal good, increases in income will cause the individual to demand greater quantities of leisure time. On the other hand, increases in the wage will induce him to devote a greater quantity of time to work. When these two tendencies are in conflict, the net result cannot be determined a priori. Many observed tendencies of the real world have been explained by this theoretical construct. Perhaps the best known of these is the backward bending supply curve of labor.

But leisure time can also be viewed as a valuable resource. When combined with goods, it allows the individual to provide himself with the services of commodities. Rather than being an end, time becomes a means to an end. Commodities, not goods or time, are consumed by the individual. In effect, the questions of time value and the efficient allocation of time are shifted from consumption theory to production theory. They are determined by the value of commodities and by the production relationships with goods, through the law of variable proportions.

This approach is a much more general one than is the traditional theory. That theory treated only the overall choice between work and leisure. The more general theory sees the decision as a continuum. Within leisure time itself, a choice is constantly being made between more or less time devoted to the provision of commodities.

The new theory forces a radical change in the traditional theory of consumer choice. No longer is the individual's choice determined solely by relative market prices of goods. To maximize his welfare, the individual will seek an optimal allocation of both time and income.

Even with the "work-leisure" choice, the traditional theory breaks the problem into a false dichotomy. Jacob Mincer introduces this point in a study analyzing the labor-leisure choice for married women.[1] He states, "The analysis of labor supply to the market by way of the theory of demand for leisure time viewed as a consumption good is strictly appropriate whenever leisure time and hours of work in the market in fact constitute an exhaustive dichotomy. This is, of course, never true even in the case of adult males. The logical complement to leisure time is work broadly construed, whether it includes remunerative production in the market or work that is currently 'not paid for'."[2]

Mincer's major objective is to reconcile the apparent contradiction between the large secular increase in participation rates of females with the cross-sectional decline observed with rising family income. He finds the explanation largely in two factors: (1) the stronger relationship between wives' participation with transitory than with permanent income and (2) the weak correlation between the wife's earning power and her husband's income. Both of these factors make the income effect stronger and the substitution effect weaker cross sectionally than secularly.

In a later article, Mincer again discusses this study.[3] Accounting for these two factors, a positively sloping supply curve is obtained.

[1] Mincer, "Labor Force Participation".

[2] Ibid., p. 65.

[3] Mincer, "Market Prices".

The negative relationship so often observed cross sectionally is, "no more than an accident."[4] In fact, the opposite is to be expected. The wage-rate parameter does not simply reflect substitution between leisure time and wage goods. He states, "In the case of married women, the main substitution is between services of the homemaker and wage goods. Only if the two substitution effects here compared were equal in size, would a backward-bending shape be imparted to the supply curve of female market labor, when compressed to a two-dimensional form. But, there is no reason to expect this."[5]

With increasing income, substitution from wage goods to leisure time is only one possibility. Another is from household services to leisure time, using such things as more and better appliances, convenience foods, and hired help. If the increasing income is associated with a wage increase, the shift may very well be from household services to wage goods. Mincer's point is that evidence of substitution between household services and wage goods is "much more pervasive" than of substitution between time and wage goods. He concludes that interpretation of the negative relations observed between income and the labor force rate of married women is associated with, "a misunderstanding of the opportunity cost variable resulting from an improper attribution of generality to the 'backward bending' supply curve."[6]

In this later article, Mincer also examines other specification biases introduced into empirical studies which result from "neglecting certain

[4] Ibid., p. 74.

[5] Ibid., p. 72.

[6] Ibid., p. 74.

easily overlooked or misunderstood price variables."[7] He rejects the common assumption of demand studies that "price" is constant or does not vary systematically cross sectionally. He states, "...for a number of products and services, market prices alone do not provide sufficient information on the theoretically relevant opportunity costs. Moreoever, such costs are specific to individuals and are likely to be linked to their incomes. Price variables in this general sense are not fixed in cross sections, and cannot be left out of the analysis without creating misinterpretations of income effects."[8]

High income elasticities found for such commodities as air travel, domestic servants, and information can partly be explained by their time-saving natures. Since opportunity costs are not usually included in analyses of the demand for these products, part of their effects will be absorbed in the income elasticity measures. For example, Mincer shows that by not accounting for the wife's wage, the effect of the income variable in the demand for domestic servants, is biased upward by more than 50 per cent. He also points to the high income elasticity of demand for Consumer Reports as being largely the result of relative price effects.

On the other hand, the negative income elasticities usually observed for family size can be partly attributed to time costs of children. Mincer develops a demand function based on about 400 families selected from the 1950 BLS Survey of Consumer Expenditures. In it, numbers of children (X) is related to family income (Y), and wife's full-time earnings (E), both

[7] Ibid., p. 67.

[8] Ibid., p. 67.

in thousands of dollars, and years of husband's schooling (S):

$$X = 0.10 \cdot Y - 0.19 \cdot E - 0.02 \cdot S$$

The income effect is positive: the price effect is negative and its coefficient is stronger than the income coefficient. Since E will be positively correlated with Y, its omission will reduce the income coefficient, perhaps giving the usually observed negative gross relationship between family income and family size. This evidence would explain why, even after correction for such factors as contraceptive knowledge and quality in child care, income elasticities for children remain quite low.

Formal presentation of the theory of the allocation of time was made by Becker in the 1965 Economic Journal article.[9] But, traces of the theory can be found in earlier writings by the author[10] and by others, principally from the Labor Workshop at Columbia.[11] The central aim of Becker's study is to develpp a theory of consumer choice which fully integrates the cost of time into the individual's consumption decisions. His basic assumption is that households "...combine time and market goods to produce more basic commodities that directly enter their utility functions."[12] Thus, the household performs two functions in their "non-working" time: they are both producing units and consuming units. Becker

[9] Becker, "A Theory".

[10] See his: "An Economic Analysis of Fertility," Demographic and Economic Change in Developed Countries, National Bureau of Economic Research Conference Series (New York: Columbia University Press, 1960); "Irrational Behavior and Economic Theory," Journal of Political Economy 120 (February 1962): 1-13; "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy, special supplement 70 (October 1962) 9-49; Human Capital (New York: Columbia University Press for the National Bureau of Economic Research, 1964).

[11] In addition to the studies mentioned in this chapter, see: Becker, "A Theory", for a list and review of many of these studies.

[12] Ibid., p. 495.

is breaking the traditional dichotomy between production and consumption.

The budget constraint to which the household is subject is not simply money income. Its capacity to consume is determined rather by its "full income":[13] the maximum money income achievable if all time were devoted to work. The reasoning behind this single constraint is that time can easily be converted into goods through market labor or devoted directly to "consumption" activities, in which case money income would be forgone.

Once variable proportions are admitted to consumer production functions, fixed "price" ratios can no longer be assumed. Relative marginal utilities must now be equated to relative marginal opportunity costs of production, and these will depend upon production functions and on relative factor proportions. Shifting will occur between time and goods intensities not only through shifts among commodities, but also through production processes.

The consequences of the tendencies proscribed in this theoretical construct will depend, to a large extent, on the importance of time inputs for the production of commodities: with services, it is likely to be great. The effects on measured income elasticities has already been considered above. Its effect on measured "price" elasticities will often also be significant. Those commodities with relatively greater time to goods inputs will tend to have their price elasticities biased downward: a change in money price will have a lesser effect on total price and, hence, have less effect on quantity demanded.

These studies show that time is a valuable resource. In trying to measure the effects of changes in its value on consumption patterns, they generally assume that its value is equal to the wage. M. Bruce Johnson

[13] Ibid., p. 497.

claims[14] that traditional economic theory would reject this assumption as an overestimate since work has a negative marginal utility. How important this negative factor is, however, is an empirical question. In fact, many jobs appear to provide positive utility. Nevertheless, several studies have examined the question of the relationship between time value and the wage rate.

Becker[15] estimates a value of time, based on land value and commuting distance, which is about 40 per cent of average hourly earnings. He suggests that the low value may be attributed either to errors in his assumptions or to "... severe kinks in the supply and demand functions for hours of work."[16]

M. E. Beesley[17] compares public modes of commuting to develop estimates of time value. He finds that the average worker values his time at about one-third of their hourly wage, while more highly paid workers value it at between 42 and 50 per cent.

Gronau[18] also considers the question of the proper value for time. Rather than starting with the assumption that time value equals the wage rate, he analyzes the demand for air transportation using the weaker assumption that the value of time is proportional to the wage rate. He then tries to estimate what this proportion is for two different classes of air trips: personal and business. He regresses the log of the number

[14] M. Bruce Johnson, "Travel Time and the Price of Leisure," Western Economic Journal (Spring 1966): 138-139.

[15] Becker, "A Theory", See note 5, p. 510.

[16] Ibid.

[17] M. E. Beesley, "The Value of Time Spentin Travelling: Some New Evidence," Economica (May 1965): 174-185.

[18] Gronau, The Value of Time.

of trips per thousand families per year against the logs of a number of other variables, including a price variable of the following form:

$$(P + R*W*T)$$

where:

P = fare of trip

R = the ratio of the price of time to hourly earnings

W = hourly earnings

T = elapsed time of trip

His method is to try different "R's" and select the one which has the highest explanatory value in terms of adjusted index of determination.

Gronau cannot "derive an estimate of the value placed on time by personal travellers. On the other hand, for business travellers (he estimates) that the price of time almost equals hourly earnings."[19] For professionals and managers, it is between 1.15 and 1.25 and between .65 and .70 for male professionals and managers. Neither estimate explains significantly more than R = 1.0; however, both explain significantly more than R = 0.

The variation in values in these three studies attests to the fact that further analysis of this point is needed. Yet, with the exception of Gronau's "personal travellers", positive values of time are always found. To some extent, productive consumption, institutional factors, and the disutility of work would lead one to expect the wage to overestimate the value of non-working time. But, some of these same factors can cause the value of time to exceed the wage rate. Institutional factors discourage a reduction in the workweek as well as an increase. And, work may provide certain non-pecuniary benefits. One of Gronau's pro-

19 Ibid., p. 51.

portions for professionals and managers is greater than 1.0.

Opportunity costs, but not time costs, have played important roles in outdoor recreation demand studies. They fall into three broad types: time series; market oriented cross-sectional; and site oriented cross-sectional. Of these, the site oriented studies have been the most successful at incorporating opportunity costs. Yet, even they consistently ignore time costs and the effects of the interaction between income and the value of time. They have, however, made extensive use of other non-fee opportunity costs associated with travel to and from recreation sites.

Of the time series studies, one[20] is of special concern. Its major objective is to show that "market recreation" and "leisure time" are complements in the production of recreational services. John M. Owen summarizes his results thus:

> "We found that higher income levels in the form of higher wages led to an expansion of the demand for both leisure time and market recreation. We found that the two goods are complementary, both in the sense that they are used "together" and in the narrow sense that an increase in the price of one leads to a decrease in the demand for the other."[21]

But he also makes a brief examination into variable proportions between time and goods in the consumer's production function. His result tends to support the existence of substitution effects with changes in relative prices, but the evidence is not very conclusive and shows only weak substitution effects.

Among the market oriented cross-sectional studies, Mueller and

[20] John M. Owen, The Supply of Labor and The Demand for Recreation in the United States, 1900-1961 (Ph.D. dissertation, Columbia University, 1963) (University Microfilms 65-2089).

[21] Ibid., pp. 416-7.

Gurin[22] examine the relationship between income and leisure time. They note, "The subjective judgment - I need more free time - was expressed somewhat more frequently by those with incomes over $7500 than by middle income people and much less frequently by the lowest income groups."[23] They also present evidence that upper income people make more active use of their leisure time: the percent participating regularly in "active sports" increases much more quickly with income than do those for such passive activities as "Looking at TV", "Visiting friends, relatives", "Reading", and "Pleasure Driving".[24]

The idea that travel-related costs are an important part of the price of utilizing recreational services has been most fully developed by the site-oriented studies. These costs vary a great deal across space, providing a unique opportunity for these studies to investigate the effects of "price" variation on participation rates. It allows the easy development of market demand curves, and most important, in the view of most of these studies, it allows a dollar value to be placed on recreational facilities for use in benefit-cost analysis.

The initiator of this idea is Harold Hotelling. In a 1949 letter,[25] he suggested that distance can be used as a proxy for price and that the

[22] Eva Mueller and Gerald Gurin, Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults ORRRC Study Report 20, (Washington, D. C.: Government Printing Office, 1962).

[23] Ibid., p. 34

[24] Ibid., p. 35.

[25] Harold Hotelling, letter to Roy A. Prewitt in "The Economics of Public Recreation - An Economic Survey of the Monetary Evaluation of Recreation in the National Parks," (Washington, D.C.: National Park Service, 1949, mimeo)

per capita demand function developed by regressing visitor days per thousand of population against travel cost can be used for valuing recreational facilities. He argued that the value of the service to the individual must be at least as great as the travel costs associated with the trip to the site. By using concentric circles around the site, zones of approximately equal travel costs are created. When number of visitor days per year per thousand of population is regressed against average travel cost, assuming a negligible entrance fee, an annual per capita demand function is obtained. Development of the demand function is seen by Hotelling as a first step in placing a value on a recreational facility.

Marion Clawson[26] extends Hotelling's approach into a two-stage affair. To Clawson, Hotelling's per capita demand function is for the entire recreation experience. From this function, the demand "for the site itself" can be derived by assuming that the population views increases in entrance fees in the same way that it views increases in travel costs. Different fees are substituted into the per capita demand function to get estimates of the numbers coming from each origin zone to the site. The summation of these quantities for a given fee gives the quantity demanded at that fee.

Clawson derives demand functions for four National Parks: Glacier, Grand Canyon, Shenandoah, and Yosemite. Because his interest is in developing a method for valuing facilities, he does not present elasticity measures or his demand functions, except in graphical form. Figure 1 is a reproduction of the per capita demand functions[27] for Grand Canyon,

[26] Marion Clawson, Methods of Measuring the Demand for and Value of Outdoor Recreation, Reprint 10 (Washington D.C.: Resources for the Future, Inc., 1959).

[27] Ibid., p. 22.

Glacier, and Shenandoah. Clawson gives the following analysis of the results:

> "For Grand Canyon national park, the curve approaches unit elasticity at the end toward lowest costs and largest volumes; there is not the increase in elasticity here that was found for California. The lack of a considerable local residential population may be one explanation. On the other hand, the curve for this park gets much more elastic at the end toward fewer visits and higher costs. The curve for Glacier national park is highly elastic throughout. That for Shenandoah is roughly unit elasticity for the half with lower volumes and higher prices, but gets much more elastic for the higher volumes and lower prices."[28]

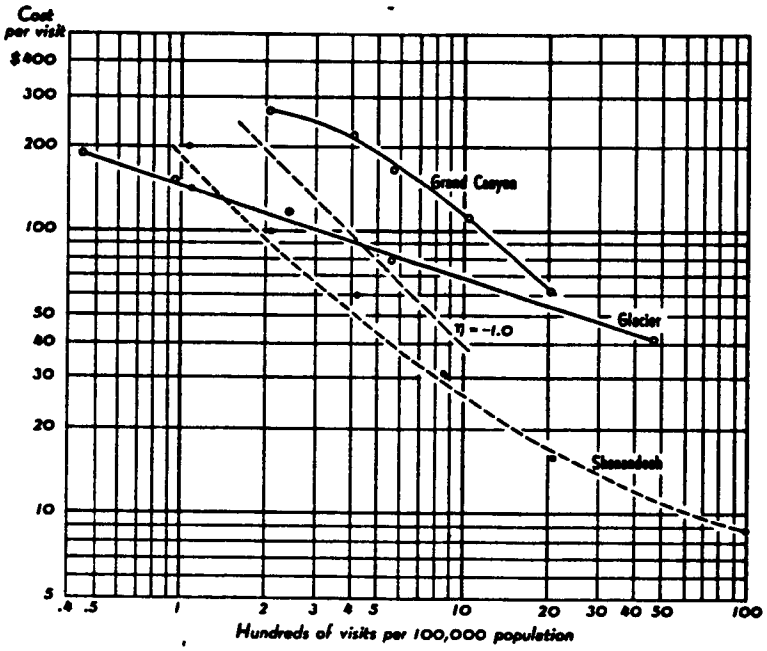


Figure 1. Estimated costs per visit in relation to number of visits per 100,000 of population, Grand Canyon, Glacier, and Shenandoah national parks.

Source: Reproduced from: Clawson, figure 3.

Figure 2 is a reproduction of the results for Yosemite broken into two parts: groups of states (excluding California) and groups of California

[28] Ibid., p. 21.

counties.[29] The following is his analysis of these two curves:

> "It is clear from the chart that each curve has an elasticity greater than unity for at least part of its length. For the more distant states, the elasticity is close to unity; for the nearer states, much more elastic. It is above unit elasticity for all California counties, and becomes greater for the nearer ones where the costs are lower."[30]

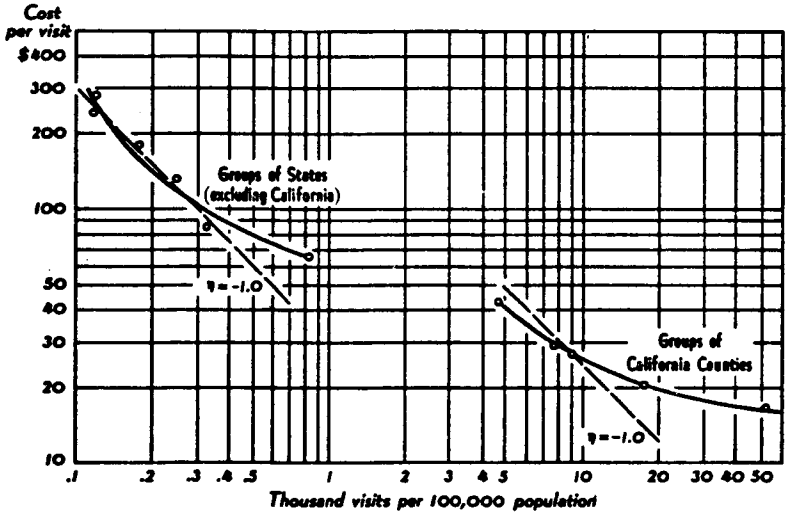


Figure 2. Estimated costs per visit to Yosemite, in relation to number of visits per 100,000 population, 1953.

Source: Reproduced from: Clawson, figure 2.

One other study[31] using the "Hotelling-Clawson" approach is of major interest. In it, Anthony Scott opens to question the assumption, implicit in the approach, that the populations from the different travel time zones will value their time equally. Because higher money travel costs will be associated with increasing distance, Scott expects that "...the average level of visitors' incomes would rise with their zone's distance

[29] Ibid., p. 19.

[30] Ibid., pp. 16-18.

[31] Anthony Scott, "The Valuation of Game Resources: Some Theoretical Aspects," in Canadian Fisheries Reports (Ottawa: Department of Canada, 1965).

from the resource."[32] Alluding to Becker's theory of the relationship between income and the value of time, Scott suggests that this will mean that the opportunity cost of time will rise with distance. Price elasticities developed using Clawson's "step two" will tend to overestimate the true elasticities because it overestimates the effects of fee increases more in the upper ranges (longer distances) of the demand function. Facility valuation based on such a function will be distorted unless an adjustment is made for differences in the relative values of time to money.

Scott's study is the first to consider the consequences of ignoring differences in the value of time. He does not, however, empirically test the six hypotheses on which he bases his theoretical conclusions. In light of the continued use of the Hotelling-Clawson approach, a fuller understanding of the relative importance of the tendencies is required. Scott's discussion of some of the potential problems to the approach presented by the interaction between income and the value of time opens the way to this type of analysis.

An analogous problem exists for income elasticities developed for recreational facilities. Income elasticities developed for more remote facilities will tend to be underestimates of the true income elasticities. The time price of these more remote facilities will be higher to higher income people. Thus, income will have a dual effect. It will alter the price of the experience as well as determine the willingness and ability to pay the price. A corollary result is that there will be an upward bias in the measured income elasticities of market-oriented facilities, as these facilities will be correspondingly less costly in terms of valuable time.

[32] Ibid., p. 33.

CHAPTER III

Time Value and Outdoor Recreation Demand Theory[1]

Individuals subject to budget constraints with both time and money components will react differently to given money price and income changes than they would if time was a free good. Direction and degree of response to price and income parameter changes will depend upon relative time intensity differences among the commodities of the system. Several important conclusions about the properties of outdoor recreation demand functions should be possible because of its general time intensive nature and its close natural resource ties.

If outdoor recreation (commodity 1) was the relatively more time intensive commodity in a two-commodity world, the relationship between outdoor recreation consumption and compensated wage changes would have to be negative and the standard income elasticity measure would under-value the true income elasticity of demand for outdoor recreation. Assume that the individual is subject to one overall budget constraint defined by:

$$F = w * T + V$$

$$\bar{P} = \bar{P}_1 * z_1 + \bar{P}_2 * z_2 \qquad (1)$$

[1] The mathematical formulation presented in this chapter stems from the conceptual framework developed by Becker. The principal works from which ideas and formulations were used in its derivation are: Paul A. Samuelson, Foundations of Economic Analysis (Cambridge: Harvard University Press, 1948); R. G. D. Allen, Mathematical Analysis for Economists (London: Macmillan and Co., Ltd., 1938; New York: St. Martin's Press, 1962); James M. Henderson and Richard E. Quandt, Microeconomic Theory (New York: McGraw Hill Book Company, 1958); C. E. Ferguson, Microeconomic Theory, Revised Edition (Homewood, Illinois: Richard D. Irwin, Inc., 1969).

where:

F = the individual's full income.

w = the individual's average and marginal wage rate and value of time.

T = the total time available to the individual for work or consumption: that time not required to maintain health and efficiency.

V = Supplementary income (e.g. return on invested capital, gifts, and capital consumption).

$\bar{P}_i$ = the total marginal and average price of commodity i.

z_i = the quantity consumed of commodity i.

Breaking expenditures into its two components the constraint may be rewritten:

$$F = (p_1 * x_1) + (w * t_1) + (p_2 * x_2) + (w * t_2) \qquad (2)$$

where:

p_1 = the marginal and average money price of the goods used in commodity i.

x_1 = the quantity of goods used in the individual's production of commodity i.

t_1 = the amount of time used in the individual's production of commodity i.

The overall constraint encompasses both the time and the goods constraints:

$$T = N + t_1 + t_2 \qquad (3)$$

and

$$w * N + V = p_1 * x_1 + p_2 * x_2$$

where:

T = time available for work or consumption: that time not required to maintain health and efficiency.

N = hours of work.

These constraints are independent only if hours of work is a constant. It is more likely that there is a degree of tradeoff possible between work and consumption and hence between the time and goods components of consumption. Therefore, the overall constraint is the only constraint relevant to the decision process.

Equilibrium will exist for the individual when he is at the maximum attainable position on his utility function:

$$U = U\ (z_1, z_2) \tag{4}$$

Marginal utilities per dollar spent on the two commodities will be the same and will equal the marginal utility of money income (L):

$$\partial u / \partial z_i = L * \bar{P}_i \tag{5}$$

and:

$$\bar{P}_1 * dz_1 = -\bar{P}_2 * dz_2 \tag{6}$$

From this, with k_1 and k_2 as the proportions of full income spent on commodities 1 and 2:

$$k_i = (\bar{P}_i * z_i)/F \tag{7}$$

and E_{12} as partial elasticity of substitution between commodity 1 and commodity 2:

$$k_1 * E_{11} = - k_2 * E_{12} \tag{8}$$

This equality can help establish the response of outdoor recreation demand to changes in system parameters. The relative change in the quantity of outdoor recreation consumed when prices change (with a compensated income change) can be obtained from:

$$d\ z_1 / z_1 = (k_1 * E_{11} * d\ \bar{P}_1 / \bar{P}_1) + (k_2 * E_{12} * d\ \bar{P}_2 / \bar{P}_2) \tag{9}$$

using equation (8):

$$d\ z_1 / z_1 = k_2 * E_{12} * (d\ \bar{P}_2 / \bar{P}_2 - d\ \bar{P}_1 / \bar{P}_1) \tag{10}$$

In a two commodity world substitution elasticity must be positive. Therefore, the bracketed expression in equation 10 must be negative for less outdoor recreation to be consumed for a compensated increase in prices. This will occur only if the relative increase in the price of z_1 is greater than the relative increase in the price of z_2. Proportional increases in the prices of both commodities (real income unchanged) will leave the consumption of outdoor recreation unchanged.

An increase in the wage rate (w) will cause full commodity prices to rise. The effect on outdoor recreation consumption will depend upon the relative share of time price in full price of the two commodities. Defining s_i as the proportion of time price to full price of commodity i:

$$s_i = (w * t_i)/(\bar{P}_i * z_i) \tag{11}$$

The relative change in the price of commodity i may be written:

$$d\,\bar{P}_i \,/\, \bar{P}_i = s_i * d\,w \,/\, w \tag{12}$$

Equation (10) will now take the form:

$$d\,z_1 \,/\, z_1 = k_2 * E_{12} * (s_2 - s_1)\, d\,w \,/\, w \tag{13}$$

By assumption outdoor recreation is the relatively more time intensive commodity (i.e. $s_1 > s_2$). Therefore, the expression in brackets and the relationship between consumption of outdoor recreation and compensated wage changes must be negative. Rises in the wage rate which do not alter real full income will lead to a decline in the consumption of outdoor recreation.

Dropping the assumption of income compensation, the effect of a rise in the wage rate on outdoor recreation consumption will depend upon an income as well as a price effect. The equation

relating changes in consumption of outdoor recreation to system parameters, equation (13), must be rewritten to reflect the effect of changes in the individual's real income position. This equation will take the following form:[2]

$$d\ z_1 / z_1 = (k_2 * E_{12} * (s_2 - s_1) + M_1\ W/F)\ dw/w \qquad (14)$$

where:

M_1 = the true income elasticity of demand for outdoor recreation with respect to changes in real income.

W = the earnings component of full income, where $W = w \cdot N$

Solving this equation for M_1, gives:[3]

$$M_1 = (d\ z_1 / z_1 * w / d\ w * F/W) - (k_2 * E_{12} * (s_2 - s_1) * F/W) \qquad (15)$$

The first expression on the right is the standard income elasticity measure. From the assumption that outdoor recreation is the more time intensive of the two commodities, the second expression on the right will be negative.

True income elasticity will exceed measured income elasticity due to shifting to the other, now relatively cheaper, commodity. The extent of underestimate will be positively related to: the cross-price elasticity between the two commodities; the relative importance of the substitute commodity in the full income budget, the difference in relative time intensity between the two commodities, and the relative role of non-wage income in full income.

[2] There are actually two sources of income rise with an increase in the wage rate. The one represented by W in the equation reflects the increase in wage-goods (money) income for working time. The other source is the increased value of consumption time. However, this increase is exactly offset by the increase in the value of time expenditures needed to maintain the original consumption position. Thus, only the former income increase represents an improvement in real income position.

[3] $M_1 * W/F * dw / w = (d\ z_1 / z_1) - (k_2 * E_{12} * (s_2 - s_1) * dw / w)$

If the possibility of a more time intensive (leisure time) activity is introduced into the analysis some subjective changes would be required in the response of outdoor recreation consumption to changes in the wage rate. In a three commodity world:

$$U = U\ (z_1,\ z_2,\ z_3) \tag{16}$$

where:

z_1 = a more time intensive leisure time activity

z_2 = outdoor recreation

z_3 = other commodities (less time intensive than either the leisure time or outdoor recreation commodities)

The change in the consumption of z_1, resulting from income compensated changes in system prices will be the product of interaction among the three commodities in the system:

$$d\ z_1\ /\ z_1 = (k_1 * E_{11} * d\ \bar{P}_1\ /\ \bar{P}_1) + (k_2 * E_{12} * d\ \bar{P}_2\ /\ \bar{P}_2) + (k_3 * E_{13} * d\ \bar{P}_3\ /\ \bar{P}_3) \tag{17}$$

The relationship among the elasticities of substitution is given by:

$$k_1 * E_{11} = -(k_2 * E_{12}) - (k_3 * E_{13}) \tag{18}$$

Using this equality, equation (17) may be rewritten:

$$d\ z_1\ /\ z_1 = k_2 * E_{12} * (d\ \bar{P}_2\ /\ \bar{P}_2 - d\ \bar{P}_1\ /\bar{P}_1) + k_3 * E_{13} * (d\ \bar{P}_3/\bar{P}_3 - d\ \bar{P}_1/\bar{P}_1) \tag{19}$$

From (12), equation 19 will take the form:

$$d\ z_1\ /\ z_1 = (k_2 * E_{12} * (s_2 - s_1) * dw/w) + (k_3 * E_{13} * (s_3 - s_1) * dw/w) \tag{20}$$

By assumption the bracketed expressions in equation 20 are both negative. If substitution relationships exist between z_1 and each of the other two commodities, consumption of this leisure time commodity must decline for compensated wage changes. A complementary relationship with either commodity would make the direction of effect

indeterminant. The effect will be more negative or less positive: as the time intensity of the substitute is less than of the complement; as the substitution relationship is stronger than the complementary relationship; and as the proportion of full income spent on the substitute is greater than that spent on the complement.

The effect of a wage change on the consumption of the less time intensive outdoor recreation activity is more problematic:

$$d\,z_2 / z_1 = (k_1 * E_{12} * (s_1 - s_2) * dw/w) + (k_3 * E_{23} * (s_3 - s_2) * dw/w) \quad (21)$$

The first bracketed expression in (21) is positive; the second is negative. If the leisure time activity is complimentary with outdoor recreation the overall effect of a compensated wage change on the consumption of z_2 would have to be negative.[4] If they are substitutes, the first right hand expression would be positive. Even then, however, only if a complementary relationship exists with the third commodity would the overall effect necessarily be positive. A substitution relationship would make the second expression negative. The net overall effect would then depend upon the strengths of the two partial effects. A strong substitution relationship with the more time intensive leisure time commodity might make the overall time price effect positive, but a much larger proportion of full income devoted to the less time intensive substitute (which represents all other commodities) may make a net negative effect a more probable outcome even given a weaker substitution

[4] At least one commodity must have a substitution relationship with the rest. Therefore, E_{23} must be positive, and the second right-hand expression in (21) must be negative.

relationship.

For an uncompensated wage change, equation 20 will have an income term:

$$d z_1 / z_1 = (k_2 * E_{12} * (s_2 - s_1) * dw/w) + (k_3 * E_{13} * (s_3 - s_1) dw/w) + (M_1 * W/F * dw/w) \quad (22)$$

Solving for M_1 gives:[5]

$$M_1 = (d z_1 / z_1 * w/dw * F/W) - (k_2 * E_{12} * (s_2 - s_1) * F/W) - (k_3 * E_{13} * (s_3 - s_1) * F/W) \quad (23)$$

The income elasticity of demand for z_1, will be undervalued by the standard elasticity formula when wage changes are associated with income changes, if both of the other commodities are substitutes of z_1. If one commodity is complementary, the two sources of bias will work in opposite directions. The net bias will depend upon the cross-elasticities and the role of the commodities in consumption, in combination with the differences in relative time intensity. If the complementary commodity has a low time intensity, is an important component of overall consumption, and has a close association with z_1, the net bias might well be positive.

The income elasticity for z_2 will be subject to the influence of both a negative and a positive time price effect: its price will rise relative to z_3 but fall relative to z_1. If both commodities are substitutes, the biases will oppose each other, and the net bias will depend upon the strengths of the underlying forces. If z_1 is complementary, both biases will be positive.

[5] $M_1 * W/F * dw/w = (d z_1 / z_1) - (k_2 * E_{12} * (s_2 - s_1) * dw/w) - (k_3 * E_{13} * (s_3 - s_1) * dw/w)$

The rank of a commodity in terms of its time intensity will help determine the direction and extent of any wage-price effect. A high rank (high time intensity) will mean that more commodities will experience relative price declines with wage increases and that the extents of relative decline will tend to be greater than the extents of relative increase. Strong substitution relationships with high or complementary relationships with low time intensive commodities can alter or moderate the tendency, but in general, the more time intensive is a commodity, the more likely it is that it will be subject to a downward net wage-price effect.

Using the standard income elasticity measure for a commodity subject to a net wage-price effect will result in a biased estimate of the commodity's true income elasticity of demand when wage differences are associated with income differences. A commodity subject to a negative wage-price effect will also be subject to a negative bias in its measured income elasticity when the value of time is ignored in its determination. The negative bias will be equal to:

$$\sum_{i=1}^{n} k_i * E_{ci} * (s_i - s_c) * F/W \qquad (24)$$

Given an inverse relationship between commodity time intensity and net wage-price effect, there will be a tendency to undervalue true income elasticity more with high than with low time intensity commodities. Because of this, some forms of outdoor recreation should be especially subject to the problem of low measured income elasticities in combination with much higher true income elasticities, at least among the more time intensive activities. However, very

strong substitution relationships with more time intensive commodities, such as other leisure time activities, might well cause a reverse bias for some outdoor recreation activities as well as for outdoor recreation as a whole.

Time and goods are not the only inputs made by the household in the production of outdoor recreation. Effort is expended in preparation for, travel to, and participation in most outdoor recreation occasions. This effort expenditure enters directly into the household's utility function. Exercise associated with participation effort may yield positive value to the household, but on the whole, effort requirements will involve disutility, adding to the marginal cost of the production of outdoor recreation commodities.

At equilibrium[6] the marginal utility derived from activity i will be:

$$u_i = L\ (p_i * x_i + w * t_i + d / L * e_i) \qquad (25)$$

where:

L = the marginal utility of income

d = the marginal disutility of effort

e_i = the marginal input of effort

The total price of activity i will be composed of three parts, a goods component, a time component, and an effort component:

$$\bar{P}_i = (p_i * x_i)+(w * t_i)+(d/L * e_i)$$

equal to its marginal cost of production.

The existence of this additional component of total price reduces the proportion (δ_i) of time price to total price of commodity i, as it

[6] The approach and terminology used here for incorporating effort into the analysis is patterned after the discussion by Gronau in Chapter two.

does for all commodities with effort components involving disutility for the household. The extent of reduction depends on the relative share of disutility in total commodity price. Among leisure time activities, outdoor recreation makes especially high effort demands on the household and is therefore particularly sensitive to relative overestimation of its time intensity when effort disutility is ignored.

Effort will often not be the sole source of disutility to the household in the production of outdoor recreation occasions. Pain may be associated with some forms of outdoor recreation for some people. Aggravation will sometimes be associated with travel to recreational facilities.

Discomfort may be associated with being hot, cold, wet, or sticky. As with effort all of these forms of disutility enter to increase the marginal cost, and hence the price, of outdoor recreation occasions and reduce its relative time intensity. On the whole, they will also be more closely associated with outdoor recreation trips than with other forms of leisure time activities. Therefore, although the term effort is primarily used here, it should be interpreted as a proxy for the full range of relevant disutilities.

Disutility will vary across individuals as well as across commodities. It will vary because of differences in physical and mental capacity and because of differences in taste. The amount of effort required to produce a given form of outdoor recreation will be negatively related to physical ability and ingenuity. To some extent present effort requirements will be the product of past effort inputs. There is also likely to be carryover from effort inputs made to other recreation activities, to education, to work, and to other aspects of living. Present effort expenditures will

contain an investment component applicable to future effort requirements.

The amount of disutility derived from a given level of physical effort will still ultimately depend on the household's tastes. Some forms of effort could yield positive utility to the household, given the proper utility surface. Because of the interaction between effort requirements in the production of a given activity and past effort expenditures, not only for that activity but for other commodities and work as well, the household's past taste structure is appropriate to present effort disutility levels in two ways, through its effect on present taste structures and through its effect on the current efficiency of effort in the production of the given activity.

Past effort does not necessarily interact in a productive way with the effort requirements of present activity undertakings. Different forms of past effort will interact in different ways. For example, an excessive taste for mental effort in the past might well have displaced physical exercise to the point where present effort (pain) requirements are excessive for some forms of outdoor recreation. In general, however, taste for effort can be expected to be more evenly balanced, and individuals willing to strive harder in one area can be expected to strive harder in other areas as well.

The combination of these elements: the carryover of effort productivity among activities, the addition to present human capital made by past effort, and the prevailing nature of a taste for effort, reduces to a potentially very important relationship between time price and the disutility of effort. Those same factors which combine to make the effort component of the total price of outdoor recreation commodities relatively

lower to some people are the ones which also combine to make its time price relatively higher to them. The earning power of the individual will, to a large extent, be determined by his past and present taste for and efficiency of effort.

Because other leisure time activities (eg. reading, relaxing, visiting with friends, and watching TV) may be among the closest substitutes to outdoor recreation outings, their low effort components compared to outdoor recreation's is of special interest. The presence of this disutility element may be sufficient to reduce the of outdoor recreation commodities below these other leisure time activities, since they too will have fairly substantial time components. Their prices will then rise relative to outdoor recreation activities with increases in the value of time.

The tendency for effort disutility to be negatively related to time price, across individuals, further increases the likelihood that other leisure time commodities will rise in price relative to outdoor recreation with increasing time value. The offsetting change in the effort disutility component of total price decreases the amount of overall price increase to which outdoor recreation commodities will be subject. With other leisure time commodities such an offsetting "price" effect will not be as prevalent.

To this point the analysis has proceeded on the assumption of fixed relative shares (S_i) among commodities. Adjustment to changes in the price of time has been through shifts the proportions of commodities in the individual's consumption bundle. No consideration has yet been given to the possibility of shifts in consumer production processes.

For the moment, assume once again that time and goods are the only two

inputs, that there is no utility or disutility associated with travel to recreational facilities. Changes in the relative share of time in total price, for any given commodity, will then depend on the elasticity of substitution between time and goods in the consumer's production function. Time's relative share will increase with increases in time's price only if it does not result in a greater percentage substitution of goods for time. An increase in the price of time increases the price of all commodities with time inputs. Those commodities with high elasticities of technical substitution of goods for time, however, will experience reductions in relative time shares when compared to other commodities. The previous conclusion that less time intensive commodities will experience relative reductions in their prices may not always hold if their consumer production functions are subject to low factor substitutability while more time intensive commodities have high substitution elasticities.

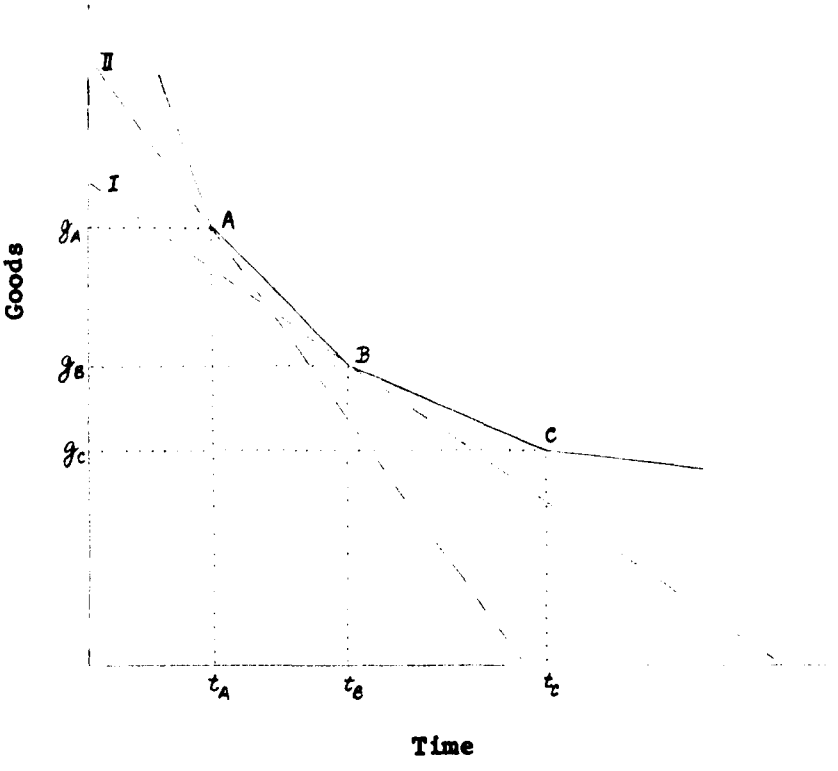
Much outdoor recreation has become closely associated with remote open space and natural resource areas. This is partly the result of public parkland policies and partly the result of normal market processes. Many activities require quantities of land and other natural resources which makes their provision much less costly away from population centers. Thus, those individuals willing to travel to more remote locations will generally be able to save substantially on entrance fee costs.

The existence of a variety of locations offering the same activities at different fees opens the possibility of significant time-goods substitution without shifting out of desired activities. Figure 1 shows the effects of an increase in the goods price of time on the time-goods ratio under the condition that there are three sites offering a single form of

outdoor recreation. For a given site, factor proportions are assumed as fixed. Time-goods substitution is made possible, however, through shifting among facilities. Site C is the most remote of the three. As such, it offers the lowest user fees but requires the greatest time inputs. The site would appeal most to individuals with very low time values. Site A is the most proximate facility to the center of population. Higher fees would be charged at this facility to cover higher land rents there.

Figure 1

Outdoor Recreation
Facility Choice



An individual whose time value was represented by line I would choose intermediate facility B. By traveling longer to $(t_B - t_A)$ he pays a lower entrance fee $(g_A - g_B)$. But if his time value increases to II he will no longer value the money savings as much as the time he can save by going to facility A and so he shifts to the exclusive use of facility A.

An analogous argument would hold for three facilities located at equal distances but charging different entrance fees. The facility with the lowest entrance fee would have the greatest crowding and longest waiting times. Individuals would choose the low fee facility as long as they valued the money savings more than the time lost waiting in lines. In a similar vein, the three points might represent three time periods at a given facility. Unless higher fees are charged during those periods when time value is typically low, crowding will increase normal time-goods ratios then. Individuals with high prices of time then would shift their activity to more off-peak periods.

Site selection will be closely tied to total price as viewed by the individual. This price will be composed of three major components: user fees; travel related money expenditures; and time costs of travel and waiting. User fees, in turn, will tend to reflect savings in the other components of price. Those facilities offering low travel and waiting costs will be able to charge comparably higher user fees.

The net recreational benefit attributable to the capital invested in a new facility comprises such things as the saved travel expenditures and values of saved travel times and reduced waiting times on the parts of facility users. A large part of this might be captured by appropriate user charges, but with public facilities, where user charges are usually

nominal, most of the net benefits will be spread among those well located relative to the facility. The present procedure for estimating the benefits of public recreational facilities from travel related expenditures but not from the value of travel and waiting time saved risks the serious over-valuation of more remote facilities relative to more population oriented ones.

For commodities where time is a large component of total price, money price changes will often have little effect on quantity demanded. Studies using money price while ignoring time costs might well conclude that demand was price inelastic when, in fact, sensitivity to changes in total price was high. The tecnhique employed by recreation facility demand studies of using money travel expenses to proxy for fee differences, however, more likely leads to overestimation of price sensitivity. Little change in price is seen as occurring since only non-time travel expenses are considered. In fact, travel time cost is changing in the same direction perhaps leading to substantial changes in quantity demanded.

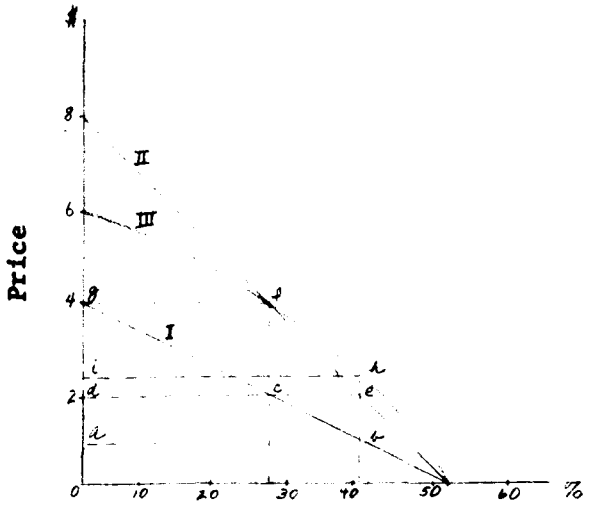
Figure 2 illustrates this point. Line I is the measured demand curve and Line II is the true demand curve. True travel cost is assumed to be double measured travel cost and the entrance fees and other costs are assumed to be zero. Two potential sites, A and B, are to be evaluated. Site A is the more distant one from the only population center, containing one million people.

Measured two-way travel cost to site A is $2.00; actual two-way cost is $4.00. The respective costs to site B are $1.00 and $2.00. The measured price effect is, therefore, double the true price effect.[7]

[7] Coincidently, note that price elasticity is the same under the assumptions used.

Figure 2

Recreation Facility Valuation



Percent of Population

Cost benefit analysis of the two sites, based on the measured demand function, would conclude that the annual net benefit attributable to site B (total benefit minus consumer costs) was greater than for site A by the area a b c d or by $342,500.[8] The true net benefit difference is, in fact, double this (area d e f g) or $685,000. Capitalizing the under-evaluation in annual net benefits of site B over 100 years at 5% will mean a total facility under-evaluation relative to A of approximately $6,850,000.[9]

Since it is closer to the center of population, land and other natural resource costs will tend to be higher at facility B. If the added capitalized net benefits of approximately $7 million are obtained using the measured demand function,[10] resources will be

[8] Based on one million people and 27.5 and 41.0 percents respectively for sites A and B.

[9] Using 20 x $342,500 to approximate this value.

[10] The present value of 100 years of a b c d at 5%. This value is also $6,850,000.

directed to facility A. If the value of consumer time savings are also considered, however, capitalized costs at B could exceed those at A by over $13 million before A would be chosen over B.

One major factor altering these conclusions somewhat is that time value varies among individuals and across time periods. Also, a degree of productive consumption can be involved in recreation trips, particularly when other people are being driven to the facility. If people with lower net time values are more inclined to choose the more remote facilities,[11] time cost will not go up and down uniformly with the distance of the facility.

Curve III, in figure 2, reflects the first assumption, that average time value tends to increase for locations closer to the center of population. As distance increases, those with higher time values drop out first. For the longest trips, average total price increases only slightly with distance because only those with very low time values remain. The actual reduction in cost offered by facility B is only g-i and the true net benefit difference is represented by the smaller area i h f g. The degree of resource misallocation is less than would occur if all individuals had the same time values, equal to the average at facility A. The greater the proportion of the population with very low time values, the smaller will be the net benefit difference between the two sites. Under the second assumption the curve going through f would be convex from below and the degree of resource misallocation would be greater.

[11] Scott, p. 33, suggests that just the opposite will be true because high wage (income) people will be better able to afford the greater money costs involved in longer trips.

People with low time values may lack the means of access to get to more remote facilities. A program to provide access to such people could make park systems more efficient. In addition to increasing use of remote facilities it would help to reduce waiting time at more proximate facilities, potentially more attractive to individuals with high time values.

Disutility associated with travel to recreational facilities would further increase the overestimation of price elasticity that occurs when current recreation facility demand techniques are used. Because of this disutility the technique would further undervalue total benefits and give even more weight to remote recreational facilities. If disutility is not constant across individuals but varies inversely with time value, for the reasons already considered, any tendency for people with higher time values to make shorter trips would be lessened and perhaps reversed, making the degree of resource misallocation even greater.

CHAPTER IV

TIME COSTS AND THE DEMAND FOR OUTDOOR RECREATION: AN EMPIRICAL ANALYSIS

In spite of high consumer time components in outdoor recreation services, very little is known about the effects of time costs on recreation consumption decisions. The major thrust of Becker's theoretical construct is that time costs do enter the individual's choice calculus, altering relative commodity prices and shifting consumption as its value changes. And Mincer's empirical studies show that income effects tend to be under-estimated for more time intensive commodities because of a positive relationship between income and time costs. However, Gronau's results indicate that these effects may not be important when leisure time purposes are involved in the commodity. He found that air travel for vacation or personal purposes is not significantly affected by time costs.

This chapter tests the hypothesis that time costs play an important role in outdoor recreation consumption decisions and considers how changes in the value of time alter consumption patterns. It relies principally upon two home interview surveys concerned with outdoor recreation and run by New York State in 1968. The first was run in the Syracuse area in the winter and asked about outdoor recreation during the past year. It gave 1686 usable interviews. The second was run in the summer on Long Island and asked about the past Sunday's and the previous weekday's outdoor recreation. It resulted in 3007 usable interviews. In addition, aggregated data from the National Recreation Surveys of 1960 and 1965 were used to provide further evidence.

Copies of the survey forms and further survey description is in the Appendix .

Money Versus Time Expenditures

The two New York surveys asked questions about quantity of outdoor recreation only in terms of numbers of occasions, but the National Recreation Survey of 1960 also obtained information on money expenditures and hours of outdoor recreation. Figure 1 charts each of the three quantity measures on log-log graph paper against the ten income classes used in the survey. The close association between income and time value is relied upon to help reveal the effects of time value variation.

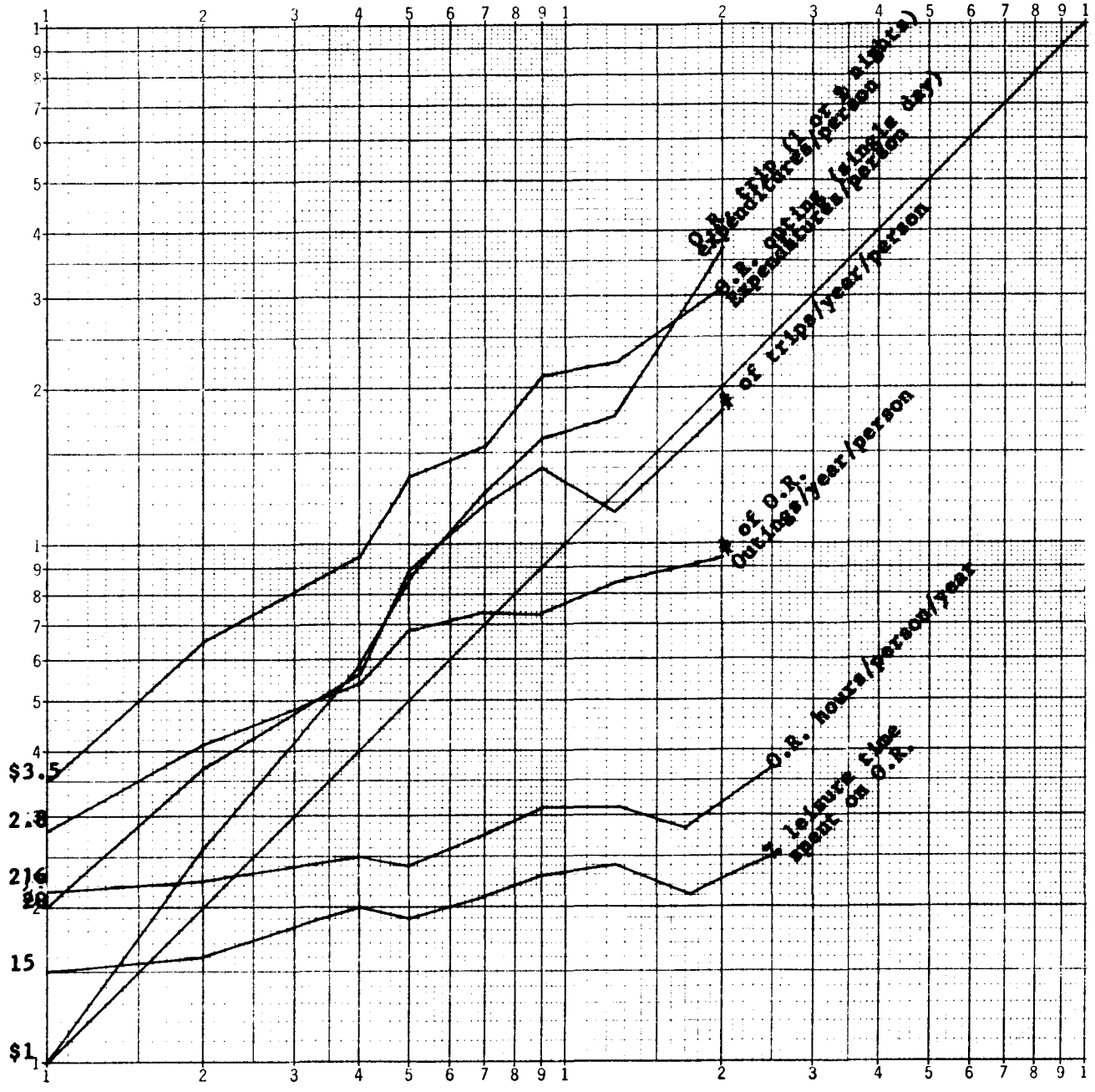
Recreation trips (1 or 2 nights) are measured independently of single day outings. Although trips rise faster than outings, as might be expected from their ability to conserve on preparation and travel time, both types of occasions show substantial increases with increasing income (and time values). Neither one rises as fast as money expenditures, however. Trip expenditures rise faster than outing expenditures, its income elasticity greater than one.

Since expenditures rise faster than outings, average money expenditures per occasion rise with income. For outings, expenditures per person per day increase from $1.25 for family incomes less than $1,500 to $3.35 for incomes over $15,000. Trip expenditures go from $1.80 to $8.00 per person per day.

Also plotted in Figure 1 are hours of outdoor recreation per person per year and percent of leisure time spent on outdoor recreation. Both rise moderately across the income classes. When activity occasions per

Figure 1

Selected Measures of Outdoor Recreation Quantity
by Family Income



Source: Abbott L. Ferriss, National Recreation Survey, ORRRC Study Report 19, (Washington, D. C.: Government Printing Office, 1962), Tables 5.35, 5.38, and 5.41.

person are accumulated for all four seasons for all the activities included in the study and divided into total annual hours of outdoor recreation per capita, an estimate of time expended per activity occasion is obtained.

Unlike money expenditures, which shows a rise with income for all types of recreation occasion, time per activity occasion declines from 3.98 hours per person for individuals with family incomes of less than $1,500 to 2.84 hours for individuals with incomes more than $15,000. Thus, individuals from the lowest income bracket spend a full 1/3 more time per activity occasion as do individuals from the highest income bracket. This estimate of time per activity occasion is only a rough estimate because less than twenty activities and activity types are included in the study tables. Although these include most of the more popular outdoor activities, excluded are some of the most income sensitive ones such as skiing, golf and tennis. Thus, the true difference between average activity times may be even greater than indicated here.

Inter-Period Time Value Differences and Outdoor Recreation Consumption

Additional evidence of the effects of time value differences on outdoor recreation consumption decisions is found from period to period differences in observed levels of consumption. Both the Long Island Survey and the 1960 National Recreation Survey distinguished between weekend and weekday outdoor recreation. In addition, the National Survey asked about holiday activity. The results of both surveys, presented in Table 1, reveal a large drop in outdoor recreation consumption on weekdays as compared to weekends and holidays. In all cases, weekday outdoor recreation levels were less than 60% of the weekend

and holiday levels. Becker notes that the cost of an individual's time is likely to vary from period to period and that the cost of time will often be less on weekends (and holidays) because many firms are closed then.[1]

In addition to cutting down on activity time, greater time economy can be achieved by selecting activities and facilities which allow shorter trips. In the Long Island Survey, the average weekday trip was 28 minutes while the average Sunday trip was 40 minutes. The median weekday trip was a little over 10 minutes while the median Sunday trip was close to 25 minutes. Some idea of the extent of time economizing that can take place can be obtained from Table 1 by observing how the hours of leisure time devoted to outdoor recreation decreases relatively more than does outdoor recreation participation.

Relative differences in the inter-period variation in time value can be expected to exist among people according to the time value hypothesis. Retired people should find little difference in the cost of time from weekend to weekday. Students will probably have a higher cost of time during the week, while school is in session, but little difference should exist in the summer. Even during the school year recreation time cost will frequently be low because of school physical education requirements which introduce a productive consumption factor. The housewife will have many of the same responsibilities on weekends as she has during the week. Normal weekend responsibilities will also exist. However, on weekends and holidays there will be a certain amount of productive consumption in recreation time as family outings are

[1] Becker, p. 503.

frequently planned then.

The Long Island Survey was used to compare differences in participation levels for different labor force status groups. The ratio of weekday to Sunday activity participation was calculated for each group. Table 2 gives the results of these calculations. The ratio is lowest for employed workers: .398. Housewives have a larger ratio (.495) indicating that time costs increase relatively less for them than for employed workers.

TABLE 1

WEEKDAY-WEEKEND OUTDOOR RECREATION PARTICIPATION LEVELS

	National Recreational Survey* Hours of Outdoor Recreation Per Person Per Day**			Long Island Home Interview Survey # of People Engaging In Outdoor Recreation
	Week-Day	Week-End	Holi-Day***	
FALL	.50	1.25	1.75	Summer Sunday - 1025
WINTER	.25	.75	.75	Summer Weekday - 591
SPRING	.25	.75	.50	W/S = .576
SUMMER	.75	1.50	2.00	

* Source: Ferriss, Tables 1.34, 2.34, 3.34, and 4.34.
** Figures rounded to nearest quarter hour.
*** Holidays are: Labor Day, Thanksgiving, Washington's Birthday, and Memorial Day respectively. All figures are rounded to nearest quarter hour.

TABLE 2

DIFFERENCES IN SUNDAY-WEEKDAY RECREATION PARTICIPATION BY LABOR FORCE STATUS (LONG ISLAND HOME INTERVIEW SURVEY)

Labor Force Status	# of Occasions		Wdy/Sun	# of Interviews
	Sun	Wdy		
Employed	402	160	.398	1140
Housewife	343	170	.495	1069
Student	251	185	.737	508
Retired	27	23	.851	224

Since this survey was conducted in the summer, the high ratio (.737) observed for students is as expected. The fact that it is much higher than for employed people and housewives may be because students have their best options on summer jobs that are of a service nature which require weekend work. Retired people exhibit the highest ratio (.851) of any other group. Apparently, they find little difference in time costs between weekday and weekend activities. In some cases it may be even less since crowding at facilities on Long Island often increases required activity and travel times. One possible explanation why there is any decrease at all might be because retired people often have to make their time-use schedule conform to others.

Expressed Awareness of Time Costs

The most direct evidence in support of the hypothesis that time costs are an important element in outdoor recreation choice decisions and that increasing time value reduces outdoor recreation consumption levels is found in the responses to questions asking if and why

individuals do not participate as often as they would like in outdoor recreation. In the National Recreation Survey of 1960, individuals were asked if they participated as often as they liked in their three most preferred outdoor recreation activities. As can be seen in Table 3, only a minority participated as often as they would like, time being given as the principal restriction.

TABLE 3

PERCENT OF PERSONS (12 YEARS AND OVER) RESTRICTED IN PARTICIPATION IN THEIR THREE MOST PREFERRED ACTIVITIES*

	First Choice	Second Choice	Third Choice
Persons with preference	100%	100%	100%
Free Participation**	30	39	42
Restricted Participation	70	61	58
Reasons:			
Time	(56)	(52)	(47)
Financial	(16)	(18)	(18)
Other	(28)	(30)	(35)

* Source: Ferriss, National Recreation Survey, table 1.14A

** Participation as often as desired

Each of the four surveys asked the reasons for non-participation in desired activities. Table 4 summarizes the results for "time" and for "expense." In every case, time is found to be a more frequent deterrent to participation than is expense. Time is always mentioned at least twice as often as expense as the reason for non-participation in desired activities.

TABLE 4

PERCENT OF REASONS FOR NOT DOING DESIRED ACTIVITIES

	National Recreation Surveys								Long Island Survey	Syracuse Survey
	1960*				1965**					
	Su	Fa	Wi	Sp	Su	Fa	Wi	Sp		
Time (%)	25	30	18	26	58***	58	42	58	25	29
Expense (%)	11	9	7	9	12	11	13	10	6	12
T/E	2.3	3.3	2.6	2.9	4.8	5.3	3.2	5.8	4.2	2.4

*Source: Ferriss, National Recreation Survey, Tables 1.16, 2.16, 3.16 and 4.16.

**Source: Bureau of Outdoor Recreation, The 1965 Survey of Outdoor Recreation Activities (Washington, D.C.: Department of Interior, 1967) table 5.

***These figures refer to restrictions on participation in favorite (rather than desired) activities.

Although income and other socio-economic information was obtained in each of the surveys, none asked wage rates directly. In order to see how changes in time value might relate to the reasons for not engaging in desired activities a wage was developed for each individual record in the two New York surveys to act as a proxy for time value. In order to create a wage variable with some independence from the income variable, a three-way wage matrix, based on national averages in 1969, with seven age, seven education and two sex classes was used. The wage matrix is presented in Table 5.

Attaching this wage to each record, and assuming wage differences adequately reflect time value differences, allows the two-way breakdown of reasons for not doing desired activities

TABLE 5

HOURLY WAGE RATES FOR NON-FARM WORKERS IN 1969

Years of Education

Age	0-8	9-11	12	13-15	16	17	18+
Males							
14-19	1.900	1.966	2.016	2.247	6.604	3.292	-
20-24	2.371	2.671	2.921	2.841	3.092	3.626	3.651
25-34	3.153	3.586	3.815	4.236	5.095	5.213	5.702
35-44	3.503	4.104	4.390	5.205	6.948	6.766	8.362
45-54	3.559	4.079	4.602	5.716	7.645	6.792	9.395
55-64	3.598	4.111	4.727	5.478	7.699	7.449	9.155
65+	2.985	3.761	4.512	5.550	6.045	8.703	8.265
Females							
14-19	1.975	1.732	1.925	2.190	-	-	-
20-24	1.511	1.851	2.236	2.433	3.207	3.802	3.444
25-34	1.969	2.161	2.615	2.925	3.763	3.391	4.625
35-44	2.073	2.354	2.667	3.004	4.239	5.065	5.051
45-54	2.074	2.352	2.715	3.096	4.099	5.119	5.658
55-64	2.156	2.510	2.772	3.175	4.294	5.766	5.000
65+	1.744	2.321	2.462	3.470	3.373	3.231	4.929

Source: From the unpublished wage tables developed by Victor R. Fuchs and the National Bureau of Economic research. This table is the National wage table for white males and females.

presented in Table 6. Only those individuals with ages 25 to 45 were used because of the importance of age differences in outdoor recreation consumption decisions observed from previous studies. Dividing individuals into two classes based on whether the wage was above or below $3.00 allowed each of the two survey populations to be divided into fairly equal class sizes.

As can be seen from the Table, the proportions of the populations giving time as their reason for not doing desired activities increases slightly with the wage rate in both surveys. This is true even though the proportions giving any reason declines with the wage rate in both surveys. When time is taken relative to all other reasons, substantially higher ratios are found in the high than in the low wage brackets. In both surveys time as a percentage of all other reasons is 50% higher in the high than in the low wage bracket.

Time Value and the Overall Demand for Outdoor Recreation

As time value increases people become more aware of the time costs involved in outdoor recreation commodities relative to other restrictive forces. To see how this increased awareness of time costs is translated, if at all, to outdoor recreation consumption decisions, once again the wage based on age, education and sex is relied upon to indicate the effect of increasing time value. Using the Syracuse Survey, which asked frequency for each past year outdoor recreation activity, number of occasions during the past year was regressed on the wage rate for all outdoor recreation occasions for individuals over 20. From the 1,325 individual observations, the following regression equation was obtained:

$$\underset{\quad}{OR} = \underset{\quad}{14.96} + \underset{(3.09)}{2.06w} + \underset{(5.46)}{.90y} - \underset{(.84)}{1.77h} + \underset{(4.73)}{21.65s} - \underset{(3.45)}{10.79r} \quad R^2 = .078$$

where: OR = number of occasions per year
w = hourly wage (in dollars)
y = annual family income (thousands of dollars)
h = dummy variable for housewife (1 = YES, 0 = NO)
s = dummy variable for student (1 = YES, 0 = NO)
r = dummy variable for retired (1 = YES, 0 = NO)

Note: T-values in brackets

The wage regression coefficient is a significant positive. For outdoor recreation as a whole, the hypothesis that consumption will decline with increasing time value must be rejected. Increases in time value actually causes a small net shift into outdoor recreation in spite of the high time components in outdoor recreation commodities. The positive time value effect is found even though income is included in the regression equation to adjust for the close positive association expected between income and the wage rate. The three dummy variables, included to account for possible differences between market wage rates and time values, also do not appreciably change the results.

It is possible that the time value proxy, developed as it was from individual characteristics which may themselves have significant influences on the propensity to consume outdoor recreation, do not correctly specify time value's true effect. But assuming that at least the direction of effect has been correctly specified, the alternative hypothesis developed in the theory chapter may explain in part these findings.

In its essential form the alternative hypothesis rejects the principal assumption of the first, that outdoor recreation in general is time intensive relative to its closest substitute commodities. Other leisure time activities will involve substantial blocks of time as well. Although many of these will also have high money price components, some of the more popular non-outdoor recreation uses of leisure time will not. Among these

are activities such as watching TV, reading, listening to the radio or records, playing cards and other games, visiting with friends, or simply resting, relaxing and passing time.

TABLE 6

TIME AS A REASON FOR NOT DOING DESIRED ACTIVITIES BY WAGE RATE (ALL THOSE AGE 25-45)

Wage	Prop. Giving Time As a Reason	Prop. Giving Any Other Reason	Time/All Other Reasons	# of Observations
		SYRACUSE HOME INTERVIEW SURVEY		
<$3.00	.23	.52	.44	(288)
>$3.00	.28	.42	.67	(344)
		LONG ISLAND HOME INTERVIEW SURVEY		
<$3.00	.24	.75	.32	(592)
>$3.00	.29	.58	.50	(597)

Note: The overall breakdown of reasons used in the Long Island and Syracuse Home Interview Surveys consists of: Lack of time; facilities too far away or lack of transportation; facilities not available; no public facilities; activity too expensive; lack of equipment; physical condition; activities restricted because of children; facilities too crowded; facilities too dirty or polluted; done't care for existing facilities; don't know how or never learned; no local instruction; no one to participate with; afraid; family reasons.

It is not just that outdoor recreation frequently involves money expenditures for fees, travel and equipment while the other leisure time activities do not. It is also because outdoor recreation has a fairly substantial third total price component not important to the other leisure time commodities or most other commodities. This is a disutility component

conceived here to be primarily in the form of effort disutility but also perhaps composed of such things as pain, aggravation, and discomfort. In addition to the disutility that may be involved in trips to and from recreation facilities, disutility is often involved in preparation for and straightening up after recreation occasions and in the actual participation itself. It is much easier to watch a football game on television than to go to the stadium or to relax at home than to go for a hike in the mountains.

Large money and disutility components, reduce relative overall price change with changes in the value of time. Other leisure time commodities, without large money and disutility components, would thus tend to experience greater relative price increases with given changes in the value of time.

Also potentially very important is the possibility that disutility is not constant across individuals but varies inversely with time price. For example, if individuals with higher time values also have higher efficiencies of effort (and perhaps lower resistances to effort), other leisure time commodities would rise even faster relative to outdoor recreation with increases in the value of time. Personality traits which give individuals the incentive to strive harder (or make them more efficient with a given level of effort) in their schooling and at their occupations, and so attain higher salaries, may also make them willing to pursue more active uses of their leisure time. In fact, greater past willingness to undertake the effort of outdoor recreation may reduce present effort requirements since physical conditioning is an important element in determining how much effort is required in outdoor recreation. Outdoor recreation would be relatively cheaper, in terms of effort disutility,

to those individuals for which it would be relatively more expensive, in terms of time price. This would help explain why individuals with higher time values, although they consume more outdoor recreation, would also feel more constrained by the amount of leisure time available to them.

Health, Effort Price and the Time Value Effect

Health is likely to be an important determinant of effort disutility differences among people with respect to outdoor recreation commodities. Although health questions were not asked in the available recreation surveys, the relationships found in previous studies between education, age and the state of physical health allow several rudimentary tests to be performed to check the hypothesized role of effort cost in total price. Of special interest is the effect of effort increases on the time value effect.

Variation in health among people will increase with age. This should lead to increased effort "price" variation and through this to increased variation in outdoor recreation participation. As Table 7 shows the coefficient of variation of outdoor recreation participation does increase with age. Based on the full sample from the Syracuse Survey, the coefficient of variation increases steadily from .59 for those less than twenty to 1.45 for those over sixty-five.

The range of activities is great enough to provide forms of outdoor recreation for all conditions of health. Thus, it is likely that health enters as a cost factor, as postulated here, rather than as a physical constraint. Therefore, this increased variation may reasonably be taken as an indication of the effect of effort "price" differences.

The second test relies on the assumption that as age increases effort requirements will also increase. This increase, in turn, will dull any

TABLE 7

VARIATION IN OUTDOOR RECREATION PARTICIPATION BY AGE (SYRACUSE HOME INTERVIEW SURVEY)

Age	Average Number of Occasions Annually	Coefficient of Variation in Participation	N
20	57.0	.59	(326)
20-29	38.7	.86	(329)
30-39	41.5	.80	(258)
40-49	29.8	1.06	(320)
50-64	24.0	1.24	(275)
65+	14.9	1.45	(178)

TABLE 8

OUTDOOR RECREATION PARTICIPATION BY WAGE, BY AGE (SYRACUSE HOME INTERVIEW SURVEY)

Age	Wage*	X	H/L	N
20-29	L	41.4	.739	(245)
	H	30.6		(84)
30-39	L	33.7	1.424	(118)
	H	48.0		(140)
40-49	L	25.5	1.294	(139)
	H	33.0		(181)
50-59	L	18.8	1.505	(123)
	H	28.3		(152)
60+	L	9.8	2.857	(128)
	H	28.0		(50)

*L = Wage < $3; H = Wage > $3

negative time price effect associated with wage increases. Table 8 breaks the Syracuse Home Interview Survey down into five age and two wage classes.. Taking the ratios of participation of high by low wage classes within age brackets allows consideration of changes in wage effects with increasing age. As age increases, the simple wage effect shifts from a clear negative to a strong positive, supporting the effort hypothesis.

It is not possible to use a more refined test with the Syracuse Survey because the wage matrix used to attach wage variables to each record is based on age, education and sex. These variables cannot be broken out as separate variables in a multiple regression analysis. Using a dummy wage variable in the Long Island Home Interview Survey, however, further examination of the interaction of effort price and the time price effect is possible.

By introducing interaction variables, changes in the net wage effect with age and education changes can be determined. For example, if the equation takes the form:

$$OR = a + b(W) + c(AW) + d(EW)$$

where: OR = recreation
W = wage
AW = age * wage
EW = education * wage

The partial with respect to the wage is:

$$\partial OR / \partial W = b + c*A + d*E$$

The net effect of wage changes on outdoor recreation participation will not be constant but will depend on the age and education variables.

Use of a Sunday-weekday dummy as a proxy for value of time differences is not entirely satisfactory since other important differences will also be closely associated with this dichotomy. Institutional forces will be an important element causing not only value of time differences but establishing new sets of inter-relationships. For example, most of the more popular forms of outdoor recreation are oriented at the household rather than at individuals. In this case,schedules of all household members and their associated time value structures become important to recreation decisions.

Especially important in evaluating measured price effects is the relationship between Sunday and weekday occasions, since substitution or complimentary relationships may exist among the two types of occasion; they are not simply the same thing offered at two different prices. Also, the choice is not an absolute one. Both offers exist simultaneously and a decision not to purchase the one type of occasion at the one price does not preclude the possibility of purchase of the other type.

These factors may be particularly important among different population groups, particularly labor force status groups. To help reduce the importance of the differences not directly reflected in the time price differences separate equations were developed for housewives and employed people. The results are presented in Table 9.

TABLE 9

INTERACTION EQUATIONS
(LONG ISLAND HOME INTERVIEW SURVEY)

HOUSEWIVES

OR = .33 - .31w + .41 aw - .04 ew - .66a + .20e + .05y R sq = .076
(2.02) (2.60) (.37) (5.79) (2.82) (3.09) N = 2120

EMPLOYED

OR = .39 - .46w + .58aw - .04ew - .57a + .14e + .06y R sq = .083
(3.37) (3.02) (.52) (2.63) (4.19) (3.42) N = 2240

OR = outdoor recreation participation (0 = no; 1 = yes)
w = wage proxy dummy (0 = Sunday; 1 = weekday
aw = age/100 * w
ew = education/10 * w
a = age/100
e = education (years of schooling)/10
y = family income/1000

Note: t - values in brackets below coefficients.

The aw and ew variables are interaction variables. They show how the "wage" effect changes with increasing age and education. In both equations both variables yield coefficients of the correct sign to support the hypothesis. As age increases and education decreases, physical health should decrease, and as a result effort price should rise and the net wage effect should decrease. The equation shows this to be the case for age. As age increases the negative wage effect is reduced..The education interaction variable is not significant.

These results are preliminary. More direct health measures would greatly improve the measurement process. Nevertheless, the consistent support given to the hypothesized relationships between health, effort price and the time price effect is enlightening. It indicates that much more concern should be given to the whole health-effort price-time price question, especially with leisure time commodities.

Time Value and the Demand for Different Classes of Outdoor Recreation

Although outdoor recreation as a whole increases with time value some forms of outdoor recreation may be more subject than others to the negative influence of increasing time price. Those forms of outdoor recreation requiring the least effort and demanding the least money expenditures should be more likely to be subject to negative time price effects. Five broad classes of outdoor recreation were developed to test this hypothesis: (1) sports in developed areas, (2) activities requiring large investments in recreational vehicles and other equipment, (3) backwoods activities, (4) swimming, and (5) passive activities. The activities in each class are listed in Table 10.

For the most part, developed activities are the most time efficient forms of outdoor recreation. They require large effort inputs and moderate goods inputs, but most can be accomplished in small time periods. Recreational vehicle activities make the greatest goods demands of any activity class. In addition, they also have high effort components. This reduces their relative time intensities even though they will also have substantial time inputs. Backwoods activities require large blocks of activity time, but they also make fairly large effort demands. Goods inputs are moderate.

TABLE 10

ACTIVITIES WITHIN EACH OF FIVE CLASSES

1.	Developed	-	golf, team sports, tennis, handball, skiing, bowling, range, ice skating, sledding, bicycling
2.	Recreational Vehicle	-	boating, camping, snowmobiling
3.	Backwoods	-	horseback riding, mountain climbing, hiking, fishing, hunting
4.	Swimming	-	swimming
5.	Passive	-	picnicking, driving for pleasure, walking for pleasure, spectator sports

Swimming does not generally require very large goods inputs. In its more popular form (going in the water and sunning on the beach) it also does not require much effort, except perhaps in terms of travel effort in metropolitan areas. The passive activity class is probably the most time intensive form of outdoor recreation primarily because the goods and effort demands of this class are very small compared to the other activity classes. Its time demands are generally.

moderate.

Using ratios of class frequencies to overall outdoor recreation frequency as the dependent variables, net wage effects were computed for each of the activity classes. The regression results are presented in Table 11. The independent variables are entered in the same form as used in the equation for all outdoor recreation. The wage effect is a significant positive for the two high goods-effort activity classes and a significant negative for the class judged to be the most time intensive. For the two intermediate classes the wage effects are not significantly different from zero.

These results generally support the modified time value hypothesis as presented above. The effect of time value variation is not uniform across the different activity classes. Increasing time value has the greatest positive effect on those forms of outdoor recreation with substantial effort-goods components to total price. It has the greatest negative effect on the passive class of activities which is perhaps the most time intensive primarily because of its low effort and money demands.

TABLE 11

NET WAGE EFFECTS FOR FIVE ACTIVITY CLASSES (SYRACUSE HOME INTERVIEW SURVEY)*

DV**	= 7.45	+ 2.09w (2.84)	+ .45y (2.35)	- 3.68h (1.57)	+ 9.49s (2.02)	- 5.64 r (1.38)	R^2 = .036
RV	= 3.96	+ 1.06w (2.16)	+ .17y (1.31)	+ .17h ((.11)	- .72s (.23)	- 2.43r (.89)	R^2 = .012
BW	= 20.84	- .18w (.27)	- .08y (.43)	- 11.46h (5.25)	- 9.08s (2.07)	+ 1.20r (.31)	R^2 = .035
SW	= 10.93	- .41w (.70)	+ .53y (3.52)	+ 2.47h (1.33)	+ 6.26s (1.68)	- 10.34r (3.20)	R^2 = .036
PV	= 57.07	- 2.16w (2.28)	- .84y (3.46)	+ 11.54h (3.83)	+ 1.08s (.18)	- 14.77r (2.81)	R^2 = .061

*Individuals over 20 years of age and doing at least one form of outdoor recreation during the previous year (N = 1024).

**The form of the dependent variables is: class frequency * 100 / overall outdoor reereation frequency. The classes are respectively: developed, recreational vehicle, backwoods, swimming and passive. The other variables have the same form as with the overall outdoor recreation regression equation.

CHAPTER V

CONCLUSION

In her article appealing for a national time-budget, Mary Holman states, "Income is a necessary means for the satisfaction of many wants, but some will remain unsatisfied because of a time-budget rather than an income-budget restriction. For many people, time has become a factor constraining activities as much as income."[1] Still, a number of articles focused on recreational uses of leisure time treat time as an increasingly overabundant resource requiring the injection of large quantities of other resources for its efficient use.

Time is not a free good in consumer production functions in the market for outdoor recreation services; nor will its value be a constant. Its value is likely to be correlated with variables utilized by outdoor recreation demand studies. Variations in its value may cause distortions in measured income and price effects when these changes are not accounted for by recreation demand studies. Cost benefit studies which ignore consumer time (and effort) costs can cause important resource misallocations. These and other findings of this study warn that time opportunity costs should not be ignored by outdoor recreation demand studies: time costs are simply too large a component of total costs for them to be ignored. "Time" is consistently a much greater deterrent to participation in desired activities than is "expense."

There certainly are segments of the population with excess time,

[1] Mary A. Holman, "A National Time Budget for the Year 2000," Sociology and Social Research XLCI (October 1961): 17.

without adequate means to supply themselves sufficient recreational pursuits, but for the vast majority of people discretionary time appears to be much less abundant than discretionary income. Although part of the advance in productivity over the past century has been channeled into reduced hours and years of working time, the resulting increases in leisure time have been (and will be) largely overshadowed by enormous increases in discretionary income: alternative uses of leisure time have increased much more quickly than has available leisure hours.

The potentials for expanding goods output are much greater than for expanding discretionary time in the future. As this relative expansion in physical output occurs, time will become an ever more valuable resource in consumer production functions. The role of time costs in outdoor recreation demand decisions will increase. Future recreation patterns will reflect the increased opportunity cost of time. Some time intensive outdoor recreation activities and facilities may be unable to compete and will lose their following.

The prospect that time costs will command an even greater influence in future outdoor recreation consumption decisions makes it all the more important that techniques be developed for incorporating time costs into recreation demand analysis. The theory of the allocation of time provides the theoretical basis for the inclusion of time. The present study has shown that the theory's expectations are borne out in the market for outdoor recreational services.

The major technical problems involved in utilizing time costs revolve around developing methods for valuing time and for sensing

changes in its value. The individual's view of his time's value is even more important in determining his demand patterns than is the value assigned to it by the market place. His wage may not always be a good proxy for this value. In addition to institutional factors which may make his immediate true market value deviate from his wage the individual is subject to other forces which may make him attribute more or less value to his time than the marginal net return that he would actually be able to receive in the market place. There is also likely to be a degree of productive consumption in some recreational uses of leisure time, reducing the net time cost attributable to the recreational service itself.

Combined, these facts make it impossible to know a priori whether the wage is an underestimate or overestimate of the net time cost which enters the individual's demand calculus. One alternative is to assume that there is a proportionate relationship between the wage and marginal time value without predefining the relationship. Even this assumption may be too strong however. As seen from the Long Island Survey, labor force status groups appear to differ in the relative declines in their valuation of time from workday to weekend day. Adjustments could be made for such factors, but they would further complicate the valuation process.

A second alternative is to develop a procedure to determine directly the value of the individual's time as viewed by the individual himself. If a practical procedure could be developed, this approach would undoubtedly be the best answer. Past recreation studies have attempted to obtain dollar values, through direct questions, for such things as scenic views and recreational facilities.

Typical questions ask how much more an individual would be willing to pay, above any current entrance fees, before he would forego a service, or how many times he would come to a facility at given hypothetical entrance fees. The limited success of these studies indicates that such hypothetical questions are difficult to get consistent answers for. This would probably be even more true of questions attempting to obtain time value estimates. Any potential improvement in predictability may be more than offset by loss in consistency.

The final judge of any time value measure used must be its ability to explain observed recreation patterns. The degree to which people act as if a given time value measure influences their actions is the degree to which that measure can improve the predictability of the model. Thus, while attempting to obtain the true value of time directly may achieve closer estimates to the true value of time in many cases, loss in consistency may make an estimate derived from the wage, or income, a superior proxy for time value for use in demand functions and for valuing facilities. In large part, this depends upon finding a stable and workable functional relationship between time value and the wage, or income.

Accounting for time costs is not enough, however. The empirical results show that another major non-money cost element, effort, also plays an important part in outdoor recreation consumption decisions. Since the disutility of effort reduces the relative weight of pure time value changes, less distortion of measured income effects is likely because of it. On the other hand, distortions in measured price effects may be even greater since money price changes

will have less meaning to outdoor recreation consumption decisions. The current practice in outdoor recreation demand studies of using travel related money costs as proxies for money price changes, while ignoring the effort as well as time involved in travel, will result in greater overestimates of the effects of money price changes than would occur from ignoring travel time costs alone.

The hypothesis is put forward here that time value and effort productivity are positively related for outdoor recreation commodities. This would imply offsetting "price" effects and a shifting from time intensive to effort-goods intensive activities with increasing wage rates. Evidence is found that such shifting does occur. One determinant of effort productivity is physical health. Relying on health's association with age and education, a number of tests are made of the hypothesis that health induced increases in effort disutility lead to reductions in the effect of time value increases on outdoor recreation consumption decisions. The test results support the hypothesis as formulated, indicating that the time value hypothesis must be modified to include this consumer disutility element when outdoor recreation commodities are concerned.

Dividing activities into classes based on relative effort-goods to time price components allows a very rudimentary test of the time value hypothesis as so modified. Although far from conclusive, the results provide a measure of support for the modified time value hypothesis. The activity groups judged to be more effort-goods intensive, in general, give more positive time value effects. The time intensive ones tend toward negative time value effects.

To be a consumer of outdoor recreation a person must also be a producer of outdoor recreation. More than for most other commodities, time and effort are important inputs into this production process. This study has only begun to look at these elements and their relationship to outdoor recreation consumption decisions. Their roles in the production and consumption of outdoor recreation and the full range of leisure time activities should be examined much more fully. Special consideration should be given to developing procedures for valuing these cost elements for inclusion in benefit-cost analyses of future public recreation facilities and to establishing more clearly their relationships to other individual characteristics such as earning power and physical health. Only by considering all consumer borne costs can overall beneifts and costs be correctly accessed and alternative facility proposals be meaningfully evaluated. Clearly, the potential net benefits of locating recreation facilities closer to the population centers is much greater than would be indicated by present cost-benefit studies which consider only money travel costs.

APPENDIX

SURVEY DATA BASE

Cross-sectional data from two home interview surveys provided the principal data base in this study. They were both conducted in New York State in 1968. The two surveys held to a framework similar to that of the National Recreation Surveys of 1960 and 1965, conducted by the Department of Interior, but there are a number of important differences. As with the National Surveys, the Long Island Survey selected one individual (12 and over) from each household, but the Syracuse Survey sought to interview all individuals of the household 12 years old and over.

Although the Syracuse Survey contained past year activity participation and frequency questions similar to those of the National Surveys, the Long Island Survey concentrated on activities of the previous day and of the past Sunday. No attempt was made to obtain past year frequencies. The Syracuse Survey also contained questions on past week activities, however, and since it was conducted in the winter and the Long Island Survey was conducted in the summer the two surveys complement each other on these questions. Because they do not require recall over long periods, these questions provide a more accurate information base. However, they do not provide frequency information directly: aggregation of the data is required.

Households were selected for the Syracuse Survey from the Syracuse Metropolitan Transportation Study sample frame conducted the previous year by the N. Y. S. Department of Transportation.

Selection of households was made proportional to the metropolitan region population as stratified by income groups and geographically distributed throughout the Metropolitan Region. In a maximum of three visits (the National Survey used four) all household members over the age of eleven were interviewed. The Survey itself was conducted by Economics Consultants Organization, Inc., for the N.Y.S. Department of Conservation.

When possible, households with incomplete questionnaires were contacted by telephone to obtain the necessary information. A random sample of completed questionnaires were also contacted for validation purposes. A total of 813 households and 1702 persons were interviewed. Fifty two percent of the households were in the City of Syracuse and the remainder were distributed among the 23 towns and villages in the study area.

The Long Island Survey was conducted in the summer of that same year by Economic Consultants Organization, Inc. for the N. Y. S. Office of Planning Coordination. In this survey, only a single member of each household was interviewed because of the feeling that activity patterns within families are often interrelated. A total of 3,098 year-round residents were interviewed from July 1 through September 7, 1968 (excluding holiday periods). The sample was selected in proportion to the town populations, stratified by age-sex groups. Addresses were randomly selected from the meter listings of the Long Island Lighting Company where possible. Survey control methods were similar to those used in the Syracuse Survey.

These two surveys are also similar to the National Surveys in that they contain questions on outdoor recreation on vacations. But neither one attempted to obtain information specific to overnight trips. Moreover, expenditure data is much less exhausting. Preference data and reasons for not doing desired activities were obtained in all the surveys, though in somewhat different forms, with the latter two surveys concentrating on activities not presently being done. Certain questions on equipment ownership were carried forward from the National Surveys to the Long Island Survey, but they were generally excluded from the Syracuse Survey.

All four surveys contained similar socio-economic questions, although classes sometimes do not conform. Copies of the two New York surveys follow.

☐☐☐☐☐☐ Family number ☐☐ ☐☐ ☐☐☐ Location code ☐☐☐

HOUSEHOLD RECREATION SURVEY
ONONDAGA COUNTY
WINTER 1968

Ask the head of the household or his spouse the following questions before going to the following pages:.

Complete the following form for each family member living at home who is 12 years old and over:

Person No.	DO NOT USE	PERSON IDENTIFICATION (Relation to Head)	AGE (yrs.)	SEX	RACE	OCCUPATION	INDUSTRY OR BUSINESS	YEARS OF SCHOOL COMPLETED
1		HEAD		M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
2				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
3				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4. 4+
4				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
5				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
6				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
7				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+
8				M F	W O			0 1 2 3 4 5 6 7 8 9 10 11 12/1 2 3 4 4+

☐ How many persons living in this household are less than 12 years old?

☐☐ Total persons living in household

Has this family lived in this house for more than 1 year? Yes 1 No 2 ☐

How many automobiles do members of this family own? ☐

Do any of the family members own. . .

Truck Yes 1 No 2 ☐
Pick-up Truck Yes 1 No 2 ☐
Motor Scooter Yes 1 No 2 ☐
Motorcycle Yes 1 No 2 ☐
Other (specify) _____ ☐

OBSERVE: Ask if unsure:

Type of structure:
1. Single family house
2. Apartment in a house
3. Apartment in an apartment building or complex
4. Trailer

Other (specify) _____ ☐

ASK THIS QUESTION LAST:

Which of these income groups covers your total family income for 1967

SHOW FLASH CARD ☐

Family Number ____________ Person Number ____________ Person's name or relationship to head and age ______________________________

Did you go on a vacation trip away from home during the past year?

☐ 1. Yes 2. No If "No," go to next page: If "Yes", ask:

Identification Coding	When did you take your vacation? Month?	How many days were you away from home?	Did you go on vacation with other family members?	Where did you spend most of your time?	What activities did you engage in while at this location? SHOW FLASH CARD	How many persons in your party were:		Approx. how much money did you spend while on vacation?	Did you stay at: Check only one:					
						Under 12 years old	12 years or more		Resort	Hotel	Motel	Camp-	Friends, Relatives	Other, specify:
			1. Yes 2. No	City or place State				$	O	O	O	O	O	
			1. Yes 2. No	City or place State				$	O	O	O	O	O	
			1. Yes 2. No	City or place State				$	O	O	O	O	O	
			1. Yes 2. No	City or place State				$	O	O	O	O	O	
			1. Yes 2. No	City or place State				$	O	O	O	O	O	
			1. Yes 2. No	City or place State				$	O	O	O	O	O	

During the past week, did you engage in any outdoor recreational activities? SHOW FLASH CARD

☐ 1. Yes 2. No If "No," go to next page: If "Yes," ask:

What were the activities you engaged in since a week ago today?

Identification Coding	Activity	How many times did you do.... on w days	How many times did you do.... on w ends	Where did you go to do.... Is it in the neighborhood? 1 Yes 2 No	How long did you do....	What mode of travel did you use to get to the site?	Did you go directly from home to the site?	How many persons in your party were: Under 12 years old	How many persons in your party were: 12 years or more	How much did you spend while at the facility?	Did you pay for a season pass or ticket?	Were you satisfied with the facility? 1 Yes 2 No If "No" what were you dissatisfied with?
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	
				Name Street address City, place and state	1 - ½ day 2 + ½ day	If car D or P circle	1 Yes 2 No			$ amount	1 Yes 2 No $ amount	

What outdoor recreational activities did you engage in during the past year while you were not on vacation? SHOW FLASH CARD

Identification Coding	Activity	In which seasons did you engage in this activity? 1 Yes 2 No	Approx. on how many days did you.... during the season?	Where did you usually go to do.... Is it in the neighborhood? 1 Yes 2 No	How much time did you usually spend doing....?	Did you usually do.... during the season on ?	How much did you spend at the facility?	Did you pay for a season pass or ticket?	Were you satisfied with the facility you usually went to? 1 Yes 2 No If "No," what were you dissatisfied with?
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	

What outdoor recreational activities did you engage in during the past year while you were not on vacation? SHOW FLASH CARD

Identification Coding	Activity	In which seasons did you engage in this activity? 1 Yes 2 No	Approx. on how many days did you.... during the season?	Where did you usually go to do.... Is it in the neighborhood? 1 Yes 2 No	How much time did you usually spend doing....?	Did you usually do.... during the season on ?	How much did you spend at the facility?	Did you pay for a season pass or ticket?	Were you satisfied with the facility you usually went to? 1 Yes 2 No If "No," what were you dissatisfied with?
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____
		W F Sm Sp most frequently ____	1-4 5-9 10-19 20+	Name ____ Street address ____ City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $ ____	1 Yes 2 No $ ____ Amount	____ ____

What outdoor recreational activities did you engage in during the past year while you were not on vacation? SHOW FLASH CARD

Identification Coding	Activity	In which seasons did you engage in this activity? 1 Yes 2 No	Approx. on how many days did you.... during the season?	Where did you usually go to do.... Is it in the neighborhood? 1 Yes 2 No	How much time did you usually spend doing....?	Did you usually do.... during the season on ?	How much did you spend at the facility?	Did you pay for a season pass or ticket?	Were you satisfied with the facility you usually went to? 1 Yes 2 No If "No," what were you dissatisfied with?
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	
		W F Sm Sp most frequently	1-4 5-9 10-19 20+	Name / Street address / City, place and state	1 -½ day 2 +½ day	1 W days 2 W ends 3 Both	Average Amount $	1 Yes 2 No $ Amount	

Are there any types of recreational activities you would like to engage in that you do not at present?

☐ 1 Yes 2 No If "No," go to next question. If "Yes," ask:

	What activities?		Why don't you?

Are there any types of recreational facilities you would like to see added to this neighborhood or near your home?

☐ 1 Yes 2 No

If "Yes," what types of things do you have in mind?

HOUSEHOLD RECREATION SURVEY
NASSAU-SUFFOLK COUNTIES
SUMMER 1968

ECONOMIC CONSULTANTS ORGANIZATION, INC. - 17 INDEPENDENCE STREET - WHITE PLAINS, N. Y. - 914-946-0800

DO NOT USE 1

I. IDENTIFICATION DATA:

A. Interview Data:

1. Address of Interview_____ _____ Town_____ County_____
Street Address Apt. No.

2. Phone Number_____ No Phone(check)_____ Interviewer's No._____ Date:_____ Time_____

B. Household Data:

1. Person interviewed: (relationship to head)_____ Sex-Age Group_____

Age	Observe Sex M F	Race W O	Occupation	Place of Work N S E	Years of School Completed 0 1 2 3 4 5 6 7 8 9 /10 11 12/ 1 2 3 4 4+	Daily Afternoon Travel Time, Work (School) To Home
_____			_____			_____Hrs. _____Mins.

2. How many persons, including yourself, are there in this household?_____
Ask: Number in each age group: Under 5_____; 5 to 11_____; 12 to 19_____; 20 to 34_____; 35 to 44_____; 45 to 54_____; 55 to 64_____; 65 & over_____

3. Does this family live in this house year-round? Yes_____ No_____

4. Do any members of this family own an automobile? Yes_____ No_____ If Yes: How many?_____

5. Do any family members own any of the following: (check if yes) IF YES: How many?

Truck_____ _____
Motorcycle_____ _____
Camper_____ _____
Boat_____ _____
Type of Boat:_____ Size_____ft.

6. Do any family members have a summer home? Yes_____ No_____
IF YES: a) Where is this home located? Nassau_____ Suffolk_____ Elsewhere_____
b) Is this home winterized: Yes_____ No_____

DO NOT USE

7. OBSERVE: Type of Structure (Ask if not sure)

_____ Single-family house
_____ Two, Three or four-family building
_____ Five or more family apartment building
_____ A rooming or boarding house
_____ An apartment hotel
_____ A unit in a mixed commercial (industrial) and residential building
_____ Farm House
_____ Trailer
_____ Other (specify)_____ __ __

8. Is there a swimming pool on this property available for your use? Yes____ No____ __

9. Have you or your family paid for a season pass or membership at any recreation facility?
YES____ NO____
IF YES: a) Where is it located? Nassau_____ Suffolk_____ Elsewhere_____ __ __ __
b) Amount paid?_____ __ __
c) Are you satisfied with this facility? Yes_____ No_____ IF NO: Why?_____ __ __ __

_____

d) What activities do you engage in at this facility?

_____ _____ __ __ __ __

_____ _____ __ __ __ __

_____ _____ __ __ __ __

DO NOT USE

II. VACATION IN PAST YEAR:

A. Did you take a vacation(s) in the past 12 months? Yes________ No________

B. Did you take a vacation trip(s) away from home for three or more nights in the past 12 months? Yes___No___

IF NO: Go to next page; IF YES, Ask:

Month of Your Vacation?	How many days were you away from home?	Where did you spend most of your time?	How many persons, including yourself, were in your party? Number Under 12 years of age?	Number 12 Years of age and over?	Did you Stay at:*	What activities did you engage in at this location? (SHOW FLASH CARD)	2
____	____	____ Name of Place ____ Street Address ____ Locality ____ State	Total: ____ Family____ Non-Family: ____	Total: ____ Family____ Non-Family: ____	____	____ ____ ____ ____ ____	
____	____	____ Name of Place ____ Street Address ____ Locality ____ State	Total: ____ Family____ Non-Family: ____	Total: ____ Family____ Non-Family: ____	____	____ ____ ____ ____ ____	
____	____	____ Name of Place ____ Street Address ____ Locality ____ State	Total ____ Family____ Non-Family: ____	Total: ____ Family____ Non-Family: ____	____	____ ____ ____ ____ ____	

* 1. Resort 3. Motel 5. Own summer home 7. Friends, relatives
2. Hotel 4. Campsite 6. Rented summer home 8. Other (specify)

III. OUTDOOR RECREATION ACTIVITIES:

A. Did you engage in any outdoor recreation activities last Sunday? YES_____ NO_____

IF NO: Go to Question 2; IF YES, Ask:

1.

Name of Activity (SHOW FLASH CARD)	Is this in your community?	Where did you go to.....? If yes to community: DO NOT ASK.	What means of travel did you use to get to the site?	How long did it take you to get to the site?	How many persons, including yourself, were in your party? Number Under 12 years of age?	How many persons, including yourself, were in your party? Number 12 years of age and over?	Were you satisfied with the facility?	IF NO: Why Not?	DO NOT USE 3
_____	YES____ NO____	_____ Name of place _____ Street address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family____ Non-Family: _____	Total: _____ Family____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family____ Non-Family: _____	Total: _____ Family____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street Address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family____ Non-Family: _____	Total: _____ Family____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street Address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family____ Non-Family: _____	Total: _____ Family____ Non-Family: _____	YES____ NO____	_____	_____

2. If there are persons under 12 years of age in the family, Ask: (If none, go to next page) Did anyone in your family under 12 years of age engage in any outdoor recreation activities last Sunday? YES____ NO____

IF YES: What Activities? (SHOW FLASH CARD) _____ _____ _____

Did they do this activity in this community? Yes____ No____ Yes____ No____ Yes____ No____

III. OUTDOOR RECREATION ACTIVITIES:

A. Did you engage in any outdoor recreation activities last Sunday? YES_____ NO_____

IF NO: Go to Question 2; IF YES, Ask:

DO NOT USE

1.

Name of Activity (SHOW FLASH CARD)	Is this in your community?	Where did you go to.....? If yes to community: DO NOT ASK.	What means of travel did you use to get to the site?	How long did it take you to get to the site?	How many persons, including yourself, were in your party? Number Under 12 years of age?	How many persons, including yourself, were in your party? Number 12 years of age and over?	Were you satisfied with the facility?	IF NO: Why Not?	3
_____	YES____ NO____	_____ Name of place _____ Street address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family_____ Non-Family: _____	Total: _____ Family_____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family_____ Non-Family: _____	Total: _____ Family_____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street Address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family_____ Non-Family: _____	Total: _____ Family_____ Non-Family: _____	YES____ NO____	_____	_____
_____	YES____ NO____	_____ Name of Place _____ Street Address _____ Locality _____ State	_____	____Hrs. ____Mins.	Total: _____ Family_____ Non-Family: _____	Total: _____ Family_____ Non-Family: _____	YES____ NO____	_____	_____

2. If there are persons under 12 years of age in the family, Ask: (If none, go to next page) Did anyone in your family under 12 years of age engage in any outdoor recreation activities last Sunday? YES____ NO_____

IF YES: What Activities? (SHOW FLASH CARD) _____ _____ _____

Did they do this activity in this community? Yes____ No____ Yes____ No____ Yes____ No____

DO NOT USE
6

V. RECREATION ACTIVITIES

A. Are there any recreation activities you would like to engage in, but do not at present? Yes_____ No_____ ____ ____ ____ ____

IF YES, Ask:

What activities would you like to engage in? Why don't you? ____

_____ _____ ____ ____ ____

_____ _____ ____ ____ ____

_____ _____ ____ ____ ____

Additional activities (SHOW FLASH CARD)

_____ _____ ____ ____ ____

_____ _____ ____ ____ ____

_____ _____ ____ ____ ____

B. Would you please tell us those recreational activities in which you have had professional instruction?

Check if none_____ ____

List activities_____ _____ ____ ____ ____ ____

_____ _____ ____ ____ ____ ____

_____ _____ ____ ____ ____ ____

C. Are there any types of recreation activities in which you would like to receive professional instruction?

YES_____ NO_____ ____

IF YES, Ask: What Activities?

_____ _____ ____ ____ ____ ____

_____ _____ ____ ____ ____ ____

_____ _____ ____ ____ ____ ____

VI. Could you please tell us your total family income for 1967? (SHOW INCOME FLASHCARD) ____ ____

DO NOT USE

5

IV. COMMUNITY RECREATION AREAS

A. Are there any recreation areas in your community? YES_____ NO_____

IF YES, Ask:

Which of these areas do you use?	Are there any improvements that can be made in this area?	IF YES: What improvements?
_____	Yes____ No____	_____
_____	Yes____ No____	_____
_____	Yes____ No____	_____
_____	Yes____ No____	_____

B. Are there any types of recreational facilities you would like to see added in your community:
YES_____ NO_____
IF YES, Ask: What type of facilities? _____ _____

_____ _____

_____ _____

C. Are there areas in your community not now used for recreation that could easily be converted to recreation use? YES_____ NO_____

IF YES, Ask:

What are these areas used for now?	What could they be used for?	Where are these areas located?
_____	_____	_____
_____	_____	_____
_____	_____	_____

BIBLIOGRAPHY

OUTDOOR RECREATION DEMAND

Boyet, W. E. and Tolley, G. S. "Recreation Projection Based on Demand Analysis", Journal of Farm Economics, XLVIII, (4) (November 1966): 984-1001.

Clarke, A. E. "The Use of Leisure and Its Relation to Levels of Occupational Prestige", American Sociological Review, XXI (June 1956): 301-307.

Clawson, M. Methods of Measuring the Demand for and Value of Outdoor Recreation, (10). Washington, D.C.: Resources for the Future, Inc., April 1958.

Clawson, M. and Knetsch, J. C. Economics of Outdoor Recreation. Baltimore: The Johns Hopkins Press for Resources for the Future, Inc., 1966.

Crutchfield, J. A. "Valuation of Fishery Resources", Land Economics, XXXVIII (May 1962): 145-154.

Gardner, B. D. "Analytical Issues in Demand Analysis for Outdoor Recreation", Journal of Farm Economics, XLIX, (5) (December 1967): 1304-06.

Gillespie, G. A. "Effects of Nonprice Variables Upon Participation in Water Oriented Outdoor Recreation", American Journal of Agricultural Economics, L, (1) (February 1968): 82-90.

Grubb, H. W. and Goodwin, J. T. Economic Evaluation of Water-Oriented Recreation in the Preliminary Texas Water Plan, Texas Water Development Board, Report 84, September 1968.

Hotelling, H., Letter to Roy A. Preuitt in "The Economics of Public Recreation - An Economic Survey of the Monetary Evaluation of Recreation in the National Parks", National Park Service, Washington, D. C., 1949. (Letter Excerpted in Outdoor Recreation Resources Review Commission Report No. 24, 1962).

Knetsch, J. L. "Outdoor Recreation Demands and Benefits", Land Economics, XXXIX, (4) (November 1963): 387-396.

McClellan, K. and Medrich, E.A. "Outdoor Recreation: Economic Considerations for Optimal Site Selection and Development", Land Economics, XLV, (2) (May 1969): 175-182.

Owen, J., The Supply of Labor and the Demand for Recreation. Unpublished PhD Dissertation, Columbia University, 1964, University Micofilms at Ann Arbor, Michigan - #65-2089.

Scott, A. "The Valuation of Game Resources: Some Theoretical Aspects". Canadian Fisheries Reports, (4), Ottawa, Canada: Department of Fisheries of Canada, Queens Printer, 1965: 27-47.

Seckler, D. "On the Uses and Abuses of Economic Science in Evaluating Public Outdoor Recreation", Land Economics, XLII, (2) (November 1966): 485-494.

Stoevener, H. H. and Brown, W. G. "Analytical Issues in Demand Analysis for Outdoor Recreation", Journal of Farm Economics, XLIX (December 1967): 1295-1306.

Trice, H. and Wood, E. "Measurement of Recreation Benefits", Land Economics, XXXIV, (3) (August 1958) 195-207.

Wennergren, E. "Valuing Non-Market Priced Recreational Resources", Land Economics (November 1964): 303-314.

THE VALUE OF TIME

Becker, G. S. "Irrational Behavior and Economic Theory," Journal of Political Economy, (February 1962): 1-13.

_____. "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy, Special Supplement, (October 1962): 7-49.

_____. "A Theory of the Allocation of Time, "The Economic Journal, LXXV (September 1965): 493-517.

_____. Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1964.

Beesley, M. E. "The Value of Time Spent in Traveling - Some New Evidence," Economica, XXII (May 1965): 174-185.

Cairncross, A. K. "Economic Schizophrenia," Scottish Journal of Political Economy, V (February 1958): 15-21.

Gronau, R. The Value of Time in Passenger Transportation: The Demand for Air Travel, New York: Columbia University Press for the National Bureau of Economic Research, 1970.

Mincer, J. "Labor Force Participation of Married Women," Aspects of Labor Economics, Princeton University Press, (1963): 63-105.

_____. "Market Prices, Opportunity Costs and Income Effects," in Christ, C. F. (ed.), Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld, Stanford University Press, (1963).

Reid, M. "Consumer Response to the Relative Price of Store Versus Delivered Milk," Journal of Political Economy, (April 1963), pp. 180-186.

GENERAL

Cesario, F. J. Jr. "Operations Research in Outdoor Recreation," Journal of Leisure Research, I, (1) (Winter 1969), pp. 33-52.

Devine, E. J. "The Treatment of Incommensurables in Cost-Benefit Analysis," Land Economics, (August 1966), pp. 383-387.

Ezekiel, M. and Fox, K. A. Methods of Correlation and Regression Analysis, New York, John Wiley and Sons, Inc., (1959).

Goldberger, A. S. Econometric Theory, New York, John Wiley and Sons, Inc., (1964).

Holman, M. "A National Time - Budget for the Year 2000," Sociology and Social Research, XLCI (October 1961), pp. 17-25.

Johnson, B. M. "Travel Time and the Price of Leisure," The Western Economic Journal, IV, (2), (Spring 1966), pp. 135-145.

Johnston, J. Econometric Methods, New York, McGraw-Hill, (1963).

Maass, A. "Benefit - Cost Analysis: Its Relevance to Public Investment Decisions," The Quarterly Journal of Economics, LXXX (May 1966), pp. 208-226.

Marglin, S. A. Public Investment Criteria, The M.I.T. Press, Institute of Technology, Cambridge, Mass., (1966).

Sterling, T. D. and Pollack, S. Introduction to Statistical Data Processing, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, (1968).