THE TIME PRICE SYSTEM -- ITS APPLICATION TO THE MEASUREMENT OF PRIMARY OUTDOOR RECREATION BENEFITS

Thesis for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY

ARNDT SEIFERT

1971

This is to certify that the

thesis entitled

THE TIME PRICE SYSTEM -
ITS APPLICATION TO THE MEASUREMENT
OF PRIMARY OUTDOOR RECREATION BENEFITS

presented by

Arndt Seifert

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Economics

W Paul Strassmann
Major professor

Date 2/25/72

O-7639

J —— #138

ABSTRACT

THE TIME PRICE SYSTEM--ITS APPLICATION
TO THE MEASUREMENT OF PRIMARY OUTDOOR
RECREATION BENEFITS

By

Arndt Seifert

The purpose of this study is to present a method of how primary outdoor recreation benefits can be measured. Primary economic benefits are measured by what people are willing to give up in order to consume goods, i.e., by their price. Any price has two components: money and time. In the case of consumption of (public) outdoor recreation, the price reduces mainly to time, as no appropriate money price exists in the market other than nominal entrance fees. The time price cannot be expressed only in terms of pure time units (hours, minutes, etc.), but also in terms of money units ($), for the wage rate can be regarded in most cases as a minimum opportunity-cost estimate of consumption time. Only in the case when actual work time is smaller than desired work time (undertime) does there exist a weak possibility that the wage rate may overvalue the opportunity-cost of leisure. This possibility, however, may be excluded

when sufficient undertime-compensations (unemployment insurance, etc.) exist.

In order to compute a measure of total primary outdoor recreation benefits, we must add to the money time price, i.e., to the foregone wages of the visitors, the following elements:

a. an estimate of the money price of outdoor recreation,

b. the value of external economies of outdoor recreation,

c. entrance fees, and

d. an appropriate value of the travel time.

The empirical measurement of the time price presents no great difficulties, since visitor-day statistics for U.S. recreation areas are available. If an appropriate average wage figure for a particular outdoor recreation area is not available, one can resort to minimum wages.

It is shown that the system of time prices could serve as a (supplementary) highly equitable public goods (accounting) price system and thus could help to solve the basic economic problems with which any society is confronted.

THE TIME PRICE SYSTEM--ITS APPLICATION
TO THE MEASUREMENT OF PRIMARY OUTDOOR
RECREATION BENEFITS

By

Arndt Seifert

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Economics

1971

TO MY PARENTS

"The natural beauties of a place of fashionable resort have a direct money value which cannot be overlooked; but it requires some effort to realize the true value to men, women and children of being able to stroll amid beautiful and varied scenery."

Alfred Marshall
Principles of Economics,
IV, III, §7

ACKNOWLEDGMENTS

The value of a dissertation is not measured by the amount of time the author spends in writing it but, to a certain extent, by the quantity and value of reading-time it "consumes" and the discussion it generates. This dissertation owes much to the most valuable time Professors Thomas R. Saving, Jan Kmenta and Paul Stressmann spent in reading it. To them I wish to express my profound gratitude. I am also indebted to Professor C. F. Carter and Wilhelm Neuefeind for reading and commenting on section 6 of Chapter IV. Further, thanks also go to Jack L. Knetsch, the Bureau of Outdoor Recreation in the Department of the Interior and to the U.S. Forest Service, for providing me with most helpful information.

The study was made under a Resources for the Future, Inc. Doctoral Dissertation Fellowship. To this corporation also go my sincere thanks. However, the conclusions, opinions, and other statements in this study are those of the author and are not necessarily those of Resources for the Future, Inc.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

LIST OF ILLUSTRATIONS

Figure | Page

LIST OF APPENDICES

LIST OF ABBREVIATIONS

OR = Outdoor Recreation

OT = Own Time

ST = Sold Time

OTI = Own Time Interval

STI = Sold Time Interval

TD = Time Distance

TDD = Time Distance Distribution

ORRRC = Outdoor Recreation Resources Review Commission

INTRODUCTION

The demand for outdoor recreation,[1] i.e., the demand OR places upon scarce land, water, plants, animals and fresh air, has become a central characteristic of our age. Factors such as changes in leisure time, income, tastes, population growth, urbanization, mobility, transportation, congestion, pollution, etc., all lead us to expect an even greater demand for OR in the future,[2] while the available supply of land, water and air must needs remain relatively fixed or will even diminish. On the other hand, the industrial-commercial and other demand placed on these natural resources will grow simultaneously. The question therefore arises of how society can best satisfy these conflicting demands. Were OR a good sold predominantly in the private market, the conflict would be resolved through the (money) price mechanism. But, for the most part, OR is consumed as a "public good," being provided free (if we neglect nominal entrance charges to

---

[1]Outdoor recreation henceforth abbreviated as OR.

[2]_Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation_, A Report to the Outdoor Recreation Resources Review Commission, ORRRC Study Report 23 (Washington: U.S. Government Printing Office, 1962).

OR areas) by state, local or Federal governments. With the market price system not operating, governments and courts are faced with the problem of finding alternative or substituting signals of value which could guide the efficient and welfare-oriented allocation of natural resources,[3] if the allocation decision is not to be left completely to the political process.

Cost-benefit analysis is one such alternative device. While the costs of investment in OR are known, the measurement of the resulting benefits has so far presented grave problems (see Chapter II). Especially, we do not know very much about the direct or primary OR benefits, i.e., those benefits which accrue to the recreationists themselves:[4] "One of the most urgent needs is for more

---

[3]According to the Policies, Standards, and Procedures in the Formulation, Evaluation and Review of Plans for Use and Development of Water and Related Land Resources, 87th Congress, Second Session, Senate Document 97 (Washington: U.S. Government Printing Office, 1962), land and water resources development planning should "insure the realization of the optimum degree of physical and economic efficiency" (p. iii) and the "well-being of all of the people shall be the overriding determinant in considering the best use of water and related land resources" (p. iv).

cf. also: Federal Executive Branch Policy Governing the Selection, Establishment, and Administration of National Recreation Areas, Recreation Advisory Council Circular No. 1 (Washington: U.S. Government Printing Office, 1963), p. 4.

[4]Primary OR benefits must be distinguished from secondary OR benefits, which are increases "in the value of goods and services which indirectly result from the project under conditions expected with the project as compared to those without the project" (Senate Document 97, op. cit., p. 9). Thus, secondary OR benefits are mainly increases in employment and income to the recreation industry resulting from the money expenditures of recreationists.

knowledge about the direct benefit that individuals derive from OR."[5] The issue is usually confused and made more difficult by calling these benefits "intangibles" as they, it is said, consist of social, spiritual, aesthetic, scenic, historical, health, educational . . . benefits, which cannot be measured as such in monetary terms. From an economic point of view, however, the worth or value of a good is not measured by listing and evaluating its various beneficial characteristics (every good, whether sold in the market or not, has characteristics which as such may be intangible: the carpet which is bought in the market, e.g., has aesthetic, warmth, acoustic, and other benefits, but the market price summarizes all these values, i.e., makes them tangible), but by what the individual is <u>willing to give up</u> to obtain it, its price. The good called OR, or the satisfactions which the recreationist attains through his presence on the OR area, is therefore in no way more or less intangible or tangible than any other good. What the recreationist is mainly giving up, in the absence of an appropriate money price, is his scarce time. It is the central argument of this dissertation, that there exists a <u>time price system</u> in addition to the customary money price system and that through this value of

---

[5] <u>Outdoor Recreation for America</u>, A Report to the President and to the Congress by the Outdoor Recreation Resources Review Commission (Washington: U.S. Government Printing Office, 1962), p. 184.

time theory primary OR benefits can be measured in monetary terms.

CHAPTER I

THE SOLD TIME-OWN TIME CHOICE MODEL

Before we review past attempts at measuring primary OR benefits, we will first introduce, for a better perspective, the method by which we think (part of) these benefits can and should be measured, so that they can serve as a sound basis for making policy and management decisions on the development of recreational facilities for present and future needs.

We can imagine the good (input) called OR to be a composite good, package or bundle of separate, yet interdependent goods like scenery, air, waterfalls, trees, lakes, mountains, etc., yielding an output in terms of <u>hours</u> of actual OR experience to the recreationist.[6] Our contention is that the primary OR benefits of the area are just the value of this time of actual participation in

---

[6] We require here active participation in OR, i.e., actual presence of the recreationist at the OR site. The benefits which the OR area may yield for persons <u>not</u> actively participating will be considered later on as <u>external economies</u>.

John H. Foster has also suggested to measure the "productivity" of outdoor recreation land in terms of "total annual patron time per acre." See J. H. Foster, "Measuring the Productivity of Land Used for Outdoor Recreation," <u>Land Economics</u>, XL, No. 2 (May, 1964), 224-227.

OR,[7] which (i.e., the time) is at the same time the price paid for the OR experience, if we neglect for a moment entrance fees to OR areas. In order to evaluate the price or value of OR time, we will make use of and develop further the familiar neoclassical labor-leisure model first advanced by Lionel Robbins[8] and pictured in modified form in Figure 1. Along the horizontal axis we measure total personal time per period (OM, here equal to one year = 8760 hours) and along the vertical axis we measure Income (Y), which stands for all goods except time. Sold time (abbreviated as ST) is total personal time per period _actually_ exchanged, spent or used in the market for the earning of money income (Y). Own time (OK) is defined as total personal time per period (OM) minus sold time (KM).[9]

---

[7]Primary OR benefits cannot only be _created_ through actual participation in OR, but can also be _destroyed_, e.g., through the construction of a dam at an OR area. In the decision process of whether to build the dam or not, the estimated, _prospective_ primary OR benefits, i.e., mainly the value of participation time which would be foregone, would take the place of the actual benefits.

[8]Lionel Robbins, "On the Elasticity of Demand for Income in Terms of Effort," _Economica_, X (June, 1930), 123-129.

[9]Own time as such cannot be considered as an "economic good proper," for time is not useful and scarce as such, but only in connection with specific activities: "time is always 'time-for-something'" (Alfred E. Ott, "Der Zeitbegriff in der Wirtschaftstheorie," in _Wirtschaftskreislauf und Wirtschaftswachstum_, ed. by Erich Schneider (Tübingen: J. C. B. Mohr, 1966), p. 138 (my translation). Thus, when we speak of own time, we

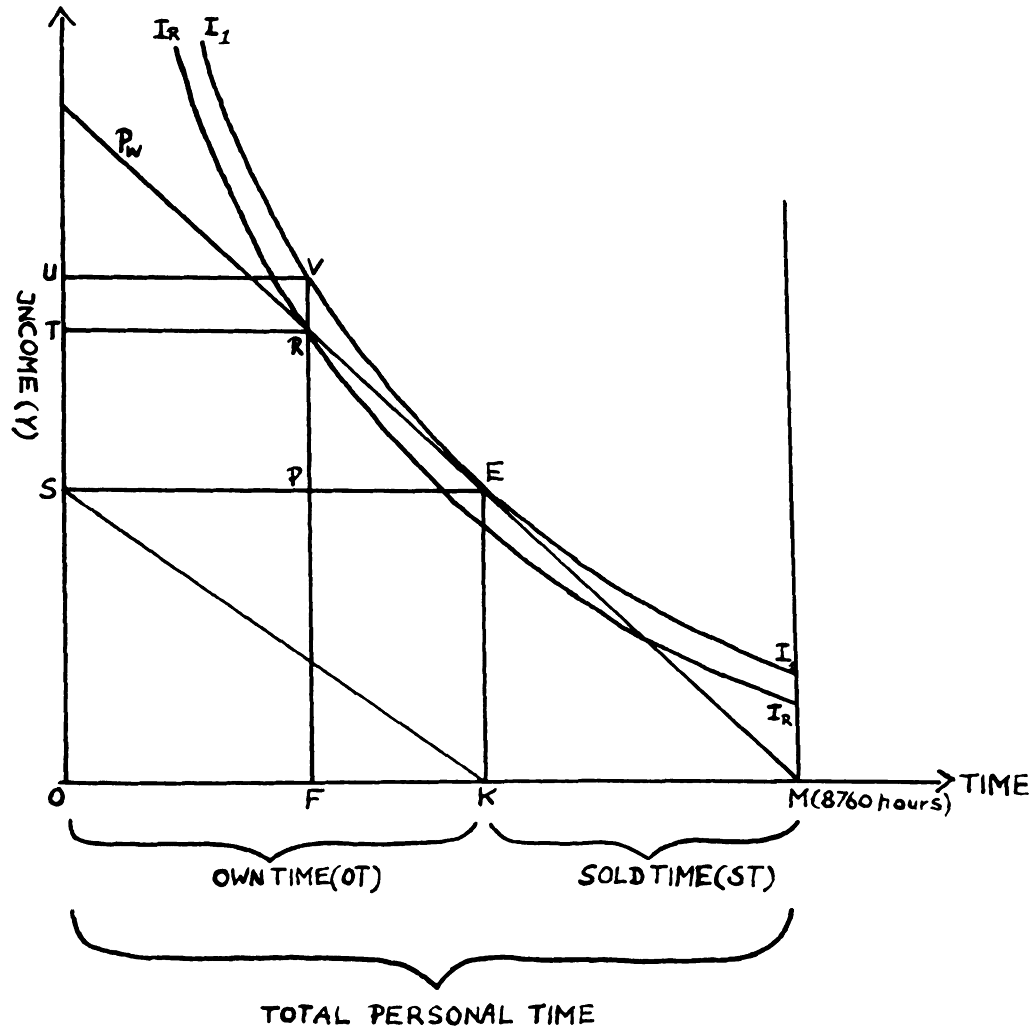

Figure 1.--The sold time (ST) - own time (OT) model.

I_1I_1 represents the indifference curve of an individual, indicating the various combinations of (Y) and (OT) which are indifferent to the individual (cf. IV, 1. B,C) P_w his hourly wage rate and (E) the equilibrium situation, i.e., (KM) hours of sold time are exchanged for (EK) = (SO) units of income (Y) per annum. (OK) are the remaining own time (abbreviated as OT) hours available to our individual, <u>including</u> among others the OR hours. Let (FK) represent this portion of his own time hours which he spends as OR time (e.g., vacation time). Then at the going wage rate

---

are always implicitly concerned with specific forms of own time: leisure, cleaning time, shopping time.

It is misleading, but so far has been the custom, to equate own time with leisure and sold time with work or labor. Actually, only a fraction of own time, for example (FK), may really be called leisure, while the rest (OF) falls into categories which range from pure work not sold in the market, to cross-breeds between leisure and work: miscellaneous household activities, like do-it-yourself, etc. Evidence indicates that non-leisure-own time (OF) must on the average amount to a substantial portion of total own time (OK). The National Recreation Survey of the U.S. (<u>National Recreation Survey</u>, A Report to the Outdoor Recreation Resources Review Commission, ORRRC Study Report 19 [Washington: U.S. Government Printing Office, 1962], p. 361) estimates 1318 annual leisure hours per capita, which together with an annual estimate of 2000 hours of sold time (work), would still leave 5442 hours of the total annual 8760 hours (= 365 x 24) for (OF). Even if we were to add 2920 hours (= 365 x 8) of sleep-own time to the leisure time estimate, the (OF) part of 2522 hours would still not be negligible.

In addition, sold time (KM) may include hours which only superficially can be called work: jobs, where people are paid <u>also</u> for the readiness to and presence at work. These and other difficulties are revealed as really unnecessary, when we adopt the more precise concepts of own time and sold time. The advantage of not defining non-sold time as leisure will become obvious especially in Chapter IV, 6.

P_w, our individual is actually foregoing (RP) = (TS) units of (Y) in exchange for (PE) = (FK) hours of OR leisure, i.e., the income opportunity cost of his total OR time amounts to (TS) of (Y) per year. Furthermore, should it be desired to induce our individual to work during his OR time (FK), we see that just paying him the going wage rate P_w would not suffice, for at R he is definitely worse off (i.e., on a lower indifference curve $I_R I_R$) than at E. To make him as well off as before would require payment of a premium of <u>at least</u> (RV) = (TU) dollars, or a higher wage rate for the additional (FK) hours of sold time supplied.[10]

We can say therefore, that the reason why the individual is actually <u>not</u> working during his OR time, preferring the leisure time to work, is, because the income opportunity cost (RP), or the market price of (FK) hours of OR time, is smaller than the "real" value of (FK) to the individual, which is at least (PV) dollars. Thus, he enjoys an "OR-surplus" of (RV) dollars. In other words, the value of own time, the price of OR time in particular, is <u>at least</u> P_w per hour.

---

[10] Later on we will show the effect which a different <u>distribution</u> of the ST-OT intervals may have on the value of time.

By aggregating the OR hours[11] over all individuals who have visited a particular OR area (park) during a year and multiplying by the respective wage rates (an average or minimum wage rate may be used), we then can estimate a money value or a portion of the primary OR benefit accruing to that OR site per year, if we consider entrance fees to be negligible.[12] The primary OR benefit of planned but not

---

[11] According to Recreation Advisory Council Circular No. 6 (Federal Executive Policy Governing the Reporting of Recreation Use of Federal Recreation Areas, Recreation Advisory Council Circular No. 6 [Washington: U.S. Government Printing Office, 1965]), Federal Agencies shall report OR use beginning 1965 in terms of "annual totals of visitor-days on the sites and areas which they administer" (p. 3). Visitor-days are defined as: "Twelve visitor-hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons" (p. 2). A visitor-hour is: "The presence of one or more persons on lands or waters, generally recognized as providing outdoor recreation, for continuous, intermittent, or simultaneous periods of time aggregating 60 minutes" (p. 2). For examples of visitor-day statistics see Appendix C.

[12] Formally, the money time benefit (MTB) of an OR area (j), per year, is:

$$MTB_j = \sum_{i=1}^{n} P_{Wi} \times T_{ij},$$

where P_{Wi} = hourly wage rate of the i^{th} recreationist, T_{ij} = number of visitor-hours which the i^{th} recreationist spent at OR area (j) per year, and where there are i = 1...n, recreationists per area and year.

T_{ij} measures only the actual time spent by recreationist i at OR area j. It therefore excludes desired visitor-hours in excess of the actual hours, which could not be actualized because of fixed contractual ties. For example, if the weather should turn out to be too beautiful, I might be willing to forego my income for an yet developed OR areas can be obtained by forecasting expected OR visitor hours and their money value per area and period. These forecasts will be a function of expected own time, wage rates and tastes, supply substitutes and other factors.

---

afternoon, in order to be able to spend the time in OR. However, the rigid labor contract forbids this.

One may therefore argue, that not the actual visitor-hours, but the desired visitor-hours (the desire being backed up by the willingness and ability to pay for it) should be measured by T_{ij}, for also these desired visitor-hours express the valuation attributed to the OR area. As we can in practice only measure the actual OR hours and the desired OR hours probably are greater than the actual hours, MTB_j underestimates the true (time) value of the OR area.

CHAPTER II

REVIEW OF MAJOR ATTEMPTS AT MEASURING PRIMARY OUTDOOR RECREATION BENEFITS*

The problem of how to measure primary OR benefits arose first within the various agencies of the U.S. Federal Government, for benefit measures were needed for planning, project justification and cost allocation among the

---

*Findings up to 1962 are already summarized in: Economic Studies of Outdoor Recreation, A Report to the ORRRC, ORRRC Study Report 24 (Washington: U.S. Government Printing Office, 1962).

See also: Water for Recreation--Values and Opportunities, ORRRC Study Report 10 (1962), pp. 47-50.

A further discussion of various methods of evaluation can be found in Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation (Baltimore: John Hopkins Press, 1966), especially pp. 212-229.

This review will therefore be limited to the summary of the essentials of the major methods.

Cf. also Paul R. Kipp, Annotated Bibliography on the Economic Evaluation of Outdoor Recreation and Related Subjects, 1959. (Available at the Central Library, Department of the Interior, Washington, D.C., mimeograph.) 29 pp.

William A. Dill, A Partial Bibliography on the Economic Evaluation of Sport Fishing and Fisheries Resources, FAO Fisheries Circular No. 8 (Revision 1), prepared for European Inland Fisheries Advisory Commission (EIFAC), Rome, March, 1964, 18 pp.

German "attempts" are summarized in Hartmut Jacob, "Zur Ökonomik der Erholungsfunktion des Waldes," Allgemeine Forst Zeitschrift (München), 26. Jg., 17, (April 24, 1971), 348-351.

A survey article is that of T. L. Burton and Margaret N. Fulcher, "Measurement of Recreation Benefits--A Survey," The Journal of Economic Studies, III, No. 2 (July, 1968), 35-48.

purposes served. It is therefore not at all surprising that these agencies also first attempted to evaluate these benefits.

(1) The first most systematic study was undertaken by the National Park Service in 1947 in the form of an analysis of letters in which a list of consultants replied to an inquiry of the National Park Service.[13] The general conclusion of this report was unnecessary pessimistic: "recreational values cannot be measured in dollar terms other than on some arbitrary or judgment value basis" (p. 30), mainly because these values are intangible. One of the reply letters, written by Harold Hotelling at least saved the face of the study. Hotelling suggested:

> Let concentric zones be defined around each park so that the cost of travel to the park from all points in one of these zones is approximately constant. The persons entering the park in a year, or a suitably chosen sample of them, are to be listed according to the zone from which they come. The fact that they come means that the service of the park is at least worth the cost, and this cost can probably be estimated with fair accuracy. If we assume that the benefits are the same no matter what the distance, we have for those living near the park, a consumers' surplus consisting of the differences in transportation costs. The comparison of the cost of coming from a zone with the number of people who do come from it, together with a

---

[13] Roy A. Prewitt, "The Economics of Public Recreation--An Economic Study of the Monetary Evaluation of Recreation in the National Parks," U.S. Department of the Interior, National Park Service, Washington, D. C., 1949. (Mimeographed.)

> count of the population of the zone, enables us to plot one point for each zone on a demand curve for the service of the park. By a judicious process of fitting it should be possible to get a good approximation to this demand curve to provide, through integration, a measure of the consumers' surplus resulting from the availability of the park. It is <u>this</u> consumers surplus (calculated by the <u>above</u> process with deduction for the cost of operating the park) which measures the benefits to the public in the particular year (Sect. II, p. 5 ff).

While Hotelling's approach has been criticized mainly for his assumption of identical tastes or preferences of visitors from different zones,[14] it at least provided a foundation upon which several followers could erect their modifications. We will mention here only those of Trice and Wood and M. Clawson.[15]

---

[14]In fact, the visitors from the most distant zone would set a "bulk-line value" of recreation and the consumer surplus which recreationists from nearer zones would enjoy, because they have to pay comparatively lower travel costs, would orient itself at the travel costs of the most distant user.

[15]Other modifications are those of N. W. Mansfield, "The Estimation of Benefits from Recreational Sites and the Provision of a New Recreation Facility," <u>Regional Studies</u>, V, No. 2 (July, 1971) 55-69; Peter H. Pearse, "A New Approach to the Evaluation of Non-Priced Recreational Resources," <u>Land Economics</u>, XLIV, No. 1 (February, 1968), 87-99; Leonard Merewitz, "Recreational Benefits of Water Resource Development," <u>Water Resources Research</u>, II, No. 4 (Fourth Quarter, 1966), 625-640; E. Boyd Wennergren, "Valuing Non-Market Priced Recreational Resources," <u>Land Economics</u>, XL, No. 3 (August, 1964), 303-314 and "Surrogate Pricing of Outdoor Recreation," <u>Land Economics</u>, XLIII, No. 1 (February, 1967); and William G. Brown, Ajmer Singh, and Emery N. Castle, <u>An Economic Evaluation of the Oregon Salmon and Steelhead Sport Fishery</u>, Technical Bulletin 78 (Corvallis: Agricultural Experiment Station, Oregon State University, 1964), 47 pp.

Trice and Wood[16] make use of Hotelling's travel cost method in an empirical application. For three areas in the Sierra Nevada the following sample information was available:

> 1. Number of persons in each recreational party.
> 2. The city or county of origin of each party.
> 3. The number of days spent by each party in the area of recreation.
> 4. The number of days the party spent on its entire recreation trip.
>
> By use of the four items of specific information secured from each recreational party, there was computed for each of them an average cost of travel per visitor day (p. 204). [A travel rate of 6.5 cents per mile was used.]

As it was not known whether the trips were single purpose or multiple purpose trips, i.e., whether other areas were visited along the trip to the subject area, it was assumed

> That a proper charge of travel cost to the area under study is the percentage of the total round trip spent in the recreational area. For example, if four people on a fourteen-day vacation trip, spent seven days in the area, fifty percent of the computed round trip cost would be divided by the total number of person days in the trip (28), to obtain the per visitor day cost of travel (p. 204).

The total travel cost per visitor day is then plotted against the number of visitor days, which yields a kind of a downward sloping demand curve. Trice and Wood establish a bulk-line market value at the 90th percentile and subtract from it the median travel cost to obtain a "free benefit" or consumer surplus of approximately $2.0 per visitor day. Trice and Wood admit their "rather broad

[16] Andrew H. Trice and Samuel E. Wood, "Measurement of Recreation Benefits," Land Economics, XXXIV (August, 1958), 195-207.

assumption as to the sameness or homogeneity of the members of the group under study" (p. 206), an assumption which is criticized in a reply by L. G. Hines.[17] A. Scott[18] maintains that

> the Trice-Wood method is actually a short-cut, avoiding the working out of a full demand curve. Its disadvantages are not only that it searches for the irrelevant consumer's surplus, but also that it is highly sensitive to essentially arbitrary decisions made by the researcher (p. 37).

M. Clawson,[19] while building upon the basic Hotelling idea, gets around the identity of preferences assumption. He begins by plotting a demand curve for the whole recreation experience, showing total monetary cost per visit to four National Parks on the vertical axis and thousand visits per 100,000 population on the horizontal axis, "for groups of California counties and for groups of states, in each case within rather well-defined distance zones from the park" (p. 16). The total cost per visit is "estimated at average cost of $9.00 per day

---

[17]Lawrence G. Hines, "Measurement of Recreation Benefits: A Reply," Land Economics, XXXIV (November, 1958), 367.

[18]Anthony Scott, "The Valuation of Game Resources: Some Theoretical Aspects," Canadian Fisheries Reports, No. 4 (Ottawa: Department of Fisheries of Canada, May, 1965), pp. 27-47.

[19]Marion Clawson, Methods of Measuring the Demand for and Value of Outdoor Recreation, Resources for the Future, Inc., Reprint No. 10 (Washington, February, 1959).

(reported cost, minus transportation $8.47); plus 10 cents per mile for car for double one-way distance, divided by four on assumption of four passengers per car (p. 17, Table 1, fn. 5). The number of days or the estimated time required to complete a visit is "estimated on basis of 1 day per 400 miles of travel plus 1 day in park" (p. 17, Table 1, fn. 4). Thus, this method assumes that "money, time, and distance are highly correlated" (p. 16).

Clawson then proceeds to plot a second kind of demand curve, that for the recreation site per se, which he derives (extrapolates) from the demand curve for the total recreation experience. On the vertical axis of this new demand curve are shown increases in entrance fees and on the horizontal axis thousand visits. He contends "that this approximates the true demand curve for the recreation opportunity itself. It shows the relationship between price per unit and the number of units, all other factors remaining unchanged" (p. 26).

In a later study,[20] M. Claswon together with J. L. Knetsch, among other things, refine the method of estimating total costs per visit, by intuitively taking account of the fact that the trip to the parks may be multiple in nature. Thus the estimated cost per visit is shown

---

[20] Clawson and Knetsch, Economics of Outdoor Recreation.

a. as a full-cost figure "based on the assumption that the trip was made for the sole purpose of visiting Yosemite," and

b. as a shared-cost figure "based on the assumption that the trip was made for more than this purpose; it therefore includes all the direct costs of the side trip to Yosemite but only part of the costs of the main trip" (pp. 72-73).

For trips of less than 500 miles the whole cost of the trip is charged to Yosemite; the shared cost is therefore the same as the full cost of these trips. On the assumption that trips of more than 500 miles were undertaken only in part to visit Yosemite, costs of trip were charged 80 per cent to Yosemite for 500-1,000 mile trips, 60 per cent for 1,000-1,500 miles, 50 per cent for 1,500-2,000 miles, 40 per cent for 2,000-2,500 miles, and 33 per cent for 2,500 and more miles (Table 7, p. 74, fn. 6).

The total (gross) primary user benefit from the recreation area is measured as "the sum of the maximum prices which various users would pay for the various units of output from the area or project. This is equivalent to the total area under the demand curve" (p. 217) for the recreation site per se. For example, the total annual (primary) OR benefit for John H. Kerr Reservoir (a Corps of Engineers hydropower and flood control project on the Virginia-North Carolina border), "for the July 1, 1963-June 30, 1964 year, was about $1.6 million" (p. 221), and for the Lewis and Clark Lake in South Dakota ("a large reservoir created on the Missouri River by the Gavins Point Dam"; p. 64), the benefit measure was approximately $1.4 million.

The authors recognize that "owing to the incomplete accounting of the effects of time,[21] of intervening opportunities, and other constraints to visits in addition to money cost, these benefit estimates also have a downward bias" (p. 221).

The above travel cost method has been adopted by the U.S. Water Resources Council[22] in 1970 as one possible approach of measuring primary OR benefits for water and related land resources:

> Using marginal travel costs (i.e., variable costs of automobile operation directly related to the number of miles driven) taken as a measure of what people are willing to pay for water-oriented recreation and how price affects use, the relationship between price and per capita attendance can be established for recreation sites and market areas. This relationship, the conventional demand curve having a negative slope, sums up the response of users' demand to alternative prices of the recreational product (or experience). . . . [I]nitial project year day-use and camping-use

---

[21]Anthony Scott, op. cit., adjusts the demand curve for the opportunity cost of travel time. For another correction of this bias see Frank J. Cesario and Jack L. Knetsch, "Time Bias in Recreation Benefit Estimates," Water Pesources Research, VI, No. 3 (June, 1970), 700-704.

[22]The Water Resources Council is composed of the Secretary of the Interior, the Secretary of Agriculture, the Secretary of the Army, the Secretary of Health, Education, and Welfare, and the Chairman of the Federal Power Commission. It coordinates planning of water and related land resources, conducts, reviews and approves studies and makes recommendations. cf. The Water Resources Planning Act, Public Law 89-80, 89th Congress, S. 21, July 22, 1965.

benefits are computed by measuring the area under their respective demand curves.[23]

How is the above method related to our time price method? First of all, it should be emphasized that the travel cost method does not represent an alternative to our time price method but that it is supplementary to it, i.e., it is a possible (proxy) or indirect method of measuring the money price portion of the total price of OR, for the total price (benefit) is composed of the time price (P_T) and a money price (P_M), where we provide a measure of the former.

Secon dly, as was already stated earlier, distance traveled and time (length of stay at an OR site and travel time) are positively correlated, i.e., there is a tendency for the length of stay (the time spent at an OR area) to be greater, the longer the distance traveled to the area, cet. par.[24] Travel costs (prices) and time costs (prices) tend therefore also to be correlated.

(2) The "Standards" established by the Water Resources Council provide for another approach (besides the travel cost method already mentioned) to the measurement of OR benefits. It suggests daily unit values, which

---

[23] Standards for Planning Water and Related Land Resources, Report to the Water Resources Council by the Special Task Force (Washington, D.C.: Water Resources Council, July, 1970), III-B-2-15.

[24] Cf. Chapter V, 2; cf. also A. Scott, op. cit., p. 35.

are simulated prices per recreation day net of associated costs. This method is now in actual use in federal water resources planning on an interim basis and was originally published in Senate Document No. 97[25] and its Supplement No. 1[26] which was an official "recognition and full consideration of outdoor recreation as a primary purpose in water resource development project formulation and evaluation."[27]

According to the 1970 "Standards," the range of unit day values depends upon the type of outdoor recreation day:

a. A General Outdoor Recreation Day, which has a range of unit day values of \$0.75-\$2.25 is "a recreation day involving primarily those activities attractive to the majority of outdoor recreationists and which generally require the development and maintenance of convenient access and adequate facilities" (III-B-2-17),

---

[25] Op. cit.

[26] Evaluation Standards for Primary Outdoor Recreation Benefits, Supplement No. 1 (Washington, D.C.: Ad Hoc Water Resources Council, June 4, 1964), 9 pp.

[27] Jack L. Knetsch, Economics of Including Recreation as a Purpose of Water Resources Projects, Reprint No. 50 (Washington, D.C.: Resources for the Future, Inc., January, 1965), p. 1148.

b. A Specialized Outdoor Recreation Day, which has a range of unit day values of $2.50-$7.00 is "a recreation day involving those activities for which opportunities, in general, are limited, intensity of use is low, and often may involve a large personal expense by the user" (III-B-2-17).

The unit day values "reflect the consensus judgement of qualified technicians" and are "intended to measure the amount that the users should be willing to pay, if such payment were required."[28] They "represent an expansion of [a] schedule of values for fishing and hunting to all forms of outdoor recreation associated with water development projects."[29] These values for fishing and hunting were obtained from National Surveys of Fishing and Hunting "in the form of sportmens' expenditures . . . together with similar expenditure information from other federal and state expenditure surveys."[30]

> As finally developed, the schedule of values for the various types of fishing and hunting was believed to represent a first approximation of the net amount that a hypothetical private operator could realize from providing fishing and hunting on a federal reservoir project.[31]

---

[28] Supplement No. 1, op. cit., p. 5.

[29] William M. White, "Evaluation of Recreation in Water Developments," Journal of the Power Division, Proceedings of the American Society of Civil Engineers (May, 1965), 7.

[30] Ibid.

[31] Ibid.; William M. White, "The Economics of Sport Fisheries Management," Canadian Fisheries Reports, No. 4 (Ottawa: Department of Fisheries of Canada, May, 1965), pp. 73-78.

This method is thus a particular application of what is called the <u>market value method</u> which imputes private prices to comparable public OR areas.[32]

The above method can be critized mainly because:

a. Using charges at private OR areas for the measurement of benefits at public OR areas imposes a downward bias on these benefits, as the almost free supply of public areas competes with and depresses the price which can be charged at private areas.

b. "The charges that users are willing to pay at private areas may largely reflect payments for benefits in excess of those available at public areas--better management, less crowding, for example. It is precisely because private areas are not fully comparable with public areas that users are willing to pay fees or charges."[33]

---

[32]See: R. A. Spargo, "Methods and Techniques of Evaluation of Sport Fishing," <u>Canadian Fisheries Reports</u>, No. 4 (Ottawa: Department of Fisheries of Canada, May, 1965), 53-69.

Ruth P. Mack and Sumner Myers, "Outdoor Recreation," in <u>Measuring Benefits of Government Investments</u>, ed. by Robert Dorfman (Washington, D.C.: The Brookings Institution, 1965), pp. 71-101, espec. pp. 82ff.

<u>Proposed Practices for Economic Analysis of River Basin Projects</u>, Report to the Inter-Agency Committee on Water Resources ("Green Book"), Prepared by the Subcommittee on Evaluation Standards (Washington, D.C.: U.S. Government Printing Office, May, 1958), pp. 43-44.

[33]Clawson and Knetsch, <u>op. cit.</u>, p. 227.

c. A further bias is introduced through the fact that the number of recreation days at public areas are measured at a nominal or zero charge. "The number at a zero charge will be considerably larger than the number at the entrance fee which would maximize revenue. Multiplying the value per visit by the number of visitors at a zero charge will therefore result in an overestimate, perhaps a serious one, of the benefits or values produced."[34]

(3) Closely linked with the two previous evaluation methods is the so-called gross expenditure method.[35] "This method attempts to measure the value of recreation to the recreationist in terms of the total amount spent on recreation by the recreationist,"[36] for such items as food, lodging, transportation, recreation equipment, etc.

Obviously, this method, while popular, must be subjected to severe criticism:

a. "Many so-called recreational expenditures are normal expenditures"[37] which would have been made also in the absence of OR. A substantial portion of food and travel expenditures belong to this category. Thus it

---

[34] Ibid.

[35] See Trice and Wood, op. cit., pp. 198ff.

[36] Clawson and Knetsch, op. cit., p. 224.

[37] Trice and Wood, op. cit., pp. 199-200.

cannot be said that these expenditures were in any sense "new or additional" in order that they could be attributed solely to the OR experience to measure the "worth" of the latter.

b. "Even those expenditures which are over and above normal living costs are not necessarily measures of recreational enjoyment, but are the price paid for certain goods and services (in connection with the OR experience)[38] for which there are established market values. Dollars spent in pursuit of recreation appear to be more significant as indicators of secondary benefits to the business community than as measures of primary recreational benefits."[39]

(4) Cost Method. This method "assumes that the value of outdoor recreation resource use is equal to the cost of generating it or, in some extreme applications, to a multiple of that cost."[40]

While there may be a tendency for benefits, measured in terms of visitor hours spent at OR areas, to be greater, the greater the cost of developing these areas, nothing can be "gained by assuming a constant

---

[38]My insertion.

[39]Trice and Wood, op. cit., p. 200; cf. also Spargo, op. cit., p. 59).

[40]Clawson and Knetsch, op. cit., pp. 225-226.

relationship between benefits and costs." It involves circular reasoning:

> Obviously, the reason for estimating benefits in the first place is to decide economic feasibility or, in other words, whether costs should be incurred at all. To assume that benefits are equal to or twice as great as costs in every case is to make all recreational projects feasible. In addition, if the ratio of benefits to costs are equal for every project, there is no [real][41] basis for establishing priorities among projects,[42]

and justification of projects will be left to "intangible considerations."

Furthermore "this method offers no guide to evaluating a contemplated loss of recreation opportunities, and it allows very little discrimination between the relative values of alternative investment opportunities."[43]

(5) A more refined method of using costs for the measurement of primary OR benefits is the <u>alternatives method</u>. Benefits are here "established on the basis of the difference between the cost of production by one means and the cost of production by the next alternative means of production."[44]

---

[41]My insertion.

[42]Trice and Wood, <u>op. cit.</u>, p. 201.

[43]Clawson and Knetsch, <u>op. cit.</u>, p. 226.

[44]Spargo, <u>op. cit.</u>, p. 63.

A variant of this method can be applied to computing OR benefits of fishermen:

> If in fishing the alternative [river, e.g.][45] higher costs are incurred (such as having to travel farther), then this represents an additional cost to the sportsman. The saving of this additional cost represents the primary benefits to the fisherman from having the river he tends to fish in existence."[46]

A problem will here consist in finding comparable alternatives (which may be difficult for unique areas like, e.g., Grand Canyon) and of selecting the one most appropriate for the area under consideration.

In Germany, H. Papst[47] has computed for a forest near Freiburg, its outdoor recreational value in terms of cost savings which would result, if the forest would not be converted to other (non-recreational) uses. The cost savings, through preservation of the forest, includes "the near city location, number and frequency of recreationists and costs for alternative recreation" (p. 163). Papst analyses and compares the costs of three possible OR-alternatives (to the forest in existence):

---

[45] My insertion.

[46] Cf. Edward L. Ullman and Donald J. Volk, "An Operational Model for Predicting Reservoir Attendance and Benefits: Implications of a Location Approach to Water Recreation," Papers: Michigan Academy of Science, Arts and Letters, XLVII (1961), Ann Arbor, 1962.

[47] H. Papst, "Zur Bewertung der Sozialfunktion des Waldes in Stadtnähe," Allgemeine Forst-und Jagdzeitung, 140.Jg., Heft 7 (July, 1969), pp. 158-163.

1. Alternative recreational facilities are not supplied, the town people have to divert to other more distant areas at their own expense.
2. The loss of the forest area is compensated by the establishment of town-area parks at public expense.
3. The forest is preserved and converted into a woodland park at public expense (p. 163).

(6) Direct Interview Method. This method simulates demand curves for OR areas through direct interviewing of recreationists concerning their willingness to pay "for the services of the land and water areas used."

> Willingness to pay of a sample of users was determined in an interview which included, among other things, a bidding "game" in which respondents could react positively, negatively or indifferently to increased costs of visiting the area. Bids were systematically raised (or lowered) until the user switched his reaction from inclusion to exclusion (or vice versa).[48]

> There are obvious problems of bias in stating reactions to hypothetical purchases, but this may be reduced with skillful interviewing. There are also disadvantages from the standpoint of generalizing the results to wider and proposed new areas, and costs of obtaining the needed information are high.[49]

(7) Although it would certainly not represent a very popular method, the most direct way to measure

---

[48] Robert K. Davis, "The Value of Outdoor Recreation: An Economic Study of the Main Woods" (unpublished Ph.D. dissertation, Harvard University, 1963), Summary, p. 1.

[49] Clawson and Knetsch, op. cit., p. 228; cf. Spargo, op. cit., p. 62; and Mack and Myers, op. cit., pp. 85ff.

primary OR benefits or willingness to pay, would be to leave all the indirect methods discussed so far aside and impose actual fees or tolls. A. Scott shows "that a value for the resource could be obtained, mechanically, by estimating the maximum present value of net returns that could be gained by the imposition of a hypothetical toll."[50] Warren C. Robinson suggests that recreation services be priced at marginal costs.[51] The Land and Water Conservation Fund Act of 1965 (78 Stat., 897), which encourages and permits user or admission fees to federal recreation areas under various conditions, goes a modest step in this direction.[52]

---

[50]A. Scott, op. cit., p. 43.

[51]Warren C. Robinson, "The Simple Economics of Public Outdoor Recreation," Land Economics, XLIII, No. 1 (February, 1967), 71-83.

David W. Seckler proposes that demand curves for OR be corrected for the effects of unequal income distributions, otherwise the imposition of fees would ration OR areas not in an "income neutral" way, i.e., the rationing would be in favor of the "comparatively well-off." David W. Seckler, "On the Uses and Abuses of Economic Science in Evaluating Public Outdoor Recreation," Land Economics, XLII, No. 4 (November, 1966), 485-494.

[52]Cf. U.S. Congress, House, Subcommittee on Rivers and Harbors and the Subcommittee on Flood Control of the Committee on Public Works, Hearings, Entrance, Admission, and User Fees at Corps of Engineers Projects, 89th Cong., 2nd Sess., 1966, H.R. 13313 and related bills (Washington, D.C.: U.S. Government Printing Office).

U.S. Congress, Senate, Committee on Interior and Insular Affairs, Hearing, Land and Water Conservation Fund, 88th Cong., 2nd Sess., 1964, H.R. 3846 (Washington, D.C.: U.S. Government Printing Office).

(8) R. P. Mack and S. Myers "find that benefits need to be measured in terms of a merit-weighted service unit: merit-weighted user-days of outdoor recreation,"[53] whereby "'merit' rests in the utility measured along a social welfare function" (p. 89).

> The utility of a user-day of recreation differs, of course, depending on what sort of recreation is used by whom. These differences are taken into account in the weighting system whereby various sorts of recreation for various sorts of people under varying conditions of supply are converted to merit-weighted user-days. The weights imply the formulation of criteria for proper performance of government's function with respect to the provision of the service. The political process as well as explicit judgments are viewed as contributing to the formulation of the criteria (p. 72).

> The criteria fall in several groups: Public-private relationships; quality standards; balance among the kinds of recreation that are provided; distributive justice among present members of the community; justice with respect to present and future members (p. 90).

U.S. Congress, Senate, Report No. 1364, Calendar No. 1300, Land and Water Conservation Fund Act, 88th Cong., 2nd Sess., 1964.

U.S. Congress, House, Committee on Public Works, Briefing on H.R. 5269, The Federal Water Project Recreation Act, 89th Cong., 1st Sess., 1965 (Washington, D.C.: U.S. Government Printing Office).

U.S. Congress, Federal Water Project Recreation Act, Public Law 89-72, 89th Cong., S. 1229, July 9, 1965.

For a discussion of the pro and cons of OR pricing, cf. Clawson and Knetsch, op. cit., pp. 272ff. and pp. 313ff.

[53] My emphasis; Mack and Myers, op. cit., p. 71.

Among these criteria, distributive justice (need) and gross geographic equity (supply excess or deficiencies; proximity) are especially emphasized.

While this procedure may be useful in that it provides "a check list and some quantitative orders of magnitude of benefits and costs" (p. 100), in our opinion, it seems to be too arbitrary in its reliance upon the judgment of some OR-merit-evaluator. Although performance criteria may indicate that one park has greater merit than an alternative park, on what basis should one decide by <u>how much</u> actual or estimated user-days are to be adjusted, so that the merit-weighted level of service can be computed? Rather than having the merit-evaluator decide for the community what is good for them, it is more desirable to take explicit account of the actual demand in terms of time- and money-prices, which have the further advantage in that they can be compared with dollar benefits of other purposes of land use, while not all other pruposes and their respective benefits can be measured in merit-user days.

For analytic completeness it should be mentioned that the above method <u>could</u> be combined with our time price method, if the newly available figures of visitor-days per annum would take the place of user-days and if the corresponding <u>merit-weighted visitor-days</u> (hours) would be weighted with the respective wage rates to yield dollar figures of primary OR benefits.

(9) There have been attempts to derive OR benefits from the increased market value of private property close to OR areas.[54]

In this connection, we suggest that a portion of the aesthetic-scenic yield of the total primary OR benefit can be estimated empirically through the following view-method:

Hotel-room prices are often differentiated according to "views," i.e., prices of rooms of equal comfort, size, etc. vary with the quality of their window exposures to the outside (lake vs. backyard exposure, i.e., scenery vs. no scenery). There thus exists a definite price for a "view per day" (P_x), which can be computed by subtracting the price of the room without the view (P_o) from the price of the room with the view (P_m), *cet. par.*, assuming that (P_x) is not a price for prestige. By multiplying (P_x) with the number of average "visitor-days" per year ($\bar{D}_v$) of a particular site, we can get through imputation an estimate of the annual scenic

---

[54] See Elizabeth L. David, "Lakeshore Property Values: A Guide to Public Investment in Recreation," *Water Resources Research*, IV, No. 4 (August, 1968).

M. Prodan, "Zur Bewertung der Sozialfunktion des Waldes in Stadtnähe," *Allgemeine Forst- und Jagdzeitung*, 6 (1968), pp. 131-138.

Clawson and Knetsch, *op. cit.*, pp. 222-223.

yield or benefit of this site. Empirically, (P_x) can be approximated through a sample of hotels and their room prices, for which the cet. par. assumptions hold. An average for (P_x) from the various price differentials could then be computed.

(10) Recently, Erwin Hartsch[55] has proposed a method which shows some similarity to our own. He measures the value of an hour of leisure (F) as follows:

$$F = \frac{NE}{Z \cdot B}, \text{ where}$$

NE = National Income, Z = average leisure time in hours per year and per worker in "material production," B = number of workers in "material production."

Hartsch assumes that the value of physical and psychic energy reproduced during leisure time is at least as great as the value produced during the time of production, which we can measure in National Income.

The recreation potential of an OR area (W_E), measured in money units, according to Hartsch, is:

$$W_E = \Sigma_m \Sigma_n \times T_{mn} \times K_{mn} \times \alpha F, \text{ where}$$

[55]Erwin Hartsch, "Versuch zur Bestimmung des ökonomischen Wertes von Erholungsgebieten," Wissenschaftliche Zeitschrift der Technischen Universität Dresden, 19, Heft 2 (1970), pp. 499-501 (Editor: TU Dresden, East-Germany.)

T = the sum of OR hours spent in the OR area,

K = capacity of the OR area (in hours),

m = the different kinds of OR (e.g., walking, swimming, etc.),

n = the different social groups (e.g., age, profession, etc.).

Hartsch then subtracts social and individual costs per area (A_E) from (W_E), to find (N_E), the (net) benefit of the OR area, i.e.,

$$W_E - A_E \equiv N_E.$$

While Hartsch derives his leisure value (F) as an average for the whole economy, our opportunity cost value (P_W) is a micro-value. (F) would correspond to our value (P_W), if Z would be substituted through our (ST), which would yield an average wage for the whole economy.

However, as normally ST < OT per year (OT corresponding to Z), (F) has a downward bias, which can also be shown in Figure 1 through the difference in slope between (P_W) and the line (SK), i.e., (SK) being flatter than (P_W) as OT > ST. Only in the rare case when ST = OT, would the value (P_W) and (F) coincide. When ST > OT, $(F) > (P_W)$.

The above downward bias of (F) is further reinforced through the fact (as we will show later on), that (P_W) underestimates the true value of OT per hour, because there exists <u>above</u> (P_W): (a) an own time surplus, and (b) a direct price of own time.

To conclude, most of the methods mentioned in this chapter, in so far as they try to provide money measures of the willingness to pay for OR, may serve as possible measures of the pure money price side of the total primary OR benefits per area or acre. They are, however, all[56] deficient in that they neglect to measure the actual time price paid by recreationists, which is the second component of any figure of total primary OR benefits. We propose a method of quantifying this second element.

---

[56]With the exception of the Hartsch proposal and the modification of the travel-cost method, proposed by A. Scott, <u>op. cit.</u>, which takes account of the opportunity cost of time in the estimation of the elasticity of demand.

CHAPTER III

TIME AND ECONOMICS

The role of time in economic theory can be condensed into three different "sets of problems:"[57]

a. Time as the Economic Period;
b. Time as an Economic Good;
c. Time as Velocity of Adjustment.

We will here be concerned with time in its second "role." In particular, the role of time in its "money" function as a measuring rod of value and as an object of valuation--apart from and in addition to the role which time has already played in the "Labor Theory of Value," Queuing Theory and in the Economics of Transportation--will be of interest.

With increasing economic development there is reason to predict economics to become relatively more concerned with time (prices) and relatively less with money (prices). The more economies grow toward a level

---

[57] This distinction is adopted from P. N. Rosenstein-Rodan, "The Role of Time in Economic Theory," Economica (February, 1934), pp. 77-97.

Paul Bernhard Wittenburg, "Wirtschaft und Zeit," (Eine Untersuchung über den Begriff der ökonomischen Zeit), Heidelberger Studien, ed. by Arthur Salz (Institut für Sozial-und Staatswissenschaften), II, Heft 6 (Heidelberg: Verlag der Weiss'schen Universitätsbuchhandlung, 1932), who classifies the various uses and meanings of the time concept found in economic theory, distinguishes seven meanings.

of material abundance ("guaranteed income," etc.), the less we have to be concerned about material scarcities and the more our attention will be focused upon the ultimately scarcest of all goods: "human time."

(1) Time Scarcity

The scarcity of human time[58] is of a fourfold nature:

a. The time of human existence is not a free good, but must be "produced" through the consumption of other scarce resources. In the beginning, money (goods) was (made) time, and only after that, time was money.[59] This we call the production-cost scarcity of time.

b. The production of time is restricted by a law of nature to certain "quotas" or rations, i.e., no more or less than one day, hour, week, etc., can be produced per person at a time, during one day, hour, week, etc., respectively. Time occurs only successively and not "simultaneously." Only on the macro scale of a group, nation of individuals (population) may we speak, for instance, about a production of 180 million human days per day.

---

[58]Relative to human wants--hence the necessity to economize it.

[59]Cf. Appendix A: The Theory of the Production of Time.

Because we consume our time as soon as we produce it, i.e., consumption and production of time occur simultaneously, time can never be saved or stored in the sense we save and store other goods (money). This leads us to derive the <u>time-satiation-impossibility-law</u>, which says that we can never be satiated with time (except when we are bored), because we can never have enough time (at a time). Time is always scarce and distant: the next day can be had only tomorrow and not now. Needless to say, that the above holds true only under the assumption that time is desirable in the first place. And time will be desirable only as long as we desire goods, are involved in projects, whose still "outstanding" fulfillment and satiation (completion) in turn implies that we are separated from them by finite or infinite (God; the "infinite" landscape) time distances (cf. Chapter IV, 5). Ultimately, time is therefore scarce and will be valued only because we desire to live[60] and we desire to live because we are always and perpetually continuing to be distant from where, how and

[60] If we don't desire to live, when the utility of lifetime is zero or negative, we either commit suicide, or if the own cost and the cost to others of taking the lifetime exit (suicide) is too great, we may continue to live at the level of despair or absurdity. These aspects I have further developed in an unpublished paper: "A Theory of Projects: Its Application to Death and Suicide," May, 1966.

what we would like to be.[61] The latter "distance" in turn is the result of our incapacity to consume all goods and to do all things simultaneously and instantly and our inability to produce more time at a time. The circulus vitiosus is closed.[62] "Being" and the objective "time constraint" are tangential.

This time scarcity would exist even in a hypothetical state of unlimited lifetime. It is reinforced through our limited human capacity to consume goods and to do things simultaneously, which necessitates the choice of present vs. future consumption, i.e., the choice of when to consume (do) what and how much.

c. On the demand side, we can observe a tendency for an increasing scarcity of time. Here, scarcity is caused, as is stressed by Linder,[63] through economic growth; for consumption of an increasing amount of goods increases the competition for the fixed amount of time per period: it takes time to consume goods in addition to money.

---

[61]This is not to deny that there may exist "desireless" times in human lives, when the human soul is at peace and rest.

[62]Every man alive must be engaged in some project(s). Even the "Absurd Man" as portrayed by A. Camus in the "Myth of Sisyphus," affirms his project of pushing the rock or of writing essays and even the despairing man may find in suicide his last, although futile, project.

[63]Staffan B. Linder, Das Linder Axiom oder Warum wir keine Zeit mehr haben (Gütersloh-Wien: Bertelsmann Sachbuchverlag, 1971).

d. There exists a force beyond human control yet: death, which sets an ultimate upper limit (budget) to all individual time production; a transcending force through which all intermediate time units (budgets) attain an additional and increasing sense of scarcity.

We can therefore view time budgets in a short run and a long run sense: a long run (lifetime) budget of uncertain size, which in turn is made up of short run sub-budgets. The short run budgets of an hour, day, week, month or year are scarce already because of the first three reasons, but this time scarcity is reinforced through the final horizon of the long run lifetime budget which is continuously "eaten up," or approached by the short run time budgets.[64] Every new short run time budget brings us a step closer to the point where nothing of the long run budget--whose uncertain[65] size can only

[64] The size of the long run lifetime budget may depend upon the way we spend our short run budgets, cet. par. At the extreme, if the short run budget allocation for an individual's leisure existence-minimum (I_L in Appendix A) does continuously not occur, the long run budget will soon approach. But the closer the long run budget horizon, the higher will be the scarcity of lifetime, and the higher will, cet. par., be the value of allocating short run budgets as a leisure existence-minimum. This is the economic explanation for the "natural" tendency of man to preserve his life. The person who has faced death, whether in sickness, accident or contemplated suicide, will consider life more precious. Life's built-in scarcity mechanism can be life-preserving.

[65] The fact that the lifetime budget is uncertain, in itself enhances the scarcity and value of present short run time budgets. Even if lifetime were infinite with a 99% probability, the remaining death possibility of 1%

be estimated according to the laws of probability--remains. This third aspect thus yields a Law of the Increasing Scarcity of Time, with increasing lifetime (age or imprisoned time),[66] i.e., through living, the

---

would suffice to make time scarce. Not knowing with certainty (but probability only) whether we will be alive the next hour, day or year, it is more secure and less risky to treasure and prefer present over future thought and action, unless one is a risk-preferer. This also supports the Austrian time preference theory.

[66]In the words of the philosopher Arthur Schopenhauer: "As long as we are young, whatever we are told, we look upon life as being endless and we treat time accordingly. The older we become, the more we economize (use sparingly) our time." (Arthur Schopenhauer, Aphorismen zur Lebensweisheit, Goldmanns Gelbe Taschenbücher, München, 1960, p. 207; my translation).

The increasing frequency of death anxiety with old age can be said to be a positive function of this increasing scarcity of time, although it may not necessarily be death himself that is feared, but the waste of ones lifetime--a heightened recognition of the "inefficient" allocation of human time and resources. (Cf. Herman Feifel, "Death-Relevant Variable in Psychology." Ch. 3 in Existential Psychology, ed. by Rollo May [New York: Random House Studies in Psychology, 1961], pp. 72-73).

Furthermore, the huge suns of money which are sometimes invested in hopeless cases of illness, only in order to extend lifetime for relative short periods, are evidence of the heightened preciousness of scarce time once the long run time budget horizon is near. In these cases we would be truly justified in saying that: Money is Time.

Whether the same sums of money would have been invested in human lifetime (health) when the death horizon was still far away, may be doubted. According to an old German saying: During the first half of our life we sacrifice our health in order to earn money; during the second half of our life, we sacrifice our money to regain our health. In the meantime, life and health fade away.

This latter form of human myopia--a myopia of future time scarcity--when one thinks to have plenty of it, may be very costly indeed: the cost of prevention remaining lifetime budget is continuously dwindling, becomes scarcer: life is a journey towards death.

Whether there exists also a Law of the Increasing Marginal Utility of Time with increasing age, will depend upon the inherent utility of additional lifetime units. There is a tendency--which however is not a necessary one--for activities, experiences, etc., to become increasingly repetitive and monotone (satiated) with increasing lifetime, a tendency therefore for a diminishing marginal valuation of time which might reduce, balance or outweigh the increased value placed upon additional time resulting from its heightened scarcity.

---

usually would be less than the cost of cure and the opportunity cost of no cure, i.e., premature death (cf. Burton A. Weisbrod, Economics of Public Health, [Philadelphia: University of Pennsylvania Press, 1961]).

Government legislation and health programs (work-hour legislation and health programs (work-hour legislation, vaccinations, free physical checks, etc.) may partially correct some of this myopia. (Cf. Ludwig Schnorr von Carolsfeld, "Arbeitszeit und kollektiver Arbeitsvertrag," in Arbeitszeit und Freizeit; Nümberger Hochschulwoche, Februar, 1961, Nürnberger Abhandlunger zu den Wirtschaft- und Sozialwissenschaften, Heft 15; Duncker und Humboldt, Berlin, pp. 149-160).

Later on, we will see that the investment of time and money in OR may be an indirect way of preventing ill health.

Moreover, the costly attempts of life extension or preservation through medical research ("Human Hibernation"; sleep substitution, etc.) illustrate man's dissatisfaction with the length of his conscious and unconscious lifespan. From the economic point of view, the tremendous waste of human capital which occurs every time a human person dies, that huge store and creator of knowledge which decays before our eyes--while at the same time a great part of the investment in education of a new generation must try to replace just this knowledge which thus has vanished--may be the greatest conceivable waste.

Hermann Friedmann[67] has also observed this antinomy of the two tendencies:

> The "lifetime-good" manifests two characteristics which are seemingly antinomous. With each act of consumption it tends towards an infinitely great "satiation," on the other hand, the value of the continuously decreasing liferest is continuously growing and becomes infinitely great at the moment of death (p. 371).

Friedman (p. 371) summarizes the latter tendency--which we have called the Law of the Increasing Scarcity of Time--in the form of the following equation:

$$x = \frac{1}{T - t}$$

in which "(t) stands for some instant (point of time) during a lifetime whose end occurs at a later instant (T)," and (x) represents the ordinal, subjective value of the lifetime-rest.

> When the difference (T - t) disappears, i.e., when the lifetime has reached its end, (x) will become infinitely great. In the case when the end is impending immediately, i.e., when only an infinitely small interval separates (t) from (T), (x) will be at a maximum (p. 371).[68]

This idea is further illustrated through the following Figure 2, in which the horizontal distance OB represents the expected "own" supply of lifetime $S_T S_T$, which is being produced at a constant (marginal) cost (I) through the

---

[67] Hermann Friedmann, Wissenschaft und Symbol, Aufriß einer symbolnahen Wissenschaft (München: Verlag C. H. Beck, 1948), p. 371ff.; my translation.

[68] At birth, i.e., when t = 0, x will be a minimum.

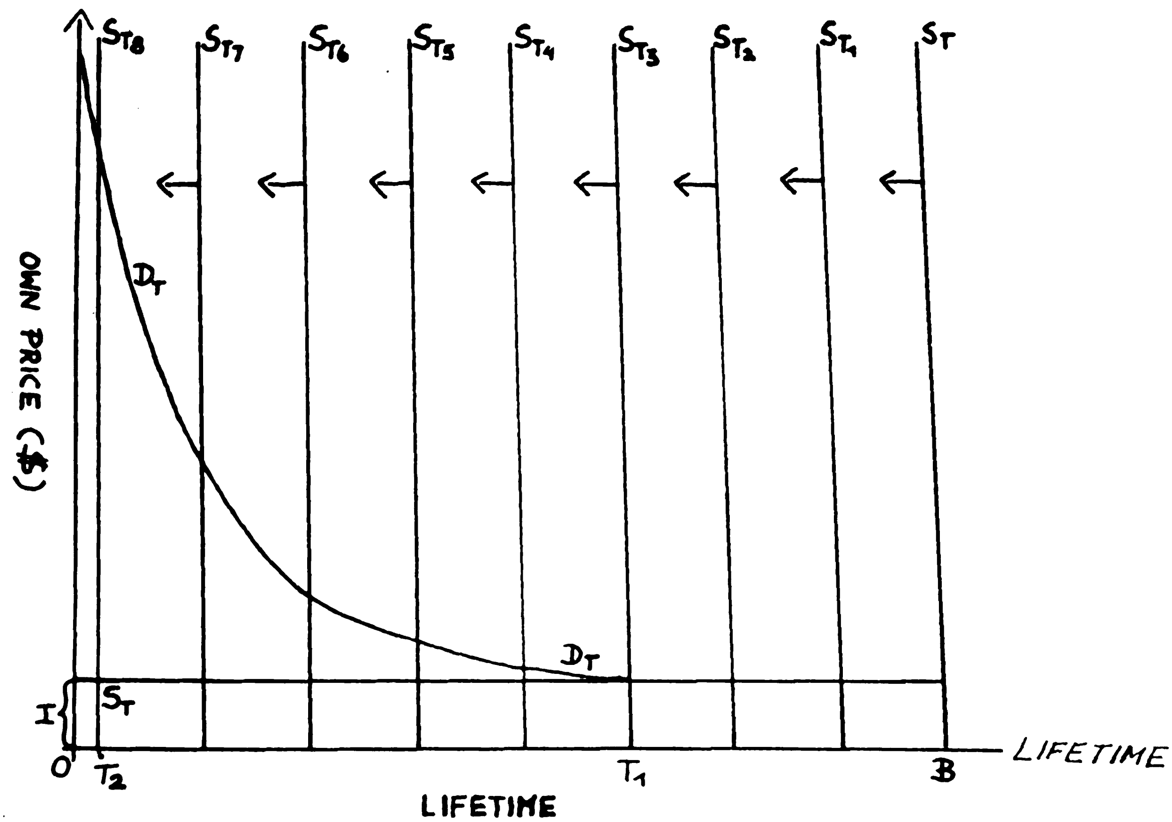

Figure 2.--Demand and supply of lifetime.

consumption of the existence minimum (cf. Appendix A) and in which D_TD_T is the demand curve for "own" lifetime. S_TS_T and D_TD_T are shown to become identical beyond point T_1.

At birth, the distance OB obviously is at a maximum. Continuous living means that the vertical stretch of the supply curve moves closer and closer towards the origin (O), i.e., the supply of lifetime decreases the longer we live. This "natural" movement of $S_T S_T$ toawre (O) has to be distinguished from temporary, premature leftward jumps of $S_T S_T$, which may occur through life-threatening sickness, accidents, etc. To the left of some point, say T_1 (T_1 here corresponds to (t) in the above equation), the own price or value of lifetime begins to exceed its production cost (I): the price which a person whose death approaches is willing (and able) to pay (for time) increases. At O, this price reaches its maximum.

The personal investment in human lifetime (recreation-health expenditures, etc.) should therefore be expected to increase, the older people become; or the greater the proportion of old people within a population, the greater will the demand for "lifetime-extenders" become, *ceteris paribus*.

If we take account of the fact, that during the individual's retirement span--which *may* correspond to the distance OT_1 in Figure 2--probably also the *cost of production* of lifetime (I) increases, because more leisure (Time Income, TY) and[69] perhaps also more money income is needed to fulfill the existence minimum (cf. Appendix A)--a fact which would be represented

---

[69]There is no doubt that old people in general need, already from a physiological point of view, more rest, leisure and recreation to maintain their health, than younger people.

through upward shifts of the horizontal portion of the supply curve in Figure 2 to the left of T_1--the increase in the Own Price of lifetime would necessarily be reinforced.

(2) The Characteristics of Time

Time is not only scarce but, in addition, can be looked at as money (budget). Benjamin Franklin's famous "advice to a young tradesman": "Remember that time is money,"[70] while characterizing much of a religious ethic, undoubtedly still pervades our contemporary western, predominantly secular, philosophy of living (Weltanschauung). In our western behavior, language and thinking, time is treated as money. We speak of: spending, saving, allocating, having, budgeting, wasting, losing, selling, stealing, and gaining time; we say that something is

---

[70] "He that can earn ten shillings a-day by his labor, and goes abroad, or sits idle one half of that day, though he spends but sixpence during his diversion or idleness, ought not to reckon that the only expense; he has really spent, or rather thrown away, five shillings besides." Memoirs of the Life and Writings of Benjamin Franklin, 3rd ed., Vol. V (London: Printed for Henry Colburn, Conduit Street), 1819, p. 104: Advice to a young Tradesman, written Anno 1748.

If we discount this quotation for its moral undertone, then it is as clear an explanation of the Income-Opportunity-Cost-Theory as one may want.

According to Diogenes Laërtius (V, 2n, 10, 40) it was Theophrast (about 372-287 B.C.) who already used to say: "Time is a precious expenditure." Georg Büchmann, Geflügelte Worte, Zitatenschatz (Berlin und Darmstadt: Deutsche Buch-Gemeinschaft, 1953), pp. 107, 422).

"worth" or not worth our time, that time is sufficient or insufficient, etc., although so far nobody has yet seen, touched or smelled time. The mystery is complete, when we then assert to be able to measure its duration and value ("or say we do and think we do"),[71] in fact measure it respectively through a unit of time (seconds, minutes, hours, etc.) and money itself.

However, treating time like money, as a budget,[72] can be justified only to the extent that we are aware of the distinguishing characteristics which exist between money and time--often overlooked--and summarized below:

a. Virgil's "Sed fugit interea, fugit irreparabile tempus" (But meanwhile flees, flees the irreplaceable time),[73] expresses the basic uniqueness of lifetime, the fact that every new day is a step closer towards death, a process which we are unable to change: we simply cannot "replace" or repeat past time or "lost" time in the sense we can replace lost money through a gift of money. Bygone time is undoubtedly bygone; it is irreversible and irrepeatable. This we call the uniqueness of time, for

---

[71]D. W. Hering, "The Time Concept and Time Sense among Cultured and Uncultured Peoples," Chapter 5 in Time and its Mysteries (New York: Collier Books, 1962), p. 89.

[72]Pitrim A. Sorokin and Clarence Q. Berger, Time Budgets of Human Behavior (Cambridge: Harvard University Press, 1939).

[73]Virgil, "Georgica," 3, 284 (quoted in G. Büchmann, op. cit., p. 128), my translation.

something which cannot be replaced or substituted for, is said to be unique. No two days can be exactly alike for the same person, be it only because of their successiveness. Furthermore, all time must necessarily be human time, as only the living human individual can be the measuring rod, the time-divide, in relation to whom past, present and future can have meaning. The uniqueness of the individual in turn implies the uniqueness of time.[74] In contradistinction, it is one of the essential features of money units as a medium of exchange, to have identical value for everybody, quite independent from variations in the marginal utility of money.

b. The three-dimensionality of time as past, present and future, the fact that time can only occur successively, never simultaneously,[75] characterizes time

---

[74] cf. John Dewey, "Temporal seriality is the very essence, then, of the human individual" ("Time and Individuality," Chapter 7 in Time and Its Mysteries, op. cit., p. 146).

cf. also, Rollo May, "Contributions of Existential Psychotherapy," Chapter II in Existence--A New Dimension in Psychology and Psychiatry, ed. by Rollo May, et al. (New York: Basic Books, 1958), especially pp. 65-71 and 101-108.

[75] Except in certain god-like "peak experiences" (creative moments), which have often been characterized through a simultaneity or "synchronicity" of time. For example, cf. C. G. Jung, The Structure and Dynamics of the Psyche, Vol. 8 of the Collected Works, Bollingen Series XX (New York: Pantheon Books, 1960), especially pp. 435, 518, 531.

As an example of the "tree" of poetry, the following lines of T. S. Eliot's "Four Quartets" (Burnt Norton) may be illustrative:

essentially as a flow (although for analytic purposes, time can sometimes be treated as a stock), while neither the stock nor flow aspects of money can be said to predominate.[76]

c. Almost identical with its flow character is the non-storability aspect of time.[77] Neither can time, like money, be stored to be used in the future, nor can time be added simultaneously and instantly. Time is additive and exists only through living (it), for time has no independent existence apart from the living human being. Time must continuously be spent, in the process of which it is added and becomes past. The time budget thus is necessarily always completely exhausted: consumption and production of time occur simultaneously.

Time saving can therefore never occur in the sense of money saving, because the latter are abstinence

---

> Time present and time past
> Are both perhaps present in time future,
> And time future contained in time past.
> If all time is eternally present
> All time is unredeemable.
> . . . Time past and time future
> Allow but a little consciousness.
> To be conscious is not to be in time.

[76]We might be tempted to look upon the living or dead human body itself, at any particular moment of time, as a stock of time, i.e., view age as a certain quantity of imprisoned time. However, this would change the meaning of "stock" from its customary usage and extend it into methaphysics.

[77]Unless we employ a very broad interpretation of storability as indicated in footnote 76.

from present consumption for future consumption, while the former represent only a minimization of time expenditures for some uses of time in order to be able to maximize time expenditures for other uses. A money budget for a certain period is underexhausted by the amount of money savings, while the time budget for the same period is necessarily always exhausted.

d. The uniqueness and individuality of time has a further implication: Time can be directly transferred only in person. For example, a servant can exchange, transfer his work-time against the money wage, or the carpenter can directly exchange a certain amount of his work-time against a certain amount of work-time of the mason, but in order to do so, both have to appear in person at the construction site, except in the case of homework.

Money transfers and exchanges, on the contrary, usually take quite impersonal routes through financial intermediaries. "Time banks" could be imagined to perform only a function as markets for labor substitutes, i.e., if, for instance, a worker performing standard tasks should prefer to extend his holidays, play tennis the next day, etc., than to do his regular work during this time, he might be able to call up the time bank to arrange for and to "buy" a labor substitute for this amount of time.

Time transfer processes do not only exclude indirect routes, but in addition terminate with the first round of spending: the carpenter cannot again spend the mason's time and the mason cannot again transfer the carpenter's time.

(3) Money Price System vs. Time Price System

In contemporary economic price theory it is customary to identify prices and budgets with money prices and money budgets (excepting the theory of exchange),[78] although the existence of time budgets is undeniable and even primary. The standard theory of the price system should therefore be called more correctly the theory of the money price system.

The latter system, being essentially an information or signaling system can, theoretically at least, solve as we know the five basic economic problems which any society has to face, i.e., _what_ to produce, _how_ to produce, for _whom_ to produce, how much to _maintain_, how

---

[78]For two recent exceptions compare the following papers: Gary S. Becker, "A Theory of the Allocation of Time," _The Economic Journal_ (September, 1965), pp. 493-517; Jacob Mincer, "Market Prices, Opportunity Costs, and Income Effects," in _Measurement in Economics, Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld_, by Carl F. Christ, et al. (Stanford University Press, 1963), pp. 67-82.

much to progress and finally it can adjust consumption to production within very short periods (rationing).[79]

It is the purpose of this section to demonstrate briefly that a time price system, under certain conditions, theoretically, could perform the same five basic functions and that time prices successfully could provide supplementary (to money prices) information for resource allocation in some cases where the working of the money price system is imperfect, breaks down or is not working at all.

In sections (1) and (2) of this chapter we have seen that money and time budgets in many ways are comparable with due recognition of their differences.

The spending of money for goods by individual consumers in a free enterprise system, we know, is basically the result of the confrontation of a system of more or less independent individual tastes, limited money budgets, and parametric prices. However, while for each individual separately prices may be said to be parametric, as part of a group of consumers, his spending of money nevertheless influences the determination of prices and therefore the allocation of resources.

---

[79]cf. Frank H. Knight, The Economic Organization (New York: Harper Torchbooks, The Academy Library, 1965).

The spending of individual time budgets[80] may be viewed in analogous fashion, with the exception, that the individual is now not subject to "external" pricing of the market or firms (monopoly pricing), but can freely determine and vary the amount of time he wants to spend per unit of commodity and activity himself. He is his own (internal) time price fixer, although there may be some institutional upper limits on individual and total time prices: the concert performance lasting 2 hours; the camping permit which has a maximum validity of 14 days, etc.

The only main difference to the spending of money budgets is that the notion of parametric prices now may attain a changed double meaning, depending upon whether:

a. The spending of a time budget is considered independently from existing or non-existing money prices, or whether

b. the use of the time budget depends upon existing money prices.

As to the former (a) case, we can imagine, to clarify our thinking, that in a state of terrestrial paradise, where time is still scarce but money prices are absent (all goods are "free"), individual time prices--the amount of

---

[80] In a state of terrestrial paradise, where all goods except time are free, time budgets would be the only conceivable budgets at all.

time the j-th individual spends per unit of commodity or activity (i), i.e., (P^{j}_{Ti}), if there are j=1...n, individuals and i-1...m, goods, activities--are parametric in the sense that constant amounts of time are spent per unit of particular commodities and activities, or that the opportunity cost of foregone goods, pursuits, activities (other than work) is constant.

But individual time prices may also deliberately be varied by the individual, according to the subjective change in feeling of this opportunity cost, thus leading to a change in the allocation of the scarce time to specific goods. This turns out to be the most general--ordinal--meaning of a "time disposition equilibrium" (Zeitverwendungsgleichgewicht"), already observed by Gerog Sulzer in 1895,[81] that for an individual the Marginal Utility per last time unit (hour, day, etc.) spent on a unit of good, activity A (MU_A), must be equal

---

[81]Georg Sulzer, Die wirtschaftlichen Grundgesetze (in der Gegenwartsphase ihrer Entwicklung), (Zürich: Albert Müllers Verlag, 1895), especially pp. 190-194, 203-238, 544-545. cf. also Rosenstein-Rodan, op. cit., pp. 85 ff.

Hermann Heinrich Gossen in his Entwicklung der Gesetze des menschlichen Verkehrs und der daraus fließenden Regeln für menschliches Handeln, published in 1854, should be credited for having first developed the law (known as Gossens Second Law) as it applies to the disposition of time. See Erich Schneider, Einführung in die Wirtschaftstheorie, IV. Teil: Ausgewählte Kapitel der Geschichte der Wirtschaftstheorie, 1.Band (Tübingen: J. C. B. Mohr, 1962), pp. 168-190, especially p. 185.

to the Marginal Utility of the last time unit spent on a unit of good, activity B, C, ... (MU_B, MU_C,...), otherwise a reallocation of time among the goods, activities, could make the individual better off.

If in our pure state of scarce time, therefore, two hours are spent by the individual per unit of activity B, while four hours are spent per unit of activity A during the budget period, the utility per unit of activity A must be twice that of activity B at the point of equilibrium.

There exist numerous examples in our daily lives where we consciously[82] alter or fix the allocation of our time per unit of activity or good, in order to attain "time disposition equilibrium." Take the situation of a theatre performance, whose quality in terms of acting is so unsatisfactory that we do not find it "worth our time" to continue our visit and we leave before the performance is over, or, take a vacation trip which turns out to be so enchanting that we decide to extend the stay for a few days. Setting the alarm-clock in the evening is a way of individual time price fixing or maintenance for the good "sleep"; if we should oversleep, "disequilibrium" in the truest sense of the word would result and we are,

---

[82] We emphasize "consciously," because it seems that a great number of our activities are habitual, implying that the allocation of time occurs without the effort of reflection, almost unconsciously, i.e., at a minimum of (thinking-) cost.

no doubt, on a lower indifference curve as a result of the plan failure.

As isolated individuals, we hardly can significantly influence the <u>total time price</u> or the total amount of time, $\sum_{j=1}^{n} P_{Ti}^{j}$, (total time expenditure per unit of commodity (i) by j=1...n, individuals). Our individual effective demand, expressed through the time (e.g., two hours) we spent, for instance, during a theatre performance, would be too minute in comparison to the total number of hours spent by all present visitors.[83] However, if <u>several individuals together</u>, simultaneously or successively spend time for the same activities, they can and they are influencing the total time price.[84] If in our

---

[83]If there are, e.g., 500 visitors present during the performance (j=500), every visitor spending two hours, then the total amount of time spent per performance (i) would be 1000 hours, of which our two hours are insignificant indeed. It is clear, that the size of the total time price per unit of activity or good, is a product of the number of time spending (voting) individuals per unit of commodity, the amount of time these individuals have spent each and the opportunity cost (i.e., what could be "earned" by using the time for a different purpose) per time unit.

[84]A kind of monopoly pricing could not be excluded as a possibility even under the time price system. Time voting (spending) organizations and firms could capitalize on the desire of individuals to increase the time price and thus influence the allocation of resources for certain goods, i.e., members of time voting organizations would be sent to particular supply points and would be paid for casting their time votes for the respective good.

assumed paradisiac state, everybody happened to go swimming simultaneously at the same swimming site, the resulting huge total time price would inform the "sponsor" of the paradise to increase the supply of similar sites. Time votes--voting by feet and body--would be an effective guidepost for resource allocation in this situation. The time measuring instrument, the watch, would take the place of the price tag. The system would be highly equitable, as everybody would be truly equal, insofar as no one has more time to spend than anybody else (work is absent) and no one's time is valued differently from that of anybody else. The time budgets are all equal in size and value.[85] Waiting queues (lines), crowded, congested places, would be indicators of excess demand, which may even occur in paradise when there occurs a sudden run on certain free items.

This price system could directly solve the what--for whom and rationing problems, while the remaining two

---

[85]This necessarily assumes that the opportunity cost of swimming time is equal among the swimmers, an assumption and interpersonal comparison which may be questioned. The perfect equity of the system would however remain undisturbed, even when the opportunity costs are not equal, if resource allocation were based exclusively upon the quantities of expended time, i.e., were not based upon the value which individuals attach to this amount of time.

problems would not be at issue or would be external to the system under the assumed conditions.[86]

As to the latter (b) case, i.e., if the allocation of time budgets depends upon (an) existing money price(s), a case which undoubtedly is true in the present age, individual time prices of goods and activities will be parametric, if one of these money prices is parametric for the individual and if the amount of time spent per unit of commodity or activity is constant.

Let one hour spent in activity A (work) have a money reward (price) of P_W dollars and assume that it would be possible for the individual always to spend his total time budget on activity A if he so wished, then, if the individual engages also in other activities than A, their reward (value) to him must at the margin--per unit of time spent on them--be as great as P_W. This is the cardinal form of time disposition equilibrium, standing in contrast to the previous ordinal form, because specific money values (P_W) are now attached to the time units. Expressed differently, the money opportunity cost per unit of time spent on activity B, C,...Z, will be constant or parametric for the individual at a level not

---

[86]Whoever may be the paradise sponsor, nothing would prevent him to orient the investment and the provision for future goods as well along "expected" time prices, population trends, etc. The VMP = P_W efficiency criterion could also be maintained if time prices were substituted for money prices in the equation.

smaller than P_W.[87] The cardinal time consumption equilibrium condition almost reduces to the result already obtained under (a) above, because for the isolated individual the money opportunity cost P_W, per unit of time (hour) spent on activities other than work is the same for all activities. If we are interested not only in the individual, but also in the total time price or total time demand for a good or activity, cases a and b have to be distinguished. While to each individual separately, P_W is his parametric money time price per hour, for a group of individuals there may be more than just one P_W,[88] i.e., there may be several differing P_W's.

Each individual time vote may therefore be weighted by a different P_W, i.e., the money opportunity cost prices per hour will vary and the system looses the perfect equity character of the previous pure or ordinal time price system.[89]

---

[87] We will see later on that P_W is really an underestimate of the money value of non-work time and that the true money estimate of certain kinds of non-work time may vary.

[88] There may even be several P_W's per individual. If there are people performing several different jobs (moonlighting) for which they are paid different wage rates.

[89] In comparison to the present highly skewed income distribution, the equity of the time price system is nevertheless much superior to that of the money price system. The quantity of own time per annum distributed among the population may also be uneven, but is not as uneven as income.

In addition, the size of the individual time budgets after the work time has been subtracted, may differ among individuals, so that the allocation of time--its amount and/or distribution--may consequently be different from that allocation implied in cases a, i.e., the case where the total time budget could be so allocated because work was absent.

Moreover, although P_W is parametric in the short run for the individual, for the total group of individuals, the P_W's may be changed through a change in the allocation of time budgets as between work and other activities. With constant demand conditions, there need only be a group of individuals large enough to affect supply (of labor) by increasing the number of work hours sold at a given wage rate: the supply curve would shift downward and a new equilibrium in the labor market would be established at a lower P_W. More hours of work have resulted in a general lowering of the remuneration of work, which in turn may reduce the supply of labor and increase P_W, etc. The individuals as a group impose "pecuniary external diseconomies" upon each other and the non-work time opportunity cost has been lowered paradoxically.[90]

---

[90]Under conditions of economic depression, this may not be too unrealistic a case: the downward spiral of wages may be reinforced through an increased supply of labor in terms of hours, as individuals try to maintain their income. Reversing a 19th century rhyme, we may say:

We have now to ask, how this kind of a time price system would answer the stipulated five economic questions, it being understood that the role of the cardinal time price system would now be supplementary or complementary and not an alternative to the money price system.

Like under the pure or ordinal time price system a, the _what_, _for whom_ and _rationing_ problems _could_, theoretically at least, be handled by the present system's money time votes, assuming that the government or some philanthropic organization provides the supply of goods free of charge (public goods)[91] and with the reservation that the time votes would now be _weighed_ according to individual wage rates (P_W's).[92] The time price system

---

Whether you work by the piece
Or work by the day,
Increasing the hours
Decreases the pay.

(_Encyclopaedia Britannica_, Vol. II, 1959, "Hours of Labor," pp. 802-807). Cf. also Wladimir Woytinsky, "Hours of Labor," _Encyclopaedia of the Social Sciences_, Vol. 7, pp. 478-493, _481_.

During the 1933/34 depression, we find that in the USA as well as in Germany the hours of work were legally limited to 40-36 hours, _in part_ reflecting the efforts to halt the above tendency. (Cf. Hermann Pechan, "Arbeitszeit," in _Handwörterbuch der Sozialwissenschaften_, Vol. 1, 1956, pp. _408-411, especially p. 409_.

[91] Free of charge here means free of a direct charge. Indirectly, people are paying for the "free" public goods through taxes and through the opportunity cost of resource withdrawal from their alternative employments.

[92] Under the _money_ price system, individual money votes are also _weighed_, i.e., weighed by income. A rich man who is able to purchase 10 more units of good B than the poor man, has a voting power (for B) which so to

could, therefore, turn out to be a public good price system, which actually is urgently needed.

Empty, uninhabited, unused stores, places and buildings, would be indicators of excess supply, while crowded stores and places would signal the existence of excess demand. For activities, it would be the actual time spent at and during consumption, while for commodities

---

speak counts (is weighed) 10 times that of the poor man. This multi-voting power is, however, only effective, if the rich man actually purchases a greater number of units of the same good than the poor consumer. Were the richer of the two men to buy also only one unit of B, both votes would be counted as equal in the market. This weighing mechanism differs from the above time voting mechanism, because the one unit of time spent for good B by the high wage earner will count more than the same unit of time spent by a low wage earner. There is even an implied justification for weighing time votes by the wage rate, for the size of the wage rate is usually a signal of relative labor scarcity, and excess demands (waiting queues, crowded places) should from an economic efficiency viewpoint first be eliminated where--assuming equal degrees of excess demands to prevail--there are relatively more high wage earners voting, as this would save socially higher valued time. In waiting (room) situations (barbershops, physician's waiting room, etc.)--where it is a frequent social practice to give priority of attention and service to certain people whose (time) opportunity cost of waiting is presumed to be relatively higher than that of other people (children, the poor, etc.) lower down in the social hierarchy--we find a confirmation of the fact, that people sometimes actually behave according to interpersonal comparisons of the relative value of their respective time.

When the time voting, for instance, takes place not in waiting lines but in OR-areas, this justification may appear less important but still remains valid.

An analogous justification for money income weights could be maintained only if all income were wage income.

it would be purchasing time: waiting time or simply the number of purchases of a good, if they occur instantaneously, which would be relevant.[93]

The comparative size of the total time (prices) spent by j-individuals for i-commodities and activities,[94] i.e., $\sum_{i=1}^{m} \sum_{j=1}^{n} P^j_{Ti}$, or "cardinally" $\sum_{i=1}^{m} \sum_{j=1}^{n} P^j_{Ti} \times P^j_W$, could be measured by special administrative time-wage-keepers and resources could be allocated according to the relative money value or size of the time votes "issued" for the i=1...m, commodities and activities respectively.

The problem of how to produce and how to organize production most efficiently, revolves around product and factor prices and the profit-loss mechanism of competition.

---

[93] Money has often to be expended for goods which are less "good" than others. In fact, we sometimes spend money for discommodities in order to be able to get to commodities. The money cost of trips to work, to the theatre, etc., may be examples. Likewise, time has often to be expended as a "necessary evil," in which cases it can only be considered as a "joint element of economic goods" (Rosenstein-Rodan, op. cit., p. 86), for no independent discommodity will ever be freely consumed. Waiting time, the work-trip time, etc., are examples of this "bad" and burdensome time expenditure (unless they are enjoyed as commodities) which one usually tries to minimize in order to maximize the time to be spent for economic "goods" proper. All that counts, however, for the proper functioning of both money and time price systems, is that money and time are actually expended in the market.

[94] The "size" per good or activity is the product of the number of people voting for the good, the amount of time everybody allocates per good and in the case of the cardinal time price system, their respective money wage rates.

Once product prices of public goods are determined along the lines sketched in the previous paragraph, i.e., once the government time-wage-keepers have set up periodic time price lists for the various free government products subdivided for various demand regions of the consumption sector of the economy,[95] they can pass on this information to the public good production sector of the economy which in order to employ resources most efficiently, has to follow the "rule" that the value of the marginal product (VMP) produced by a particular factor must be equal to its factor price.

If we know factor or resource prices, other than wages, which are determined, like the money wage rate, in the factor market where money prices prevail,[96] there is nothing to prevent the execution of the "rule" and thus the efficient allocation of resources.

---

[95]For OR, the U.S. Government has already made it a policy that recreation use be measured and reported in terms of "visitor-hours." Sophisticated statistical methods will be employed in the measurement of this data (cf. Appendix C). (A Uniform Method for Measuring and Reporting Recreation Use on the Public Lands and Waters of the United States, prepared by Recreation Advisory Council Study Committee Number Two [Washington, D.C.: April, 1965], 56 pp., mimeographed. Cf. also Recreation Advisory Council Circular No. 6, op. cit.

[96]Although the existence of some factor time prices would not prevent the efficient allocation of resources, i.e., money factor prices are a sufficient but not a necessary condition for the applicability of the "rule."

This illustrates, how both money and time prices can coexist side by side--the money time price in the left side and the money price in the right side of the VMP = P_F (= P_T x MPP = P_F) equation (assuming perfect competition in the factor markets)--and that both price systems are not competitive but complementary.

Finally, the maintenance and progress problems would have to be solved by our new price system. Again, this could be done by unifying the money price, i.e., the interest rate (r) and the time price in the familiar discounting formula for investments:

$$\text{Present Value of Investment} = \sum_{1}^{n} \frac{\text{Expected Time Returns of Inv. (\$)}}{(1+r)^n}$$

In other words, investment will occur if the discounted present value of its expected time returns (dollar time prices for n-periods) is greater than the present cost of the investment.

A comment should be made about the comparability, uniformity, compatibility and justification of coexistence of/between money prices and money time prices, which we presupposed above. Not only do both prices have a common root in the common and related scarcity of both money and time budgets (cf. sections 1 and 2), but we know also that under competitive assumptions (money) product and factor prices are supposed to be signals, simultaneously expressing both relative resource scarcities or costs (supply) and the effective desirability of these resources/products relative to human wants (demand). To be comparable, coexisting prices, money time prices must correspond to these price characteristics, which are a necessary condition for economic efficiency.

Relative resource scarcities and demands are revealed in total and individual (money) time prices in so far as:

(i) the lower the positive sloping supply curve of commodities, i.e., the greater the capacity and volume of goods on, in, for and around which people spend their time,[97] the less will be, under constant demand conditions, the crowding per unit of the good and/or the lower will be the waiting time price for each individual per unit of commodity. If the demand curve is inelastic, the total time price per unit of the good will be lower than before the supply increase. The reverse will be true if demand is elastic. For activities, like concerts, OR, etc., an increase in the number of concert halls or OR-areas (supply), will likely increase the total time expenditure of individuals for these activities, as this demand

---

[97] We assume here that the supply of the goods is already existing, so that time votes can actually be expressed. Expected time votes for still non-existing supply can, however, be also a guide for the allocation of resources. Crowding in existing parks is both a signal for more (new) parks and the extension of existing parks.

is highly elastic (assuming ticket prices to be zero or constant).

Upward (downward) shifts of the demand curve will under positive sloping supply curve conditions, lead to increasing (decreasing) total time prices. These results would be true even in a non-monetary or paradisiac state. Effective demands (desirability) in terms of time expenditures from limited, scarce time budgets would merge with physical supply conditions to give birth to total and individual time prices for specific goods.[98] The amount and/or value of time spent per period for particular goods would turn out to be as much a measure of the relative esteem or worth of goods as are normal money prices.[99]

---

[98]In OR, supply and demand curves will be strongly interdependent, especially as shifts (increases) in the supply of OR areas usually call forth shifts (increases) in the demand for these areas.

[99]This conception of a time price system may provide a connecting link between the Ricardian "Labor Theory of Value" and the Austrian opportunity-cost notion. We have to remember that for Ricardo and Marx, the value of a commodity was determined by the quantity of labor-time (or "socially necessary labor time" for Marx) contained in, or imprisoned in the commodity, while for us the value of certain time intensive goods and activities is determined either by the quantity of non-labor-time (own time) spent by one or several individuals (laborers or non-laborers) per period on, in, for and around the good (Ordinal Time Price System), or by the same quantity of time multiplied with the respective wage rates (opportunity cost) of the individuals (Cardinal Time Price System). Since the Industrial Revolution, both money- and own-time budgets have increased substantially, above all for workers. Our new price system, if adopted, would even more improve the lot of the working class by giving them not only an increased command over money goods, but by giving

We, so to speak, would spend ourselves (our time) at supply points, our length of stay, our individual physical appearance and presence would substitute for anonymous money bills.

(ii) When money- and money-time prices are co-existing, then money wage weights will be an additional guarantee for the fulfillment of the economic efficiency criterion for time prices. As we saw already, money wage rates are indicators of labor scarcities and labor desirability. Weighting pure time prices ($\Sigma\Sigma P^j_{Ti}$) with wage rates, giving us money time prices ($\Sigma\Sigma P^j_{Ti} \times P^j_W$), is in itself a melting of two price systems, each of which fulfills the efficiency requirements separately. Money time prices therefore conform to the efficiency pre-requisites literally "twice" and are interdependent with money prices proper. That this interdependence is truly a two way affair, can be seen, if we remember that money wages through labor supply (sold time) depend upon the allocation of individual time budgets (to work), thus depend in turn upon the expenditure of pure time.

---

everybody an equal vote in the selection and supply of public time-intensive goods.

A certain irony becomes apparent: Marx used the Labor Theory of Value to demonstrate the exploitation of workers. We use a non-labor theory of value to show how not exploitation, but improvement of worker's living standards would result.

While we have here sketched only the pure theoretical outlines of the time price system, we will try to demonstrate the usefulness and applicability of the analysis in subsequent chapters.

Here we reemphasize, that this system can never, even theoretically, be feasible, unless the goods to be allocated and produced are "free" (public) goods, for no private entrepreneur could exist on time prices which are essentially only accounting prices, unless he were reimbursed by some philanthropic organization or the government. The issue at stake is not the replacement of the traditional and present price system, nor the superiority or inferiority of the one or the other system, but at issue is whether the time price system can fill some of the gaps, shortcomings of the money price system, perhaps supplement it in the case of goods which are not traded in the customary market, which have a zero or near zero money price (public goods), or goods with strong external economies-diseconomies.

Our following case study, in which the time price system is applied to the measurement of primary OR benefits, should shed some light on whether this is both possible and feasible.

CHAPTER IV

THE ECONOMIC VALUE OF TIME

In the previous chapter, while discussing the function which time could perform as a possible signal for resource allocation, we used the wage rate (P_W) to weigh the pure ("ordinal") time prices, which thereby were transformed into "cardinal" money time prices. Here we will begin to look somewhat closer at this value of time.

We know that time like most other goods has a production cost amounting to an "existence minimum" of consumption (I) (cf. Appendix A). This is the Own Price (cost) (P_I) of supplying one additional day to oneself, or alternatively, the Own Price which one must pay for effectively demanding one more day, like: T_0T_1; T_1T_2; T_2T_3; etc. in Figure 3.

In Figure 3, S_TS_T is the horizontal marginal cost curve of time supply to oneself--assuming (I) to remain constant over time--and $D_{T1}D_{T1}$; $D_{T2}D_{T2}$; $D_{T3}D_{T3}$; etc., the demand curves for additional lifetime days (for simplicity we abstract here from the T_1O portion of lifetime in Figure 2 and thus restrict our analysis to

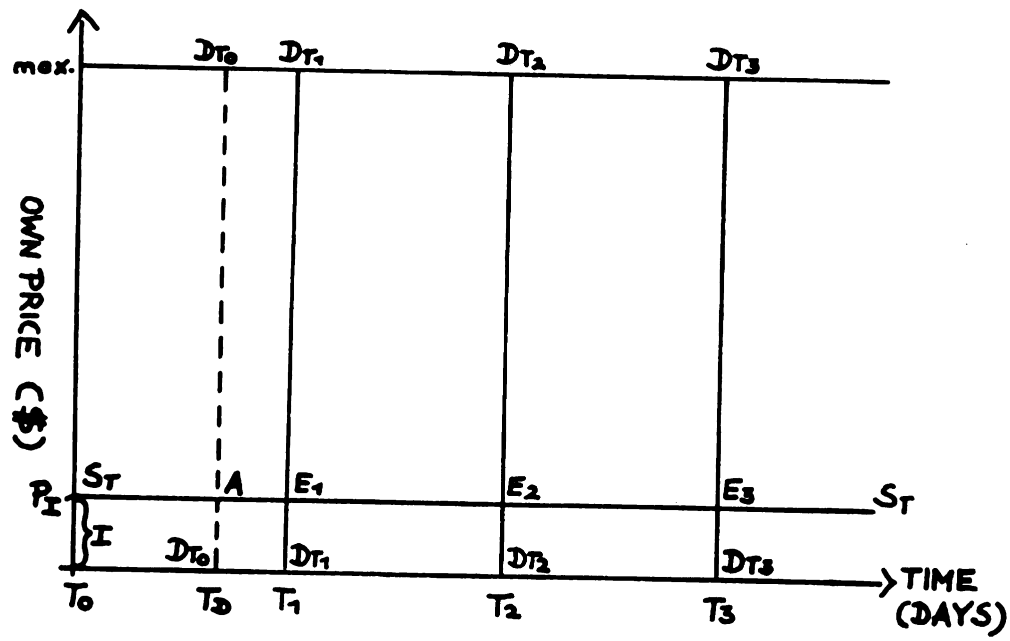

Figure 3.--The own price of lifetime.

the T_1B portion of Figure 2; the basic conclusions will thereby not be affected). The D_TD_T's will be perfectly inelastic, up to a maximum own price where they become horizontal, because lifetime demand is an either-or decision. The demand curves can therefore never--as long as we choose to live--lie to the right of the indicated day along the time axis, because time can, as we saw, only be produced successively and not simultaneoulsy.

Should the (effective) demand curve not go through its <u>lifetime</u> equilibrium points E_1, E_2, E_3, etc., for instance through insufficient income (poverty), like $D_{To}D_{To}$ in Figure 3, starvation (death) would result.

"Death equilibrium" at (A) indicates a supply of only T_oT_D hours, which is T_DT_1 hours short of another day. $D_{To}D_{To}$ could equally well depict a suicide situation: the absence of "taste" for life would here cause death equilibrium.

This Own Price (value) is really the price of <u>time as a resource</u>, <u>factor</u> or <u>budget</u>. P_I is therefore not the price of time (day) as an end product.[100] Figure 3 only shows the supply and demand conditions of the <u>own factor market for time</u>. The product market price of time is determined in another way, as we shall see, and results from the allocation of the produced short run time budgets (day, year, etc.) among alternative goods and activities.

In Chapter III we already observed that even if lifetime were infinite, the time scarcity problem would thereby not be eliminated, because time can only be produced in "quotas," small amounts. In a hypothetical state of paradise, where all goods except time are abundant and free, the economic problem would consist in

---

[100]An exception might be seen in the case where there exists no employment or use for the factor time; but this is impossible, for as long as time is produced, it is completely spent or exhausted on goods and activities (cf. footnote 9). A possible exception, however, would be the case where P_I equals the potential money income (PY), (cf. Appendix A), i.e., when the total revenue of time (income) just equals its total production cost (I) and no time profit is earned.

allocating this scarce time among alternative possible uses. To engage in activity X during time span T_X would still preclude the spending of this time from other possible uses Y, Z,... etc., for our limited human capacity enables us to engage only in a limited number of different pursuits at the same time.[101]

What holds true for every earthly valuation would continue to be valid also in the pure state of paradise: the value of time spent in activity X would be <u>derived</u> from the opportunity cost of alternative foregone pursuits Y, Z,..., for we should always remember that:

> Every valuation <u>is</u> a comparison; we have no conception of an absolute utility or an absolute standard of utility. The notion of value is meaningless except in relation to alternatives of choice. Not only is utility measured by another utility--all things are measured by things of their own kind as

---

[101] The capacity to use a particular time period for several instead of only one activity (<u>multiple consumption</u>), to read, for example, the newspaper while eating or while steambathing, etc., may be a great time saver. However, there may also be an associated cost of increased nervousness and ill health, with which one has to pay for such time savings and which (i.e., the costs) our human myopia again too often begins to realize when it is "too late" to prevent the "manager sickness." On the other hand, the preference for a great number of simultaneous activities, the desire to do things <u>now</u> instead of <u>later</u>, may be rationalized by resorting to the uncertainty and risk discount of the future (time). In fact, there may be a <u>trade-off</u> between the number of present activities and the size of the long run lifetime budget, i.e., the latter becoming shorter (through adverse health effects) with the increasing preference of <u>now</u> activities.

> standards--but its existence is conditioned by that of the alternative; . . ."[102]

In our contemporary non-paradisiac monetary economies,[103] work (sold time) for most people is undoubtedly still one of the major "alternatives of choice" for the employment of the produced short run time budgets. The valuation of the own time can therefore be based upon the foregone value of sold time (work),[104] i.e., its wage (salary) income opportunity cost. If an individual spends part of his time for non-work uses, then under certain assumptions (Chapter IV, 1), he will value--reflectively or unreflectively--this non-work time (own time) higher

---

[102] Frank H. Knight, Risk, Uncertainty and Profit (New York: Harper Torchbooks, The Academy Library, 1965, 1921), Chapter III, p. 63.

[103] In non-monetary economies, e.g., the value of time spent with girl (O) must be at least worth the value of the foregone time not spent with girl (X); or the value of time used for pleasure hunting, must be at least worth two baskets full of fishes foregone, otherwise spending the same amount of time with girl (X), or using the time for fishing instead, would make the individual better off.

[104] Other yardsticks than the money value of work time would be possible (cf. footnote 103). There is, however, none that is more convenient and obvious than the one chosen, i.e., P_W. In comparison to our analysis of the value of time in a paradisiac or a non-monetary state, we see that the money (wage) value of time is simply a special case, a special method of valuing time. Besides the money wage (income) weighted value of time, there often exists, for instance, a psychic wage (income) weighted time value. (Cf. New York Times, February 28, 1966, "Salesmen Reported in Love with Work--Not (ugh) Money," p. 29).

than his work-time (sold time), whose return is income. This proposition will be explained diagrammatically in more detail in the subsequent sections of this chapter.

(1) The Assumptions of the Model

We maintain that (P_W) is a possible weighting factor for the determination of the value or price of individual human own time per hour. This contention is based upon several assumptions, which we now begin to state as explicitly as possible.

A. We assume an ordinal, convex, non-stochastic and continuous utility function of the following type:[105]

---

[105] M. Bruce Johnson in "Travel Time and the Price of Leisure," The Western Economic Journal, Vol. 4, No. 2 (Spring, 1966), pp. 135-145, has questioned the validity of specification of the neoclassical labor-leisure (here sold time-own time) utility function, into which he wants to introduce as an additional and separate variable work time (sold time, in our terminology). We think, however, that the traditional utility function is still the correct one, mainly because the value of leisure already includes the disutility of work and is reflected in the slope of the indifference curve between leisure and income, i.e., the value of leisure and the disutility of work are interrelated variables; the greater the latter, the greater will the former be and vice versa. Johnson's function is thus clearly overspecified. A detailed critique of Johnson's thesis will be found in Appendix B.

C. J. Oort in "The Evaluation of Travelling Time," Journal of Transport Economics and Policy, III, No. 3 (September, 1969), pp. 279-286, uses the same three-variable utility function as B. Johnson.

See also: John D. Owen, The Price of Leisure (An Economic Analysis of the Demand for Leisure Time) (Rotterdam: Rotterdam University Press; Montreal: McGill-Queens University Press [a coedition], 1969), 169 pp., especially pp. 20, 23.

(1) $U = U\ (Y, OT)$, with: $\frac{\delta U}{\delta Y} > 0$; $\frac{\delta U}{\delta OT} > 0$;

i.e., utility (U) per period is positively related to the quantity of income (Y) and the amount of own time (OT).[106] Function (1) is subjected to the time budget constraint (cf. Figure 1):

(2) $OM = OT + ST$, where OM is a fixed time period, here one year and ST = Sold Time,

and the money budget constraint:

(3) $Y = P_W \times ST$, where P_W is the money wage rate per hour of ST.

B. Between the goods (Y) and (OT) we assume a relationship of continuous substitutability to hold, i.e., money income can be substituted for decreases of own time and own time can be substituted for decreases in money income in such a way, that the total level of satisfaction or utility for the individual remains constant after the substitution. This substitution relationship we assume furthermore to conform to the specific law of:

---

[106] (U) is not only a function of the amount of own time per period, but also of its distribution. The distribution of OT is defined through the frequency, size (duration), and sequence of the OT-intervals, which make up the total amount of OT per period. The full formal treatment of this distribution variable cannot, however, be within the scope of this study and must be left for a separate treatise. We will later on discuss the relevance of the OT-distribution for our model.

C. Diminishing Marginal Rates of Substitution, represented in Figure 1 by convex indifference curves, like $I_1 I_1$, $I_R I_R$, which we assume to be non-intersecting, each curve indicating separate and ordered levels of satisfaction or combinations of (Y) and (OT) between which the individual is indifferent. With reference to Figure 1 in which OM is a particular period of personal time (e.g., one year), the above law says that the more units of OT our individual has *relative* to income Y (moving in eastward direction along the indifference curves), the less he values additional, equal units of OT (= ΔOT), or what amounts to the same thing: the smaller are the units of income Y (= ΔY) which he is willing to substitute (give up) for additional OT's in order to stay on the same indifference curve.

D. While the indicated indifference curves represent the *subjective* rates at which the individual is *willing* to transform income into own time and own time (sold time) into income, we assume also that there exists a market in which the individual *objectively is able* to transform his time into income (through work) at a--in the short run constant--money wage rate P_W, which is shown in Figure 1 as the negatively sloping line ME and which may or may not be independent of the number of sold time hours the individual wishes to sell. Later on we will discuss the case of a *kinked* wage line.

In the case where the individual works on more than just one job (multiple job-holding; "moonlighting") and where the wage rates of these jobs differ among each other, P_W would have to be a weighted average of the multiple wage rates, the weights corresponding to the number of hours worked under each wage. This difficulty can however be circumvented by drawing separate figures, like Figure 1, for each different employment and wage rate.[107] For non-wage employments, like salaried jobs, one can easily arrive at a P_W by dividing the normal daily-, weekly-, monthly-, or annual income, exclusive of fringe benefits, vacation pay, etc., by the respective number of sold time hours.

Under the market conditions given by P_W, the individual will reach his highest level of satisfaction (utility), where one of his convex, continuous and non-intersecting indifference curves--each indifference curve lying further to the northeast from the origin O, indicating a higher, ordinal level of utility--is tangent to the wage rate line P_W. In Figure 1 this is the case at point E on indifference curve I_1I_1. In other words, KM units (hours) of time are exchanged (through work) for an income per period amounting to EK = SO dollars. At

[107] Cf. Leon N. Moses, "Income, Leisure, and Wage Pressure," The Economic Journal (June, 1962), pp. 320-334.

equilibrium E the marginal rate of substitution between own time and income, i.e., $\frac{MU_Y}{MU_{OT}}$, is equal to the negative slope of the wage line P_W.

E. Implicit in the equilibrium notion at E is the assumption that the individual can freely vary the amounts[108] of time he wants to sell for income (Y), or expressed negatively, that nobody/nothing forces him to sell more or less time than he would choose himself. Under conditions of slavery, forced labor, fixed working hours, unemployment, etc., this assumption may not be tenable. While we admit this exception, it is however frequently objected, in addition, that the above assumption is not realistic,[109] in so far as work hours (ST) are institutionally, socially determined ("standard work week," cf. L. N. Moses, op. cit.) and are, therefore, not subject to the free choices of individuals. The speciousness and self-deception of this objection is however revealed through a closer look at what really determines the hours of work in our present western societies:

---

[108] Distinguished from the freedom to choose amounts of ST must be the freedom to choose the distribution of these amounts. The latter "freedom" in general seems to be less "free" than the former.

[109] The worker "is seldom in a position to determine how much of his services to sell (i.e., how many hours to work):" Tibor Scitovsky, Welfare and Competition (London: Unwin University Books, 1952), p. 83.

> . . . the individual is like the perfect competitor: to each individual separately, the number of hours of work per week may be fixed, yet the level at which it is fixed is the result of the choices of the individuals as a group. If at any moment this level of hours is, say, larger than on the average people prefer at the given wage rate, this means that any employer who makes them shorter, who adjusts them to the workers' preferences, will make employment with him more attractive than employment with others. Hence he can attract the better people or attract people at a lower wage rate. Employers thus have an incentive to adjust working conditions and hours to the preferences of the workers.[110]

Not only are working hours _today_ continuously adjusted to the demands of the employees through labor-management negotiations, union contracts, "organizers," strikes, etc.,[111] but there exist often overlooked additional and very individual ways of varying, at the margin, the own time - sold time proportions per period: overtime work, part-time work (moonlighting), miscellaneous leave, unpaid

---

[110] Milton Friedman, _Price Theory_ (A Provisional Text) (Chicago: Aldine Publishing Company, 1962), p. 205.

See also John D. Owen, _The Price of Leisure_, _op. cit._, especially pp. 12-15. Only in so far as the choices of the "group" are the result of _non-unanimous_ individual votes, can there be discrepancies between the preferences of an individual and that of the group.

[111] Cf. _Encyclopaedia Britannica_, Vol. II, 1959, _op. cit._, p. 807: "The demands of unions, sometimes for higher wages, sometimes for shorter hours, and the related pressure exerted upon legislature to limit daily or weekly hours, _ultimately reflect the choices of individuals within and without unions_, and are not separate forces. Union bargaining power and legislative enactment at times accelerated the decline of weekly hours, but it is unlikely that over a period of a half-century their influence has been predominant" (my emphasis).

leave, absenteism, malingering, do-it-yourself, black-work ("Schwarzarbeit"),[112] are obvious examples.[113]

---

[112] Black-work (Schwarzarbeit) is a rather widespread phenomenon in Germany. It amounts to paid work (mainly craft work) in violation of certain labor market controls and regulations. The output of this hidden labor market was estimated (conservatively) at 1.5 billion DM in 1955.

Thus, even when there exist legal limits to work hours, the expression of the individual preferences for the desired number of work hours cannot be stopped, but will, if necessary, be effective "underground."

Cf. Georg Türnau, "Die volkswirtschaftliche und finanzwirt schaftliche Bedeutung der Schwarzarbeit," Diss., Wirtschafts und Sozialwissenschaftliche Fakultät der Univ. zu Köln (Joseph Hansen, Telgte, 1958), pp. 10, 21, 26, 37.

See also "Multiple Jobholders in May 1964," Monthly Labor Review, March, 1965.

[113] L. N. Moses (op. cit., p. 321) assumes that some of these devices "can accomplish only a limited reduction (my emphasis) in hours . . . , since workers who use the . . . devices too freely risk being classified as unreliable." This assumption, in the form stated, is, however, only of limited usefulness, if we remember, that the degree of "limitedness" is a direct function of the tightness and looseness of the labor market. (Cf. Wall Street Journal, 1966, p. 1: "More Workers Gather Nerve to Switch Jobs As Labor Gets Scarcer").

Apparently, if workers fear loosing their jobs in threatening unemployment, lay-off situations, the desire for more own time through malingering, unpaid leave, etc., will be at a minimum (during the relatively mild recession in Germany in 1967, some workers are even reported to have continued working, although they were sick enough and thus justified to stay at home; see General Anzeiger, Bonn, Germany, May 8, 1967, p. 1: "Krank"), while the reverse will be true in times of labor scarcity. Expressed differently, the desire to reduce ST--shown by a movement of indifference curves along the wage line--will only exist, when the worker is also able to effect the reduction (i.e., when the labor market is tight), without incurring the risk of being forced into less desirable lines of work or non-work.

Furthermore, as long as there is free entry into occupations, the choice of an occupation is at the same time also a choice of the hours of work which go with the particular occupation. This represents therefore another possibility of individual free choice of sold time.[114]

Finally, our analysis so far has implicitly dealt only with dependent, contractual work. It goes without saying, that one of the significant advantages of "free" professions, i.e., independent, non-contractual work (self-employment), most often is, in particular, the possibility of relatively free variability of work hours and their distribution.

The above assumption of free choice and determination of sold time (work time) is however more restrictive than is really necessary for the justification of our model, i.e., it is a sufficient but not necessary condition. A necessary condition and less restrictive assumption, for our purposes, is that the individuals under consideration, i.e., the outdoor recreationists, should be able either to work (sell) as many hours as they wish per period (at the given P_W), or, that in case they are unable to do so, they

[114]For a theoretical demonstration that those individuals who choose occupations which are relatively skewed towards leisure characteristics tend to be "leisure-lovers," while those individuals who choose occupations which yield relatively fewer leisure characteristics tend to be work-lovers, see Kelvin J. Lancaster, "A New Approach to Consumer Theory," Journal of Political Economy, LXXIV, No. 2 (April, 1966), pp. 147, 155.

would not prefer to work during the time spent in OR, i.e., that they are either not forced to sell fewer hours of work--through various forms of "undertime" or enforced own time (involuntary unemployment, lay-off, etc.)--as they really wanted to at the given wage rate, or that, if undertime exists, the part of own time spent in OR is not considered by the individual as part of undertime.[115]

Looking at Figure 1, this means, that actual sold time hours may deviate from the desired (planned) sold time hours (indicated by the equilibrium position at E or K) in the westward direction (overtime) and in the eastward direction (undertime)[116] with the reservation, however, that in the latter case (of deviating undertime), OR-time must not be considered by the individual as part of the deviating undertime, or that it if so happened, some form of extra compensation for the undesired deviation be found. This does not amount to saying, that we assume the individual to be fully employed--according to his standards of full employment--for we even permit unemployment under

---

[115]ORRRC Report No. 5, p. 15 (Table 5) shows that the participation rate of unemployed responding outdoor recreationists in 1960/61 was very low (0.1%), a fact, which seems to support our assumption. See also ORRRC Report No. 20, p. 11, p. 14, Table 11.

[116]We will later on explain this possibility diagrammatically in more detail.

the above two conditions. Involuntary overemployment (overtime) we permit unconditionally.[117]

Potentially, at one extreme, our assumption implies that the individual is "free" to sell all his time (through multiple jobholding, day- and night-shift work), i.e., that he ultimately is "free" to commit suicide through overwork and overexhaustion[118] (cf. Appendix A).

---

[117] For the ultimate purpose of this analysis, i.e., the determination of the money value of OR areas, even this less restrictive assumption, although sufficient, will not really be necessary, as we will see later on. The present analysis only deals with the single individual, while the money time value of an OR area will depend upon a great number of individuals (visitors) and their relative wage rates, relative length of stay, relative equilibrium or disequilibrium positions. Individual cases for which the above assumption does not hold true may thus be brought into balance (or be outweighed) through other cases which more than just fulfill the assumption, i.e., it is the average of the individual wage rates or income opportunity costs, that will together with the total amount of own time "consumed" by the OR-area determine its money value.

[118] Experiments of temporary sleep deprivation have shown that: "The cerebral cortex can prolong the waking state, but not beyond certain limits. Sixteen hours of wakefulness in 24 is probably near the physiological limit of tolerance over the long run for most of us" (Nathaniel Kleitman, "Sleep," Scientific American, November, 1952, p. 4).

"The effects of chronic sleep loss are almost unknown . . ." ("Current Research on Sleep and Dreams," U. S. Department of Health, Education, and Welfare, Public Health Service [Washington D.C.: U.S. Government Printing Office, 1965], p. 27; my emphasis).

Of course, an individual who continuously reports to work overexhausted, sleep-deprived, will soon loose his job and his potential suicide will thus ultimately not really be caused (after a time lag) by the lack of a leisure existence-minimum (cf. Appendix A), but by starvation, for no job ultimately means no income and no income means no bread but death. Being unemployed, however, means that the individual has again enough leisure to

The fact that most people normally work only for a fraction (about one third) of their potential total personal time per year does not mean that they are not able to and could not sell more work time,[119] but means, that they

---

recuperate from his exhaustion, by living off his previously earned income. Thus he will soon be able to work again and repeat the maximum work - maximum leisure cycle, if he so wishes--a rather uncommon OT-ST distribution indeed.

This queer distribution of OT-ST would actually be conceivable only, if the individual is a self-employed, independent worker. The elaborate studies on the "economic optimal work-day" (cf. Otto Lipmann, Das Arbeitszeitproblem, Berlin, 1924), i.e., the number and distribution of daily work hours which makes a days' production (output) a maximum--the scientific results of "work physiology" (Human Engineering), time-motion studies, etc., which are concerned with the most "efficient" (in terms of output) distribution and length of rest--recreation periods ("Erholungszuschlag," "Erholungszeiten," etc.)--show, that the employer would and should be interested in preventing a non-optimal amount and distribution of ST-OT. He might even be willing to pay "premiums" to induce the individual to sleep or to rest for a while, if the individual happens to be such a neurotic work-preferrer.

In one sense, therefore, the individual would never really be able to work the maximum potential number of hours per annum, because of his physiological limitations. This, however, does not mean that within his given situation and physiological limits, he would not be able to adjust his ST-hours according to his preferences.

[119]Sleeping time, e.g., cannot be treated like a "fixed factor" which has no opportunity cost, because normally nobody forces us as adults to sleep. As long as we could employ sleeping time in some other non-sleep uses--among which work is an open possibility--we cannot, under appropriate employment conditions, hide under the blanket while other individuals are working night shifts and at the same time claim that we really had no other choice than to sleep. It just would be another illustration of Sartrean "bad faith," in which a free "pour-soi" (for-itself) reduces himself to a choiceless "en-soi" (in-itself) or object, in order to escape the responsibility of his preferences and choices (cf. Jean-Paul Sartre, Being and Nothingness).

Too often it is forgotten that living--which means "yes" for life--can only be truly authentic living in have chosen, reflectively or unreflectively, to work for money only part of their time (their OT is worth more for them than P_W per hour), i.e., that they prefer to continue to live and to live relatively healthy lifes, in which the consumption and spending of own time (leisure) also plays a part (revealed preference).

We assume, therefore, that earnings are foregone for the total amount of OT, which includes free weekends, evenings and nights, vacations, holidays, etc., for if the individual really wanted to sell time (work) during this OT, he could find some employment (excluding for the moment the possibility of unemployment), be it only at a minimum wage.

---

confrontation with the possible "no" against life, i.e., suicide. Our analysis, by showing economic decisions to be at the same time also existential decisions, not only should create, or help creating, a greater awareness of previously unexamined, unreflective choices (cf. R. May, *op. cit.*, p. 90: "I am doubtful whether anyone takes his life with full seriousness until he realizes that it is entirely within his power to commit suicide"), but should simultaneously assist in bringing economics, philosophy and psychology closer together, ultimately culminating in "Existential Economics."

Furthermore, as will become obvious in Chapter IV, 5, sleeping time is a "natural" way of gaining a time distance (TD) to the next day, thereby enhancing "tomorrows" scarcity and value. Sleep is, so to speak, an investment in the value of the next day. Through sleep we are able to attain a distance from yesterday (a night may cure many wounds; it helps us to forget; in it we bid farewell to sorrows and suffering; it is the no man's land, the dreamland between yesterday and tomorrow, is thus pure present), are able to greet a "new," fresh morning (day). Sleep thus enhances the variety of life. Through sleep we are each day "born anew." Preferring sleep over work seems to be, therfore, a quite good and rational (natural) choice with ample returns.

If the individual could find work at a certain minimum wage, but actually refrains from working because this wage is too low for him, then this means that this possible ST, now a form of OT, is worth more to him per hour than the minimum wage rate.

Even in case an individual would actually be unable to sell time, e.g., through physical disability, laws, etc., this does not disprove our thesis, for preferences could still exist. All that is ultimately necessary is that the individual can potentially imagine the alternative "work" (ST) at a certain P_W and then prefer the situation he is in, i.e., that of own time (OT).

F. At the other extreme we admit the possibility that no time at all may be sold for wage or salary income, which may be true for students, children, the leisure class, retirees and other individuals. In our context, this implies that outdoor recreationists may prefer not to be members of the labor force and thus should not be considered as unemployed.[120] The assumed necessary condition (point E) only requires that outdoor recreationists could

---

[120] Cf. ORRRC Report No. 20, p. 11, p. 14 (Table 11), p. 15, pp. 16-17 (chart 1-2), pp. 21-23 (Tables 17-18), p. 40--for evidence of the low OR-participation rates of older and retired people, people who are not in the labor force.

ORRRC Report No. 5, pp. 14-15 (Table 5) indicates that according to questionnaire respondents, 9.8% housewifes, 6.3% students, 2.7% retired and 0.1% unemployed people participated in OR in 1960/61.

sell a part or the whole of their personal time for income if they so wished, or that in case they should be unable to do so through the intervention of "higher forces" (undertime), they would then be sufficiently compensated.

All social groups (except children) participating in OR--whether those in their training-span of life (students, pupils, etc.), in their working-span, in their retirement-span, or whether housewifes--are truly confronted with a wage rate as a possible alternative return to their OR-time.

Those in their training-span do not already sell their time, because through investment in their human capital, the discounted present value of their future income streams exceeds what they could earn now, their opportunity-cost. The money value of their non-training time spent in OR is therefore at least worth their present opportunity-cost, i.e., the wage rate they could earn in the market.

Those in their retirement-span, assuming that they would physically still be able to work part of their time,[121] do not anymore sell time, because they prefer 100 per cent OT. Their case is illustrated in Figure 4. If FO = AK is their fixed retirement income, then the

[121]Even physical disability, however, would not prevent the existence of preferences for OT spent in OR over imagined, alternative ST (work) (cf. p. 87).

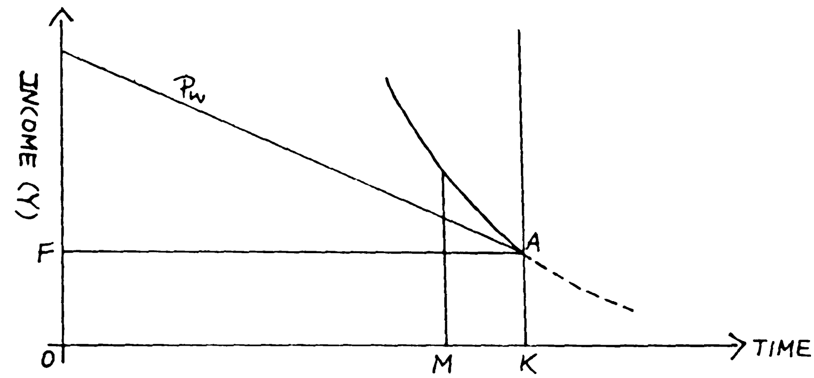

Figure 4.--The sold time-own time model: a 100% OT-preference.

retiree, not selling time anymore in the market, is at equilibrium A. If MK is the OT spent in OR, then we see again that its money value is at least worth P_W. The same analysis can be applied to other people, not selling time in the market, but who receive fixed money incomes, irrespective of whether they work or not (the leisure class).

It is debatable whether it is realistic to see children who are not in their training-span, as being confronted with the market wage rate. Remembering the days of child-labor during the Industrial Revolution, we may be tempted to an affirmative answer. Even though present laws generally forbid the employment of children below a certain age, we may assume that even in case these laws were non-existing, children would refrain from selling part of their time in the market. Their case could therefore be treated like that in Figure 4, where income AK now takes the form of the subsidy granted by parents, orphanages, etc. Only in the special case when children would prefer selling part of their personal time, instead of spending it in OR, would or analysis not hold.

Finally, we have to distinguish the case of <u>housewifes</u>,[122] for they represent the rather peculiar case of people, who work without being usually <u>directly</u> and fully paid for it. They don't sell time in the market, because the imputed income they "earn" through household work probably exceeds what the market offers them. If these housewifes spend time in OR, then the value of this time must be at least worth this imputed income to them and as the latter exceeds the possible market income, we are back to our general result that the OR time per hour is worth more than the alternative market wage.

G. The single money wage rate P_W of Figure 1 already implies that we are assuming here short run static or comparative static situations and constant returns to

[122] <u>Part-time housewifes</u>, i.e., those who partly sell their time in the market and who partly perform the functions of a housewife, need no special attention, because they are truly confronted with a wage rate.

hours of work. We are interested primarily in the value of time _at_ a certain date, but are not, in this context at least, interested in the _changes_ in: the preference structure, the OT-ST composition, P_W and the size of income _over time_.[123]

H. As _decision and planning period_ for the allocation of OT-ST, the year is assumed to be most appropriate. This assumption seems to be justified in view of the employee obligations arising out of labor contracts, which usually are not intended to be written for shorter than annual periods and also in view of the annual recurrance of _all_ different sized OT-ST intervals. The appropriate time budgets or periods, in relation to which consumption allocation decisions are made, will be different for different groups of goods. The present OT-ST allocation decision, which involves such goods or intervals as vacations of several weeks duration, cannot therefore be seen in relation to a time budget shorter than one year and not longer than one year, because of the general annual recurrance of vacations.

I. We have defined sold time as personal time per period _actually_ "sold," spent, exchanged or used for the

---

[123]These aspects have been developed by Gordon C. Winston, "An International Comparison of Income and Hours of Work," _The Review of Economics and Statistics_, XLIII, No. 1 (February, 1966), 28-39.

See also J. D. Owen, _The Price of Leisure_, _op. cit._

earning of money income and own time as total personal time per period minus sold time. Further clarification of this distinction will show why we prefer the ST-OT distinction to the customary labor-leisure dichotomy (cf. footnote 9).

a. Is the simple readiness to ("Arbeitsbereitschaft") and presence at work,[124] the travel time to and from work to be regarded as work time or not; is the daily coffee break part of leisure time or work time? These are some confusing difficulties which for our purposes are really unnecessary if we adopt the more neutral concepts of OT and ST. Under the latter dichotomy, the deciding criterion now is not whether "work" was actually performed or not, but whether time was <u>actually</u> "sold" for money income or not.

A third concept: <u>Paid Time</u> (PT), defined as the personal time (OM) for which money payment <u>is actually</u> made--where PT $\gtrless$ ST--may help in clarifying this criterion. Paid Time can be greater, equal, or smaller than Sold Time, in most cases will tend to be greater than Sold Time by the amount of fringe benefits, holiday-vacation pay,

---

[124]Arthur Nikisch, <u>Arbeitsrecht</u>, I, Bd., 3. Aufl. (Tübingen: J. C. B. Mohr, 1961).

Paul Bobrowski u. Dieter Gaul, <u>Das Arbeitsrecht im Betrieb</u> (Heidelberg: Verlagsgesellschaft Recht u. Wirtschaft, m.b.H., 1965), 5. Aufl.

Alfred Hueck u. Hans Carl Nipperdey, <u>Lehrbuch des Arbeitsrechts</u>, 1. Bd. (Berlin u. Frankfurt a.M.: Franz Vahlen), 1963.

sickness pay, "paid" leave, etc. If PT > ST, the <u>time</u> difference will be part of OT, i.e., the time of sickness is still "own" sickness time (nobody can be sick for me) and hardly could be called "leisure," at least, if it is an involuntary kind of sickness and no malingering. If ST > PT, as may be the case when the travel time to and from work is not paid and is not regarded as a good in itself by the individual and when the employer has to defer wage-salary payments or is illiquid, the <u>time</u> difference will be included as part of ST.[125]

b. The concept of Sold Time refers directly to the market nexus (i.e., "selling"), which above all has to be the decisive criterion for any such distinction of time in economics. Work time or labor time--while it makes up undoubtedly the major part of sold time--occurs also in non-market contexts and therefore <u>can</u> be a part of own time. In fact, for some people (certain artists, intellectuals and others) the nonwork-work (leisure-labor) dichotomy does not really exist, although they must, in

---

[125]Both cases would modify our Figure 1 to the extent that we should draw an additional budget line, lying parallel below MER by a horizontal distance of (ST-PT), to which an indifference curve will be tangent at the intersection point of line EK and the new budget line. For simplicity, we have omitted this second budget line from our model as the conclusions of our analysis would thereby not be affected or changed. Cf. Leon N. Moses and Harold F. Williamson, Jr., "Value of Time, Choice of Mode, and the Subsidy Issue in Urban Transportation," <u>Journal of Political Economy</u>, LXXI, No. 3 (June, 1963), 247-264, for a graphical presentation.

order to survive "sell" some time by, e.g., composing operas, painting portraits, writing essays, etc.:

> In these healthy people we find duty and pleasure to be the same thing, as is also work and play, self-interest and altruism, individualism and selflessness.[126]

(2) Equilibrium Solutions

There is still another way to help in clarifying the understanding of our OT-ST terminology.

Under assumption E above, we have already mentioned the actual deviation possibilities from the desired (planned) equilibrium position E in Figure 1. Let us therefore picture the individual starting his working year with a definite time plan in mind, a plan which takes very specific and concrete forms in the case of dependent work: the labor contract or law listing quite unmistakably the amount and distribution of work hours (length of the work-day or week, number of paid vacation days, etc.) and which is less specific, at least formally, in the case of independent (professional) work, although even an independent craftsman, for example, usually has a quite definite idea, often habitual, about the normalcy or unnormalcy of his work time, an idea, which is oriented along work hour legislation lines and the general trend of the market.

---

[126]Abraham H. Maslow, Toward a Psychology of Being (Princeton: D. Van Nostrand Co., 1962), p. 153.

The indifference curve I_1I_1 at point E in Figure 1 can be thought of representing this plan, and equilibrium at E as therefore the planned or desired equilibrium under the given wage rate constraint P_W. The exchange of KM hours of sold time for EK (= SO) dollars of income, would bring the individual to the highest attainable level of satisfaction I_1I_1. Any actual changes of this planned equilibrium at E would be considered by him as being unnormal disturbances of equilibrium--unplanned, exceptional cases--for which special provisions have to be made through special overtime wage rates, unemployment compensation, etc.[127] Should "actual" time sold extend "over" the

---

[127] Empirical evidence for the U.S. shows that: "Other things being equal, persons who usually worked long hours were far less likely to receive premium pay--only 1 in 4 persons as compared with over half of the workers whose usual workweek was 40 hours or less. This may result from the fact that extensive and recurring overtime tends to be concentrated among workers whose occupation or industry is exempt from legislative or contractual regulations governing the payment of premiums for overtime. In each occupation and industry, however, those persons who usually worked overtime and those who worked very long hours were least likely to receive premium pay (chart 1)." (Special Labor Force Report, No. 57: "Long Hours and Premium Pay," from the Monthly Labor Review (September, 1965), Reprint No. 2472, U.S. Department of Labor, Bureau of Labor Statistics, p. 1; my emphasis).

In other words, if overtime is "usual," if it more or less becomes an expected, normal phenomenon, it tends, in terms of remuneration at least, not to be considered as real overtime. The equilibrium at E may therefore include some of this "normal" overtime. Only if overtime is unusual or unnormal, will it be shown by an extension of ST to the left of E.

amount indicated by E or K, it would be regarded as "over-time" by the individual[128] and should alternatively, actual sold time be "under" the desired equilibrium amount at E, "undertime" (unemployment) would result. In other words, all time to the left of E is overtime for the individual if actual ST exceeds desired ST and all time to the right of E is undertime for the individual if actual ST is less than desired ST. Normal equilibrium time is therefore that time which is neither "under"- nor "over"-time in the true sense of the words over and under.

If ST_I^P and ST_I^A stand for the planned (desired) sold time and actual sold time of the individual (I) respectively, this can be expressed formally by the following inequalities:

a. If $ST_I^P > ST_I^A$, the time difference will be undertime, i.e., unemployment time, lay-off time, involuntary sickness time, etc.

b. If $ST_I^P < ST_I^A$, the time difference will be "overtime" in the true sense of the word.

---

[128] This implies that overtime in the eyes of the employer may not necessarily coincide with overtime as seen by the employee.

For the case of <u>dependent</u> labor, this normal equilibrium notion can be refined when we include in the analysis the employer as the "buyer" of ST together with the previously defined Paid Time concept.

Let BT_E^P and BT_E^A represent the planned (P) and actual (A) time "bought" respectively by the employer (E) from the individual (I), and let PT_I^A, PT_I^P, PT_E^A, PT_E^P, stand for the actual and planned Paid Time (PT) received or paid, by the individual (I) and the employer (E) respectively, then we can first of all derive the following identities:

a. $ST_I^A \equiv BT_E^A$,

b. $PT_I^A \equiv PT_E^A$.

The accompanying matrix table (Table 1) summarizes all other conceivable constellations between the defined concepts. Among other things, it shows that there are several ways of expressing (through inequalities) the concept of overtime (OVT) and undertime (UT)--in the case of overtime we have, for example, extracted eight possibilities. The equalities, of course, always hold true under normal equilibrium (NE) conditions.

TABLE 1.--Matrix of defined time concepts.

	PT_I^P	PT_E^P	PT_I^A (= PT_E^A)	ST_I^A (= BT_E^A)	BT_E^P
ST_I^P	$ST_I^P = PT_I^P$ (= NE) $ST_I^P > PT_I^P$ (= EPD) $ST_I^P < PT_I^P$ (= VAP, SIP, ABS, PL, AP, MAL)	$ST_I^P = PT_E^P$ (= NE) $ST_I^P > PT_E^P$ (= EPD, UE, LO, UT) $ST_I^P < PT_E^P$ (= VAP, SIP, ABS, PL, AP, MAL)	$ST_I^P = PT_I^A$ (= NE) $ST_I^P > PT_I^A$ (= UE, UT, LO, PD) $ST_I^P < PT_I^A$ (= MAL, AP, ABS, PL, SIP, OVT, OE)	$ST_I^P = ST_I^A$ (= NE) $ST_I^P > ST_I^A$ (= UE, UT, LO, UPL) $ST_I^P < ST_I^A$ (= OVT, OE)	$ST_I^P = BT_E^P$ (= NE) $ST_I^P > BT_E^P$ (= UE, UT, LO) $ST_I^P < BT_E^P$ (= ABS, MAL, OVT, OE)
ST_I^A (= BT_E^A)	$ST_I^A = PT_I^P$ (= NE) $ST_I^A > PT_I^P$ (= PD, TR) $ST_I^A < PT_I^P$ (= VAP, MAL, ABS, PL, AP)	$ST_I^A = PT_E^P$ (= NE) $ST_I^A > PT_E^P$ (EPD, OE, OVT, TR) $ST_I^A < PT_E^P$ (= VAP, MAL, ABS, PL, UE, UT, LO, SIP, AP)	$ST_I^A = PT_I^A$ (= NE) $ST_I^A > PT_I^A$ (= TR, PD) $ST_I^A < PT_I^A$ (= VAP, AP, MAL, ABS, PL, SIP)	X	$ST_I^A = BT_E^P$ (= NE) $ST_I^A > BT_E^P$ (= OVT, OE) $ST_I^A < BT_E^P$ (= UE, UT, LO, MAL, ABS, UPL, SIP)
PT_I^A (= PT_E^A)	$PT_I^A = PT_I^P$ (= NE) $PT_I^A > PT_I^P$ (= OVT, OE, AP) $PT_I^A < PT_I^P$ (= UE, LO, PD, UT)	$PT_I^A = PT_E^P$ (= NE) $PT_I^A > PT_E^P$ (= OVT, AP, OE) $PT_I^A < PT_E^P$ (UE, UT, LO, UPL, PD)			$PT_I^A = BT_E^P$ (= NE) $PT_I^A > BT_E^P$ (= AP, OVT, OE, ABS, SIP, MAL, PL) $PT_I^A < BT_E^P$ (= UE, UT, LO, UPL, PD)
BT_E^P	$BT_E^P = PT_I^P$ (= NE) $BT_E^P > PT_I^P$ (= UPL) $BT_E^P < PT_I^P$ (= LO, UE, UT)	$BT_E^P = PT_E^P$ (= NE) $BT_E^P > PT_E^P$ (= EPD, TR) $BT_E^P < PT_E^P$ (= AP, MAL, ABS, VAP, SIP, PL)			
PT_I^P	X	$PT_I^P = PT_E^P$ (= NE) $PT_I^P > PT_E^P$ (= PD, LO, UE, UT) $PT_I^P < PT_E^P$ (= OE, OVT)			

Abbreviations:

ABS = Absenteeism
AP = Advance Payment
EPD = Expected Pay Deferment
LO = Lay-off
MAL = Malingering
NE = Normal Equil.
OE = Overemployment
OVT = Overtime
PD = Pay Deferment
PL = Paid Leave
SIP = Sickness Pay
TR = Travel time (to and from work)
UE = Unemployment
UPL = Unpaid Leave
UT = Undertime
VAP = Vacation Pay (Holiday Pay)

Overtime Possibilities:

1.) $ST_I^P < PT_I^A$
2.) $ST_I^P < ST_I^A$
3.) $ST_I^A > PT_E^P$
4.) $ST_I^P < BT_E^P$
5.) $ST_I^A > BT_E^P$
6.) $PT_I^A > PT_E^P$
7.) $PT_I^A > BT_E^P$
8.) $PT_I^P < PT_E^P$

(3) A Diagrammatic Demonstration

Through the discussion of the assumptions, the elaboration about the own time-sold time distinction and about the concept of a desired or "normal" equilibrium, we have cleared the way for a direct and full exploration and manipulation of the model, which, as we said, is to show P_W to be an acceptable weighting factor for the determination of the money value (price) of individual human time. For this purpose the diagrammatic method of presentation will be most suitable.

From Figure 1 it is already obvious that the money value of individual or personal sold time is SO (= EK), or that the money value per hour of sold time is P_W. It must therefore be now our task to show that P_W can also serve as a money weight for the rest of the annual time period, i.e., for the own time (OK).

Let Figure 5 be based on Figure 1 and let KK_1 represent a fraction of OT which may be leisure time, or more specifically, time spent in OR. Erecting a vertical line on K_1 we see, that under the given money wage rate P_W, our individual is wise not to work (sell time) during the KK_1 period, for the additional income (GN) he thus could earn would surely be less than the subjective value of this time period KK_1, which is at least (NF) dollars; or alternatively, were the individual forced to sell the

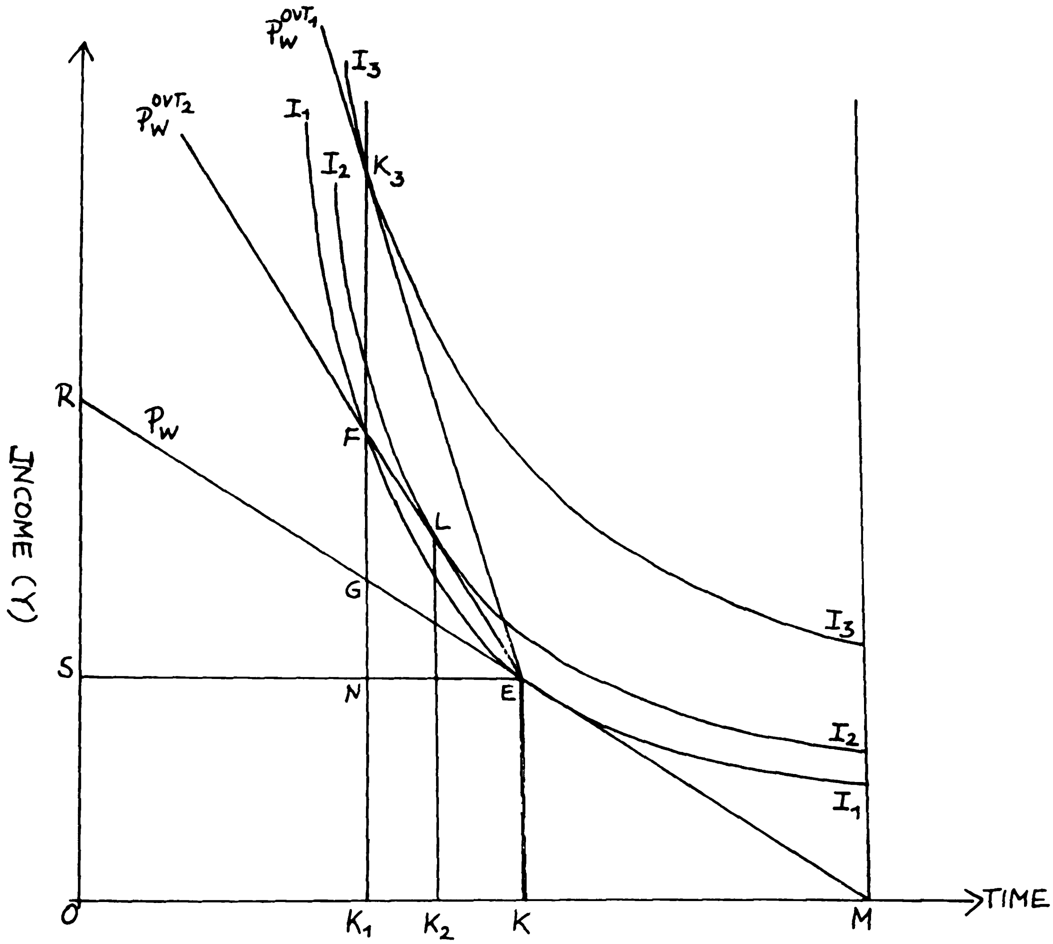

Figure 5.--The sold time-own time model: the own time surplus and overtime wage rates.

KK_1 hours at P_W, this would lower the level of satisfaction below that indicated by indifference curve I_1I_1, i.e., the individual would be worse off (than at E) on an indifference curve (not shown) passing through G.

The difference between (NF) and (GN), i.e., (GF) is so to speak an own time- or, in our case, an outdoor recreation surplus for the individual. The reason why our individual in Figure 5 does in fact not work during the KK_1 time period, is precisely because this time is worth more on the margin (i.e., GF dollars, at least) to him in own time uses than in the possible sold time (work) use. Moving point K_1 eastward and close to point K, so that the KK_1 difference reduces to just one hour (not shown), we see that the money value of this hour of OT is at least P_W, i.e., exceeds P_W by an own time surplus which increases at an increasing rate as we move westward from K, thus mirroring through indifference curve I_1I_1 the increasing relative scarcity of OT.

This result should not puzzle us at all, for we know that overtime wage rates are generally higher than normal wage rates to compensate, among other things, for this OT-surplus,[129] so that the individual (after overtime

[129]This compensating effect of overtime wage rates is complementary and does not substitute for what we may call the discouraging effect of overtime rates. In fact, the original purpose of overtime rates as stipulated, for example, in the United States Fair Labor Standards Act (FLSA) of 1938, was "to discourage the employment of any one person for more than 40 hours per week, in order to create additional jobs." (Encyclopaedia Britannica, op. cit., p. 804.)

Moreover, overtime rates are instruments of social policy, intending to keep the extent of overtime at a necessary minimum, in order to avoid adverse health effects which may be caused through excessive work. (Cf.P. Bobrowski and D. Gaul, op. cit., p. 140; A. Hueck and H. C. Nipperdey, op. cit., p. 275; cf. also footnote 66.

work of KK_1 hours, for instance) is at least as well off as he would be at his revealed preference point E. Figure 5 shows that payment by the employer of a money premium amounting to (GF) dollars for overtime work of KK_1 hours, would bring the individual back to his indifference curve I_1I_1 at F.

However, paying the same total amount of (NF) dollars for KK_1 hours of overtime in the form of an overtime wage rate $P_W^{OVT}2$, could induce the individual to work only KK_2 hours of overtime, as there is an indifference curve I_2I_2 tangent to the overtime wage line $P_W^{OVT}2$ at L, which indicates a higher level of satisfaction as that represented by I_1I_1. By paying overtime rates instead of overtime premiums (lump-sums, bonuses),[130] the desired KK_1 hours of overtime would only be worked by the individual, if the employer paid him a still higher (than $P_W^{OVT}2$) overtime wage rate, such as $P_W^{OVT}1$. Equilibrium at K_3 on indifference curve I_3I_3 would represent this situation.

---

[130]This result is analogous to the familiar differential impact of excise versus income taxes and demonstrates that overtime bonuses would be economically more efficient than overtime rates. (Cf. T. Scitovsky, op. cit., pp. 65ff., Figures 18, 19.)

There are numerous German labor-court cases in which this rate vs. premium conflict had to be resolved. The problem is known as the "Pauschalierung" (lump-sum payment) of overtime compensation. Cf. A. Nikisch, op. cit., p. 347, footnote 92; P. Bobrowski and D. Gaul, op. cit., p. 141; H. D. Rewolle, "Die Überstundenpauschale," Der Betrieb, Nr. 51 (December 19, 1956), pp. 1209-1210; and H. Meissinger, "Pauschalvergütungen im Arbeitsrecht," Der Betrieb, Nr. 19 (May 9, 1956), pp. 448-450.

The case of a paid vacation, i.e., when PT > ST, does not change our results so far obtained but only reinforces them. In Figure 6 the distance $EE_1 = MQ$ represents the vacation pay for the OT-vacation period LL_1. Thus vacation pay has the effect of increasing the area of attainable combinations by the triangle EE_1N, thereby shifting the individual to a higher indifference curve I_2I_2. The overtime premium would in this case amount not only to NF but to ND. The same analysis can be applied to other fringe benefits.

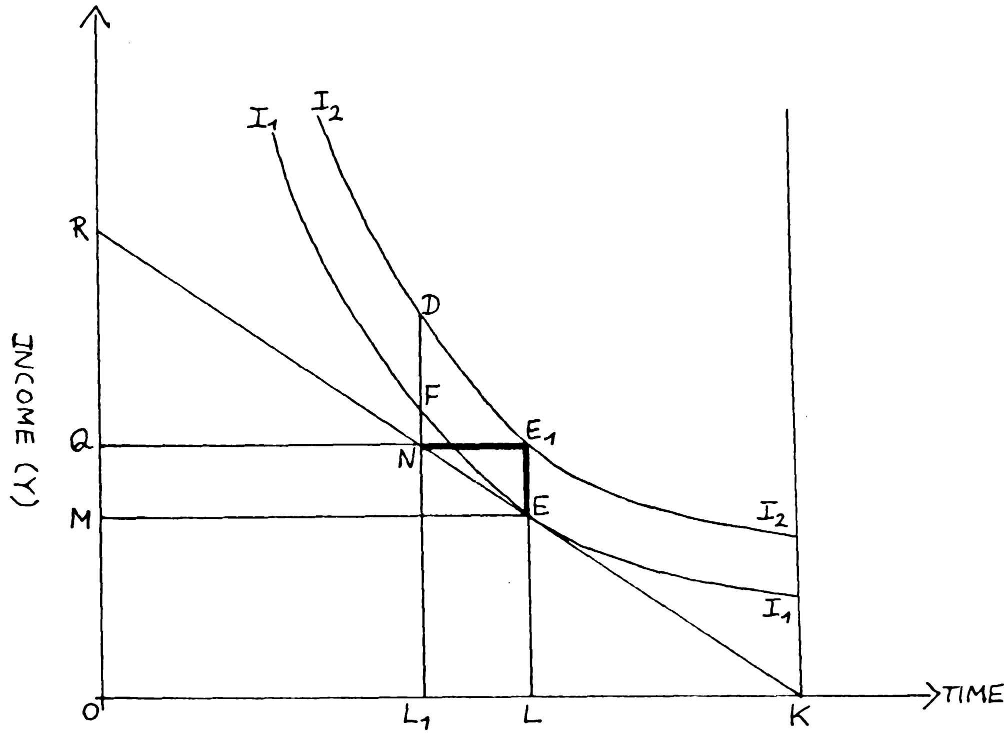

Figure 6.--The sold time - own time model: vacation pay.

We are here abstracting from another possible hypothesis, which sees the choosing individual as being confronted not only with a single money wage rate (ex ante), but with several (overtime) wage rates per job simultaneously. In such a case, there would be one or several kinks in the wage line, shown in Figure 7 below, and equilibrium would

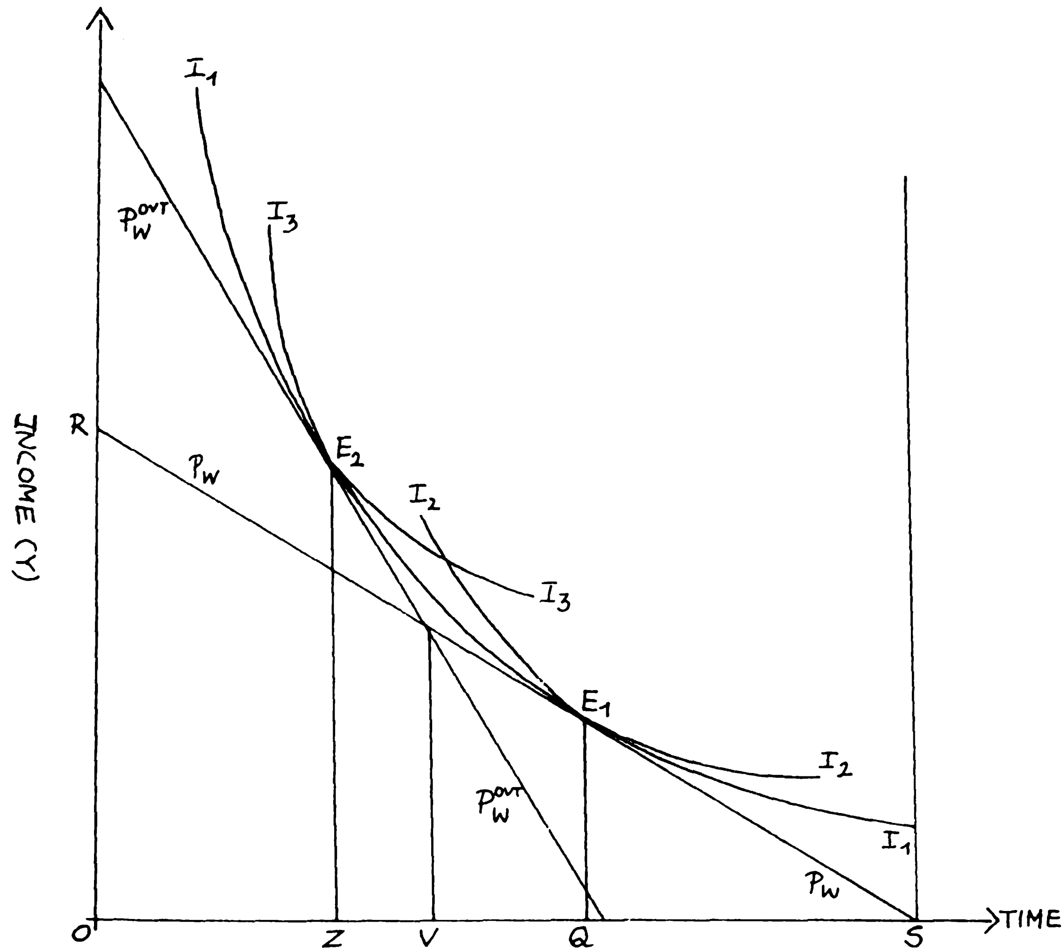

Figure 7.--The sold time-own time model: the "kinked" wage line.

now not be unique anymore, but would be established twice (or several times), if there is, e.g., an indifference curve like I_1I_1 in Figure 7 which is tangent to the line segment of P_W at E_1 and tangent to the line segment of P_W^{OVT} at E_2 simultaneously (ex ante) and not ex post as in Figure 5. (Figure 7, showing three different (intersecting) indifference curves should not confuse the reader as each curve corresponds to a separate case (situation) discussed subsequently. The three cases are all treated in one diagram only to economize the latter.) The individual would work in this case QS hours at the normal wage rate P_W and ZV hours at the higher overtime rate P_W^{OVT}, while VQ plus OZ number of hours are reserved as own time.

There exists empirical evidence that this is a possibility under tight labor market conditions. The fact that many employees under union contracts "get time and a half for Saturday work and double time for Sunday work regardless of how many hours they labor during the regular week (my emphasis)," accounts for the preference of absenteeism during regular week days and work during overtime periods. "Thus if a man works Monday through Saturday, he gets 6.5 days pay; but if he takes off Wednesday and works the rest of the week, he gets 7.5

days pay for six days' work."[131] VQ in Figure 7 represents this absenteeism time.

Indifference curve I_3I_3 which is tangent to the P_W^{OVT} line at E_2, shows the possibility where an individual himself deliberately chooses[132] overtime of ZV hours at wage rate P_W^{OVT} and VS hours of normal sold time at the normal rate P_W.[133]

---

[131]Kenneth G. Slocum, "I'll Be Out Today--Rise in Absenteeism Plagues Firms Already Hurt by Labor Pinch; Envelope Maker Pays Bonus for Perfect Attendance; Other Concerns Get Tough; Sick- or Hunting New Jobs?", Wall Street Journal, (June 6, 1966), p. 1.

[132]The own choice of overtime by the employee himself runs, however, counter to the general rule, that overtime wages have legally to be paid only if the employer gives the order, i.e., the employer and not the employee is the choosing and deciding agent in this case. (Cf. Dr. Jobst Gumpert: "Bezahlung von Mehrarbeit und Überstunden", Gutachten; Der Betriebsberater, Heft 12, (April 30, 1961), pp. 487-490, espec. p. 489).

[133]According to the German weekly Die Zeit ("Eine Überstunde", Jan. 18, 1966, p. 14), more than 90% of the employees of a great W-German retail enterprise have agreed to work one hour per week as overtime at a special high overtime rate. This proves the existence, however exceptional, of the E_2 equilibrium possibility. Furthermore, numerous newspaper advertisements in the U.S. for skilled workers often explicitly state the hours of work and thus the possible overtime hours implicitly, at times even the overtime hours themselves. This may also be interpreted in terms of the E_2 equilibrium situation, i.e., as an indication that the worker has a choice to determine the overtime hours himself.

Indifference curve I_2I_2 illustrates the separate case and possibility where the individual prefers to sell only SQ hours of time, which is below the point V, from whereon time is officially counted as overtime. In this situation, the given P_W^{OVT} could never induce the individual to work overtime, as his chosen sold time is VQ hours short of the ST limit, beyond which overtime is paid.

Our previous result that P_W is an underestimate of the money value of OT would, however, even under these exceptional cases of Figure 7 not be changed, as the OT-surplus to the left of E_1 and/or E_2 would continue to exist.

In Figure 5 we assumed (GF) dollars to represent a sufficient premium, which added to (GN) dollars, should make the individual as well off as he would be at E, were he not to work the KK_1 hours as overtime.

This finding, however, can only be true if the <u>distribution of own time</u> at K_1, i.e., the frequency, size (duration) and sequence of own time intervals was the same as that at K, or if the individual was sufficiently compensated for a <u>changed</u> distribution of OT at K_1 by the (GF) premium, i.e., that the OT-distribution implied at point F along indifference curve I_1I_1 coincided with the <u>actual</u> OT-distribution associated with the KK_1 hours of overtime demanded by the employer.

This fact, that underlying any point along the distance OM and underlying indifference curve I_1I_1 is a certain distribution of time, usually is not noticed in the economic literature at all, or is at most only implicitly assumed. Sold time and own time are not continuous blocks of time, as might be inferred from ourdiagrams, but are summations of interlocking ST and OT intervals of varying duration. Underlying equilibrium position E in Figure 5, for instance, is a particular distribution of these intervals.

Going back to Figure 5, it is now clear that the distribution of OT/ST at F cannot be the same as that at E, for either the number of ST/OT intervals must have increased/ decreased, or at least some of the same number of OT-ST intervals must have been shortened and lengthened respectively. A third possibility consists in a combination of the two previous possibilities.

With the above definition of the distribution of time, indifference curve I_1I_1 in Figure 5 must have been drawn under the implicit assumption of a changing distribution of OT/ST intervals along its course. Thus point F expresses not only the taste of the individual, i.e., that with NF dollars of additional income and KK_1 hours of additional sold time, he is as well off as at point E, but it expresses also a particular taste for a particular (different than that at E) distribution of OT-ST.[134] If, in our example, the distribution of the overtime ST-intervals (which add up to the KK_1 hours of Figure 5) demanded by the employer does not coincide with that distribution implicit at point F or K_1 and if the individual is not indifferent as between the two distributions, then even the payment of the GF dollar premium could not make the individual as well off as he would be at E. In such a case, indifference curve $I_{11}I_{11}$ in Figure 8 below would take the place of I_1I_1 - both curves now representing equal levels of utility ($\bar{U}$), but different distributions of OT-ST for any given amount of total OT-ST hours along OS. The employer would have to induce and "bribe" our individual with an additional premium of FH dollars to change his OT-ST distribution preference at F or K_1 and thus to bring the employee's desires into balance with the employer's needs.[135] As an example

[134] The degree of convexity (steepness) of the indifference curve and therefore the required premium will depend upon labor market conditions: the tighter the market, the higher will be the premium which has to be paid, i.e., the steeper will the indifference curve be, cet. par. (Cf.: "More Workers Gather Nerve to Switch Jobs As Labor Gets Scarcer", Wall Street Journal, 1966, p. 1; Cf.: Frederick C. Klein: "Pay vs. Play - Firms Offer Employees Double Wages If They Give Up Some Vacation", Wall Street Journal, May 24, 1966, p. 1).

[135] If the premium is paid in form of an overtime wage rate (P_W^{OVT}), (not shown), i.e., a straight line connecting E with H - this rate would suffice to induce the KK_1 hours of overtime only, if the wage line happened to be tangent at H to indifference curve $I_{11}I_{11}$; otherwise, even a still higher overtime wage rate would have to be paid. (Cf. ftn. 130).

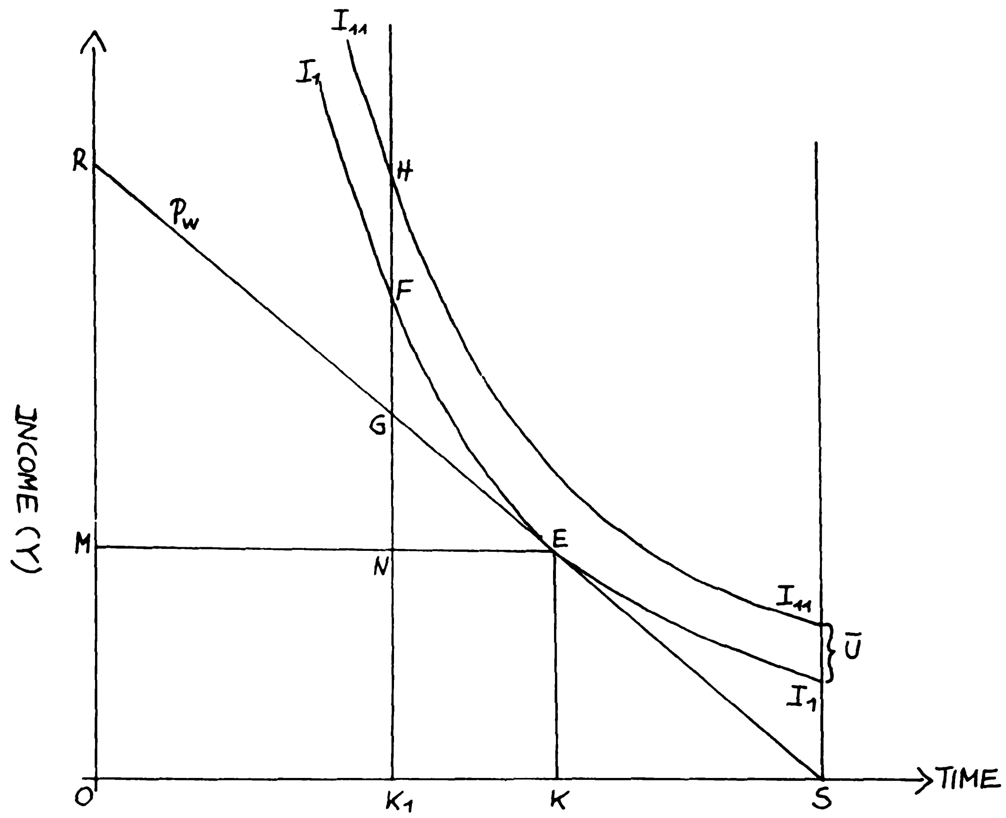

Figure 8.--The sold time-own time model: income compensations for inferior ST-OT interval distributions.

take the case where the employee is supposed to work the KK_1 hours overtime as a unit during a weekend, while he would much prefer to distribute the same amount of overtime evenly over the work week--a preference which indifference curve I_1I_1 depicts at F or K_1. In other words, our individual prefers the same amount of own time in large, continuous (weekend) blocks, instead of in small pieces.[136]

---

[136] There are several reasons why usually (for constant total amounts of OT) continuous, large blocks (clusters) of OT are preferred over scattered, small pieces of OT:

i. Working overtime in the form of an extended workday saves an additional work-trip, usually involved in weekend work.

ii. A larger variety and number of different (time-complementary) activities can be pursued if the own time span available is relatively long rather than when it is short, because of the greater profitability of transportation investments (money and time), because of seasonal, day- and night rhythms, physiological conditions and other reasons. The individual's choice is expanded and thus his welfare increased, if his activity/consumption time horizon (budget) of OT is less often interrupted by ST intervals. The fact that Sunday and holiday overtime (or vacation "pay-in-lieu") rates are in general higher than weekday overtime rates, may partially account for this inferior distribution of OT/ST entailed in Sunday or holiday work. For the double-time pay experiences--which are sometimes capped with an additional bonus--of several U.S. companies, Cf.: Frederick C. Klein: "Pay vs. Play--Firms Offer Employees Double Wages If They Give Up Some Vacation", op. cit., p. 1.

Demoscopic evidence shows that of a sample of 1030 West-German and West-Berlin employed laborers, 18 years and over, who were confronted with the choice of either working the standard 48 weekly hours within 5 days with a free saturday, or of distributing the same number of hours through shorter work-days over all 6 week-days, 73% preferred a free saturday (and thereby a longer weekend) through longer weekly work-days, while only 20% voted for 6 work-days with the associated shorter daily work time and 7% were undecided (Gerhard Schmidtchen: Die befragte Nation--Über den Einfluß der Meinungsforschung auf die Politik, (Freiburg: Verlag Rombach, 1959), p. 39).

This general preference for short work-weeks and long weekends, may, however, disobey and be not in accordance with the advice coming from medical research. A. Hittmair's pioneering sport-medical investigations, e.g., demonstrate. . ." that the six-day-week is still the best and most natural regarding the present living and working conditions", because of a . . ." negative phase of neuro-vegetative liability". . . which just occurs on the (third) day after a 2-day weekend ("blue monday"). "The prolonged weekend cannot therefore bring genuine recuperation". . ., as. . . "relaxation and recuperation are conditions which take some time to get underway". (Anton Hittmair: "Wissenschaft vom Urlaub", Münchener Medizinische Wochenschrift, 101. Jg., Heft 31, July 31, 1959, pp. 1329-1333).

(4) Disequilibrium Situations

A. Deviations of Actual From Desired (Planned) Sold Time

Up to this point we have operated under the assumption of either a normal equilibrium, i.e., that actual and planned (desired) ST and OT coincide, are identical, or that even when undertime exists, OR-Own Time is still preferred to work (ST). Under assumption E (see IV,1) we, however, already stated that in order to show the validity of our OT-money-value-contention-more specifically our OR-time-money-value-contention--we need only assume that in the case where actual ST hours are less than the desired ST hours of equilibrium position E (undertime), i.e., a part or the whole of OT is undesired, either some form of extra compensation for this "undesired" deviation is found, or that the individual would not prefer to work (sell time) during his OR-time, even in this undertime situation. We will now demonstrate the soundness and general validity of this less restrictive assumption diagrammatically in Figure 9.

i. If actual ST should exceed desired ST - as may be the case when standard work weeks, forced labor, etc., prevail--and if no extra (above P_W) compensation for this "overtime" is paid, the individual, then a "leisure preferrer", can be represented to be in a position like that at G in Figure 9, KK_1 measuring the excessive ST. We

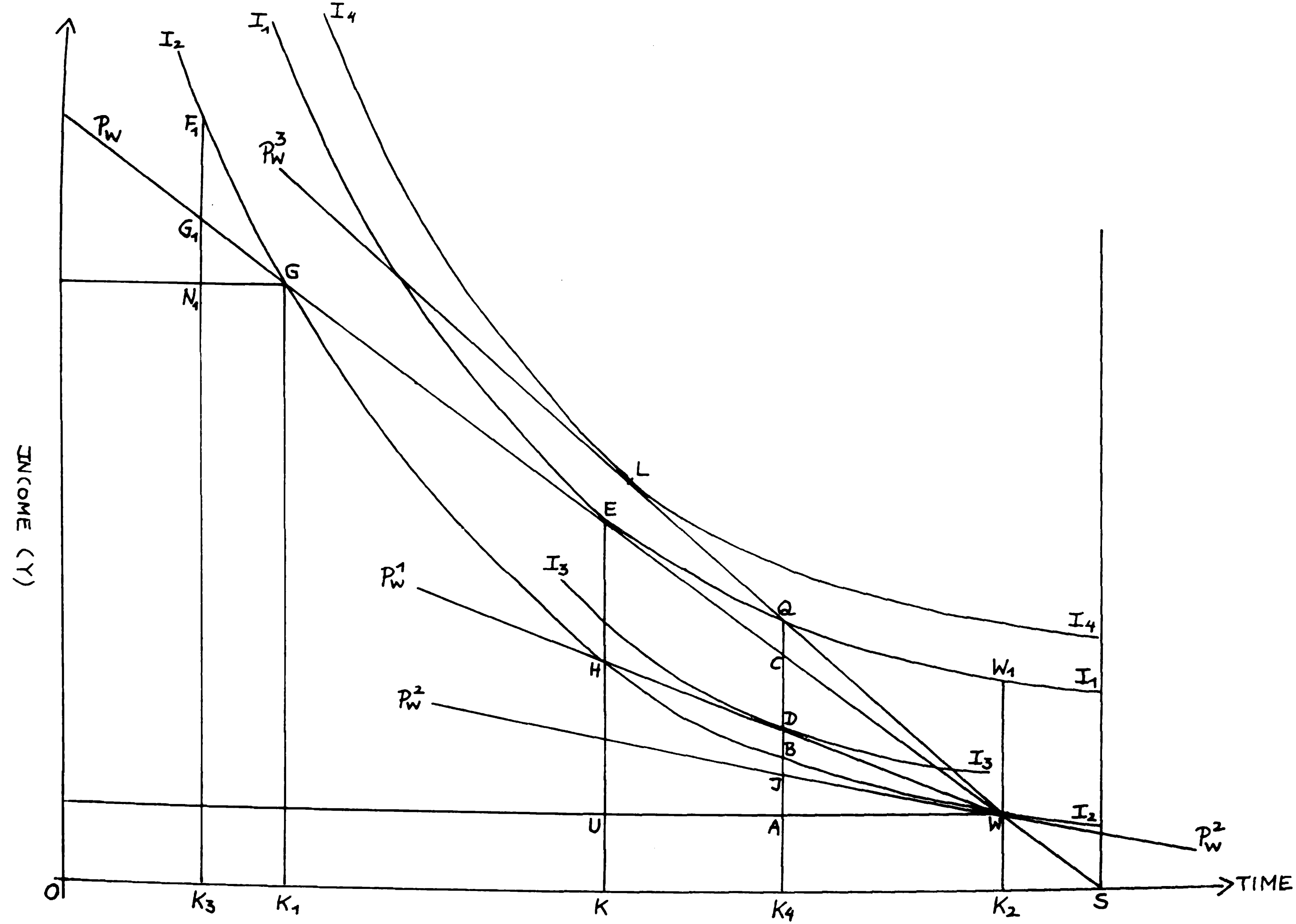

Figure 9.--The sold time-own time model: deviations of actual from desired sold time (undertime-overtime).

see, that an indifference curve I_2I_2 must pass, through G lying below I_1I_1, the desired (planned) level of satisfaction, which the individual could attain at E, were he not pressured or forced to sell more time than he really wishes (overemployment). The individual wishes to sell only SK number of hours, but actually sells SK_1 hours, i.e., his actually sold time exceeds his desired sold time by KK_1 hours. There is in this situation, however, no doubt that P_W, as before, is a minimal weighting factor for the derivation of the money value of the leftover own time OK_1.

Let K_3K_1 stand for that part of own time which is spent in OR, then it is again obvious that G_1N_1--even in this disequilibrium situation--is an underestimate of the value of K_3K_1 hours of OT, for $F_1N_1>G_1N_1$ would be a measure of the value of this OR-time, i.e., a $P_X>P_W$ would be the money value per hour of OR-time.

In other words, even if we should go along with the critics who maintain that the individual cannot really freely determine his hours of ST or OT in the downward direction (Cf. ftn.109), i.e., that he must sell more time than he really wishes to, our previous conclusion continuous to be true.

ii. The answer to the situation where the desired amount of ST exceeds the actual ST hours (undertime), i.e., where the individual would like to sell more time than he actually can, SK exceeding SK_2 by KK_2 hours in Figure 9, is more complex. Here the individual is an "income preferrer". Being able to sell only SK_2 hours instead of the desired SK hours means that the individual's actual position is at point W on indifference curve I_2I_2 in Figure 9, i.e., he is again worse off than he would be were he able to achieve "normal equilibrium" at E along indifference curve I_1I_1. Our diagram shows that he would, therefore, be willing or prefer to work for the whole or part of the KK_2 hours of undertime at wage rates even below P_W, like at wage rate P_W^1, but at and below no wage rate such as P_W^2, the wage line which is tangent to I_2I_2 at point W. Were the individual able to work, for instance, K_4K_2 hours at P_W^1, this would bring him to the higher indifference curve I_3I_3 at point D. All points <u>between</u> K and K_2 at wage rate P_W^1 would also be preferred to the original situation at W, but would be points on lower indifference curves than I_3I_3. <u>At</u> point K or H he would be indifferent to situation K_2 or W. All wage rates <u>above</u> P_W^2 would induce the individual to sell more than SK_2 hours. <u>At</u> the wage rate P_w^2 he would prefer to remain at W and at wage rates <u>below</u> P_W^2 he would be better off by choosing more (than OK_2) hours of own time.

If we let K_4K_2 stand (for illustrative purposes only) for that part of total own time (OK_2) which the individual spends in OR, this time is now, in the undertime situation, worth to him <u>at least</u> AJ dollars, which is CJ dollars less than its value at wage rate P_W. Alternatively, our individual would only accept work for K_4K_2 hours, even in this undertime situation, if he were paid an income of at least AB dollars, because point B is indifferent to point W and because the K_4K_2 hours in the form as leisure have an own value (reservation price) for him of at least AB dollars.

Using P_W as the money weight in the case where the individual is in an undertime situation might[137] thus over-estimate the true value of own time or OR-time, unless, as we shall see later on, he is fully compensated for his being forced in the undesirable undertime situation.

Our model shows that unemployment OT (a form of undertime) is of lower value than normal OT, as the individual would be willing to forego this undertime OT at wage rates less than P_W but not below P_W^2.[138]

---

[137]Even in an undertime situation, P_W may still be the correct weight as long as the OR-time is not part of the undertime, i.e. if the time distance K_4K_2 is part of the own time to the left of E; for this would imply that the individual, although unemployed, still prefers the K_4K_2 hours as OR-time over work, i.e., he does not participate in OR to just "fill" the undertime gap.

[138]J. D. Owen, in a different context, assumes "that in times of less than full employment, the market price of the leisure of employed persons will be less than the average wage rate paid, and that the differential will rise with the unemployment rate" (p. 63).

Our model-analysis comes to the same conclusion. Whether the "differential will rise with the unemployment rate", will, however, depend upon the preference structure of the individuals, i.e., upon the slopes of the various indifference curves between leisure and income. For instance, undertime at K_2 is obviously greater than at K_4 in Figure 9, which is another way of saying that the unemployment rate at K_2 is greater than that at K_4. To determine whether the reservation price or own value of OT (leisure) per hour at K_4 is greater than at K_2, we have to observe the slopes of indifference curves passing through C (not shown) and

Own Production

Up to this point our analysis implicitly assumed that only by selling time in the market would the individual be able to generate (money) income. This assumption, however, has to be modified for those individuals who in addition are able to generate income as own producers, are, so to speak, selling time to themselves.

In the present context this means that there may exist a lower limit to the number of hours by which desired ST may exceed actual ST and which is determined by the productivity of the individual as an own producer, i.e., by the skill and opportunity to generate income or goods in a non-market context. In Figure 10 below we have modified Figure 9 so as to show these possible Robinson Crusoe aspects of our individual.

W, respectively. Although indifference curves to the left of W seem to have a steeper slope if they are almost parallel (which would support Owen's argument), it is nevertheless conceivable (yet as we think exceptional), that the indifference curve at C is less steep than the indifference curve at W (which would contradict Owen's argument). We agree, however, with Owen in that it makes more economic sense, that an unemployed worker will be ready to sell his time at increasingly lower wage rates, the higher the degree of unemployment, expressed in undertime hours, if there exist no compensations (Cf. IV,4,A) for the undesirable situation in which he finds himself.

John D. Owen, "The Demand for Leisure", *Journal of Political Economy*, Vol. 79, No. 1 (Jan./Febr., 1971), pp. 56-76.

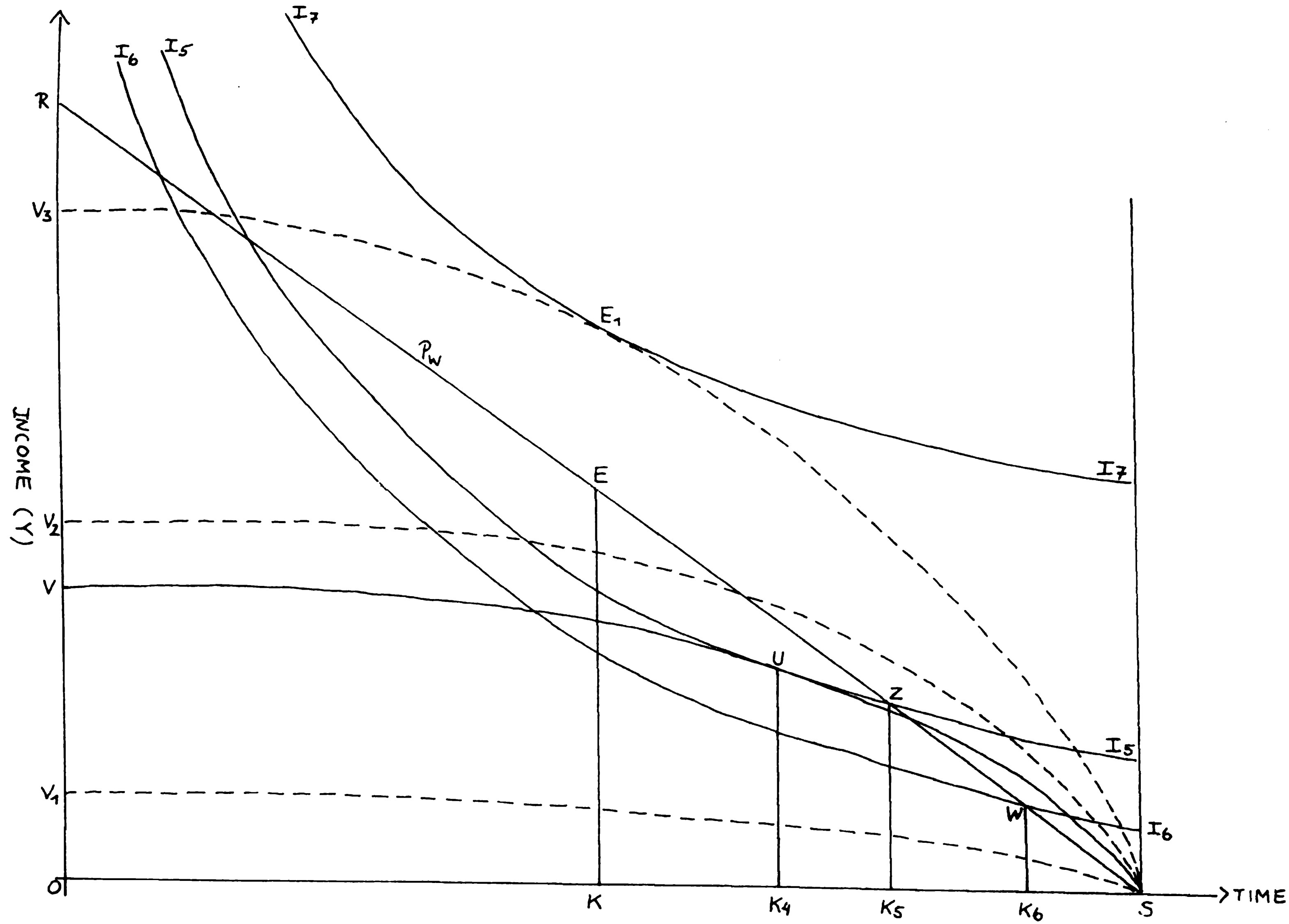

Figure 10.--The sold time-own time model: own production

SUVO represents the own production possibility block or curve of the isolated individual whose trading ties to the labor market have been severed, e.g., through a temporary lay-off. Assume that he has a choice of either being his own producer, or of actually selling only SK_6 hours of sold time (by working, for example, only one third of his normal daily working time) to his employer for WK_6 dollars of income per year.[139] Then, as our Figure 10 shows, he would prefer being his own producer, because through this choice he could attain indifference curve I_5I_5 which is tangent to his production block at point U, - i.e., trading SK_4 hours of work with nature, so to speak, for UK_4 dollars of imputed income, - and which lies above indifference curve I_6I_6 on which he would be at point W, were he to accept the alternative of reduced daily ST hours. This assumes, that for the individual under consideration, "own time"-work and sold time-work are in no way different in his utility function, i.e., that possible differences in the distribution and in the utilities/disutilities of time used in own production (being one's own master) and sold production, leave the individual indifferent. Otherwise, indifference curves I_5I_5 and I_6I_6 would be comparable only with further qualifications.

---

[139] Later on we will treat the case where he does both, i.e., being his own producer and selling time in the market.

If the actual time which the individual could sell should amount to SK_5 hours, he would be indifferent between own production and sold production, as U and Z are situated on the same indifference curve I_5I_5. For all points lying to the left of K_5 he obviously would prefer sold production to own production. For an individual whose own production block is rather flat, like SV_1O in Figure 10, the point of minimum acceptable sold time would lie to the right of K_6, but would not coincide with S, at least as long as some own production possibilities exist. For more productive own producers, represented, e.g., by the SV_2O production block, the acceptable sold time minimum would be located to the left of K_6.

Should the return from own production exceed the return attainable through the labor market over the major part of OS - like production block SE_1V_3O - it is apparently more <u>efficient</u> for the individual, quite independent of tastes, to select a point of equilibrium such as E_1 on indifference curve I_7I_7 and along the "higher" <u>curve of attainable combinations</u> SE_1V30, than to move along the "lower" budget line RES.[140] In many areas of economic development this latter case is not at all unlikely, when wages are relatively low and own production possibilities in the agricultural sector relatively abundant.

---

[140] Cf. K. Lancaster: "A New Approach . . .", <u>op. cit</u>., p. 146.

Perhaps a more realistic situation is depicted in Figure 11. Here we assume that the individual is not confronted, as he was in our analysis of Figure 10, with the either-or choice (i.e., of either being an own producer, or of selling time to the market exclusively), but we assume now that he is able to deal with his undertime situation by actually selling SK_6 hours in addition to his own production, i.e., that he is able to supplement his own production (sold production) income through sold production (own production) income. This can be shown graphically either by shifting the own production block SUVO of Figure 10 to the left by a horizontal distance of SK_6 and upwards by a vertical distance K_6W, so that its origin (nose) is transferred from S to point W, or starting with the own production block, by letting a ray R_1U_2, parallel to RS, emanate from U_2, the latter point representing the equilibrium position for $SS_4 = K_4K_6$ hours of own production. The ray R_1U_2 must pass through point U_1, so that $(SS_4)+(S_4K_4) = (SK_6)+(K_4K_6)$.

Figure 11 assumes furthermore that the dimensions of the production block remain unchanged after its move to W (only the segment FQNL will be lost to the realm of non-attainable combinations), i.e., that own work, being now performed between or before/after the ST intervals totaling SK_6 hours, remains as productive as under the previous assumption of no interrupting sold time when own production was chosen. This assumption is, however, made only in order

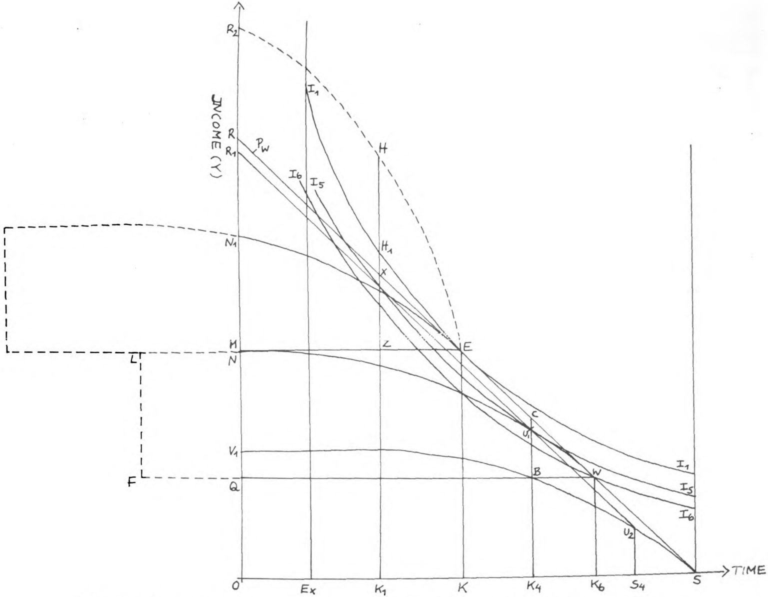

Figure 11.--The sold time-own time model: sold time plus own production.

to simplify the diagrammatic exposition and therefore does not represent a necessary condition, i.e., the production block could be flatter or steeper than before, without changing the substance of the conclusions to be reached.

Although the own production block, through its origin transfer, has lost its "big end" FQNL, the remaining production possibilities represented now through the shorter block WNQ, to which indifference curve I_5I_5 is tangent at U_1, shows that the individual has improved his welfare by supplementing his disequilibrium amount of sold time SK_6 through own production of $K_4K_6 = SS_4$ hours. Instead of being at point W on indifference curve I_6I_6, the individual has moved to point U_1 on a higher level of satisfaction represented by indifference curve I_5I_5. His <u>total</u> income amounts to K_4U_1 dollars, of which K_4B (=WK_6) dollars are due to sold time equal to SK_6 (=K_4S_4) hours and of which the remaining BU_1 (=S_4U_2) dollars are due to own production time equal to SS_4 (=K_4K_6) hours. Total income K_4U_1 is still U_1C dollars short of income K_4C which he could have attained, had he been able to sell the K_4K_6 hours in the market at P_W, instead of using them for own production. Market imperfections (undertime) have <u>reduced</u> the "gains from trade". Own production, while it ameliorates the undertime situation, falls still short of the "gains from (labor) trade", which the market normally provides.

If we continue to slide the production block with its "nose" along the wage line P_W in the north-west direction, keeping its base always parallel to the horizontal axis, we see that the tangency positions (like U_1) between indifference curves and the production block, will occur more and more towards the "nose". This is explained through the increasing steepness (convexity) of the indifference curves as we move along their course towards the north-west, which limits the tangency positions with the production block also to its steeper portions, i.e., those towards the nose.

At point E where the nose touches equilibrium, no own production will occur at all. This is as it should be: the own production income supplement will tend to be greatest, the greater is the undertime, i.e., the more we move away from normal equilibrium E along RS towards point S and it will tend to be zero at the point of desired eqiulibrium E.[141]

To the left of E, own production would take the individual only to lower and lower indifference curves, at least as long as we continue to consider the exclusive goal of own production to be the provision of an alternative (own) income substituting or supplementing activity.

---

[141]The private garden plot or allotment, which permits some own production, can be a cushion against emergencies such as an (unemployment) undertime situation, in addition to its psychic returns.

Once the desired equilibrium at E has been attained by the individual, this does however not necessarily imply the absence of any own production, for own production can and probably will consist also of productive activities whose aim is not that of an alternative to sold time activities or of a supplement for an unnormally low ST-income - as there is now (at equilibrium E) no need - but whose aim consists predominantly and exclusively in the production of "psychic income".

Many of the multiple household do-it-yourself activities fall into this category, but also any other own time activity, OR included. We may picture this situation in terms of a psychic-income-production-possibility-block ER_2M, which will have to lie to the north-east of the money budget constraint P_W and to the north-east of the "physical" (material) own income production block EN_1M. The individual's actual position will be somewhere along R_2E, probably to the south-east of point R_2, although the desired equilibrium will tend to be located at R_2, the maximum psychic income level. The individual seems to be continuously on the way towards his goal R_2 (R_2 is like a magnetic pole towards which the individual is pulled), will, however, at least during one lifetime (but perhaps upon reaching "nirvana"), never reach R_2, because there is always still a sufficient amount of negative psychic income, i.e., dissatisfaction, own "bads", lack, scarcity (nothingness), etc. around, all of which consume own time too, in fact, to a certain extent, the latter seem to fulfill a rather necessary function, for how else could we perceive our positive psychic income goal, were it not for the negative psychic income, which unceasingly separates us from the goal?

Of course, psychic income units cannot be directly compared with money or good income units. Point H, for example, cannot be considered as a point on a higher (than I_1I_1) indifference curve, but only as a, in psychic income possibility space, blown-up illustration of point H_1 on indifference curve I_1I_1, i.e., as an explanation _why_ the value of KK_1 hours of own time is _worth more_ than just the wage equivalent ZX.

After this rather lengthy, but as we shall see necassary, excursion into the realm of own production, let us return to our main argument, from which, for the time being, we will, in order to simplify, exclude the possibility of own production.

Undertime Compensations

We left our main argument with the postulate, that even in an undertime situation P_W may continue to serve as a minimum money weight for the determination of the money value of own time, if _either_ the particular amount of OT (e.g., OR time) whose value has to be measured, is not part of the undertime, _or_ if the individual is fully compensated for the undesirable undertime. We will now show in detail three main possibilities of <u>undertime compensation</u>:

1. It is a likely possibility that the "individual in undertime" will receive <u>unemployment compensation</u> or <u>unemployment insurance benefits</u>.

If in Figure 9 our individual at point K_2 (or W) should receive WW_1 dollars exogenously from his unemployment insurance or from some benevolent institution/agent, this would bring him to indifference curve I_1I_1 at W_1, where he is as well off as at E. Unless he distinguishes subjectively between income received from work (ST) and income received from his insurance, e.g., when a dollar <u>earned</u> through work is worth more (or less) to him than a dollar <u>received</u> from insurance,[142] points W_1 and E can be interchanged, as they are on the same indifference curve I_1I_1, and we obtain our earlier result, that to the left of E own time is <u>at least</u> worth the P_W -wage rate equivalent per hour.[143] It is probably realistic to assume that the

---

[142]We will here not analyze the case where a stigma (discount) is attached to the receipt of insurance benefits and where work incentives are influenced, as this would not change the substance of our argument. See: C. T. Brehm and T. R. Saving: "The Demand For General Assistance Payments", <u>American Economic Review</u>, LIV, No. 6 (December, 1964), pp. 1002-1018.

[143]Furthermore, we are here abstracting from the fact, that unemployment time is usually an imperfect kind of own time, because the freedom to use this time according to own wishes, is often severely restricted through the legal requirement, demanding that the registered unemployed individual has to report personally and periodically to the "employment-office", in order to be able to cash in the unemployment compensation.

WW_1 dollars will be sufficient to compensate the individual for the undertime, if KK_2 is only a minor portion of annual personal time and if the undertime is of a non-recurring nature. For if the total unemployment compensation would amount to about 50%[144] of the usual income which the individual would have earned in the absence of undertime, i.e., one half of KE, our diagram indicates that it would be a full compensation.

2. A further compensation possibility has also been discussed by L. N. Moses.[145] If the individual were able to work K_4K_2 hours as overtime in Figure 9, at the special overtime wage rate $P_W^3 > P_W$, he thereby could reach indifference curve I_1I_1 at Q, where he would thus be as well off as at E. (That the individual, if he could, would like to work more than only K_4K_2 hours of overtime, can be seen at L where P_W^3 is tangent to a higher indifference curve I_4I_4). Here too, P_W could be maintained as a valid money weight. The same result could have been reached, of course, also with fewer than K_4K_2 overtime hours, when the overtime wage rate was greater than P_W^3 and with a greater than K_4K_2 number of overtime hours, if the overtime wage rate was lower than P_W^3, but not lower than P_W.

---

[144] In Germany, for example, unemployment money (Arbeitslosengeld), since the 1st of April 1967, amounts to 62.5% of the net income of a single person (Cf. <u>General Anzeiger</u>, Bonn, February 18/19, 1967).

[145] L. N. Moses, <u>op. cit</u>., p. 329, Figure 4.

In this connection, we have to mention a rather interesting form of overtime compensation, which in colloquial German is known as "Abfeiern". It involves cases, where overtime is worked but is "paid" for not in terms of the customary overtime wage rate, but in terms of additional own time (leisure). This we show in Figure 12 below, where it is assumed that the individual is paid a premium of KK_1 hours of OT as a compensation for changing his OT-ST distribution through overtime work, i.e., the individual may one day, e.g., work overtime for 2 hours and during the next day work "undertime" (shorter hours) for 3 hours, but be paid the normal wage rate for the standard number of hours on both days. The overtime premium thus consists in the additional hour "earned", or alternatively, his "Paid Time" exceeds his "Sold Time" by one hour.[146] In Figure 12 this means that the individual ends up at point F on a higher (than I_1I_1) indifference curve I_2I_2. Unless the distribution of OT-ST implied at F is inferior to that implied at G, FG dollars of income could be subtracted without making the individual worse off, or, making him as well off as at E.

The conclusion is that although actual sold time ($=SK_1$) is less than desired sold time ($=SK$), the individual

---

[146]Figure 12 can also depict the case of absenteeism from work, when KK_1 stand for the time of absenteeism.

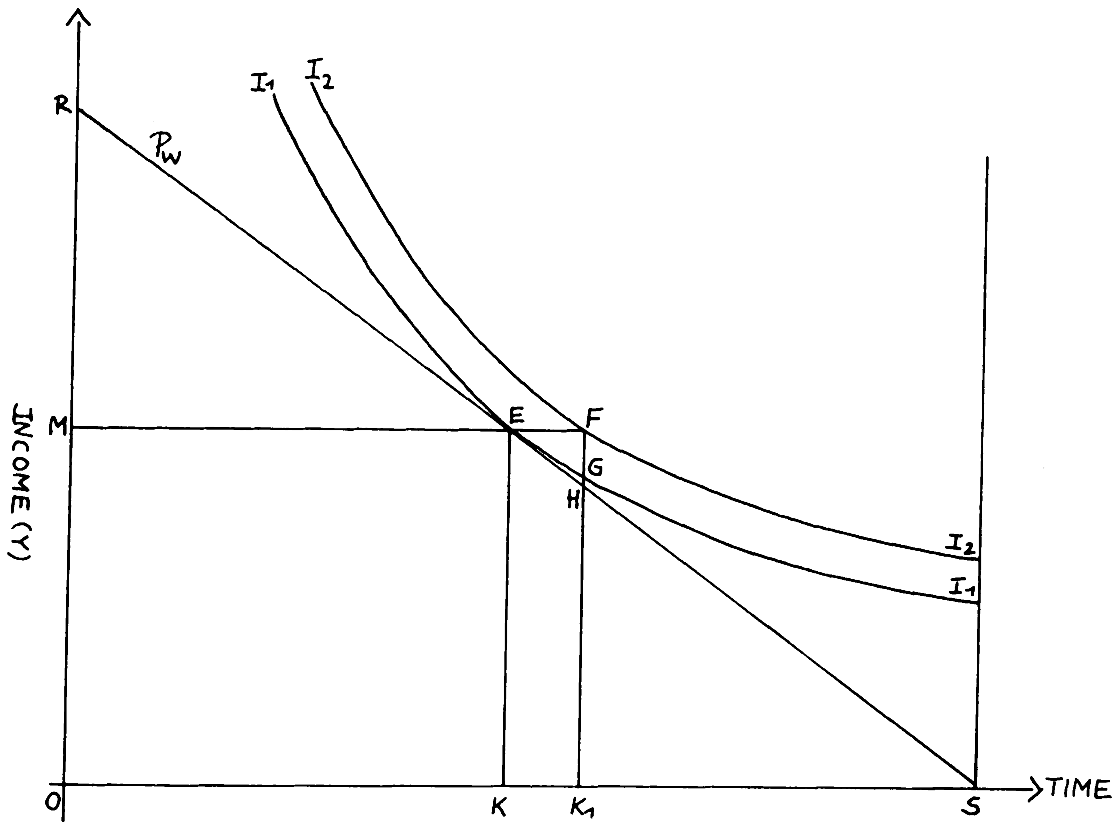

Figure 12.--The sold time-own time model: own time as a compensation.

nevertheless may attain an even superior level of satisfaction I_2I_2. As G and E are points on the same indifference curve, the money value of OT per hour cannot be below P_W. The general preference of leisure-lovers for this method of overtime compensation over the customary overtime-rate method, demonstrates that individuals really seem to reach "higher" (than I_1I_1) levels of satisfaction.

J. Gumpert[147] concludes, that this method of overtime compensation is also superior to the payment of a money premium or the customary overtime wage rate, "because it serves the purpose of work-hour regulation, i.e., to protect the health of the employees, that much better".[148]

3. Besides the above "overtime in undertime" compensation possibility we have to mention finally a third compensation situation, which may arise if the individual is an own producer, i.e., if he can make use of the additional own time for the production of own produce (income). Going back to Figures 10 and 11 by inserting into Figure 13 below the individual's own production block WU_1NV, so that its "nose" coincides with W and its base lies horizontal to the time axis, we see again that the individual has improved his undertime position of KK_2 hours, through a movement from indifference curve I_2I_2 passing through W, to indifference curve I_5I_5, which is tangent to WU_1NV at U_1. Doing more than K_4K_2 hours of own production work, in addition to SK_2 hours of sold time work, would only bring the individual to lower than I_5I_5 indifference curves. The slope of indifference curve I_2I_2 at W $(=P_W^2)$, probably will be less than the slope of

---

[147] J. Gumpert, op. cit., p. 490.

[148] Cf. also: A. Nikisch, op. cit., pp. 347-349; P. Bobrowski/D. Gaul, op. cit., p. 141.

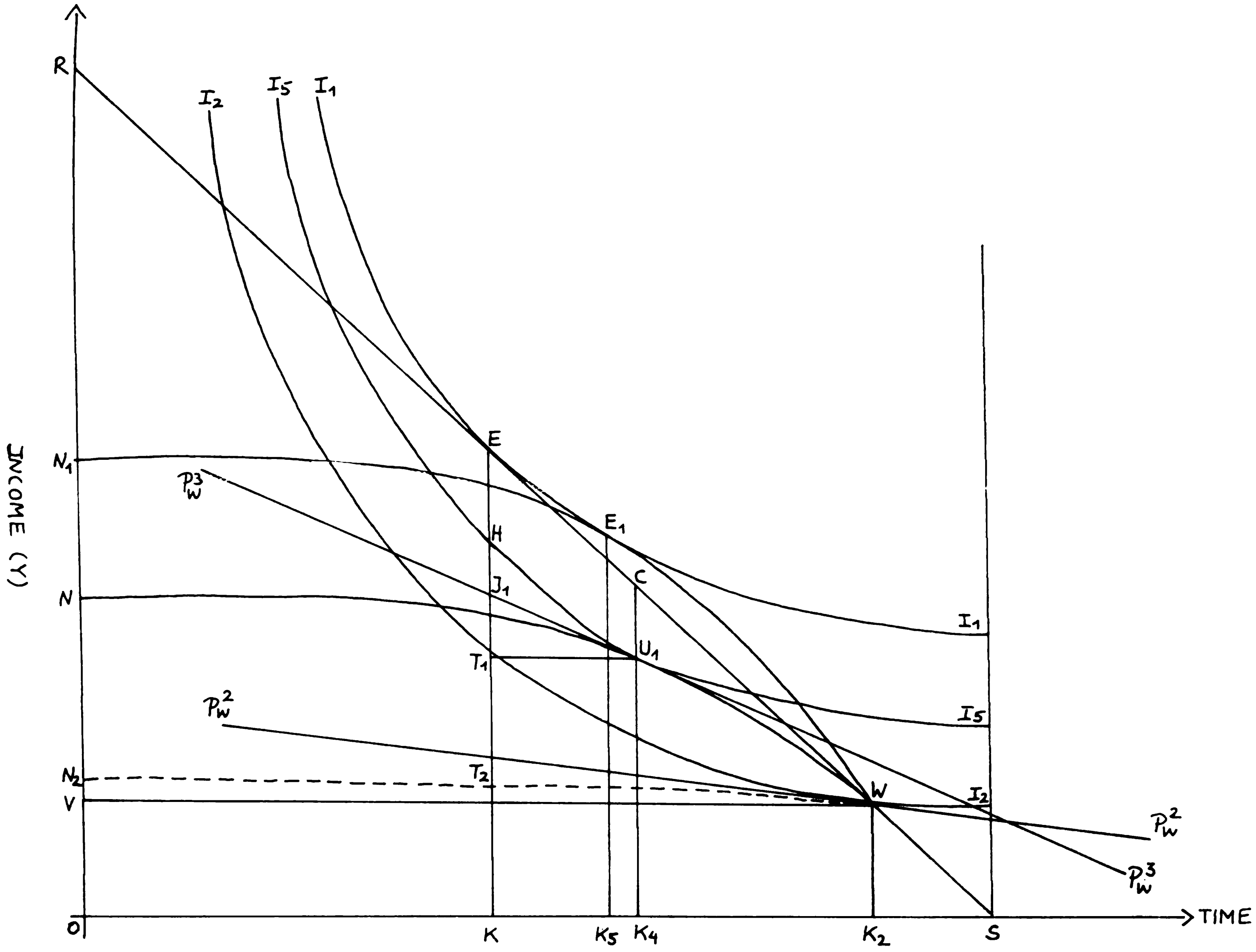

Figure 13.--The sold time-own time model: own production as undertime compensation.

indifference curve I_5I_5 at U_1 ($=P_W^3$), because of the increased convexity of the indifference curves to the left of W and because of the non-intersection requirement; however, it need not be less. Points U_1 and H are both points on indifference curve I_5I_5. If we tried to induce the individual to work the remaining KK_4 hours of undertime by paying him a wage rate indicated by the line $P_W^3 \geq P_W^2$, the individual could at the maximum receive T_1J_1 dollars of additional income, which would, however, be J_1H dollars short of the amount of income needed to make him at least as well off as he would have been, were he to stay at U_1 or K_4, i.e., at wage rate $P_W^3 \geq P_W^2$, he would definitely prefer not to offer the KK_4 hours or any intermediary amount for sale in the labor market. Expressed differently, KK_4 hours, or any amount in between, are worth more to the individual in the form of own time if the wage rate does not exceed P_W^3. Even though he is in an undertime situation, the individual would not accept work at any wage rate, for P_W^3 is so to speak his reservation price of own time, which through own production, will approach P_W, if $P_W^3 > P_W^2$. We may therefore conclude, that, assuming P_W to be the minimum estimate of the money value per hour of own time, even in an undertime situation, may overestimate the true money value of OT by less, if we allow for own production. As P_W^3 probably is greater than P_W^2, and as the individual has brought himself closer to I_1I_1 through the movement from I_2I_2 to I_5I_5, we also see that own production of K_4K_2 hours has partially compensated the individual for the undesirable situation in which he finds himself.

There even exists a possibility of full compensation in the case where the individual is a highly productive own producer. For should his own production block be of the size WE_1N_1V in Figure 13, to which indifference curve I_1I_1 is tangent at E_1, it is obvious, that at equilibrium E_1, with K_2K_5 hours of own work, he is now as well off as he would be at E and our postulate about the money value of own time remains unshaken.[149]

For a very unproductive own producer, represented, e.g., by production block WT_2N_2V in Fig. 13, it would be preferable not to engage in any own production at all, as any indifference curve intersecting the WT_2 section of the block would be on a lower level than I_2I_2, on which he is situated at W when he does no own work.

[149] People who are able to switch from industrial wage or salary employments back to the agricultural sector, in times of unemployment, like the children of farmers who return to the farm to "trade with nature" again, may enjoy a comparative advantage over those, who have no opportunity to till the soil on their own. In highly unstable economies, like many of the development countries, it may therefore be a wise and economically efficient decision, not to sever ones ties with the agricultural sector completely, so that in times of need, the reemployment possibility remains open. The frequently observed division of work time between the industrial and the agricultural sector in development areas of the world, may be so motivated and may thus be explained also in economic, in addition to the customary sociological (family ties, etc.) terms.

Twentieth century "Industrial Man" probably happens to be in such a situation,[150] where it turns out to be really not worth his while to engage in any own production, because the return would be so low in comparison to the return from other uses of the same (under-)own time. Here, P_W^2 would, as we saw already in Figure 9, be the reservation price of the own time not sold.

A fourth compensation possibility may be seen in the simultaneous existence of 2 or 3 of the previous compensations. The payment of unemployment compensation, plus some overtime wage rate, plus some own production,[151] together, is more likely to, but need not fully compensate our "undertime" individual, than the existence of only one compensation method separately.

B. Unexpected Short-Run Disturbances and Other Alleged Causes

Under part A. above, the deviations of actual from desired sold time were shown to be deviations between an unmoved, unchanged, i.e., constant desired normal equilibrium at E and a flexible actual amount of ST lying either to the left or to the right of the desired equilibrium point E. We have now to concern ourselves with the

---

[150] Excepting those who own farms, sufficient garden allotments, etc.

[151] The following compensation pairs are conceivable: a. Undertime compensation plus overtime wages, without own product., b. Undertime compensation plus own product., without overtime wages., c. Overtime wages plus own product., without undertime compensation.

possibility that <u>both</u> desired and actual ST may vary during the course of a year. The ST-OT plan, which we assumed to exist in the mind of the individual <u>at the beginning of the period</u> (year), may incur unexpected adjustments and revisions <u>during</u> the period under consideration. This can be the result of a host of environmental factors, such as: weather changes, climate, family tragedies, accidents, etc.,[152] but can also be due to the individual's change of mind.[153]

---

[152]As an illustration, take the case of an individual who loses his brief-case containing his monthly salary. He may consequently forego his planned vacation OT to make up for this loss. Here we have a case, where the normal equilibrium position is moved to the left of E, while actual and desired ST-OT remain identical there. The situation would be different, if somebody desired to sell <u>less</u> time, but is unable to do so, because of contractual ties, e.g., when the weather turns out to be too beautiful and the disutilities of work therefore become excessive. In this instance, actual ST would <u>exceed</u> desired ST, because of the environmental disturbance (Cf. ftn. 12).

[153]In fact, the increased flexibility and freedom in the choice of the number and distribution of ST hours, which professionals, managers, independent workers and others, more or less "enjoy", creates a built-in disturbance. No wonder therefore that the usual overtime compensation practice does not apply to these "independents", but is restricted to a large extent to contractual and dependent work (Cf. ftn. 127). The relative size of the income of independents almost assumes and implies that they work on the average longer than the majority (Cf. A. Nikisch, <u>op. cit.</u>, p. 350). There exists conclusive evidence that the average weekly hours of the self-employed or independents are longer than those of the "dependents" (Cf. e.g.,: "Selbständige arbeiten länger", <u>Die Zeit</u>, May 24, 1966, p. 13; "Der Traum vom eigenen Geschäft - Der Selbständige kennt keinen Sieben-oder Achtstundentag", <u>General Anzeiger</u>, Bonn, August 20/21, 1966; "Arbeitszeiten der Erwerbstätigen", <u>Bulletin des Presse-und Informationsamtes der Bundesregierung</u>, Bonn, March 30, 1966, Nr. 44, p. 351).

In Figure 9 these short run plan disturbances could be thought to be represented through movements of point E or indifference curve I_1I_1 along the budget constraint SEG. The result of our previous analysis of part A. would, however, not be altered through this possibility, as only the money value of the final, actual OT has to be measured here.

Variations in the money value of OT around P_W have been alleged to be due to another reason. Specifically, it has been argued, that the opportunity cost of time presumably varies:

> considerably among commodities and at different periods. For example, the cost of time is often less on week-ends and in the evenings because many firms are closed then[1], which explains why a famous liner intentionally includes a week-end in each voyage between the United States and Europe.[2]
>
> [2](See the advertisement by the United States Lines in various issues of the New Yorker magazine: 'The S.S. United States regularly includes a week-end in its 5 days to Europe, saving [economic] time for businessmen' (my insertion)).
>
> The cost of time would also tend to be less for commodities that contribute to productive effort, traditionally called 'productive consumption'. A considerable amount of sleep, food and even 'play' fall under this heading. The opportunity cost of the time is less because these commodities indirectly contribute to earnings" (G. S. Becker, op. cit., p. 503).

In the context of OR, Anthony Scott (op. cit., p. 33), e.g., argues that:

> Wage earners will seldom be able to afford visits during their work week. Hence, most of their visits will be on days off or weekends, when their income-opportunity cost will be close to zero.

> . . . For persons with a relatively larger independent ('unearned') income, the opportunity cost of income may ber zero.

On the basis of our model these statements obviously can hardly convince us. They imply either that people really would like to work (sell time) during "week-ends" and evenings, but are hindered from so doing by forces beyond their control, or that these outside forces are not the result of the preferences and choices of individuals, with whom they can agree or identify. We know, however, that "holi(y)-days", Sundays, "free" OT evenings, etc., did and do not usually come into being through distatorial and undemocratic decisions, but we know that they are the product of a multitude of social-political-religious forces expressing the - often silent - preferences of majorities. The reason why most people do not work during Sundays or evenings is not because there normally is a lack of opportunity to work for income during these periods, or because the cost of finding a suitable second or third job for these periods is excessive (to the contrary, there exists today even a shortage of people willing to work during holidays, Sundays, etc., and relatively higher wage rates/salaries have to be paid to attract enough people into these occupations), but because these people, reflectively or unreflectively, prefer it that way.[154] The 5-day work week with its "free" Saturday, is not the outcome of "higher" forces, but is the most obvious expression of the conscious demands for own time of a majority. Firms are usually closed in the evening and on week-ends, ultimately, because people prefer it that way. G. Becker's and A. Scott's arguments would thus be of relevance in this context only if the individual considered week-ends and evenings as part of undertime, with the further restriction that even in this case when actual ST is less than desired ST, the money value of OT must not, as claimed, necessarily be below the wage rate equivalent P_W, as was shown under part A. above. Moreover, it is doubtful whether the decisions of businessmen, of which liner to take to Europe, really depends upon the kind of time-cost saving mentioned by G. Becker. For if these businessmen were really such extreme time-economizers or savers, they probably, i.e., not necessarily, would take the much faster plane in the

---

[154] Restaurants, e.g., which could stay open even during holidays and Sundays, are often deliberately closed on some holidays/Sundays (to the often great dismay of hungry customers), and we know that people who actually work during Sundays/holidays/evenings, have their "day-off" (morning or evening off) at some other day during the week (Cf. A. Nikisch, op. cit., p. 341).

Own time periods generally are chosen (except in undertime) and are not somehow forced upon individuals through a shortage of work opportunites.

first place and not the boat. The fact that they nevertheless may go by steamer, is evidence of the more realistic observation, that the ocean journey is enjoyed as a leisure good as such, or offers a welcome combination of work in a recreational environment.

With respect to this point there are even more magazine advertisements to be found, trying to lure the prospective customer with the colorful aspects of the luxurious life on board,[155] and which invite especially the businessman to establish his work-office on "deck" by providing him with the necessary room and communication facilities.

---

[155]Cf., e.g., the American President Lines Advertisement in Saturday Review, entitled: "Take The Time, Take The Ship".

The advertisements of railways (Cf., e.g., the advertisement of the German Federal Railway: "To win the day at night in the DSG sleeping car" (Nachts den Tag gewinnen im DSG-Schlafwagen), Die Zeit, March 24, 1967, p. 53), trying to induce people - for whom the sightseeing - and other values of travel are not strong - to travel at night, have, in principle, no other aim than to permit people the saving of day-time - not because night-time is valued less than day-time, but because it is assumed that individuals usually would have slept anyway at night and that therefore the simultaneous, double consumption of sleep and travel increases the efficient use of their time. The rate differential between day and night travel (sleeping car travel is more expensive than normal and equally comfortable Pullman car travel) might be taken as an underestimate of the value of the time saving achieved.

If the businessman (on land) usually does not sell time during the weekend, because as we saw, he prefers it that way, i.e., the OT is at least worth his wage rate per hour, the opportunity cost of time (on sea) cannot be considered less (than P_W) during this period. The quoted time saving advertisement of the liner must therefore be understood differently: The reason behind the decision of including a week-end in their 5-day trips to Europe, is not because "the cost of time is often less on week-ends", but because it minimizes the number of sold time days foregone by passengers to three days. In the choice between liners to Europe, the one which includes the week-end in its trip-schedule, may be preferred, because it can save two days of sold time, if the week-end would have been used for leisure pursuits on land anyhow. Furthermore, the opportunity cost of the remaining 3 days foregone, may be reduced or eliminated through the offer of work possibilities on board. By stressing, in addition, the leisure-luxury atmosphere, the passenger liners are thereby prudent enough to offer the best of two worlds to their customers simultaneously: to those who might stay away because of the loss of ST (the work inclined), they offer an attractive schedule and on-board work facilities, while those who are more leisure inclined are attracted by the emphasis on the vacation-while-travel luxuries, which may transform a previous conception of a week-end plus 3 wasted days of travel, into a to be consciously enjoyed extended leisure week-end of 5 days - the latter being <u>then</u> preferred to and being <u>worth more</u> than the foregone earnings. It goes without saying, that the double attraction must be even stronger for passengers who are <u>both</u> work as well as leisure inclined.

What concerns the opportunity cost of time used in "productive consumption", we have again, by following the logic of our model, to dispute the conclusion reached by G. Becker. We have already shown (see ftn's. 118, 119) that most people spend a certain amount of own time in sleeping, food consumption, etc., not because they have no other choice (nobody forces us to exist), but because they consciously or unconsciously prefer it so in their particular situation. This time is thus valued relatively higher in "productive consumption" uses than in ST uses (for "existence" reasons), and the opportunity cost of this time cannot therefore be less than P_W per hour. In fact, we can be quite sure that this time will never be part of undertime and therefore <u>possibly</u> worth less than P_W per hour. Alternatively, as long as the individual decides to live, the <u>reservation price</u> per hour of his existence minimum of leisure time, OEx in Figure 11, will at the limit become infinitely great, as is shown at the point where indifference curve I_1I_1 becomes tangent to the vertical line erected on Ex, i.e., the individual might be induced to sell ExK_1 hours of OT at increasing overtime wage rates, but would under the above "life" assumption, never sacrifice his existence (-basis) even if he could become infinitely rich.[156]

In our "Theory of the Production of Time" (Appendix A), we demonstrate that the "productive consumption" time or existence minimum of leisure is part of the direct cost of time in general, a portion of which (i.e., produced time) is then allocated for the "production" of money income, while another portion is spent in the production of "psychic income."[157] Productive consumption therefore does not only indirectly contribute to the subsequent money earnings, but also indirectly contributes to the subsequent psychic earnings or satisfactions (and dissatisfactions). Just because this productive consumption time is so productive, for non-money earning time (OT) as well as for money earning time (ST) and thus forms the basis for all time, it will as we saw have the highest reservation price and will therefore not be worth less than P_W per hour. It is irrelevant for

---

[156]This is not to deny the possibility that sometimes the indifference curve, especially of parents, still shows a negative slope at the border of the existence minimum Ex. The case is not seldom that parents overwork and overexhaust themselves through excessive work, in order to secure financial independence and/or satisfactory bequests for their children. The common saying that somebody "works himself to death," implies that the price of working into the time existence minimum OEx often has been premature death.

[157]This is not to say that work may produce no psychic income in addition to money income.

the valuation of own time (including OEx of existence minimum leisure), whether this OT contributes to "productive" money earnings or "non-productive" non-money earnings--these are only reasons explaining why time was spent this or that way in terms of differing rates of money-psychic returns--all that matters at the level of choice is that continued existence and continuous ability to work, i.e., the use of a certain amount of time for productive consumption, was preferred to its use in possible work for money income, and the ultimate possibility of death.

Finally, the statement by A. Scott about persons with large, "unearned" independent incomes is clearly wrong. As long as these persons can or are able to sell part or the whole of their personal time, but actually refrain from doing so, their own time must be worth more to them than what they could earn on the market by selling it and the income opportunity cost cannot be zero, unless the market wage rate is zero. At the extreme, where points E and S become identical because indifference curve I_1I_1 is tangent at S (not shown), we can see that the opportunity cost of OT nevertheless remains.

(5) The Effect of a Different Distribution of Own Time--Sold Time (The Time Distance Approach)

We have seen that, given certain assumptions, the money value of OT per hour, in general, lies above the wage rate P_W foregone. How much above P_W the value of this OT lies cannot be said *a priori*. The only thing that is certain from a look at indifference curve I_1I_1 of Figure 14 below is that as we move, starting from point K or E, westwards towards the origin O, the "surplus value" of the remaining OT increases at an increasing rate, as is shown through the vertical difference between the constant budget line, whose negative slope is P_W, and the indifference curve I_1I_1. If the individual works overtime for a certain amount of personal time to the left of E, the money value of the rest of the OT should be higher than the overtime wage rate, per hour.

In the situation where the individual, for instance, is able to choose a certain amount of overtime like KK_6 at an overtime rate P_{OVT}, represented by the line FE in Figure 14, thereby reaching a higher indifference curve I_6I_6, we could infer that the remaining amount of OT, i.e., K_5K_6 (abstracting as indicated from the existence minimum OK_5) is at least worth P_{OVT} per hour, or that one hour of own time K_5K_6 is worth more than P_{OVT}. Probably

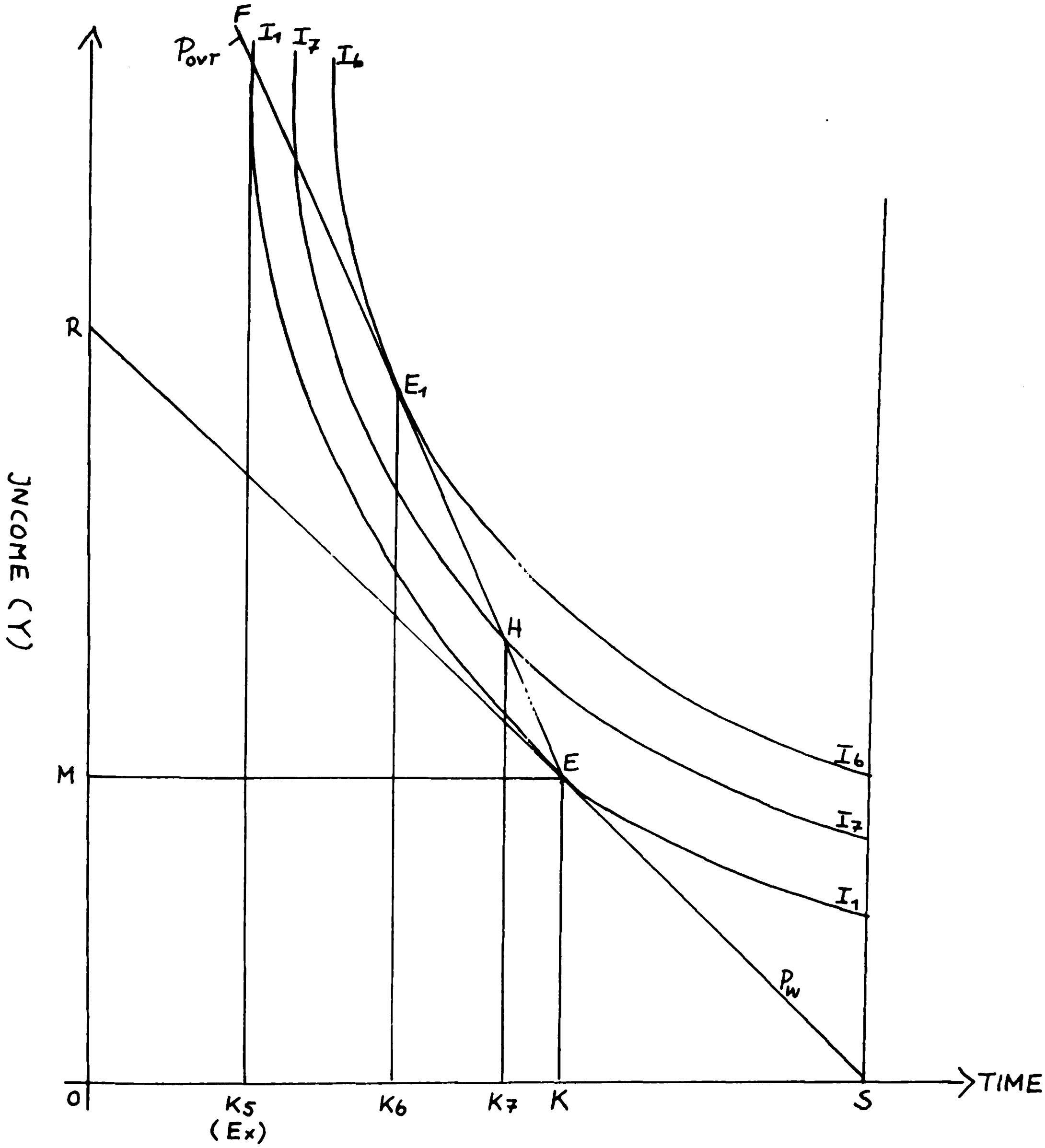

Figure 14.--The sold time-own time model: the value of OT after overtime.

more realistic and general, however, is the case, where the individual is in a disequilibrium situation of "undertime in overtime," i.e., where the desired hours of overtime KK_6 exceed the actual hours of overtime KK_7 in Figure 14. Here, the individual would end up at H on a lower (than I_6I_6) indifference curve I_7I_7 and we see that the money value per hour of remaining own time K_5K_7 is less than P_{OVT}, as the overtime wage line FE intersects I_7I_7 from above. No specific and absolute money value (above P_W) can therefore be attached to own time intervals even in an overtime situation, unless we assume that the individual either has a free choice in the selection of his overtime hours in addition and after (ex post) the fulfillment of his normal equilibrium at E, or is in a position along FE to the left of E_1, where the actual amount of overtime exceeds the desired amount KK_6.

We have seen furthermore, that one of the possible reasons why increasing amounts of income must be paid for the successive sacrifices of OT to the left of E is, because of the possible inferior distributions of OT-ST intervals, i.e., because changes in one or several of the three possible variables ($\overline{X}_{OTI}$ = Average size of OT-Intervals; ΣOTI = Number of OT-Intervals; and SEI = Sequence of OT-Intervals) which determine any particular distribution of OT-ST intervals (=DI), may be considered as inferior by the individual. In what follows we will try to say something in more or less hypothetical form about the variations and graduations in value among the OT-intervals above their per hour minimum value P_W, variations, which are mainly due to "distributional" reasons. We will thereby abstract from the OT which is part of the existence minimum OK_5 in Figure 14, because from all OTI's which are summed up in the distance OK in Figure 14, those OT-intervals (OTI's) which are part of the existence minimum OK_5 (sleep, rest, etc.) must needs, as we saw, involve the highest (even infinite) OT-surplus, as long as the individual decides to live.

More difficult is the problem of passing judgment upon the value of the rest of the OTI's in Figure 14 (KK_5), i.e., to decide whether, for instance, a day of OT which is spent in the form of OR is valued relatively higher than a day spent relaxing at home, etc. Everything else constant, we postulate, by making use of the Law of Diminishing Marginal Utility or its more general form, i.e., the Law of Diminishing Marginal Rates of Substitution or Law of Variable Proportions--to say that the comparative values (above P_W per hour) of recurring and non-recurring OT-intervals per period (for an individual), whose size (duration) differs sufficiently from that of other OTI's to be able to classify them as different[158] are a function of the frequency of their occurrence per period, their relative size, as well as of the time distance (TD), time span, intervening period or interim period, separating successive occurences of OTI's, i.e., their sequential arrangement per period.

For example, a two or three week vacation OTI usually occurs only once or twice during the year, with a relatively long (frequently half a year) time period separating, e.g., the summer vacation from the winter vacation; on the other hand, a two day week-end OTI occurs not only much more often during the same period (year), but the intervening non-week-end time-distances are obviously much smaller. We may therefore expect, cet par., an individual to value a unit of time of his chosen vacation OTI relatively higher than the same time unit in the form of a week-end OTI. An analogous relationship we postulate to exist, e.g., between week-ends and holidays, vacations and holidays, etc.[159]

---

[158]Cf. hereto the empirical methods of determining just-noticeable-differences (j.n.d.'s) of physical stimuli, of the famous Weber-Fechner Law of psycho-physics.

[159]For non-working individuals (the leisure class, children, retirees, a.o.), i.e., people with 100% Own Time per period and no Sold Time, the postulated value differentials between week-ends, holidays and vacations, may vanish, as OT now occurs as one continuous interval per year and as there are now no finite TD's separating OTI's from STI's anymore to make OTI's distinct intervals. In

In another context we already observed that, in general, Sunday or holiday overtime rates are relatively higher than workday-evening overtime rates. This rate differential can be explained by the postulated higher preciousness which a less frequent and farther apart spaced Sunday or holiday OTI (or unit thereof) has for the individual in comparison to a more frequent and closer time-spaced evening (or unit thereof). In other words, there are a <u>lot</u> of evenings per week, but only <u>one</u> weekend and I may thus be more willing to sacrifice a part or the whole of something of which I have a lot per period, than of something which I may have only once during the same period.[160]

Column 4 of Table 2 gives us, as an example, the frequency per interval size of the annual OTI's of an individual. For example, there are two OTI's in the 80-90 hour group and also two OTI's of 110 hours each. In terms of frequency <u>alone</u>, a comparison of their relative value

---

fact, Sundays and holidays <u>may</u> then be valued relatively less than week-ends, because of a shortage of (time-) complementary activity possibilities on these days (stores, libraries, etc., are closed, etc.).

[160]This is quite independent of <u>other</u> non-distributional reasons, which may make overtime as a continuation of the normal work-day preferable to the same amount of overtime worked during a week-end. An obvious example is the additional cost of the work-trip, which may be saved if overtime is worked as an extended work-day (cf. footnote 136).

TABLE 2.--Frequency of major ST-OT interval sizes per year of a representative worker.

(1) Interval size (duration) in hours(days)	(2) No. of ST Intervals per interval size (Frequency)	(3) Total No. of ST hours per interval size (1)*(2)	(4) No. of OT Intervals per interval size (Frequency)	(5) Total No. of OT hours per interval size (1)*(4)	(6) Total No. of Intervals(TI) per interval size (2)+(4)	(7) Total No. of(ST+OT) hours per interval size (6)*(1)= (3)+(5)
4	10	40			10	40
8	171	1368			171	1368
10	36	360			36	360
12	11	132	7	84	18	216
14			27	378	27	378
16			137	2192	137	2192
20			8	160	8	160
24 (1d.)			3	72	3	72
60 (2.5d.)			2	120	2	120
62			6	372	6	372
64			32	2048	32	2048
68			1	68	1	68
86 (3d.14h.)			1	86	1	86
88			1	88	1	88
110 (4d.14h.)			2	220	2	220
404 (16d.20h.)			1	404	1	404
568 (23d.16h.)			1	568	1	568
Totals:	ΣSTI=228	1900	ΣOTI=229	6860	ΣTI=457	8760

The equations for the weighted arithmetic means are:

$$(2)\quad \bar{X}_{STI} = \frac{\Sigma(\text{Col.}(1)\times\text{Col.}(2))}{\Sigma STI} = \frac{1900}{228} = 8.33..\text{ hours}$$

$$(3)\quad \bar{X}_{OTI} = \frac{\Sigma(\text{Col.}(1)\times\text{Col.}(4))}{\Sigma OTI} = \frac{6860}{229} \approx 30\text{ hours}$$

$$(4)\quad \bar{X}_{TI} = \frac{\Sigma(\text{Col.}(1)\times\text{Col.}(6))}{\Sigma TI} = \frac{8760}{457} = 19.168\text{ hours}$$

Note: Interval sizes below 4 hours which may occur <u>during</u> the work (ST) period (rest intervals, f.i.), are here omitted to simplify the analysis.

would therefore be impossible. Taking their relative size as an additional distinguishing characteristic, i.e., valuing the two 110 hour OTI's (or parts thereof) higher than the two 86-88 (or 80-90) hour OTI's,[161] would, however, be only justified if the time spacing of OTI's were necessarily and always positively related to their absolute size. However, as we cannot exclude the possibility that the two 110 hour OTI's may happen to be located timewise closer together than the two 86-88 hour OTI's, thus offsetting or even outweighing the previous size effect, it is therefore more correct and more inclusive to take the time span between the two pairs of OTI's as a third deciding characteristic, besides the frequency and relative size, to determine their relative values.[162]

We can illustrate the time distance idea by Figure 15. Let the circle in Figure 15 describe a clock-disk for variable periods (i.e., not necessarily for a day period, but in this context, e.g., for an annual period) and let the distances A and A' along its circumference

---

[161] $\bar{X}_{OTI}$, the mean of the distribution, could not be used in this context, because it refers only to the total number of OTI's per period, while we are here comparing a selected few of the total number of OTI's.

[162] The frequency distribution of Table 2 reveals that the relationship between interval size and frequency is not symmetric enough (but double peaked), to warrant a possible substitution of the size variable for the frequency variable.

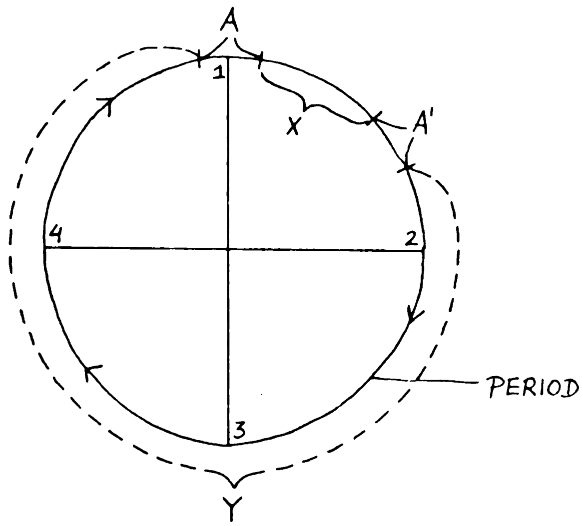

Figure 15.--A time period with two OTI's and their time-distances.

represent two OTI's of equal size (duration). Then, if we want to make an ordinal value comparison between A and A' (which is a different comparison than that discussed so far), their number frequency and their relative size obviously cannot now be relevant, because they are equal. We are thus left with the time distance or interim periods X and Y as a possible distinguishing factor. Under the assumption that the value of equal sized OTI's varies according to the size of the time span between them, we hypothesize that in Figure 15 the value of both A and A', or parts thereof, tends to increase (decrease) the farther (shorter) A is separated from A', *ceteris paribus*, i.e., as we let A' move in clockwise (counter-clockwise) direction away from (towards) A and the observer is placed at point 1, a part or the whole of A's and A'/s value increases (decreases), cet. par.

For example, if there are two three-week vacation periods per year A and A', then moving A and A' closer together timewise decreases their value or part of their value. It is, as if the A (or A') OTI-horizon seen as a time budget were extended (shortened) through the transcending increased (decreased) proximity (distance) of the future (or past) A (or A') OTI, or as if the reduced (increased) time distance had created a greater plenty (scarcity) of own time and therefore as if the marginal value (utility) schedule for OT units, of the A-interval or parts thereof, had shifted downward (upward). In other words, the utility of homogeneous, equal sized commodities or intervals (A), is not independent of the time distribution of past and future homogeneous and equal sized commodities or intervals:

$$\frac{\Delta MV_A{}^t}{\Delta TD^{t-(t-1)}} > 0; \qquad \frac{\Delta MV_A{}^t}{\Delta TD^{t-(t+1)}} > 0;$$

i.e., the change in the marginal utility/value (MV) of good A at time (t) increases, if the time distance (TD) between the consumption of A in the past (t-1) and its present consumption increases, _cet. par_. The same holds for the future consumption (t+1).[163]

So far we have, however, looked only at one side of the coin, because the closer A' is located towards A time-wise and we observe the situation at A' _after_ the experience of interval A, which now lies in the past, the greater will be the transcending or radiating force of the future, now more distant A interval (Y has increased by the decrease in X) on the present A' interval or time units thereof. Especially the value of the _last_ units of interval A' will tend to exceed the value which they (units) would have attained had the time distance not changed, as the individual will now have to "wait" longer for the recurrence of the same consumption experience.

The last days on a vacation, the last hours before a parting, in general, are usually regarded extremely precious and the preciousness will tend to be greater, the greater the expected time distance to the next reunion or consumption of the good, _cet. par_. Kisses tend to be longer and more intense, the longer the "kissers" were separated (in time and space) and expect to be separated from each other. The same will be true for the first time units of the reunion.

[163]The "_economics of separation_"yields very interesting policy conclusions. If a certain sum of money has to be distributed among the poor, _spacing_ the distribution in intervals per period, should tend, _cet. par_., to make the people happier than if the money were distributed as a _once_ per period lump-sum payment.

When A' merges with A (i.e., when X reduces to zero), at least part of the time units--especially the early ones--of interval A' will probably be of less value than those at the beginning of interval A, or during interval A. In other words, the value of a present OTI of size A can differ, _cet. par._, from the value of past or future OTI's of equal size A--the value differential depending upon the _proximity_ or _distance_ of the experienced or expected neighboring OTI's of size A from the present A. The longer (shorter) the time separation between them, i.e., the longer (shorter) the present experience of the interval of size A is separated from its _last_ experience and its _next expected_ occurrence,[164] the higher (lower) will it be valued, _ceteris paribus_.[165]

---

[164]Unexpected, transitory acts of consumption of A may be included in the form of a certain probability distribution.

[165]It has been said that marriage partners tend to like each other relatively "more" after they have been separated for some time through taking vacations single, etc., _cet. par_. _Varietas delectat_ (freely translated as: Variety is the spice of life) and abstinence, separation, partings, from homogeneous consumption experiences, obviously are able to enhance variety.

Not only the _actual_ or expected time separation of consumption acts does affect their relative values, but already the _threat of time separation_ or partition influences the values of continuous consumption acts.

At one extreme, we know that the _threat of death_ of the other person--a death whose coming can never, or rather seldom, be predicted with certainty--and who threatens with the ultimate and maximum conceivable (infinite?) time separation between human beings (i.e., the loss of the _physical_ presence of the "other")--transcends many interpersonal, irreplaceable (love) relationships, by heightening the appreciation and valuation of the "other" while he is still alive. Death, or the threat of maximum time separation, thus has _also_ often overlooked positive aspects.

There may also be a tendency for certain consumption experiences during old age to become relatively more valuable, as the expectation and the probability of their recurrence decreases, i.e., it may have been the "last time" that one was able to consume a certain good (the TD to the next consumption experience of the good begins to approach infinity). This tendency should reinforce and support our _Law of the Increasing Scarcity of Time_ (cf. III, 1).

(The strong preferences for present satisfactions, for the "Now," through which the present generation has been characterized as the "Now Generation" (see _Time Magazine_, January 6, 1967, p. 16), probably reflects the threat of increased scarcity of life, the threat of imminent doom, which a freely flourishing scientific (atomic) age--an age which still has to grow up to find out where its limits are--has created.)

Our TD-theory seems to support Böhm-Bawerk's theory according to which present satisfactions are generally preferred to, or are worth more than future satisfactions (goods) (cf. Böhm-Bawerk: _Positive Theorie des Kapitals_, 4. Aufl., Vol. II--Excurse--Jena 1922; cf. also: Alexander Mahr: "Gegenwart und Zukunft in den wirtschaftlichen Dispositionen der Konsumenten," _Zeitschrift f. National-ökonomie_, Band XXVI, Heft 4, August 26, 1966, pp. 435-459.)

The value of the present consumption experience of good A is the higher, the greater is the prospective time distance, for which present consumption might have to be postponed. Here it is the _prospect_, _threat_ of a TD, or a threat of scarcity created through the prospective TD, which makes people realize the relative higher value of present consumption over future consumption.

We should not be surprised to find that people attach immense value to very rare, unique and non-recurring consumption experiences per lifetime period, like weddings, confirmations, etc., because the expected TD to the next experience of the same good is by definition either very long, or infinite. For example, the value of a wedding for an individual should therefore vary depending upon its expected probability of recurrence or the probability that he may "consume" another wedding in the future--a probability, which may be greater for a previously divorced person relative to a non-divorced person. It may also explain the self-propelling nature of many divorces.

There is also something to be said, from an economists viewpoint, for an intentional, conscious time

(The fact that our human capacity to consume goods <u>simultaneously</u> is by nature rather limited and the fact that time can only be "produced" successively (cf. III, 1),

---

separation of a previously instant or simultaneous consumption of goods: Eating the cake in separate intervals of time should yield a higher total satisfaction, than eating it all at once. Furthermore, varying, changing the TD's from period to period, should by increasing inter-period variety, eliminate or reduce the sobering monotony which would be associated with a complete uniform time distribution of goods from period to period (cf. A. Mahr, op. cit., p. 459).

The cake example shows how much our TD-theory is in agreement with, and gives an economic rationale to the old advice, that it is wise to keep within bounds, or to observe moderation (Maßhalten). Even psychologists have lately learned, that personal (human) growth implies continuous, unceasing, little (inner) "own deaths" and "rebirths," i.e., partings and separations. Only at a distance does perception become complete (cf. A. Maslow, op. cit., p. 173, 190).

Cf. Hermann Friedmann, op. cit., p. 372, especially footnote 1.

Cf. Benedict De Spinoza: "Towards something future, which we conceive as close at hand, we are affected more intensely, than if we conceive that its time for existence is separated from the present by a longer interval; so too by the remembrance of what we conceive to have not long passed away we are affected more intensely, than if we conceive that it has long passed away." (Prop. X of Part IV of The Ethics; see, e.g.,: The Rationalists--Descartes, Spinoza, Leibniz [Garden City, New York: A Doubleday Dolphin Book, Doubleday and Co., Inc.), p. 331.)

Interpreting the quotation with respect to the present context, we may say: If the memory or expectation of the not too distant (past and future) consumption of good A is thus still alive/fresh and "close at hand," respectively, the present consumption of A will be subject to the forces of the Law of Diminishing Marginal Utility; but the longer the above distance separates the present consumption of A from its past and future consumption, the weaker will be their (i.e., past and future's) intensity of affection on the present and the "newer," "fresher," "scarcer," and therefore relatively higher valued will be the present consumption experience of A, cet. par.

i.e., that we have to wait a certain time interval before the same consumption act can be repeated, must thus heighten the scarcity and valuation of the goods. Even if all goods were "free" goods, i.e., if all prices are zero, and even if lifetime were infinite, the necessary TD between two successive acts of consumption of goods--which is _either_ created through the intervening consumption of other goods, _or_ through the limited human capacity to consume simultaneously and instantly more of one or several goods--would affect and determine the ordinal time prices, to which the marginal utilities per unit of time must be proportional. In other words, the time price will be the actual amount of consumption time spent for the various goods and the time price per unit of a good will, _cet. par._, be higher, the higher is the marginal utility per unit of the good, and the marginal utility will tend to be higher, the greater is the TD the good was separated from its last and will be from its next act of consumption. It follows, that the greater the TD, the greater will be the time price, everything else constant. Consumption can thus never stop throughout our lifetime, as we can never really catch up, as we are always _distant_ from where, what and how we would like to be (cf. Ch. III, 1).

More generally, we may say that the present experience and valuation of a good is determined not only by the _last_ or _next_ expected experience and valuation of the same good, but by past and future consumption experiences even further distant than the most immediate ones.

"Ultimate situations" of past extreme plenty or scarcity of a good may still exert an important influence on its present valuation, as many people who at one time have suffered great hunger, will even in times of affluence continue to consider a piece of bread relatively very precious and people who at one time during the past were very wealthy, but who have become relatively poor in the meantime (e.g., through wars, natural catastrophes, etc.), will feel the loss presently and in the future to be more severe, the wealthier they were during the past. The same will hold in case of expected future scarcity.

This simultaneity or convergence of past, present and future within the valuation process, should be explored further (cf. the quotation from T. S. Eliot's "Four Quartets" in footnote 75).[166]

In Figure 15, we see that the comparative values of A and A' should be equal, cet. par., when we move A' to point 3, where they are equally distant. Equal time

---

[166] Price expectations, which basically are expectations of future relative scarcities or plenty of goods, undoubtedly do influence present consumer behavior, leading to the familiar hoarding of goods, shifts in the labor supply, etc. (cf. Milton Friedman: Price Theory, op. cit., pp. 205-207).

distances between the consumption of a certain number of equal sized, homogeneous OTI's or commodities per period, should therefore also make their relative valuation equal, cet. par. Whether the value of A and A' is also at a maximum at point 1 and 3 respectively, i.e., whether A and A' are optimally distributed during the period, cannot be determined a priori, but will ultimately be decided only in terms of their valuation and relation to the totality (Gestalt) of all other non-A consumption experiences during the same period. We may conceive A and A' to be intertwined within a highly complex polynominal and multipolar "Utility Wreath." Goods are therefore in this sense never really "independent" from each other and among themselves, but are related, in terms of valuation, in a particular matrix of time distributions, at least. This is the economic "theory of relativity."

At point 4 in Figure 15, e.g., A'/s value (at least the value of the first units of A') might be thought to be relatively greater than its value at point 3, as the expectation of its experience was kept longer in the waiting by the time distance between 4 and 3. However, this increased separation-effect may have been offset or even outweighed by the increased proximity-effect of the succeeding OTI, A, which will tend to decrease the value of the last units of A' relatively to the value of the same last units of A' when at 3, and which will also affect the value of the first units of A negatively, although the last units of A will in turn be enhanced in the next period through the increased successive TD to A'.

There is a tendency for the (magnetic) pull of the future A to be stronger,[167] than the "push" of the past, when the individual anticipates, plans or expects to consume A and when he is actually in the process of consuming A, because he is not at rest, but is continuously moving towards the future and away from the past consumption experience of good A. In the latter case of actual consumption, two effects have, however, to be distinguished with respect to the future:

a. There is the continuously shrinking TD separating the present moment of the consumptive act of A from its final, terminating moment (or "bite"), which tends to enhance (because of the increased proximity of the end of the present consumptive act of A, i.e., the increased scarcity) the value of the last, final units of A, and

b. There is also the TD to the beginning of the next, expected (future) consumptive act A, which continuously shrinks, as we consume A presently, and which should

---

[167]According to A. Mahr, op. cit., the joy of anticipation (Vorfreude) increases, or is the stronger, the less distant in time the anticipated act of consumption is for the individual.

exert a dampening effect upon (because it somehow does reduce the scarcity of the present units of A) the value of the final, last units of A. However, in relation to the size of the shrinking TD of (a) above, this equally shrinking (b) TD will be proportionally smaller, the greater the TD between successive occurrences of acts of consumption of A. The effect of the increased proximity (decreased TD) to the next, future A, will thus not be as strongly felt as the effect of the increased scarcity of the final units of the present A. The net effect will thus tend to <u>enhance</u> the value of the final units of A presently consumed, and the increase in this value will be relatively greater, the greater is the TD separating the end of the present A from the beginning of the future A consumption experience. For example, if an individual were consuming only one meal per day, taking 30 minutes of consumption time, then the value of the meal units, of say the last five minutes of consumption, would be relatively greater, if the individual were only given the mean every other day (i.e., bi-daily), than if the <u>daily</u> consumption rhythm would continue. The size (duration) and value of the actual consumption time (i.e., 30 minutes) of good A must be seen in relation to the TD to the next (and also past, as we shall see) act of consumption of A. No wonder, therefore, that vacation consumption periods are usually quite long: the TD separating successive vacations is usually quite long too. There may exist an optimal proportion of TD's and consumption time for all goods: i.e., that the greater the TD's, the greater will be the consumption time (cf. pp. 159-160, where we reached the same conclusion through a different line of argument), cet. par.--a "medial section" of consumption.[168] Honeymoons, for instance, or "extended" visits with friends and relatives, are obvious examples of adjusting consumption time to finite and infinite time distances. The longer the time during which parents expect their children not to return home, the longer, cet. par., will the children, paradoxically (have to) stay at home.[169]

With respect to the influence of the past, the continuous movement away from the past consumption experience of good A in time, has also two to be

---

[168]This is also reminiscent of the Weber-Fechner Law of psychophysics, that: "greater length must be added to a longer line if the change in length is to be noticeable" (Earnest R. Hilgard, Introduction to Psychology [New York: Harcourt, Brace and Co., 1957], pp. 7, 599; cf. also H. Friedmann, op. cit., pp. 90 ff.).

[169]For infinitely "distant" goods (unique goods, like the marriage love-project) and therefore infinitely valuable goods, one will therefore never tend to separate during our "finite" lifetime. The Believer, who is related ("married") to an infinitely distant God, thus to the infinity of God (who "consumes" infinity), within a "love-project," will, because God is infinitely valuable to him, never "let him go," never part with God, will continuously "consume" Him during his finite lifetime, for the "next" consumption may be in "eternity" (infinity).

distinguished effects, when the individual <u>actually</u> is in the process of consuming good A now:

a. There is the continuous increasing TD separating the present moment of the consumptive act of A from its last (past) moments (or "bites"), which will tend to enhance the value of the present units of A, because of the increasing separation from the first unist of A, but as consumption is thus continuously occurring since the beginning of the present consumption act (the TD is not "empty"), this effect will through the resulting satiation be eliminated.

b. There is also the TD to the previous (past) consumption act A, which increases continuously and which should therefore tend to enhance the value of the present units of A. However, this increase, seen in comparison to the total TD separating the beginning and end of successive occurrences of acts of consumption A, will be relatively smaller than the increase under (a) above.

If we show in Figure 16 below (the) two homogeneous consumption experiences A_1 and A_2 of equal duration (D), whose ends and beginnings are separated by a finite time distance Y, we see that the time distance Z_1, e.g., amounts to a greater proportion (%) of the total duration (D) of A_1 than of the time distance Y. Alternatively, the TD (Z_2)

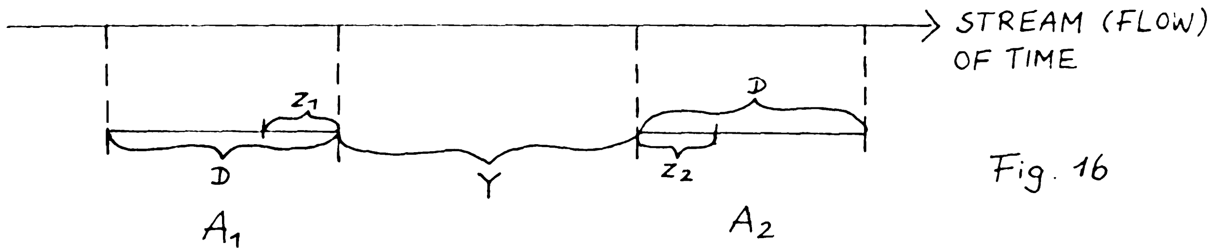

Fig. 16

Figure 16.--The value of two homogeneous consumption experiences and their time distances.

amounts to a greater proportion (%) of the total duration of A_2, than of the TD (Y). The effect of the <u>increased</u> separation from the last A_1 will thus not be as strongly felt as the effect of the proportionally greater TD or separation from the beginning of the present consumption experience A_2 (satiation). Both effects will, however, here tend to enhance the value of the <u>first</u> units of A_2 presently consumed, while the satiation effect of (a) will soon, <u>after</u> the first units of A_2 have been consumed, take its course. Of course, the value of the <u>first</u> units of A_2 will tend to be greater, the greater the TD separating the beginning of the present A_2 (i.e., Y) from the end of the previous A_1 consumption experience, <u>cet. par</u>. As before, when we considered the future extension, the size of the actual consumption time (duration D), must again be seen, now also from the past extension, in relation to the TD to the previous act of consumption of A: the longer the children were separated from their parents, the longer they will tend to stay at home, cet. par., a.s.o.

Furthermore, the influence of the past is not really restricted to the actual consumption process of a good in the present, but additionally supplies the present with a residue, remnant, which is called memory and which tends to be stronger, cet. par., the longer the duration of past consumptive acts was. The function which (the joys of) anticipation performs for future consumption acts, memory, in symmetrical fashion, performs of past consumption acts. But as both memory and anticipation are united in the present moment, both past and future must be united in the present (cf. p. 161). We know that not all acts of consumption, whether past or expected future ones, yield equal returns in terms of memory and anticipation respectively. It almost seems, that the more repetitive the acts of consumption are, i.e., the shorter the TD's separating them, the lower will also be the constribution to memory and anticipation, cet. par. We usually derive no great value from the memory of yesterdays' breakfast, as well as from the anticipation of tomorrows' breakfast, but the memory of our last vacation usually accompanies us perpetually, together with the anticipation of our next vacation,[170] and the latter memory and anticipation are enjoyable experiences in themselves, thus are valuable.

Certain goods thus are consumed for periods longer than their "actual" consumption time, through memory and anticipation,[171] in fact, some goods (weddings, graduations, certain OR experiences, certain "peak experiences" à la Maslow (op. cit.) and other "unique," authentic experiences) never really stop being consumed during our lifetime.

Our analysis leads us to the conclusion that there may exist something like an optimal consumption selection, i.e., he will have led a "rich" life, cet. par., who has concentrated his consumption and activities on "goods" with relatively great memory and anticipatory yields. The materialist, who has become a slave without knowing to

---

[170] Marion Clawson, e.g., divides the OR-experience into "five more or less clearly separate phases: anticipation, travel to, on site, travel back, and recollection" (Land and Water for Recreation [Chicago: Rand McNally, 1963], pp. 40ff.; cf. also ORRRC Report No. 24, op. cit., pp. 75-76; cf. Canadian Fisheries Reports, op. cit., pp. 13-15).

[171] Some goods, especially "public goods" (hospitals, parks, etc.) need not really be "actually" consumed by everybody and still yield an anticipatory return in the form of an "option value," i.e., "the option to consume in the future." This stand-by value or value of availability (for times of need)--a kind of insurance--can be viewed as an "external economy," as has been shown by Burton Weisbrod in "Collective-Consumption Services of Individual-Consumption Goods," Quarterly Journal of Economics, August, 1964, pp. 471-477.

excessive material object consumption, usually only derives very short-lived, quick, almost instantaneous satisfactions and therefore must unceasingly try to amass and attain new ones. He thereby does not only lose the capacity to enjoy the goods,[172] for as we saw, separation-scarcity is a necessary condition for true enjoyment and value, but he may never come to realize and therefore change this neurotic process of good-accumulation.

We can in this context and place only hint at the effect which the inclusion of this distribution factor, i.e., the time spacing of commodities, in general, will have on utility and welfare theory, which still operate on

---

[172] Manfred Frings in his discussion of Max Scheler's Theory of Social Economy (p. 140) notes:

"The amount of the production of agreeable things, Scheler says, is in proportion of the lack of human capacity to enjoy them. The ancient moral maxim, according to which one may obtain fullest enjoyment with the least means of agreeable and useful things, has been reversed. Hence, Scheler attributes to modern society the 'ideal' of the minimum of enjoyment with the maximum of agreeable and useful things.'"

If Scheler's therapy of "affluent societies" is correct, this may lead to a complete reversal of welfare-utility theory. Manfred Frings, "Max Scheler's Theory of Social Economy with Special Attention to its Ethical Implications," Review of Social Economy (September, 1965), pp. 127-143.

The contemporary demand, especially among the young generation for material relatively "simple": non-shaved, un-washed, un-cleaned, etc., "hippy-beatnik" styles of existence, the strong demand for OR in the "wilderness" and in "primitive" areas (cf. ORRRC Report No. 3), the "back to nature" call of a post-Rousseauean, mass-touristic age ("to get away from it all"), can be looked upon as a way of creating and demanding "distances" or scarcities, in order to be able to enjoy again that from which one has paid to become distant for a while, or to be able to enjoy a more permanent distance as such.

the assumption that utility is an increasing monotonic function of increasing rates (amounts per period) of consumption of commodities. Utility is, however, as we have demonstrated above, also affected by the time-distance-distribution of a certain number of commodities per period, a distribution, which can differ, depending upon whether the consumption of the particular quantity of goods per period occurs simultaneously (at once), or in even or uneven (unequal) spaced intervals. Henceforth, the traditional indifference surface can continue to be drawn therefore only under the explicit assumption of instantaneous/simultaneous (zero time spaced) consumption.[173] For if we let the TD's between the chosen equilibrium number of homogeneous commodities vary, we will have to draw different indifference curves representing equal levels of satisfaction ($\bar{U}$), but different time-distance-distributions (TDD's).

In Figure 17, e.g., all three indifference curves represent equal levels of satisfaction, but varying TDD's. In equation form, this amounts to saying, that the correct specification of the utility function should read:

---

[173] Cf. A. Mahr, op. cit., p. 453.

It would be absurd to resort to the possible way out of the dilemma, by treating homogeneous goods with different TDD's as different goods. Whether the TDD of a good per period could simply be called and handled as another "characteristic," is doubtful, but should be further explored.

Cf. K. Lancaster, "A New Approach to Consumer Theory," op. cit.

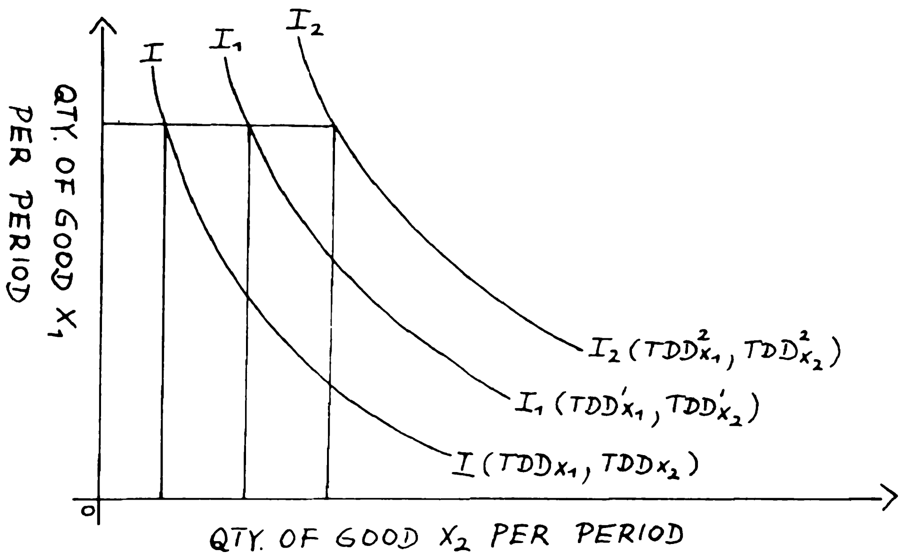

Figure 17.--Indifference curves with varying time distance distributions.

$U = f\ (X_1, X_2, \ldots X_n;\ TDD_{X_1}, TDD_{X_2}, \ldots TDD_{X_n})$, where $X_1 \ldots X_n$ are individual commodities and where TDD_{X_1} is the time-distance-distribution of good X_1 per period, for example. TDD_{X_1} is defined through:

a. the time distance (measured in time units) between individual acts of consumption of a certain quantity of X_1 per period, and

b. the sequential ordering of these individual acts of consumption.

It would be beyond the scope of this analysis to show how the TDD is measured. Suffice it here to indicate that different TDD's can affect (U) positively, negatively, or not at all.[174]

Unless commodities are consumed to an increasing extent simultaneously or instantaneously (to which, as we saw, there is a natural human capacity limit) per period, an increasing (decreasing) number of goods per period must necessarily shorten (lengthen) the TD between at least <u>some</u> of the goods. But relatively shorter (longer) TD's tend to decrease (increase) relative commodity

---

[174] An example may illustrate what we mean by different TDD's. Let X_1 represent the rate of consumption of six apples per day (24 hours). These six apples can be consumed at a finite number of equal or unequal TD's. For instance, all six apples may be consumed at once, i.e., TD's = 0. The utility (U) of the six apples consumed all at once, may, however, be different, depending upon their sequence of consumption, i.e., <u>when</u> during the 24 hours the act of consumption takes place. It may be U_1 when I consume them at 8 a.m. and U_2 when I consume them at 4 p.m. (where $U_1 \neq U_2$), etc. Various possibilities of <u>equal</u> TD's exist. When I consume one apple every four hours, all TD's = four hours and utility = U_3. Consumption of two apples every eight hours gives a TD of eight hours and U_4. Consumption of three apples every 12 hours, gives a TD of 12 hours and U_5.

Furthermore, <u>equal</u> TD's (TD = six hours) are possible when I consume one apple at 12 p.m., two apples at 6 a.m. and three apples at 12 a.m., yielding U_6. The same TD's may, however, also result, if I consume the same amounts in different sequences, i.e., three apples at 12 p.m., two apples at 6 a.m., and one apple at 12 a.m., yielding U_7. If we include, in addition, the <u>unequal</u> TD's, we see that there exists an astronomical number of TD- and sequence possibilities.

We can imagine that the individual is able to rank all these TDD possibilities in an <u>ordinal</u> scale of preference, i.e., he can say, e.g., whether U_4 is greater, equal to, or smaller than U_6, a.s.o.

values, cet. par., as we saw. Our TD argument, thus supports and reinforces the Law of Diminishing Marginal Utility, in fact, provides it with a novel rationale.[175] Furthermore, we see that the number of goods per period and the TD separating their consumption, under the above conditions, are not independent variables.

Our TD approach may even assist in the correct definition of "periodically recurring," "constant," "regular" and "non-recurring" (unique) wants, according to which economic consumption (planning) periods are to be distinguished.[176]

---

[175]So far, it has not been sufficiently understood, that the Law of Diminishing Marginal Utility corresponds to the Second Law of Thermodynamics in physics and can be explained in terms of the increased entropy. The Weber-Fechner Law of psycho-physics may represent a bridge in this direction (cf. footnote 168; cf. C. G. Jung, op. cit., pp. 25-27).

If we picture the expected future act of consumption of a good A to stand as much in a relationship of polarity with the present act of consumption of the same good A, as does the past act of consumption of A, and if we picture a tension of psychic energy to exist between these poles unified in the present, we may find again a psycho-physical explanation and counterpart to our theory: "the opposites equalize one another, and gradually a new attitude develops, the final stability of which is the greater in proportion to the magnitude of the initial differences. The greater the tension between the pairs of opposites, the greater will be the energy that comes from them; and the greater the energy, the stronger will be its constellating, attracting power" (C. G. Jung, op. cit., p. 26, also pp. 25ff.).

[176]Cf. Rosenstein-Rodan, op. cit., p. 80; cf. A. Mahr, op. cit.

Let us return, after this more general clarification of the TD theory, to the main purpose of our analysis, i.e., the estimation of the relative values (above P_W) of OTI's per period. In formal terms our conclusion can thus be summarized in the following equation:

$$(4) \quad U_{OTI^p_{ij}} = f\left(\sum_1^m OTI^p_i;\ SI_{ij};\ TD_{i[j-(j+1)]},\ TD_{i[j-(j-1)]}\right)$$

in which $U_{OTI^p_{ij}}$ is the utility of the j-th OTI of size (i) per period (p), when there exist j=1...m OTI's of size (i) (duration = hours) per period (p) and i = 12...568 hour sized OTI's per period (cf. column 1 and 4 in Table 2). Within the brackets, $\sum_1^m OTI^p_i$ stands for the frequency, or total number of the i-sized OTI's per period; SI_{ij} is the actual size (duration) of the j-th interval of size (i) and $TD_{i[j-(j+1)]}$, $TD_{i[j-(j-1)]}$ represent the sequential arrangement of the j-th, i-sized OTI, i.e., its time distance from the next, (j+1)th OTI of size (i) and from the last (past), (j-1)th OTI of size (i), when the TD is observed by the individual at the end and at the beginning of the j-th interval under consideration, respectively. Thus, $U_{OTI^p_{ij}}$ will be greater, the greater the TD's and SI_{ij}, and the smaller $\sum_1^m OTI^p_i$, <u>cet. par</u>.

Equation (4) therefore has the following partial derivatives:

$$\frac{\partial U_{OTI^{p}_{ij}}}{\partial \sum_{1}^{m} OTI^{p}_{i}} < 0; \quad \frac{\partial U_{OTI^{p}_{ij}}}{\partial SI_{ij}} > 0; \quad \frac{\partial U_{OTI^{p}_{ij}}}{\partial TD_{i[j-(j+1)]}} > 0;$$

$$\frac{\partial U_{OTI^{p}_{ij}}}{\partial TD_{i[j-(j-1)]}} > 0$$

Going a simplifying step further, we postulate that:

(5) $U_{OTI^{p}_{ij}} = f\ (K_{ij})$, where

(6) $K_{ij} = \dfrac{SI_{ij} \times \overline{TD}_{ij}}{\sum_{1}^{m} OTI^{p}_{i}}$, and

(7) $\overline{TD}_{ij} = \dfrac{TD_{i[j-(j+1)]} + TD_{i[j-(j-1)]}}{2}$,[177]

where $\dfrac{\partial U_{OTI^{p}_{ij}}}{\partial K_{ij}} > 0$.

---

[177] $\overline{TD}_{ij}$ and $\sum_{1}^{m} OTI^{p}_{i}$ may <u>not</u> be independent variables, as an increase in the number of OTI's of size (i) per period (P) must naturally decrease the TD between <u>some</u> of the (m) OTI's, but may <u>not necessarily</u> decrease <u>just the</u> TD of <u>the j-th OTI of size (i)</u>, in whose value we happen to be interested. Both variables must therefore be included in equation (6).

Fxpressed in words, we can summarize by saying, that the value of the j-th interval of size (i) per period (p), is (ordinally) positively correlated with K.[178]

If $K > K_1 > K_2$, i.e., if the <u>absolute</u> value of K exceeds the absolute value K_1 and K_1 exceeds the absolute value K_2 (transitivity requiring that K also exceed K_2), of an OTI, then the <u>ordinal</u> value of this interval will be greater than K than under K_1, greater under K_1 than under

---

[178] As will be explained subsequently, the inclusion of $\overline{TD}_{ij}$ in equation (6) will be only justified and realistic, if <u>within</u> the TD's there occur no OTI's which are bigger (of <u>longer</u> duration) than the j-th OTI under consideration.

Our TD theory is, as we already indicated previously, reminiscent of the famous Weber-Fechner Law of psychophysics, i.e., $S = k \log R$, where S = sensation, k = a constant and R = stimulus intensity. In words, the size of the sensation can grow arithmetically only, if the stimulus intensity increases geometrically (the difference between S and R, i.e., the "loss" in sensation may be due to the increase in entropy (cf. footnote 175).

If we substitute in the equation TD or K for R and U for S, we have arrived at a specific form of equation (5), with its "ordinal" restriction.

Furthermore, we cannot here enter into a discussion of a possible "<u>isomorphism</u>" existing between the time-distance-distribution of goods and the sensation therefrom: a longer TD producing increased sensation of lack (scarcity) in the brain. (Cf. Wolfgang Köhler: "It is a frequent experience that one event lies temporally between two others. But experienced time must have a functional counterpart in brain events just as experienced space has. Our principle (of psychophysical isomorphism) says that the temporal 'between' in experience goes with a functional 'between' in the sequence of underlying physiological events . . . <u>experienced order in time is always structurally identical with a functional order in the sequence of correlated brain processes</u>" (<u>Gestalt Psychology</u>, [New York: A Mentor Book, 1961, 1947], p. 39; cf. also pp. 89, 117, footnote 7) (bracket added).

K_2 and greater under K than under K_2. "Ordinal" means, that we do not presume to know by how much greater the interval values are, i.e., means, that we do not make the "cardinal" assumption of utility measurement.

Making use of several distinct interval sizes of Table 2, we may illustrate equations (5) and (6) in Table 3.

The results for K in column (6) of this table, in general, are in accordance with what we would expect, i.e., the OT, or parts thereof, that separates one 8-hour work day from another (i.e., the 16 hour OTI), is valued relatively less than the OT, or parts thereof, of the vacation interval, e.g., and part or whole of the OT of an extended week-end, is worth more relatively than part or whole of the OT of a normal (two day) week-end, etc. There is in fact only one difference in K-values in column (6) which may be subject to doubt: why should the value of a 24-hour holiday (or time unit thereof) exceed the value of a longer normal weekend[179] (or time unit thereof)? Our result in column (6), i.e., K = 31008, probably is biased upwards, because, although the TD between the three 24-hour holidays may happen to be greater than the TD

---

[179] If the comparison were between a 24-hour Sunday and a 24-hour holiday OTI, there would be no doubt about the relative higher value of the latter OTI, because holidays are usually less frequent and are separated usually by greater TD's per year than Sundays (cf. A. Nikisch, op. cit., p. 341; cf. A. Hueck and H. C. Nipperdey, op. cit., pp. 272-273).

TABLE 3.--Computation of K-values.

	1	2	3	4	5	6
DESCRIPTION OF j-th OTI	SI_{ij} = SIZE (i) OF THE j-th OTI (in hours)	$TD_{i[j-(j+1)]}$ = TIME DISTANCE TO NEXT $(j+1)^{th}$ OTI OF SIZE (i), MEASURED FROM END OF (j^{th}) OTI (in hours)	$TD_{i[j-(j-1)]}$ = TIME DISTANCE TO PREVIOUS $(j-1)^{th}$ OTI OF SIZE (i), MEASURED FROM BEGINNING OF (j^{th}) OTI (in hours)	$\overline{TD}_{ij} = \frac{COL.2 + COL.3}{2}$	$\sum_1^m OTI_i^P$ = FREQUENCY OF OTI's OF SIZE (i) PER YEAR	$K_{ij} = \frac{COL.1 \times COL.4}{COL.5}$
EVENING AND NIGHT	16	8	8	8	137	0.93
HOLIDAY	24	(32) 4824	(48) 2928	(40) 3876	3	(320.0) 31,008.0
NORMAL WEEK-END	64	104	264	184	32	368.0
EXTENDED WEEK-END	87 $(=\frac{86+88}{2})$	250	8336	4293	2	186,745.5
	110	6466	2074	4270	2	234,850.0
MAJOR VACATION	568	8192	8192	8192	1	4,653,056.0

Note: In Col.(1) only those OTI-sizes which differed sufficiently from other OTI-sizes, to make a value comparison meaningful, were included.

It was necessary, to take the midpoint of the 2 (86-88) hour OTI's, because their 2-hour time difference was too small. Although it would be justifiable also to take the midpoint of the 6o-68 hour- and 20-24 hour-, as well as the 404-568 hour range, we did not resort to this more complex procedure, as it would not have altered the ordinal value comparison.

Source of figures: Table 2

between normal week-ends, in the case of holidays, the TD loses its scarcity creating effect, as there exist other intervening and even longer (than 24 hours) intervals between the holidays (cf. footnote 178). We should therefore restrict the applicability of the TD variable to those cases, in which there occur within the TD, separating OTI's of equal size (i), no longer than i-sized OTI's; otherwise, the TD effect would be neutralized through this/these larger or longer OTI's. We can, however, correct such situations, by taking the TD not between equal (i) sized OTI's, but between OTI of size (i) and the two neighboring next higher sized (> i) OTI's. In Table 3, we have indicated this procedure in terms of the holiday-row figures in brackets. Now, the K-value for week-ends exceeds the respective K-value for holidays, which substantiates our previous expectation.

The conslusion which we can derive from the foregoing excursion into TD-theory for our analysis of OR benefits is, that:

a. In comparison to the value of other, non-outdoor recreational OT, the value of outdoor recreational OT, being usually spent during week-ends, holidays and vacation periods, probably exceeds the value of the other OT, and that

b. P_W probably underestimates the money value per hour of the total time spent at OR-sites per period by outdoor recreationists, relatively more in cases where certain OR-sites "consume," so to speak, relatively more vacation time than week-end time, and relatively more week-end time than holiday or evening time, etc., in comparison to other OR-sites.

The above analysis may also confirm the finding of the Outdoor Recreation Resources Review Commission contained in ORRRC Report No. 5, p. 19, Table 11, i.e., that only a relatively low percentage (25.6%) of the sample of outdoor recreationists interviewed at 24 US recreation areas in 1960/61, were on a "major annual vacation," while 53.6% were on "week-end trips," "overnight trips," or a "day outing." There may thus be a great number of people, who reserve their prime (most valuable) vacation time for trips abroad (which usually can only be made during the relatively "longer" vacation OTI's), and who therefore spent only the relatively less valuable week-end time or holiday time at home. This behavior may also reflect the certain relative unattractiveness, the relative inferior quality[180] (the immense distances, through very often

---

[180]This is not to deny that the relative "unattractiveness" of domestic OR areas relative to foreign OR areas, at least for a certain species of individuals, may be a world-wide phenomenon: the grass is said to be greener on the other side of the fence. Also, living close to the most beautiful scenery, architecture, etc., in the long run becomes monotonous, as the Law of Diminishing Marginal Utility never stops operating. Again, variety is the spiec of life.

There may thus also exist a spatial distance scarcity (value) creating effect, which is analogous to the barren, desert-like, monotonous landscapes and through polluted residential areas whose "beautification" is still at most marginal, which the US Outdoor Recreationist has to traverse in order to get to one OR area, or from one area to another--besides the relatively high expenditures in time and money which these distances imply--are also aspects of inferior quality) of present domestic US recreation areas--especially for high income earners--in comparison to comparable foreign OR areas (it is one of the comparative advantages of European OR areas, for example, that they are located relatively closely together and that they are not separated, in general, by "waste-lands" of external diseconomies), a speculation, which is supported by the statistic that of the 25.6% of outdoor recreationists who spent their "major annual vacation" at the OR areas in the USA, nearly 50% (49.1%) spent it in National Parks and that the predominant percentage of wilderness users were spending their vacation time[181]--

---

time distance effect: the farther away the OR area, the scarcer it therefore is relative to human wants, the greater its attraction, cet. par. The expansion of tourism, in fact, confirms this tendency. Furthermore, the relative value of homogeneous goods at spatially distant points--their transportation cost differential, etc.--i.e., the Economics of Transportation and Location, may thus be unified with value theory along the distance concept.

[181]Cf. ORRRC Report No. 3, p. 171, Appendix B.

both, kind of OR areas, which are known to be areas of exceptional and distinctive quality.

In other words, if the contention that the most precious vacation time (at least for high income recipients) is to a large extent spent at OR areas of superior quality,[182] i.e., areas whose supply is rather limited (at home), is correct, there should be a tendency for substantial increases in foreign tourism, as incomes (P_W's) and vacation time increase, and there should be a tendency for stays at domestic OR sites to be rather of short term nature. At the extreme, each country's OR areas may ultimately be visited mainly by visitors from abroad.

Creating new OR areas close to residential-urban areas, should therefore be a priority goal for recreation planners also from this point of view. It was one of the "main thrusts" of the ORRRC Reports that OR should be "people oriented" and "closely allied to the urban areas where people live."[183] The land acquisition program of

---

[182] Not only money prices, but also time prices can therefore be indicators of the quality of goods. This point will be the core of our section on quality (V, 4. A). (Cf. Andre Gabor and C. W. J. Granger, "Price as an Indicator of Quality;" "Report on an Enquiry," Economica, February, 1966, pp. 43-70; cf. also T. Scitovsky, op. cit., pp. 403ff.).

[183] Edward C. Crafts (Director, Bureau of Outdoor Recreation), "The Dilemma of America," Remarks before the Nevada Governor's Conference on Natural Beuaty and

the Land and Water Conservation Fund, seems to follow the above priority, as is, e.g., evidenced by the fact that more than 95% of the recreation land area (158,800 acres) to be purchased by the Forest Service in 1965/1966, "was located within 125 miles or two and one-half hours' driving time of urban areas."[184]

(6) The Direct Price of Own Time

So far, we have demonstrated that the income-opportunity-cost money weight of own time per hour (P_W) is an underestimate of the value of OT per hour in all but exceptional "undertime" cases.

To this indirect (opportunity cost) value P_W should, however, be added a second component--thus reinforcing the

---

Outdoor Recreation, Las Vegas, Nevada, September 21, 1966; released by Bureau of Outdoor Recreation, U.S. Department of the Interior, September 21, 1966, p. 4 (mimeographed).

See also: Federal Executive Branch Policy Governing the Selection, Establishment, and Administration of National Recreation Areas, op. cit., pp. 4-5. ". . . National Recreation Areas should . . . be strategically located within easy driving distance, i.e., not more than 250 miles from urban population centers which are to be served." "Preference should be given to proposed National Recreation Areas that:

a. Are within or closely proximate to those official U.S. Census Divisions having the highest population densities;"

[184]"Expanding America's Outdoor Recreation Estate--The Land and Water Conservation Fund's First Year and a Half," U.S. Department of the Interior, Bureau of Outdoor Recreation, cumulative to June 30, 1966, p. 3 (mimeographed); see chart: "Driving Time from Center of Nearest Urbanized Area."

conclusion that P_W is really an underestimate of the money value of own time per hour--which we call the direct price of own time and which amounts to a portion or to the whole of the price paid for time-saving devices/goods (skills), like cars, washing machines, sewing machines, sleeping cars, etc., and/or a portion of the wage paid for servants. This we can show in Figure 18 and its quadrant II, where OK_2 is the non-leisure OT of quadrant I, which remains after the "own leisure" part of own time (KK_1) has been subtracted from the total own time (OK), and which (i.e., OK_2) could be converted into additional leisure through the help of a servant or certain goods.

Quadrant II of Figure 18 contains a graphic representation of the ordinal utility function[185]

$$(8) \quad U = U(Y,ALOT), \; \left(\frac{\partial U}{\partial Y} > 0, \; \frac{\partial U}{\partial ALOT} > 0\right),$$

where (ALOT) is additional (to KK_1) leisure-own-time consciously bought through the help of and investment into time-saving servants and/or goods. Function (8) is subject to the time-budget constraint:

$$(9) \quad OK_2 = NLOT + ALOT, \; \text{(at equilibrium L in Figure 18: } NLOT = K_2N \text{ and } ALOT = NO\text{)},$$

[185] The indifference curves of quadrant II are those of quadrant I only turned around by 180°.

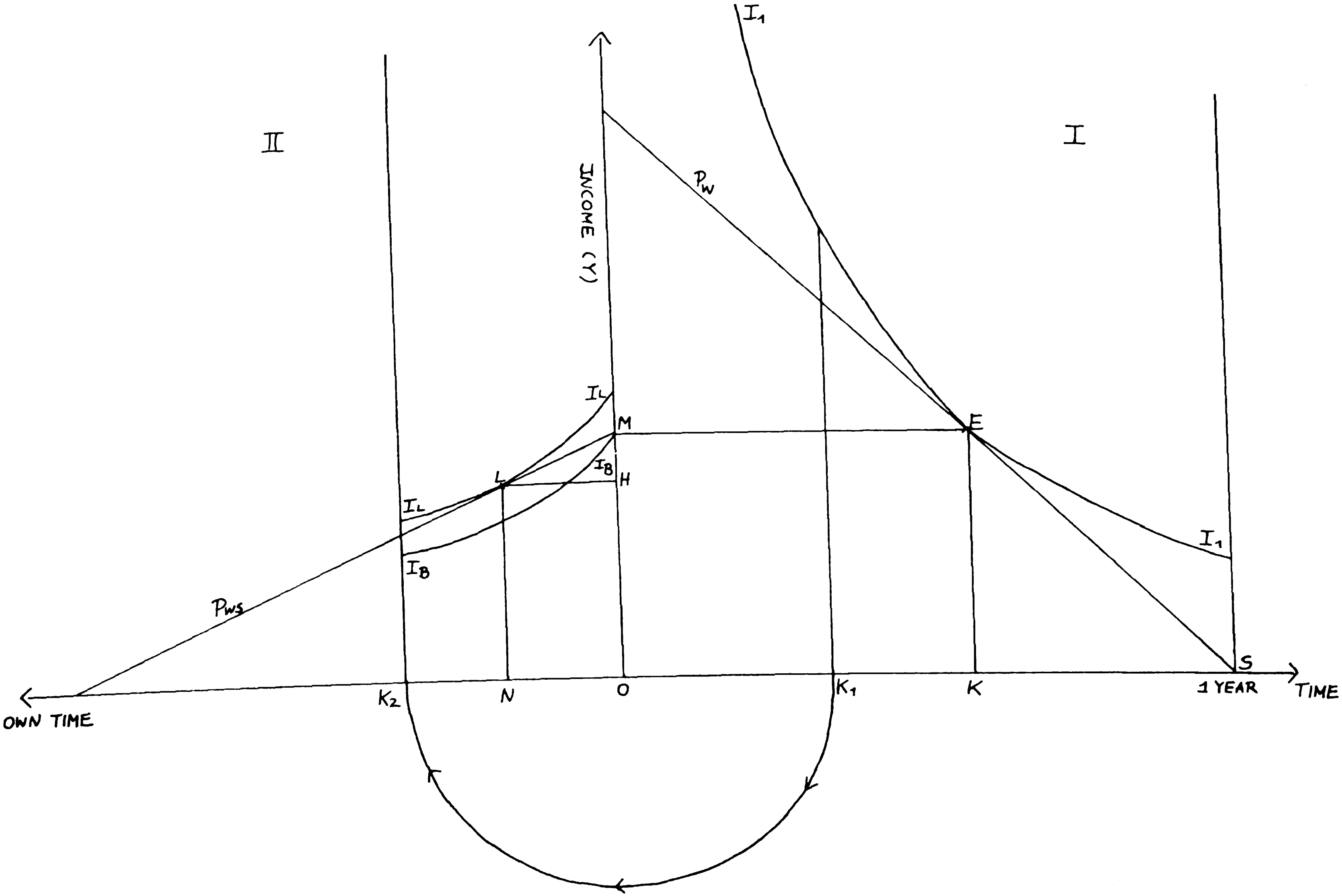

Figure 18.--The sold time-own time model: purchase of additional leisure.

where $OK_2 = OK_1$ = <u>total</u> non-leisure-own-time of quadrant I, NLOT = OK_2 - ALOT = non-leisure-own-time; and the money budget constraint:

(10) $Y = P_{ws} \times ALOT$, (Y is now measured in the downward direction, starting at point M),

where (P_{ws}) equals the money wage rate per hour of the servant(s) and/or some imputed price (consisting of both money and time costs) for time savings per hour derived from the price of time saving goods,[186] when his/their productivity is equal to the productivity of the individual under consideration. The assumption of equal productivity has no other meaning as that, for simplifying reasons only, we presume one hour of his/their service to substitute for exactly one hour of the individual's own time which he would need to perform the servant's/good's task himself, i.e., without the help of "servants,"

---

[186] While under a broad interpretation, nearly all goods could be said to possess time saving utilities (compared to the situation where they would have to be produced by the individual himself), the analysis is here restricted to only those goods, which are purchased directly intentionally (also) because of their time saving utilities, i.e., in the mind of the buyer the whole or at least part of the price paid for the "goods" is paid for their time saving utilities. The same good may thus have different time saving utilities for different consumers, depending also upon the frequency of use of the good.

The consumer's awareness of the time-saving utilities of goods is often a function of advertisements which stress the time-saving properties of goods.

interpreted in the widest sense, to include also the own time-saving skills of the individual.[187]

For simplicity we assume furthermore, that only time-saving utilities are involved in the purchase of additional leisure via time-saving servants/goods, although other utilities (e.g., effort-savings, convenience, flexibility, etc.) may be involved. In case such other utilities are simultaneously bought, only a fraction of P_{ws} will be the direct price of own time per hour.

We thus consider the time-saving utilities to be an intrinsic characteristic shared by many goods and maintain--"that it is the properties or characteristics of the goods from which utility is derived" and not as the

---

[187] P_{ws} could be modified to account for relatively higher and lower productivity of the servant/good, when compared with that of the individual. If the servant's productivity of performing the various tasks of the individual's household is, e.g., twice that of the individual (because of specialization) per hour, the latter will actually pay only $P_{ws/2}$ for each hour of substituted leisure, or expressed differently, to gain one hour of "extra" leisure, the individual needs to employ a human or non-human servant for only half an hour. Let (α) represent a relative productivity index, which equals one if the "servant's" and the individual's "own" productivity per hour coincide and which is greater (smaller) than one, if the servant is more (less productive. Then, $P_{ws} = P_{wm/\alpha}$, where P_{wm} stands for the servant's money wage rate per hour unadjusted for comparable productivity. Assuming a downward sloping demand curve, the quantity of extra leisure (ALOT) demanded by the individual will therefore tend to increase (decrease), cet. par., if P_{wm} decreases (increases) and/or (α) increases (decreases).

traditional approach would have it--"that goods are the direct objects of utility."[188]

Indifference curve $I_L I_L$ indicates that the individual would be willing to substitute decreasing amounts of income (Y) for increasing equal units of additional leisure-own time (ALOT) and remain equally well off. At equilibrium L the worker actually exchanges (MH) dollars of wage income for (NO) hours of extra leisure (= ALOT).[189] Expressed differently, (NO) hours of previous non-leisure-own time are transformed through the help of a "servant" into (NO) hours of preferred (ALOT) at an hourly wage rate of P_{ws}. The individual's level of satisfaction has thereby increased from indifference curve $I_B I_B$ to indifference curve $I_L I_L$.

With income (OM) which our individual has earned in the first round,[190] so to speak, he does "buy back" at

---

[188]Kelvin J. Lancaster, "A New Approach . . . ," op. cit., p. 163.

[189]Obviously, leisure is only one of a multitude of possible uses of the "bought" own time (NO) and in practice it may be difficult to disentangle for which substituting uses the time was actually bought. This difficulty, however, does not change the substance of the argument.

[190]While the employment of a time-saving servant/good probably affects the individual's sold time/own time decision in quadrant I--the decision of a mother to enter the labor force (i.e., to supply certain quantities of ST) may depend upon the price and availability of time-saving baby-sitters, "instant" foods, etc., which may serve as substitutes for her household activities--our static

equilibrium (L), (NO) or (LH) hours of leisure (or other own-time).

The total amount of leisure, therefore will now amount to (KK_1) + (NO) hours, of which (KK_1) is "own leisure" (i.e., leisure not directly bought) and (NO) is directly "bought leisure." The total price (cost) of (KK_1) + (NO) hours is then at least:

$$(11) \quad (KK_1) \times P_W + (NO) \times P_W + (NO) \times P_{ws}$$

$$= P_W \, [(KK_1) + (NO)] + (NO) \times P_{ws}$$

From which follows that the price per hour of leisure (P_L) is:

$$(12) \quad P_W + P_{ws} \times \frac{NO}{KK_1 + NO}.$$

In the special case when (KK_1) is zero and (NO) positive,

(13) $P_L = P_W + P_{ws}$, and when (NO) = 0, while

(KK_1) is positive,

---

analysis, for simplicity, separates the, in practice, often simultaneous decisions of quadrant I and II in such a way, that the decision in quadrant II is treated after the decision in quadrant I has occurred. For example, the decision in quadrant I may be based not only upon the wage rate P_W, but also upon P_{ws}, i.e., one is inclined to work relatively more or less hours, the greater the differential between P_W and P_{ws} and between (α) and (α_1), cet. par., where (α) and (α_1) measure the "own" and the servant's/good's productivity (cf. Jacob Mincer, op. cit., pp. 74-75), respectively.

(14) $P_L = P_W$.

Even if we can empirically only make a rough guess of the direct price of own time (leisure),[191] a price which is certainly not negligible in the face of the numerous goods bought totally or partially because of their time-saving utilities, the above analysis adds at least a second explanation to the earlier contention, that P_W is really an underestimate of the money value of own time per hour.[192]

While time is said to be money (cf. quadrant I), money can be said to be time (cf. quadrant II).

---

[191] Except when, e.g., additional leisure is bought exclusively through the help of a human servant, whose wage rate and productivity per hour are known to the individual.

[192] This second explanation is reinforced in those cases, where the consumption of leisure involves other direct expenditures, e.g., in the form of entrance fees to National Parks, golf club subscriptions, etc., expenditures, which would represent an additional possible third element in the total price of own time (leisure).

CHAPTER V

THE TOTAL PRIMARY OUTDOOR RECREATION BENEFIT

(1) Admission Fees

Up to this point, we have considered the time (length of stay) actually, physically spent at OR-sites[193] and its money value, to be the measure of primary OR-benefits. To be added to the time price naturally are the nominal fees, money charges, collected at the entrance of OR areas per annum and one estimate of the money portion of the total primary OR-benefit estimated indirectly (cf. Chapter II).

---

[193]This time will be a summation of visitor-hours distributed most often unevenly over the year, month, week, or day. To avoid idle capacity of the OR-area resulting from this uneven distribution, multiple uses of the area may be suggested (cf. Multiple Use of Land and Water Areas, ORRRC Study Report 17 [Washington: U.S. Government Printing Office, 1962]); cf. Clawson and Knetsch, op. cit., pp. 160 ff., pp. 177-188.

Assume that there are two OR-areas with the same total annual OR benefit, but with different (seasonal) distributions of these benefits throughout the year. The park which offers the possibility for other, non-recreational uses (e.g., because its visitor-hours are highly concentrated over a few months, while the other park shows a more even distribution of visitor-hours), would therefore have a higher social value.

Admission fees represent a clearly identifiable, measurable element of the total price directly paid for OR.[194]

These fees must be distinguished from fees paid _within_ the OR area for facilities, services (boating fees, swimming, camping fees, hunting fees, etc.) rendered. The latter fees serve as an allocator of resources _within_ the OR area and not for the area itself.

Both portions of the total primary OR-benefit measure, i.e., time and money prices, are clearly related, as the amount of time spent at OR areas will, _cet. par._, decline (increase) if the money price increases (declines).

(2) Travel Time

The question arises, of whether besides the time price of the actual stay at or in the OR area, the time price and money expenditures incurred during the travel to and from the OR area should be part of the total price paid for OR? The travel time to and from the OR area would have to be included as part of the total time price paid _if_ and only _if_ the length of stay at the OR area would have been

---

[194] For statistics on OR-fees see:

Hearings, on H.R. 13313 and related bills, Entrance, Admission, and User Fees at Corps of Engineers Projects, _op. cit._, pp. 95 ff.

Hearings, on H.R. 3846, Land and Water Conservation Fund, _op. cit._, pp. 83ff.

Briefing, on H.R. 5269, The Federal Water Project Recreation Act, _op. cit._, pp. 17ff.

extended by this travel time, had the travel been instantaneous (timeless). Expressed differently, the deciding criterion of whether the value of travel time should be added to the time price of the actual stay, is the utility of travel itself.

If the travel is enjoyable in itself (e.g., because of roadside scenery), for the whole or parts of the distance travelled to and from the OR area, the parts or the whole of the travel time price should be allocated to the measurement of highway benefits and not to the OR area itself.[195] The same is true for direct money expenditures of travel for gasoline, tires, etc. The difficulty of disentangling the utility or disutility portions of travel are even more increased when the outdoor recreationist is not on a single purpose trip (i.e., visits not only one OR area), but on a multiple purpose trip (visiting friends and relatives on the trip),[196] for then one would have to decide of how much of the total travel expenditures (in time and money prices) to allocate to the various OR areas visited (cf. Chapter II). As long as there is no clear-cut evidence with respect to the utility-disutility of travel time among outdoor

---

[195] Cf. A National Program of Scenic Roads and Parkways, Recreation Advisory Council Circular No. 4 (Washington: U.S. Government Printing Office, April, 1964).

[196] ORRRC Study Report 20, op. cit., p. 47 (Tables 46A, 47, 48), pp. 48, 55-57 (Table 56).

recreationists, there exists no justification for including this time in the total primary OR-benefit (price).[197]

(There seems to exist a certain optimal proportion between the amount of travel time and the patron time spent at OR areas. The longer the travel time to the area, the longer will the patron time tend to be, cet. par.[198] Few people will travel, e.g., five hours to stay only 10 minutes at the OR site. Travel time can be considered as a fixed investment in OR--if it does not yield utility in itself--whose rentability increases the longer the actual time spent in OR.)

(3) External Economies of Outdoor Recreation

A possible fourth element of the total price (benefit) of OR are the External Economies, i.e., benefits which are external to the time- and money-price system and are not accounted for in the time- and money-price system. These benefits can accrue:

a. To the actually and physically participating recreationist and,

---

[197] The results of an empirical investigation as to whether travelling is a utility in itself, are included in: G. A. Norton, "Public Outdoor Recreation and Resource Allocation: A Welfare Approach," Land Economics, XLVI, No. 4 (November, 1970), 414-422, especially p. 421.

[198] ORRRC Study Report 3, op. cit., p. 139 (Table 60), p. 142 (Table 72).

b. to individuals not actually spending time at an OR site, but to whom the OR site has value at a distance (in time and space).

As to (a): External Economies and External Diseconomies can arise in OR as the result of consumer-consumer interdependencies in utility functions. This can mean that:

(i) the utility which recreationist A derives from the "consumption" of scenery X_1, e.g., is also a function of recreationists B, C, D, etc. consumption of scenery X_1, and that

(ii) the whole utility function of B, C, D,... etc. is a part of the utility function of A, meaning that A feels happier, the happier B, C, D,... etc. are.

The question now arises, whether and in how far these benefits are already included in the time- and money-prices, i.e., whether they can be called External Economies in our time price system at all? Clearly, some of these interdependencies can be seen to influence the length of time which outdoor recreationists stay at a site: I may increase (reduce) the time spent at an OR site, the better (worse) the companionship I have found.[199] In this case,

---

[199] When External Diseconomies exist, e.g., through crowding in a park, a time limit of stay may be set by the park administrator, in order to avoid the External Diseconomies--a form of time price administration. For an example of the External Diseconomies of OR, see "Ah, Wilderness--Severe Overcrowding Brings Ills of the City

the External Economies (External Diseconomies) are already internalized in the time price and no misallocation of resources results.

In addition, however, there are External Economies which are not already reflected in the amount of time spent, but which could be isolated in the form of money which outdoor recreationists would be willing to give up in order to be able to enjoy the External Economies, or would have to be paid when External Diseconomies are present,[200] (to neutralize the External Diseconomies). In so far as the External Economies outweigh the External Diseconomies, the OR site is undervalued by the net amount of money people would be willing to give up to be able to consume the External Economies of OR.

As to (b): An OR area may not only have value to those directly (physically) participating, but also to those who are at a distance, in time and space, from the area, whether they still can see the area or not. The

---

To Scenic Yosemite (Park's Rangers Fight Crime, Traffic Jams, Smog; Bears Become Surly Gourmands)," Wall Street Journal, XLVI (June 24, 1966), 1.

[200]External Diseconomies are probably relatively small in comparison to the External Economies of OR:

"For a minority of people the appeal of OR may lie in the possibility of getting away from people--to nature and solitude; but for the majority a major attraction of OR seems to be the opportunity to be with people and share leisure activities with others" (ORRRC Study Report 20, op. cit., p. 37; see also pp. 38, 57, 58).

External Economies of "current production" takes the form of a so-called option value (to consumption in the future), or stand-by capacity of the OR area,[201] i.e., the OR area acts like an insurance to non-users and we can imagine that they would be willing to pay a specific sum of money, be it only to know that the area still exists.[202]

At a distance, in time and space, the OR site may have a further value beyond that of actual participation. As we already saw,[203] the OR experience, besides the immediate enjoyment, begins with anticipation and ends with memory. The value of the consumption time of

---

[201]Cf. B. Weisbrod, op. cit., 1964.

[202]This option value can be thought of to be a positive function of the number of OR areas existing, i.e., the fewer, scarcer the areas become, the greater will, cet par., be the value of the remaining ones (cf. ORRRC Study Report 3, op. cit., p. 214).

In the case of wilderness areas, this form of External Economies to non-users may be especially high. Here, the External Economies probably account for a greater portion of the total benefit, as the actual intensity of use (time spent) is intentionally kept low to preserve the character of wilderness. Cf. ORRRC Study Report 3, p. 15, op. cit.; cf. Clawson and Knetsch, op. cit., pp. 168, 180, 181; and cf. Orris C. Herfindahl and Allen V. Kneese, Quality of the Environment--An Economic Approach to some Problems in Using Land, Water, and Air (Washington, D.C.: Resources for the Future, Inc., Distributed by The Johns Hopkins Press, Baltimore, 1965), pp. 76ff.

There exists here an obvious conflict between the aim of maximizing the total benefit (time) of the OR area and preserving the character of wilderness.

[203]Cf. pp. 167-168.

anticipation (preparation) and memory should therefore be added as an additional element to the total time price.

How to collect or measure these additional quantities indeed is a problem and cannot be solved here.[204] The existence of these Externalities, however, supports the arguments of those, who maintain that OR should be and remain essentially a public good and should be subsidized.

(4) Selected Problems

A. Time Prices and Outdoor Recreation Quality

The (subjective) quality of the OR experience and the (objective) quality of the OR site, are clearly interdependent.

It might be maintained that our time measure of primary OR benefits does not adequately reflect the quality differences of OR areas, i.e., that the hour which recreationist A spends in OR area X (when area X is generally considered to be of superior quality than another area Y) is not valued differently than the hour which A spends at area Y and that therefore a misallocation of resources might result.[205] Our time prices, however,

---

[204] It has been suggested that the "vicarious benefits question could be investigated by a public opinion poll which asked such questions as 'How much in taxes would you be willing to pay for the preservation of wilderness areas?'" (ORRRC Study Report 3, *op. cit.*, p. 225).

[205] Cf. "A Uniform Method for Measuring and Reporting Recreation Use on the Public Lands and Waters of the United States," *op. cit.*, p. 18.

are not insensitive to quality differences, if we remember that it is the total amount of time spent per person at an OR site, which is ultimately relevant for the benefit measurement. We maintain, that the greater the quality of an area, the longer will people tend to stay at the area, *cet. par.*, i.e., quality is reflected in the time price, or time price is an indicator of quality. This becomes more obvious when we observe that quality of an OR area is made up of elements like: number of attractions (animals, fauna, mountains, lakes, waterfalls, swimming sites, facilities, etc.), the beauty of these attractions; weather, climate, size of area, etc.

Empirical evidence supports our hypothesis:

a. Man-days of use per acre of California wild and wilderness are clearly positively correlated with size of area and number of lakes.[206]

b. "The data suggest that the intensity of recreational use is governed to a large degree by the general character of the region itself, relative to availability of recreational waters, . . ."[207]

---

[206] See ORRRC Study Report 3, *op. cit.*, p. 243, Table 147.

[207] ORRRC Study Report 10, *op. cit.*, p. 42.

c. Assuming that the greater frequency of participation in OR activities involves a greater expenditure of time, cet. par.:

> For hunting, swimming, and picknicking, there is a clearly evident relation between facility ratings (i.e., quality of facilities--my insertion) and the proportion of residents in the area taking part in the activity.[208]
>
> d. Statistical analysis reveals a very significant degree of correlation between area visits and area facilities. On the average, 40 percent of the total variation in visits was accounted for by the facilities index.
>
> (The facilities index assigns numbers to various park facilities representing their relative power of attraction.)[209]

As a possible indicator of the OR area quality may serve the distance travelled to OR areas by outdoor recreationists, i.e., the area (park) with the greatest number of recreationists having travelled the greater distance (to the area) will rank higher in quality. This observation results from the fact "that the more distinctive an area is, the more willing people are to travel long distances to utilize it."[210]

---

[208] ORRRC Study Report 20, op. cit., p. 8, also Table 8.

[209] The Future of Outdoor Recreation in Metropolitan Regions of the United States, ORRRC Study Report 21, Vol. II (Washington, D.C.: U.S. Government Printing Office, 1962), pp. 34-35, Table E-17.

[210] ORRRC Study Report 3, op. cit., p. 132. We abstract here from the difficulty when several OR areas are visited during the travel. Furthermore, the

On first sight, this method of quality ranking may be taken as a separate index; it, however, reduces again to our time price method, when we once more consider that the distance travelled _to_ and the length of stay _at_ an OR area are positively correlated (cf. Chapter II): The longer the distance travelled to an OR area, the longer will, _cet. par._, be the time spent in the area (cf. p. 194). The empirical evidence clearly points in this direction: "The strongest single influence found on length of stay is distance of the user's home from the wilderness area (table 60)."[211]

B. Activity-Variation of Outdoor Recreation Benefits

Not only does there exist a seasonal distribution of OR benefits, but benefits (time prices) are also distributed over the various OR-activities performed during the visit of the OR area by the recreationist. Thus total OR-time spent at an area can be seen as being broken down into fishing-time, hunting-time, sightseeing-time, camping-time, etc. This breakdown will obviously be of great use to those whose task it is to allocate, administer

---

assumed direction of influence goes one way only: one travels great distances because of the high quality of the OR site, but the high quality does not depend upon the distance one travels.

[211] ORRRC Study Report 3, _op. cit._, p. 139, see also Table 61.

and manage resources _within_ the OR areas. A draft revision of the Recreation Advisory Council Circular No. 6 (_op. cit._) through the Standing Committee on Outdoor Recreation of the Environmental Quality Council, notices the importance of this breakdown and recommends as an additional (to the Recreation Visitor-Hour) recreation use data-definition the _Recreation Activity-Hour_. It is defined as a "Recreation visitor-hour attributable to a specific recreation activity."[212]

---

[212] Cf. ORRRC Study Report 24, _op. cit._, pp. 12-13.
Cf. _Recreation Information Management (RIM) Handbook_ (Forest Service Handbook), Amendment No. 16, April 1970 (124.11--2), Amendment No. 22-*, October, 1970 (124.21) (Washington, D.C.: U.S. Department of Agriculture, Forest Service).

CHAPTER VI

SUMMARY AND CONCLUSIONS

The consumption of goods/activities usually does not occur instantaneously. It takes time to consume goods in addition to money. As time is, as we saw (cf. Chapter III, 1), a scarce good in itself and thus is economized--it can be treated analogously to money proper (with due regard of the exceptions), for: Time is Money (cf. Chapter III, 2), and the amount of our "clock-time" (and its money value) which we allocate for the consumption of particular goods (P_T), is part of--besides the money price (P_M) per unit of the goods--the total price (TP) per unit of goods, which we pay in order to be able to consume them.

We can write therefore the true price per unit of the j^{th} good/activity as follows:

$$TP^j = P_M^j + P_T^j, \text{ where there are } j=1...m, \text{ goods.}$$

(P_T^j) can be expressed not only in terms of pure time units (hours, minutes, etc.), but also in terms of money units (\$), for the wage rate is, as we showed diagrammatically, in most cases, a minimum opportunity-cost money estimate per hour of consumption time (OT).

The wage rate (P_W) is a minimum monetary estimate or *underestimate* per hour of own time (leisure), because there exist *above* (P_W):

a. an own time surplus, and

b. a direct price of own time.

The core of the dissertation consists in the contention that P_W is an underestimate of the value of own time per hour. This is clearly in opposition to the frequently heard claim that individuals really have *no free choice* between sold time and own time (standard work week). The latter claim, however, must imply one of the following, i.e., *either* that:

a. Actual sold time - Desired sold time, or

b. Actual sold time > Desired sold time (overtime), or

c. Actual sold time < Desired sold time (undertime).

As we have shown diagrammatically, only in the third case (c) of undertime does there exist a weak possibility that the wage rate may *overvalue* the opportunity-cost of OT per hour; in both of the other cases, the wage rate was shown to be an *underestimate* of the value of OT per hour.

The claim of the critics should therefore be rephrased and made more specific by saying: that individuals would like to work *more* than they are actually doing per period (undertime, or enforced OT), but are unable to do so for reasons beyond their control.[213] Considering the value of the specific time spent in OR, we must furthermore refine the analysis, for even in cases of undertime, the OR-own time may be not part of the enforced own time, but be part of that portion of OT that is desired for its own end. If the latter is true, then P_W is truly no overestimate of the money value of this OR-own time, but an underestimate as in the usual case. The undertime-overestimate possibility is moreover excluded in those cases where sufficient undertime-compensations exist.

Applied to the field of public OR-benefit measurement, a direct money price, P_M^j, is absent here other than in nominal entrance fees, and the price (primary OR-benefit) of OR therefore reduces to P_T^j.

In order to compute a measure of total primary OR-benefits, to P_T^j, i.e., the monetary value of visitor-hours per OR area and year, must be added:

a. a proxy for P_M^j (a review of possible methods of measurement is presented in Chapter II),

b. the value of external economies of OR,

---

[213]For demoscopic evidence about the preferences of individuals (in four European countries and the U.S.A.) concerning their desires for more or less work, see George Katona, Burkhard Strümpel and Ernest Zahn, Zwei Wege zur Prosperität (Düsseldorf, Wien: Econ Verlag, 1971), pp. 159ff., especially Table 9-5 and Appendix C, pp. 281ff.

c. entrance fees, and

d. an appropriate value of the travel time.

Thus our OR-benefit measure is clearly use-oriented and use-intensive, accounts for "intangibles," and "adequately calibrates" a substantial portion of these benefits, although the monetary values must needs be minimum values, because P_W was shown to be a minimum weight of the value of own time.

The empirical measurement of P_T^j--since the publication of visitor-day statistics (cf. Appendix C) for U.S. recreation areas by the U.S. Government--should present no great difficulties anymore, and if an appropriate average wage figure for a particular OR area is unavailable, one can always resort to a minimum wage.

We showed, that the system of time prices could serve as a highly equitable (supplementary) public goods (accounting) price system and thus could help to solve the basic economic problems with which any society is confronted.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Bobrowski, Paul u. Gaul, Dieter. Das Arbeitsrecht im Betrieb, 5. Aufl. Heidelberg: Verlagsgesellschaft Recht u. Wirtschaft, 1965.

Böhm-Bawerk, E.v. Positive Theorie des Kapitals--Excurse- 4. Aufl., Vol. II. Jena: Gustav Fischer, 1921.

Büchmann, Georg. Geflügelte Worte, Zitatenschatz. Berlin, Darmstadt: Deutsche Buch-Gemeinschaft, 1953.

Camus, Albert. The Myth of Sisyphus and other Essays. New York: Vintage Books, 1955.

Clawson, Marion and Knetsch, Jack L. Economics of Outdoor Recreation. Baltimore: Johns Hopkins Press, 1966.

Clawson, Marion. Land And Water For Recreation. Chicago: Rand Mc Nally, 1963.

Dewey, John. "Time and Individuality." Time and its Mysteries. New York: Collier Books, 1962, Chapter 7.

Eliot, T. S. The Complete Poems and Plays, 1909-1950. New York: Harcourt, Brace and World, 1962.

Encyclopedia Britannica. "Hours of Labor." Vol. II, 1959, pp. 802-807.

Encyclopedia of the Social Sciences. "Hours of Labor." Mac Millan Co., 1950, Vol. 7, pp. 478-493.

Feifel, Herman. "Death--Relevant variable in Psychology." Existential Psychology. Edited by Rollo May. New York: Random House, 1961, Chapter 3.

Friedmann, Hermann. Wissenschaft und Symbol--Aufriß einer symbolnahen Wissenschaft. München: C. H. Beck, 1948.

Friedman, Milton. Price Theory--A Provisional Text. Chicago: Aldine Publishing Co., 1962.

Herfindahl, Orris C. and Kneese, Allen V. Quality of the Environment. Baltimore: Johns Hopkins Press, 1965.

Hering, D. W. "The Time Concept and Time Sense Among Cultured and Uncultured Peoples." Time and its Mysteries. New York: Collier Books, 1962, Chapter 5.

Hilgard, Ernest R. Introduction to Psychology. New York: Harcourt, Brace and Co., 1957.

Hueck, Alfred u. Nipperdey, Hans Carl. Lehrbuch des Arbeitsrechts, 1. Bd. Berlin, Frankfurt a.M.: Franz Vahlen, 1963.

Jung, C. G. The Structure and Dynamics of the Psyche, Vol. 8 of the Collected Works, Bollingen Series XX. New York: Pantheon Books, 1960.

Katona, George; Strümpel, Burkhard; and Zahn, Ernest. Zwei Wege zur Prosperität. Düsseldorf, Wien: Econ Verlag, 1971.

Knight, Frank H. The Economic Organization. New York: Harper Torchbooks, The Academy Library, 1965.

Knight, Frank H. Risk, Uncertainty and Profit. New York: Harper Torchbooks, The Academy Library, 1965.

Köhler, Wolfgang. Gestalt Psychology. New York: Mentor Book, 1961.

Linder, Staffan B. Das Linder Axiom oder Warum wir Keine Zeit mehr haben. Gütersloh-Wien: Bertelsmann Sachbuchverl., 1971.

Lipmann, Otto. Das Arbeitszeitproblem. Berlin: Institut für angewandte Psychologie, 1924.

Mack, Ruth P. and Myers, Sumner. "Outdoor Recreation." Measuring Benefits of Government Investments. Edited by Robert Dorfman. Washington D.C.: The Bookings Institution, 1965.

Maslow, Abraham H. Toward a Psychology of Being. Princeton: D. Van Nostrand Co., 1962.

May, Rollo. "Contributions of Existential Psychotherapy." Existence--A New Dimension in Psychology and Psychiatry. Edited by Rollo May, et al. New York: Basic Books, 1958, Chapter II.

Memoirs of the Life and Writings of Benjamin Franklin. 3rd ed., Vol. V. London: Printed for Henry Colburn, 1819.

Mincer, Jacob. "Market Prices, Opportunity Costs, and Income Effects." Measurement in Economics, Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld. Edited by Carl F. Christ and others. Stanford University Press, 1963.

Nikisch, Arthur. Arbeitsrecht, I.Bd., 3. Aufl. Tübingen: J. C. B. Mohr, 1961.

Ott, Alfred E. "Der Zeitbegriff in der Wirtschaftstheorie." Wirtschaftskreislauf und Wirtschaftswachstum. Edited by Erich Schneider. Tübingen: J. C. B. Mohr, 1966.

Owen, John D. The Price of Leisure. Rotterdam: Rotterdam University Press, 1969.

Pechan, Hermann. "Arbeitszeit." Hanwörterbuch der Sozialwissenschaften. Vol. 1. Stuttgart: Gustav Fischer; Tübingen: J. C. B. Mohr, 1956, pp. 408-411.

Sartre, Jean-Paul. Being and Nothingness. New York: Citadell Press, 1964.

Schmidtchen, Gerhard. Die befragte Nation--Uber den Einfluß der Meinungsforschung auf die Politik. Freiburg: Verlag Rombach, 1959.

Schneider, Erich. Einführung in die Wirtschaftstheorie, IV. Teil: Ausgewählte Kapitel der Geschichte der Wirtschaftstheorie, 1. Bd. Tübingen: J. C. B. Mohr, 1962.

Schopenhauer, Arthur. Aphorismen zur Lebensweisheit. München: Goldmanns Gelbe Taschenbücher, 1960.

Scitovsky, Tibor. Welfare and Competition. London: Unwin University Books, 1952.

Sorokin, Pitrim A. and Berger, Clarence Q. Time Budgets of Human Behavior. Cambridge: Harvard University Press, 1939.

Sulzer, Georg. Die wirtschaftlichen Grundgesetze. Zürich: Albert Müllers Verlag, 1895.

The Rationalists--Descartes, Spinoza, Leibniz. Garden City, New York: Doubleday & Co., no date.

Weisbrod, Burton A. Economics of Public Health. Philadelphia: University of Pennsylvania Press, 1961.

Periodical Articles

"Ah, Wilderness--Severe Overcrowding Brings Ills of the City To Scenic Yosemite." Wall Street Journal, XLVI (June 24, 1966), 1.

"Arbeitszeiten der Erwerbstätigen." Bulletin des Press -und Informationsamtes der Bundesregierung, Bonn, Germany, Nr.44 (March 30, 1966).

Becker, Gary S. "A Theory of the Allocation of Time." Economic Journal (September, 1965), 493-517.

Brehm, C. T. and Saving, T. R. "The Demand For General Assistance Payments." American Economic Review, LIV, No. 6 (December, 1964), 1002-1018.

Burton, T. L. and Fulcher, Margaret N. "Measurement of Recreation Benefits--A Survey." Journal of Economic Studies, 3, No. 2 (July, 1968), 35-48.

Cesario, Frank J. and Knetsch, Jack L. "Time Bias in Recreation Benefit Estimates." Water Resources Research, 6, No. 3 (June, 1970), 700-704.

David, Elizabeth L. "Lakeshore Property Values: A Guide to Public Investment in Recreation." Water Resources Research, 4, No. 4 (August, 1968).

"Eine Uberstunde." Die Zeit (Hamburg), January 18, 1966, 14.

Foster, John H. "Measuring the Productivity of Land Used for Outdoor Recreation." Land Economics, XL, No. 2 (May, 1964), 224-227.

Frings, Manfred. "Max Scheler's Theory of Social Economy with special Attention to its ethical implications." Review of Social Economy (September, 1965), 127-143.

Gabor, Andre and Granger, C. W. J. "Price as an Indicator of Quality; Report on an Enquiry." Economica (February, 1966), 43-70.

General Anzeiger (Bonn, Germany), February 18/19, 1967.

Gumpert, Jobst. "Bezahlung von Mehrarbeit und Uberstunden." Der Betriebsberater, Heft 12 (April 30, 1961), 487-490.

Hartsch, Erwin. "Versuch zur Bestimmung des ökonomischen Wertes von Erholungsgebieten." Wissenschaftliche Zeitschrift der Technischen Universität Dresden, 19, Heft 2 (1970), pp. 499-501.

Hines, Lawrence G. "Measurement of Recreation Benefits: A Reply." Land Economics, Vol. 34 (November, 1958), 365-367.

Hittmair, Anton. "Wissenschaft vom Urlaub." Müchener Medizinische Wochenschrift, 101. Jg., Heft 31 (July 31, 1959), 1329-1333.

Jacob, Hartmut. "Zur Ökonomik der Erholungsfunktion des Waldes." Allgemeine Forst Zeitschrift (Müchen), 26. Jg., 17 (April 24, 1971), 348-351.

Johnson, Bruce M. "Travel Time and the Price of Leisure." Western Economic Jcurnal, 4, No. 2 (Spring, 1966), 135-145.

Klein, Frederick C. "Pay vs. Play--Firms Offer Employes Double Wages If They Give Up Some Vacation." Wall Street Journal (May 24, 1966), 1.

Kleitman, Nathaniel. "Sleep." Scientific American (Nov., 1952), 6pp.

"Krank." General Anzeiger (Bonn, Germany), May 8, 1967, p. 1.

Lancaster, Kelvin J. "A New Approach to Consumer Theory." Journal of Political Economy, LXXIV, No. 2 (April, 1966), 132-157.

"Long Hours and Premium Pay." Special Labor Force Report No. 57, from the Monthly Labor Review (September, 1965), 6pp., Tables.

Mahr, Alexander. "Gegenwart und Zukunft in den wirtschaftlichen Dispositionen der Konsumenten." Zeitschrift für Nationalökonomie, XXVI, Heft 4 (August, 1966), 435-459.

Mansfield, N. W. "The Estimation of Benefits from Recreational Sites and the Provision of a New Recreation Facility." Regional Studies, 5, No. 2 (July, 1971), 55-69.

Meissinger, H. "Pauschalvergütungen im Arbeitsrecht." Der Betrieb, Nr. 19 (May 9, 1956), 448-450.

Merewitz, Leonard. "Recreational Benefits of Water Resource Development." Water Resources Research, 2, No. 4 (Fourth Quarter, 1966), 625-640.

"More Workers Gather Nerve to Switch Jobs as Labor Gets Scarcer." Wall Street Journal (, 1966), 1.

Moses, Leon N. and Williamson, Harold F., Jr. "Value of Time, Choice of Mode, and the Subsidy Issue in Urban Transportation." Journal of Political Economy, LXXI, No. 3 (June, 1963), 247-264.

Moses, Leon N. "Income, Leisure, and Wage Pressure." Economic Journal (June, 1962), 320-334.

"Multiple Jobholders in May 1964." Monthly Labor Review (March, 1965).

Norton, G. A. "Public Outdoor Recreation and Resource Allocation: A Welfare Approach." Land Economics, XLVI, No. 4 (November, 1970), 414-422.

Oort, C. J. "The Evaluation of Travelling Time." Journal of Transport Economics and Policy, III, No. 3 (September, 1969), 279-286.

Owen, John D. "The Demand for Leisure." Journal of Political Economy, 79, No. 1 (January/February, 1971), 56-76.

Papst, H. "Zur Bewertung der Sozialfunktion des Waldes in Stadtnähe." Allgemeine Forst -und Jagdzeitung, 140. Jg., Heft 7 (July, 1969), 158-163.

Pearse, Peter H. "A New Approach to the Evaluation of Non-Priced Recreational Resources." Land Economics, XLIV, No. 1 (February, 1968), 87-99.

Prodan, M. "Zur Bewertung der Sozialfunktion des Waldes in Stadtnähe." Allgemeine Forst -und Jagdzeitung, 6 (1968), 131-138.

Rewolle, H. D. "Die Uberstundenpauschale." Der Betrieb, Nr. 51 (December 19, 1956), 1209-1210.

Robbins, Lionel. "On the Elasticity of Demand for Income in Terms of Effort." Economica, Vol. 10 (June, 1930), 123-129.

Robinson, Warren C. "The Simple Economics of Public Outdoor Recreation." Land Economics, XLIII, No. 1 (February, 1967), 71-83.

Rosenstein-Rodan, P. N. "The Rôle of Time in Economic Theory." Economica (February, 1934), 77-97.

"Salesmen Reported in Love with Work--not (ugh) Money." New York Times (February 28, 1966), 29.

Seckler, David W. "On the Uses and Abuses of Economic Science in Evaluating Public Outdoor Recreation." Land Economics, XLII, No. 4 (November, 1966), 485-494.

"Selbständige arbeiten länger." Die Zeit (May 24, 1966), 13.

Shoup, Carl S. "Production from Consumption." Public Finance, XX, No. 1-2 (1965), 173-202.

Slocum, Kenneth G. "I'll Be Out Today--Rise in Absenteeism Plagues Firms Already Hurt by Labor Pinch." Wall Street Journal (June 6, 1966), 1.

Stigler, G. J. "The Cost of Subsistence." Journal of Farm Economics, XXVII (1945).

Time Magazine (January 6, 1967), p. 16.

Trice, Andrew H. and Wood, Samuel E. "Measurement of Recreation Benefits." Land Economics, 34 (August, 1958), 195-207.

"Traum vom eigenen Geschäft--Der Selbständige kennt keinen Sieben--oder Achtstundentag." General Anzeiger, Bonn, Germany (August 20/21, 1966).

Ullman, Edward L. and Volk, Donald J. "An Operational Model for Predicting Reservoir Attendance and Benefits: Implications of a Location Approach to Water Recreation." Papers: Michigan Academy of Science, Arts and Letters, Vol. 47 (1961), Ann Arbor, 1962.

Weisbrod, Burton. "Collective--consumption Services of Individual-consumption Goods." Quarterly Journal of Economics (August, 1964), 471-477.

Wennergren, Boyd E. "Valuing Non-Market Priced Recreational Resources." Land Economics, XL, No. 3 (August, 1964), 303-314.

Wennergren, Boyd E. "Surrogate Pricing of Outdoor Recreation." Land Economics, XLIII, No. 1 (February, 1967).

White, William M. "Evaluation of Recreation in Water Developments." Journal of the Power Division, Proceedings of the American Society of Civil Engineers (May, 1965), 9pp.

Winston, Gordon C. "An International Comparison of Income and Hours of Work." Review of Economics and Statistics, XLIII, No. 1 (February, 1966), 28-39.

Wittenburg, Bernhard Paul. "Wirtschaft und Zeit." Heidelberger Studien, Vol. II, Heft 6 (1932), Heidelberg: Verlag der Weiss'schen Universitätsbuchhandlung.

Government Documents

A National Program of Scenic Roads and Parkways, Recreation Advisory Council Circular No. 4. Washington, D.C.: U.S. Government Printing Office, April, 1964.

A Uniform Method For Measuring And Reporting Recreation Use On The Public Lands And Waters Of The United States, prepared by: Recreation Advisory Council Study Committee Number Two. Washington, D.C.: April, 1965, 56pp. (Mimeographed.)

Cordell, Harold K.; James, George A.; and Griffith, Russel F. Estimating Recreation Use at Visitor Information Centers, USDA Forest Service Research Paper SE-69, November, 1970, Southeastern Forest Experiment Station-Asheville-North Carolina, U.S. Department of Agriculture, Forest Service, 8pp.

Crafts, Edward C. "The Dilemma of America." Remarks before the Nevada Governor's Conference on Natural Beauty and Outdoor Recreation, Las Vegas, Nevada, Sept. 21, 1966; released by Bureau of Outdoor Recreation, U.S. Department of the Interior, Sept. 21, 1966, 11pp. (Mimeographed.)

"Current Research on Sleep and Dreams." U.S. Department of Health, Education, and Welfare, Public Health Service. Washington, D.C.: U.S. Government Printing Office, 1965.

Dill, William A. A Partial Bibliography on the Economic Evaluation of Sport Fishing and Fisheries Resources. FAO Fisheries Circular No. 8 (Revision 1), prepared for the European Inland Fisheries Advisory Commission (EIFAC), Rome, March, 1964, 18pp.

Economic Studies of Outdoor Recreation. ORRRC (Outdoor Recreation Resources Review Commission) Study Report 24. Washington, D.C.: U.S. Government Printing Office, 1962.

Evaluation Standards For Primary Outdoor Recreation Benefits. Suplement No. 1. Washington, D.C.: Ad Hoc Water Resources Council, June 4, 1964, 9pp.

"Expanding America's Outdoor Recreation Estate--The Land and Water Conservation Fund's First Year and a Half." U.S. Department of the Interior, Bureau of Outdoor Recreation, cumulative to June 30, 1966. (Mimeographed.)

Federal Executive Branch Policy Governing the Selection, Establishment, and Administration of National Recreation Areas. Recreation Advisory Council Circular No. 1. Washington, D.C.: U.S. Government Printing Office, 1963.

Federal Executive Policy Governing the Reporting of Recreation Use of Federal Recreation Areas. Recreation Advisory Council Circular No. 6. Washington, D.C.: U.S. Government Printing Office, 1965.

James, George A. Pilot Test of Sampling Procedures for Estimating Recreation Use on Winter-Sports Sites. USDA Forest Service Research Paper SE-42, September 1968, Forest Service, U.S. Department of Agriculture, Southeastern Forest Experiment Station, Asheville, North Carolina, 8pp.

James, George A. and Tyre, Gary L. Use Of Water-Meter Records To Estimate Recreation Visits and Use On Developed Sites. U.S. Forest Service Research Note SE-73, April 1967, U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, Asheville, North Carolina, 3pp.

James, George A. Instructions For Using Traffic Counters To Estimate Recreation Visits And Use On Developed Sites. U.S. Department of Agriculture, Forest Service, April, 1966, Southeastern Experiment Station, Asheville, North Carolina, 12pp.

James, George A. and Harper, Robert A. Recreation Use of the Ocala National Forest in Florida. U.S. Forest Service Research Paper SE-18, June 1965, 28pp.

James, George A. and Ripley, Thomas H. Instructions for Using Traffic Counters to Estimate Recreation Visits and Use. U.S. Forest Service Research Paper SE-3, March 1963, Forest Service, U.S. Department of Agriculture, Southeastern Forest Experiment Station, Asheville, North Carolina, 12pp.

Kipp, Paul R. Annotated Bibliography on the Economic Evaluation of Outdoor Recreation and Related Subjects, 1959 (available at the Central Library, Department of the Interior, Washington, D.C.), 29pp. (Mimeographed.)

Marcus, Leslie F.; Gould, Ernest M., Jr.; and Bury, Richard L. Measuring the Recreation Use of National Forests. U.S. Forest Service, Pacific Southwest Forest & Range Experiment Station, 1961, Tech. Paper 59, 26pp.

Multiple Use Of Land And Water Areas. ORRRC Study Report 17. Washington, D.C.: U.S. Government Printing Office, 1962.

National Recreation Survey. ORRRC Study Report 19. Washington, D.C.: U.S. Government Printing Office, 1962.

Outdoor Recreation For America. A Report to the President and to the Congress by the ORRRC. Washington, D.C.: U.S. Government Printing Office, 1962.

Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults. ORRRC Study Report 20. Washington, D.C.: U.S. Government Printing Office, 1962.

Policies, Standards, and Procedures in the Formulation, Evaluation and Review of Plans for Use and Development of Water and Related Land Resources. 87th Congress, 2nd Session, Senate Document 97. Washington, D.C.: U.S. Government Printing Office, 1962.

Prewitt, Roy A. The Economics of Public Recreation--An Economic Study of the Monetary Evaluation of Recreation in the National Parks. U.S. Department of the Interior, National Park Service, Washington, D.C., 1949. (Mimeographed.)

Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation. ORRRC Study Report 23. Washington, D.C.: U.S. Government Printing Office, 1962.

Proposed Practices for Economic Analysis of River Basin Projects. Report to the Inter-Agency Committee on Water Resources ("Green Book"), prepared by the Subcommittee on Evaluation Standards. Washington, D.C.: U.S. Government Printing Office, May 1958, 56pp.

Recreation Information Management (RIM) Handbook (Forest Service Handbook), Amendment No. 16, April 1970, Amendment No. 22-*, October 1970. Washington, D.C.: U.S. Department of Agriculture, Forest Service.

Scott, Anthony. "The Valuation of Game Resources: Some Theoretical Aspects." Canadian Fisheries Reports, No. 4 (Ottawa: Department of Fisheries of Canada, May 1965), pp. 27-47.

Spargo, R. A. "Methods and Techniques of Evaluation of Sport Fishing." Canadian Fisheries Reports, No. 4. Ottawa: Department of Fisheries of Canada, May 1965, pp. 53-69.

Standards For Planning Water And Related Land Resources. Report to the Water Resources Council by the Special Task Force. Washington, D.C.: U.S. Water Resources Council, July 1970.

The Future Of Outdoor Recreation In Metropolitan Regions Of The United States. ORRRC Study Report 21, Vol. II. Washington, D.C.: U.S. Government Printing Office, 1962.

The Quality of Outdoor Recreation: As Evidenced by User Satisfaction. ORRRC Study Report 5. Washington, D.C.: U.S. Government Printing Office, 1962.

U.S., Congress, Federal Water Project Recreation Act. Public Law 89-72, 89th Congress, S. 1229, July 9, 1965.

U.S., Congress, House, Committee on Public Works, Briefing on H.R. 5269, The Federal Water Project Recreation Act. 89th Congress, 1st Session, 1965. Washington, D.C.: U.S. Government Printing Office.

U.S., Congress, House, Subcommittee on Rivers and Harbors and the Subcommittee on Flood Control of the Committee on Public Works, Hearings, Entrance, Admission, and User Fees at Corps of Engineers Projects. 89th Congress, 2nd Session, 1966, H.R. 13313 and related bills. Washington, D.C.: U.S. Government Printing Office.

U.S., Congress, Senate, Committee on Interior and Insular Affairs, Hearing, Land and Water Conservation Fund. 88th Congress, 2nd Session, 1964, H.R. 3846. Washington, D.C.: U.S. Government Printing Office.

U.S., Congress, Senate, Report No. 1364, Calendar No. 1300. Land and Water Conservation Fund Act. 88th Congress, 2nd Session, 1964.

Wagar, Alan J. Estimation of Visitor Use From Self-Registration At Developed Recreation Sites. USDA Forest Service Research Paper INT-70, 1969, Intermountain Forest and Range Experiment Station, Ogden, Utah, U.S. Department of Agriculture, Forest Service, 27pp.

Water for Recreation--Values and Opportunities. ORRRC Study Report 10. Washington, D.C.: U.S. Government Printing Office, 1962.

White, William M. "The Economics of Sport Fisheries Management." Canadian Fisheries Report, No. 4. Ottawa: Department of Fisheries of Canada, May 1965, pp. 73-78.

Wilderness and Recreation--A Report on Resources, Values, and Problems. ORRRC Study Report 3. Washington, D.C.: U.S. Government Printing Office, 1962.

Other Documents

Brown, William G.; Singh, Ajmer; and Castle, Emery N. An Economic Evaluation of the Oregon Salmon and Steelhead Sport Fishery. Technical Bulletin 78. Corvallis: Agricultural Experiment Station, Oregon State University, 1964, 47pp.

Carolsfeld, Ludwig Schnorr von. "Arbeitszeit und kollektiver Arbeitsvertrag." Arbeitszeit und Freizeit; Nürnberger Abhandlungen zu den Wirtschafts- und Sozialwissenschaften, Heft 15, Februar 1961. Berlin: Duncker und Humboldt, pp. 149-160.

Clawson, Marion. _Methods of Measuring the Demand for and Value of Outdoor Recreation_. Reprint No. 10. Washington, D.C.: Resources For The Future, Inc., February, 1959. 36pp.

Davis, Robert K. "The Value of Outdoor Recreation: An Economic Study of the Maine Woods." Unpublished Ph.D. dissertation, Harvard University, 1963, Summary.

Knetsch, Jack L. _Economics of Including Recreation as a Purpose of Water Resources Projects_. Reprint No. 50. Washington, D.C.: Resources For The Future, Inc., January, 1965, pp. 1148-1157.

Letter from Ross D. Netherton, Chief, Division of Research and Education, Bureau of Outdoor Recreation, U.S. Department of the Interior, December 2, 1970.

Seifert, Arndt. "A Theory of Projects: Its Application to Death and Suicide." Unpublished paper, May 1966.

Türnau, Georg. "Die volkswirtschaftliche und finanzwirtschaftliche Bedeutung der Schwarzarbeit" (Dissertation, Wirtschafts- und Sozialwissenschaftliche Fakultät der Universität zu Köln; Joseph Hansen, Telgte, 1958.

APPENDICES

APPENDIX A

APPENDIX A

The Theory of the Production of Time

In the familiar labor-leisure choice model,[1] personal time is commonly treated as a given, fixed endowment, which has only to be allocated to the alternatives of work (sold time) and leisure (own time). However, human time--our next hour, day, week, etc.--usually does not fall from heaven or is handed to us as a gift, human time has to be "produced" before it can be so allocated, i.e., it is costly itself.

In order to live, in order to be able to work,[2] to exchange sold time (ST) for income, we have to consume at least a certain minimum of life-preserving commodities and leisure: the "existence minimum." Failure to do so--through voluntary self-starvation (suicide) or through an involuntary death of starvation, malnutrition, freezing,

---

[1]Cf. Lionel Robbins, op. cit.; Gary S. Becker, op. cit.

[2]Carl S. Shoup, "Production from Consumption," Public Finance, Vol. XX, No. 1-2, 1965, pp. 173-202, discusses the "changing relationship" between increments of consumption and increments of production. We assume here a minimum amount of consumption which would maintain the total product at its maximum. Cf. also: J. D. Owen. The Price of Leisure, op. cit.

thirst--will ultimately (after a certain time lag)[3] throw us out of the enterprise of time production or time prolongation (living) through premature death.

Once we have been "thrown" into this world, our life becomes an "enterprise" for whose pure existence the production of additional time is the <u>necessary</u> but not the sufficient condition.[4]

As long as we are in the "infant industry" stage of our life cycle, at least, we produce our time through the aid and subsidy of external agents (parents, orphanages, relatives, etc.), who more or less "force" and train us into the habit and skill of time production through the consumption of certain bundles of goods. Having reached the stage ("take-off") from whereon we are self-sustaining, self-supporting, self-preserving and self-conscious "enterprises," we will after a little reflection discover, that we have embarked upon a course--are members of an industry (of living)--not of our own choosing. However, once we have become self-conscious and mature individuals, we are

---

[3]Even the hunger artist who earns his living by minimizing the amount of food consumption or maximizes the time lag between food intake and exhaustion, can be an artist only for a certain period.

[4]The "<u>profitability</u>" of this enterprise will, above all, depend upon the <u>kind</u> of projects, activities, in which we are engaged: the <u>how</u>, the <u>style</u>, the <u>uniqueness</u>, etc. with which we handle them. We produce time not for its own sake, but <u>for something</u>, in order to. . . .

now also "ex post" free either to leave the industry (through suicide), or to affirm our "entry" (better "entered" entry), consciously or subconsciously. If we affirm to continue the enterprise, we are, in other words, perpetually choosing to produce time,[5] literally, to consume our time into existence. The cost of time thus produced can best be illustrated through the aid of the following "growth model" (Figure 19).

In quadrant I of our diagram, time in homogeneous units (here days)[6] is plotted along the horizontal axis, so that the distances T_0T_1, T_1T_2, a.s.o., each represents one successive day (24 hours) respectively. The line marked MPST represents the Marginal Propensity To Sell Time, which is shown to be equal to a constant fraction, $0 \leq m \leq 1$, of T_0T_1, T_1T_2, etc., i.e., $m = MPST = \frac{\Delta ST}{\Delta TT} \leq 1$, where ΔST is the change in sold time as a result of a change in Total Time (ΔTT = 1 day).[7] The distances T_0S_1, S_1S_2, S_2S_3, . . . , along the vertical axis indicate these Sold Time changes.

---

[5]Which is a choice with at least a certain probability distribution of expected outcomes. Whether the alternative choice, i.e., death through suicide--a choice with a completely uncertain "after"--can really be called a choice, can be questioned.

[6]We abstract here from "psychological" time units, which may be greater, equal, or smaller than our homogeneous clock-time units.

[7]$\Delta TT = \Delta ST + \Delta OT$

$$\frac{\Delta TT}{\Delta TT} = \frac{\Delta ST}{\Delta TT} + \frac{\Delta OT}{\Delta TT} = 1$$

$$\frac{\Delta ST}{\Delta TT} = 1 - \frac{\Delta OT}{\Delta TT}\text{, i.e.,}$$

MPST = 1 - MPOT, where $MPOT = \frac{\Delta OT}{\Delta TT}$, is the Marginal Propensity To Own Time.

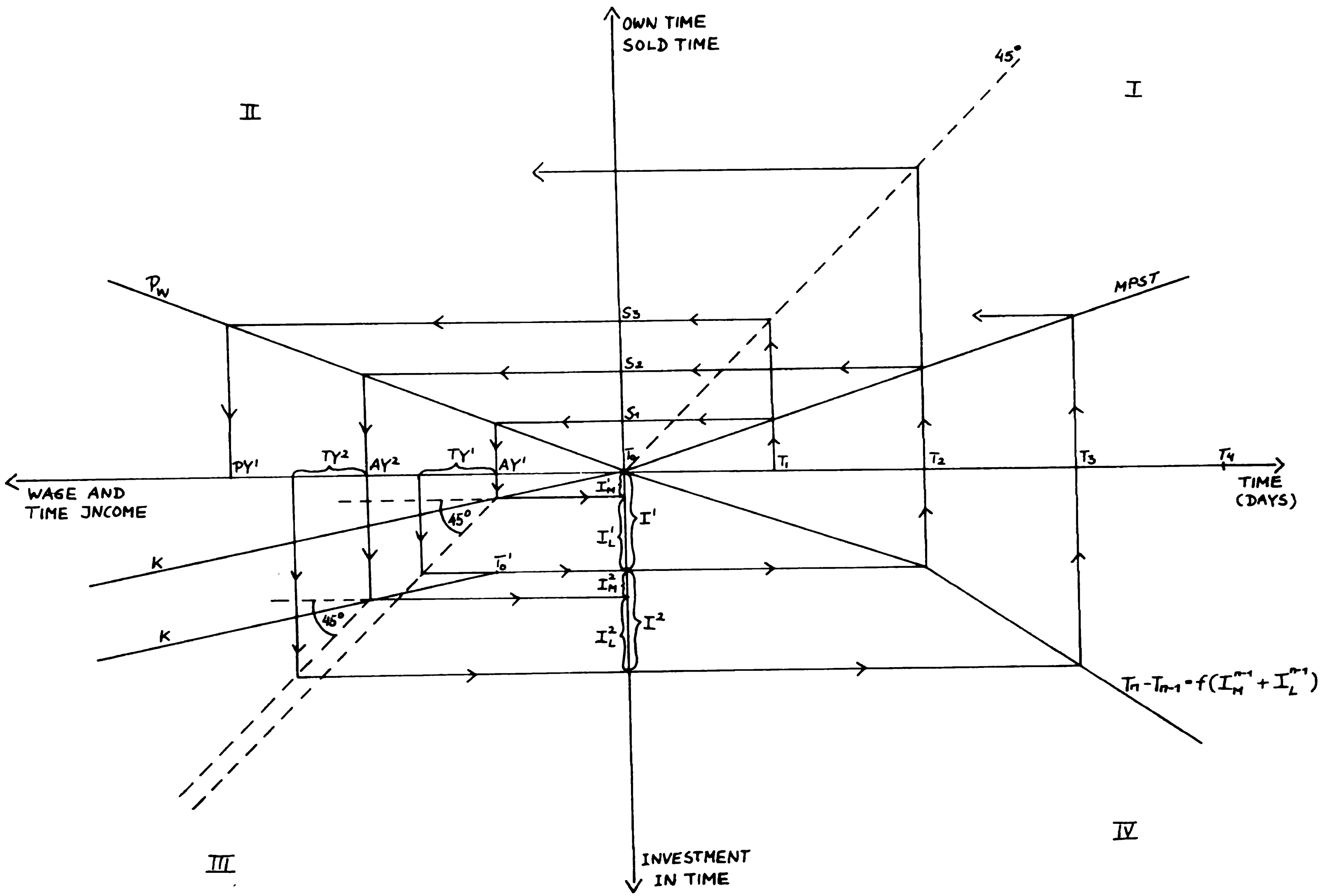

Figure 19.--The time production growth model.

On the first day of his self-supporting working-life, we can assume our individual to be presented with a gift of T_0T_1 hours (one day), of which he sells T_0S_1 hours as work and reserves S_1S_3 hours as own time (OT), for:

(1) ST + OT = TT.

At an hourly wage rate of P_W,[8] shown in quadrant II, he could transform the total gift of T_0S_3 (= T_0T_1) hours into a potential wage income of PY' dollars:

(2) (ST + OT) x P_W = PY.

However, as he chooses not to commit suicide through overwork--more mildly, as he normally prefers not to overexhaust himself--the individual actually only converts, e.g., T_0S_1 hours into an Actual Wage Income amounting to AY' dollars:

(3) ST xP_W = AY,

(4) OT x P_W = TY = PY - AY, (where TY is Time Income, i.e., the opportunity-cost of Own Time)

reserving S_1S_3 hours as own time.

As he chooses to live and work the next day, a fraction (k) $\leq$ 1, of his Actual Income of AY' dollars must be spent on food, shelter, clothing, etc., i.e., (k) stands here for the direct money expenditure part of his "existence minimum," to which must be added a minimum of TY' dollars (TY' = t x TY, for 0 $\leq$ t $\leq$ 1), the opportunity-cost for own

---

[8]We could easily modify the analysis to account for higher overtime wage rates to be earned after a certain amount of ST. The basic idea intended to be illustrated, however, would not be changed at all.

time (sleep, rest, consumption-time, etc.). Quadrant III illustrates this aspect of the model. Thus I'_M gives us the fraction of his Actual Income AY', i.e.,

(5) $AY' \times k = I'_M$,

and $TY' = t \times TY = I'_L$,[9] the minimum amount of Time Income (TY), which must be invested by the individual, so that he is able to produce another day. The total investment in additional time (the next day) therefore consists of:

(6) $I'_M + I'_L = I'$, dollars.

Should I' be smaller than I^{Ex}_{Min}, where the latter is the existence minimum, then ΔTT will after a certain time lag--which is maximal for a hunger artist--reduce to zero: death occurs.

In quadrant IV we show the production function, which summarizes the physiological result of the working-mechanism of the living human body, i.e., an input of a minimal I', placed in, on and around the human body, is transformed by this body into the output of another work day (T_1T_2):

(7) $T_2 - T_1 = f\ (I'_M + I'_L)$, or in general:

(8) $T_n - T_{n-1} = f\ (I^{n-1}_M + I^{n-1}_L)$, where n=number of lifetime days.

We see that from now on the cycle is repetitive.

---

[9] The fact that (k) and TY may vary according to age, profession, season, etc., does not interest us here and does not change the substance of the analysis. It suffices, if (k) and TY represent averages.

As result we have found I^{n-1} to be the cost of a time unit $(T_n - T_{n-1})$. In other words, we need both time (consumption time, leisure) and money income to produce or to extend (maintain) our individual life-time. Human time as such is therefore not a free endowment.[10] Subtracting time-production-costs from the value of the particular time period, we have:

(9) $(AY + TY) - (I_M + I_L) = \pi$, the <u>net time profit</u> per day, or

(9') $PY - (I_M + I_L) = \pi$

On the empirical side, the old difficulty of how to define and measure[11] adequately the existence minimum, of separating the time investment portion of consumption from the pure consumptive (utility) portion, may loom large, but can be partially handled by employing estimates of poor relief, general assistance payments, etc. Finally, the consequences for income taxation can here only be hinted at.

To conclude, we have demonstrated that economic consumer theory must deal with three, not only two different, consequtive and interdependent choice situations:

1. The <u>either-or</u>, existential choice of living or not living, of time production or of taking the

---

[10]Even if I were subsidized by somebody else, then it is this other agent who will have to pay for my time. The same result holds true also in non-market societies. Here I_M is replaced by the own produce of clan, tribe members, for instance.

[11]G. J. Stigler, "The Cost of Subsistence," <u>Journal of Farm Economics</u>, Vol. XXVII, 1945.

industry exit, i.e., the <u>economics of suicide</u> and the economics of living.

2. The traditional labor-leisure, -better, Sold Time- Own Time- Income choice.
3. The consumer choice proper, i.e., the optimal allocation of a given income and time (OT) (from 2. above) among alternative goods.

APPENDIX B

APPENDIX B

Travel Time And The Price Of Leisure: A Critique

In the spring 1966 issue of the Western Economic Journal,[1] M. Bruce Johnson has questioned the validity of specification of the neoclassical consumer-choice model between income (Y) and leisure (L), which treats either leisure or work (W) as residuals, i.e.,:

(1) $U = U\ (Y, L)$, or $U = U\ (Y, W)$.

He concludes, . . .

> that a worker demands a wage rate as a compensation for sacrificing desirable leisure and for performing a disagreeable task. Thus work and leisure should both be included in the utility function so that a distinction between the marginal utility of leisure and the marginal disutility of work is made at the level of individual preferences (p. 140).

In other words, Johnson specifies the utility function as follows:

(2) $U = U\ (Y, L, W)$.

The main difference between the traditional utility function (1) and function (2) is made more apparent after differentiation of both functions with respect to work (W) subject to the time budget constraint:

---

[1] M. Bruce Johnson, Western Economic Journal, op. cit.

(3) $T_0 = W + L$, (T_0 = a fixed time period),

and the money budget constraint:

(4) $Y = P_W \times W$, (P_W = the money wage rate).

Utility function (1) thus yields:

(5) $\frac{MU_L}{MU_Y} = P_W$ (MU = Marginal Utility)

and utility function (2):

(6) $\frac{MU_L}{MU_Y} = P_W + \frac{MU_W}{MU_Y}$.

The crucial difference lies in the additional term $\frac{MU_W}{MU_Y}$, the marginal rate of substitution between income and work. If work involves disutility at the margin, $\frac{MU_W}{MU_Y}$ will be negative--an assumption made by Johnson--and the money wage rate turns out to be an overestimate of the value of leisure (own time). Overinvestment in roads <u>may</u> be one of the consequences.

It is the purpose of this Appendix to demonstrate not only that utility function (1) is still the correct one and is analytically more complete than function (2), but that even when we accept the three variable utility function, some of the results which Johnson derives from it do not necessarily follow.

1. The Specification Error

The major criticism must be concerned with utility function (2) which is clearly overspecified, in so far as (W) and (L) are strongly related variables: the utility of leisure is a positive function of the disutility of work and vice versa, i.e., leisure will be more desirable, the more disagreeable the work and the more desirable the leisure, the more disagreeable will be the work. This can be shown as follows:

(i) The concept of leisure would be meaningless today, were it not for the implied existence of work or some other alternative of choice. To clarify the latter, let us imagine a state of terrestrial paradise in which all goods except time are free and where work is unknown. Under such conditions, the value of leisure time can not be derived from our work-leisure model, but from the opportunity cost of alternative foregone pursuits. In fact, the latter statement implies the more general formulation of the theory of value, for:

> Every valuation _is_ a comparison; we have no conception of an absolute utility or an absolute standard of utility. The notion of value is meaningless except in relation to alternatives of choice. Not only is utility measured by another utility--all things are measured by things of their own kind as standards--but its existence is conditioned by that of the alternative; . . .[2]

---

[2]F. H. Knight, _Risk, Uncertainty and Profit_, _op. cit._, Chapter 3, p. 63.

Returning to our non-paradisiac situation, we see that even a person who decides not to work at all, will value his leisure in comparison to the possibility of work, whose (i.e., work's) existence as an idea is therefore a sufficient condition for the valuation process. If we agree that work as possibility and/or fact exists in our world and that around the margin, at least, work involves disutility, it is impossible to separate the interdependent work--and leisure variables, for: The value of the one is a function of the value of the other. The reason why one more unit of leisure time is chosen instead of work time (at a constant money wage), is simply because the value of the additional unit of leisure outweighs the value of the unit of work foregone (i.e., income), and the reason why the marginal value of leisure thus exceeds the marginal value of work, results from the expected disutility of additional work. The value of leisure therefore already includes the disutility of work and is reflected in the slope of the indifference curve between leisure and income. To account, like Johnson does for the disutility of work separately amounts to double counting. The confusion probably rests in a difference between consciousness and conduct explained by F. H. Knight:

> while to the eye of critical scrutiny there is no 'logical' distinction between an increasing disutility experienced and an increasing utility foregone, a 'psychological' difference must be

> admitted; there is no difference for conduct, but there is one for consciousness, to our pecuniarly sophisticated consciousness at least.[3]

We cannot logically distinguish between increasing disutility of work and increasing utility of leisure on the level of choice and conduct--the level which is relevant for economics--and we must leave the remainder to psychology.

The standard specification of the utility function as equation (1) thus is the correct one in avoiding double counting of mirror images, by setting either the marginal disutility of work or the marginal utility of leisure equal to zero.

2. Fixed-versus Variable Disutility of Work

Setting the marginal disutility of work equal to zero, however, does not necessarily exclude the disutility of work factor in another form from equation (1). Equation (5) would not be changed at all, if we were to introduce the disutility factor in equation (1) as a constant. In other words, we can imagine in analogy to the fixed cost-variable cost distinction of production theory, that the disutility of work dichotomizes into a fixed,-constant-and variable element. There exists a disutility of work which is independent of the amount of working time, i.e., whether I work one hour or eight hours per day, the disutility of reporting to work, of facing my superior, of being confronted

[3] *Ibid.*, p. 67.

with a rigid distribution of leisure, the dirtiness of the occupation, etc., remains the same. This fixed disutility (or utility) of work, however, exerts greater influence on the attractiveness and thus on the choice of occupation, than it does on the labor-leisure choice once the occupation has been chosen.[4]

Johnson uses the concept of disutility of work in the variable sense (compare his Figure 1, p. 139), i.e., for him the marginal disutility of work increases at an increasing rate with increasing number of work hours. This may be due to the associated increased energy loss, increasing fatigue, beautiful weather, a.s.o. But the latter are not so much disutilities in themselves, but mainly result from a lack of leisure. The disutility of a specific kind of work which is not apparent during the early phase (even Johnson admits the possibility that work may be "desirable in 'small' amounts" [p. 137, n.7] before the equilibrium position is reached) of the work period (before equilibrium), but which increases with the increasing length of work, can only be due to an insufficiency of leisure, better, is due to a certain distribution of leisure (work). For if work periods were shortened to the point where the <u>variable</u> disutilities make their

---

[4]The relative attractiveness of an occupation in turn finds its reflection on the supply side in the "equalizing differences" of remuneration which may or may not be offset by demand forces.

appearance, i.e., if the distribution of work (leisure) were changed, we could eliminate the whole argument about the variable disutility of work. Dissatisfactions which originated with an unfavorable amount and distribution of leisure (work), appear disguised under the disutility concept. We are thus thrown back at leisure (its distribution) and have discovered a second explanation for the functional relationship between the utilities of leisure and work and for the equality between the marginal utility of leisure and the marginal disutility of work.

3. The Distribution of Leisure, Overtime and the Value of Leisure

The above argument has led us to the conclusion that the variable disutility of work component is a function of the distribution of leisure (work), i.e., the frequency, size and sequence of leisure intervals per period.[5]

Now both functions (1) and (2) hold true only under a certain distribution of leisure, a fact that is, as we said, usually not noticed at all or is at most implicitly assumed. This was illustrated in Figure 8.

Our analysis of overtime work showed that at least a portion of the overtime wage rate P_W^{OVT} , or FH in premium form, in our diagram 8, is paid to compensate the individual

---

[5]This does not necessarily imply that the fixed disutility component and the distribution of leisure may not also be correlated, in all probability they will be, as the amount and distribution of leisure (own time) are important factors in determining the attractiveness and therefore the choice of a particular occupation.

for an inferior distribution of leisure, which is another way of saying that FH dollars are paid as a compensation for the increased disutility of work.

At most, GH might be looked upon as a premium paid to compensate for the increased disutility of work or the inferior distribution of leisure, otherwise no overtime would be worked.[6] In all cases, the value of KK_1, whether it is leisure,[7] overtime or general own time, can never fall below GN or P_W, usually will lie above.

4. Overemphasis of the Disutility of Work

The disutility of work in comparison to its utility seems to have been generally overstated and overemphasised[8] as a result of a universal human tendency to magnify hardships, the "bads" of life and to disregard too easily the positive and good parts.

Although the disutility of work differs as to when we look at it, i.e., whether before, during, or after work,

---

[6] If at all, then a marginal disutility of work discount must be made from the overtime wage rate and not, as proposed by Johnson, from the normal money wage rate P_W.

[7] If our individual chooses leisure instead of overtime (KK_1), then the expected increased disutility of work (inferior distribution of leisure) has increased his valuation of leisure at least by the amount of the premium(s).

[8] There exists some demoscopic evidence for the USA and Germany, that a secular improvement in the utility of work has occurred as a result of better working-conditions, etc. See: George Katona, et al., op. cit., pp. 152ff., espec. Tables 9-1, 9-2.

we usually concentrate our attention on the "before" and "during" perspective and thus follow the above tendency. The fact that we are commonly satisfied "after" work is done, is generally neglected. Taking account of both satisfactions and dissatisfactions of work, we will be left with either a net or zero utility/disutility of work.

Another factor which should minimize the disutility of work for a person when we assume free entry into the occupation, is that . . . "everybody will perform the work he likes most (or dislikes least) and is best fitted for."[9] Some of the disutilities of work may have been already compensated through additional amounts of leisure (own time), e.g., in the case of teacher vacations. Furthermore, the collective bargaining power of individuals as a group will tend to . . . "adjust working conditions and hours to the preferences of the worker.[10]

Turning Johnson's argument around to take account also of those individuals who suffer no disutility of work but who enjoy positive utility of work instead, the term $\frac{MU_W}{MU_Y}$ in equation (6) will be positive and P_W will truly be an underestimate of the value of leisure (OT).

[9] T. Scitovsky, op. cit., Chapter 5, p. 97.

[10] M. Friedman, op. cit., Chapter 11, p. 205.

With reference to the measurement of primary OR-benefits, the money value of the total time price "paid" at an OR site per year, would now depend upon (assuming Johnson's specification of utility function to be true for some outdoor recreationists):

a. the relative number of recreationists enjoying utility of work and those suffering disutility of work,

b. the relative subjective intensities (degrees) of these utilities- or disutilities of work, measured indirectly in terms of possible money compensations,

c. the relative number of visitor-hours spent by the "utility- and disutility recreationists," respectively,

d. the relative wage rates of disutility-and utility recreationists.

(The same analysis applies to other public investments, like that of road investment. In the latter instance, we would only have to substitute "travelling people" for outdoor recreationists.)

5. The Direct Price of Leisure

As we have seen, the total price of OT (leisure) is made up not only of an indirect (wage-opportunity-cost) estimate, but OT has also, in most cases, a direct price (cf. Chapter IV, 6), which is, e.g., the price paid for time-saving (leisure creating) goods.

Going back to Figure 18 and equation (11), we must infer that--even if we would for a moment assume Johnson's utility function (2) with its negative marginal disutility term--it would ultimately depend upon the relative size of P_{ws} and $-\frac{MU_W}{MU_Y}$ to decide whether P_W is an overestimate of the value of leisure or not.

APPENDIX C

APPENDIX C

Visitor-Day Statistics

Outdoor recreation visitor-hours represent the raw material for our measurement of primary OR-benefits. According to the Recreation Advisory Council Circular No. 6,[1] beginning with calendar year 1965, all Federal agencies shall report public recreation use in terms of visitor-days.[2] A visitor-day is defined as:

> Twelve visitor-hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

A visitor-hour is defined as:

> The presence of one or more persons on lands or waters, generally recognized as providing outdoor recreation, for continuous, intermittent, or simultaneous periods of time aggregating 60 minutes.

The implementation of the policies contained in Recreation Advisory Council Circular No. 6 so far . . . "has been very uneven. The U.S. Forest Service has had extensive visitor-day figures by recreation area available for the past few years, and the Bureau of Land Management has been increasing its data-gathering effort. Figures for the other

---

[1] Recreation Advisory Council Circular No. 6, *op. cit.*

[2] Cf., "A Uniform Method For Measuring And Reporting Recreation Use On The Public Lands And Waters Of The United States," *op. cit.*

agencies--where available at all--have been derived from 'number-of-visits' estimates by the application of judgmental conversion factors. Moreover, these estimates are seldom broken down by recreation area."[3]

Since the Forest Service has played a leading role not only in the conceptualization of the new visitor-day statistics, but also in the implementation of Circular No. 6, we have, for demonstrative purposes, included some of these statistics in this Appendix. Also included is a sample source document for field reporting of recreation use.

The reader who is interested in the visitor-day measurement techniques and methods, is referred to the following selected documents:

1. Harold K. Cordell, George A. James, and Russell F. Griffith, Estimating Recreation Use at Visitor Information Centers, USDA Forest Service Research Paper SE-69, November 1970, Southeastern Forest Experiment Station-Asheville-North Carolina, U.S. Department of Agriculture, Forest Service, 8pp.

2. J. Alan Wagar, Estimation Of Visitor Use From Self-Registration At Developed Recreation Sites, USDA Forest Service Research Paper INT-70, 1969, Intermountain Forest And Range Experiment Station, Ogden, Utah, U.S. Department of Agriculture, Forest Service, 27pp.

3. George A. James, Pilot Test of Sampling Procedures for Estimating Recreation Use on Winter-Sports Sites, USDA Forest Service Research Paper SE-42, September 1968, Forest Service, U.S. Department of Agriculture, Southeastern Forest Experiment Station, Asheville, North Carolina, 8pp.

---

[3]Letter from Ross D. Netherton, Chief, Division of Research and Education, Bureau of Outdoor Recreation, U.S. Department of the Interior, December 2, 1970.

4. George A. James and Gary L. Tyre, Use Of Water-Meter Records To Estimate Recreation Visits And Use On Developed Sites, U.S. Forest Service Research Note SE-73, April 1967, U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, Asheville, North Carolina, 3pp.

5. George A. James, Instructions For Using Traffic Counters To Estimate Recreation Visits And Use On Developed Sites, April 1966, U.S. Department of Agriculture, Forest Service, Southeastern Experiment Station, Asheville, North Carolina, 12pp.

6. George A. James and Robert A. Harper, Recreation Use of the Ocala National Forest in Florida, U.S. Forest Service Research Paper SE-18, June 1965, 28pp.

7. George A. James and Thomas H. Ripley, Instructions for Using Traffic Counters to Estimate Recreation Visits and Use, U.S. Forest Service Research Paper SE-3, March 1963, Forest Service, U.S. Department of Agriculture, Southeastern Forest Experiment Station, Asheville, North Carolina, 12pp.

8. Leslie F. Marcus, Ernest M. Gould, Jr., and Richard L. Bury, Measuring the Recreation Use of National Forests, 1961, U.S. Forest Service, Pacific Southwest Forest & Range Experiment Station, Tech. Paper 59, 26pp.

Estimated National Forest Recreation Use Service-Wide Summary, C.Y. 1969, by Activities.

ACTIVITY			PUBLIC USE	
			VISITOR-DAYS 1/	PERCENT
CAMPING			41,629,700	25.5
PICNICKING			6,837,700	4.2
RECREATION TRAVEL (MECHANIZED)			37,832,000	23.2
AUTOMOBILE	(34,296,200)	(21.0%)		
SCOOTER & MOTORCYCLE	(1,741,400)	(1.1%)		
ICE & SNOWCRAFT	(1,555,300)	(.9%)		
OTHER	(239,100)	(.1%)		
BOATING			4,267,300	2.6
POWER BOATS	(3,011,300)	(1.8%)		
SELF-PROPELLED BOATS	(1,256,000)	(.8%)		
GAMES & TEAM SPORTS			585,600	.4
WATERSKIING & OTHER WATER SPORTS			603,900	.4
SWIMMING & SCUBA DIVING			2,932,800	1.8
WINTER SPORTS			5,893,600	3.7
SKIING	(4,777,400)	(2.9%)		
OTHER	(1,12[illegible],200)	(.7%)		
FISHING			14,868,200	9.2
HUNTING			14,147,900	8.7
HIKING & MOUNTAIN CLIMBING			4,962,400	3.0
HORSEBACK RIDING			2,170,500	1.3
RESORT USE			4,033,200	2.5
ORGANIZATIONAL CAMP USE			4,324,000	2.7
RECREATION RESIDENCE USE			8,015,200	4.9
GATHERING FOREST PRODUCTS			1,440,900	.9
NATURE STUDY			878,000	.5
VIEWING SCENERY, SPORTS, ENVIRONMENT			5,542,700	3.4
VISITOR INFORMATION (EXHIBITS, TALKS, ETC.)			1,867,600	1.1
SERVICE TOTAL (DISTRIBUTED TO ACTIVITIES ABOVE)			162,836,100	100%

[1] Recreational use of N.F. land and water which aggregates 12 person-hours. May entail one person for 12 hours, 12 persons for one hour, or any equivalent combination of individual or group used, either continuous or intermittent.

Estimated National Forest Recreation Use Service-Wide Summary, C.Y. 1969, by Kinds of Sites and Areas.

PLACE WHERE USE OCCURRED	PUBLIC USE	
	VISITOR-DAYS 1/	PERCENT
DEVELOPED SITES		
OBSERVATION	807,700	.5
PLAYGROUNDS, PARKS, SPORTS SITES	34,400	2/
BOATING SITES	1,330,200	.8
SWIMMING SITES	1,107,600	.7
CAMPGROUNDS	31,659,600	19.4
PICNIC GROUNDS	4,602,200	2.9
HOTELS, LODGES, RESORTS	4,011,200	2.5
F.S. OWNED - 353,500		
PVT. OWNED - 3,657,700		
ORGANIZATION SITES	5,770,500	3.5
F.S. OWNED - 513,900		
PVT. OWNED - 5,256,600		
CONCESSION SITES	413,600	.3
RECREATION RESIDENCE SITES	7,991,400	4.9
WINTER SPORTS SITES	5,661,800	3.5
VISITOR CENTERS	140,100	.1
SUBTOTAL, DEVELOPED SITES	63,740,300	39.1
DISPERSED AREAS		
ROADS (RECREATION)	38,738,400	23.8
TRAILS (RECREATION)	5,573,000	3.4
WATERS (ALL RECREATION STREAMS, RIVERS, LAKES, RESERVOIRS, ETC.)	20,277,800	12.5
GENERAL UNDEVELOPED AREAS	34,508,600	21.2
SUBTOTAL, DISPERSED AREAS	99,097,800	60.9
SERVICE-WIDE TOTAL	162,838,100	100%

[1] Recreation use of N.F. land and water which aggregates 12 person-hours. May entail one person for 12 hours or 12 persons for one hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Less than .05%.

Estimated National Forest Recreation Use of Classified Areas C.Y. 1969, by Activities.

ACTIVITY	ESTIMATED VISITOR-DAYS OF USE 1/		
	NATIONAL RECREATION AREAS	WILDERNESSES & PRIMITIVE AREAS	SPECIAL-INTEREST AREAS 2/
CAMPING	723,000	1,858,900	221,000
PICNICKING	24,500	21,700	35,500
RECREATIONAL TRAVEL (MECHANIZED)	754,000	30,400	201,700
BOATING	272,600	206,800	28,600
GAMES & TEAM SPORTS	800	---	---
WATERSKIING & OTHER WATER SPORTS	17,400	---	1,100
SWIMMING & SCUBA DIVING	66,300	43,700	22,300
WINTER SPORTS	---	2,400	13,000
FISHING	238,900	801,900	103,500
HUNTING	74,400	480,600	59,200
HIKING & MOUNTAIN CLIMBING	38,400	696,300	185,100
HORSEBACK RIDING	8,500	243,600	8,900
RESORT USE	109,700	100	59,800
ORGANIZATIONAL CAMP USE	34,100	---	300
RECREATION RESIDENCE USE	40,700	---	100
GATHERING FOREST PRODUCTS	3,100	21,500	---
NATURE STUDY	5,100	86,900	21,600
VIEWING SCENERY, SPORTS, ENVIRONMENT	133,800	419,800	295,800
VISITOR INFORMATION (EXHIBITS, TALKS, ETC.)	21,900	146,300	149,300
TOTAL, ALL COMPONENTS	2,567,200	5,071,600	1,406,800

[1] Recreation use of N.F. land and water which aggregates 12 person-hours. May entail one person for 12 hours, 12 persons for one hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Use of classified archeological, botanical, geological, historical, memorial, and scenic areas.

Estimated National Forest Recreation Use of Classified Areas C.Y. 1969, by Kinds of Sites and Areas.

KIND OF SITE AND AREA	ESTIMATED VISITOR-DAYS OF USE 1/		
	NATIONAL RECREATION AREAS	WILDERNESSES & PRIMITIVE AREAS	SPECIAL INTEREST AREAS 2/
OBSERVATION SITES	13,000	---	99,900
PLAYGROUND, PARK, SPORTS SITES	---	---	---
BOATING SITES	115,400	---	5,100
SWIMMING SITES	7,800	---	---
CAMPGROUNDS	686,100	59,500	227,200
PICNIC GROUNDS	13,300	---	31,800
HOTELS, LODGES, RESORTS	48,100	---	61,000
ORGANIZATIONAL SITES	29,900	---	2,400
OTHER CONCESSION SITES	16,000	100	---
RECREATION RESIDENCE SITES	40,700	---	100
WINTER SPORTS SITES	---	---	12,500
VISITOR CENTERS, REC.-ORIENTED	5,300	---	9,900
ROADS, RECREATION	856,800	---	198,700
TRAILS, RECREATION	50,200	920,100	155,100
WATERS, RECREATION	458,800	1,058,100	149,500
GENERAL UNDEVELOPED AREAS	225,800	3,034,100	453,600
TOTAL, ALL COMPONENTS	2,567,200	5,071,900	1,406,800

1 Recreation use of N.F. land and water which aggregates 12 person-hours. May entail one person for 12 hours, 12 persons for one hour, or any equivalent combination of individual or group use, either continuous or intermittent.

2 Use of classified archeological, botanical, geological, historical, memorial, and scenic areas.

U.S. Department of Agriculture, Forest Service, Recreation Use of the National Forests.

VISITS-C.Y. 1924-1964

Calendar Year	Campgrounds	Picnic Grounds	Winter Sports Sites	Hotels and Resorts	Recreation Residences	Other Forest Areas	Total
1924	1,588,489	1,871,534	--	1,018,541	181,825	--	4,660,389
1925	2,129,968	2,086,717	--	1,161,660	243,861	--	5,622,206
1926	2,056,742	2,403,411	--	1,318,965	265,149	--	6,044,267
1927	1,845,709	2,623,608	--	1,350,123	317,373	--	6,136,813
1928	1,845,693	2,937,511	--	1,381,595	385,518	--	6,550,317
1929	1,907,961	3,056,456	--	1,795,861	376,780	--	7,132,058
1930	1,980,736	3,272,682	--	1,330,610	326,896	--	6,910,924
1931	2,193,866	3,765,025	--	1,618,460	496,566	--	8,073,917
1932	2,178,231	4,048,796	--	1,138,634	530,182	--	7,895,843
*1933	2,219,804	4,355,936	--	1,037,096	552,685	--	8,165,521
*1934	2,343,132	4,610,171	--	1,014,008	613,495	--	8,580,806
*1935	2,395,658	5,326,037	--	1,268,998	727,637	--	9,718,330
*1936	2,421,275	5,811,720	--	1,712,134	835,965	--	10,781,094
*1937	2,836,040	5,973,930	--	2,165,329	857,359	--	11,832,658
*1938	3,181,817	7,627,914	--	2,758,224	927,319	--	14,495,274
1939	3,157,490	7,019,180	1,289,211	1,987,812	878,168	--	14,331,861
1940	3,583,091	7,931,485	1,538,432	2,257,548	852,411	--	16,162,967
1941	3,349,898	5,818,963	1,519,054	1,917,766	601,288	4,797,816	18,004,785
1942	1,771,340	3,300,632	993,920	1,136,271	379,599	2,825,358	10,407,120
1943	1,095,212	2,050,384	266,765	679,863	244,385	1,938,050	6,274,659
1944	1,246,768	2,051,077	287,426	715,369	370,173	2,481,140	7,151,953
1945	1,814,928	2,729,376	527,291	1,271,369	505,963	3,225,162	10,074,089
1946	3,055,114	4,458,748	1,249,200	2,286,107	713,380	6,478,128	18,240,677
1947	3,518,147	5,262,600	1,725,675	2,110,406	525,978	8,177,945	21,330,751
1948	3,424,088	6,682,158	2,284,943	1,928,756	572,499	9,118,520	24,010,964
1949	3,837,010	7,659,234	1,712,607	1,929,597	615,242	10,326,565	26,080,255
1950	3,858,845	7,577,575	1,504,575	1,902,140	627,481	11,897,181	27,367,797
1951	4,140,866	8,669,341	1,929,270	2,133,674	636,173	12,440,928	29,950,252
1952	4,527,979	9,515,926	1,758,083	2,500,196	670,632	14,034,079	33,006,885
1953	4,810,341	10,335,910	1,944,193	2,564,219	758,493	14,989,894	35,403,050
1954	5,806,130	11,467,849	2,362,420	2,990,264	864,568	16,812,806	40,304,037
1955	6,796,706	12,418,342	2,977,220	3,230,860	863,332	19,426,409	45,712,868
1956	7,204,986	14,667,226	3,040,513	4,128,912	851,474	22,662,973	52,556,084
1957	8,352,360	16,138,508	3,158,675	4,211,682	828,550	28,267,498	60,957,273
1958	9,324,700	17,845,200	4,127,000	4,117,300	850,400	32,184,900	68,449,500
1959	9,955,800	19,283,300	4,184,100	4,597,400	896,300	42,604,100	81,521,000
1960	10,878,000	19,600,800	4,706,800	4,575,500	1,114,200	51,519,200	92,594,500
1961	11,835,100	20,456,800	4,478,300	5,309,900	1,175,600	58,656,800	101,912,500
1962	12,940,900	21,283,600	5,575,800	6,161,600	1,183,800	65,616,500	112,762,200
1963	13,562,500	21,575,400	6,677,600	4,917,000	1,347,900	74,501,600	122,582,000
1964	14,152,100	21,476,900	7,911,800	5,719,700	1,395,600	81,062,400	133,762,300

VISITOR-DAYS 1/ C.Y. 1965-1969

1965	34,040,000	5,687,000	5,481,600	3,791,700	9,820,500	101,515,300	160,336,100
1966	32,664,100	4,703,300	4,842,600	4,057,900	7,966,600	96,494,400	150,728,900
1967	30,230,700	4,609,500	5,102,300	3,906,500	7,689,900	98,108,200	149,647,100
1968	30,665,100	4,623,400	5,564,000	3,978,400	8,143,800	103,690,600	156,665,300
1969	31,669,600	4,802,200	5,661,800	4,011,200	7,991,400	108,721,900	162,838,100

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail one person for 12 hours, 12 persons for one hour, or any equivalent combination of individual or group use, either continuous or intermittent.

RECREATION – USE INFORMATION

BLOCK 1

A. DOC NO (1-2): ØL
B. SERIAL NO (3-9): L3L24
C. REGION: Ø6
D. FOREST: L3 SNOQUALMIE
E. DISTRICT: Ø3 NACHES

F. SITE OR AREA NO.: LØØ
G. KIND: CAMPGROUND (FAMILY) 41 L
H. STATE: WN

J. COUNTY: LL3 STINSON
K. CARD NO (10): 1
N. L&WCF ACT CLASS: 1
P. (11)
Q. REPORTING PERIOD (12): 1
R. RELIABILITY
S. ERROR-TERM TOTAL)

Range Reports

BLOCK 2

Card No. 1

LINE		CODE	VISITOR-DAYS USE (Thousands)
1	CAMPING, AUTO	(14-16) 4 1 1	(17-20)
2	CAMPING, TENT	(21-23) 4 1 4	(24-27)
3	CAMPING, GENERAL	(28-30) 4 1 2	(31-34)
4	TEAM SPORTS (TRACK AND FIELDØ	(35-37) 2 1 1	(38-41)
5	BICYCLING	(42-44) 1 4 1	(45-48)
6		(49-51)	(52-55)
7		(56-58)	(59-62)
8		(63-65)	(56-69)

Card No. 2

LINE		CODE	VISITOR-DAYS USE (Thousands)
9	CARD NO (10) 2	(14-16)	(17-20)
10		(21-23)	(24-27)
11		(28-30)	(31-34)
12		(35-37)	(38-41)
13		(42-44)	(45-48)
14		(49-51)	(52-55)

PRELISTED ACTIVITIES IF REPORTED LAST year

Sample Source Document For Field Reporting of Rec. use

BLOCK 3

RECREATION VISITS (Thousands) (56-60)
NON-RECREATION VISITOR DAYS (Thousands) (61-64)
% USE BY MINORITY GROUPS (65-67)

REPORT PREPARED BY:
TITLE
DATE
RIM CENTER

U.S.D.A.-FOREST SERVICE
2300-1 (8/68)